

Reed and Hyde Families Papers.

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Version 3
August 20, 2018

N.D.

INTERNATIONAL HARVESTER

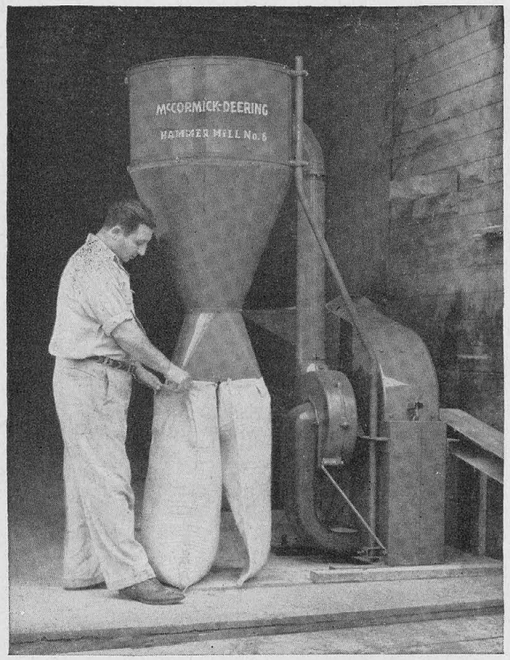
McCORMICK

Hammer Mills and Feed Grinders



SAVE ALL THE FEED





The No. 6 hammer mill will grind ear corn, small grain and dry roughage with low power requirements.

ALL GRAIN should be ground for dairy cows in order to obtain its maximum feeding value. Otherwise, as much as 57 percent of ear corn, 35 percent of shelled corn and 25 percent of the oats may pass through the cows undigested, if not ground.

Grinding is also profitable for many crops with other kinds of livestock. Grinding oats for pigs generally increases its value 25 percent or more, while the value of barley may be increased 17 percent by grinding. The value of grain sorghum to all livestock is greatly increased by grinding. Grinding increases the value of milo heads 62 percent for feeding calves and grinding threshed milo increases the value 41 percent for feeding calves, even when followed by pigs. More than one-half of the seed from sorghum grain may pass undigested through dairy cows when fed whole.

Grinding roughage, not containing seeds, does not increase its digestibility but may be desirable to improve palatability, avoid digestive troubles, lessen waste and facilitate handling of manure.



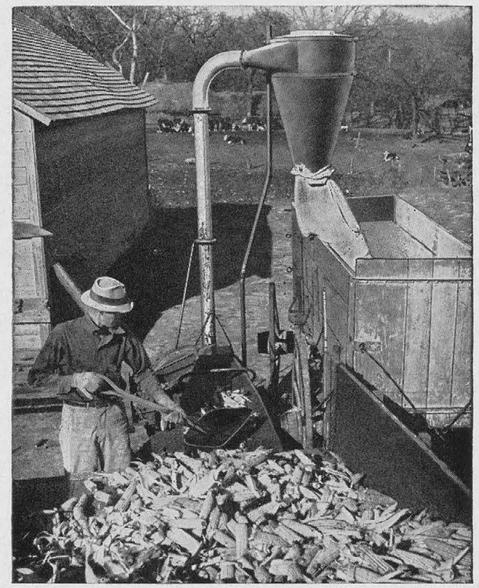
The No. 10-C hammer mill has special knives to handle the stalks and leaves that contain one-third of the feeding value of the whole corn plant.



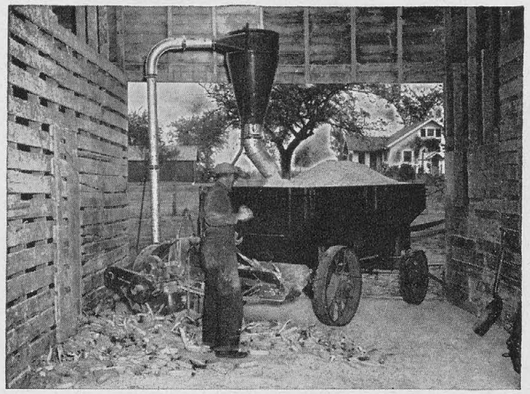
Mixing chopped or ground alfalfa with ground grain often helps to prevent colic and other digestive disturbances.

*McCORMICK-DEERING OFFERS YOU THESE EXTRA VALUE } HAMMER MILL FEATURES

- **Boiler plate safety construction**
- **Clean-cut design for convenience in operation**
- **Swinging hammers with four usable grinding faces**
- **Rust-resistant steel cyclones with welded dust-proof seams**
- **Rigid long-life cyclone pipe with flange connections**
- **Rockwood drive pulley and fittings for pressure lubrication**
- **Wide variety of grinding screen sizes—easy to change**
- **Unequalled after-sales service**



Ground ear corn, full-fed to steer calves, as compared to shelled corn has been found to make weight gains at lower cost. It also makes rapid gains to produce a high quality beef. The Ohio Experiment Station has found that 100 pounds of cobs in corn and cob meal replace 62 pounds of shelled corn in feed lot comparisons.



The No. 10C hammer mill with traveling conveyor feed is convenient for grinding ear corn. The high cyclone with wagon loader is shown.



Soil Conservation Service Photo

One-third of the feeding value of corn is found in the leaves and stalks. Ground fodder can be mixed and fed to advantage with other feeds.

*All illustrations and descriptive matter in this publication apply to International Harvester products sold under either the McCormick-Deering or McCormick trade name.

NO. 10-C HAMMER MILL

Saves Time and Money

Graintight Feed Conveyor

Roughage Reducing Knives

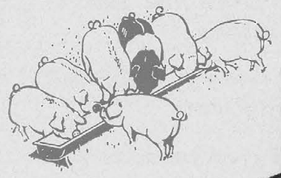
Nonclogging Blower with Auger Feed Conveyor

THE No. 10-C HAMMER MILL has many features which appeal to dairymen and livestock feeders. It is equipped with roughage reducing knives for grinding ear corn, grain sorghums (both headed and bundled) and other roughages.

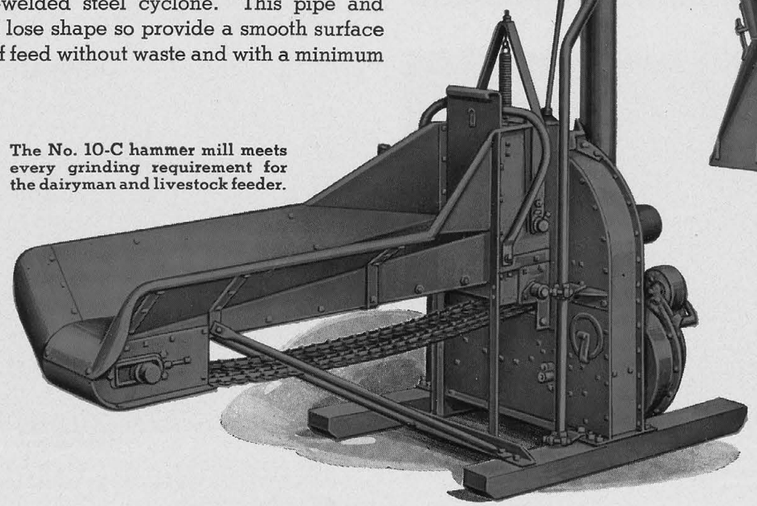
The operator is able to utilize the entire grinding capacity of the 26 swinging hammers because of an auger conveyor which carries the ground feed from the bottom of the screen to the blower fan that is mounted on ball bearings (see illustration of hammer mill cross section on page 7, item M). Clogging of the fan and blower pipe is avoided, so no time is lost in cleaning out.

The fan blows the feed through a rigid pipe and free-flow feed elbow joined with bolted flange joints to the seam-welded steel cyclone. This pipe and elbow do not lose shape so provide a smooth surface for passage of feed without waste and with a minimum of dust.

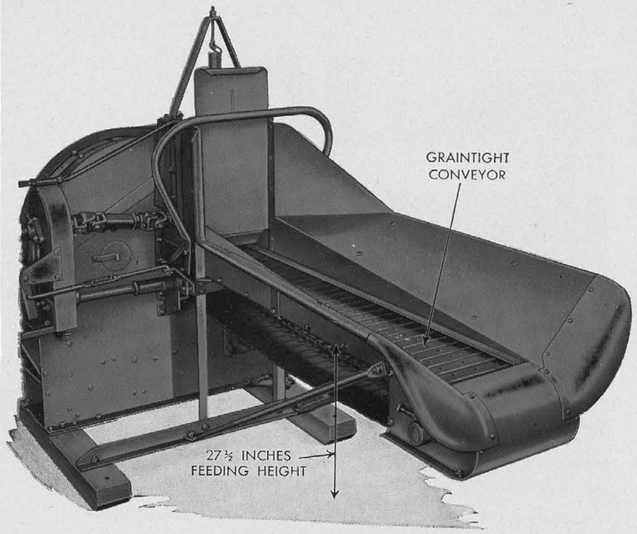








The No. 10-C hammer mill meets every grinding requirement for the dairyman and livestock feeder.

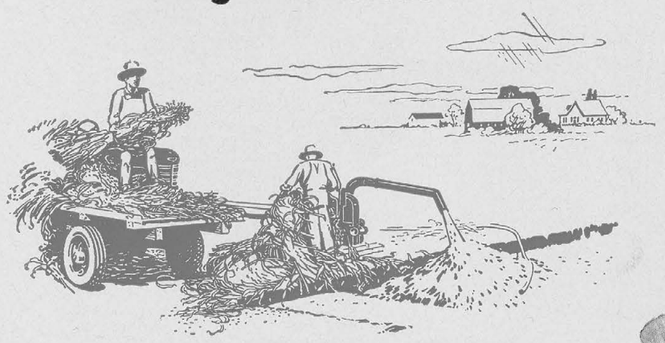


Owners appreciate the convenient low height of the feeding table on the No. 10-C hammer mill.

Grinds All Grains Ear Corn, Fodder and All Dry Roughages

Elevates Feed or Ensilage 40 Feet or More

Excellent for Filling Pit Silos



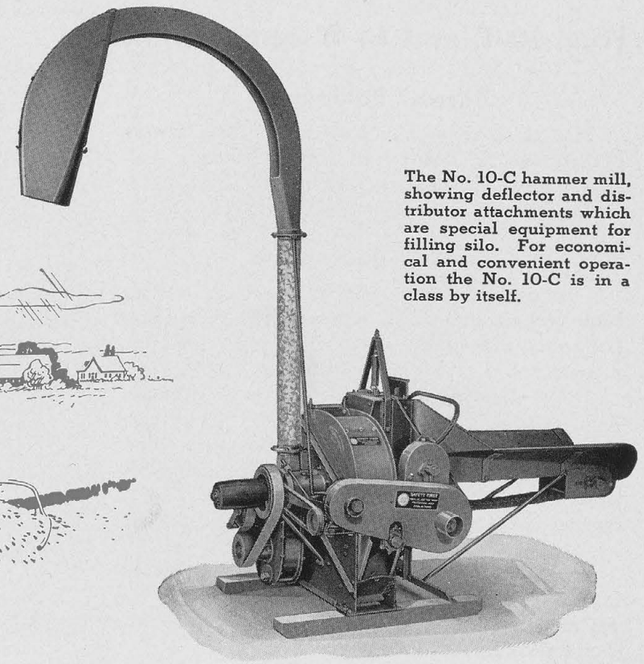
NO. 10-C HAMMER MILL

Convenient Feeding at Low Height

THE low-height, graintight feed conveyor supplied with the No. 10-C hammer mill saves much time and effort when grinding ear corn, stalks or other roughages. It consists of feeding roll, feed trough and a graintight, steel slat-conveyor belt. A safety control lever extends across the feed conveyor.

The feed trough is only 27½ inches high and thus provides a 10 to 12-inch lower lift than found on most mills, which is especially appreciated when grinding heavy materials. This means easier work and less fatigue. It is also easier to feed without spilling and there is no grain leakage through the feed table.

By removing the screen and hammers, the No. 10-C mill with feed conveyor may also be used for filling silos. The 15-tooth clutch drive sprocket, regularly supplied, provides a $\frac{3}{32}$-inch cut. A special 18-tooth sprocket makes a $\frac{5}{64}$-inch cut; and the 11-tooth sprocket, also available on order, provides a $\frac{7}{32}$-inch cut.



The No. 10-C hammer mill, showing deflector and distributor attachments which are special equipment for filling silo. For economical and convenient operation the No. 10-C is in a class by itself.



The No. 10 hammer mill with large-capacity hopper feed, showing low cyclone attachment with two-way bagger.

NO. 10 HAMMER MILL

Has Hopper Feed

THE NO. 10 is identical with the No. 10-C hammer mill except it has a gravity hopper feed. A baffle of sectional, hinged, retarder fingers helps to regulate the feed of ear corn and prevent batting back of ears. The amount of grain entering either the Nos. 10 or 10-C hammer mills is controlled by an adjustable gate.

The integral-type motor shaft assembly of the Nos. 10 and 10-C hammer mills operates on roller bearings in a bath of oil and all moving parts are sealed to keep dirt out. The rotor has a steel disk design and is equipped with 26 swinging hammers which operate in a 24-inch circle when extended in operation. These swinging step-cut hammers have four cutting surfaces and are reversible side for side and end for end. As the hammer swings freely on a pin they are easy to remove and reverse, there being no nuts or bolts.

Nos. 10-C and 10 Hammer Mills

Regular Equipment

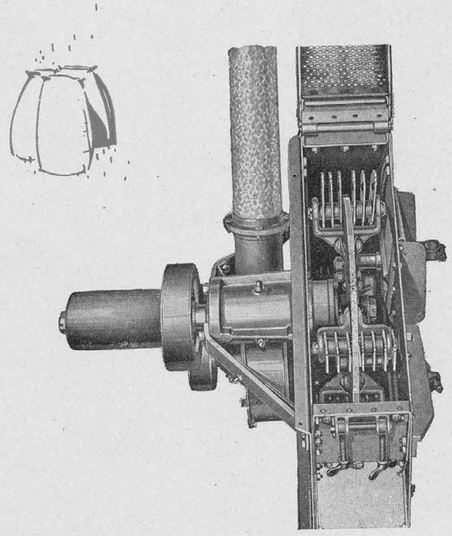
Main drive pulley, 5-inch diameter. Two screens, 3/8-inch and 3/4-inch round hole. Grinding plate liner. Two roughage reducing knives. Feed hopper for No. 10 mill. Conveyor feed for No. 10-C mill.

Special Equipment

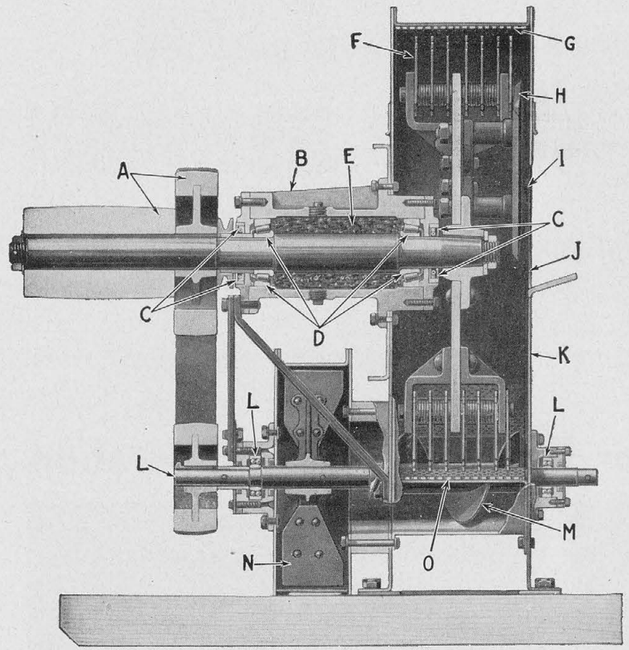
Low cyclone attachment with two-way bagger. High cyclone attachment with wagon-loading spout. Deflector, distributor, distributor pipe top joint (2 feet), and distributor pipe sections (3 feet).

Drive pulleys, 4 1/2, 6, and 7-inch diameter. Knife grinder. 8-foot blower pipe. Shredder bars. Liner for general coarse grinding. Cyclone elbow, 45°. Hard-face knives. Four-knife equipment. Wide-faced hammers. Conveyor feeder for No. 10 mill. Special drive sprockets, 18 and 11-tooth, for No. 10-C mill.

Extra grinding screens are available in the following sizes: 3/64, 1/32, 1/16, 3/32, 1/8, 3/16, 1/4, 5/16, 7/16, 5/8, 7/8, 1 1/4 and 2 1/4-inch round hole; and 7/8, 1 1/8 and 1 9/16-inch square hole.



The flywheel or rotor assembly of the Nos. 10 and 10-C hammer mills has 26 swinging hammers. The rotor shaft is mounted on roller bearings and runs in a bath of oil.



Cross section of Nos. 10 and 10-C mills, showing feed grinding mechanism. These mills are designed for livestock feeders and dairymen, who demand the best in grinding equipment.

(A) Rockwood drive pulleys reduce belt slippage.

(B) Oil-tight housing so rotor shaft bearings run in bath of oil.

(C) Spring-loaded rawhide seals keep oil in and dirt out.

(D) Tapered roller bearings, for easy running.

(E) Oil supply—requires very little attention.

(F) Swinging hammers have four grinding edges—notched to increase grinding surfaces.

(G) Grinding plate liner increases capacity.

(H) Cutter knives chop ear corn, sorghums, stalks, etc., as roughage enters mill.

(I) Side delivery permits either conveyor or hopper feed.

(J) Side delivery improves feeding when grinding roughage.

(K) Strong boilerplate safety construction.

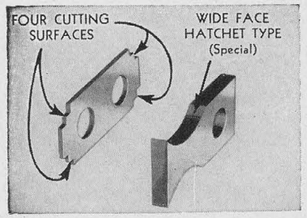
(L) Fan and auger shaft mounted on double row, self-aligning ball bearings.

(M) Auger to blower fan assures positive feed to fan.

(N) Spring-steel fan blades resist wear.

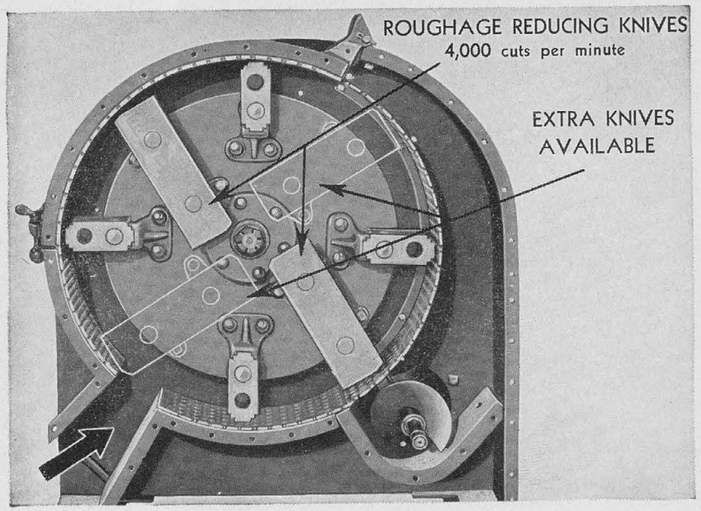
(O) Wide choice of grinding screens—easy to change.

Roughage Reducing Knives Assure Large Capacity in Grinding Sorghums, Etc.



The reversible step-cut hammers are regular equipment but special wide-faced undercut hammers are available on special order.

Roughage reducing knives increase the capacity of the Nos. 10 and 10-C mills when grinding roughage or ear corn. This reduces the size of material 75 percent before it reaches the hammers. The arrow in the illustration points to the safety clean-out pocket which collects tramp metal, etc., that might otherwise be forced through the mill.



Nos. 10 and 10-C Hammer Mill Capacities

POUNDS PER HOUR

Size Screen	Oats	Wheat	Shelled Corn	Ear Corn	No. 10-C Stalks and Corn	No. 10-C Alfalfa
3/16 in.	1,500- 3,000	.....	.....	.....	.....	.....
3/8 in.	4,500- 9,800	5,400-15,000	4,700-12,500	.....	.....	.....
1/2 in.	4,700-11,500	6,200-15,500	5,000-13,000	.....	.....	.....
3/4 in.	.....	.....	.....	2,700- 9,000	2,000-3,500	.....
19/16 in.	.....	.....	.....	3,500-12,000	3,000-5,000	1,000-4,000

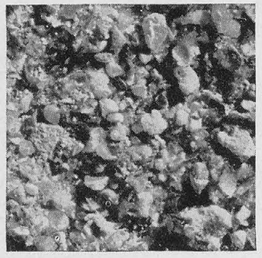
Capacity of the mill for grinding barley is approximately the same as for shelled corn.

NOTE: The capacities shown above for grain and roughage are approximate and will vary according to speed of mill, power applied and condition of materials to be ground.

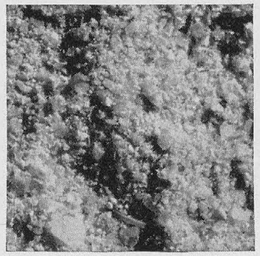
A Choice of Screen for Every Grinding Operation



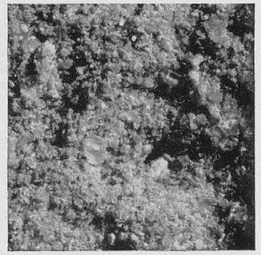
Ear corn, actual size, ground with 1¼-inch round-hole screen.



Ear corn, actual size, ground with ¾-inch round-hole screen.



Shelled corn, actual size, ground with ¼-inch round-hole screen.



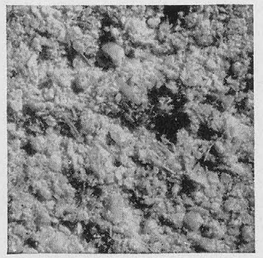
Shelled corn, actual size, ground with ⅛-inch round-hole screen.



Oats, actual size, ground with ¼-inch round-hole screen.



Oats, actual size, ground with 1/16-inch round-hole screen.



Soybeans, actual size, ground with ⅛-inch round-hole screen.

Samples of feeds shown in these illustrations were ground in Hammer Mills with grinding plate liners.



Corn fodder, actual size, ground with 19/16-inch square-hole screen.



Alfalfa, actual size, ground with ¾-inch round-hole screen.



Alfalfa, actual size, ground with ¼-inch round hole screen

NO. 6 HAMMER MILL

For Use with 1 and 2-Plow Tractors

Wide Rotor with Large Screen Area
Air-Cleaned Grinding Screen
Swinging Step-Cut Hammers

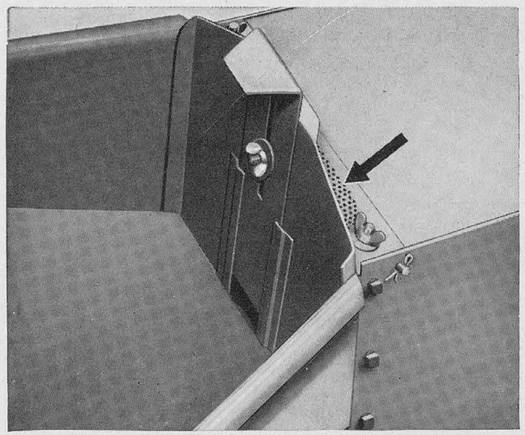
Nonclogging Blower with Windswept Feed Delivery



McCormick-Deering No. 6 hammer mill with low cyclone and two-way bagger.

THE No. 6 HAMMER MILL is designed to obtain maximum grinding capacity with belt power from a one or two-plow tractor. It has a rotor that is both wide and of big diameter to provide large grinding space for its 30 swinging hammers.

Rotor ventilation equalizes pressure within the grinding chamber and obtains quick separation of ground from unground feed. This increases the capacity of the mill because there is no back pressure to cause "floating" of feed above the screen after it has been ground to desired fineness.



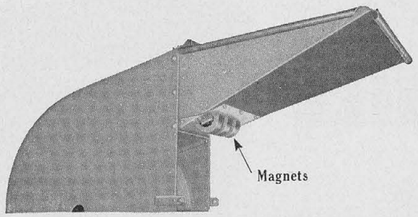
The arrow points to the rotor ventilator which helps to keep the grinding screens clean. The adjustable gate for small grain in also shown. This is removed for grinding ear corn and dry roughage.

Notching of the hammers increases cutting surface and grinding capacity. Being reversible with four cutting surfaces they also have long life. The swinging hammers are easy to remove and reverse because there are no nuts and bolts. There is also greater safety from breakage when hard objects get into the rotor.

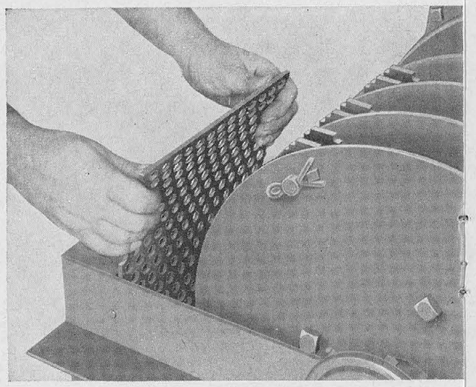
Ground feed underneath the air-cleaned grinding screen is removed continuously as long as the mill is operating at recommended speed. This avoids any clogging or choking and is possible because open-vent construction provides a positive suction force at all times to the large blower fan, thus preventing any piling up of feed and keeps the passage clean.

Wind-swept feed delivery makes it possible to utilize the full grinding capacity of this mill and increases its daily capacity because it eliminates stopping the machine to clean out the blower inlet elbow.

Like other McCormick-Deering hammer mills the No. 6 has a rigid leak-proof feed delivery from fan to cyclone to prevent waste and makes for less dust while grinding.



This magnetic metal catcher, consisting of powerful non-electric magnets, fits into the feed chute of the No. 6 and No. 4-E hammer mill and prevents any metal objects or scraps, such as wire, nails, screws, parts of machinery, tools, etc., from entering the machine. The metal catcher protects the mill from damage and, more important, prevents small pieces of metal from getting into the ground feed to be eaten by the livestock and poultry with possibly fatal results. Available as special equipment.



A wide choice of grinding plates is available for the No. 6 hammer mill. It is easy to remove and change the grinding plate when desired.



The No. 6 hammer mill can be supplied with a high cyclone and wagon loader attachments. Detail of vent for wind-swept feed delivery is shown at right.

Regular Equipment

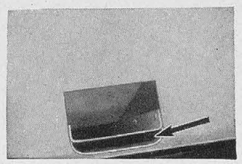
Main drive pulley, 4½-inch diameter. Two screens, ¼ and ½-inch round hole, unless otherwise specified.

Special Equipment

Drive pulleys, 5, 6, and 7-inch diameter. Low cyclone with 2-way bagger. High cyclone with loading spout. 8-foot blower pipe. Grinding plate. Extra screens. Magnetic metal catcher.

Available Grinding Screens

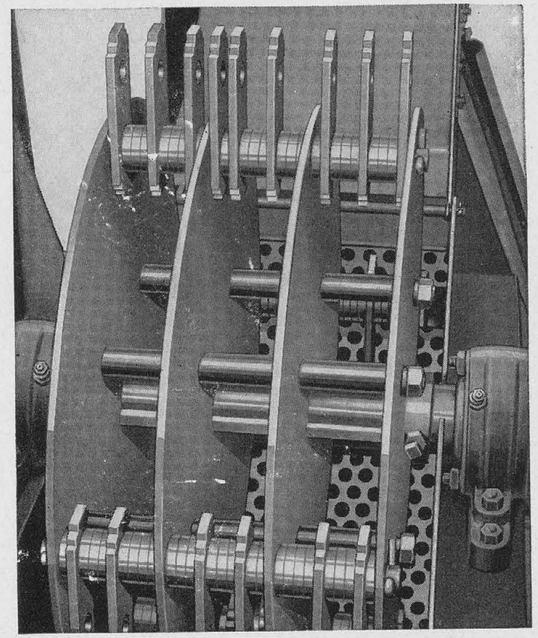
Screens for ear corn; ⅝ and ¾-inch round hole. Screens for shelled corn and oats; ⅜, 7/16, and ½-inch round hole. Screens for wheat, barley, rye, etc.; ¼, 5/16, and ⅜-inch round hole. Other round hole screens; 1/32, 1/16, 3/64, 3/32, ⅛, 3/16, 7/32, 1¼, 2¼, and 3⅛ inch. Square hole screens, 7/32, 1⅛ and 1 9/16 inch.



Avoids Clogging
Avoids Choking
Avoids Stopping
To Clean

Specifications

Power required	1 or 2-plow tractor
Rotor speed r.p.m.	2200–2500
Main drive pulley (Regular)	
Diameter	4½ in.
Face	8 in.
Diameter of rotor (Hammers extended)	24 in.
Number of hammers	30
Total screen area	402 sq. in.
Blower diameter	18 in.
Cyclone	27¼ in.
Blower pipe outlet, diameter	5 in.
Blower pipe inlet (Rectangular)	7 x 3¼ in.
Width of rotor housing	10½ in.
Feed Throat Width	10⅛ in.
Feed Throat Height	10½ in.
Height from ground to top of cyclone	
High	140 in.
Low	89⅜ in.
Width overall (end rotor shaft to blower inlet)	35 in.
Width overall with cyclone	64¾ in.
Height from ground to bottom of swivel spout	73½ in.
Length of mill overall including feed hopper	59 in.
Floor space required for skids Low cyclone	24 x 30 in.
Floor space required for skids High cyclone	24 x 43½ in.



The air-cleaned grinding screen has an effective separation area of 402 square inches. The swinging hammers are staggered to cover the entire screen area.

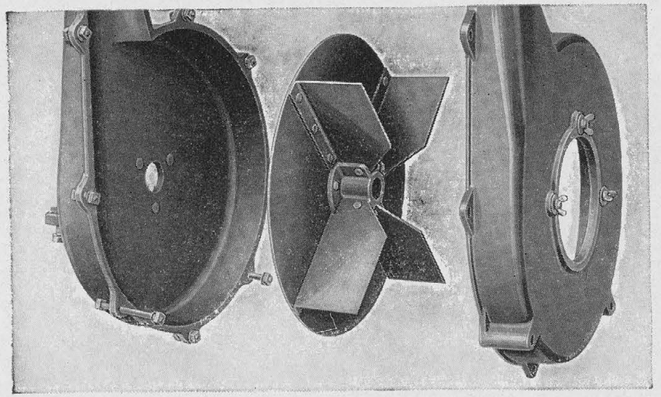
No. 6 Hammer Mill Capacities

APPROXIMATE POUNDS PER HOUR

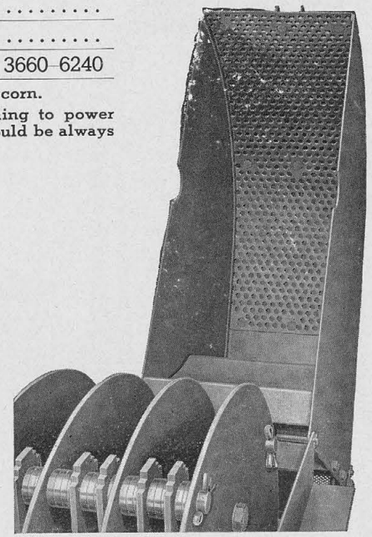
Size of Screen	⅛ in.	¼ in.	⅜ in.	½ in.	¾ in.
Oats	870–2100	2522–5460	3765–7080	6180–13000	.....
Shelled Corn	.....	4620–8210	5040–8540	5580–8880	.....
Ear Corn	.....	1680–4200	2100–4530	3060–4860	3660–6240

Capacity of mill for grinding barley is approximately the same as for shelled corn.

NOTE: The capacities shown above are approximate and will vary according to power applied, climatic conditions, and condition of materials to be ground. The mill should be always operated at recommended speed in order to obtain best results.



The blower fan blades are of large size and of ample capacity. The housing for the fan is of wear resistant grey iron which helps to give the mill exceptionally long life.



A grinding blade liner for the rotor housing with area of 266 inches is available as extra equipment. It increases the capacity when grinding oats and other small grain.

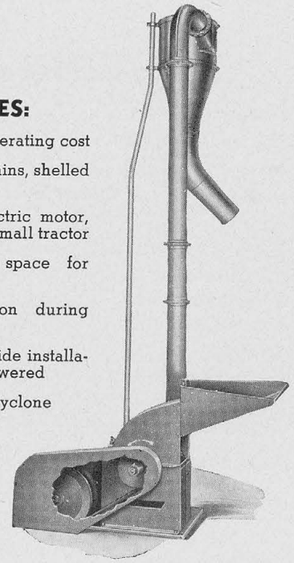
No. 4-E
HAMMER MILL

For Use with an Electric Motor, Small Power Unit, or Small Tractor

THE No. 4-E hammer mill is a small but highly efficient mill that can be driven by an electric motor (3, 5, or 7½ h.p.) or by a small power unit or tractor having the power of a Farmall Cub tractor. When powered with an electric motor it can be permanently installed in buildings with overhead bins and operated all day with minimum attention. This mill, which incorporates all the time-tested features of the larger mills, grinds all grains, shelled corn, ear corn, and even small amounts of roughage. See the preceding pages for details or send for a special pamphlet.

ADVANTAGES:

1. Low initial cost—low operating cost
2. Grinds efficiently all grains, shelled corn, ear corn
3. Can be driven by electric motor, small power unit, or small tractor
4. Requires only small space for installation
5. Requires little attention during operation
6. Ideal for permanent inside installation when electric-powered
7. Choice of high or low cyclone



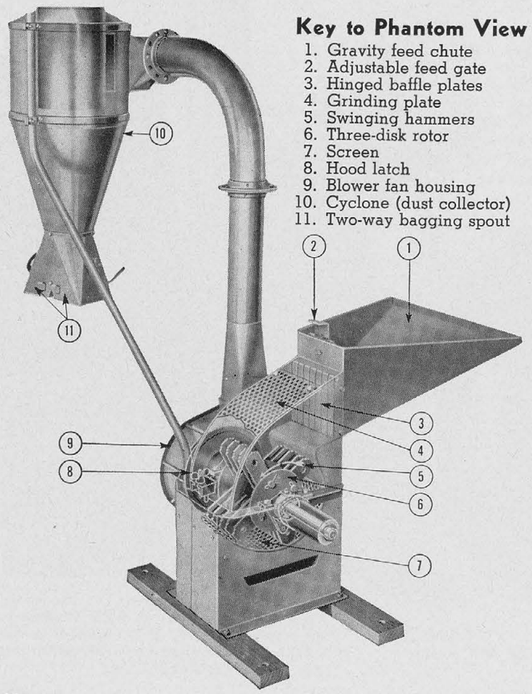
The No. 4-E mill equipped with high cyclone, wagon spout, and electric motor drive attachment with motor drive shield.

No. 4-E Hammer Mill Capacities

APPROXIMATE POUNDS PER HOUR

Size of Screen	3/16 in.	1/4 in.	3/8 in.	1/2 in.	3/4 in.
Oats	250–750	375–900	1000–2400	.....	.....
Shelled Corn	800–2800	900–3000	1400–4500	1500–6300	.....
Ear Corn	.....	300–1000	450–1400	650–2000	900–2600

Capacity of mill for grinding barley is approximately the same as for shelled corn. NOTE: The capacities shown above are approximate and will vary according to power applied, climatic conditions, and condition of materials to be ground. To obtain best results the mill should always be operated at the recommended speed.



Key to Phantom View

1. Gravity feed chute
2. Adjustable feed gate
3. Hinged baffle plates
4. Grinding plate
5. Swinging hammers
6. Three-disk rotor
7. Screen
8. Hood latch
9. Blower fan housing
10. Cyclone (dust collector)
11. Two-way bagging spout

Regular Equipment

One screen (with ½-in. round holes unless otherwise specified). Blower inlet. Blower outlet pipe. Gravity feed chute.

Special Equipment

Low cyclone with 2-way bagger. High cyclone with wagon spout. Electric motor drive attachment for use with 3, 5, or 7½ h.p. motor as specified. Motor drive shield attachment. Cyclone elbows, 45 or 90 degrees, 4-in. diameter. Blower pipe sections, 4-inch diameter and in lengths of 12, 39, and 96 in. Rotor drive pulley: 3 x 5 in. for tractors with belt speed of 2,600 f.p.m.; and 2⅝ x 5 in. for tractors with belt speed of 3,100 f.p.m. Wood skid attachment (for use with tractor). Screens: 1/32, 1/16, 3/32, 1/8, 3/16, 1/4, 3/8, 1/2, 5/8, 3/4, and 7/8-in. round hole type. Magnetic metal catcher.

SPECIFICATIONS

Speed of rotor and blower fan.....3,200 to 3,350 r.p.m.
Power required.....3 to 7½ h.p. electric motor, small power unit, or small tractor such as the Farmall Cub
Rotor....3-disk type with 20 swinging hammers 2 x 4⅞ x ¼ in.
Rotor diameter, hammers extended.....12 in.
Grinding plate area.....123 sq. in.
Screen area.....148 sq. in.
Grinding plate size.....17¾ x 6 15/16 in.
Screen size.....19¾ x 7½ in.
Rotor housing inside dimensions.....7⅝ x 7 13/32 in.
Blower pipe inlet dimensions.....5 in. wide x 2 in. deep
Blower fan.....one-piece, cast steel (10⅜-in. diameter, 5 wings 3 1/16 in. wide)
Floor space required.....38 in. long, 25 in. wide

TYPE D

Feed Grinders for Grinding Corn in the Husk, Ear Corn, Kafir Corn and Milo Maize

Built with 10-inch Grinding Plates



The Type D feed grinder operates on from 6 to 16 h.p. and will grind ear corn in the husk up to 85 bushels an hour.

THE Type D feed grinder and the Type C (next page) meet the preference of many poultry raisers, dairymen, and livestock feeders for a burr-type mill. Both of these grinders are strongly made of steel and are designed for high-quality work. By means of a simple hand crank arrangement the grinding plates can be adjusted to grind fine or coarse. The plates can also be drawn apart quickly while running (by means of a small release lever), should a stone or other hard object get into the mill. The main shaft bearings are wide and well babbitted. Grease cups are provided for lubrication.

All-Purpose Feed Grinder

The Type D grinder is designed to grind kafir corn, milo maize, shell corn, and small grains. Regularly equipped with spiral cutting knives (see illust.), cob breaker, cob knife, and concave, it also grinds corn in the husk.

Requires Minimum Power

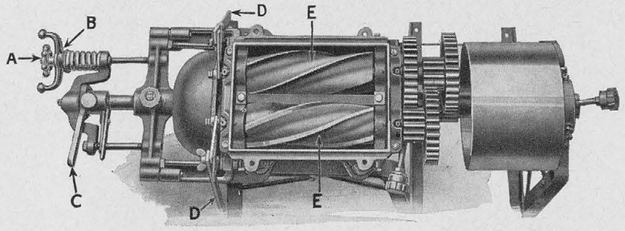
The Type D mill is geared to operate with a minimum of power requirements. The gears are carefully fitted and nested so that they occupy only a small amount of space and are well shielded to keep out dirt. The steel bar between the cutting knives has four sharp edges so that when the upper two corners are dull, the bar can be turned over and the other cutting edges used.

Convenient Shut-Off Slides

The Type D feed grinder is equipped with two shut-off slides which control the amount of grain flowing to the grinding plates. Either one or both of these slides can be opened depending upon the amount of power that is available and the kind of grinding that is being done.



The double-faced grinding plates are reversible and interchangeable. They do fast grinding with a minimum of power. The breaker cone and ring at the center do most of the heavy work.

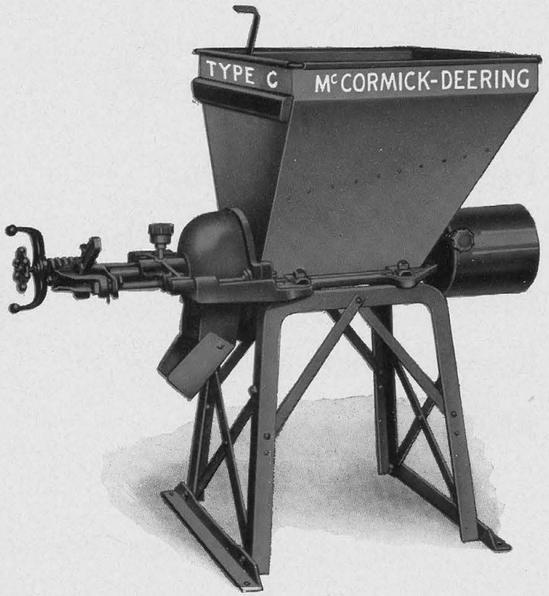


Type D grinding mechanism for grinding corn in the husk. (A) indicates hand lock nut; (B) plate adjusting crank; (C) plate release lever; (D) feed-regulating slides; (E) cob-cutting knives.

TYPE C

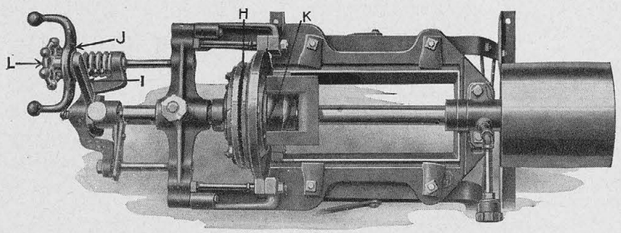
Feed Grinders for Grinding Small Grains and Shelled Corn

Built with 8-inch Grinding Plates



The Type C feed grinder operates on from 6 to 12 h.p. and will grind shelled corn up to 72 bushels an hour.

THE TYPE C FEED GRINDER is a low-cost mill simple in design. It is built for the poultry raiser, dairyman, and livestock feeder who expects to grind small grains and shelled corn only and is supplied in one size with an 8-inch grinding plate. The hopper for this type, like the others, is made of heavy sheet steel, electrically welded and reinforced at the top. The hopper on the Type C mill is equipped with an inside shut-off to regulate the flow of grain.



Type C grinding mechanism. (H) indicates the grinding plates, (I) plate release lever, (J) plate adjusting crank, (K) feeding spiral, (L) hand lock nut.

Adjustable Grinding Plates

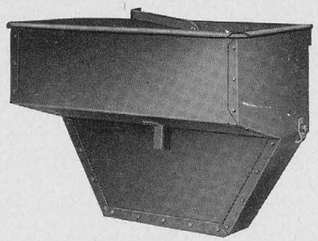
Grinding plates in the Type C grinder are of the same type as those in the Type D. They do not easily clog up and they handle new grain successfully. The plates are self-adjusting, so make complete contact with the feed over their entire surface. By removing two nuts, the entire grinding mechanism can be exposed for inspection.

Plates for medium, all-purpose grinding are supplied as regular equipment for both mills. However, plates for fine grinding, or for coarse grinding or cracking, are available on special order. These plates are easy to change if different types of grinding are desired.

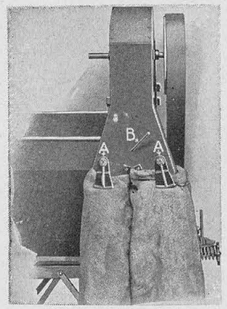
McCormick-Deering Feed Grinder Specifications

GRINDER	Horsepower Required	Grinder R.P.M.*	Bushels Per Hour	Regular Pulley		Width of Belt	Weight
				Diameter	Face		
Type C, 8-in.	6—12	600—1200	18—72	8 in.	8¼ in.	5 to 8 in.	255 lb.
Type D, 10-in.	8—16	520—1000	18—85	12 in.	8¼ in.	6 to 8 in.	440 lb.

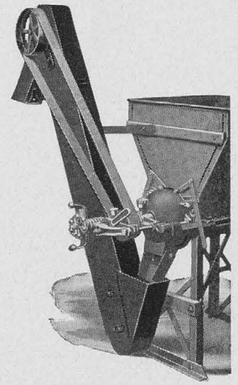
* Grinders should not run above this speed.



A supplemental hopper can be supplied for the Type D feed grinder. It is used when grinding small grain and ear or shelled corn at the same time.



Detailed view of bagging spout for short elevator showing bag clamps (A) and lever (B) for directing grain to either bag.



The short bagging elevator can be supplied as extra equipment for both feed grinders.

Useful Attachments to Save Time and Labor in Grinding Feed

GRINDING FEED requires less work and saves many valuable hours when the feed grinder is permanently installed in a convenient location as shown in the illustration at the bottom of this page. Such an installation permits feeding ear corn or other feed directly from an overhead bin. An elevator makes it possible to carry the feed either to an adjacent bin or load it into a wagon for mixing with other feed or storing it elsewhere. Bagging spouts are available for those who wish to put their feed in sacks. A supplemental hopper can also be supplied for those who wish to grind both small grain and ear corn or shelled corn at the same time. With a permanent installation the feed grinder is securely bolted to the floor with lag screws so that proper belt tension can be maintained.

Regular Equipment

One set of plates for medium grinding attached to feed grinder; one extra each grinding plate and breaker cone; 8-inch diameter drive pulley for Type C; 12-inch diameter drive pulley for 10-inch Type D feed grinder; lag screws for attaching grinder to the floor.

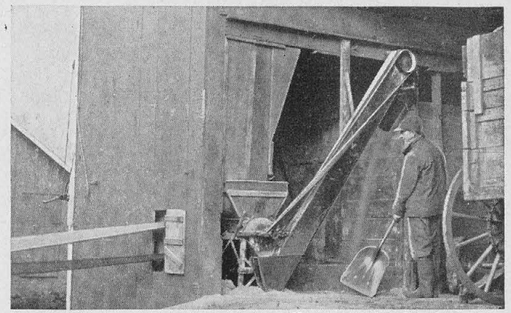
Special Equipment

Wagon elevator with either bagging or wagon spout; short bagging elevator; supplemental hopper for Type D feed grinder; grinding plates for fine and coarse grinding; 10, 12, 14, 16 and 18-inch diameter pulleys for Type C; 8, 10, 14, 16, 18 and 20-inch diameter pulleys for 10-inch Type D feed grinder.



A wagon spout can be supplied with the wagon elevator in place of a bagging spout.

The higher wagon elevator can also be supplied with a bagging spout in place of the wagon spout and is available for both feed grinders.



A convenient permanent type installation of this kind permits feeding directly from an overhead bin.

All hammer mill and feed grinder specifications in this catalog are subject to change without notice.

The IH Dealer Serves You in 3 Ways



EQUIPMENT

First, in his attractive place of business the IH dealer displays and stocks a full line of modern tractors and farm equipment suitable for use *in your locality*. He knows the crops you grow, the soil and climatic conditions you must contend with, the farming methods you prefer—and he arranges to supply you with just the types and sizes of machines and attachments you need to perform your seasonal operations quickly, efficiently, and at minimum cost. He is experienced and well-informed. He stands ready to discuss your production problems and to demonstrate, on your own acres, any equipment in which you are interested. He is a farm equipment specialist whom it will pay you to consult.



PARTS

Second, the IH dealer stocks and supplies all commonly needed replacement parts for the machines he sells and can supply the less commonly needed parts on short notice. He sells only genuine International Harvester engineered parts—made to exactly the same specifications as the original parts in the machine. Parts men are alert, obliging, and competent, ready to supply you with whatever part or accessory you need. In facilities and personnel the IH dealer spares no effort or expense to have on hand the parts you need at the moment you need them. Delays due to the breakage or wearing-out of parts seldom occur when your equipment carries the IH monogram.



SERVICE

Third, the up-to-date IH dealer maintains a well-equipped, competently staffed service station in which any type of farm equipment, from tractors and combines to disk harrows and cream separators, can be reconditioned, repaired, or overhauled according to the high standards of the Blue Ribbon Service code. He places at your disposal a large investment in shop space, tool equipment, and skilled personnel in order that your farm tractors and machines may be maintained in first-class operating condition. Avail yourself of the opportunity to keep your equipment in top-notch condition by having it repaired or overhauled—*before the season of use*—in the service station of your local IH dealer.

Specifications subject to change without notice.

INTERNATIONAL HARVESTER

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Ave. Chicago 1, Illinois, U.S.A.

A-219-MM. 4-15. PRINTED IN UNITED STATES OF AMERICA

How Much Will the GEHL Do?

Capacities are so dependent upon different conditions that it is impossible to set an exact figure. The kind and condition of the material to be ground, moisture content, power used and fineness of grinding, speed of the mill—each have a big influence upon capacity. The figures given are, therefore, approximate; they are based upon the use of 15 horsepower, and upon average condition of feed to be ground. More power, or better grinding conditions, would of course result in larger capacities. Somewhat smaller power can be used, however, and the capacity held down in proportion.

MILL CAPACITIES (POUNDS PER HOUR)

	Screen		Screen	
Oats or Barley	1/8	750–1250	Ear Corn ¼	900–1450
	3/16	1800–2500	½	2150–3200
	¼	2700–3600	¾	3600–5100
Shelled Corn	1/8	1450–2200	Alfalfa 1/8	850–1450
	3/16	2700–3600	Corn Stalks with Ears ½	750–1100
	¼	5000–5800	1	1250–1600

SPECIFICATIONS

	41 Plain	41 Comb. Plain Table	45 Plain	45 Comb. Plain Table	45 Comb. Traveling Table
Width of Grinding Chamber	10″	10″	14½″	14½″	14½″
Diameter of Grinding Chamber	24″	24″	24″	24″	24″
Number of Hammers	42	42	66	66	66
Width of Throat Opening	13⅜″	14″	17⅝″	18¾″	18¾″
Speed Recommended	2200-2600	2200-2600	2200-2600	2200-2600	2200-2600
Diameter of Mill Shaft	1⅜″	1⅜″	2″	2″	2″
Size of Pulley furnished unless otherwise specified by customer*	4x7¼″	4x7¼″	4½x8″	4½x8″	4½x8″
Width Overall without Dust Collector	33″	33″	41″	41″	41″
Length Overall without Dust Collector	71″	86″	71″	98″	132″
Height to Top of Dust Collector Post	80″	80″	84″	84″	84″
Weight of Mill	560 lbs.	1030 lbs.	750 lbs.	1300 lbs.	1500 lbs.
Power Requirements	15-20 H.P.	15-20 H.P.	25-30 H.P.	25-30 H.P.	25-30 H.P.
Length of Cut		¼″-½″		¼″-½″	¼″-½″

* Pulley can be exchanged for any size from 4″ to 6″ diameter if desired.

GUARANTEE

We guarantee all GEHL HAMMER MILLS against defect in material or workmanship, and will replace at any time free of charge at our warehouse any such defective parts returned to us at West Bend. We guarantee that GEHL Mills will grind any dry feed as finely as desired.

We guarantee that GEHL Mills when properly operated will grind more uniformly and in greater capacity per horsepower than any other hammer mill.

GEHL BROS. MFG. CO., 300 WATER ST., WEST BEND, WIS.

For Sale By
BARKER-LETZ SUPPLY CO.
312-314 Washington Ave. North
Minneapolis, Minn.

Form No. 1274A 25M-6-49 Printed in U.S.A.

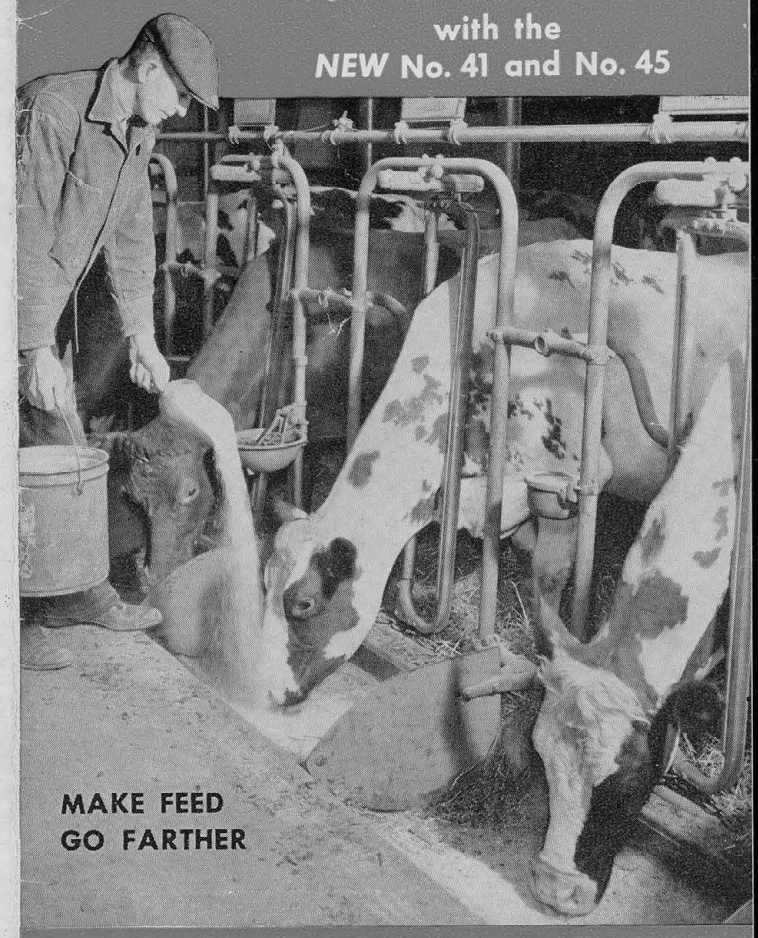
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GEHL Grind-Rite HAMMER MILLS

TRADE-MARK

BETTER GRINDING *at lower cost*

with the
NEW No. 41 and No. 45



MAKE FEED
GO FARTHER

Built by

GEHL BROS. MFG. CO.

Established 1867

WEST BEND, WISCONSIN

GEHL Grind-All HAMMER MILL — *Extra* VALUES in the NEW GEHL



Illustrating both No. 41 and 45 plain mills. Attachments as described on following pages may be added if desired.

"Sales are Blowing a Gehl"

GEHL has been a leader in hammer mill quality and value for many years, and progressive, experienced engineering year after year keeps the Gehl out front with practical improvements and advantages.

Gehl gives you a real 4-in-one Mill—(1) a Plain Hammer Mill; (2) Mill with Ear Corn Crusher and Feeder; (3) Mill with cutter-head—first it cuts, then it grinds; (4) Combination cutter, grain and roughage mill with self feeder. You can start with the plain mill and add to it according to your requirements . . . giving you just the kind of a mill you want, and the best of that type.

BUILT FOR YEARS OF SERVICE

Gehl Mills are practically all-steel construction—tough, boiler-plate steel housing, securely riveted and braced . . . steel blower housing . . . galvanized steel pipe and dust collector . . . heavy alloy steel main shaft mounted in power-saving, heavy-duty ball bearings. Swinging hammers can be turned to use all four corners. *All Gehl rotor and blower fans are statically and dynamically balanced.*

POSITIVE GRINDING ACTION

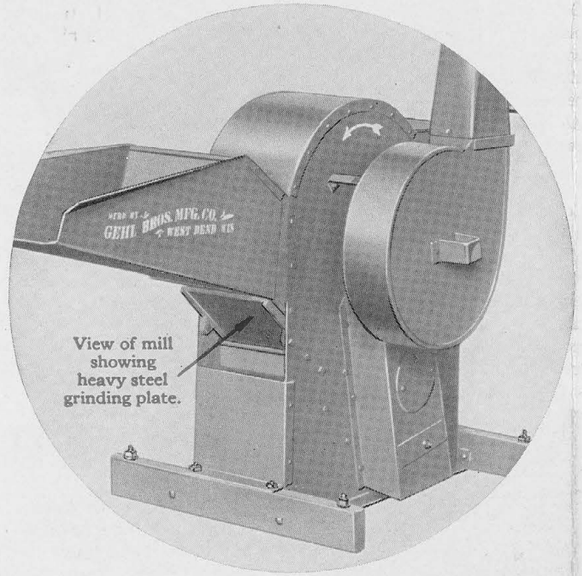
Contrary to the usual custom, the Gehl hammers strike *downward* on the incoming feed; this together with the construction of the grinding chamber results in a grinding action different and more efficient than the usual hammer mill. Running at 2200 to 2600 revolutions per minute, the hammer's tips travel at the rate of about 3 miles per minute. There are three rows, so the revolving cylinder, so far as practical purposes are concerned, presents a solid surface to the incoming feed. Figure it out.

At a speed of 2400 R.P.M., the cylinder makes one complete revolution 40 times per second and since there are three rows of hammers, there is a hammer to strike the incoming feed every 1/120 of a second. This has a tendency to hold the feed back against the grinding plate, working it down to the point where feed and hammers are compelled to meet, and the crushing-grinding action takes place just as the feed leaves the grinding plate. (See illustration at right). A large part of the work of grinding is done at that point and passes through the screen immediately, only the coarser parts being carried around for further action by the hammers.

BIG CAPACITY—LOW SPEED

LOW SPEED FOR POWER SAVING AND CONVENIENCE

The large, 24-inch diameter grinding chamber of Gehl Grind-All Hammer Mills requires a speed of *only 2200 to 2600 R.P.M.* as compared with much higher speeds of most other mills of the same price class. *You save power—you save money.* This means that a *Gehl can use a larger pulley, reducing belting difficulties . . . needs no power-wasting* speed jack. A Gehl can be belted direct to any tractor without fear of excessive belt slip.



View of mill showing heavy steel grinding plate.

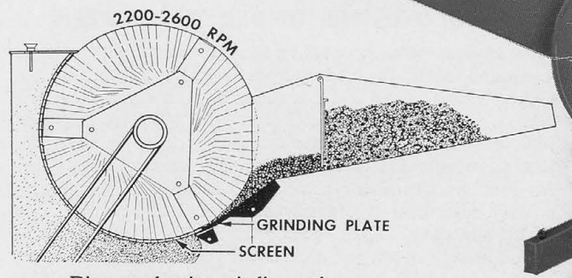


Diagram showing grinding action. See explanation at left.



Mill equipped with spout and high pipe for unloading into wagon.

GEHL Grind-All HAMMER MILL

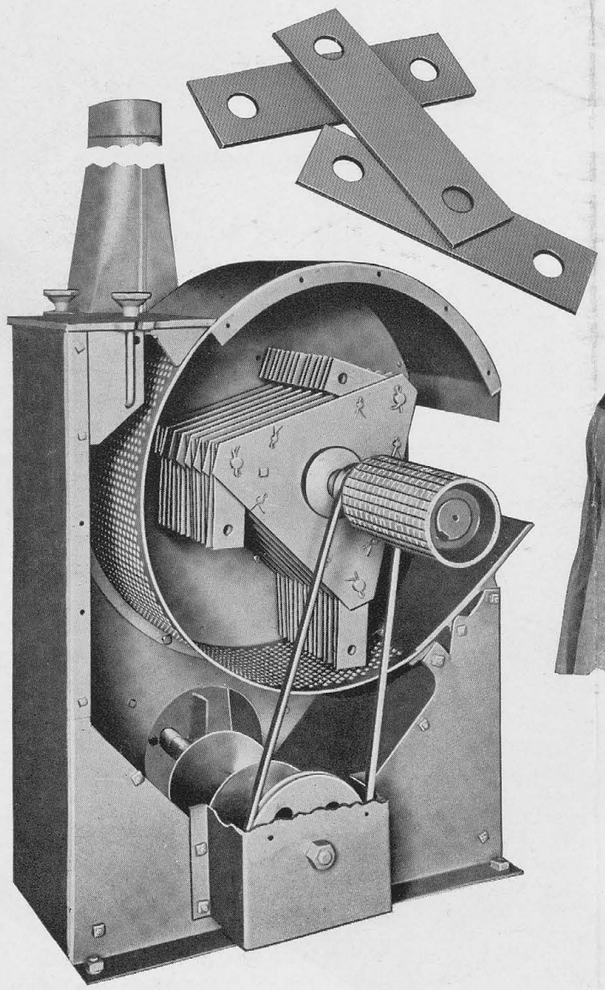
GEHL Grind-All HAMMER MILL

are FAST, STURDY, HANDY

42 LONG-LIFE, REVERSIBLE, SWINGING HAMMERS

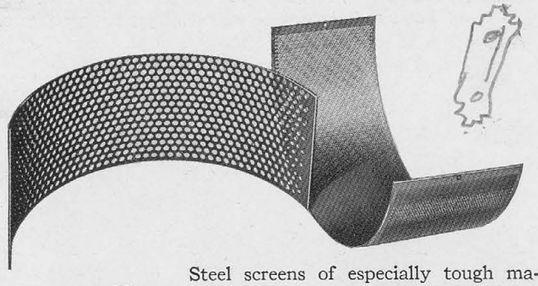
(66 Hammers on the No. 45)

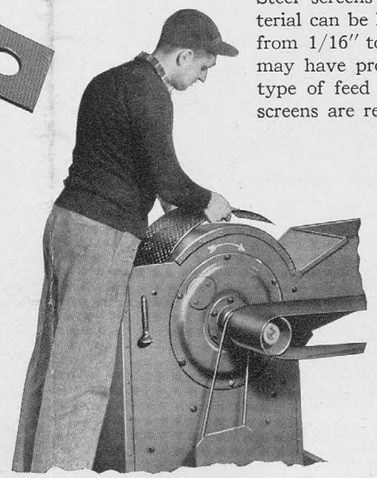
There are no dead spots on the screen of a Gehl. Its entire surface is covered completely at each revolution. The thin, sharp hammers develop greater capacity, and grind more uniformly than the heavier type. Swinging, rather than rigid hammers, make damage less likely should a piece of iron get into the mill. The hammers can be turned so as to use all four corners.



LARGE GRINDING CHAMBER FOR BIG CAPACITY

The large diameter of the Gehl grinding chamber permits the use of a long screen which will do the job better than a shorter one. Very little of the feed remains unground long enough to reach the end of the screen. The elimination of feed travel saves power . . . which means bigger capacity.





Steel screens of especially tough material can be had for your Gehl Mill in from 1/16″ to 1½″ mesh, so that you may have proper screens for whatever type of feed you want to grind. Two screens are regularly furnished.

EASY TO CHANGE SCREENS

To change screens on a Gehl, you *simply remove the small cover plate,* slide one *screen out and the other into place.* Tightening the cover plate down with the hand screws holds the screen securely in place.

NO CLOGGING UNDER THE SCREEN

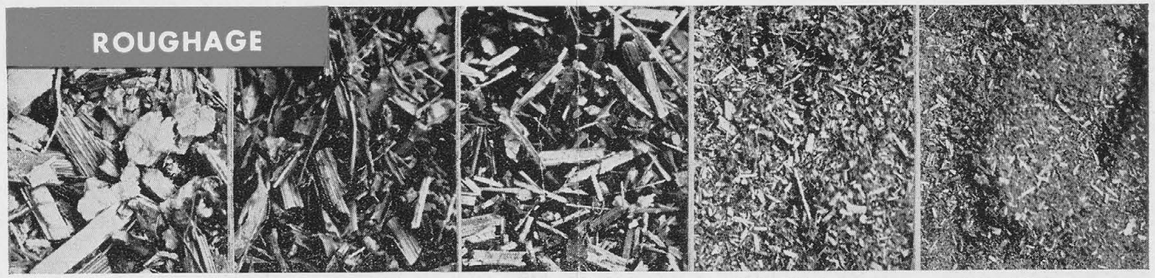
Most blowers when mounted on the main shaft must be large enough to "suck" the feed up from under the screen. A large blower wastes power and lots of air blast, making necessary a large, cumbersome dust collector. Gehl Mills are equipped with an auger to carry the feed away from beneath the screen, and paddles to throw it up the blower intake pipe. *No feed accumulates under the screen.* The action is positive regardless of capacity and the Gehl Mill does not fill up and choke if the speed reduces. The Gehl blower is comparatively small, yet creates the required amount of air blast, and operates with a conveniently compact dust collector.

GRINDS ALL FEED EQUALLY WELL

A SCREEN FOR EVERY TYPE OF GRIND

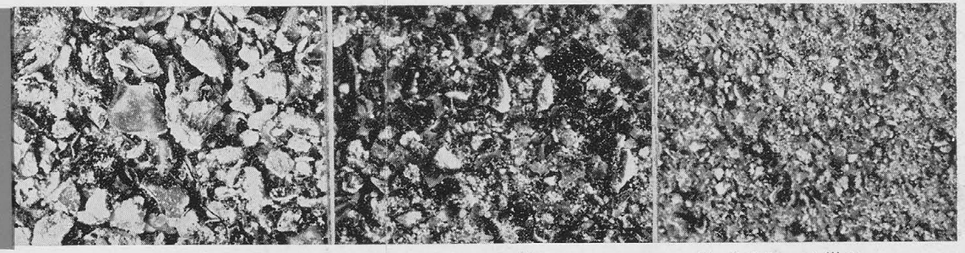
Screens on the Gehl are easily and quickly changed to accommodate every type of feed or roughage to any fineness you want. Here are actual size illustrations of feeds ground in Gehl Mills.

ROUGHAGE



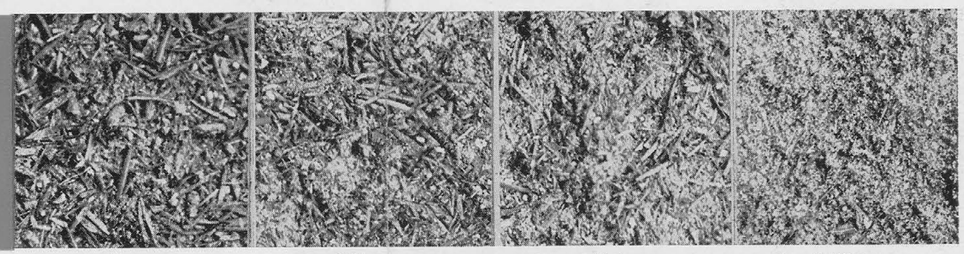
Corn Fodder 1¼″ Screen | Corn Fodder ½″ Screen | Soy Beans 1″ Screen | Alfalfa ¼″ Screen | Alfalfa 1/8″ Screen

EAR CORN • SHELLED CORN



Ear Corn 1¼″ Screen | Shelled Corn 1¼″ Screen | Shelled Corn ¼″ Screen

OATS



Oats ¼″ Screen | Oats 3/16″ Screen | Oats 1/8″ Screen | Oats 1/16″ Screen

All of the coarse screen roughage grinding (½″, 1″ and 1½″) shown above is by mills equipped also with the cutting head. This combination develops a capacity at least double that of the plain mill with equal power. Notice the absence of thread-like fiber and the uniform quality. Grinding of roughage enables the animal to utilize the entire plant—cattle cannot sort out and reject the tougher parts. It is also useful for lightening the concentrate mixture.

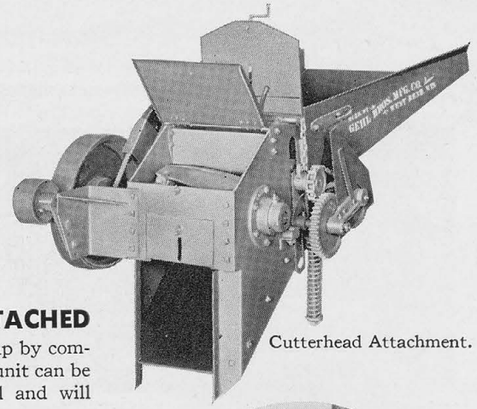
For cattle, roughage such as corn stalks, alfalfa, soy beans, sweet clover, etc., need not be ground finer than the ½″ screen, in fact, in most cases a coarser screen will be found satisfactory. For poultry and hog feed, however, it should be run through the finer screens, such as the 1/8″. Corn for cattle feeding should be coarse like the 1¼″ screen—if fed with other grains, a 3/8″ or ¼″ screen should be used. Oats for cattle feed calls for a ¼″ or 3/16″ screen, for hog feed 1/8″ screen, for chick mash 1/16″. These are "general recommendations." Individual requirements might vary somewhat according to the ideas of the operator. The general tendency on the part of most farmers is to grind too fine. Fineness of grinding for any screen may also vary somewhat according to the temperature and moisture content of the feed.

GEHL COMBINATION MILLS

FIRST IT CUTS, THEN IT GRINDS

In this Gehl Mill, roughage is fed through the feed rollers—chopped by the multiple-knife* cylinder head and dropped into the hammer cylinder. The screen around the hammers makes it possible to further reduce the feed to just the desired degree of fineness. The combination—*cutting first, then grinding, produces a better quality of feed.* Most of the work is done by the cutting head and, of course, it takes far less power to cut than to grind. *This mill takes dry roughage at least twice as fast as a plain mill with the same power.*

*3 Knives on size 41, 4 Knives on size 45.

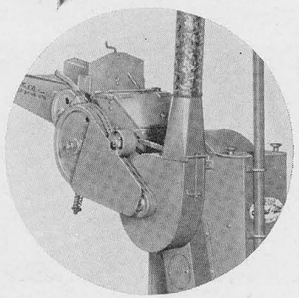


Cutterhead Attachment.

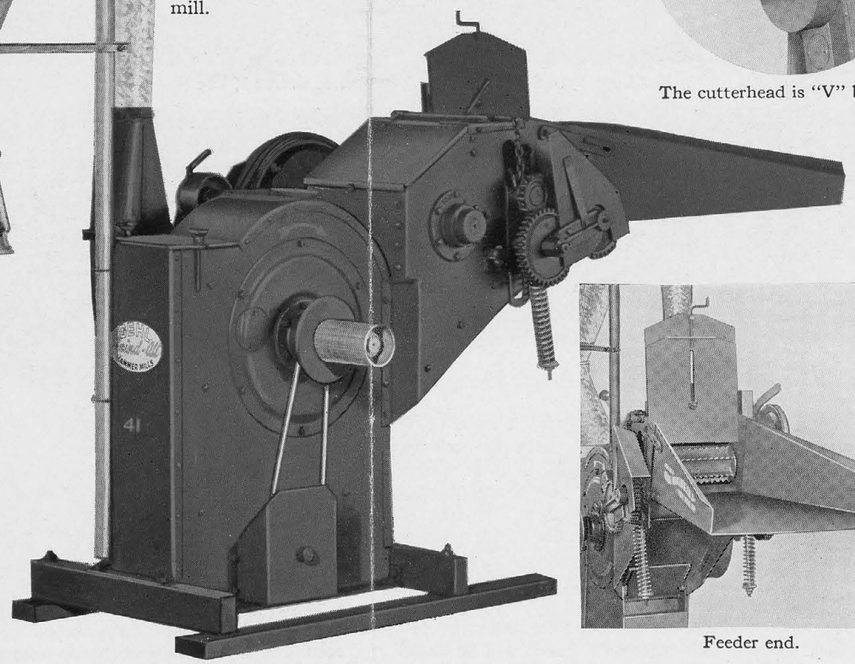


CUTTERHEAD EASILY ATTACHED

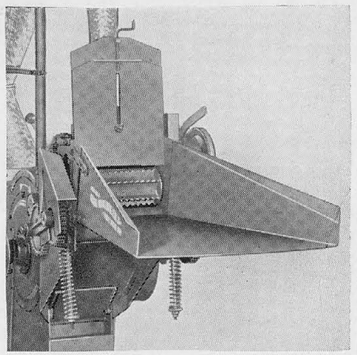
Gehl Combination Mills are made up by combining two units. The cutting head unit can be readily attached to the plain mill and will accept either the plain table as shown or a traveler feeder as shown on the opposite page. The plain table can be set at different angles to accommodate grain, ear corn, or roughage. The self-feeder outfit shown on the opposite page also includes grain hopper and the plain table. The feeders are so constructed as to make the changeover a job of only a few minutes. The traveling feeder fits only the No. 45 mill.



The cutterhead is "V" belt driven.



No. 41C and 45C Mill with cutterhead.



Feeder end.

GEHL Grind-All HAMMER MILL

BIG CAPACITY GRINDING—HAY CHOPPING

GEHL Grind-All HAMMER MILL

INCREASE THE VALUE OF HOME-GROWN FEEDS

It is more important than ever now to get the most out of your feeds. Roughage when fed whole is seldom completely consumed—coarser parts are rejected—some of it pulled out and trampled under foot, with a loss that runs all the way up to 50 per cent. Dry cornstalks are almost entirely refused, yet the stalk itself contains a large proportion of the food value in the plant. Pound for pound, it contains half as much food value as shelled corn. When run through a Gehl Mill, the cattle will relish and consume it without appreciable waste. Ground alfalfa has a feeding value equal to bran. Soy beans are consumed completely, stalk, bean and all. Sweet clover can be completely reduced, coarse stems and all, so that it can be fed without waste. The Gehl grinds practically any form of dry roughage profitably, as well as the usual grains, ear corn, etc.

FOR BIG CAPACITY ON DRY ROUGHAGE

For the farmer who has considerable dry roughage to grind, the self-feeder illustrated here is a profitable investment. It has the regular feeding mechanism as used in Gehl Silo Fillers. Top auxiliary roller combines with the traveling feed rack to make the machine very easy to feed. *Steady feeding means bigger capacity.* In many cases it is not necessary or desirable to reduce roughage too finely. When the screen is left out, the capacity of course is much greater and the resulting feed is often just right for cattle and sheep feeding. It is more uniform than regular chopped roughage — no big chunks or long hay, but coarser than if it had gone through a screen.

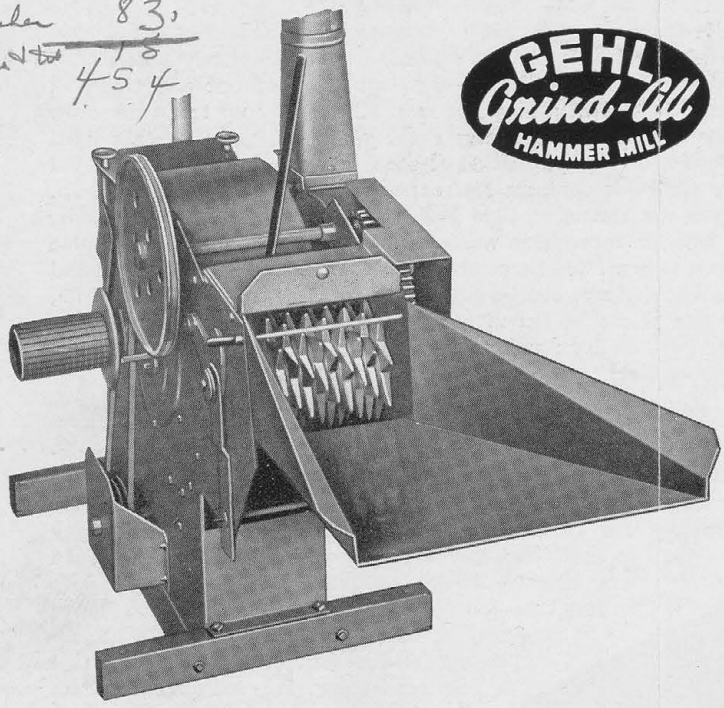


No. 45CS Mill with Grain Hopper attached. Grain and roughage may be ground together if desired.

No. 45CS Mill with cutterhead and self feeder. For roughage only.

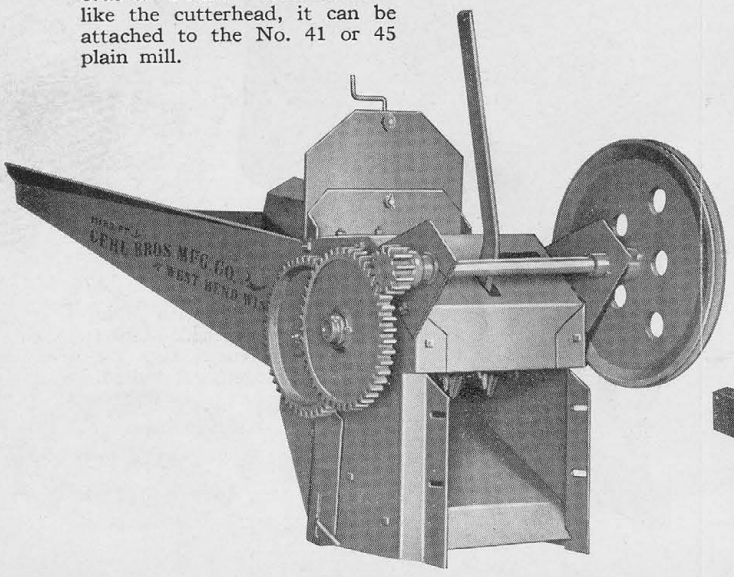
GEHL MILL with CRUSHER-FEEDER

Mill 175,
Prot Tub 196,
Crusher 83,
Trans Tub 18
454



Throat View of the Crusher Feeder. Crusher roller can be set and locked at the desired height, or allowed to float.

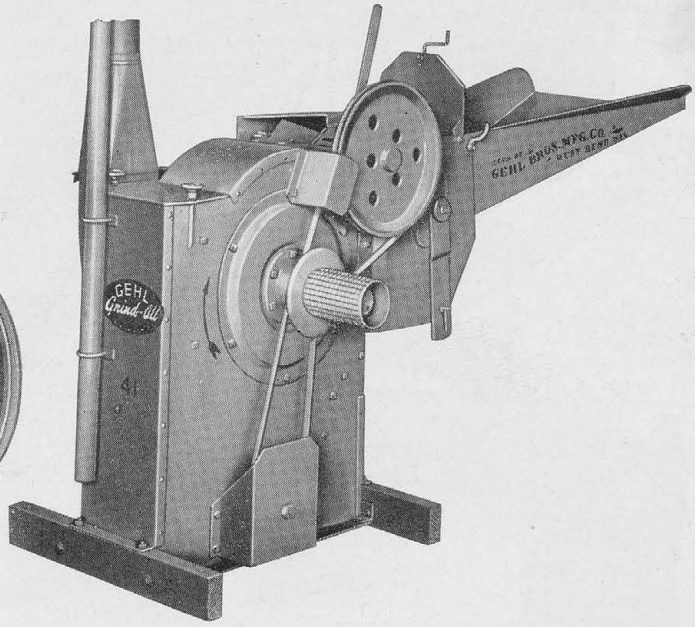
Crusher Feeder Attachment — like the cutterhead, it can be attached to the No. 41 or 45 plain mill.



Here is a mill with all the *famous Gehl features: Slow speed, big capacity; positive, non-clog elevation; uniformity of granulation; tough plate steel construction, and the added feature of an efficient crusher-feeder.* This attachment can be fitted to the plain mill and is especially convenient where much ear corn is to be ground. It partially crushes the ears as they go under the rollers, making it possible to control volume more accurately, and making the mill run much more smoothly. Even feeding has a big effect on the hourly capacity.

HANDLES EAR CORN, GRAIN OR ROUGHAGE

By raising or lowering the crusher roller, and locking it in position, the rate of feeding ear corn can be varied to meet conditions of power, fineness of grinding, etc. When locked in place, the roller acts as a crusher and feeder as well—when allowed to run free, it is an effective roughage feeder. *It keeps the roughage under control . . . prevents it from being "yanked" into the cylinder,* holding it back and giving the hammers a chance to reduce it as it enters.



Mill with Crusher Feeder—pulley side.

DOANE'S
Agricultural Report T.M.

ADJUSTING CROP-SHARE LEASES TO NEW FARM TECHNOLOGY

The crop-share cash lease is the most widely used of all leasing agreements. In most areas custom has established the basic provisions of these agreements. But customary lease provisions have not always kept pace with the changes in technology. As a result, contributions and income-sharing may not reflect a fair and equitable lease. Custom is a starting point for adjustments that should take into consideration modern technology, variances in expenses and prices, and the long-run, over-all good of the farm.

DETERMINING A FAIR RENT

The farm business not only has fixed, but also variable, expenses. Since income should be shared according to contributions, variable expenses should be shared in the same manner as fixed expenses. Fixed expenses are the ones that hold constant even though farm output changes. For instance, taxes and land charges do not change much but seed and commercial fertilizer do with increased output.

The table on the back of this page can be used quite effectively to determine the extent of contributions and consequent income sharing of the parties involved.

PROBLEM AREAS IN LEASE ADJUSTMENT

The variable expenses give the most difficulty. Benefits gained by each party are the principal gauge in arriving at an equitable agreement. From the landlord's standpoint, emphasis should be on liberal sharing to create an atmosphere of incentive for the tenant. On the other hand, the tenant should be willing to contribute his fair share on those things from which he will directly benefit, even though expenditures will have a long-run benefit.

Insect Control. Since both parties receive a direct benefit from insecticide use, these spray materials are normally shared according to sharing of income. The tenant would furnish the labor and extra machinery. In some cases, if there is need for added investment in machinery, the landlord would furnish the material and the tenant the labor and machinery. Custom spraying would normally be shared the same as the income.

Commercial Fertilizer. Limestone has a long-term benefit to the soil. In fact there is some value up to 10 years. What about the tenant sharing in the cost and then moving after 2 years without receiving full benefit from his investment? A charge-off of, say, 20% a year might be set up. Another item to consider is that limestone does not ordinarily become available the first year -- skip that year. Thus, if the tenant leaves after the second year he would be reimbursed 80% of his investment.

The carryover of soluble fertilizers containing nitrogen, phosphate and potash is not very great. Normally there should be no consideration given to nitrogen carryover and for superphosphate and potash in average applications. For heavy applications, consideration should be given a 3-year carryover.

Rock phosphate should be handled in the same manner as limestone.

Soil Conservation Practices. Contouring expense is normally borne by the tenant since there is relatively small increase in expenditure. Also the tenant realizes an immediate benefit from savings in power and increased yields.

Terraces are a long-term item. The landlord should almost invariably bear all expenses of erection. In rare instances a tenant shares expenses and is given a 5-year (20% per year) write-off for his share. The tenant should be charged with the responsibility of terrace maintenance once the terraces are erected.

Other long-term items are: farm ponds, dams, drainage tile and fencing. The landlord normally bears the expense of materials. Minor maintenance falls to the tenant.

Weed Control. In many cases the landlord furnishes the material and the tenant the labor and machinery. If the farm is heavy on weeds, the landlord might furnish the material and pay for custom spraying the first year.

Harvesting Costs And Crop Conditioning. When combining first came into being it was the common practice to share the combining expenses since landlords had already been paying part of the threshing expense. In some instances the gasoline expense is shared, when the machine is owned by the tenant. In others, the landlord pays the custom rate on his part of the crop. Sometimes the landowner pays a flat rate per acre to cover his combining. Usually the landlord does not pay any combining on 1/3 - 2/3 leases.

Corn pickers and cotton pickers came in as a labor-saving device. Thus, the tenant normally picks up the tab. What about picker-shellers and crop dryers? The use of picker-shellers can benefit the landlord as well as the tenant. Both benefit by reduced field losses, reduction in storage costs and spoilage.

Under the conventional methods of harvesting, the landlord and tenant share in the costs of shelling -- the picker-sheller eliminates this.

What about mechanical drying? How should these costs be shared? Mechanical drying and picker-sheller must be considered together. Closely coupled with the fixed investment is the added cost of fuel and electricity. The fixed investment could be handled as follows:

Tenant -- owns the field sheller, hauling and unloading equipment, including wagons, portable augers and corn dumps. He also furnishes tractor for batch heated-air dryer powered by power take-off and all of the labor.

Landlord -- owns the storage structure, drying equipment, moisture tester, fuel tank and any additional electrical facilities.

The landlord and tenant would then share in the costs of fuel and electricity in proportion to their sharing of the crop.

Grain Storage. This is normally a landlord expenditure. What if there is limited storage? The tenant and landlord should share in the available storage in proportion to their sharing of the crop. If the tenant chooses, he could erect portable storage and jointly share in the cost, with a write-off of the unused value, or he could take the units with him if he moves.

Improvements. Buildings on a crop-share farm do not directly benefit the landlord. However, there may be some indirect benefits, such as keeping or attracting better tenants and increasing the value of the property. Tenants, on the other hand, are reluctant to make expenditures due to the insecurity of tenure -- they may be required to move before they have realized a return on their investment.

In the case of minor repairs, the problem can be handled pretty well by the landlord furnishing the material and tenant the labor. Major repairs cannot be solved that easily.

There may be several answers to the problem. Here are some possible solutions?

1. The tenant be given a long-term lease ... say for 10 years. By the time the lease had expired the tenant would have realized the bulk, if not all, of his investment.

2. The landlord agrees to compensate the tenant for any unused benefits at the end of the lease. The tenant could build and have it charged off or the landlord could build and charge the tenant added rent over the useful life of the building.

3. Another alternative may be for the tenant to build movable buildings that he could take with him at the end of the lease term.

GUIDE FOR ESTIMATING AN EQUITABLE LEASE

Item of expense	Estimated total value	Estimated interest rate	Estimated annual cost: Whole farm	Landlord's share	Tenant's share
I. FIXED EXPENSES:	*Dollars*	*Percent*	*Dollars*	*Dollars*	*Dollars*
A. Fixed investment expenses:					
Land					
Farm buildings					
Tractor, truck and automobile					
Machinery and equipment					
Breeding stock					
Operating cash					
Total section *A*	xxx	xxx			
B. Fixed operating expenses:					
Labor					
Tenant's					
Unpaid family					
Landlord's					
Hired					
Depreciation					
Buildings, fences and others					
Tractor, truck and automobile					
Machinery and equipment					
Repairs					
Buildings, fences and others					
Machinery and equipment					
Taxes					
Insurance					
Limestone					
Rock phosphate					
Conservation measures					
Management					
Total section *B*					
Total section I					
Percent contributed by: Landlord					
Tenant					
II. VARIABLE EXPENSES:					
Hired labor, including board					
Tractor operating costs					
Truck operating costs					
Automobile, farm operating costs					
Machine work hired					
Seed					
Commercial fertilizer					
Pesticides, insecticides					
Other crop expenses					
Feed					
Veterinary and sanitation					
Other livestock expenses					
Electricity for the farm					
Telephone for the farm					
Total section II					
Grand total: Sections I and II					
Income to be divided			$		

Cash rent on farm dwellings:

Estimated value $_____ at _____ % ..... $_____

Depreciation, insurance and upkeep (add) ..... $_____

Total dwelling rent ..... $_____

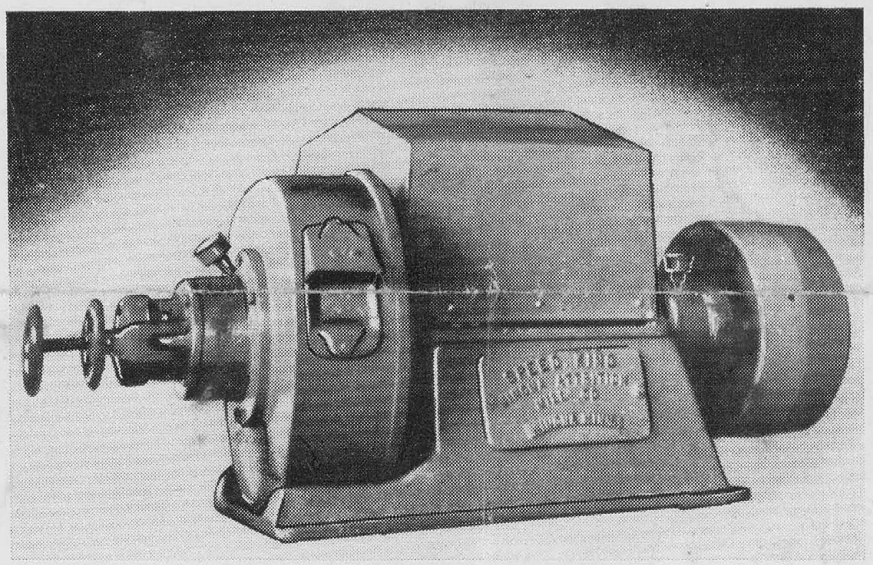
USDA

N.D.

WINONA ATTRITION MILL COMPANY

1009 WEST FIFTH ST. WINONA, MINNESOTA

SPEED KING CORN & COB CRUSHER



Large Size Type S

The Type S machine or large crusher was built especially for operators who crush an extra large amount of ear corn and want capacity. The large machine will also produce a fine job of cracked corn & wheat.

Construction

The large crusher is designed along the same lines as the small machine but it is an entirerly sturdier and heavier machine. It has large ball bearings mounted on a special alloy steel shaft. The crusher lugs are built extremely heavy. as well as other parts, such as, base, case, housing and frame. Two hand holes are provided in the case to permit the inspection of the plates and help in removing same.

Operation and Features

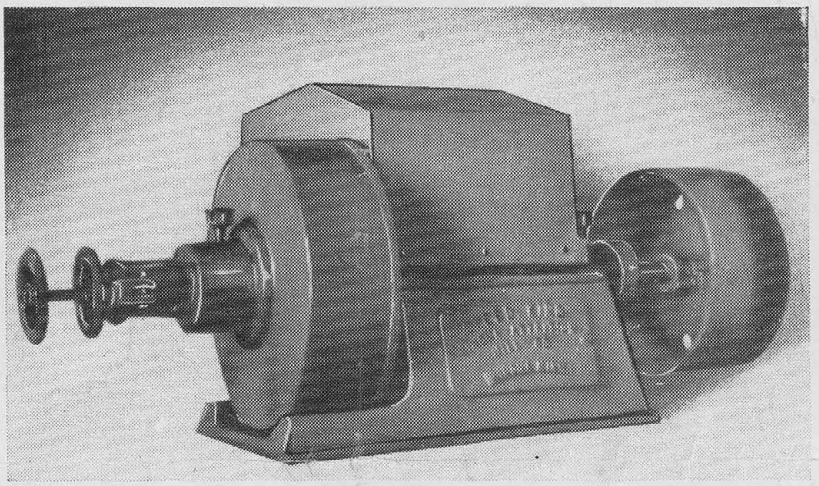
The working principal of this machine is the same as the small crusher but on a much larger scale. Safety features are provided as in the smaller machine. But due to the rigid construction of the machine it will crush more corn per horsepower than the Type B machine. Adjustment for finer or coarser grinding can be made while the machine is in operation.

This crusher can also be provided with V belt drive or direct motor connected. When direct motor connected the speed should not exceed 1140 R.P.M.

Specifications

Diameter Burr	Bushels Per Hour	Horse Power	Speed R. P. M.	Drive Pulley	Length Inches	Width Inches	Height Inches	Base Inches	Wght. Lbs.	Price with 15" Pulley
14" - 16"	80 - 180	15 - 30	750 - 800	15 x 6	56	32	27½	20 x 30	760	

SPEED KING CORN & COB CRUSHER



Small Size Type B

This crusher is generally used for crushing ear corn- wet, dry or frozen and with husks. It is an ideal crusher for crushing corn and cob for steer feed and will do a fine job of cracking corn and wheat.

Construction

The Speed King crusher is ball bearing, perfectly balanced and runs quiet; there are no noisy gears or agitators. The bearings are mounted on high grade shafting, especially adapted for taking heavy loads. All parts that wear out can be renewed at a very reasonable cost. The grinding plates or cutters are different than ordinary burrs and are designed especially for long life, capacity and producing a uniform product. Different designs of plates can be had for different classes of work.

Operation and Features

The crushing is done by revolving crusher lugs which are fastened to the main shaft. The lugs carry the corn to a corrugated bar below the lugs which reduces the cob and conveys it into the burrs. By this force feed method no clogging or plugging can take place. Adjustment for fine or course grinding can be made while in operation. The crusher also has safety features. There are two hard maple pins near the adjusting wheels and in case of iron, these will snap and release the burrs. Also, should a piece of iron get into this machine, the lugs which are of the clutch type, will cause the steel pin at the driver end to shear off and if one of the lugs break, the other lugs will disengage and prevent any material from entering into the Burr.

The crusher can be furnished with V belt drive or direct motor connected. When direct motor connected, the speed should not exceed 1140 R. P. M.

Specifications

Diameter Burr	Bushels Per Hour	Horse Power	Speed R. P. M.	Drive Pulley	Length Inches	Width Inches	Height Inches	Base Inches	Wght. Lbs.	Price with 15" Pulley
14" - 16"	50 - 100	10 - 15	650 - 700	15 x 6	48	30	24	18 x 26	500	

[1940s-50s]

JOHN DEERE

Quality Equipment

FOR YOUR FARMING OPERATIONS

Tractors: Standard tread, general-purpose, and orchard, in sizes and types for every farm, crop, and purpose. Tire pumps.

Plows: All sizes and types, including integral moldboard and disk types for John Deere general-purpose tractors. Disk plows; middlebreakers. Disk tillers in all sizes. Plow-sole fertilizer attachment for plows.

Listers: One-, two-, three-, and four-row for cotton, corn, and other crops. Integral middlebreakers and bedders and bedder planters for John Deere general-purpose tractors.

Harrows: Single- and double-action disk types. Offset disk harrows for orchard, vineyard, and cover-crop work. Spike-tooth harrows for horse and tractor operation, spring-tooth harrows, and spring-tooth weed destroyers. Stalk cutters.

Deep Tillage Equipment: Panbreakers, chisels, and combination units, available with a variety of tillage attachments.

Earth-Moving Machinery: Rotary farm scrapers, landshapers, land levelers.

Grain Drills: Tractor- and horse-drawn grain drills in a size and type for every drilling job. Plain drills, fertilizer-grain drills, press drills, plow press drills, deep furrow drills, and grass seed drills available. Adjustable-gate fluted force-feeds or double-run feeds. Choice of furrow openers. Fertilizer attachments available. Lime and fertilizer distributors.

Planters: One-, two-, and four-row for corn, cotton, peanuts, and many other crops. Multi-row planters for beets, beans, and other narrow-row crops with or without fertilizer attachment. Planting and fertilizing attachments for cultivators. Transplanters.

Potato Machinery: One- and two-row planters, with or without fertilizer attachment. Two-row tractor-drive diggers. One-row diggers —ground- and tractor-drive.

Cultivators: One-, two-, four-, and six-row for surface-planted crops; one-, two-, and four-row for listed crops. Field and orchard cultivators with stiff or spring teeth. Alfalfa cultivators. Beet and bean cultivators for horses and tractor. Deep tillage chisel cultivators. Rotary hoes. Rotary hoe attachment for tractor cultivators. Rod weeders.

Dusters: For cotton, vegetables, orchards, and groves.

Hay Machinery: Enclosed-gear horse mower, tractor-drawn mower, power-driven mowers. Side-delivery rakes, hay loaders, overshot stackers, sweep rakes, sulky rakes. Automatic pick-up baler; light power baler; field hay chopper.

Harvesting Machinery: Combines and threshers. Grain binders, corn binders. Windrowers. Power-driven one- and two-row corn pickers. Ensilage harvester. Blower. Kaffir header. Beet lifters. Beet harvester. Beet loader. Bean harvesters. Peanut pullers. Cotton harvesters.

Grain Elevators: Portable, for ear corn and small grains, portable type for small grains only. Trench silo elevator.

Hammer and Roughage Mills: Shellers for hand and power use.

Manure Spreaders: Horse-drawn and tractor-drawn. Also lime-spreading attachment. Manure loader.

Farm Wagons: All-steel rubber-tired wagons to meet all farm needs.

Get QUALITY *and* SERVICE – JOHN DEERE DEALERS GIVE BOTH

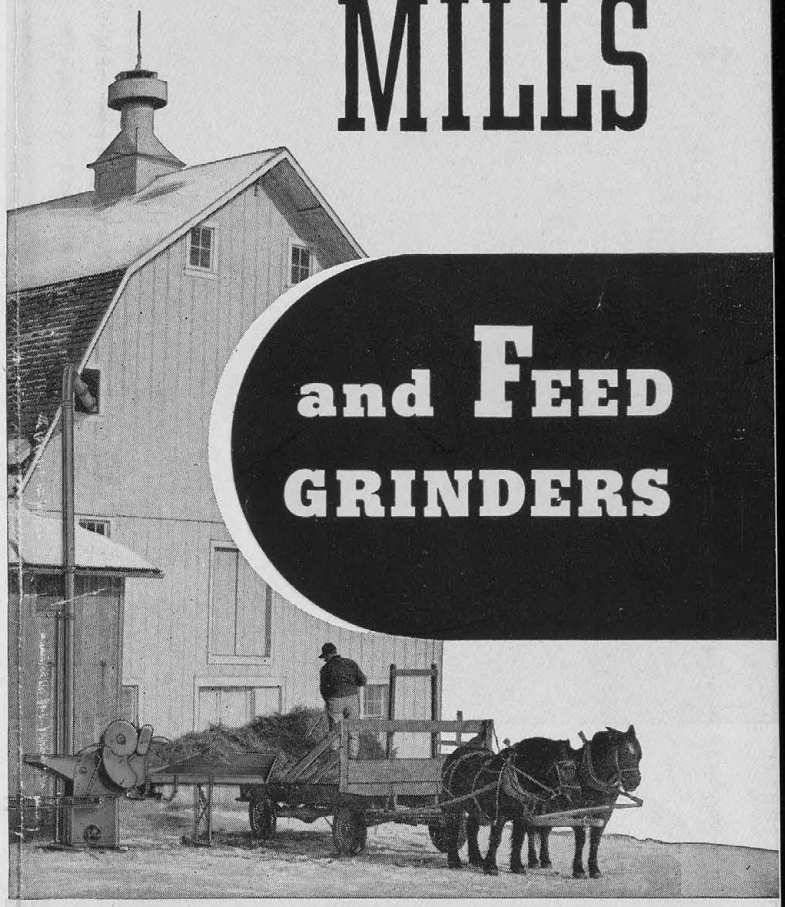
JOHN DEERE QUALITY FARM EQUIPMENT

When you buy John Deere Implements, you are sure of prompt repair service during their long life.

A625-7-48

JOHN DEERE

ROUGHAGE MILLS



and FEED GRINDERS

MAKE *Better Feeds at Lower Cost*

THEY HANDLE *Every* FEED-MAKING JOB



Chop

HAY, FODDER and ROUGHAGE

Your hay, fodder and roughage crops go farther, pay out in more milk . . . more pounds of meat, require smaller storage space, and are easier to feed when you process them with a John Deere Feed Mill. Picture at left shows the No. 114-A Roughage Mill and Feed Grinder chopping corn fodder.



Grind

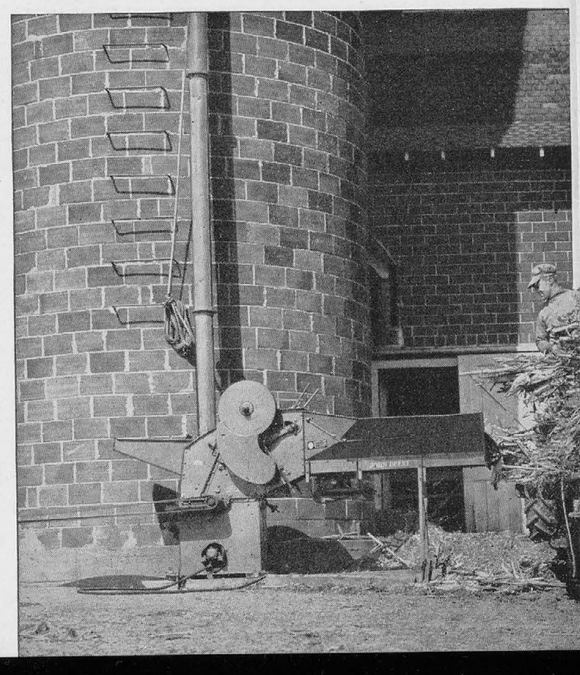
EAR CORN and all SMALL GRAINS

Ear corn, shelled corn and all small grains can be ground speedily and to any degree of fineness with a John Deere Feed Mill. Picture at right shows the No. 110-A Roughage Mill and Feed Grinder grinding ear corn on an Illinois stock farm.



Mix FEEDS

You can save a lot of money by mixing your own home-grown feeds in any desired ratio with a versatile John Deere Feed Mill. Feed hay, fodder or roughage crops into one end of the mill, and shelled corn, small grains or soy beans into the other, and you'll have high-grade feed at rock-bottom cost. This farmer is mixing oats and alfalfa hay with his No. 114-A Roughage Mill and Feed Grinder.



Fill SILOS

John Deere Feed Mills can be quickly adapted for filling above ground or trench silos. In corn, kaffir, green hay—whatever your ensilage crop may be, you'll do a good job with a small crew and at low cost. Below you see the No. 110-A Mill making corn silage.



You can turn out More Feed Per Hour with *Less Power*

CHECK THESE CAPACITY TABLES AGAINST YOUR NEEDS AND AVAILABLE POWER . . .











Material Ground	Size Screen	Degree of Grinding	Capacities Are Governed by Condition of Grain and Power Applied	
			Approximate Capacity per Hour—No. 110-A	Approximate Capacity per Hour—No. 114-A
Oats	1/20″	Extra Fine	480 to 800 lbs.	640 to 1120 lbs.
Oats	3/32″	Fine	640 to 1120 lbs.	800 to 1920 lbs.
Oats	1/8″	Medium	960 to 1280 lbs.	1120 to 2560 lbs.
Oats	3/16″	Coarse	1600 to 2560 lbs.	2080 to 3200 lbs.
Barley	3/32″	Fine	720 to 1440 lbs.	1680 to 3360 lbs.
Barley	1/8″	Medium	960 to 1680 lbs.	1920 to 4320 lbs.
Shelled Corn	3/32″	Extra Fine	2240 to 3080 lbs.	3360 to 4200 lbs.
Shelled Corn	3/16″	Fine	2800 to 4480 lbs.	4480 to 7000 lbs.
Shelled Corn	1/2″	Medium	4480 to 7000 lbs.	7000 to 9520 lbs.
Shelled Corn	1″	Coarse	5600 to 8400 lbs.	8400 to 12600 lbs.
Ear Corn	1/2″	Medium	3500 to 5600 lbs.	8750 to 10500 lbs.
Ear Corn	11/16″	Coarse	4200 to 7000 lbs.	9800 to 11900 lbs.
Snapped Corn	3/4″	Coarse	2450 to 4200 lbs.	7000 to 10500 lbs.
Wheat	1/16″	Fine	900 to 1500 lbs.	1800 to 3000 lbs.
Wheat	1/8″	Medium	1800 to 3000 lbs.	3000 to 4200 lbs.
Wheat	3/16″	Coarse	2400 to 3600 lbs.	3600 to 4800 lbs.
Soy Beans	3/32″	Extra Fine	1200 to 2400 lbs.	1800 to 3000 lbs.
Soy Beans	1/8″	Fine	1800 to 3000 lbs.	2400 to 3600 lbs.
Soy Beans	1/2″	Coarse	2400 to 4800 lbs.	3000 to 5400 lbs.
Alfalfa	1/16″	Extra Fine	1/2 to 1 ton	1/2 to 1-1/4 tons
Alfalfa	1/2″	Medium	1 to 1-1/2 tons	1-1/2 to 2 tons
Alfalfa	1-1/4″	Medium	1-1/2 to 3 tons	2 to 4 tons
Soy Bean Hay	7/8″	Medium	2 to 4 tons	3 to 5 tons
Prairie Hay	1-1/4″	Medium	1 to 2 tons	1-1/2 to 3 tons
Green Hay Silage	No Screens No Hammers	Fine to Medium	3 to 5 tons	4 to 6 tons
Grain Sorghum Silage	No Screens No Hammers	Fine to Medium	4 to 6 tons	5 to 7 tons
Corn Silage	No Screens No Hammers	Fine to Medium	4 to 7 tons	5 to 10 tons
Dry Corn Fodder	3/4″	Fine to Medium	3/4 to 1-1/2 tons	1 to 2 tons
Dry Corn Fodder	1-1/4″	Medium	1-1/2 to 3-1/2 tons	2 to 4 tons
Dry Grain Sorghum	1-1/4″	Medium	1-1/2 to 3-1/2 tons	2 to 4 tons

It's This Combination of *Cutterhead* and *Hammers*

that Insures Bigger Capacities with Less Power

THE remarkable capacities and low power requirements of the John Deere No. 110-A and No. 114-A Roughage Mills and Feed Grinders are largely the result of the combination cutterhead and hammer feed-reducing mechanisms shown here. Whether operating together or singly, these all-important units handle the feed being prepared speedily and without slugging or clogging. Running freely on draft-reducing ball bearings, they don't overload your tractor.

The combination of cutterhead and hammers makes the No. 110-A or No. 114-A a four-in-one machine—a straight chopper, an ensilage cutter, a combination chopper and hammer mill, or a straight hammer mill. In hay, fodder, roughage crops and ear corn, both cutterhead and hammers are utilized. In shelled corn, soy beans and small grains, hammers only are used, and in making ensilage, cutterhead only is used.

If you want to mix meals, grains, minerals or other supplements with your roughage, you can feed them into the grain hopper at the same time the roughage crop is being fed into the traveling feed table.

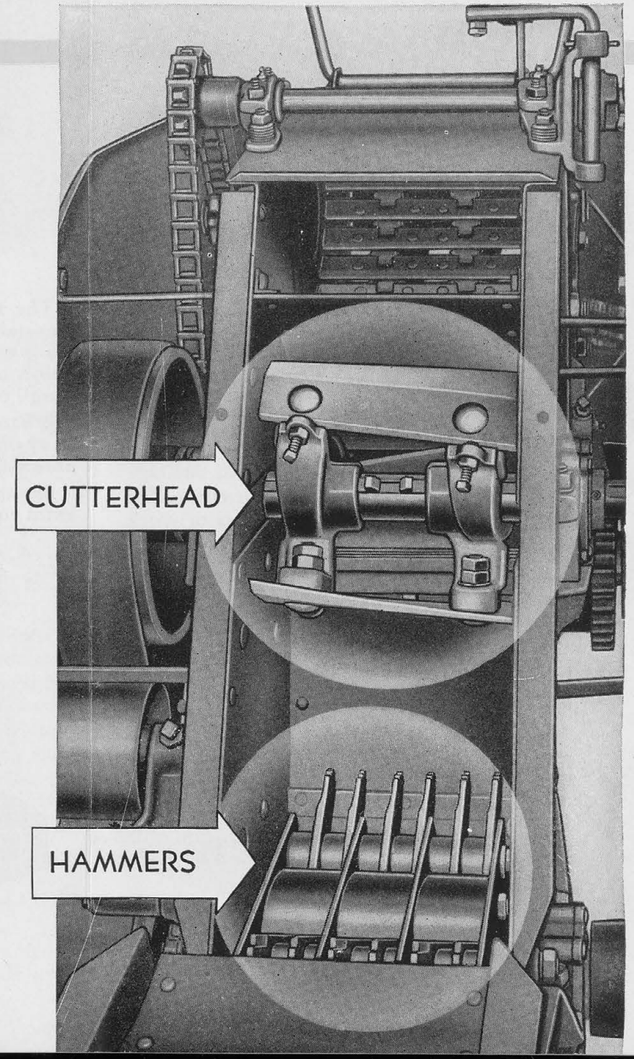


Figure 1.

With hood lowered, the cutterhead and hammer rotor are quickly and easily accessible to the operator.

Big Capacity, Governor-Controlled *Traveling* Feed Table Feeds Material *Evenly* to the Cutterhead

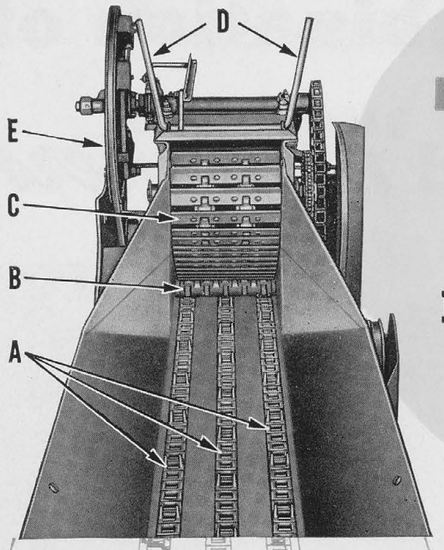


Figure 2.

Here is the big-capacity traveling feed table used on No. 110-A and No. 114-A Mills. "A" shows pronged conveyor chains; "B" is feed roll; "C" is spring-controlled pressure web; "D" is throw-out levers for feeder and feed roll; and "E" is the sensitive governor for feeder.

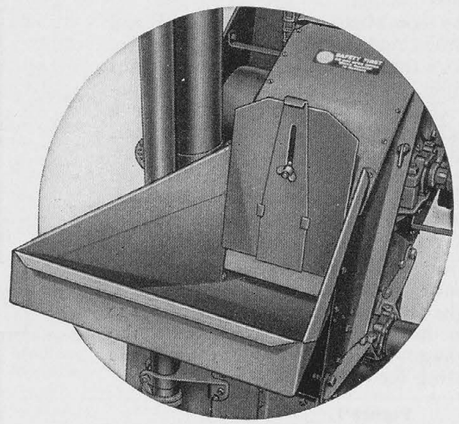
FEEDING ear corn, roughage, hay and ensilage crops into the big-capacity, governor-controlled traveling feed table requires a minimum of work and attention from the operator.

A floating pressure web and aggressive feed roll at the throat of the feeder deliver the material evenly to the cutterhead and hold it firmly for cutting regardless of the volume of material being fed into the machines. (See Figure 2 above.)

The simple, quick-acting governor engages the feed table drive when the cutterhead reaches operating speed and disengages it when speed drops below normal. This valuable feature prevents "slugging" of the mill.

A handy throw-out clutch for feeder and feed rolls has hand levers on both sides of the feeder—a valuable safety feature.

Extension sideboards for feeder are available as extra equipment. (See Figure 12 on page 16.)



Gate-Controlled GRAIN HOPPER

In grinding shelled corn, soy beans, or small grains, material is fed into the grain hopper at right. A double gate at throat of hopper permits regulating the flow of feed to the power applied.

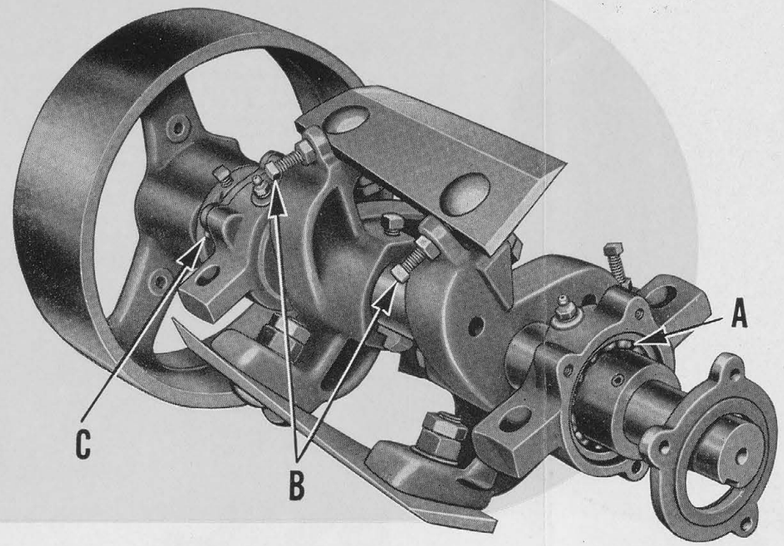


Figure 3.

The cutterhead runs on New Departure ball bearings, "A", insuring smooth, easy running and long life. Shear pins, "C", protect cutterhead against breakage should a pitchfork or similar destructive material go into the mill. Notice adjustable bolts, "B", which permit keeping knives in proper relation to shear bar.

Lawn-Mower-Type CUTTERHEAD Cuts *Fast* and *Clean*

THE heavy-duty, three-blade, lawn-mower-type cutterhead runs on anti-friction, heavy-duty, New Departure ball bearings which insure smooth, easy running, and long life. (See "A" in Figure 3.)

The high-quality spiral knives have a tool-steel inlay on the cutting edge. This edge is hardened for long life and the body of the blade is tough to reduce breakage. (See Figure 4.) These knives cut against a four-edged, reversible, hardened-steel shear bar which can be easily turned when the working edge becomes worn. The spiral shape of the knives insures faster, cleaner cutting and lighter draft.

The knives can be kept in proper relation to the shear bar by means of a convenient bolt adjustment. (See "B" in Figure 3.) Heavy bolts hold the knives securely to the malleable knife heads.

By changing the governor shaft sprockets, feed conveyor speed can be regulated to provide approximately 1/2-inch or 3/4-inch cut of material going through the cutterhead.

In case of destructive material going into the cutterhead, two shear pins in cutterhead drive sheave eliminate possibility of serious damage. (See "C" in Figure 3.)

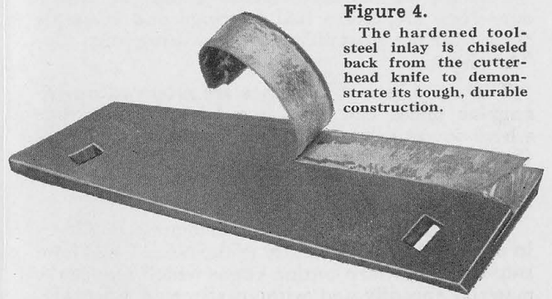


Figure 4.

The hardened tool-steel inlay is chiseled back from the cutterhead knife to demonstrate its tough, durable construction.

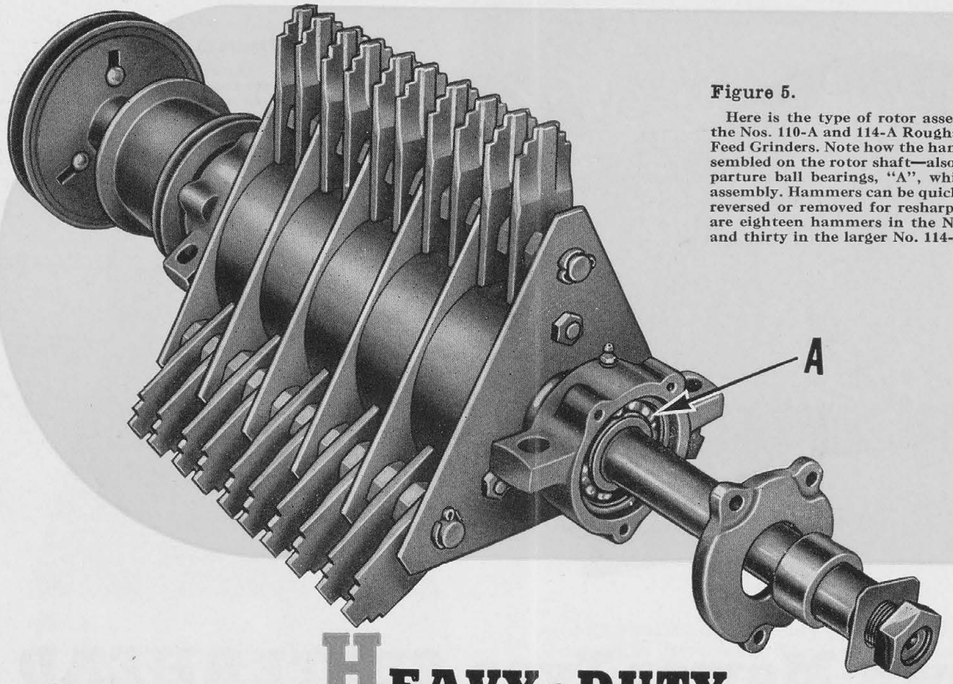


Figure 5.

Here is the type of rotor assembly used in the Nos. 110-A and 114-A Roughage Mills and Feed Grinders. Note how the hammers are assembled on the rotor shaft—also the New Departure ball bearings, "A", which carry the assembly. Hammers can be quickly and easily reversed or removed for resharpening. There are eighteen hammers in the No. 110-A Mill and thirty in the larger No. 114-A Mill.

HEAVY-DUTY GRINDING UNIT DOES *Better Work* AND *Runs Light*

THE tough, high-carbon steel rotor shaft, which carries the hammer assembly, runs on heavy-duty New Departure ball bearings and is amply strong for the most difficult feed-making jobs. (See "A" above.)

The three sets of hammers are mounted on triangular plates and separated by spacer castings which act as a heavy balance wheel on the shaft. (See illustration above.) This balanced, small-diameter rotor runs smoothly and requires a minimum of power.

The semi-rigid, heat-treated hammers, eighteen in the No. 110-A and thirty in the No. 114-A, have step-cuts and sharp cutting edges which reduce the material speedily and without slivering. (See Figure 7.) Hammers are of highest-grade hardened steel and are reversible to give double-wearing life. After both cutting edges are worn, they can be resharpened and their effectiveness renewed.

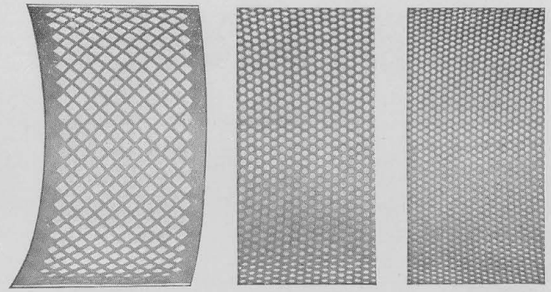
In localities where there is an excessive amount of sand and grit in the material being ground, special hammers that are exceedingly wear-resisting are available at additional cost.

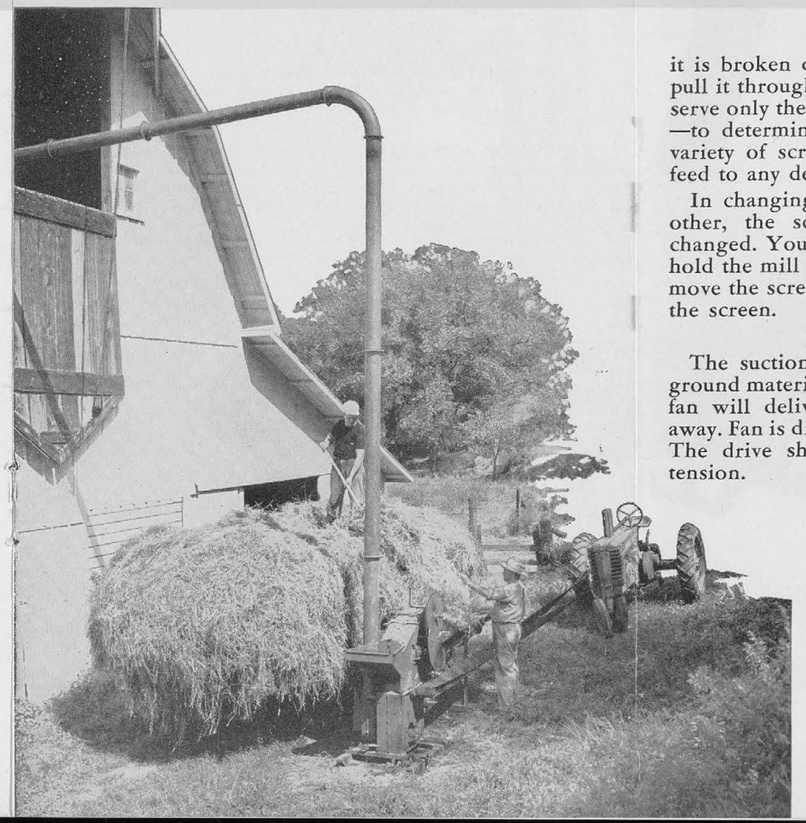
Hammers are spaced well away from screen—an advantage that insures bigger capacity, eliminates heating of materials, and prevents excessive wear on the screens.

Grinding is done by the hammers striking and cutting the material in mid-air, throwing it against the breaker bar and back against the hammers until

Figure 6.

The John Deere is regularly furnished with two screens—one with 3/16-inch punching and the other with 1-1/4-inch punching. Round hole screens in 1/32-inch, 1/20-inch, 1/16-inch, 3/32-inch, 1/8-inch, 3/16-inch, 1/4-inch, 5/16-inch, 3/8-inch, 1-1/4-inch and 1-1/2-inch sizes can be furnished. The square hole screens available are 1/2-inch, 11/16-inch, 7/8-inch and 1-inch sizes.





Chopping alfalfa hay and blowing it into the hay mow with the John Deere No. 110-A Roughage Mill and Feed Grinder. Equipped with 1-1/4-inch screen, this mill was handling three tons of hay per hour.

Figure 7.

At right—Showing one of the hardened steel hammers. Note step-cuts and sharp cutting edges. Hammers are reversible to give double-wearing life. When dull, they can be resharpened.

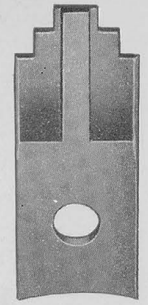
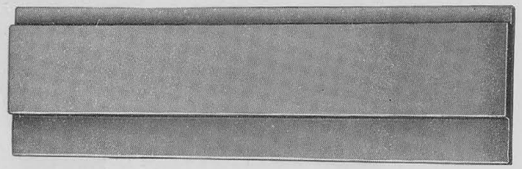


Figure 8.

Below—Showing the screen lock and breaker bar which holds screen securely in place and assist in faster, finer grinding.



it is broken down enough for the fan suction to pull it through the screen. Screens (See Figure 6) serve only the purpose for which they are intended—to determine the fineness of grinding. A wide variety of screen equipment permits grinding of feed to any desired fineness.

In changing from one type of grinding to another, the screens can be quickly and easily changed. You simply loosen the hand nuts which hold the mill top to the base, tip the top back, remove the screen lock and breaker bar, and lift out the screen.

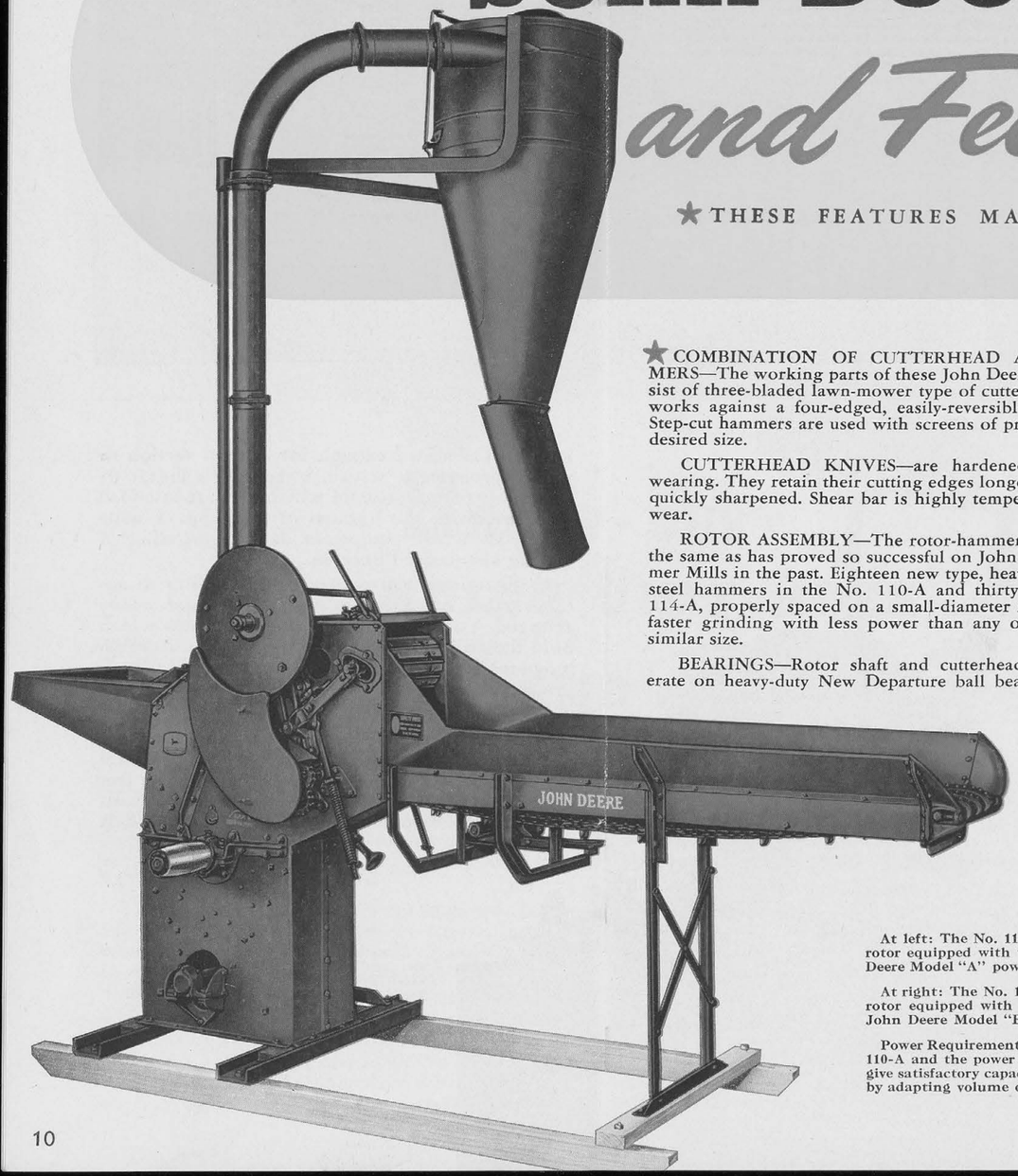
POWERFUL FAN

The suction of the three-bladed fan draws the ground material through the screen. This powerful fan will deliver ground material up to 60 feet away. Fan is driven by a V-belt from the rotor shaft. The drive sheave is adjustable for proper belt tension.

John Deere Roughage Mills and Feed Grinders

★ THESE FEATURES MAKE THEM A BETTER BUY FOR YOUR MONEY

JOHN DEERE
QUALITY FARM EQUIPMENT

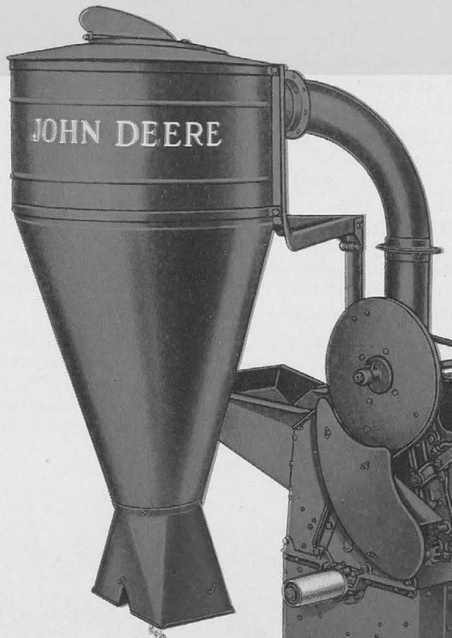


★ COMBINATION OF CUTTERHEAD AND HAMMERS—The working parts of these John Deere Mills consist of three-bladed lawn-mower type of cutterhead which works against a four-edged, easily-reversible shear bar. Step-cut hammers are used with screens of practically any desired size.

CUTTERHEAD KNIVES—are hardened and long wearing. They retain their cutting edges longer . . . can be quickly sharpened. Shear bar is highly tempered to resist wear.

ROTOR ASSEMBLY—The rotor-hammer assembly is the same as has proved so successful on John Deere Hammer Mills in the past. Eighteen new type, heat-treated, all-steel hammers in the No. 110-A and thirty in the No. 114-A, properly spaced on a small-diameter rotor, insure faster grinding with less power than any other mill of similar size.

BEARINGS—Rotor shaft and cutterhead shafts operate on heavy-duty New Departure ball bearings.



At left: The No. 114-A Mill with 14-inch feed table, cutterhead and hammer rotor equipped with wagon box feed collector. Works with tractors having John Deere Model "A" power.

At right: The No. 110-A Mill with 10-inch feed table, cutterhead and hammer rotor equipped with double sacking feed collector. Works with tractors having John Deere Model "B" power.

Power Requirements—Tractors having John Deere Model "B" power for the No. 110-A and the power equivalent of the John Deere Model "A" for the No. 114-A give satisfactory capacities. Smaller tractors will successfully power these mills by adapting volume of material being fed into the mill to available power.

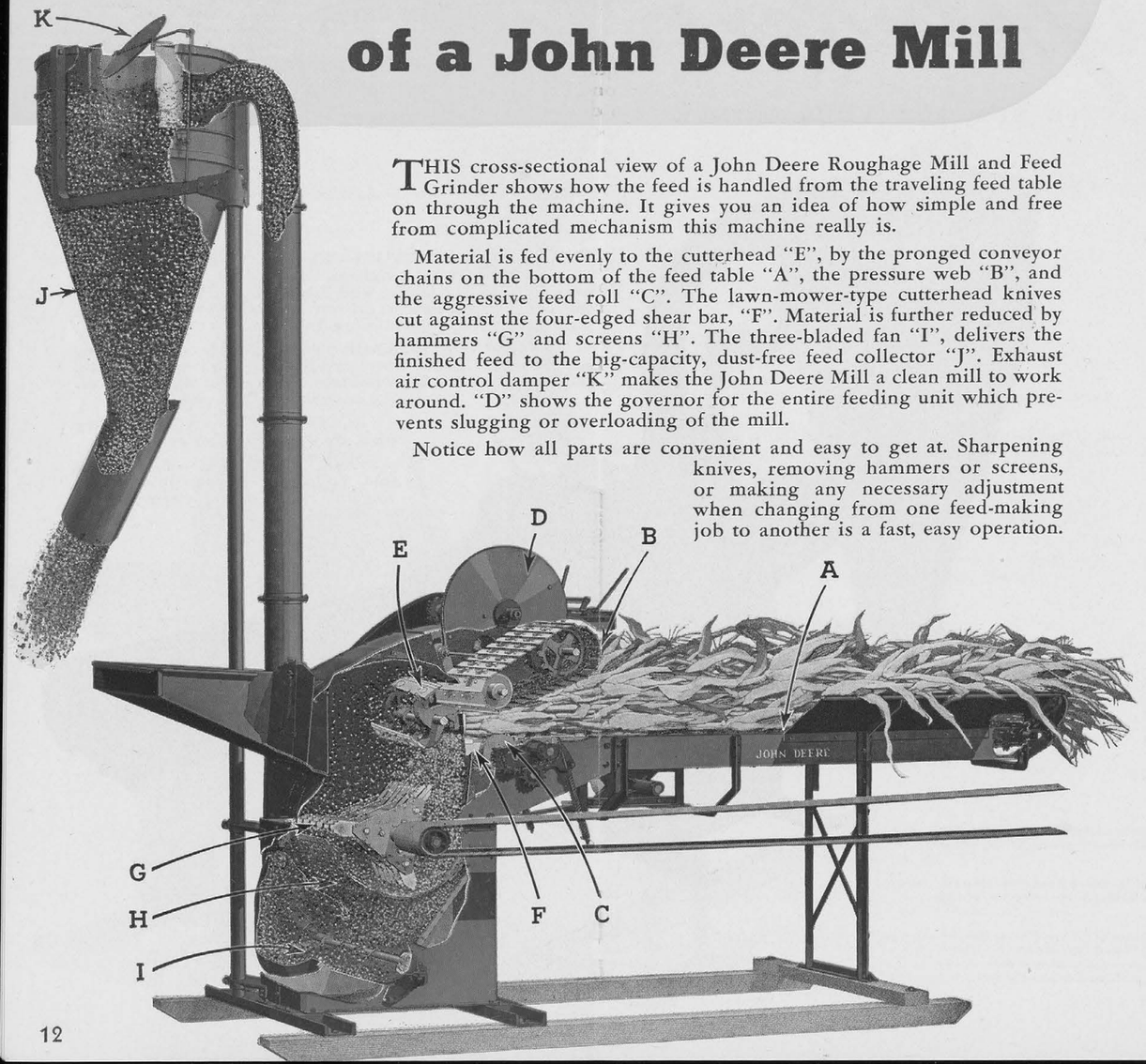
★ BIG-CAPACITY FEEDER—When grinding ear corn, chopping hay, fodder, or roughage, or cutting ensilage, the big-capacity, traveling feeder, with floating pressure web and feed roll, insures even, uniform delivery of material to the cutterhead, regardless of the volume being fed.

SENSITIVE GOVERNOR—Simple, highly sensitive governor engages feeder when cutterhead reaches normal speed, and disengages it when cutterhead speed drops slightly, allowing cutterhead to clean itself.

ACCESSIBILITY — All working parts are easy to inspect or adjust.

FEED COLLECTOR — Extra-large feed collector prevents troublesome clogging and insures a clean machine to work around.

This Cut-away Picture Shows What Goes On Inside of a John Deere Mill



THIS cross-sectional view of a John Deere Roughage Mill and Feed Grinder shows how the feed is handled from the traveling feed table on through the machine. It gives you an idea of how simple and free from complicated mechanism this machine really is.

Material is fed evenly to the cutterhead "E", by the pronged conveyor chains on the bottom of the feed table "A", the pressure web "B", and the aggressive feed roll "C". The lawn-mower-type cutterhead knives cut against the four-edged shear bar, "F". Material is further reduced by hammers "G" and screens "H". The three-bladed fan "I", delivers the finished feed to the big-capacity, dust-free feed collector "J". Exhaust air control damper "K" makes the John Deere Mill a clean mill to work around. "D" shows the governor for the entire feeding unit which prevents slugging or overloading of the mill.

Notice how all parts are convenient and easy to get at. Sharpening knives, removing hammers or screens, or making any necessary adjustment when changing from one feed-making job to another is a fast, easy operation.

FILL YOUR SILO WITH A *Small Crew* AT *Low Cost*

EITHER the No. 110-A or No. 114-A Mill can be quickly converted into an efficient ensilage mill. Cutterhead only is used in reducing the material. An open deflector is used to deliver the ensilage into either trench or upright silos. Flexible spouting can be attached to the deflector for distribution of ensilage inside the silo.

In filling upright silos, the powerful blast fan will elevate the ensilage to a height of sixty feet.

A simple molasses pump is available for mixing molasses with green hay ensilage or other feeds. It is power-driven from the mill and can be regulated to deliver the amount of molasses required.

A dial gauge shows the pressure of the molasses flow at varying temperatures. There's sufficient capacity in the John Deere Molasses Pump to handle up to 100 pounds of molasses per ton of hay.

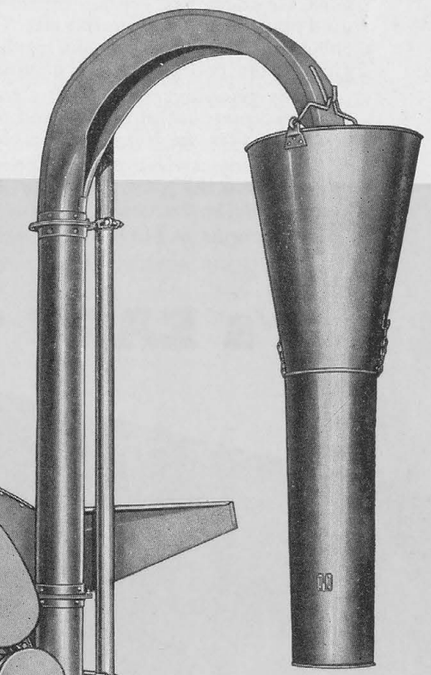
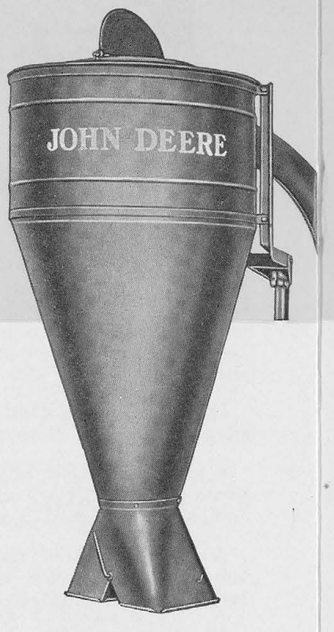


Figure 9.

Here is the John Deere No. 110-A Ensilage Mill equipped with open deflector, flexible spouting, molasses pump and special sideboards.

Feed Collector
IS EXTRA LARGE AND DUST FREE



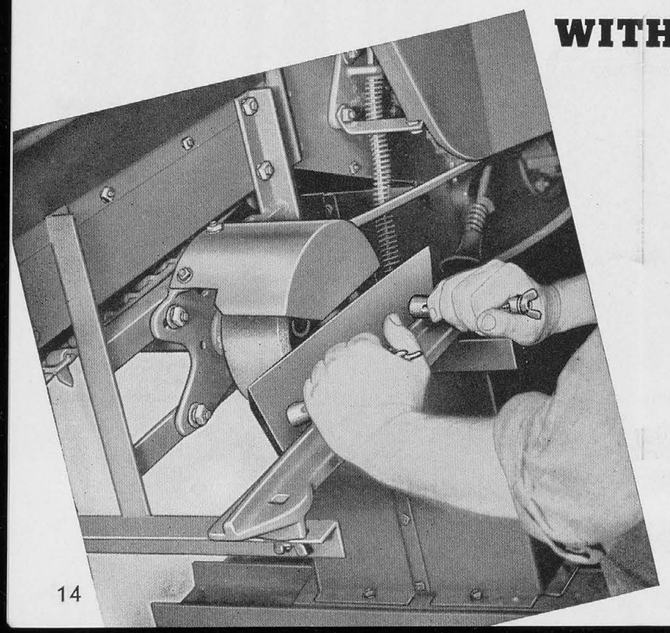
THE double sacker or wagon box spout feed collector for John Deere Roughage Mills and Feed Grinders has greater capacity than those used on other mills of similar size. The discharge end is extra large to prevent troublesome clogging in the collector when grinding coarse materials.

In fine grinding, the exhaust air control damper makes it easy to prevent material escaping out of the top and to regulate the discharge at the bottom. This damper makes the John Deere a cleaner mill to use inside a building.

The sturdy, swivel pipe support for the feed collector permits setting the collector on the pulley side or the fan side of the mill—a valuable feature every owner appreciates.

Extra lengths of blower pipe can be furnished for special settings.

IT'S EASY TO KEEP KNIVES SHARP WITH THIS *Grinder*



SHARP knives are necessary for successful cutting of hay and roughage. To make it easy to keep your knives sharp, a handy knife grinder is provided which attaches permanently to the traveling feed table and is operated by a V-belt from the rotor shaft. The knife guide on the grinder is easily adjusted to maintain the original bevel on the knife, thereby increasing its working life.

The steps and edges on the hammers can be kept in good condition by the use of the knife grinder. This will insure longer life and larger capacity.

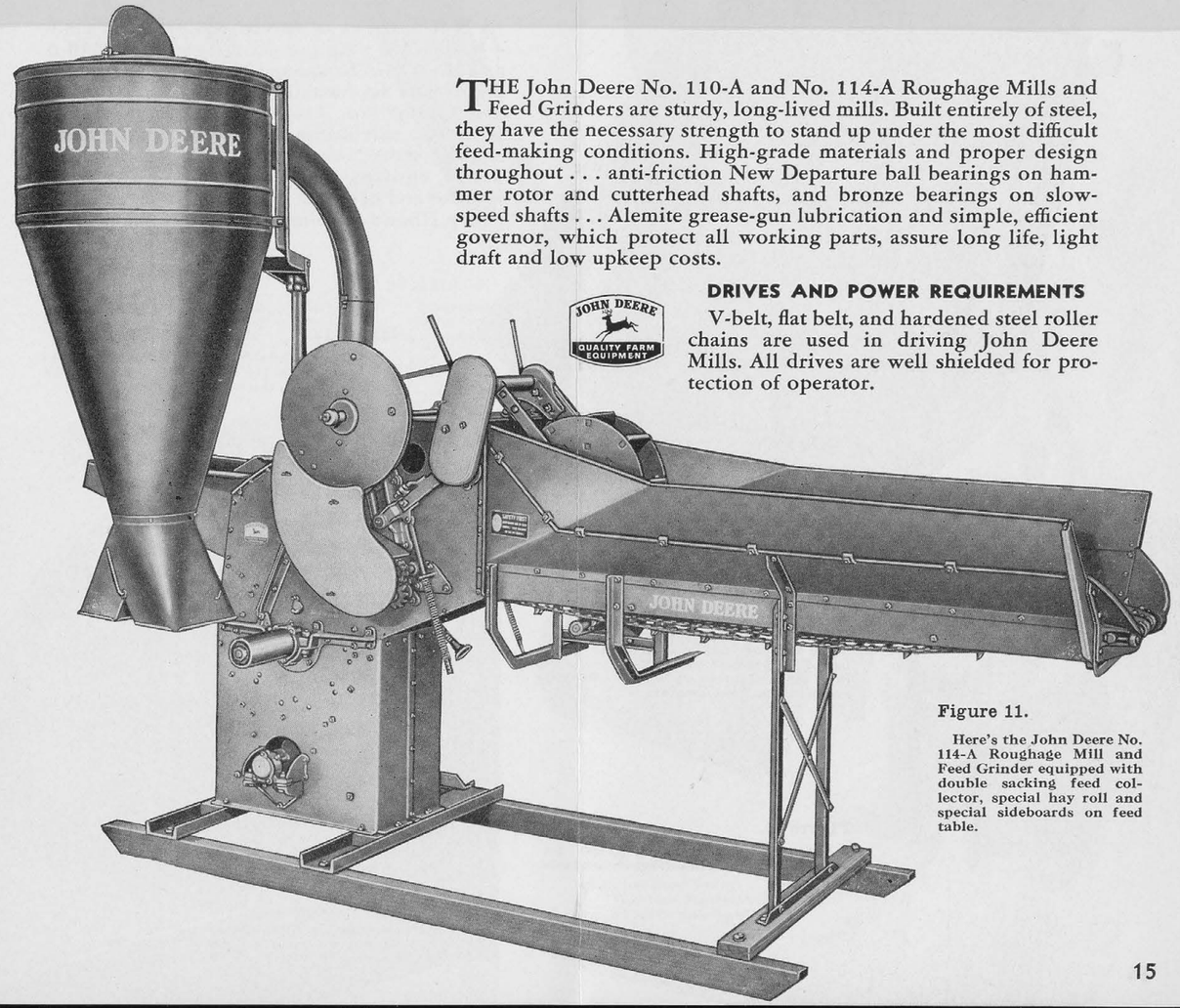
KNIFE HONE

A knife hone is regularly furnished for edging up the knives between resharpenings on the knife grinder.

Figure 10.

This money-saving, safe, efficient, and easy-to-operate knife grinder enables you to keep your knives in tip-top cutting condition.

Quality Built
For Years of Low Cost Service



THE John Deere No. 110-A and No. 114-A Roughage Mills and Feed Grinders are sturdy, long-lived mills. Built entirely of steel, they have the necessary strength to stand up under the most difficult feed-making conditions. High-grade materials and proper design throughout . . . anti-friction New Departure ball bearings on hammer rotor and cutterhead shafts, and bronze bearings on slow-speed shafts . . . Alemite grease-gun lubrication and simple, efficient governor, which protect all working parts, assure long life, light draft and low upkeep costs.

DRIVES AND POWER REQUIREMENTS

V-belt, flat belt, and hardened steel roller chains are used in driving John Deere Mills. All drives are well shielded for protection of operator.

Figure 11.

Here's the John Deere No. 114-A Roughage Mill and Feed Grinder equipped with double sacking feed collector, special hay roll and special sideboards on feed table.

SPECIAL EQUIPMENT

A WIDE variety of special equipment is available for adapting John Deere No. 110-A and No. 114-A Roughage Mills and Feed Grinders to your feed-making needs. It includes hay roll for the No. 114-A, special hard-surfaced hammers, sideboards for traveling feed table, anchor stakes, ensilage bucket, ensilage deflector, ensilage distributor pipe, adjustable elbow for end of 6-inch distributor pipe, and long sweep elbows for 6-inch distributor pipe.

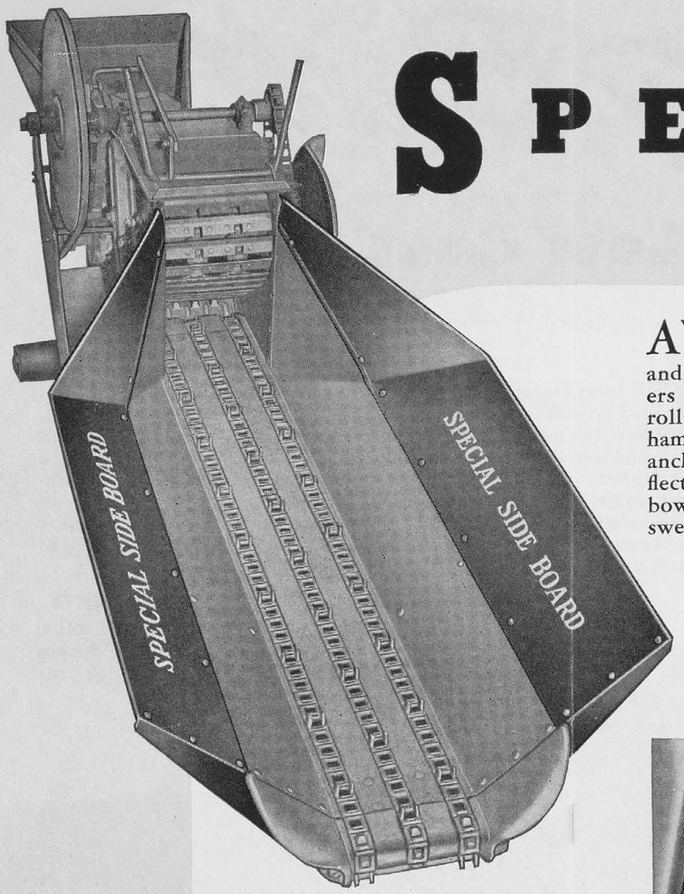


Figure 13.

At Right: A more even and uniform feed of hay into the cutterhead results from the use of this special hay roll, which is an extra for the John Deere No. 114-A Roughage Mill and Feed Grinder.

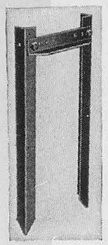
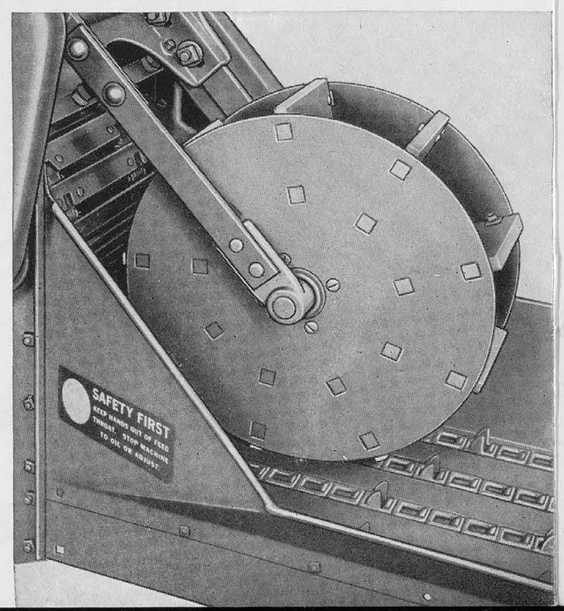


Figure 14.

At Left: Sturdy steel anchor stakes for anchoring the mill in setting are available as extras.

Figure 12.

At Left: Special sideboards are available for the No. 110-A and No. 114-A Mills which permit easier feeding of hay in the traveling feed table.



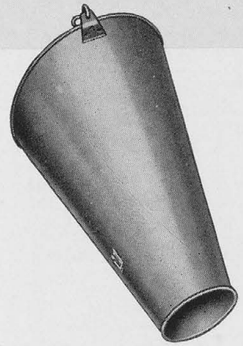


Figure 15.

Above: Ensilage bucket for directing flow of ensilage to any spot in silo.

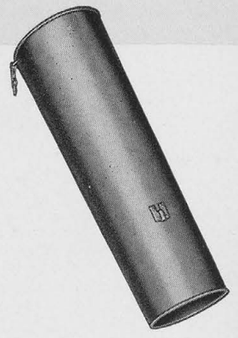


Figure 16.

Telescoping distributing pipe for attaching to ensilage bucket.

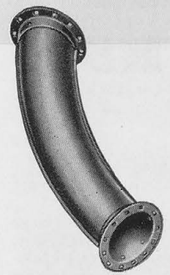


Figure 17.

Section of 45-degree long-sweep elbow for putting hay in the mow.

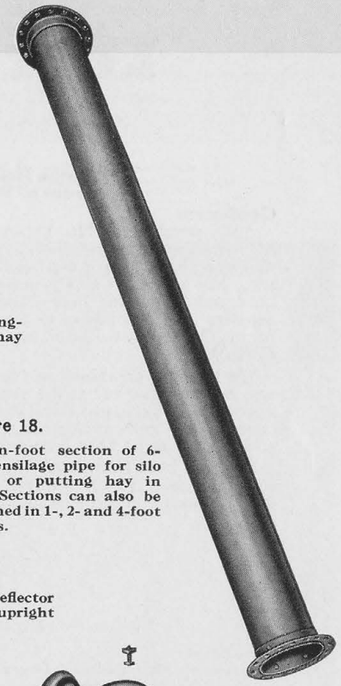


Figure 18.

Seven-foot section of 6-inch ensilage pipe for silo filling or putting hay in mow. Sections can also be furnished in 1-, 2- and 4-foot lengths.

Figure 19.

At Left: Long sweep ensilage deflector for use in filling trench silos.

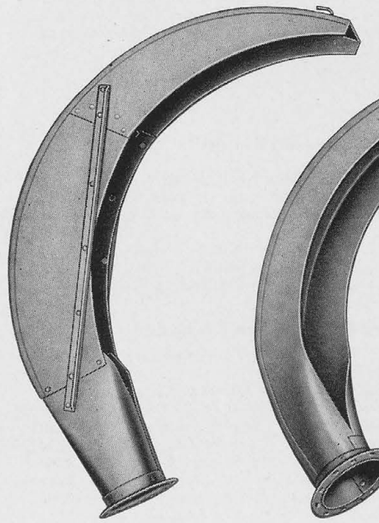


Figure 20.

At Left: Ensilage deflector for use in filling upright silos.

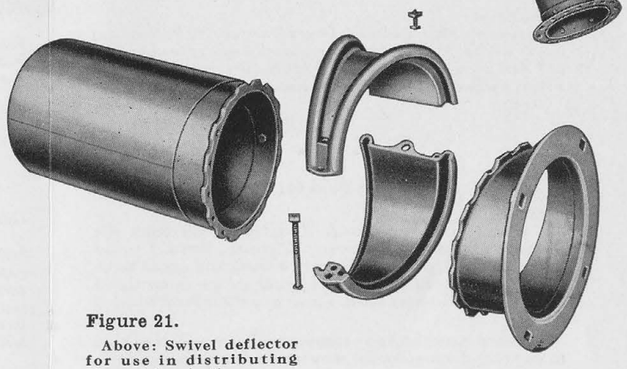


Figure 21.

Above: Swivel deflector for use in distributing chopped hay in the mow.

Read THESE LETTERS

"More Milk from Same Amount of Feed"

Gentlemen:

We purchased a No. 110-A John Deere Roughage Mill from your dealer, the Weaver Tractor Company, Sacramento, and have used it for three seasons chopping hay and corn and grinding grain for our dairy herd and hogs. Our John Deere Model "AO" tractor supplies plenty of power to operate the mill at full capacity. Ordinarily we grind hay at the rate of 1-1/2 tons per hour.

We like the combination idea of being able to cut and hammer our hay at the same time because it produces feed the cows like and there is no waste. We get considerably more milk from the same amount of feed and any saving is very important to us.

We have been in the dairy business twenty-five years in this vicinity and we would not want to continue without the advantages gained by using this roughage mill.

Very truly yours,
Charles N. Gage,
Elk Grove, California

* * *

"I Couldn't Do Without It"

Gentlemen:

I have a No. 110-A John Deere Hammer Mill which has been more than satisfactory. I grind all kinds of feed for myself and my neighbors. I grind all kinds of grain, grain in straw, fodder, and alfalfa hay. I couldn't do without it.

Very truly yours,
Oscar Plotner,
Saum, Minn.

* * *

"Mill Has Paid for Itself"

Gentlemen:

I bought a No. 110-A Roughage Mill from the Manson Implement Company, Manson, Iowa. I grind about 150 bushels of small grain a week and about three tons of long feed per week. I grind all the crops that I raise on my 280-acre farm. I also buy some feed which I grind.

I have never had any trouble with my mill clogging in any way. I sure like the way it grinds all types of feed.

I haven't had any trouble at all with my mill. Just hitch on and grind. I figure this mill has saved me the price that the mill cost already and will do so in the future.

Yours truly,
George Lyon,
Gilmore City, Iowa

* * *

"A Lot of Work at Very Reasonable Cost"

January 21, 1946.

Gentlemen:

I purchased a John Deere No. 114-A Roughage Mill in August, 1941. I have used this mill for silo-filling, about 200 tons each year, besides grinding grain of about yearly average of 8,000 bushels, and about 80 tons of dry fodder per year. This mill has done a very satisfactory job with very reasonable expense.

Yours truly,
Lester H. Harsh,
Bartley, Nebr.

* * *

"Cannot Say Enough About the Fine Job It Does"

February 7, 1946.

Gentlemen:

I purchased a John Deere No. 110-A Roughage Mill in the spring of 1945. I have ground ear corn, shelled corn, oats and soy bean and alfalfa hay, and I just cannot say enough about the fine job it does. I also will say that the capacity is more than I figured with this size mill.

Yours truly,
Louis R. Herlitz,
Cedar Lake, Indiana
R. F. D. 1

* * *

"Best Mill on the Market"

February 6, 1946.

Gentlemen:

In my opinion that John Deere No. 114-A Roughage Mill is the best mill on the market. I make this statement after having owned and used several other makes of mills. Belted to my John Deere Model "A", this mill has ample capacity and speed in grinding. It is an all-purpose mill that can't be beat.

Yours truly,
C. Arnold,
Fayette, Iowa

* * *

"Splendid Results"

Gentlemen:

I have about one hundred head of cattle. I have been feeding feed prepared with one of your No. 114-A Roughage Mills and can say that I am getting splendid results.

Yours truly,
John Snoddy,
Double Springs, Ala.

* * *

"More Capacity than I Figured"

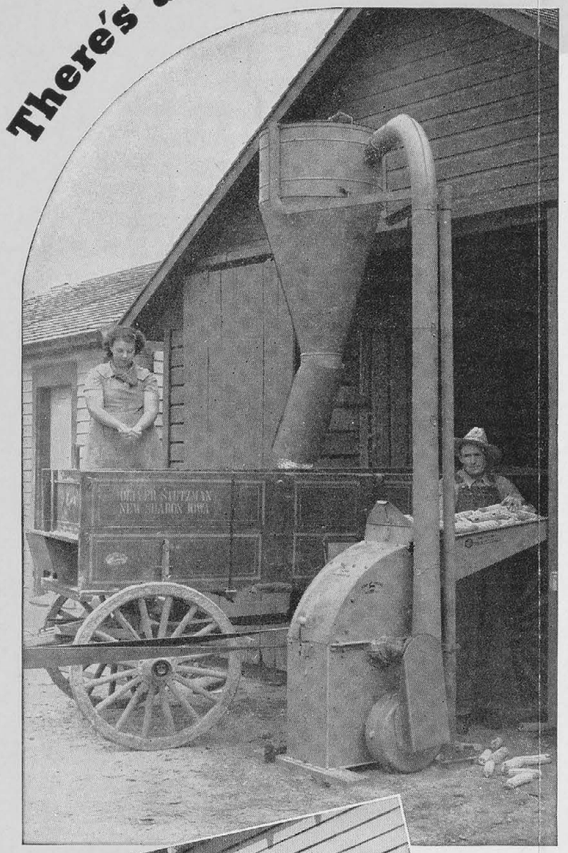
February 8, 1946.

Gentlemen:

I purchased a John Deere No. 114-A Roughage Mill last fall and we sure have worked it. This mill sure has capacity more than I figured. We grind oats and corn, ear corn and hay and fodder. I am feeding at the present time 68 steers and 100 hogs. My Model "G" Tractor sure handled this mill to full capacity and then some. This mill is a very good investment for any feeder or dairyman.

Yours truly,
Carl Giertz,
Chebanse, Illinois

There's a Full Line of Low-Cost JOHN DEERE HAMMER MILLS



FOR *Straight* GRINDING

FOR straight grinding of ear corn, shelled corn, small grains, and seed crops, you can't beat the economy and big capacity of a John Deere Hammer Mill. Made in 6-, 10-, and 14-inch sizes, you can get the mill that best matches your feed-making requirements.

← $360.00 without trailer or P.T.O.

At Left:

Grinding 170 bushels of ear corn an hour with the John Deere 14-inch Hammer Mill. That's getting the grinding done in a hurry.

Above:

Here's the new John Deere 6-inch Hammer Mill at work in ear corn. It can be operated with small electric motor or small tractor. It's the ideal mill for the small farm operator.

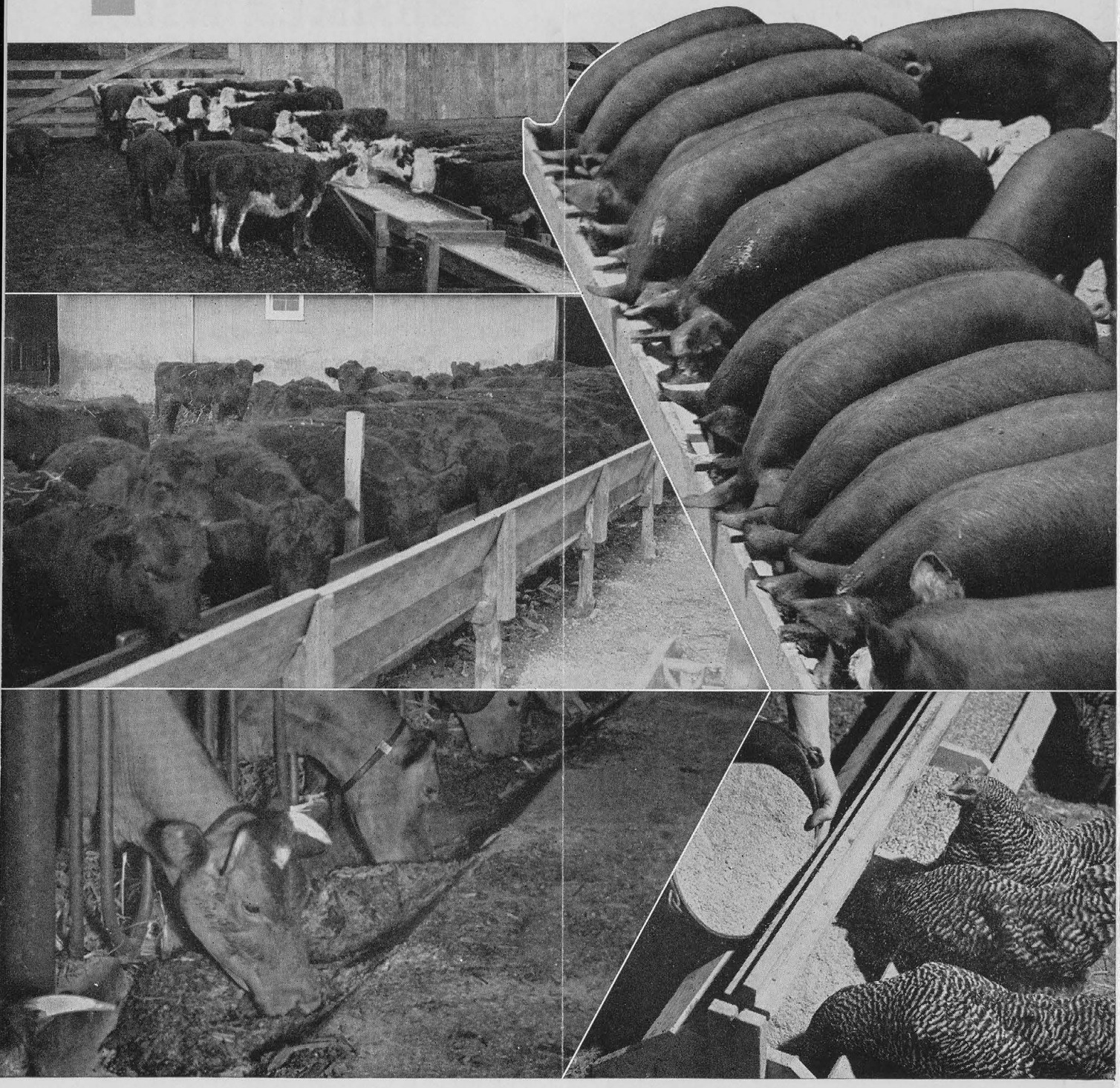


& $169.00 without trailer or P.T.O.

At Left:

Showing the John Deere 10-inch Hammer Mill doing a fast, low-cost job of grinding oats.

FEED IS WHAT YOU MAKE IT



MAKE THE MOST OF IT ON YOUR FARM

[1952?]

PROCESSING PLANT FOR PRODUCING YUCA STALK AND LEAF MEAL TO REPLACE ALFALFA MEAL IN TROPICAL AREAS

Milling Machinery, Inc.
1911 Baltimore Avenue
Kansas City 8, Missouri

PROCESSING PLANT FOR PRODUCING YUCA STALK AND LEAF MEAL TO REPLACE ALFALFA MEAL IN TROPICAL AREAS

- - - - - -

PROTEIN AND VITAMIN "A" TROPICAL NUTRITIONAL DISCOVERIES

In 1946 P. L. Wilson installed a tropical feed dehydration and processing plant in Costa Rica. The plant was located in the tropical lowlands in the Atlantic Zone. This project has been purchased by the Council of National Production of Costa Rica, and will be operated to improve the agricultural economy of Costa Rica by producing high quality dehydrated feeds.

The original objective was dehydration and processing yuca (called cassava in Dutch East Indies, and Manioc in Brazil) roots.

The stalks and leaves of the yuca plant had always been considered a waste product except that a small part of the bottom portion of the heavy stalk was used for planting new yuca root crops in the same manner that cuttings from sugar cane are used. In fact, the disposal of these stalks and leaves by removal from the fields or by burning was considered as being a part of the overhead cost of raising the yuca roots. During the course of the Costa Rica operations it was observed that stray hogs and cattle would avariciously consume the yuca stalks and leaves growing in the fields. Due to this fact, small samples of yuca stalks and leaves were harvested, ground into meal, dehydrated in a laboratory oven, and shipped via air mail to a U. S. laboratory. The laboratory analysis of the dehydrated yuca stalk and leaf meal resulted in one of the most startling tropical nutritional discoveries in modern times. The product was extremely high in protein and Vitamin A.

As a result of the dehydrated yuca stalk and leaf meal laboratory analyses the operators of the Costa Rica project developed a technic whereby they were able to economically process the yuca stalks and leaves on a large scale commercial basis. The following is a U. S. laboratory analysis of yuca stalk and leaf meal produced from five months old yuca plants on the Costa Rica plantation:

Protein	17.63%
Crude Fiber	22.20%
International Units of Vitamin A activity per pound	208,000

Excerpts from Joseph E. Seagram & Sons, Inc. feed ingredient analyses, per Page 25 of their "Feed Supplements and Proved Formulas" is listed herewith:

	% Protein	% Fiber	Vitamin A Units per pound
Alfalfa leaf meal dehydrated	20	18	100,000
Alfalfa meal dehydrated	17	27	60,000
Corn, common yellow	8	3	3,000
Oats	11	12	0
Wheat Bran	14	11	1,200

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It was found that when dehydrated yuca stalk meal was fed to milk cows, horses, and hogs that they thrived and greatly improved in condition. Feeding tests on milk cows showed that dehydrated yuca stalk and leaf meal replaces the highest grade dehydrated alfalfa meal for producing milk. Furthermore, it is not practical to raise alfalfa in most tropical lowlands and, therefore, the discovery of the high protein and vitamin value of dehydrated yuca stalk and leaf meal is of the utmost importance to the agricultural economy of tropical countries where lack of proteins and vitamins has always been one of the main reasons for the poor health and small size of both animals and humans in these areas.

Considerable experimentation and development finally resulted in a processing technic that successfully produced dehydrated yuca stalk and leaf meal per the above laboratory analysis. Said analysis was from yuca stalks and leaves dehydrated at the age of about five months. Approximately five green tons of stalks and leaves are required to produce one dehydrated ton of yuca stalk and leaf meal.

Small amounts of yuca leaves without stalks were also harvested and dehydrated for human consumption. U. S. laboratory tests indicated over 300,000 International Units of Vitamin A activity per pound and 30% protein for this product. It was found that dehydrated yuca leaf meal could be used in lieu of spinach and other vegetables to produce a delicious soup, which is served at the Costa Rica project dining room. It is thought that if this dehydrated yuca meal soup were served as a free luncheon to the school children in tropical countries that it would improve their general health and reduce protein and vitamin deficiencies.

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Estimate Covering Cost of Producing One Dehydrated Ton of Yuca Stalk and Leaf Meal

Beginning about four months after planting, harvest these stalks and leaves every 90 days by means of a mechanical forage cutter. Actual field tests and dehydration operations in Costa Rica have shown that 1-1/2 tons of dehydrated yuca stalk and leaf meal having more than 17% protein and about 200,000 International Units of Vitamin A activity per pound can be secured per hectare. Approximately 2-1/2 acres equals one hectare so this would equal 1200 pounds of dehydrated yuca stalk and leaf meal per acre every 90 days. It requires about 5 tons of green tender stalks and leaves to produce one dehydrated ton of yuca stalk and leaf meal.

It is estimated that cost of planting and raising this material is about $93.00 per hectare (including $26.60 charge for fertilizer), and that it has a three year useful life. This makes a $31.00 per hectare per year crop charge during said 3 year useful life. Four crops per year can be harvested, which equals $7.75 per hectare per crop charge for green material ready to harvest. Each crop yields 7.5 green tons per hectare, which makes cost per green ton $1.04 per green ton ready to harvest.

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Harvesting and Dehydration Estimate per Dry Ton of Yuca Stalk and Leaf Meal is as Follows:

	Cost in U. S. Dollars at November 1951 Street rate of Exchange equals 7.50 Colones per U. S. dollar.
5 green tons of material ready to harvest - cost $1.04 per ton	$ 5.20
Machine Cutting and Transporting to plant - 5 green tons at $1.10 per green ton . . (In U. S. they figure less than $1 per ton for harvesting and hauling green alfalfa based on $5 labor cost per day)	5.50
Diesel Oil for dehydrator and factory - 100 gallons	12.53
Lubricants	.40
Direct labor in plant - 10 men for 1-1/3 hours plant operation equals 13.3 man hours @ 1 colone per man hour	1.78
Total direct cost of one dehydrated ton of yuca stalk and leaf meal at plant without bags	$ 25.41

NOTE: These figures are based on actual production from yuca planted 10,000 plants per hectare. Dr. Walter N. Bangham recommended that yuca stalks and leaves planted exclusively for production of stalk and leaf meal should be planted 30,000 seed per hectare, which will greatly increase the yield per hectare of green material. It is thought that this thicker planting will greatly reduce the yield of yuca roots. The actual reduction in root yield is not known and, therefore, no value whatever is figured for the yuca roots when planting yuca exclusively for high protein yuca stalk and leaf meal production.

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In Costa Rica the pioneer plant sold its dehydrated yuca stalk and leaf meal to local feed mills for $77.00 per ton without bags, as compared to direct cost of $25.41 per net ton at plant without bags.

The Costa Rican dehydrator has a capacity of 3/4 of a ton of dehydrated yuca stalk and leaf meal per hour.

Standard dehydration operation should be three shifts totaling 20 hours per day. If plant operates 200 days per year, operating exclusively to produce yuca stalk and leaf meal, this would be 4,000 hours of annual operation with a production of 3,000 dehydrated tons of yuca stalk and leaf meal at a gross profit of $51.59 per net ton or a total annual gross profit of $154,770.00.

The same dehydration equipment can dehydrate and process yuca roots into yuca root meal, which is used in place of corn in animal feeds, and yuca flour, which is used to mix with wheat flour for bread for human consumption. The following is an estimate covering cost of growing yuca roots based on hand planting, and harvesting the roots at age of 18 months. It has been found that yuca roots harvested at age of 18 months will produce 2-1/2 times as much yield as yuca roots harvested at the age of 10 months. See attached Exhibit "A" entitled Brazilian Yuca Root Yields".

Agricultural Cost per Hectare of Yuca Roots

	Cost in Dollars at November 1951 Street rate of Exchange equals 7.50 colones per U.S. dollar.
Preparing land and planting, including seed .	$ 33.33
Fertilizer	26.60
Replanting misses	6.60
2 hand cultivations @ $13.30	13.30
Total cost per hectare	$ 93.19
Estimate 25 tons of yuca roots per hectare makes cost of one ton of roots ready to harvest ($93.19 divided by 25)	$ 3.76
Harvesting per ton (by hand, contract basis)	1.60
Transporting to dehydrator per ton	.67
Cost of one ton of yuca roots delivered to dehydrator	$ 6.03

Estimated cost of dehydrated yuca meal, per ton, as follows:

	Cost in Dollars at November 1951 Street rate of Exchange equals 7.50 colones per U.S. dollar
2.75 tons of yuca roots required to produce one dehydrated ton - - cost $6.03 per ton	$ 16.58
Dehydrator will produce one dehydrated ton per hour, requiring following fuel and labor	
50 gallons diesel	6.27
Lubricants	.15
10 man hours of direct labor @ 14.6¢ .	1.46
Total direct cost per dehydrated ton of yuca root meal at plant without bags	$ 24.46

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In Costa Rica dehydrated yuca root meal was sold for the following purposes:

a) Approximately 50% of the dehydrated whole yuca root meal can be sifted through fine Swiss silk flour bolting cloth to produce yuca flour for mixing with wheat flour for human consumption.

b) Approximately 50% of dehydrated whole yuca meal which was too coarse to pass through the Swiss fine silk flour bolting cloth produced what is termed yuca tailings, which is a high Nitrogen Free Extract feed ingredient to replace corn in animal and poultry feeds.

The capacity of the Costa Rican dehydrator when dehydrating and processing whole yuca root meal is one dehydrated ton per hour, which makes an hourly capacity of 1/2 ton of dehydrated yuca tailings per hour, and one-half ton of yuca flour per hour.

In costa Rica yuca flour was sold to bakers in 100 pound bags @ about $90 per ton at plant, and yuca tailings were sold to feed mills and farmers @ about $55 per ton at plant without bags. If the Costa Rica plant operated 200 days of 20 hours, or 4,000 hours annually, it could produce 4,000 tons of whole yuca meal from which the following products could be produced:

2000 tons yuca flour selling at $90 per ton	$ 180,000.00
2000 tons of yuca tailings at $55 per ton	110,000.00
Total sales of yuca flour and yuca tailings	$ 290,000.00
4000 tons of dehydrated whole yuca meal having direct cost of $24.46	97,840.00
Total Gross Profit, if plant operates 200 days annually on yuca roots exclusively	$ 192,160.00

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The dehydrated yuca meal is further processed through an electric gyratory sifter clothed with fine Swiss silk flour bolting cloth. The fine flour that passed through the silk bolting cloth was sold as flour and mixed with wheat flour for human consumption. The coarser product was known as "yuca tailings" and was used as a carbohydrate or nitrogen free extract product to replace corn in animal feeds. A U. S. laboratory analysis of said yuca flour and yuca root tailings is as follows:

"The J. C. Lysle Milling Company, Leavenworth, Kansas Laboratory Report on Samples Furnished and Produced by American Industries, Inc., Costa Rica, November 6, 1948.

	Yuca Flour	Yuca Tailings
Protein (Nx 6.25)	2.30%	3.10%
Fat	.495	.983
Fibre	2.034	6.3
Ash	1.99	2.78
Moisture.	10.98	11.06
Nitrogen Free Extract	82.2	75.88
Carbohydrates	84.23	82.18

The above analyses computed on a Moisture Free Basis.

J. C. Lysle, Pres."

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The humid tropical climate and lack of proper transportation and storage facilities combine to render large fertile areas of tropical land almost useless from a food production viewpoint because the products spoil before they can be consumed. For example, in Costa Rica the fertile tropical Atlantic Zone lowlands have a tremendous agricultural production potential, but the main population and almost all of the milk production of the country is located in the highlands and before the installation of the feed dehydration plant it was not practical to use much of the agricultural production of said lowlands because of transportation and spoilage difficulties. Dehydration of tropical agricultural products also enables exportation of the products to any part of the world without danger of spoilage. This also is a great benefit to the foreign exchange situation.

Dehydrated feed and food products will keep properly for long periods of time under the worst tropical conditions and this factor is of the utmost importance as it enables remote areas to dehydrate and process perishable products into practically non-perishable products. Many tropical countries have a five month dry season during which the feed and food situation deteriorates, and milk, beef, and poultry production drops. If an area is equipped with proper feed and food dehydration facilities, reserve supplies can be stored for use during the dry season and thus eliminate the yearly production losses caused by unavailability of feed during the dry season. This, of course, also reduces the amount of U. S. dollars that are now required by tropical countries to import feeds and food.

LAND USE

Predicated on yields observed at the Costa Rican plantation, the following land would be required to produce the above listed annual productions:

Product	Annual Land Use (Acres)
To produce 3000 tons of yuca stalk and leaf meal requires 15,000 tons of green product .	1250
- - - - - -	
To produce 4000 dehydrated tons of yuca root meal for further processing into yuca root tailings and yuca flour requires 11,000 tons of yuca roots. Estimate 10 tons, yuca roots per acre at 18 months of age	1100
Plus 50% because of harvesting at 18 months of age instead of each twelve months	550
Total annual land use to produce 4000 dehydrated tons of yuca rot meal	1650

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Exhibit "B" is attached, entitled "Possible Plan for Assisting Small Farmers to Produce Yuca Stalks and Leaves in Conjunction with Yuca Stalk and Leaf Meal Processing Project."

Exhibit "C" is attached and includes a floor plan of building and machinery required to process materials per the aforementioned data.

Exhibit "D" is attached and includes yield and fertilizer data from Dr. Walter N. Bangham's Agricultural Survey of the Costa Rican project in October - November, 1950.

EXHIBIT "A"

BRAZILIAN YUCA ROOT YIELDS

YUCA DATA FROM BRAZIL . . . . . January 16, 1950
(This data given to P. L. Wilson by Dr. Thurber of Southern Regional Laboratories, U. S. Department of Agriculture, New Orleans, Louisiana).

Production of Mandioca. (Yuca)

Data concerning the production of mandioca in Brazil is reviewed in the publication "Manioc in Sao Paulo," Publication No. 499, by Roger L. Heacock, American Vice Consul, Sao Paulo. Figures taken from this report indicate that about 900,000 acres of mandioca were grown in Brazil in 1937. In the southern part of the country planting is usually done from October to December and in the north from January to May. The roots are harvested for the most part, during the dry season, that is, from about April 1st to October 1st. Harvesting every two years appears to be the most economical procedure to follow since the rate in increase in weight of the roots usually falls off after the second year. According to Mr. Bierrenbach de Castro, yields at the end of 10 months of growth average about 5 or 6 tons per acre and after 18 months, the yield may be expected to be about 10 to 12 tons. Hundreds of different varities of Mandioca are grown in Brazil but experiments conducted to date by government agencies in the State of Sao Paulo indicate that the "vassourinha" is best suited to that State. Much of the soil around Campinas is sandy clay in character with a high iron content. The country is "rolling" and some terracing is being done. The rainy season extends from October to May and the total rainfall is approximately 40". Mandioca Raspa plants were paying about $4.59 per metric ton. The starch plant at Monnerat stated that the 1940 price was about $3.00 per metric ton. In Mr. Heacock's report the cost of producing the roots is calculated to be about $1.65 to $2.00 per metric ton.

10 tons per acre equals about 25 tons per hectare, and 12 tons would equal about 30 tons per hectare.

EXHIBIT "B"

Possible Plan for Assisting Small Farmers to Produce Yuca Stalks and Leaves in Conjunction with Yuca Stalk and Leaf Meal Processing Project

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In the U. S. there are many alfalfa meal dehydrating plants that purchase alfalfa from the farmer when it is ready to harvest. The dehydrator pays the farmer a certain price per ton for the alfalfa in the field, and sends its own mechanical harvesting equipment and crew to harvest and transport the product to the dehydrating plant. This same plan could be used as regards the growing of yuca for the production of yuca stalk and leaf meal, which is a substitute for alfalfa. This discovery is one of the most important and outstanding agricultural developments in the tropical world.

For example, 1250 acres of land planted with about 30,000 yuca seed per acre should yield 15,000 tons of green yuca stalks and leaves, which would produce approximately 3000 dehydrated tons of yuca stalk and leaf meal, containing approximately 17% protein and 200,000 International Units of Vitamin A per pound of dehydrated meal. This is on basis of land and climate conditions at the Costa Rica plantation and will, of course, vary in other localities. A Government could clear mechanically said 1250 acres and sell or lease 10 acre plats to 125 private farmers. Costa Rica operations have indicated that an acre of yuca can be planted, fertilized, and cultivated for about $37.00, based on using hand labor and a daily average labor rate of $1.25.

A yield of 4 crops per year of 3 green tons each equals 12 green tons per acre per year. Estimated cost of machine harvesting, transportation, fuel and direct factory labor in Costa Rica is about $20.00 per dehydrated ton. Sale price in Costa Rica was $77.00 per ton. If the Government paid farmers $3.00 per green ton for material ready to harvest this would give farmers $36.00 per year per acre from sale of 12 green tons per acre. The second and third years of the life of each planting would be even more profitable, as farmers' only labor and expense during said second and third years would be some hand cultivation, and some fertilizer. Cost of planting and seed would only be incurred every third year. It requires 5 tons of green product to produce one ton of dehydrated yuca stalk and leaf meal, so $3.00 per green ton paid to farmers for material ready to harvest would make a raw product cost to the processing plant of $15.00 per dehydrated ton of meal, and this, added to harvesting, transportation, fuel and direct factory labor cost of $20.00 would make a cost of $35.00 per dehydrated ton as compared to Costa Rican selling price of $77 per dehydrated ton.

However, the Government might elect to reduce the $77 price in order to help the dairy, beef, and poultry industries and, in fact, could make a radical reduction and still make a reasonable profit.

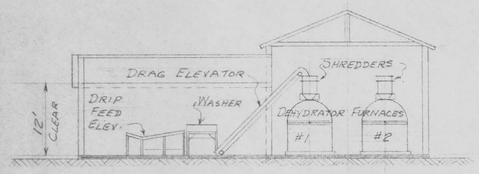
Each farmer with 10 acres should sell 120 green tons per year, which at $3.00 per green ton equals $360 cash income per farmer each year.

Some of the planting can be done by women and children and it is estimated that a farmer with average size family could complete a 10 acre planting in about six months and that it would be about 3 years before the next planting. A farmer and his family should also be able to do the necessary hand cultivation of 10 acres and still have time to raise other food crops and also to secure additional cash income from day labor from harvesting 18 month old yuca roots, which could be grown by the Government or large scale farmers for dehydrating into yuca root meal for animal and human consumption. In Costa Rica the dehydration project raised these yuca roots and paid a certain price per ton for hand labor (mostly local small farmers) to harvest them.

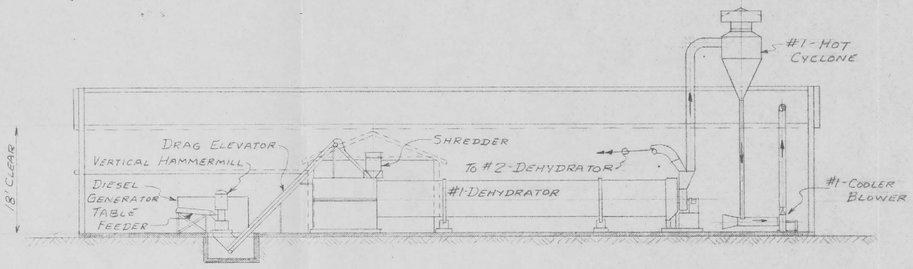
It is thought that any farmers who participate in the above outlined plan would secure more cash income and attain a higher living standard as compared to present conditions. This is based on Costa Rica where the average wage in the area of the dehydration plant is about * 15 cents. Many tropical countries have lower wage rates and in such countries it is obvious that the selling price of the dehydrated products could be lowered and at the same time present wage rates could be increased and still maintain a reasonable profit to the project.

Estimating 200 actual work days per year (same as figured for annual operation of processing plant) and assuming that individual private farmers are now averaging $1.25 per day (which they are not) this would make their present cash income $250 per year. In the area where the Costa Rican processing plant is located the small local farmers raise comparatively insignificant amounts of agricultural products beyond their own family subsistence requirements and the inauguration by the Government of the above suggested plan would improve their real living standards much more than the hypothetical figures which are being used in this estimate.

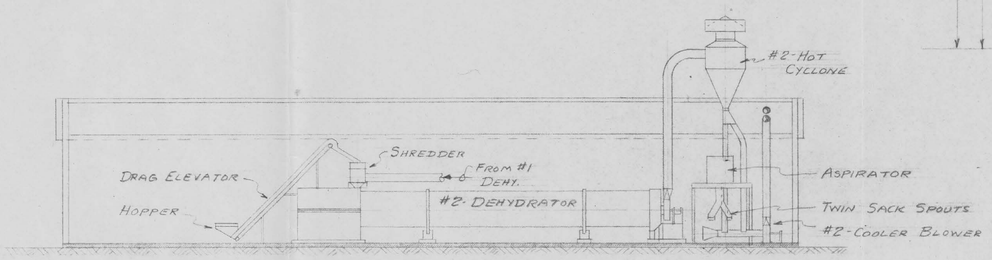
* (hourly wage)



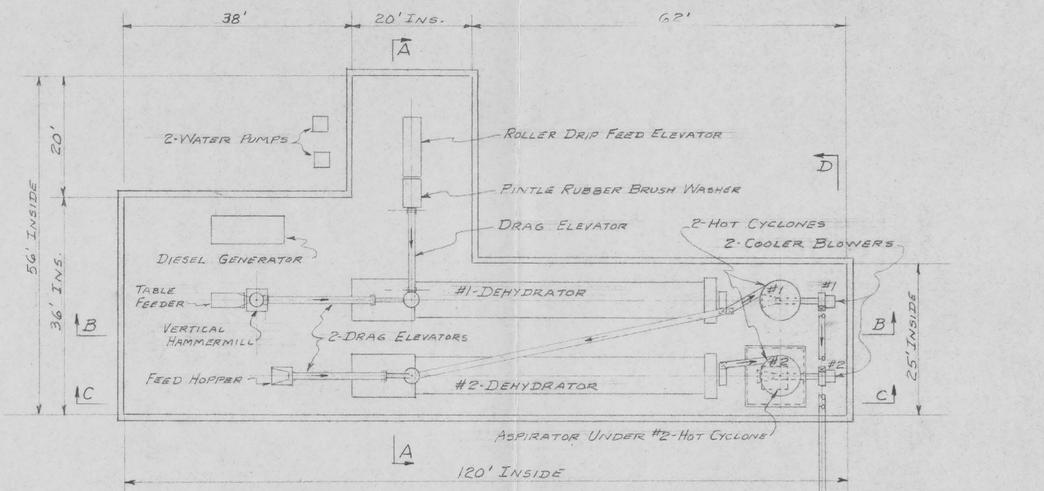
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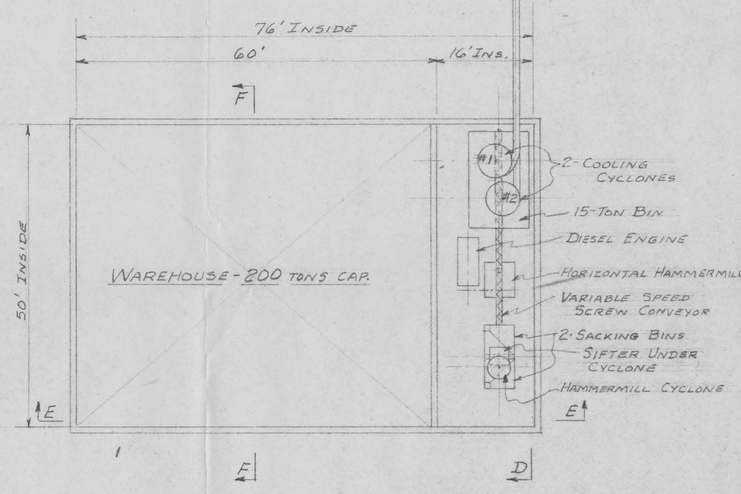


SECTION "B-B"

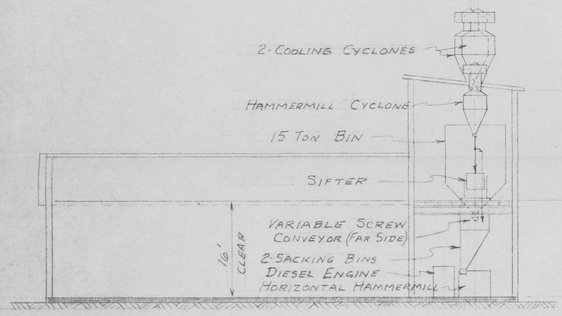


SECTION "C-C"

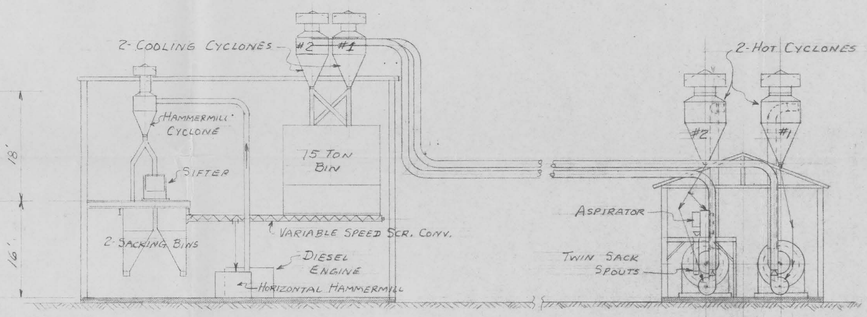




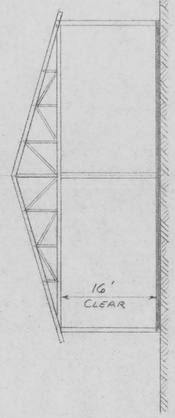
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SECTION "E-E"



SECTION "D-D"



SECTION "F-F"

REVISIONS	
DATES	
1-30-52	

TYPICAL YUCA PROCESSING INSTALLATION

SCALE		
1/16" = 1'-0"	MILLING MACHINERY, INC.	
PRINTED	JOB NO.	SHEET NO.
AUG 27 1952	KANSAS CITY, MO.	1 OF 1

EXHIBIT "D"

Excerpts from Dr. Bangham's Agricultural Survey.

Dr. Walter N. Bangham, who is an eminent Tropical Agronomist, made a special agricultural survey of the Costa Rican project in October-November 1950, and the following excerpts are submitted from his survey:

Table I shows yield on 3 months old yuca stalk and leaf meal as follows:

Green Weight		Dehydrated Weight	
Pounds per hectare	Pounds per acre	Pounds per hectare	Pounds per acre
13,740	5,500	3,126	1,255

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The above yields were secured from land that had previously been planted with sweet potatoes and also yuca roots, and no fertilizer had ever been used.

For permanent agricultural procedure, Dr. Bangham made the following fertilizer recommendations for raising yuca; exclusively for production of stalks and leaves for processing into yuca stalk and leaf meal:

"I have advised the annual application of 600 pounds per hectare (240 pounds per acre) of a fertilizer composed of 100 pounds of urea, 400 pounds of triple super-phosphate, and 100 pounds of Potassium Chloride. The fertilizer can either be applied as a top-dressing to the soil as it is being prepared, or as a side-dressing after the yuca shoots first appear. It can be applied in a single annual application. The heavy withdrawal of minerals by the yuca plants will be offset by the added fertilizer."

On Page 1A (Exhibit "D") note 3 photographs of yuca growing for processing into yuca stalk and leaf meal. These photos were taken by Dr. Bangham during his survey. Photo No. 1 shows hand harvesting of yuca stalks and leaves for processing into yuca stalk and leaf meal. A new Gehl Forage Harvester with 40 HP self contained engine has recently been shipped to Costa Rica to mechanically harvest the yuca stalks and leaves.

SEPARATION SHEET

REED/HYDE FAMILY PAPERS

TYPE	HOW MANY	OVERSIZE	ADDITIONAL INFORMATION
Photo	3		photos were affixed with glue to paper
Map			
Blueprint			
Other			

Notes: Photo #

1) hand harvesting of yuca stalks (shows harvesters)

2) un-harvested stalks (path in foreground)

3) some harvested stalks

Item(s) originally filed in:

WILDER FARM - Publications

Item(s) now filed in:

Photographs

Separated by: TJK

Date: April 2, 2001

1A - (Exhibit D)

THREE VIEWS OF YUCA FIELDS



Photo No. 1
This shows hand harvesting of yuca stalks and leaves for processing into yuca stalk and leaf meal.

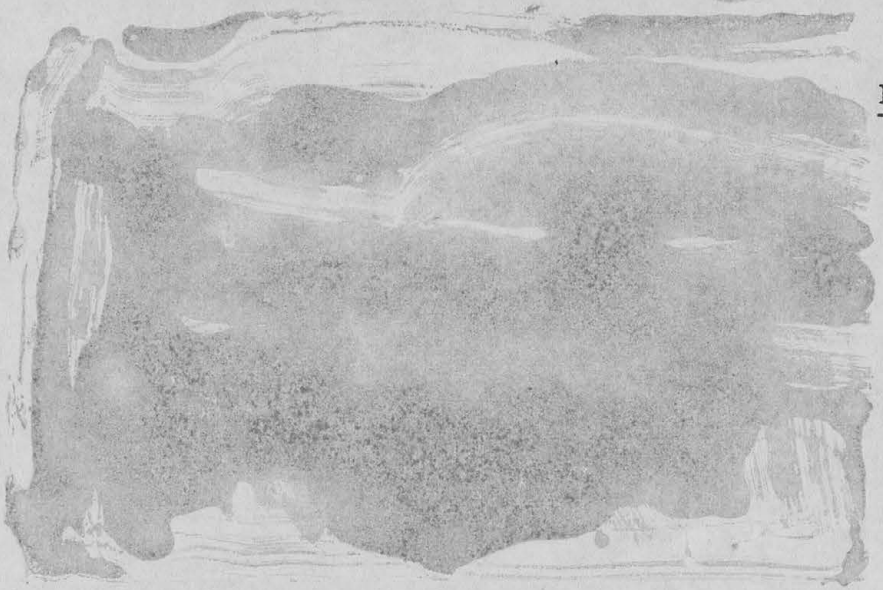


Photo No. 2



Photo No. 3

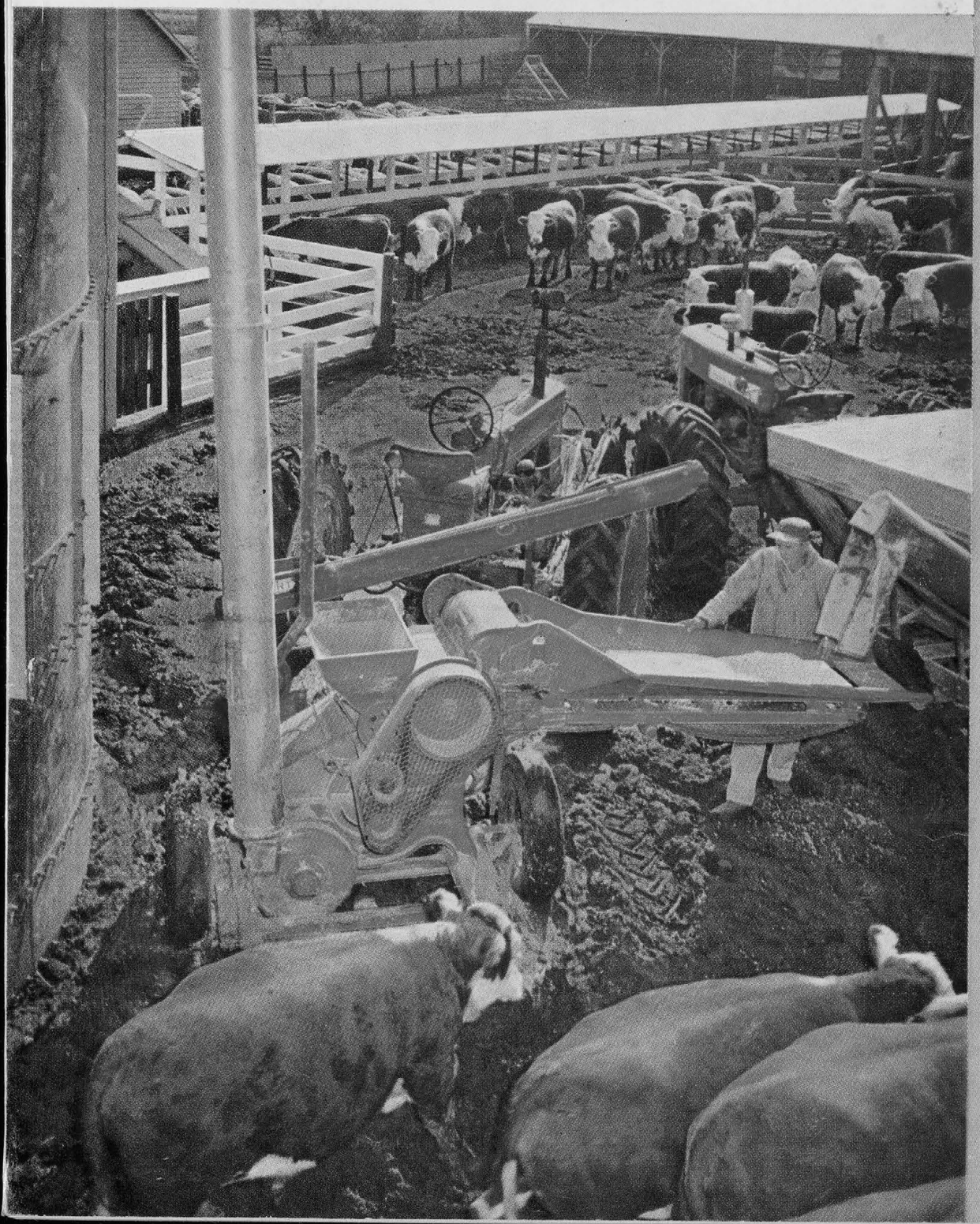
Photographs by Dr. Walter N. Bangham - on Costa Rica plantation in October, 1950.

CAPPER'S FARMER

CAPPER'S FARMER

FEBRUARY 1958

15c



TAPE-RECORDED INTERVIEW:

CAN FARMERS GET MORE BARGAINING POWER?

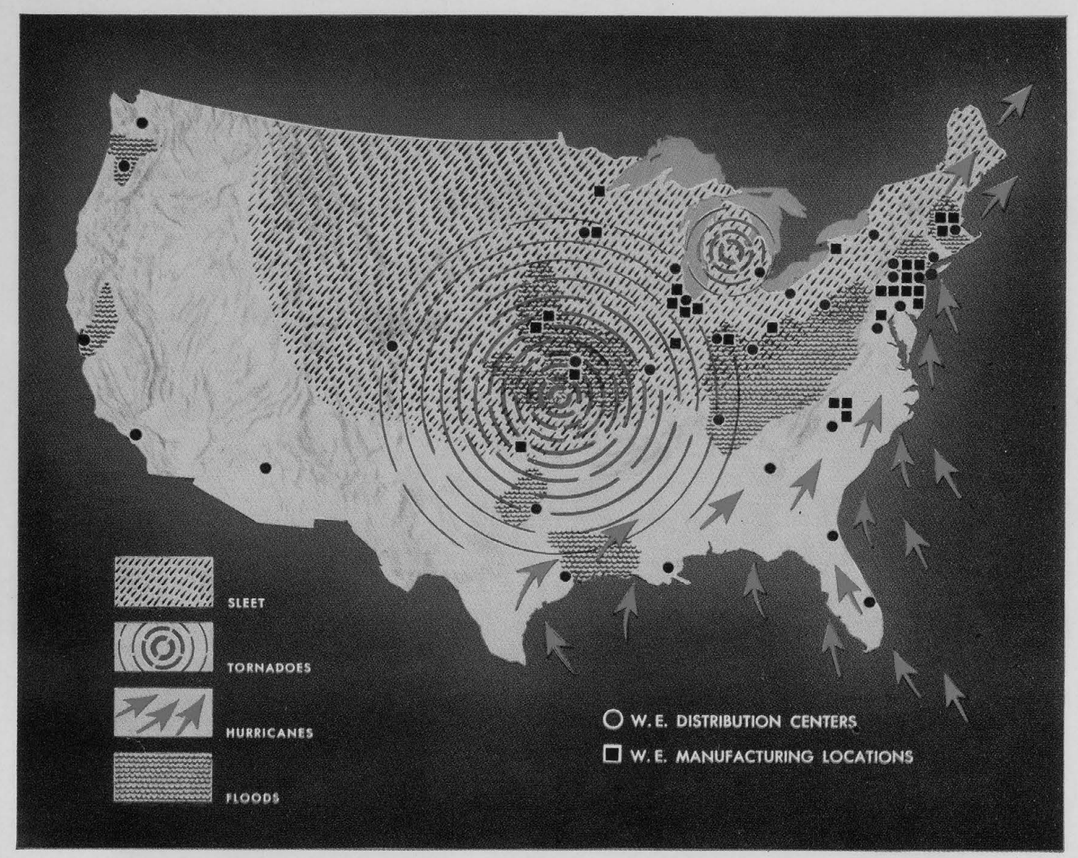
FOUR EASY OVEN DINNERS

IT TAKES GRASS, GUTS, AND GIVE-AND-TAKE!

SLICKEST WAY TO FEED CATTLE!

ICD ★

BATTLE PLAN...to chase trouble off telephone lines!





This map shows where Mother Nature is most apt to attack Bell telephone equipment. It also shows how we at Western Electric are set up to help telephone people launch immediate counterattacks against catastrophe.

At the first hint of trouble—from hurricane, flood, sleet, tornado—any operating telephone company can draw on emergency stores of wire, cable, tools and other equipment we keep on tap at a Western Electric distribution center nearby. Every switchboard, tool and strand of wire is standard—familiar to Bell telephone people the country over, and readily put to use.

Meanwhile—by plane, by train and by truck—critically needed items of tools and equipment are started into stricken areas from other Western Electric distribution centers, from our factories and from our suppliers... both to help meet the emergency and replenish depleted stockpiles. Thus the efforts of our people and telephone company people fuse into one great battle plan to restore service fast.

Here's further evidence that Western Electric shares the Bell System goal of providing you—at all times—with good, dependable telephone service... something we and your Bell telephone company together have been working at for the past 75 years.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

Look for this nearby Goodyear dealer sign for better tire values—better tire care. Convenient credit terms.

GOODYEAR TIRES

RIB HI-MILER BUILT TO *OUTPERFORM* ANY TRUCK TIRE IN ITS CLASS!

RIB HI-MILER is a *real truck tire,* through and through—but that's not all. It has rugged shoulders, deep, broad, skid-resistant tread—AND a no-extra-charge EXTRA that gives you more dependable service mile after mile *after mile!*

Reason? RIB HI-MILER—*like no other truck tire at the price*—has TRIPLE-TOUGH 3-T RAYON CORD!

Result? It gets crops to market and supplies to home long after other tires at the price are on the junk pile! Ask for RIB HI-MILER and find out for yourself!

IMPORTANT: Regardless of all other features, no tire can outlive its cord body—so why accept less than the tire with the cord that's TRIPLE-TOUGH? It's the RIB HI-MILER, the top truck tire in its class! Goodyear, Truck Tire Dept., Akron 16, Ohio.

AND the price is only $19.95 SIZE 6.00-16 tube-type 6-ply rating, plus tax and recappable tire. Other sizes—(including tubeless in 15" and 16" sizes) attractively low-priced and on EASY BUDGET TERMS at most Goodyear dealers'. Prices subject to change.



GOODYEAR TRUCK TIRES

Hi-Miler–T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Kansas City Star—Sunday—November 10, 1957

A New Barbed Wire Is Stronger, Lighter

By Donald J. Sorensen.
(A Member of The Star's Staff.)

"Don't fence me in" might well be the plaint of American barbed wire manufacturers who have found foreign producers gaining an uncomfortably large share of the market in the United States.

But one result of the effort to break out of this position is the first major change in the product in about 75 years. Credit for this stride goes to Sheffield division, Armco Steel corporation which, after months of research, has developed a cheaper and lighter wire that is stronger and more pliable than the present variety.

A Hectic Beginning.

Invented about 90 years ago, in the post-Civil war period, barbed wire roared onto the turbulent western scene, added some dramatics of its own by touching off range wars and political shenanigans while helping to tame the wild west, then subsiding into the routine role of just another item on the farm.

Barbed wire survived the range war to become a permanent fixture on farms and because of the Sheffield metallurgists here it is in a stronger position in the present trade "war" against the cheaper foreign wire.

To meet this competition, steel firms have sought a lighter wire, but one that was also stronger and more pliable than the foreign kind. Several U.S. firms have been attempting to find the key to this improved wire but it remained for Sheffield to discover the formula, which is being closely guarded.

Because of cheaper labor costs the foreign producers were able to undersell the U. S. manufacturers and Sheffield metallurgists faced quite a problem in overcoming this price disadvantage.

Lighter and Stronger.

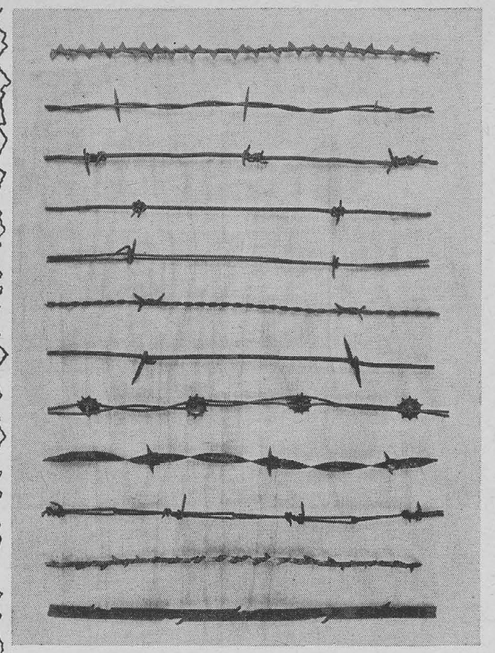
The result is Sheffield "100," a 13½-gauge wire, lighter but stronger and easier to stretch. The tensile strength is from 90,000 to 105,000 pounds a square inch, which means an actual breaking point of from 1,100 to more than 1,200 pounds. In field tests, a 1,000-pound cow was lifted without breaking the wire.

These tensile strength figures compare with 70,000 to 85,000 pounds a square inch on the standard 12½ gauge wire and as low as 64,000 pounds a square inch on the foreign variety.

Wire mills at the Sheffield division here, the largest producer of barbed wire in the Mid-West, and at Houston, Tex., are rapidly turning out miles of the new wire.

The barbed wire section of the Sheffield mill here is a dramatic example of the strides made in automation.

Each machine can roll out an 80-rod spool in 12 minutes. At capacity production, this means 160 miles of wire a day from the local plant alone.



FORERUNNERS OF MODERN BARBED WIRE
These early forms, dating back nearly a century, are a far cry from Sheffield's new "100" Barbed Wire. The first U.S. patent on barbed wire was issued to a Midwesterner in 1867.



GOOD NEWS FOR FARMERS

First Major Barbed Wire Advance in 75 Years

Sheffield "100" Barbed Wire is a major break-through by Sheffield that brings you barbed-wire quality and long service-life never before possible. You've heard how machines are made lighter but stronger by introducing other elements into carbon steel. Sheffield metallurgists have accomplished this same result in making Sheffield "100" barbed wire. At the same time they kept it pliable and easy to handle.

UP TO 20% STRONGER

Priced Right Down in the Low Bracket by Sheffield Dealers

- Up to 20% stronger than current 12½ gauge barbed wire . . . yet pliable, not stiff and unruly to handle.
- Characteristics of the new Sheffield special high strength steel are such that it takes a tight, uniform coat of galvanizing.
- Husky 13½ gauge wire with full 14 gauge barbs, double wrapped around main strand and uniformly spaced without a miss.
- Made in the two barb and 4 barb styles by neighbors who have stood behind their fence products for 30 years.

SHEFFIELD DIVISION ARMCO STEEL CORPORATION SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

See your Sheffield Dealer for all your barbed wire and woven wire fence needs.

CAPPER'S FARMER

FEBRUARY 1958

THE FAMILY MAGAZINE FOR *TODAY'S FARMING*

IF FARMERS ever expect to get their fair share of the consumers' dollar, they must have more bargaining power. You'll find pretty general agreement on that. But you'll find general disagreement on HOW they can get bargaining power.

Last month Dr. John Kenneth Galbraith, Harvard economist, told *Capper's Farmer* readers that it was highly unlikely that farmers could get that power thru voluntary organization. He argued for a long-time government program built around the production payment idea.

This month, Howard Cowden, president of Consumers Co-operative Association, presents another point of view. Farmers can get this bargaining power thru their own organization, he believes. On page 40, in another of *Capper's Farmer's* exclusive tape-recorded interviews, he explains why he thinks farmer co-operatives could lead the way to self-help.

Capper's Farmer presents Cowden's suggestions, as we did Galbraith's, as a part of our continuing effort to cast light on farm problems—and to provide you and your organizations with grist for the discussion mill.

Whether you agree or disagree with Cowden isn't so important. It's more important that the farm problem be thoroly exposed to the market place of ideas. From discussion come inspiration and action—which agriculture desperately needs.

Like Cowden, Capper's Farmer believes that farmers can find (and must find) a common ground on which they can get together for the good of agriculture and the rest of our economy. We fully agree that whatever farm program we have should be directed by farmers.

But we believe, also, that it would be unwise to abandon the price-support idea until it can be replaced with a more workable plan to insure agriculture some measure of economic security.

Our Cover Picture—Power feeding plus mechanized materials handling cuts chores, boosts gains for Archie Forsberg, the Jackson county, Minnesota feeder shown on our cover.

Forsberg used to grind feed every day. Now he grinds corn and hay into glass-lined silos once every 2 or 3 months. Meanwhile, augers unload the silos and mix rations automatically every day, eliminating work at chore time. Besides cutting labor, this gives steers a balanced ration at each bite. For more about how Forsberg and other feeders have mechanized their systems, see page 53. Photo: Bybee.

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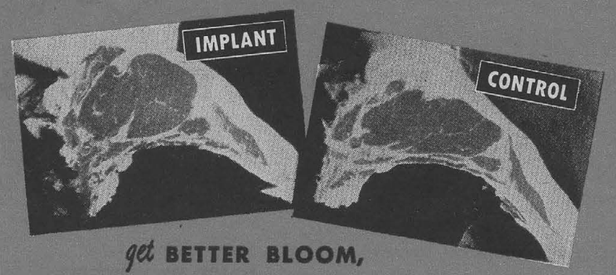
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Vol. 69 No. 2

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get BETTER BLOOM,
MORE LEAN,
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EXCELLENT MARBLING,

and up to ½ LB. EXTRA
PER HEAD PER DAY

SYNOVEX IS THE ONLY STEER FINISHING IMPLANT available today which contains two naturally occurring hormones, progesterone and estradiol benzoate. These are the hormones which make possible up to ½ pound extra gain per head per day without risk of downgrading—on the hoof, on the hook or in the display case. *In fact, research has proved that Synovex-implanted steers show finer finish, better bloom, and dress out with a higher percentage of lean and less separable fat.*

PHOTOGRAPHS PROVE QUALITY. In unretouched photographs above, note excellent quality, texture and marbling of meat. Compare. If photographs were in full natural color, you would see that meat is a prime, rich bright red. Cooler shrink is normal (Synovex does not cause excessive moisture retention in tissues). Steaks are equally as tender.

SYNOVEX SAVES UP TO 5c PER LB. OF GAIN. Synovex goes to work in minutes after implant is made and boosts weight gains faster than any other product now on the market. One implant lasts a full 150 days. Feed conversion is improved as much as 20% over controls. Tests have proved that Synovex improved rate-of-gain as much as 50% over Stilbestrol.

"... CATTLE YIELDED ABOVE 62% WITH A NUMBER OF LOADS GOING WELL ABOVE 63¾."

Here's what Mr. M. S. Anderson, feedlot operator of Greeley, Colorado, has to say about SYNOVEX:

"... these steers were of average good feeder quality, but not outstanding... most of the cattle were marketed between 125 and 150 days* and the packing companies were well pleased with both grade and yield ... cattle yielded above 62% with a number of loads going well above 63%.

"With the marketing of these cattle I have now implanted three complete turnovers of cattle with Synovex and — needless to say — I am more than pleased with the results."

*avg. days on feed 136.1; avg. daily gain 3.36 lbs.

NEW "QUIZ BOOK" ON SYNOVEX!

FREE!



It will pay you to get all the information you can about Synovex... how you can get higher weight gains at lower cost per lb. of gain, finer finish, better bloom. Write for your copy today!

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SYNOVEX IS AVAILABLE THROUGH YOUR VETERINARIAN, YOUR DISTRIBUTOR, OR YOUR NEAREST SQUIBB BRANCH IN 10-IMPLANT AND 100-IMPLANT PACKAGES. SYNOVEX IS RECOMMENDED FOR STEERS WEIGHING FROM 400 TO 1,000 LBS.

SQUIBB, *Veterinary Department*, 745 Fifth Avenue, New York 22, N. Y.

SQUIBB QUALITY—THE PRICELESS INGREDIENT

FEBRUARY 1958

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WHEAT ON THE WAY! *Rancher Cliff Wright, of Forsyth, Montana, talks things over with Conoco Agent Vic East before taking part of his high-protein wheat crop into town.*



MOUNTING UP! *Cliff's mighty Caterpillar diesel tractor gets plenty of work in caring for his 4800-acre wheat ranch.*

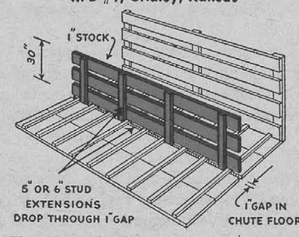


DISTAFF DOINGS! *Cliff's charming wife, Grayce, shown with a few of her distinctive ceramic creations.*

FROM POTTERY TO PROTEIN WHEAT...
there's a "Wright" way to do the job!

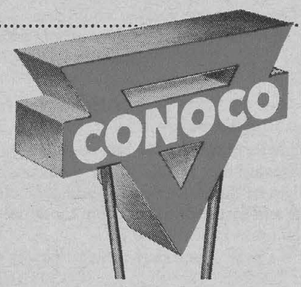
Tank Truck Tips

NO-TURN-AROUND CHUTE
(for loading hogs on cattle chute)
by Lloyd V. Luthi,
RFD #1, Gridley, Kansas



To use cattle chute for hogs, leave 1" gap in chute floor. Slide side cleats on 30" panel in gap to form center partition. Hogs can go up either side, but can't turn around. Man can easily straddle panel and follow both lanes up.

Saws for Ideas! Like to win a D-95 Henry Disston Hand Saw, worth $10? Send your favorite idea to: *The Tank Truck*, Dept. X., Continental Oil Company, Ponca City, Oklahoma. If we print it, you get the saw! Ideas become the property of Continental Oil Co.



You can't drive long in and around Forsyth, Montana, without coming across the beautiful 4800-acre wheat ranch owned by genial Clifford Wright. Here, bumper high-protein wheat crops are the rule, year in and year out! Both block and strip farming methods are used.

Step inside the Wrights' sunny ranch house and you're in for a surprise. You'll see a veritable wonderland of ceramics . . . from dainty figurines to impressive lamps . . . all the work of Cliff's attractive wife, Grayce.

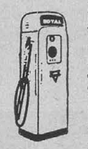
Cliff's farm equipment now consists of one Ford diesel tractor, two Caterpillar diesel tractors, 3 combines, and an L-194 International heavy-duty tandem truck. Naturally, with such a big spread to handle, Cliff can't take chances on costly lay-ups. That's why, for the past 30 years, he's been a steady user of dependable Conoco Products . . . *with not one breakdown due to lubrication failure!*

"In my farming operation, I have to be sure every single piece of equipment will operate at maximum efficiency the year through," says Cliff, "and that's why I rely on Conoco Super Motor Oil and Conoco Super Lube. They're both wonderful!"

Friends, as you can see, the "Wright" way to ranch is mighty timesaving and economical. You can enjoy these same benefits by calling your Conoco Man today. It's his job—and his pleasure—to help you out.

Hottest Brand Going... **CONOCO!**

NEW CONOCO ROYAL WITH TCP *plus*



Not since TCP has there been a gasoline advance like this! New Conoco Royal is the first gasoline in history to combine exclusive **oil-plating action** with TCP* to *boost power* as it *cuts wear* as it *increases mileage!* Get New Conoco Royal Gasoline with TCP *plus* from your friendly Conoco Dealer . . . and start enjoying that wonderful *Royal Feeling* when you drive!

CONOCO ALL-SEASON SUPER MOTOR OIL



Here's the *one* motor oil that guarantees you full-time protection against both friction and corrosive wear. With **Oil-Plating®** . . . Conoco's exclusive discovery . . . on the job, you're assured faster starts, automatic warm-up, up to 80% less wear. Next time you order motor oil for your car, truck and tractor, make it Conoco all-season Super . . . in the can with the bright gold band!

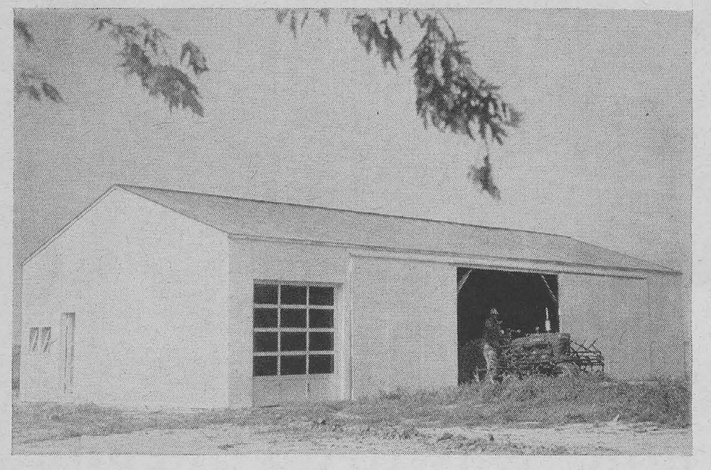
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Masonite makes the news



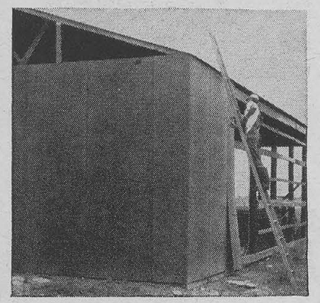
...with money-saving buildings covered with durable farm panels

Now you can have the buildings you need and cut profit-consuming overhead—slash machinery depreciation, reduce feed expense and get the grain storage you need to hold crops for seasonal market peaks. Best of all, you'll probably do the construction work yourself.

Pole-type or conventional design, your best cover material is strong Masonite® ¼" panels—the All-Purpose Farm*Board. They're wood improved—tempered to resist the roughest weather. One side is smooth—ideal for painting with brush, sprayer or roller. There's no waste due to cracks or knots. Each panel is perfectly squared, ready to nail up.

See your building materials dealer for a Masonite estimate or send coupon for FREE panel building plans.

Also investigate Masonite prefabricated buildings. Many types and designs are available, each with dozens of extra-quality features.



Fast, economical construction. Masonite farm panels saw and nail like wood—won't split or tear loose.

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I'm interested in learning more about Masonite farm buildings and All-Purpose Farm*Board. Please send me complete free information.

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Address.....

Town.....*State*.....

Route.....*County*.....

OUR READERS WRITE

How do you get cows?

Dawson, Nebraska

"$392 a cow above feed!" (*Capper's Farmer,* December 1957 issue) sure makes good reading until I get to where Mr. Meeker built his herd from $825 and Dot. I have read such things before and still don't believe it can be done.

When our son was old enough for 4-H, I bought him a purebred Jersey heifer from a large, well known Jersey herd. She was to be a foundation for our dairy herd. After 14 years she is gone—and no dairy herd. She had all bulls.

Seven years ago I bought two Guernsey heifers with the same idea in mind but to date have had one heifer. I had all three heifers bred artificially so I would get good offspring. But what's the use when all I get is bull calves? Orville Wuster

For more co-operation

Collyer, Kansas

In regard to consolidation of USDA conservation agencies—I'm for it. (See "Decision," *Capper's Farmer,* December 1957 issue.)

I was trained for technical service in conservation in my college and postgraduate work, but have been on the farm instead. Served on my local soil conservation district board of supervisors as member and chairman, state board of directors of district supervision, state soil conservation committee, watershed review boards, and administrative positions on our local extension programs. I feel qualified to observe some of the needs in this field.

Our need is permanent-type conservation practices, farm planning, and a crop loan program with the ever-normal-granary policy in effect.

To me it seems the short stave of the barrel is utilizing our technical service efficiently. Our work unit conservationists are highly skilled men, but have to spend a big share of their time in administration.

Our extension service could well serve as administrators of an over-all program.

Clarence E. Brown

Alcohol for fuel

Jansen, Nebraska

I am thankful that at last there is a farm magazine that is able to see the economic plight of the farmer and also has the courage and fortitude to condemn those people who are responsible for it.

We hear of so many farm programs de-

CONTINUED



Farmer Gunnar Stern (right) of Valley, Nebraska, agrees with dealer Flynn, regularly installs new sets of Champions in all the engines used on the 1,000 acres he farms.

Nebraska farm implement dealer says: **"To get more power for plowing, put in a new set of Champion Spark Plugs now"**

This advice comes from International Harvester dealer William Flynn of Fremont, Nebraska. He and his partner, John Larsen, operate one of the largest International Harvester dealerships in the country.

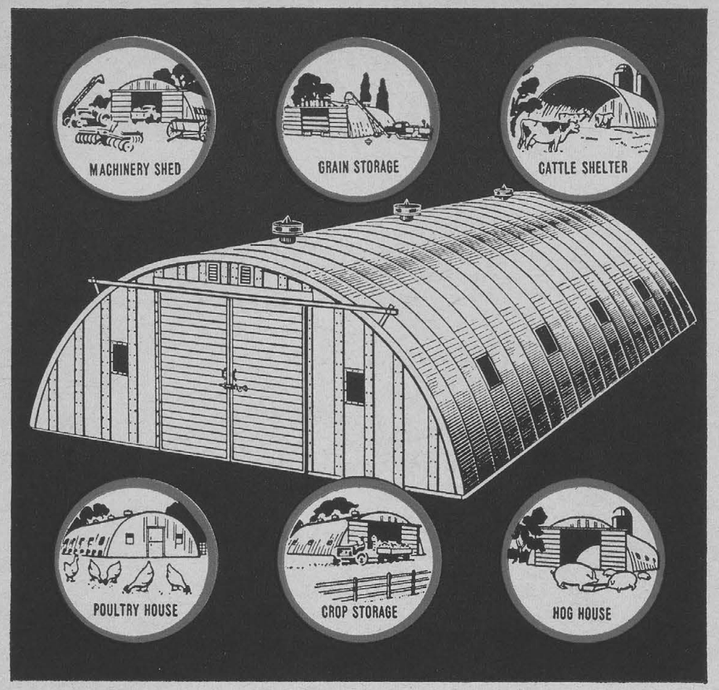
"Worn, misfiring plugs can rob you of power long before you *notice* it," says Flynn. "It's smart to replace your old plugs with new Champions—before heavy plowing. You can depend on Champion Spark Plugs—they're the first choice of the men who design and build America's tractors."



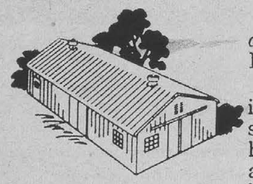
DEPENDABLE CHAMPION SPARK PLUGS

CHAMPION SPARK PLUG CO.
TOLEDO 1, OHIO

EVERY MAJOR U.S. TRACTOR MAKER USES CHAMPION SPARK PLUGS!



Quick, economical answer to your shelter needs!



Farrow or harrow, grain or grain drill — *anything's* safe in a LOK-RIB Steel Building. It's a multi-purpose unit for every farm need.

A LOK-RIB has no separate framework, so it goes up fast and saves on erection costs. You save on upkeep, also. LOK-RIB panels are heavy, 18-gauge galvanized steel, twice as thick as ordinary light metal sheathing. Steel can't burn — so you have added protection against fire. And you're safe from damage by windstorm, snow, ice, rot, and rats.

Mail coupon for free bulletins that tell you how *you* can get a LOK-RIB now and take five whole years to pay.

New! Inland Straight Sidewall Steel Buildings. Tapered rigid frame provides strength, economy, versatility. Available in varying widths and lengths. Send coupon for more details.

LOK-RIB
STEEL BUILDINGS



TEAR OUT COUPON AND MAIL TODAY!

INLAND STEEL PRODUCTS COMPANY LR-10
LOK-RIB Steel Buildings
Dept. B, 4087 West Burnham Street, Milwaukee 1, Wisconsin

Send me free bulletins on:
☐ Lok-Rib Arch-Type Steel Buildings. ☐ Inland Straight Sidewall Buildings.
I am thinking about:
☐ machinery shelter ☐ grain storage ☐ dairy barn
☐ cattle shelter ☐ hay storage ☐ poultry house ☐ other.....
☐ Have a LOK-RIB representative call on me.

NAME.....
ADDRESS.....
COUNTY.....
CITY..... STATE.....
I am an ☐ owner ☐ tenant ☐ student

CONTINUED

Our readers write

signed to help relieve the present situation, but never do we hear of anyone backing Senator Curtis of Nebraska on his bill to manufacture alcohol out of the surplus grains and blend this alcohol with gasoline for a motor fuel. What is wrong with this proposal?

The government owns two alcohol plants, one in Omaha and one in Kentucky. If the government doesn't want to run them, turn them over to private business—they can do a better job of management anyway.

We all know how much grain we fed to horses and mules to keep them in good working conditions. Today all that grain goes on the market either as grain or in some form of a livestock product.

Engineers say that the alcohol-gasoline blend will cause the motor to develop more horsepower and run more smoothly. Let's look into this thing and put the pressure on our Congressman. T. M. Syck

Need rural buying power

Aberdeen, South Dakota

If we do not keep buying power in the grassroots area, money does not find its way back thru small towns, large towns, transportation and the wholesaler to take the goods off the shelves of industry and labor. An upset of the economy such as we faced in 1929 is the natural result.

When we follow a policy of destroying the buying power in our great agricultural area, and at the same time concentrating the wealth for overexpansion of our industrial plants, are we not asking for a repetition of 1929 and 1932? C. W. Croes

Can't farm part-time

Pritchett, Colorado

It takes large machinery to operate farms around here and the cost is high. We can't make up the difference with a part-time job. Riding both sides of the fence isn't too practical. We would either neglect the job or the farm.

Better get a full-time job and forget the farm. Better move to town or a nice suburb. Farms around factories are pathetic. They become just places to hang your hat.

I'll admit we are fighting a losing battle. I've farmed all my life and today, at 64, I am on the verge of losing my life's earnings. I am wondering what may happen when industry can't supply jobs for all who have to leave the farm. Walter H. Plagge

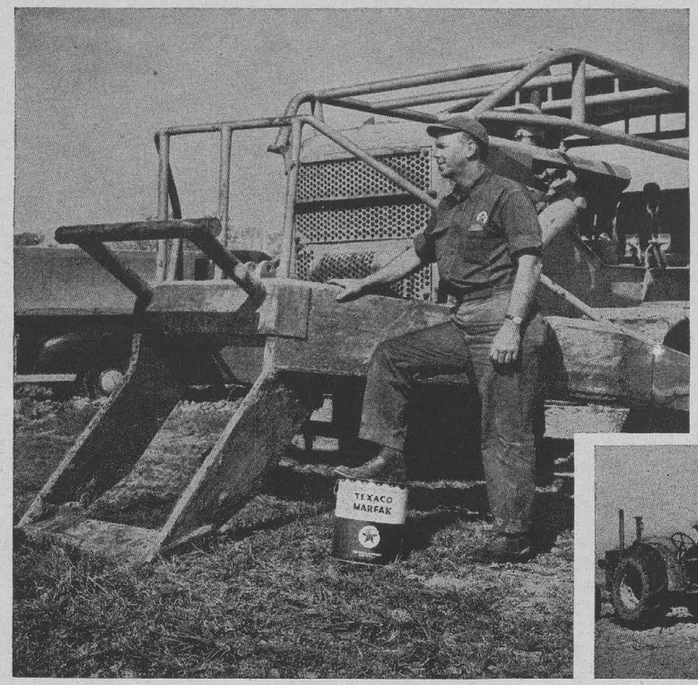
A lovely picture

Stockton, Illinois

I want to thank you for using the lovely church picture on the December issue of *Capper's Farmer*. You hardly could have chosen a more telling scene, both as a seasonal illustration, and as an equally telling one to your article, "Can the rural church survive?" I, for one, appreciate your choice.

John Hieronymus, Pastor

STUMP PULLER AND DUMP WAGON CUT COST OF LAND CLEARING!



THE homemade stump puller and a dump wagon shown save costly time and labor in clearing land on the Norris Raun farm near El Campo, Texas. Both are activated by hydraulic power.

Mr. Raun gets neighborly on-time service from Mauritz and Carroll, Texaco Distributors of El Campo.



This homemade detachable stump puller is raised or lowered by hydraulic power. J. S. Carroll, Jr., of Mauritz and Carroll, Texaco Distributors, is on hand with Texaco Marfak, the lubricant that sticks to bearings better . . . won't jar off, wash off, drip out, dry out or cake up . . . adds to machinery life.

This novel two-wheel dump wagon is operated by hydraulic power. Picture shows driver unloading stumps by tilting wagon box. The stump puller and dump wagon save time and labor in clearing land on the Norris Raun farm near El Campo, Texas.



Bert Corbello, of Kinder, La., bores holes in stumps and blasts them out of the ground. He wearproofs his engines with Advanced Custom-Made Havoline Motor Oil. This famous oil cleans as it lubricates, releasing full power from gasoline.



Dependable on-time delivery, Texaco Consignee C. M. Stevens of Neodesha, Kan., provides his customers with Texaco Fire Chief, the gasoline with superior fire power for low-cost operation. Texaco service and products help farmers in all 48 states.



In all 48 states—you'll find Texaco Dealers with top-octane Texaco Sky Chief Su-preme gasoline, supercharged with Petrox, for maximum power and famous Fire Chief gasoline at *regular* price, Havoline Motor Oil and Marfak lubricant.

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A Look Ahead

by Francis A. Kutish



THE DECEMBER USDA pig survey is more encouraging than expected. While it points to lower prices next summer than a year ago, it indicates that converting feed into pork should continue to be profitable during 1958.

The increase in the 1958 spring pig crop won't be as great as was anticipated earlier. If farmers follow thru on their December 1 plans, the spring crop will be up only about 6 percent. And the bulk of this increase will come in the winter months. Farmers were planning to raise 10 percent more litters in December, January, and February; only 5 percent more in March, April, and May.

December survey also shows that the 1957 fall pig crop was only 2 percent larger the year previous. And this increase was concentrated in June and July litters. Actually, there were slightly fewer litters in August and in September than in 1956.

This should add up to slightly smaller late winter hog marketings this year than in 1957. May and June sales should be about the same as in 1957. But there will be around 10 percent more July, August, and September pigs on the market than in 1957. October-December sales should run about 5 percent higher.

Under such supply conditions, we can expect hog prices to be as good or better during the late winter and early spring than in 1957. Summer prices will average somewhat lower; early fall prices about the same to slightly lower than 1957.

A 5 percent larger late fall slaughter in 1958 would work against a repetition of the sharp price advance of last November and December.

Cattle and calf slaughter tailed off in late 1957. But the cutback was not enough to halt the downturn in cattle numbers. So look for the January 1 livestock inventory figures, which will be released later this month, to show a further downturn in cattle population.

But if weather continues good this may be the last year of the downturn in the current cycle. If so, it will be the shortest downturn on record. Expansion from the restocking that has begun won't show up for a couple of years. Much will depend upon moisture conditions this year.

We should see smaller supplies of beef on the market the next few years than in 1956 and 1957. The beef cow has a good outlook for the next few years.

Dairy price supports have been shaved to the minimum possible under the law. Supports will be dropped to 75 percent of the parity price on manufacturing milk and butterfat on April 1. Manufacturing milk is now supported at 83 percent of parity and butterfat at 80.

Secretary Benson, in announcing the action, said dropping the supports should reduce the retail price of butter and cheese about 2½ cents a pound.

The action obviously will reduce the income of dairymen. The lower support will drop manufacturing milk prices about 25 cents a hundred and butterfat about 3½ cents a pound.

Requirements for corn loans have been eased. Grades No. 4 and No. 5 are now eligible, with discounts. The discounts will range from 1 to 13 cents, depending upon degree of damage.

No change has been made in the moisture requirements for sealing corn, however. But with the lower grade provisions, it will be possible to dry corn to meet moisture requirements and qualify for a loan. Often dried corn carries more damaged kernels than No. 3 grade allows.

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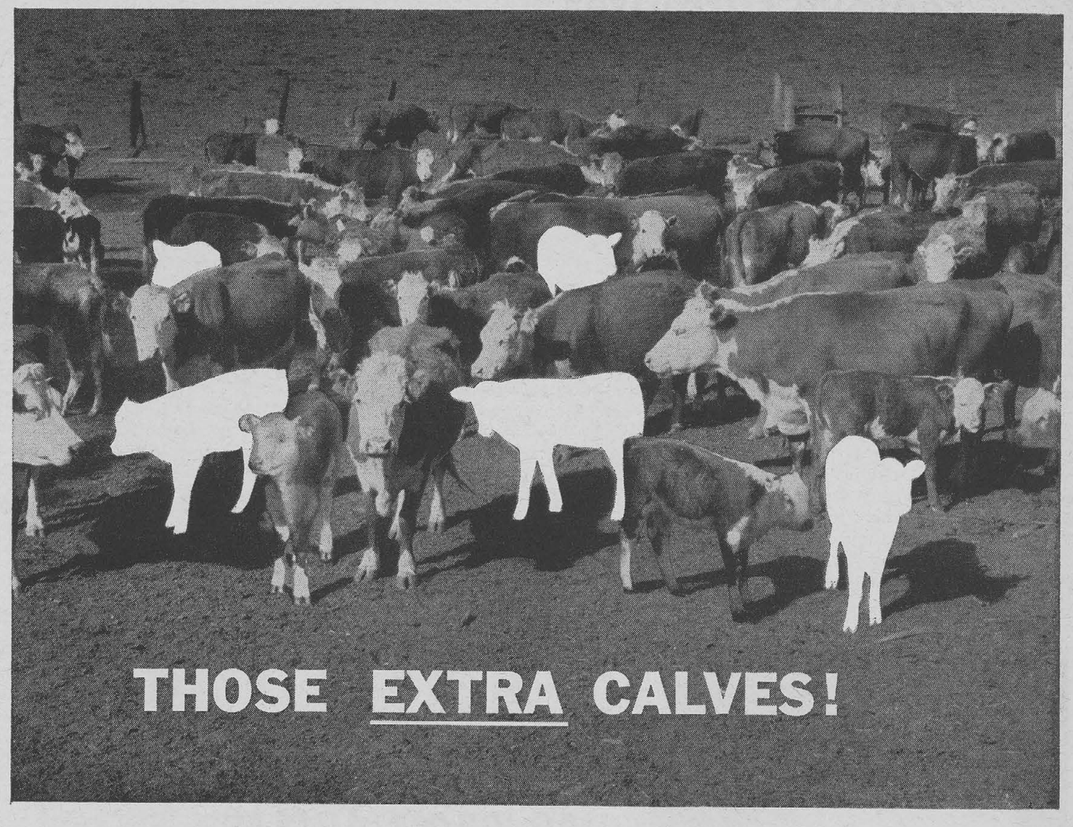
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Other reasons are: range cubes help yearling steers put on weight gains on less feed per dollar invested—help replacement heifers develop soundly and reach vigorous maturity.

AUREOMYCIN in range cubes assures more vigor, better health and growth through the suppression of disease. It protects cattle against winter stresses—holds down bacterial infections that usually follow chronic coccidiosis and infestation by internal parasites.

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A bold program to remove surpluses

A CRASH PROGRAM that would take 60 to 70 million acres out of feed grain production and immediately reduce CCC storage stocks was recommended by the field crops committee of the National Conference of Commodity Organizations at its Kansas City meeting in December.

It is unrealistic to assume that lowering price supports will adjust production, the committee agreed. It termed unrealistic also continuance of government aid programs that encourage greater production, such as payments for fertilizer use, land reclamation, and irrigation development.

The committee recommended these four items for the NCCO legislative program: 1. Take off corn acreage allotments. 2. Abolish the commercial corn producing area. 3. Remove limitation on payments per farm and individual. 4. Make payment for retired acres "in kind" from CCC stocks now in oversupply.

Goal of the committee is to cut the mountainous carry-over of feed grain to normal reserve requirements of about 900 million bushels. To reach the goal will require some bold measures, the grain producers agreed.

Immediate need is to get rid of surplus. When that is accomplished, NCCO hopes to have worked out a self-supporting method which would help hold production under control.

Realizing that corn and grain sorghums are the villains in the surplus pile, producers of these two grains came up with a program designed for drastic acreage cuts.

The proposed corn-sorghum program would repeal corn acreage allotments first.

Next, a corn and sorghum base would be established for each farm in the United States. The base would be determined from past plantings of corn-sorghum on the farm and the historical ratio of corn-sorghum acreage to the total cropland of the community.

A normal yield on which to base support payments would be established for each farm. The yield would be for either corn or sorghum, whichever is the predominant crop of the county.

Incentive to cut acreage would be a sliding scale of payments. The greater the reduction from the base, the higher the support payment would be. For example:

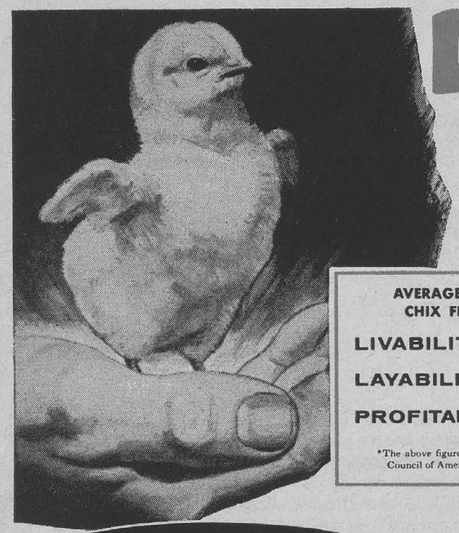
If a farmer planted only 60 percent of his base acreage, he would get price support at 90 percent of parity. If he planted 90 percent of his base, his price support would be at only 60 percent of parity. No crops could be harvested or sold from the acreage taken out of production.

In no case would noncomplying corn or sorghum producers be eligible for price supports on other feed grains and soybeans.

Payment for retired acreage would be from CCC stocks now in oversupply. If surplus stocks were insufficient to pay all participants, the difference would be paid in cash.

The producer could accept the payment in grain or sell it in normal commercial channels. The grain could not be resealed nor delivered on purchase agreements.

The grain committee reindorsed the domestic parity plan for wheat, as presented in Senate Bill 774 in the last Congress. It also recommended that limitations be taken off conservation reserve payments to encourage the placing of entire farm units in the reserve.



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*The above figures were compiled from Report No. 18 Council of American Official Poultry Tests, 1955-1956.

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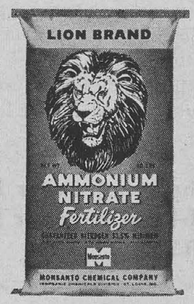
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Test your soil to learn how much nitrogen and other plant foods you need for your crops. Then figure how much and what kind of fertilizer is necessary to supply these needs. Your local agricultural advisors will help you.

Apply the full amount of proper mixed fertilizer and Lion brand Ammonium Nitrate your soil test indicates. Don't skimp—fertilizer is the least expensive item you use for crop production.

See the results when your crops get all the nitrogen they need for peak yields. You'll be glad you used low-cost Lion brand 33.5% nitrogen fertilizer. Look for the Lion on the bag at your favorite fertilizer dealer.



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FORESIGHT

WHAT TO EXPECT—WHAT TO DO—TOMORROW, NEXT WEEK, AND IN THE MONTHS AHEAD

by CAPPER'S FARMER *six-man panel of economic experts*

I have some plain grade cattle that have been cleaning up cornfields this winter. What's the best way to handle them from here on?

Bottum: If you have a profit, sell them when they come out of the cornfield.

***Elliott:** Take your profit now unless you have more unmarketable feed.

Schruben: Try to raise their grade and point for mid-summer market.

Baughman: Depending on their condition, put them on silage, follow with a short grain feed, and sell in late spring.

Kutish: Finish them off fast to avoid competition from native and short-fed cattle later this spring.

*(*Ralph A. Elliott is assistant general manager of the Farmers National Company. He is pinch-hitting for Bruce Russell while Bruce is on a mission in South America.)*

Should I buy some 700- or 800-pound cattle off wheat pasture and feed them out for late summer market?

CONSENSUS: ***Looks reasonably good if you buy good quality.***

Elliott: They should hit a good market and make money for the experienced feeder.

Bottum: If price of these cattle breaks as anticipated, feeding them out for late summer may pay.

Kutish: This is a high risk program. Don't fool with plain or medium stuff.

Baughman: These cattle would carry an excessive risk.

Schruben: If you buy them, look for the heavier ones and give them a good finish.

I have some wheat not under loan but eligible. Should I put it under loan before January 31?

Elliott: Take purchase agreement and watch for market bulge.

Bottum: Purchase agreement is cheap insurance if you want to carry your wheat past January 31.

Schruben: Why not have this protection? Purchase agreement will cost you half a cent a bushel, and you have a guaranteed price at least until end of March.

I rank in the upper 25 percent in efficiency in handling hogs. In view of prospective prices, should I cut down?

CONSENSUS: ***Keep your normal number.***

Baughman: Don't cut this year, but be ready to ease off in 1959.

Bottum: Hogs should be profitable for you with present corn prices.

Schruben: Hog-feed ratio will be favorable this year. Prospects for 1959 depend on 1958 feed crop.

Kutish: Hogs are still your best bet for converting your corn into livestock.

Elliott: Continue at normal. It seldom pays to be an "in-and-outer."

Oats have been losing money. What can I plant as a nurse crop for seedings that will rest my land and show a profit?

Bottum: It's hard to beat oats except in limited areas where barley may be better.

Kutish: Some farmers seed between wide rows of corn.

Baughman: You can experiment with wheat, barley, and wide-spaced corn. You must recognize that there are costs to establishing legumes.

Elliott: Grow wheat or barley if they are adapted to your location. For alfalfa, work stubble immediately after harvest and seed in August.

Should I hurry my February pigs for summer sale or carry them along and sell later in the fall?

CONSENSUS: ***Push them along.***

Baughman: This is a good year to get them off early.

Kutish: Our increasing numbers mean a sharper than usual fall price drop.

Elliott: Push to market weight in 5 to 6 months.

Bottum: Push them; you can lay in your corn now at a reasonable price.

Schruben: I would rather plan to sell at 6 to 6½ months of age.

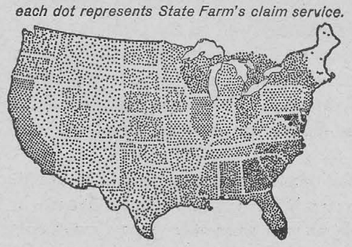
CONTINUED

PANEL MEMBERS: Ernest T. Baughman, assistant vice-president, Federal Reserve Bank, Chicago; J. Carroll Bottum, agricultural economist, Purdue University; Francis Kutish, extension economist, Iowa State College; J. A. Rohwer, president, Farmers State Bank, Schleswig, Iowa; Bruce Russell, president, Farmers National Co., Omaha; Leonard W. Schruben, agricultural economist, Kansas State College.



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FORESIGHT

CONTINUED

If we get a February or March break in hog prices, what about picking up some feeder pigs to feed for summer market?

Schruben: Figure on basis of $15 hogs next summer; $12 to $13 next fall.

Kutish: Feeder pigs have been very high. A break in market is your best hope of getting in.

Baughman: Don't expect feeder pigs to decline as much as slaughter hogs.

Bottum: Probably would be profitable. Not as much rise as normal expected this summer, however.

Elliott: Figure value of a bushel of corn against each 10 pounds of gain you will put on.

We have some cash for investment. Should we buy stocks and bonds or try to buy another farm?

Bottum: This seems to be a better time to buy stocks than land, and it diversifies your risk.

Schruben: Too many "ifs" to give a definite answer.

Baughman: If you have enough land and life insurance, buy good quality stocks and bonds.

Elliott: Farmers can diversify by owning shares in sound industry, just as businessmen hedge by owning farm land.

Kutish: Purchase of good stocks is a way to diversify your investment program.

Should I veal my dairy heifers or raise them for sale as springer heifers?

CONSENSUS: ***If they are from good producers, raise them.***

Baughman: If you have feed and labor, raise them.

Bottum: Depends on quality of heifers and alternative use for your feed.

My milo that would have made 40 bushels an acre blew down. What should I get for it as pasture for stock cows?

Elliott: Milo grain eaten by cows under limited grazing should be worth as much per pound as hay, but half the grain will likely be lost.

Baughman: You haven't much choice: Whatever someone will pay, or try to harvest grain later.

Schruben: Why not graze the milo with feeder cattle just before putting them in the feedlot?

Bottum: If grain has not deteriorated, try to use it for fattening stock rather than cows.

TIPS FOR PROFIT

Cut protein cost by comparing prices before you buy. A common rule is to compare prices on the basis of cost per pound of protein in the feed. First find the percent of protein in the analysis on the feed tag. Multiply this by 2,000 (pounds per ton). This gives you the pounds of protein in a ton. Divide pounds of protein per ton into price per ton of feed and you have the cost per pound of protein.

Do this for each kind of supplement to find the cheaper protein. The non-protein portion of the feed is about equal to corn in feeding value.

High risk projects should be saved, if possible, for years when you expect your income to be high. The reason is a simple matter of income tax planning. Suppose your average income is high enough that you pay taxes in the 30 percent bracket. If you lose on a project, your reduced tax will save $300 out of every $1,000 lost.

Shop for credit when you borrow. Interest is the price you pay for use of money. Interest rates go up and down as do prices of things you buy. Because interest is quoted in small figures it is easy to overlook the difference in cost. For example, if you borrow $10,000 at 6 percent it will cost you $100 more for a year than if you pay 5 percent.

Repayment terms are important too. Be sure you pay interest on only the actual money you use. If you repay principal in equal monthly installments, but pay interest on the full face-value of the note, a $10,000 loan at 5 percent can cost you about $250 more than it would if you pay interest on the unpaid balance.

Use price as a guide to fertilizer rate of application for highest profit. Study yield response to fertilizer for soils on your farm, estimated from soil tests. Next, estimate the value of your crop when it's sold. Finally, figure net returns in dollars you are likely to receive by 10-pound increases per acre in fertilizer applied.

Apply at the rate where the crop return for the last 10 pounds will equal the cost of fertilizer.

Your liability insurance policy can get out of date pretty fast. Here are indications you may need more insurance: More labor employed on the farm, increased size of farm business, a larger family with younger members beginning to drive a car, truck, or tractor on a public road. Relocation of highways near your farm may increase the chance for accidents involving your property.

Adequate liability insurance is a good investment. And you know you will have expert help for defense in case you need it, as well as money to pay judgments against you.

New Hustle For Your Farm Hauls!

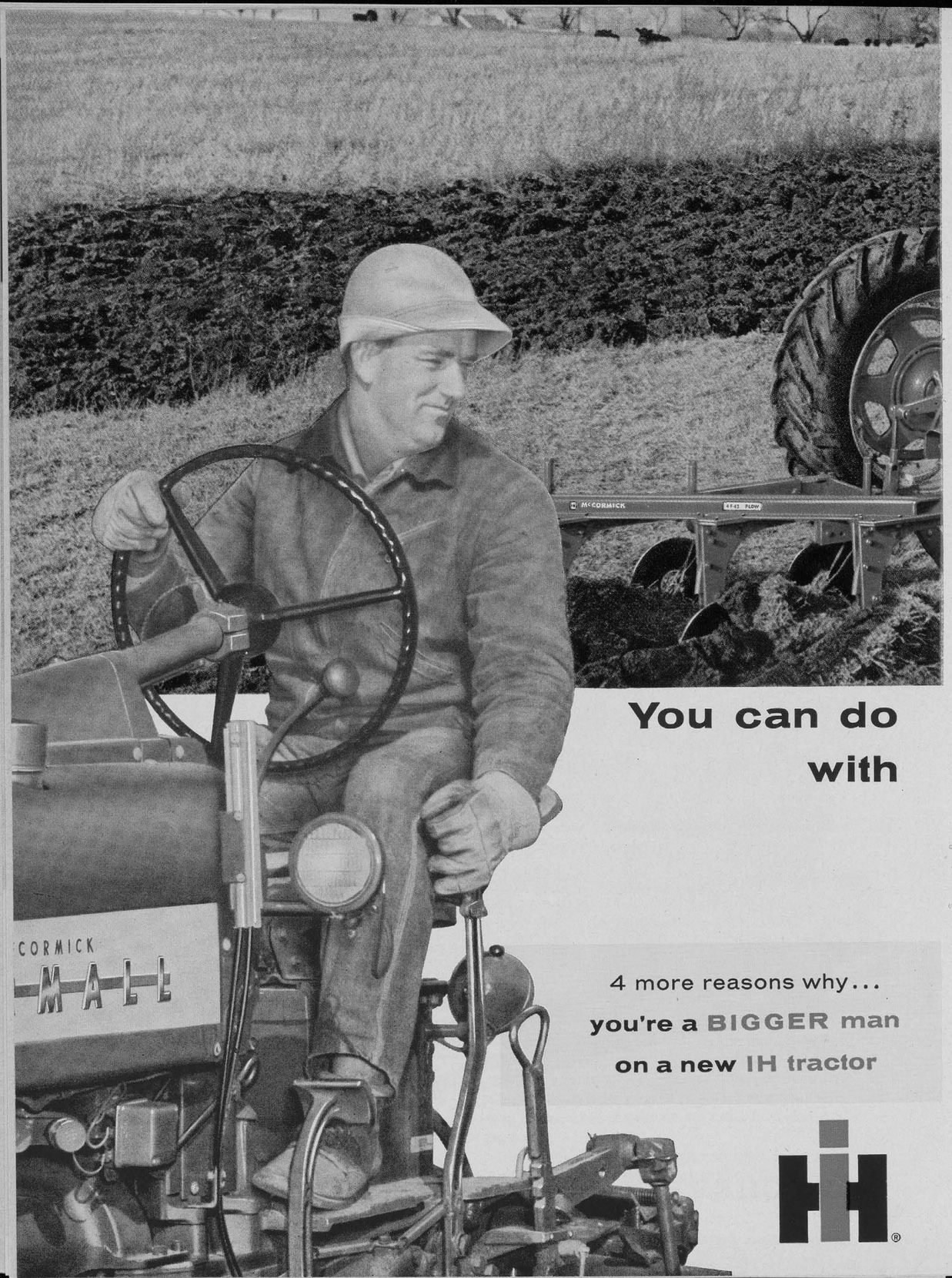
There's greater durability, increased horsepower in Chevrolet's new engine lineup for '58! There's more hustle under the hood, more savings and stamina!

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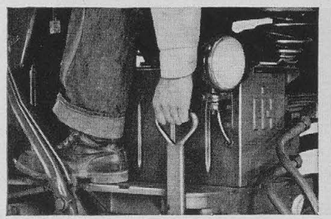
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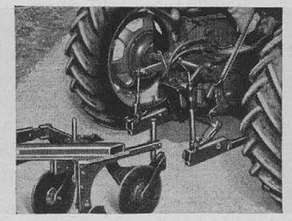
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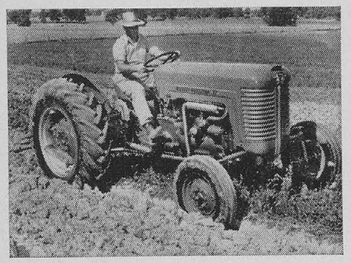


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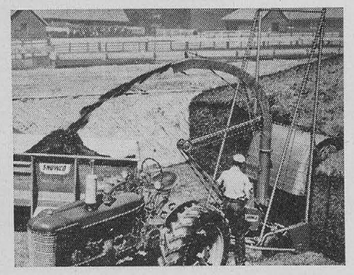
HERE COME YOUR NEW TOOLS



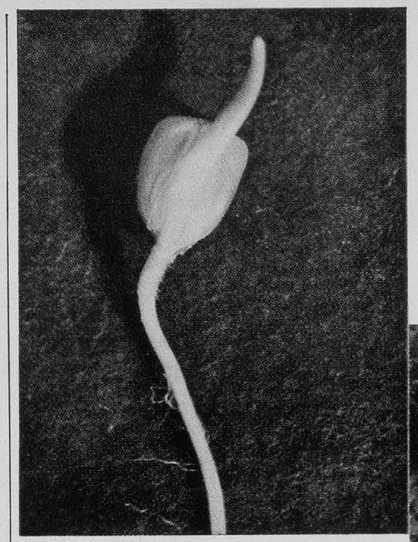
All-new four-plow tractor is announced by Massey-Harris-Ferguson. Called the Massey-Ferguson 65, the new tractor is offered in four different models. Famous Ferguson system, which lets operator transfer load weight to rear wheels for better traction, gives farmers a four-plow tractor in the medium horsepower class, company says. Other features listed are Dual Range Transmission and two PTO drives.



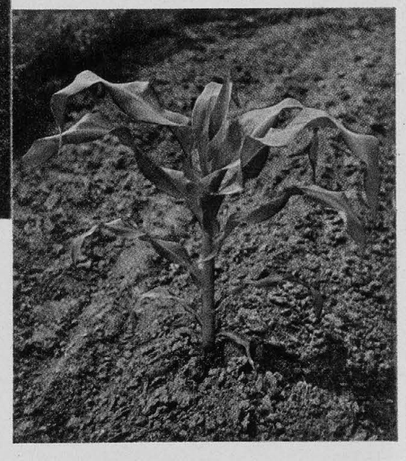
Tractor cab fits either bare machine or tractor equipped with front or rear-mounted tools, reports J. Frank Sims Cab Company, Holden, Massachusetts. Tractor and implement controls may be operated from inside roomy cab, manufacturer says. Sides roll down for added winter comfort.



Silage loader for trench or bunker silos cuts forage loose, pulverizes it, and blows it into wagon, says Snow Company, Omaha, Nebraska. Called the "Snowco" loader, it is said to operate with 3-plow tractor and deliver more than half a ton of grass silage per minute with ease.



full-season feeding



A seed is so charged with energy that it actually bursts with life. To continue this vigorous growth, Swift has developed plant foods with extra growth energy—powerful as nature stores in seed.

Swift's Plant Foods trigger

EXTRA YIELDS are built into Swift's Specialized Crop Makers by the exclusive FLO-FUSION process. It chemically hitches liquid and dry plant food elements for a balanced crop diet. Soil moisture gradually dissolves the nutrient bonds . . . providing a potent plant food for absorption by tiny roots . . . full-season feeding . . . and early maturity. Your crop is charged with new YIELD ENERGY!

With Swift's Specialized Crop Makers you invest a few pennies more per acre, but these pennies come back at harvest time . . . bringing dollars with them. Prove to yourself Swift's plant food economy—just as thousands have.

Area Adapted

Just as hybrid seed varieties are adapted for different areas, so are Swift's plant foods. They are specially charged with plus food elements needed by crops and soils in your area.

Discover the yield difference with **Blenn, Brimm, Vigoro Commercial Grower** and **Pasturgro.** Visit your authorized Swift agent—at the sign of the Red Steer. Or contact the Swift plant food factory nearest you.

Swift
103RD YEAR

AGRICULTURAL CHEMICAL DIVISION • CHICAGO 9, ILLINOIS

To Serve Your Farm and Family Better



new Yield Energy

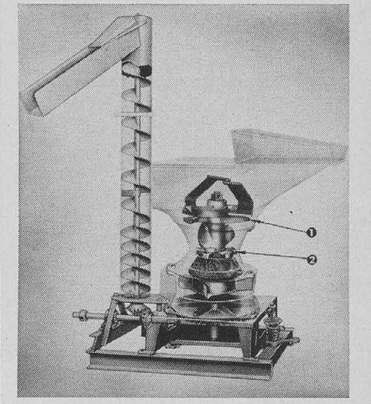


All grades of Swift's Plant Foods are FLO-FUSION manufactured—not just mixed.

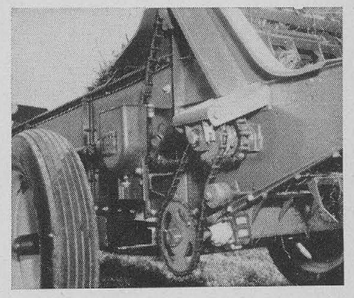
Ask about Swift's Gold Bear line of weed and insect killers



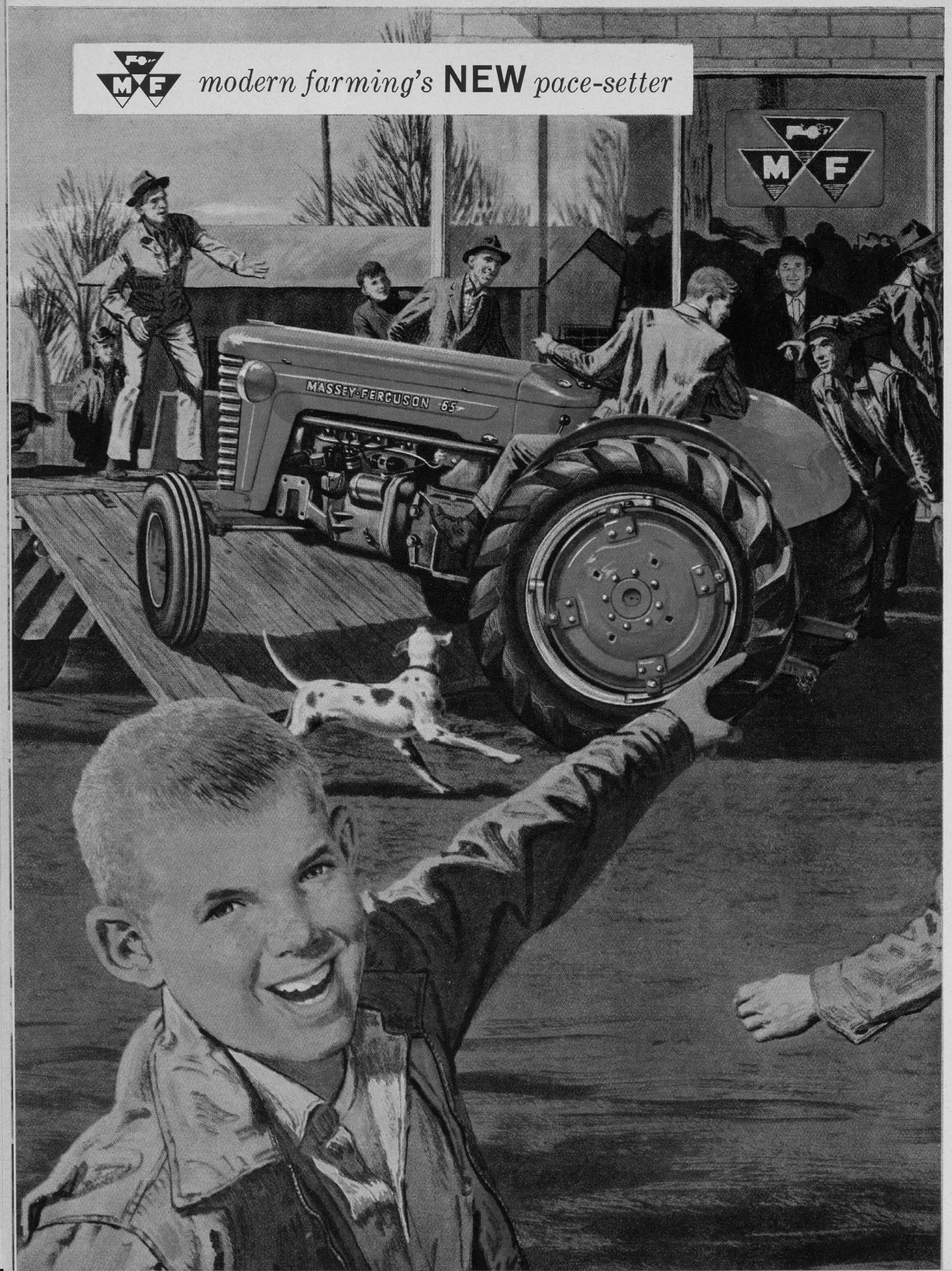
New Sure-Shred 60 line of shredders completes company's coverage of this field, says Brillion Iron Works, Brillion, Wisconsin. New units are aimed at the medium capacity and price market in between company's ligher crop residue shredders and heavy-duty lines, manufacturer says.

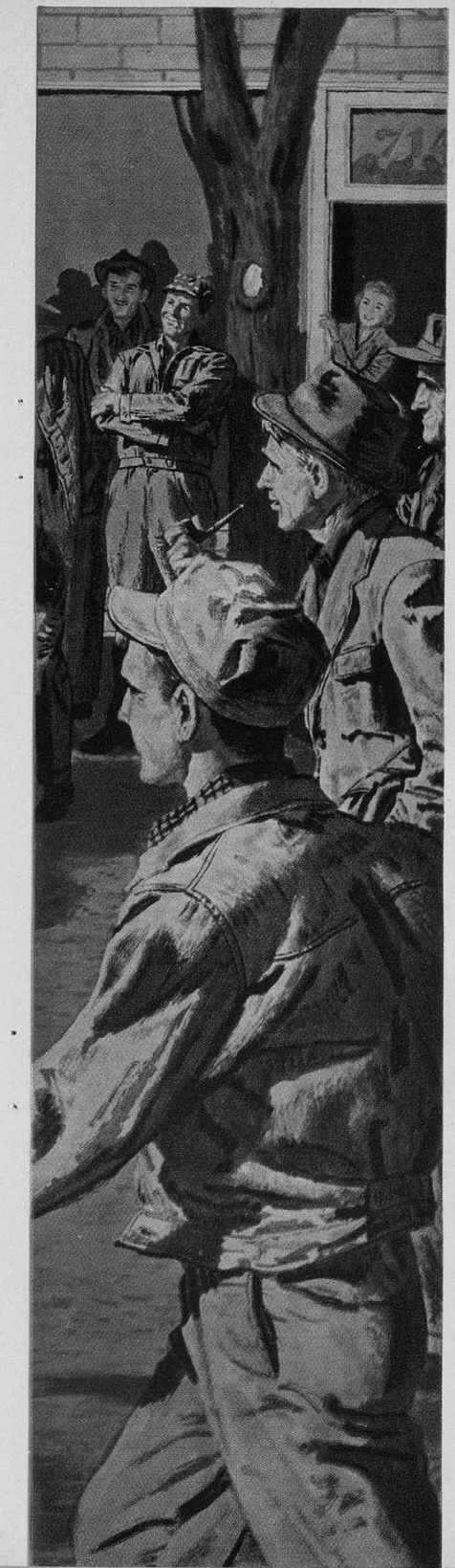


Burr mill makes quick work of shucky ear corn, says N. P. Bowsher Company, South Bend, Indiana. Called the No. 35 "Beefmaker," it is said to include two sets of hardened steel knives. These are properly spaced to cut thru both cobs and shucks for fast, clean grind, company says.



New clean-out system for manure spreader helps farmers empty it more thoroly, says New Holland Machine Company, manufacturer. Called the 221 PTO spreader, it features special high-speed mechanism for apron. When end of load is reached, new device zips remaining manure out of 100-bushel box at high speed, company says.





LOOK DAD IT'S HERE!

The first big 4-plow tractor with the Ferguson System!

It had just been delivered to Massey-Ferguson dealer Bill Bailey's place . . . the completely new tractor folks from miles around had been waiting to see: the all-new Massey-Ferguson 65.

They'd heard about it, and it had sounded mighty good. Why? It had the kind of power they wanted . . . ample power to work a 4-bottom plow under almost any conditions. But, most important, *it had the Ferguson Hydraulic System* . . . the *original* tractor hydraulic system, and still engineered years ahead of all the rest. That's what made the MF-65 unique and exciting. It was the *first* tractor in the 4-plow power class with the Ferguson System and exclusive 4-way work control.

That's what brought the crowd to Massey-Ferguson dealer Bill Bailey's place of business that Saturday afternoon. They wanted to *see* and *handle* the new MF-65 . . . get its big, powerful feel. What they saw they liked. For what they saw and did, turn the page.

This message from Massey-Ferguson continues on next page.

EVERYBODY WANTED UP

on the new MF-65

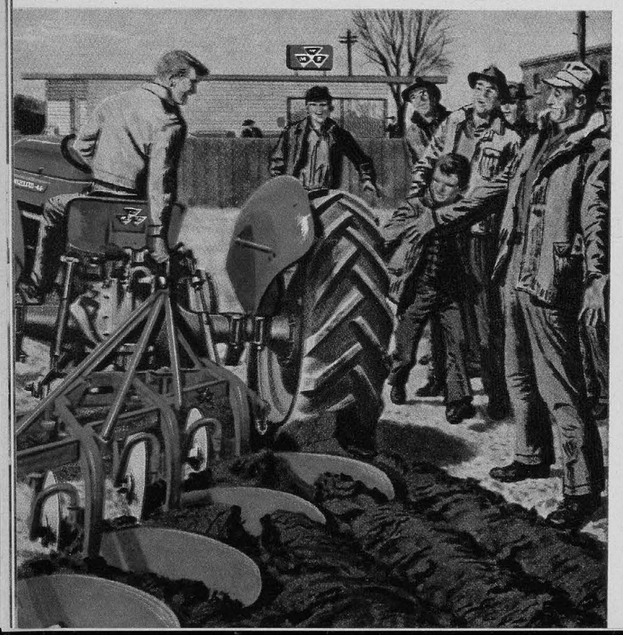
and they climbed aboard and wheeled it around the yard. Despite all its rugged 4-plow capacity power, the MF-65 handles as easily as a light tractor, even with field equipment mounted. That's the triumph of Massey-Ferguson engineering. You have all the power you need for heavy jobs, *without* hard-to-handle excessive tractor weight that only wastes fuel on lighter jobs. Yet out in the field you get all the traction you need *when* you need it, because when the going gets tough the Ferguson System automatically transfers the weight of the soil's pull to the MF-65's drive wheels.





HERE'S POWER A-PLENTY to handle big field equipment, such as a 4-bottom plow under most conditions. Mounting is fast, simple and easy with the Ferguson System wrist-action 3-point linkage . . . the simplest, most foolproof linkage yet devised. Tools hook-up fast . . . you change from one implement to another in just a few minutes.

NOW THERE ARE THREE . . . three tractors in the most used power classifications, all with the famous Ferguson System! The Ferguson System is the *original* tractor hydraulic system . . . the world's first. It is *kept* the finest by constant Ferguson-engineered improvements. Left (below) is the famous 2–3 plow Ferguson 35, the world's most popular and most copied utility tractor. Center is the Massey-Ferguson 50, the new de luxe Ferguson System tractor in the 2–3 plow power class, available in 4 interchangeable front assemblies. At the right is the all-new MF-65, the Ferguson System tractor in the 3–4 plow power class, also available in four models.







QUESTIONS AND ANSWERS

about the new MF-65 tractor

Q—Is the MF-65's hydraulic system the original Ferguson System, as in the Ferguson 35 tractor?

A—Yes. But, of course, it is engineered to handle heavier field equipment, such as a 4-bottom plow. The Ferguson System was the world's first tractor hydraulic system, introduced in 1939 and since then constantly improved.

Q—What is an easy way to recognize the Ferguson System?

A—The quadrant which you see here. This Ferguson exclusive enables you to raise and lower implements, to select draft and maintain uniform depth, to adjust the hydraulic system's speed of response and to hold implements rigidly at any position you choose . . . all with a touch of your finger tips!

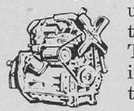


Q—Does the MF-65 have the Ferguson System's exclusive Compensating Overload Release?

A—Yes, as do both the MF-50 and Ferguson 35. Built right into the tractor, it protects the tractor and draft implements from impacts of underground obstructions. To clear and proceed, the driver doesn't even have to leave his seat!

Q—What is the horsepower of the MF-65?

A—Approximately 48 horsepower at the belt. Through the use of the Ferguson System, the effectiveness of this power at the drive wheels is multiplied. The resistance of the soil through which an implement is passing is harnessed and used to the advantage of the tractor.



Q—Isn't "Massey-Ferguson" a new name?

A—It is. It's a new brand name for Massey-Harris-Ferguson, Inc., the company that has joined together the engineering know-how and facilities of Massey-Harris and Ferguson to bring you new and better power-farming equipment . . . and a Massey-Ferguson dealer organization handling the *full line* of Massey-Harris-Ferguson equipment.

Q—What about credit terms?

A—Your Massey-Ferguson dealer now offers new, more liberal Time Repayment Plans . . . so flexible that they fit practically every farm income pattern.

Now it's **MASSEY FERGUSON**

MASSEY-HARRIS-FERGUSON, INC., RACINE, WISCONSIN

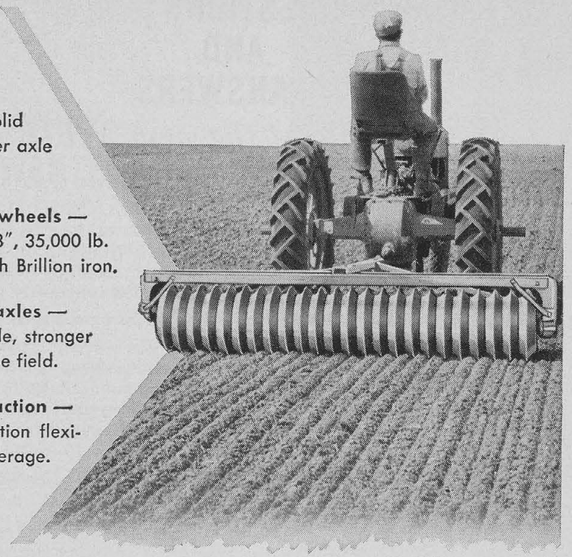
World's most famous combines and the only tractors with the Ferguson System

1. **Biggest bearings**—solid *end-and-center* axle support.

2. **Strongest wheels** — heavy-duty 18", 35,000 lb. tensile-strength Brillion iron.

3. **Sturdiest axles** — 4½" pipe axle, stronger than any in the field.

4. **Floating action** — 1½" all-direction flexibility, full coverage.

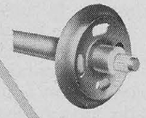


Reasons why *Brillion* is today's best pulverizer buy

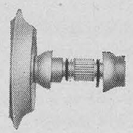
Tough seedbed finishing jobs knuckle under to the pulverizing-power of these Brillion heavy-weights. No wonder — for only in a Brillion do you get a combination of cost-cutting, clod-crushing features like this:

- sealed bearings — end and *center thrust*
- 18" wheels
- 4½" pipe axles — 2 times stronger
- suspension for all-direction flexibility
- ball and socket end bearing
- more weight per foot of length
- 110 sizes, 20 models

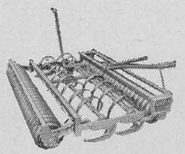
Compare! You'll want Brillion performance — ahead in features that give you more for your equipment dollar.



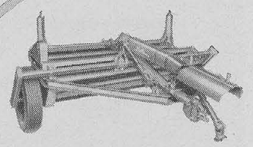
4½" pipe axles . . . twice as big as any other pulverizer axle, your assurance of a solid support for wheels, years of service-free performance.



Brillion heavy-duty sealed bearings defy dust and grit. These big-surfaced rollers smooth out the hammering slugs of crushing sun-baked clods. Self-aligning.

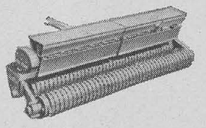


Pulvi-mulcher packs and harrows. Builds once-over seedbeds.



New Brillion Triple-Action Hay Conditioner pinches, buckles, crushes stems. Cuts curing time in half.

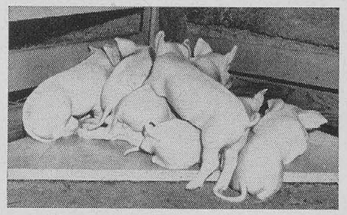
Brillion
PULVERIZERS
IF BRILLION MAKES IT, IT MUST BE GOOD



Sure-Stand seeders sow all seed in top half-inch . . . pack seedbed firm. Full stands every time on ½ the seed.

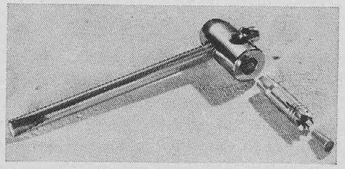
Clip and mail to Brillion Iron Works, Inc., Dept P-2-2, Brillion, Wisconsin.
Send me complete information on the Brillion Implements I've checked.
☐ Pulverizers ☐ Pulvi-Mulchers ☐ Hay Conditioners
☐ Sure-Stand Seeders ☐ I am a student
Write your name and address on the margin.

IT'S NEW for farm and home



Pig Warmer. Plug-in unit is electrically heated from a heat tape inside a triangular galvanized steel "bed." It is thermostatically controlled, has a layer of fiber glass insulation between tape and floor base so heat is forced upward. The warmer measures 33 inches by 46 inches. (Ritchie Mfg. Co., Conrad, Iowa.)

Rust-stopper. Plastic squeeze tube contains powder that stops rust with vapor. The material "condenses" on iron or steel to form a shield against rust and corrosion. For guns, you can squirt powder into muzzle or barrel. (The Martin Firearms Co., 11 West 42nd St., New York 36.)



Concrete Anchor. A hollow-core drill is installed in masonry with hand chuck and hammer. Once inside, the drill is fitted with an expander plug and becomes an anchor for a ¼-inch bolt. (Phillips Drill Co., Michigan City, Indiana.)

Roll Your Own. You can cut any size tarpaulin you need from a large continuous roll. Penknife slits are placed along the edge of the fabric and positioned wherever a tie-down is desired. The tarp fabric is vinyl plastic, permanently locked to nylon fibers. It resists tearing so slits will not spread, and edges will not ravel. Rolls are available in variety of widths. (Herculite Protective Fabrics, Belleville 9, New Jersey.)

Stylish Furnace and conditioner can be flush-mounted or built in anywhere in the house. Cooling units can be made part of the initial installation or added at a later time. The system is available in six sizes ranging from 75,000 to 200,000 BTU. (Perfection Industries, Division of Hupp Corp., 1135 Ivanhoe Road, Cleveland 10.)

CONTINUED

SAVE MORE THAN 1/2

Guaranteed by Good Housekeeping OR MONEY BACK IF NOT AS ADVERTISED THEREIN

61 PIECE Lifetime Guaranteed . . . . and virtually UNBREAKABLE

GENUINE IMPERIAL melmac® DINNERWARE

COMPLETE SERVICE for 8
DECORATOR COLORS!
• PINK • GOLD • AQUA • WHITE
LIFETIME BEAUTY! CONFETTI FINISH!

FREE! Fairbanks Ward LIFETIME GUARANTEE
Any pieces of this dinnerware that becomes broken, cracked, crazed or shows signs of defects in material or workmanship during normal use in the home will be replaced.

AS ADVERTISED IN LADIES' HOME JOURNAL LIFE Better Homes and Gardens

Not 45 Pieces . . . Not 53 Pieces . . . but ALL 61 PIECES

$29.98

NO MONEY DOWN
$3.00 A MONTH

VEGETABLE BOWL & SERVING PLATTER
8 DINNER PLATES
8 SALAD PLATES
8 SOUP DISHES
8 FRUIT DISHES

FREE DURING THIS GREAT SALE!
YOUR BONUS FOR QUICK ACTION
BUY NOW and SAVE!
SUGAR BOWL and COVER, CREAMER plus 8 JELLY DISHES
USE AS BUTTER DISH, COASTER, ETC.
8 CUPS and SAUCERS

YOU GET
• Large Serving Platter • Vegetable Bowl
• 8 Dinner Plates, 10" Size • 8 Soup Plates
• 8 Salad Plates • 8 Cups • 8 Saucers
• Creamer • 8 Jelly Dishes or Coasters
• 8 Fruit Dishes • Sugar Bowl with Cover

FAIRBANKS SEAL OF QUALITY PRODUCTS WARD
COPYRIGHT FAIRBANKS WARD INDUSTRIES, INC.

Regularly $73.35!

Only Genuine Melmac Dinnerware is unbreakable . . . stain and scratch resistant . . . safe . . . guaranteed not to chip, crack or craze. Here is a lifetime of beautiful dinnerware in newest colors. You'd pay $73.35 if it were not for this sensational sale. Don't miss this lifetime value . . . order today!

©T. M. American Cyanamid Co.

10-DAY FREE TRIAL! Order This LIFETIME VALUE Now!

REPEAT OF A SELLOUT

Helzberg's
Middle West's Largest Jewelers
Stores in Missouri, Kansas and Iowa

NO MONEY DOWN • $3.00 A MONTH

Mail Coupon Today to HELZBERG'S, Mail Order Division,
1013A McGee St., Kansas City, Mo.

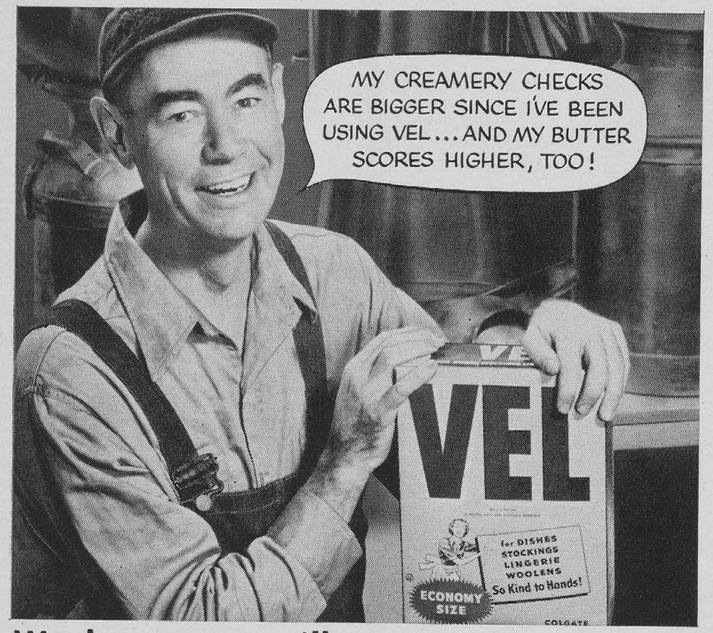
☐ Add to my account
☐ Re-open my account
☐ Open new account
(New Accounts Send References)

Please send me on approval the 61-pc. Melmac Lifetime Guaranteed Dinnerware with No Down Payment. If I decide to keep the merchandise after 10 days, I will pay $3 a month until paid.

Name_____
Address_____
City_____ State_____
Where Employed_____ How Long_____

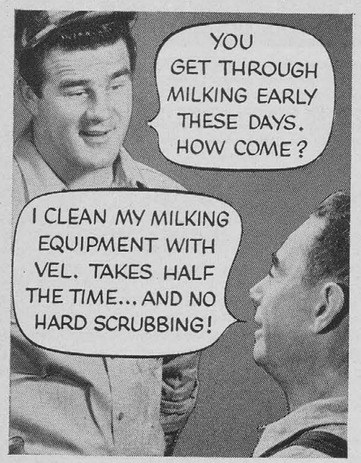
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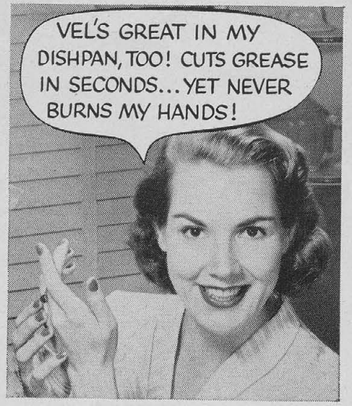
Nothing washes milking equipment cleaner than VEL!



Washes away milk scum in seconds... gets equipment GRADE A clean!

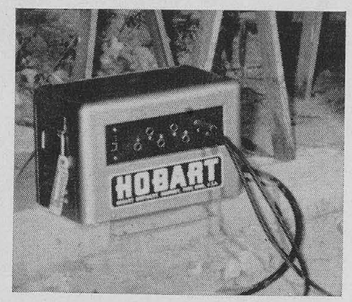
Even in coldest, hardest water non-alkali VEL (with soapless suds) gets all dairy equipment Grade A clean—ready to deliver top-quality milk and butter! Gets rid of milk scum that causes milkstone—it's the detergent recommended by leading agricultural schools and milk sanitarians. Ask for VEL in the large economy box!





..IT'S MARVELOUS!

It's new for farm and home



Workshop Welder. This low-cost welder has a 100-ampere capacity. It is different from most arc welders in that it can be conveniently operated on any 110/220-volt, single-phase circuit, fused for 30 amps. (Hobart Brothers Co., Troy, Ohio.)

Perfect Comfort. Robe made of thick terry-cloth toweling doubles in brass for use around the house, on vacation trips, or as a bathrobe. One size of these white "Moppers" fits any man or woman, except men over 6 feet. Tall men take the king-size robe. (Woodmere Mills, P. O. Box 167, Bennington, Vermont.)



Spray Easy. Sprayer has 1.2-horsepower engine and a 10-gallon tank. Extra-long hose has brass extension tube with nozzle adjustable for fine hollow-cone spray to a coarse stream. The sprayer weighs 70 pounds, is easy to maneuver. (Universal Metal Products Co., Saranac, Michigan.)

Hang It All. Low-cut garments won't stay on your clothes hangers? You stop picking them up with a hanger that adjusts easily from sizes 30 to 60. It's plastic with an extra-wide crossbar. (Arrell Sales Company, 250 West 57th St., New York 19.)

Four-way Pen. Ball-point pen has four cartridges so that you have a choice of colors —red, blue, green, and black. You retract cartridges with flick of finger to change colors. (Masterline Products Co., 6715 Hollywood Blvd., Hollywood, California.)

We've been asked:

HOW TO PROVE YOU WERE BORN!

SUPPLYING official proof of birth has become a necessity for more and more farmers since the expanded Social Security coverage went into effect in 1955. You need official proof of age to qualify for Social Security.

If you haven't such proof of birth, you have loads of company. An estimated 30 million Americans can't prove they were born!

Who goofed that so many people lack this documentary proof? Actually, you may have been born in a state that had not yet adopted compulsory birth registration. It was 1920 before the last state adopted this practice.

This means that many farmers are going to have to "dig up" their own proof to satisfy Social Security people. Of the 4,783,021 farmers counted in the 1954 census of agriculture, 779,282 reported they were 65 years old or more, and 951,310 were in the 55 to 74 age group.

If you need proof of birth, where do you start? Regular birth certificates are issued by the state in which the birth occurs thru its health department, bureau of vital statistics, or a similar agency. So the first place to start is with this agency in your state, regardless of what it may be called.

Perhaps your birth was recorded—then getting a copy of the certificate will be simple. To obtain this you must fill out an application and send documents showing your age or birth date at the time the documents were issued. The procedure varies depending on the state. But the documents you'll need will be acceptable proofs, such as affidavits from the doctor or midwife who attended the birth, family Bible records, or baptismal certificate.

If you draw a blank at this state agency, there's still another good place to try. That is the U. S. Bureau of the Census. This agency will furnish a transcript of a personal census record for use as proof of age. Here is the procedure:

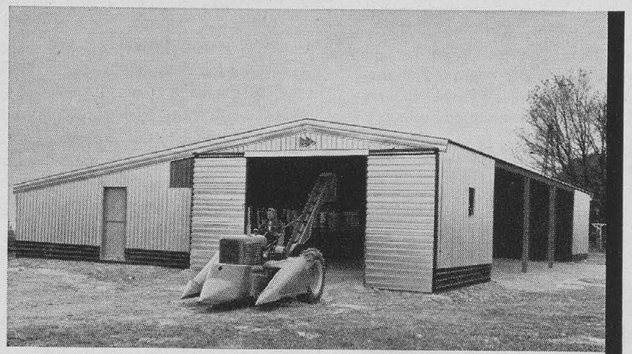
1. Ask the Bureau of the Census, Washington 25, D. C., for an Age Search Application Form.
2. Read instructions on the form; fill out and sign.
3. Send the completed form, with remittance of $3, to the Bureau of the Census, Washington 25, D. C.

The $3 fee pays for a search of not more than two censuses for one person, and for one copy of the information found. If additional copies are desired, enclose $1 for each.

It may be 30 days or more before results of the routine $3 search are in the mail. So if you want fast action, send an extra dollar—$4 instead of $3. The extra fee is used to pay special searchers who work on hurry-up requests.

During the last decade, the census bureau has handled more than 2¼ million requests for copies of census records from individuals for use in qualifying for Social Security, in settling estates and insurance cases, and for other purposes where evidence of identity, age, or citizenship is needed.

Stran-Master all-steel pole-barn



This 48' x 80' Stran-Master was erected in less than a week. Dual purpose, this building serves ideally for machinery storage or livestock shelter and feeding.

PRICED SO LOW YOU CAN BUY THE 24' x 32' STRAN-MASTER FOR ONLY $215.00 DOWN.*

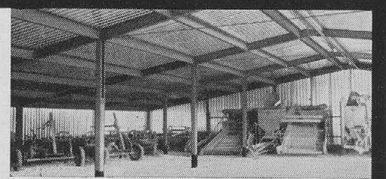
Now, with the new Stran-Master, everyone can afford modern firesafe shelter for livestock or machinery. Sizes to fit your farm and budget . . . widths from 12 to 120 ft. Choice of do-it-yourself construction or dealer's crew. Easy terms—only 25% down and five years to pay balance.

**F.O.B. Factory for do-it-yourself construction*

Dept. 2-3
STRAN-STEEL CORPORATION
Detroit 29, Michigan • Division of
NATIONAL STEEL CORPORATION



Extra-wide, full-length, heavy 26-gage galvanized sheets give added strength. Stran-Master is quality designed.



Spacious interiors provide plenty of room for every farm need. Even large combines and harvesters can be stored readily.

Send this coupon to your dealer or to:
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HERE'S HELP FOR PROBLEM SOILS

Vertical mulching—new idea in subsoiling—looks like the best thing yet to open up tough, poorly-drained claypans. It's a real stopper for runoff and erosion, too

by Ralph V. Peebler

A NEW method of subsoiling is getting a tough workout on claypan soils. It's called vertical mulching—cramming chopped-up residues in behind a subsoiler to help tight soils take on more air and moisture.

We told you about the first tests with vertical mulching in the April 1956 issue of *Capper's Farmer*. It looks like a good way to channel quick, heavy rains right where you want them—down deep in the subsoil. Could be just the thing to halt erosion and runoff.

Purdue scientists Jim Spain, Don McCune, and Bruce Liljedahl first worked out the idea. They pull a field chopper alongside a chisel mounted on a crawler-type tractor. Steel-plate wings, welded on the subsoiler, form a V-shaped channel about 20 inches deep.

These trenches are 6 inches wide at the top, around 3 inches wide at the bottom. Chopped-up straw, cornstalks, cobs, or other trash are blown into subsoil channels and act as a sponge. When quick rains come, surface water takes a nose dive down into the soil.

Judging from the Purdue tests, vertical mulching looks good. As with subsoiling, you can shatter tight claypans or compacted plow soles. Trash-filled trenches should stay open 3 years, maybe even 5. With the soil "braced" open, water can flow thru hardpans and spread out into deeper root zones.

A 20-inch channel, spaced every 80 inches, increases the absorption area 50 percent. Gentle rains, even gully washers, have a quick route down. Slow-to-drain soils can trap and store up more moisture.

That isn't all. Vertical mulching speeds up drainage. Potholes or low wet spots in a field dry out quicker.

It may also help tiled fields drain faster. Mulched trenches perpendicular to tile lines should speed the flow of water.

This new attack on problem soils uncorks a whole new food-supply area for crop roots and soil bacteria. Gives them a breath of fresh air, too.

Spain says with the soil loose and aerated, plant roots spread out and grow deep. Earthworms also step up their work; burrow holes in and around the base of channels.

Vertical mulching is still brand new. But an idea like this takes ahold fast. Purdue scientists first tried it 3 years ago. A team of South Dakota researchers headed by Fred Shubeck set up experiments in 1956.

California agronomists last year packed rice hulls into narrow trenches, 20 inches deep, 5 feet apart, in an alfalfa field. By letting more moisture soak deep into the soil, hay yields were boosted a half ton per cutting.

The research by Shubeck and his group is centered in a 200,000-acre lake-bed area in central South Dakota. Ray Pederson, who farms some of these soils in Spink county, has turned 15 acres over to soil scientists.

This land has a "slope" of 6 to 12 inches to the mile. The topsoil is gray-layered, underlain with tight claypan. It's tough almost to the surface.

Shubeck is trying out ways to best handle trenches. He's running them parallel and at right angles to the way fields are farmed.

Plowing and shallow tillage are used to see which method causes the least sealing over. The value of various trenching materials also is being checked.

If you have a high-humus topsoil, there would be little chance that plowing would cork up mulched channels. It would reduce water in-soak. So the right tillage after mulching will have to be worked out for row-crop land.

Spain says vertical mulching every 80 inches would let you run two corn rows between. An 80-inch swath also looks like the best width-of-cut. Where you have good thick stands of corn, the stover from two rows should fill the chisel mark. Usually, you would have enough straw and new growth from grain fields in a 7-foot swath.

It's amazing how much water—and trash—these trenches will handle.

Sweetclover, wheat or flax straw, ground corncobs, and stover are the residues used in the South Dakota work. Shubeck hasn't actually weighed these materials. But he has found it takes a bushel of ground cobs per foot for 18-inch-deep trenches.

As high as 12 tons of cornstalks to the acre have been jammed into channels in some of Spain's vertical mulched plots. Most of the Purdue field work has been done in August and September in dry grain fields with straw, weeds, and young meadow growth. About 2½ tons per acre will fill chisel marks completely.

How long the "mulch" will last is uncertain. Corn and sorghum stover started to decay after 5 days, Shubeck noted. He says flax straw should work. It's slow to break down and hard to get rid of, anyway.

Any high-carbon material resists decay—should last several years. Spain showed me a profile of soil vertical mulched with straw 2 years ago. Soil bugs had worked on the straw at the top of the chisel mark, but it was still open.

Trash-filled channels will handle a terrific amount of water. Purdue scientists have equipment to simulate regular cloudbursts. In one test, 5 inches were dumped on in an hour. No runoff! There wasn't any runoff until the downpour reached 7 inches.

In another experiment, mulched channels easily drained an area which had 15 inches "rained" on at ½ inch per hour. Regular subsoil channels sealed over after about 4 inches were put on.

Pelting Indiana rains last spring gave vertical mulching a real test. Quick 2- and 3-inch soakers spaced about a day apart filtered down in mulched channels. Runoff wouldn't have filled a good-sized stock tank.

Last fall I saw the first commercially made vertical mulcher. It's a one-man unit, built by M and W Gear Company.

This was the offspring of two previous test models. It has a rotary chopper, powered by a 36-horse motor. The outfit cuts a swath 80 inches wide and blows trash back around a 180-degree arc into the ground. Chopper and subsoiler can be adjusted either hydraulically or manually.

A regular 4- or 5-plow tractor pulled this machine in last year's workouts. If your tractor has enough power, you could run the chopper off the PTO instead of using an auxiliary motor.

Several companies are moving into production on vertical mulching equipment. M and W Gear's machine will be on the market in January.

Where can you use this new method?

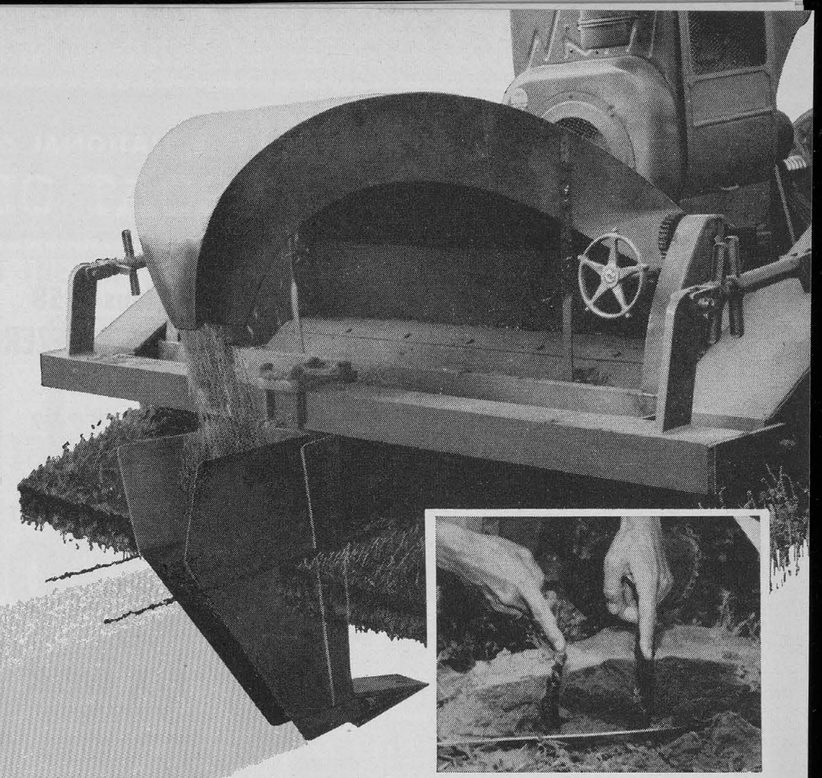
It might have value on irrigated land. A hardpan, which makes it tough for roots and moisture to penetrate, sometimes builds up under intensive irrigation. This is caused by water sifting fine soil particles down. Vertical mulching may correct this and help control the flow of irrigation water.

Vertical mulching will triple water insoak. So it could be helpful in continuous wheat country where plowpans and trapping rain are problems.

Spain's determined that vertical mulching has a place on hilly as well as flat land. He has sliced around the contours of slopes at the Southern Indiana Forage Farm. The 20-inch-deep channels hold a ½-inch rain—even if dumped on.

The trenches delay runoff, give water more time to soak in. They're all the more effective if laid out on the contour with outlets at grassed waterways.

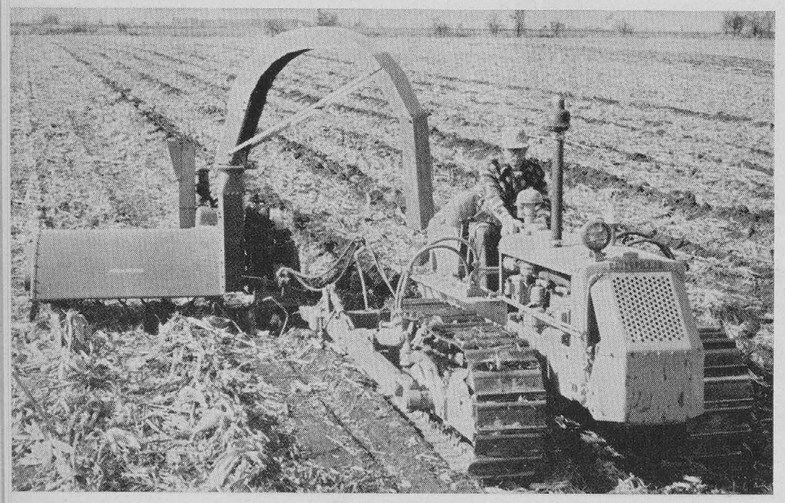
Scientists haven't enough vertical mulching research under their belts to out-and-out say, "Try it on 40 acres this year!" But one thing's sure—it will open up a whole new area of soil and water management. It could catch on quicker than some of our present conservation methods. **End**

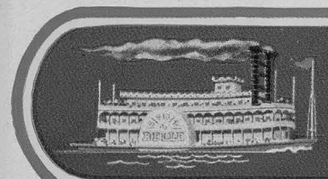


ABOVE TOP: Vertical mulcher, scheduled to go on the market this month, went thru rugged tests last year. Residues are shredded, then blown back into 20-inch-deep trench.

ABOVE RIGHT: Hardpans like this can be broken up—and held open—with this new way to subsoil. Mulch sponges up water; lets it move down and spread out in root zone.

CORNSTALKS make good trash for vertical mulching. Here, two rows of stover are chopped and blown into trenches in H. O. Dunbar's cornfield, White county, Indiana. High-carbon residues resist decay, hold subsoil channels open. Purdue vertical mulcher consists of chopper with arched blower spout to funnel trash behind mounted subsoiler.





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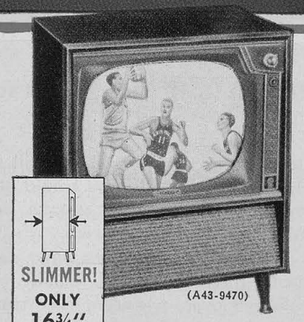
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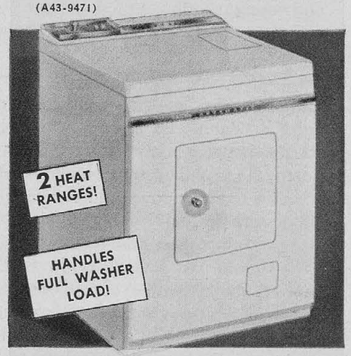
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Gambles
The Friendly Store

by Anne Hutcherson
Photos: Richards

PICK, PLACE

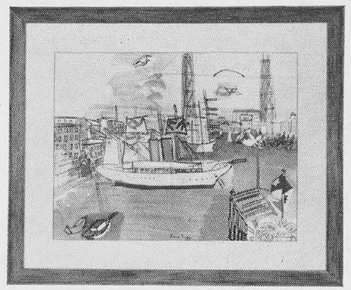
Are pictures your problem? Here are guides to help you choose and use the right picture for your room

WHERE WOULD YOU PUT THESE PICTURES?



Collection of V. W. Van Gogh
Vegetable Gardens, Van Gogh

LANDSCAPES are perfect for living rooms. So are seascapes and still lifes. Avoid religious or family pictures (they go in bedrooms). And beware the novelties that light up—or paintings so realistic that they could (and should) be photographs. Choose important subjects, strong colors.



Collection of Max Moos
Marseilles, The Old Port, Dufy

CHEERFUL pastel colors and the blithe mood of Dufy's harbor scene make it well-suited to the dining room. Also pleasant are landscapes and bird and flower paintings. Be cautious with pictures of food. They might not be conducive to good appetite. Choose bright colors, happy moods.



The Little Musician, Kanelba

CHILDREN'S bedrooms need not be decorated with kittens and puppies. It's better to provide pictures which stir the imagination. They respond to abstract styles such as the above without question. (Remember that they themselves paint abstractions.) Children are true moderns.

Why these frames?

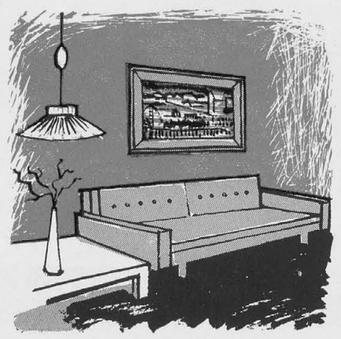
PICTURE is large (21" x 32"). Brush strokes are bold. So it needs a simple, wide frame. The 3-inch mat of rough linen crash echoes the massive, textured effect of the picture. The outer framing of wormy chestnut is rubbed and streaked with the dominant golds and oranges of the picture.

AIRY and spacious in feeling, this water-color calls for a fine-textured mat and a lightweight frame. Mat is 3 inches wide. The line of red is penciled on the beveled edge to separate picture and mat and to pick up a dominant color. Frame is 1½-inch raw poplar rubbed with raw sienna.

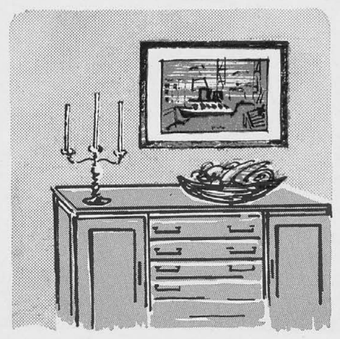
"HEAVY" picture — heavy frame. The "weight" results from the strong lights and darks in the painting. The liner is linen and the 2½-inch frame is raw oak. Frame is stained with mahogany red to pick up the background color. Dashes of blue and gold repeat other colors in the painting.

HOW SHOULD THEY BE HUNG?

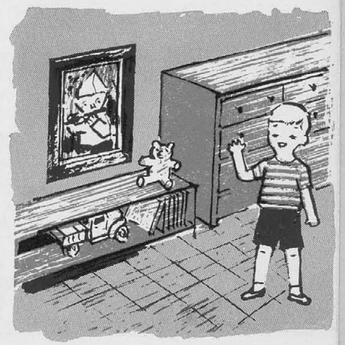
PICTURE below needs plenty of wall space and a large piece of furniture. It goes well over the sofa—a horizontal picture is good with horizontal furnishings. It hangs low enough so that it forms a unit with the sofa below. The off-center position is balanced with the hanging lamp.



NO NEED to always hang the picture smack in the center of the buffet. An informal grouping like this has more oomph (and it suggests more imagination.) The heavy candelabra matches the visual weight of the picture. Tying picture to buffet is the long, low bowl of fruit placed under it.



IN CHILD'S ROOM, drop the picture to a level the child can see easily. Here it is hung over low toy shelves. Use only a few pictures in a child's room. Change them often. Keep up with his developing personality. His picture interests will change as rapidly as he changes sizes.



by Anne Hutcherson
Photos: Richards

PICK, PLACE, AND SHOW—YOUR PICTURES

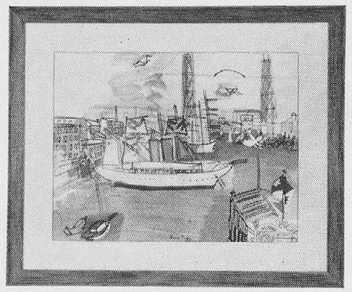
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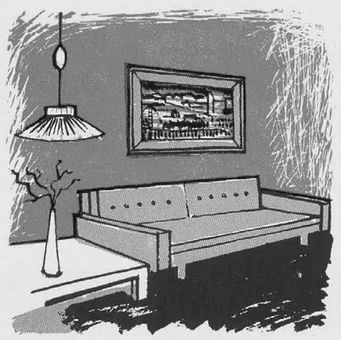
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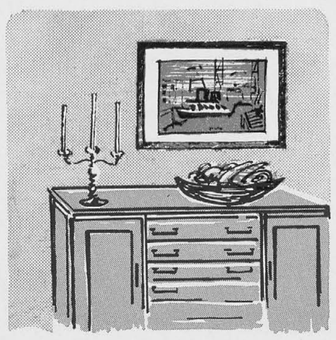
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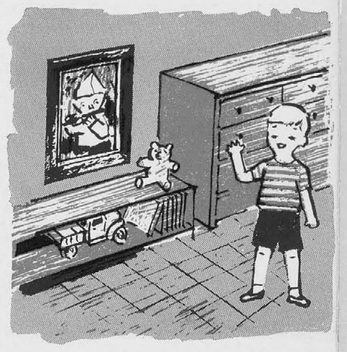
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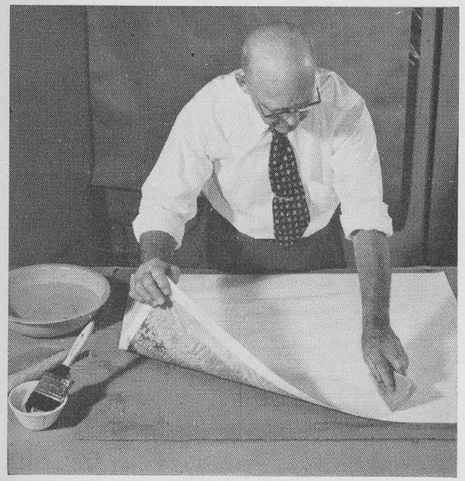


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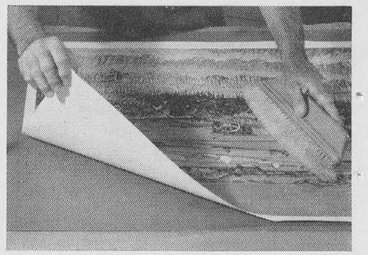
FRAMING TIPS from a pro

You can do a really distinctive frame job on your favorite picture or print. Frank Hill, whose business is picture framing, tells you how.



Mount and Shellac

HANDLE prints of oil paintings this way. First, mount. Use heavy cardboard, Masonite, or engravers' mounting board (a piece larger than the picture). Using a sponge, wet both sides of picture.

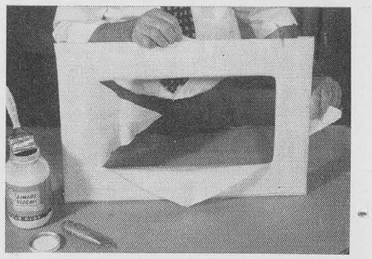


APPLY wallpaper paste evenly on the back of the picture. Then apply paste-coated picture to mounting. Smooth with brush. Cover the picture with paper and weight.



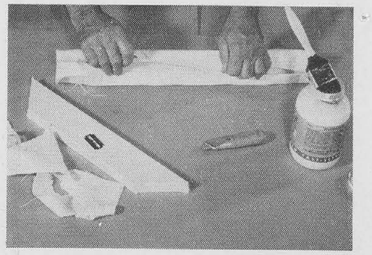
SHELLAC treatment will give the print a semi-glossy finish which makes it look very much like an original oil painting. And it protects the print from dirt. Use pure white shellac. Using short strokes, work only a small area at a time.

Try a Linen Mat



CUT CARDBOARD MAT to fit the picture. Cover it with paper glue. Apply linen, casement cloth, or burlap, and stretch to cover. Glue edges to back of mat. With a razor blade cut an X from inside corners of mat. Glue ends back.

LINEN MAT can also be made by covering mitered boards with fabric. Cover boards with glue. Stretch fabric tightly as you apply it to the boards. Trim excess with a razor blade. Glue mitered corners, then use framing tacks.



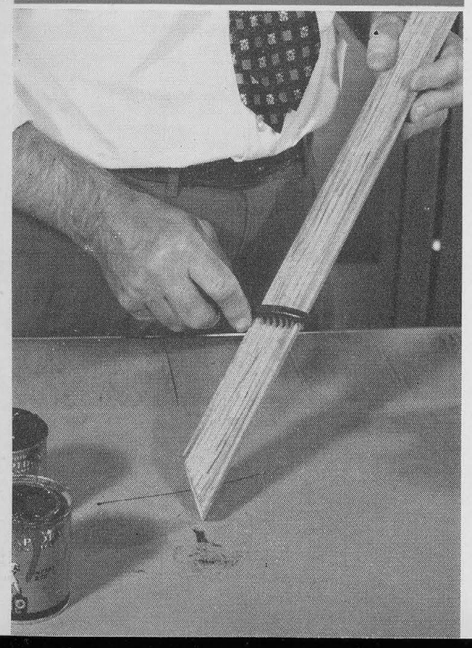
Blend Frame and Picture

TRY TINTING the frame with the dominant color of the painting. But keep the tinting subtle. If the molding does not have much grain, it can be streaked with color. Use a toothbrush. Keep strokes light.

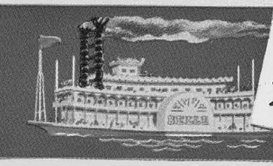


THIS METHOD for tinting the frame works best with well-grained moldings. Choose a paint which matches the background of the picture. Apply generously. Then rub off with cloth dipped in turpentine. The color stays in grain.

Capper CRAFT



Gambles NATIONAL SALE



JAN. 23 TO FEB. 15



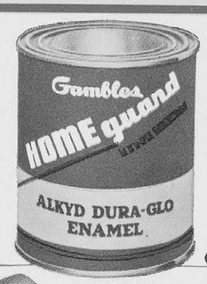
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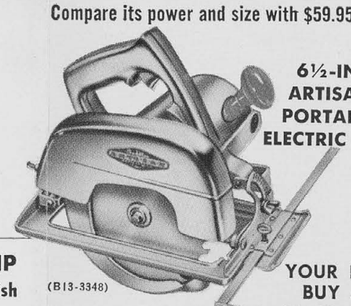
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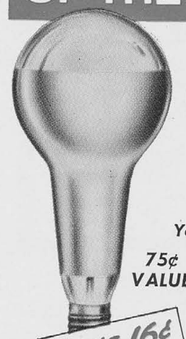
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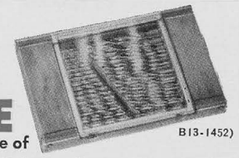
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Heavy duty ½" drill with Jacobs geared chuck, rugged 5.5 amp ball-bearing motor. Yours with 29-piece twist drill set in hardwood case for price of drill alone.



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Start stalled cars easily with **BATTERY BOOSTER CABLE SET**



2 8-ft. cables with copper-clad clamps.

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ZIP-STRIP Paint & Varnish Remover

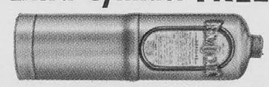
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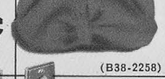
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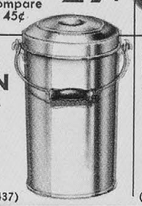
Jumbo 19x21" size, filled with 100% latex foam rubber.

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Outside cover type.

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Chromium Plated Model — $5.45

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$5.85 Value!



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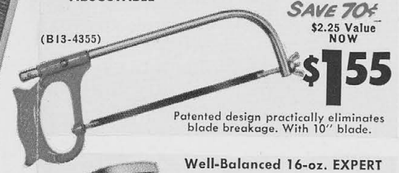


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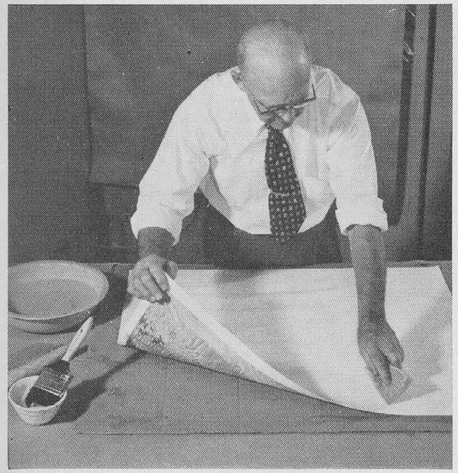
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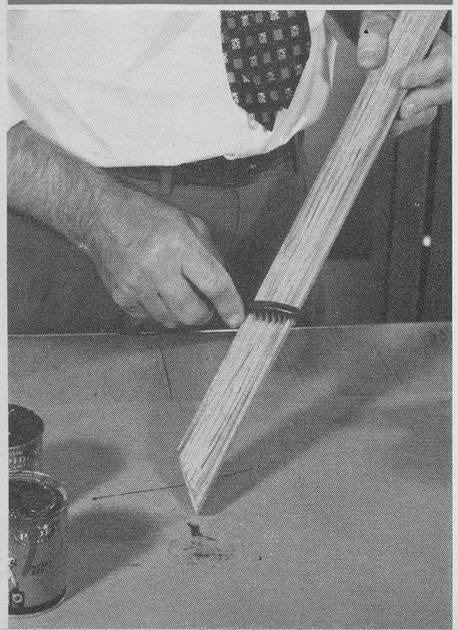
…E, AND SHOW—YOUR PICTURES

FRAMING TIPS from a pro

You can do a really distinctive frame job on your favorite picture or print. Frank Hill, whose business is picture framing, tells you how.

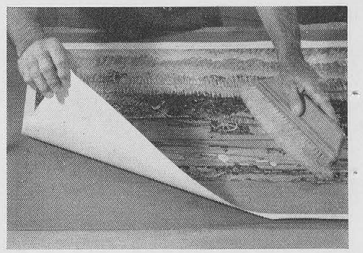


Capper CRAFT



Mount and Shellac

HANDLE prints of oil paintings this way. First, mount. Use heavy cardboard, Masonite, or engravers' mounting board (a piece larger than the picture). Using a sponge, wet both sides of picture.



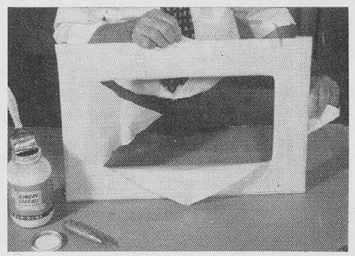
APPLY wallpaper paste evenly on the back of the picture. Then apply paste-coated picture to mounting. Smooth with brush. Cover the picture with paper and weight.



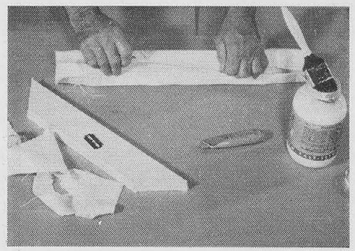
SHELLAC treatment will give the print a semi-glossy finish which makes it look very much like an original oil painting. And it protects the print from dirt. Use pure white shellac. Using short strokes, work only a small area at a time.

Try a Linen Mat

CUT CARDBOARD MAT to fit the picture. Cover it with paper glue. Apply linen, casement cloth, or burlap, and stretch to cover. Glue edges to back of mat. With a razor blade cut an X from inside corners of mat. Glue ends back.



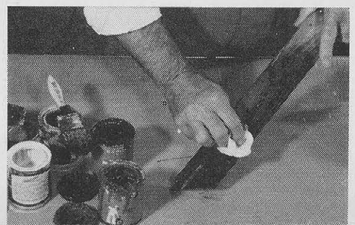
LINEN MAT can also be made by covering mitered boards with fabric. Cover boards with glue. Stretch fabric tightly as you apply it to the boards. Trim excess with a razor blade. Glue mitered corners, then use framing tacks.

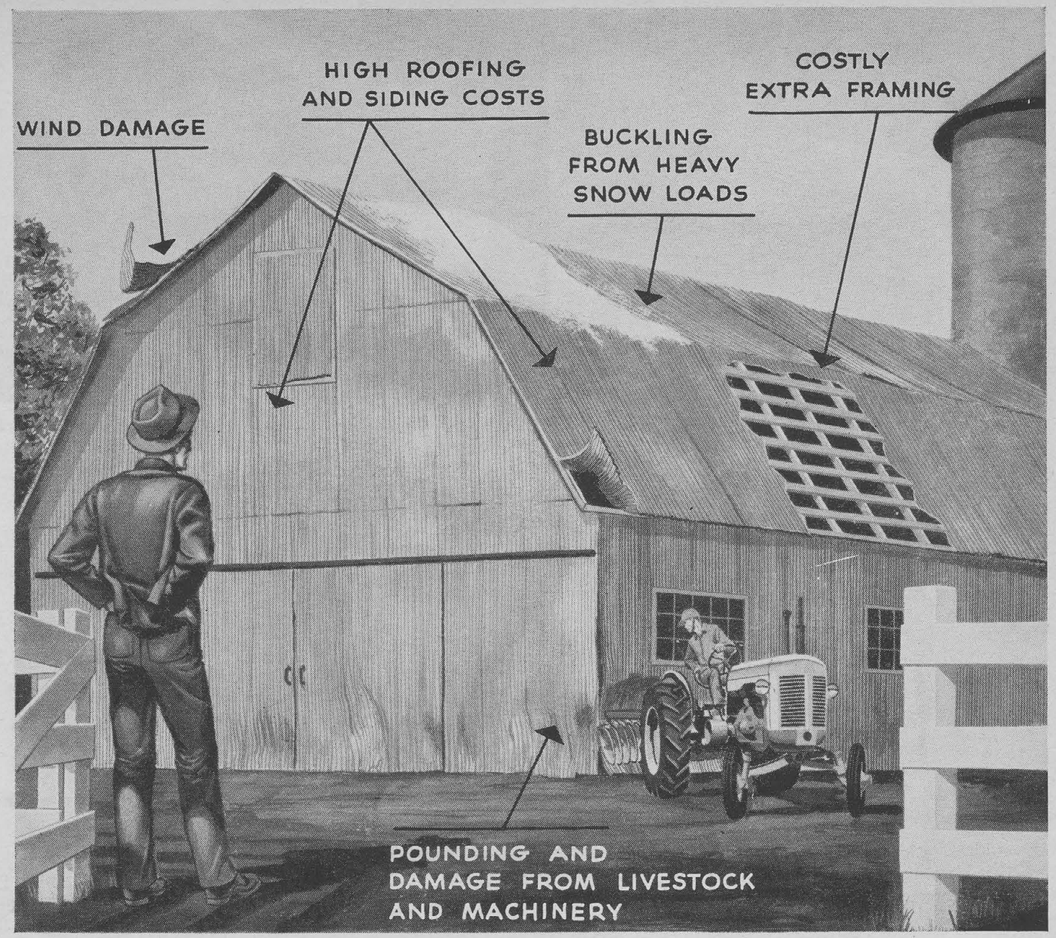


Blend Frame and Picture

TRY TINTING the frame with the dominant color of the painting. But keep the tinting subtle. If the molding does not have much grain, it can be streaked with color. Use a toothbrush. Keep strokes light.

THIS METHOD for tinting the frame works best with well-grained moldings. Choose a paint which matches the background of the picture. Apply generously. Then rub off with cloth dipped in turpentine. The color stays in grain.





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TAPE
INTERVIEW
RECORDED

with Howard A. Cowden

president and general manager,
Consumers Co-operative Association



CO-OPERATIVES offer the way to a self-help program for agriculture, Howard A. Cowden, right, tells David W. Klinger, editor.

Can farmers get more bargaining power?

Q. Mr. Cowden, why is our present farm program failing?

A. I wouldn't say it's failing completely. Rather, it is failing to give agriculture parity of income we want. I see two reasons for this:

(1) The farm program has had unsympathetic administration. The Secretary of Agriculture has said on many occasions that he doesn't favor some of the most important provisions of the program.

(2) The program has not effectively controlled production. We've continued to overproduce some of our commodities.

Q. Some have said the program has lost effectiveness because it has become involved in politics. Do you think any federal price-support program can be made to work independently of politics?

A. For the kind of price-support program we now have, large appropriations are necessary. These appropriations are voted by Congress. Therefore, it is difficult to separate the farm program from politics.

Q. How, then, would you suggest we keep politics out of our farm program?

A. We will not have a permanent solution that will give parity and security to the people who till the fields and feed the livestock of this country until we get the program in the hands of those who are affected by it.

That means that farmers must organize their economic power as industry and labor have done. We would be in a terrible mess if the question of income for all the workers of this country were set by Congress or if the prices of automobiles and farm machinery depended upon political action.

Q. Would you say that one of the causes of the present farm problem is that farmers have become a political minority?

A. Yes. And that's one reason why we cannot depend upon governmental programs completely in the future. We must have some governmental support for agriculture, but I think it would be shortsighted for farmers to depend on government alone when today we comprise only about 12 percent of the total population.

Q. Then, as farmers are now organized, you think agriculture does need some sort of a governmental program?

A. I wouldn't be in favor of dropping the effective part of what we now have until we have something better. Some legislation is necessary to enable farmers to do what I would like to see done. But I see the government program diminishing in scope and activity.

In the meantime, I would like to see farmers organize in such a way that they won't be dependent upon the government; that they would begin to use their own resources. A great psychological benefit would come from such a development. Farmers need to realize the power that they can themselves generate if they use the self-help approach as labor and industry have done.

Q. You mean that farmers need an organization to gain bargaining power such as labor has?

A. Yes.

Q. How, then, are we going to gain this bargaining power?

A. I would like to see two major actions taken. First, I would like to see Congress declare it to be public policy that the government will foster and help

CONTINUED

GO 6-ROW with Modern JOHN DEERE Tractors and Equipment



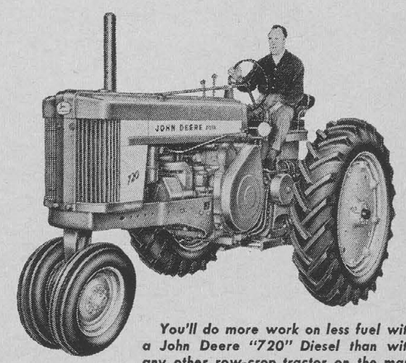
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CONTINUED

"Public is confused, and farmers are divided"

farmer co-operatives in solving the farm economic problems.

Second, to implement that policy, I would like to see Congress create a National Farmers Co-operative Board to supervise and coordinate the activities of farmer co-operatives.

Q. You are suggesting that Congress give co-operatives a good working climate in which to adopt self-help rather than federal help?

A. Yes, much as has been done for labor. You'll remember that labor unions got legislative authority for their bargaining power and laws which require labor and industry to sit down at the bargaining table. Labor also got the machinery for arbitrating differences.

Agriculture needs some such governmental approval to organize for bargaining power. Under such a policy, co-operatives could strengthen their organization and gradually work out a self-help program while getting ready to lay aside the present government price-support program.

Q. Do you see any possibility of agriculture gaining this bargaining power thru the existing general farm organizations?

A. I do not. The general farm organizations have done lots of good, but they do not own a bushel of wheat, a bale of cotton, or a head of livestock.

Some of the co-operatives affiliated with them do, but the American Farm Bureau Federation, the National Farmers Union, and the National Grange are not in the marketing field. They have no economic power in their hands. The natural thing, therefore, is for them to do as they have been doing—ask Congress for a law.

Q. You mean their power is mainly political?

A. They have only political power, and that's becoming limited because they don't agree. One farm group leans to the Republican party, another to the Democratic party.

The two-party system is a wonderful thing for our democracy. But to take the farmers' economic problem into the political field is to confuse the public and divide the farmers as a result. Co-operatives can be much more effective in solving economic problems because they have economic power.

Q. It has been said that the farm problem will eventually cure itself thru the demand of our increasing population. What is your comment on that?

A. I don't agree with it. Our farm production is increasing while our farm population is decreasing. One good farmer may buy a neighbor's farm, but he's more likely to produce more than less because he has acquired a more efficient farm unit.

Q. You see co-operatives, then, as a means of handling agricultural surpluses?

A. Yes, provided they have the right legal climate in which to operate. For that reason the congressional declaration of policy favoring co-operatives would be highly important.

We have examples of how this has been done in other countries. The government of Denmark has authorized a system under which the co-operatives not only sell their products, but allocate production to members. Under this system, the hog producers of Denmark have not had a surplus of pork since the early thirties.

In Denmark the government has authorized a plan, the co-operatives are administering it, and the farmers are disciplining themselves in its operation. One trouble with our present program, I feel, is that farmers think of it as a government program rather than their own program.

Q. You're in disagreement, then, with the popular theory that farmers are rugged individualists who will never accept production controls?

A. Production controls imposed by the government are always distasteful. And a government program is an unstable thing. Government has difficulty in imposing controls between the changes in administrations.

But if farmers are following a long-time policy which they themselves have developed in their own organizations, then I think they will support it—just the same as laborers support policies adopted by the labor unions.

Q. How about the individual farmer who says he wouldn't join a co-operative association?

A. First, I think you would get practically 100 percent participation. But some way would have to be adopted to penalize the man who would not join the program.

We would probably have to license buyers, and they could buy only the product produced in conformity with the program.

Q. Who would carry the ball on your program? Could it be done thru existing groups, or would we need additional organizations?

A. We could probably do it by strengthening and merging existing co-operatives. The emphasis needs to be changed. When members of co-operatives see their organizations as the way of solving their problem thru self-help, we'll see a big expansion.

Q. Do we have the leadership in the co-ops at present to get this program off the ground?

A. The leadership is there, and we will soon see it emerging. In the past we've depended upon the general farm organizations to do this sort of thing. The co-ops have let the Farm Bureau, the Grange, and the Farmers Union work out the program. And always it has fallen into politics.

But the co-operatives are actively discussing this new approach. The idea is being well circulated. Officers of various co-operatives are discussing the objectives.

Q. Where would the co-operatives go for financing such an ambitious program?

A. There are several possibilities. First of all, to get the self-help program under way, some capital might be supplied by the federal government, similar to the REA plan perhaps.

Another development might be a system somewhat like that of the federal land banks which obtain the money they lend farmers from the sale of bonds.

Likewise, the banks for co-operatives get the money which they lend to local farmer co-operatives from the sale of debentures which are secured by the facilities and commodities owned by the co-operatives.

A check-off plan, by which the producer would pay so much per bushel or per head of livestock, is another possibility.

Q. Such a plan as you are suggesting would no doubt meet with considerable opposition?

A. Oh yes, that would be expected. But I have the feeling if the people of the country generally felt that here's a solution to a national problem (not just a farm problem), that would give farmers an opportunity to find a solution thru self-help, that the public generally would support it.

I don't think it would be too difficult to sell this program to the public when it understood that less tax money would be going to the support of agriculture.

Editor's note: Mr. Cowden has discussed his proposed program more fully in a booklet, "What Course for American Agriculture?" If you would like a copy, write Howard A. Cowden, President, Consumers Co-operative Association, Kansas City, Mo.

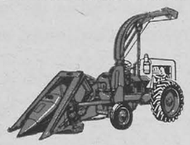
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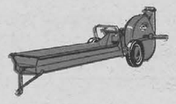


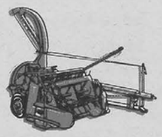
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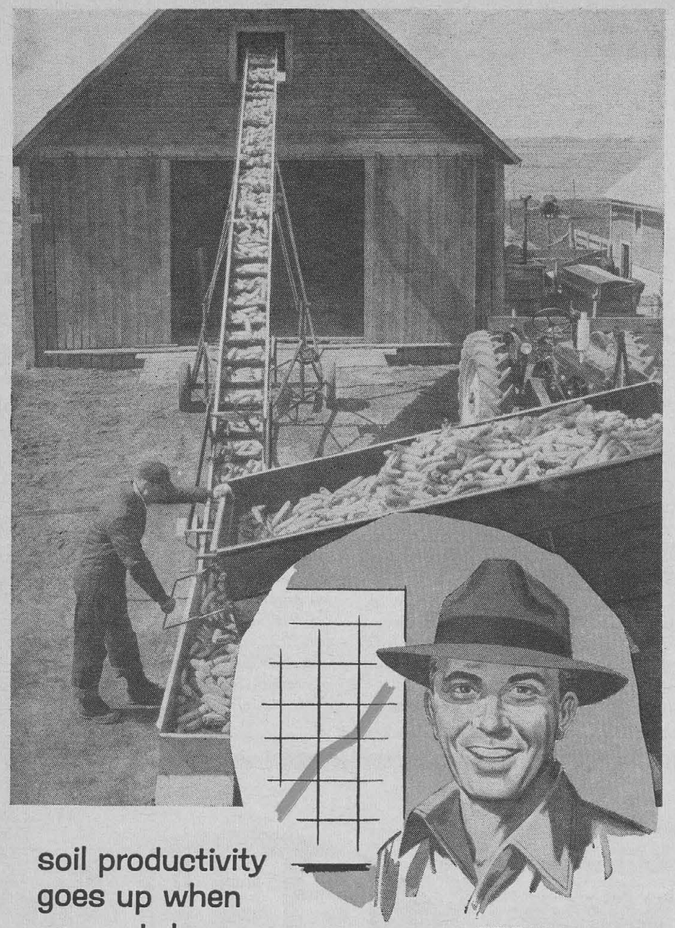
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Let's export pork again!

HOG MEN now have a chance to get back some of the pork market that has long been lost. They can do it by getting their states to outlaw virulent hog cholera virus.

About a sixth of the states already have banned the old hot kind of virus that can spread cholera to unvaccinated herds thru the raw meat or by contact the first 3 weeks after a pig gets a shot of it.

Foreign countries are smart. They don't want to bring in pork that may give their own hog herds cholera. But some of them now permit the entry of our pork if it comes from a plant that butchers only hogs from clean states. Such pork is limited in amount. We need to ban the hot virus from the big hog producing states.

So it is up to hog men in those areas to see their legislators and explain to them that we have new modified live viruses now to take the place of the virulent kind, which we no longer need.

Canada, Uncle Sam's neighbor to the north, all along has banned the old virulent virus. Canadian hog men never have a case of hog cholera except when some pork from this country slips across the line and raw rinds or scraps get into a Canadian farmer's hog trough.

There's a market for Canadian pork abroad. They can't grow hogs as cheaply up there as we can. Nor sell the meat so low. But they can find foreign buyers for the pork they want to export.

So tell your legislator we don't want our pork outlawed in foreign trade, and the way to prevent it is to stop manufacture and use of the dangerous kind of virus.

Tell him we want to keep the modified kind of live virus and get rid of the virulent kind. It is the latter that is keeping our pork out of world markets.

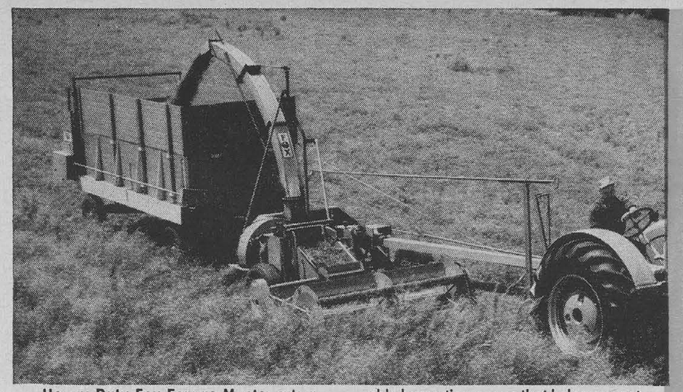
How overrated is loin-eye measure?

THERE'S a single-unit index of meat type in a hog that has loin-eye measure backed off the map. That's the weight of a ham with the skin and fat removed. A study of barrows at the Iowa testing station shows that it is about 1½ times as valuable as loin-eye section.

Meats men at various colleges have found that one hog may have a large loin at the tenth rib, the place now measured. It may be small at that point in another barrow.

And it may make a short-loined hog look better than one with greater length, when anybody knows there are more pork chops in a longer one, and more good bacon as well. Even if carcass value were equal, long-type hogs are best for top brood sow performance.

The two long breeds, York and Landrace, are highly prolific, and have udder space and milking ability to feed big litters.

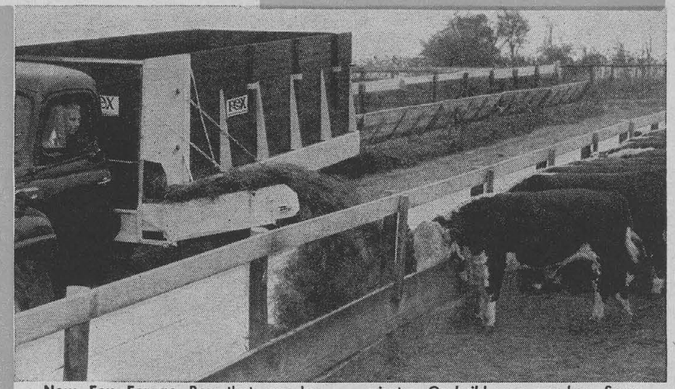


Heavy Duty Fox Forage Master cuts a full 7-foot swath to reduce field travel and harvesting time. A rugged combination of advanced design and dependable harvesting power that helps you get the heaviest crops to the bunk or silo faster . . . *yet costs very little more than smaller capacity, less efficient machines.*

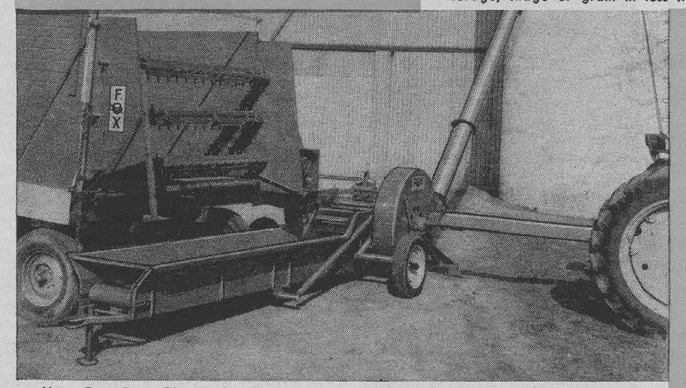
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New Fox Crop Blower handles more than a ton of corn silage a minute. Easy to put in and take out of sheds with low doorways. So well balanced one man can wheel to position. Delivers at any angle—you can set it well away from silo or barn in most convenient position to bring up loads.

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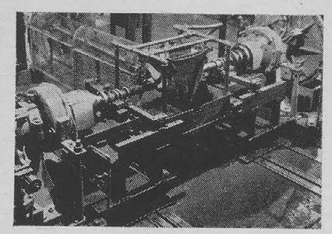
BETTER MACHINES MEAN BETTER FARMING . . . TIMKEN BEARINGS MEAN BETTER MACHINES



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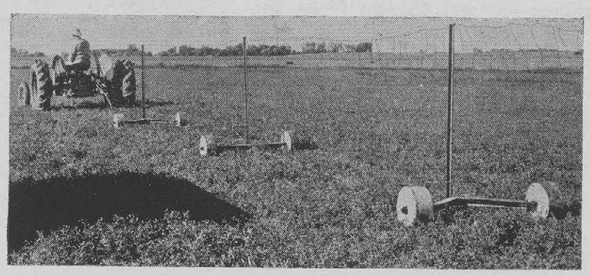
Ohio farmer J. E. Lee used to pick only 15 acres in 10 hours with his 2-row picker. And it didn't shell the corn. Now he harvests 25 acres a day, including shelling. He made the rig by mounting 4 snapping units on a combine after removing its grain header and straw walkers.

To help you make the most of mechanized farming, implement makers are mounting more and more implements on Timken® tapered roller bearings. With Timken bearings, you lose less time for lubrication, do less maintenance, have fewer breakdowns. It's what we call Better-ness.



2. FATIGUE TESTER HELPS BRING BETTER-NESS

Farmers believe in Better-ness—the American conviction that good enough isn't. The dynamometer above helps The Timken Company deliver Better-ness to the farm. It fatigue-tests rear axles and transmissions to find how they will perform in actual service. It's part of Timken Company testing facilities that help machinery manufacturers develop better bearing applications and related parts for tractors and implements.



3. WHEELS CUT FENCE MOVING TIME FROM HOURS TO MINUTES

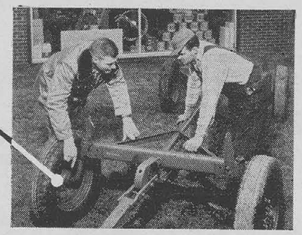
Minnesota farmer Wesley Miller put his 40 rod turkey fence on wheels. Now he tows it from pasture to pasture in minutes, instead of the 2½ hours it used to take. He poured the wheels in old milk bucket forms lined with newspaper so the concrete wouldn't stick, used junk yard rods for axles.

NOTE: $10.00 FOR IDEAS: We'll pay $10.00 for each mechanized farming idea that we accept and publish. Send photo of implement and description to The Timken Roller Bearing Company, Dept. CF-2, Canton 6, Ohio.

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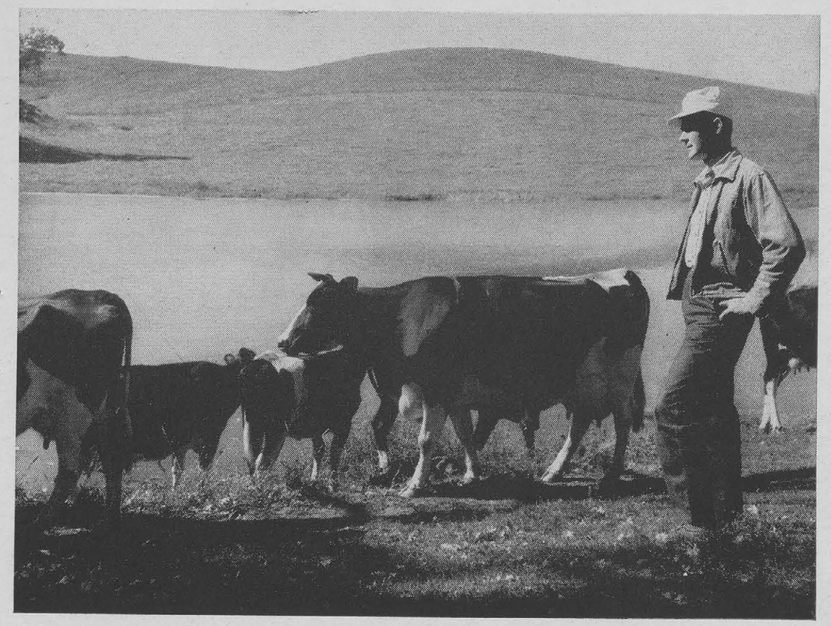


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This "Timken Bearing Equipped" label on an implement lets you *know* the bearings are the best. Timken bearings keep moving parts aligned, reduce wear. The Timken Roller Bearing Company, Canton 6, Ohio.

CAPPER'S FARMER

FEBRUARY 1958



LEFT: A farm pond adds both to the beauty and the utility of his 121 acres in Dakota county, Minnesota, Ted Wachter feels. It insures water for cows and for game in the farm's wildlife area.

Photos: Bybee

by George A. Montgomery

BIG MILK YIELDS FROM HILLY LAND

Ted Wachter soups up subsoil with fertilizer to make it grow lush grass crops

ROUGHAGE is a dairy cow's main dish. If you want her to show a profit you'd better keep her paunch full of it. And keep the quality high!

Those facts are so important to Ted Wachter that he can't let himself forget them. Holstein cows provide a livelihood for him, Mrs. Wachter, and their two small daughters. A rolling 121-acre farm in Dakota county, Minnesota has to provide most of the forage for 32 cows he milks and for the young stock needed to keep his herd at full strength. He can rent occasional small tracts, but tenure is unsure. So he doesn't rely on them for much cow feed.

When he bought his farm in 1950, he knew he had laid out a tough job for himself. The ground is steeply rolling, with some slopes running up to 40 percent grade. That means a cow must climb about 4 feet for each 10 feet she moves forward as she grazes up the sharpest slopes.

Former owners had handled the land as carefully as it could be managed in a general farming setup. But Wachter found much of the topsoil washed away. All was gone from a big part of the farm. He had to get what he grew largely from the subsoil. And he had to learn how to make subsoil produce at a profit.

He turned to federal, state, and county soil scientists, quizzed them and sought their help. For the roughest land, they prescribed grass. And the plant food needed to grow it. They frowned on the plow.

Tilled crops had to be grown sparingly on the rest of the farm. And they had to be planted so as to keep the soil in place.

So Wachter planned his course. He has held to it stubbornly. On the roughest land he grows only pasture. Where slopes are less rugged, he follows a rotation of 1 year corn, 1 of oats as a nurse crop, and 3 of hay.

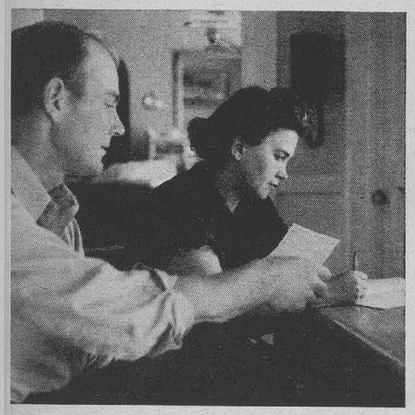
And how has it worked out? Let's skip details for the present and get

CONTINUED



RIGHT: A farm is a great place for little girls to live. Here are Camela Joy Wachter, 9 years old, and Karma Fay Wachter, age 6, with two of their pets, a fluffy kitten and a placid Holstein calf.

BELOW: Record books prove to Mr. and Mrs. Ted Wachter that conservation farming pays off handsomely. Their summer milk flow doubled after they began to fertilize to produce better grasses.



CONTINUED

Big milk yields from hilly land

down to the most striking results. Briefly, here they are:

● The pasture he grows now will produce a little more than 3 times as much milk an acre as that with which he started.

● Milk produced by the herd used to hit the lowest point of the year in midsummer. Now the warm months top all others. July production in 1951 was 12,000 pounds. Two years later, July showed 15,887 pounds. In 1955 it went up to 18,825, and last July it hit 26,278 pounds.

● Heifers now weigh 1,000 to 1,100 pounds when they are bred at 20 to 24 months old. That's 200 pounds more than they used to weigh when he had to put them out in rented pasture for the summer.

● Corn, grown on contour, has yielded up to 97 bushels an acre and averaged 90 bushels in recent years. He has filled a 104-ton silo from 4 acres of it.

● Land used for the 5-year rotation in which his hay is grown gets only manure, but it has become so rich that oats lodge to smother the seeding. That has forced him to switch some manure to pasture areas.

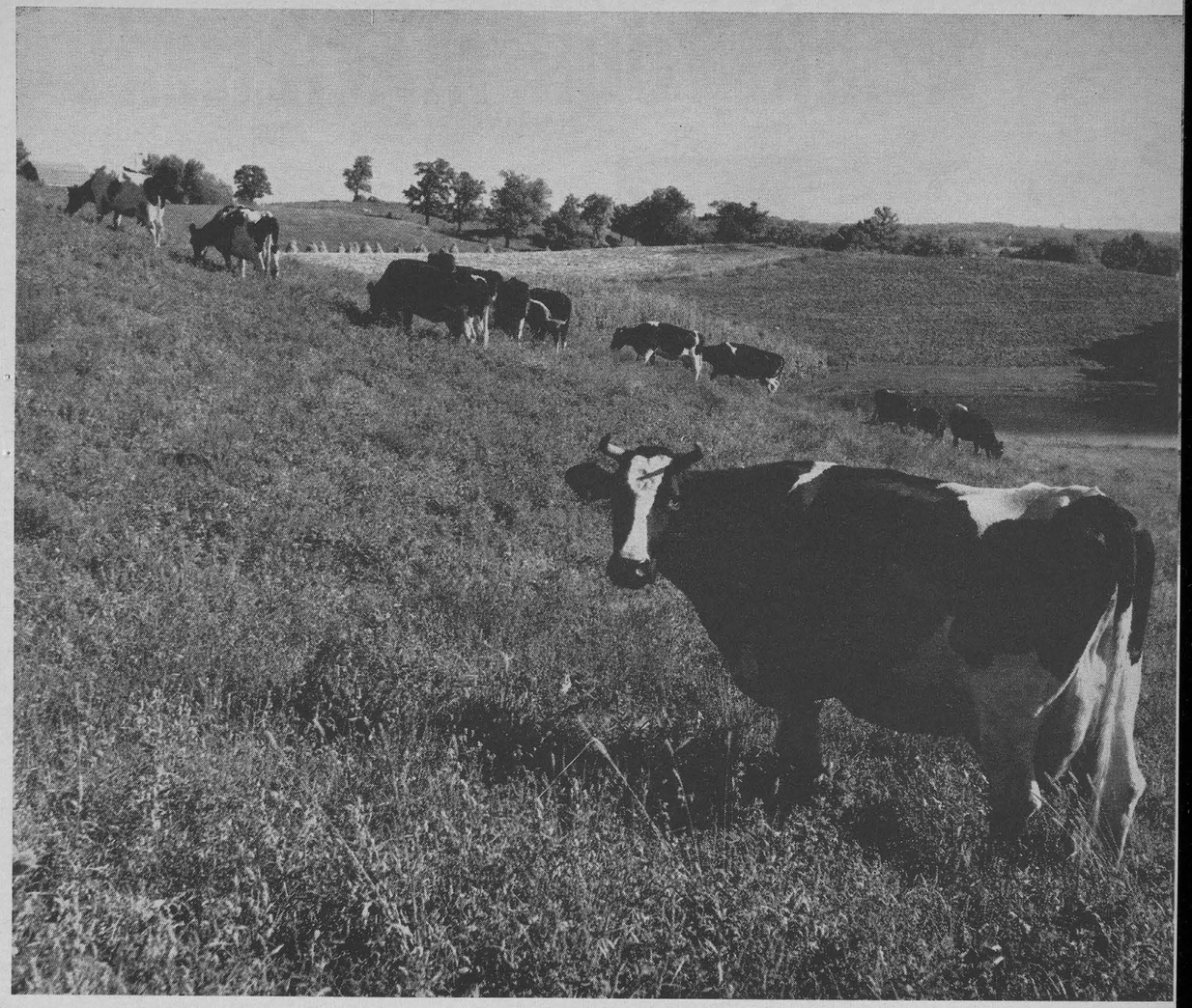
That's quite a record for subsoil. Here are added details that may help you if you have like land that you need to build up.

Wachter adopted a heavy-duty field cultivator as his tillage tool. He tears up the sod in a bluegrass pasture in the fall. The next step is to spread whatever fertilizer a soil test shows he needs. Then he goes over the plot a second time to do a more thoro job of tearing up the turf. That works the fertilizer into the soil. Most plots have needed 200 to 250 pounds an acre of 5-20-20.

Early in spring, he seeds 1½ bushels of oats an acre, 8 pounds of alfalfa, and 5 pounds of Lincoln brome. He thinks the variety of all three crops is important. He formerly used Bonda oats, which is very tall. He is switching to

BELOW: To renew pasture, Ted Wachter tears up the turf with a heavy-duty field cultivator, applies fertilizer, works it in with a second tillage, then seeds a mix of Vernal alfalfa and Lincoln brome. Sod chunks hold soil in place while the grass gets started.





THE COW HERD works its way up a steep slope in knee-high grass. At right is the farm pond. There are millions of acres of land in this country like that pictured here. Ted Wachter has shown how to improve it and make it provide for farm families.

the new Rodney variety which makes a good yield, but will shade his seedings less.

To now he has used Ranger alfalfa, which is wilt-resistant and long-lived. He is switching to Vernal for pasture because it stands grazing better than Ranger, and is about as free of disease. He will stick with Lincoln brome because it is a heavy producer, it spreads to occupy all vacant spots, and keeps his pasture high in grass.

To see how such a mixture compares with bluegrass, Wachter and George Whalen, soil conservationist, ran an accurate test. They kept records on the milk produced on improved pasture and on the bluegrass. After the amount that could be credited to grain was subtracted, the improved pasture yielded 2,225 pounds of milk an acre. Bluegrass, manured 2 tons an acre, yielded 727 pounds.

The land of gentler slope is plowed and planted on the contour. But it's in grass 3 years in 5. It yields a lot of forage, too. Last summer Wachter cut more than 4,000 bales from 35 acres. That's about 3.7 tons an acre—not so bad for hilly land.

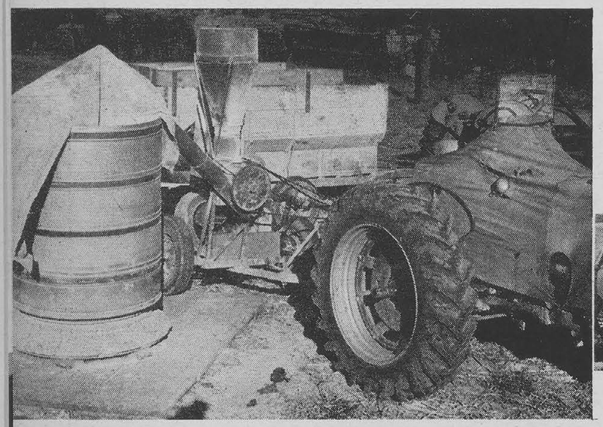
And the feed grown makes better eating for his cows, Wachter believes.

"Before I began to improve my grass, my cows always milked down skinny, and their hair coats were dull," Wachter told me. "Now even the heaviest milkers stay in good flesh and their hair stays sleek.

"It's great to have here at home the kind of grass that will grow heifers into big roomy cows. They can produce more, especially in early lactations. When I took them away to pasture, all I could lease was bluegrass. It stopped growth by mid-July.

"They went away gentle and came home wild. There was another bad feature: One in three got bred too young to scrub bulls. With plenty of feed, I can keep them at home so I don't have such problems any more." **End**

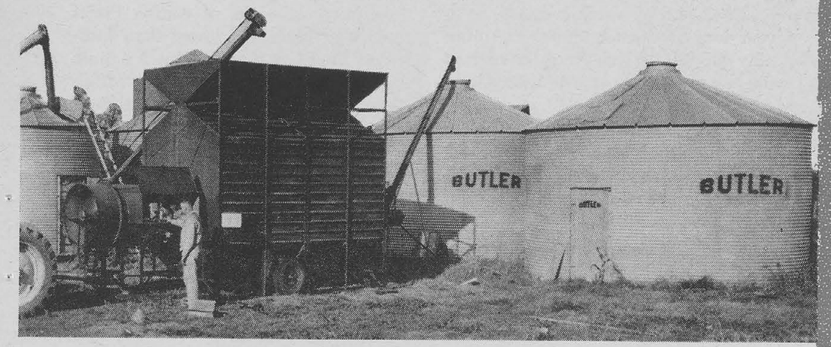
WORK YOUR MACHINERY OVERTIME!



WINTER WORK for Russell Sheeler's tractor includes grinding feed and similar jobs on his Peoria county, Illinois farm. He spreads tractor cost over more hours by giving it many jobs.



BATCH DRYER works night and day for Dorsey and Andy Bass. Here Dorsey checks it on his Boone county, Missouri farm.



They own the dryer together—make it handle both of their 1,000-acre farms by binning wet grain from combines while a load is drying. Then they dry the binned grain at night.



WINDING UP hog fences is another extra job for Sheeler's tractor. This takes work out of rotating hogs to clean pasture—gives the tractor more jobs.

Photos: Edwards, Everly

by George Beshore

Here are seven ways to spread your implement dollars over more acres

DON'T let machinery loaf! Implements earn more money if you keep them busy covering as many acres as you can each year. Make them work in winter, too, farmers advise.

"Spread your machinery and labor costs over more acres," says Dorsey Bass, Boone county, Missouri. "Make your combine cut several hundred acres instead of 100 or less."

One way is to buy or rent more land. But that's not always possible. Here are six other ways farmers spread their machinery dollars over more land. And here are some of the pitfalls they ran into—and how they licked them.

Work machinery harder. Dorsey and his brother, Andy Bass, figured out a good way to make one crop dryer work night and day for them. They farm separately. But both needed a dryer for grain sorghum.

At first one dryer didn't do the job. They couldn't dry as fast as they combined. This cut back harvest sharply—made them late getting out crops.

Last fall they beat this squeeze by binning wet grain they combined while a load was still drying. Then they dried this wet grain after the combines stopped at sundown. Sometimes they dried almost all night to finish up grain harvested during the day.

"By working the dryer overtime, we used it on both farms without holding up harvest," Dorsey says. "If you double up on equipment, you've got to figure out ways to make it work harder."

Joint ownership. "Buy bigger machines on a partnership basis," advises Loren Haas, McLean county, Illinois.

Loren and his brothers, Fabian and Leonard, each farm separately. They own separate tractors and tillage implements. Each does his own field work. But they bought two corn pickers in partnership for the three farms.

At harvest, two brothers run pickers while the third hauls. They pick 2,500 bushels of corn a day. That's five times as much as one could pick by himself.

They also own a sheller jointly. That spreads its cost over all three farms. When one brother finishes shelling, he takes it to the farm next in line for it.

"We pool big investments—make them pay off faster by spreading each one over three farms instead of one," Loren comments.

His records back this practise. Last year his machinery cost per acre was $18.74. This was $7 below the average machinery cost of $25.55 per acre for all other 160-acre hog farmers in the records group over the state.

Trade work. Most farmers like to swap work instead of owning machinery together. "If each farmer owns the machine he contributes, there's no argument about who maintains it, how it should be kept up, and who gets it first," says Earl Walton, Macon county, Missouri.

Walton and his neighbor, Melvin Riley, trade work every year. Riley owns a grain drill. He drills his small grain and Walton's. In exchange, Walton bales all hay on both farms. At corn-picking time Walton contributes his picker; Riley, an elevator.

"We don't pay each other, because we think it works out evenly for both," Walton says.

Dorsey and Andy Bass trade work sometimes. But each pays the other at the going custom rate. "The dryer is the only machine we own together," Andy says. "Otherwise, we farm separately and pay for the other's help. There's no chance of hard feelings that way."

How can you get crops out on time if you rely on one implement for two farms?

"Buy bigger machines than you would for your own acreage," Andy Bass replies. One 12-foot self-propelled combine cuts twice as much grain in a day as a 6-foot pull-type, he points out.

If two neighbors would normally need one 6-foot combine each, one can get the big self-propelled unit if they work together. They'll get both crops out as quickly with it as they would with two smaller ones—and with half the labor and less depreciation.

Custom work. "When I buy a new implement, I figure on paying part of the cost with custom work," says W. D. Price, Chariton county, Missouri.

Last year Price traded his old combine in on a new 12-foot self-propelled model. He bought a corn head for it and a batch dryer. Last fall he combined and dried 11,900 bushels of corn and sorghum grain for one neighbor—1,400 bushels for another. He also combined 500 acres of his own wheat, soybeans, corn, and grain sorghums.

"Depreciation doesn't increase greatly with added use," Price says. "Meanwhile, you spread fixed costs over more acres."

If you do custom work, plan your operation for it, Price advises. His sorghum was late last fall. So he got his neighbors' corn and milo first. His was at peak yield after he finished theirs. This spring he plans to combine and dry his wheat first, then his neighbors'.

Do some close figuring before you plan on paying for a machine with custom work, Dorsey Bass cautions. He used to do custom combining but quit.

"For one thing, I need my combines for my own crops," he explains. "For another, price of a combine has gone up 25 percent in the past 10 years. Meanwhile, the custom rate around here has stayed at $5 per acre—just where it was in 1948."

If you need an implement for your own crop, and can spare it, that's different, Dorsey adds. But don't buy an additional unit just for custom work.

Price partially agrees. He needed his combine and dryer for his own farm—figures on custom work paying part of their costs. But he adds: "The answer to the custom work cost-price squeeze is the same as the answer to any cost-price squeeze—more volume. Cover lots of custom acres. No implement earns money sitting in the shed."

Hire custom work. This may be your best answer if you have a small acreage—or if you're big but have most of your farm in one type crop.

"I'm in corn and hogs and seldom raise enough small grain to make a combine pay," says Harold Koch, Chariton county, Missouri. He always hires someone to combine for him.

Dorsey and Andy Bass farm about 1,000 acres each. They have two combines apiece, but no baler.

"We're mainly in small grain, seed, and grain sorghum," Dorsey explains. "We both need several combines. But it wouldn't pay either of us to buy a baler for the small amount of hay we raise each year."

Some jobs lend themselves to custom operations better than others. Both Riley and Price do custom spraying. Walton trades work on other jobs with Riley, but he owns his sprayer.

"You've got to spray when conditions are just right," he says. "Weeds or bugs may take a crop while you're waiting for a custom operator."

Give each machine more jobs. "Keep machinery in good shape and make it work all year," says Russell Sheeler, Peoria county, Illinois.

When his biggest tractor isn't busy in the field he grinds feed with it, hauls manure, cuts stalks for bedding, and does other jobs. He puts about 500 hours of actual work on it a year this way. Off-season jobs for another, older tractor include digging postholes, rolling up hog fences, mixing feed, etc.

Sheeler bought a baler and did custom work for the first 2 years. He put 70,000 bales of hay thru the machine in 2 seasons and figures he paid for it that way. Then he sold half interest to his brother-in-law for $800.

"A good farm shop is the key to getting the most out of machinery," Sheeler says. "Buy new machinery and keep it in top shape. It lasts longer, depreciates less, and pays for itself sooner." **End**

ARE HOG PRICES HEADED DOWN?

by Homer Hush

HOG RAISERS are facing a low-cost feed period. Corn is down to $1 a bushel in many corn-hog areas. It's possible it may continue to average around $1 per bushel in normal years.

What's ahead for hog raisers if feed does remain so cheap? The long history of the corn-hog price ratio offers a clue. Hog prices follow grain prices, as an average, over a period of years.

However, it should be noted that the effects of cheap feed on hog prices are not immediate. And hog prices may be far out of line with corn prices at certain seasons, and in some years, of the hog cycle.

But the price of corn, the main feed grain, will tell you the likely range of hog prices over a period of 5 years.

Let's look at USDA records, then estimate hog prices likely to result from $1 corn.

During the last 10 years, Corn Belt farmers have received, on the average, the value of 13.7 bushels of corn for 100 pounds of hogs, live weight. And that's very near the long-time average.

Why does this hold true? Because farmers usually reduce pig crops when the corn-hog price ratio is less than 13.7 to 1. And they increase pig crops when they get more than the value of 13.7 bushels of corn for 100 pounds of live hog. It seems to be the farmer's idea of the line between profit and loss.

So you well may expect a 5-year average of $13.70 for hogs if corn is worth $1 to the farmer. You find the probable hog price, of course, by multiplying the price of corn by 13.7.

How this relationship of corn and hog prices works is shown in the period 1950-54. Corn prices to farmers ranged from $1.33 to $1.64. Hog prices to farmers averaged about $20. (See top line on chart.)

Now let's note the fluctuations that may be expected from the average of $13.70 for hogs. Variations will be both seasonal, and by years, in the 3- to 5-year hog production cycle. Pig crops may vary 20 percent from the high to the low production year of the cycle.

Ordinarily, hog prices vary more than $3 per 100 pounds from the summer high to the early winter low. And farmers will get over $5 per 100 pounds more for hogs in the low production year of the cycle compared to prices in the high production year.

The chart and the figures used here are based on a conservative estimate of a $3.30 seasonal variation in hog prices, and a $5.40 variation from the high to the low production year of the hog production cycle.

So $1 corn could be expected to produce hog prices in something like this pattern:

In the most favorable year of the hog production cycle, farmers might get an average of $16.40 for hogs. The summer high should be around $18.05, and the November or December low around $14.75. (See middle line on chart.)

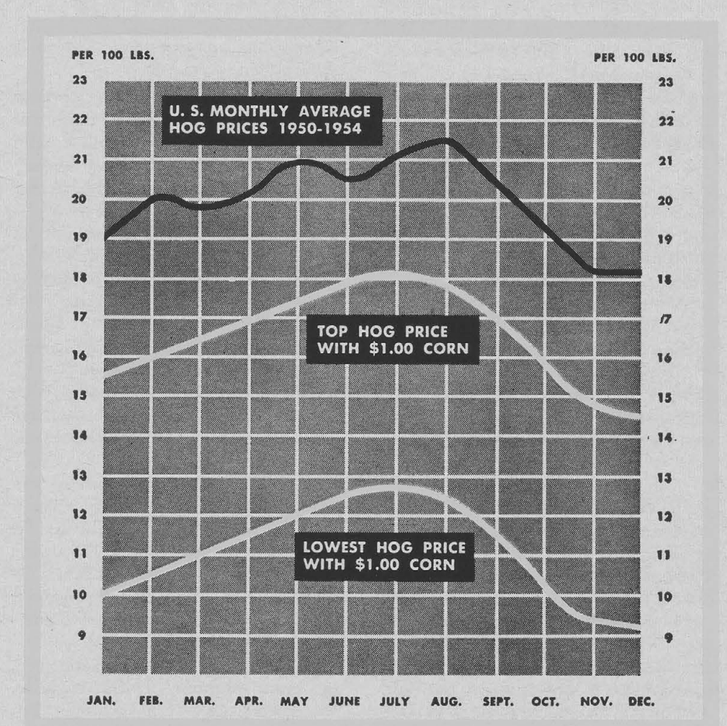
Then in the lowest price year of the hog cycle, the average price would likely be around $11. Summer high figures to be $12.65 and early winter low about $9.35. (See lower line on chart.)

There would be exceptions to these hog price estimates, of course. Prices might go higher or lower than indicated for short periods. But it's quite certain that hog prices would be within the charted range most of the time if corn prices were at $1 and other feed grain prices in line.

You might believe, however, that corn prices in the years ahead will average $1.10, or maybe only 90 cents. Then subtract or add $1.37 to the indicated hog prices on the lower lines of the chart. Remember the expected hog price over the long pull is about 13.7 times the average price of corn.

One thing individual hog raisers should note: Profit in turning corn into hogs remains quite constant as an average over a period of years. That favors a steady program of hog production in line with feed and equipment available on the farm.

Certainly you would gain nothing by quitting hog production just because hogs and corn get cheaper. **End**



OUR COVER STORY

SLICKEST WAY TO FEED CATTLE

These farmers turn their labor and feed into more pounds of finished beef.

by George Beshore and George A. Montgomery

IF YOU'RE seeking ways to keep your cattle feeding up with the times, this page and the next two are for you. We put a lot of miles behind us looking for men who have found how to save labor, step up gains, and turn grain and forage into more beef. Here's how some of them wrap up all three ideas in one neat bundle.

Three glass-lined silos are the key to Archie Forsberg's system in Jackson county, Minnesota. He grinds corn into one—puts silage into the other two. At feeding time, he adds protein and augers a complete ration out into his bunks.

Byron Willrett uses the same plan in De Kalb county, Illinois. He has two silos. So do Art Linder, and his son, Paul Linder, O'Brien county, Iowa. The Linders made their first 2-silo setup on the home farm 5 years ago. Last year they completed a second 2-silo layout on another farm.

Forsberg can't store a whole year's feed in his three silos. Instead, he uses them for a central distributing point. They let him get crops up when feed value is highest.

He makes silage of first-cutting alfalfa. It generally rains at cutting time. Ensiling lets him get hay off the field on time. He bales part of his second and third cuttings, when weather is better.

In fall he fills one silo with wet corn. Then he cribs the rest. He refills the silos with ground corn and chopped hay during the winter.

This lets him husk early at 25 to 35 percent moisture. That cuts field losses. It helped especially last fall when there was much immature corn in his area. Soft corn will keep in a crib thru cold weather. He grinds it into the silo before it spoils in spring.

The Linders live a little farther south than Forsberg, but little corn was mature in their area when killing frost hit last fall. Much contained more than 40 percent moisture. When the grain could be shelled in the field, the Linders went in with their corn combine and filled one of the silos.

Byron Willrett's corn was down to 23 to 28 percent moisture when he shelled it for a glass-lined silo. He fed it to 192 steers started in August and September at 800 to 1,000 pounds.

Paul Linder probably is the first man in this country to plan a power feeding unit built around glass-lined silos. While still a student at Iowa State College he learned of the powerized feeding plant built by James White, Marshall county, Iowa. *Capper's Farmer* told you several years ago how White uses augers to deliver mixed feed to his steer bunks.

By the time he finished school, Paul had worked out a plan for his father's farm. Within a year, the silos were up. He had the feeding machinery going by the end of another 12 months.

It wasn't until the mechanical mixer-feeder was in operation that the Linders found that a complete feed was better than one in which the forage and the grain-protein portions of the ration are offered in separate feeders. They began to get faster gains, and each unit of feed made them more beef.

When other feeders heard about their layout, there was a rush to see it. The silo manufacturer made a deal with Paul Linder to help others plan similar equipment. Forsberg and Byron Willrett built their plants after the Linder plan.

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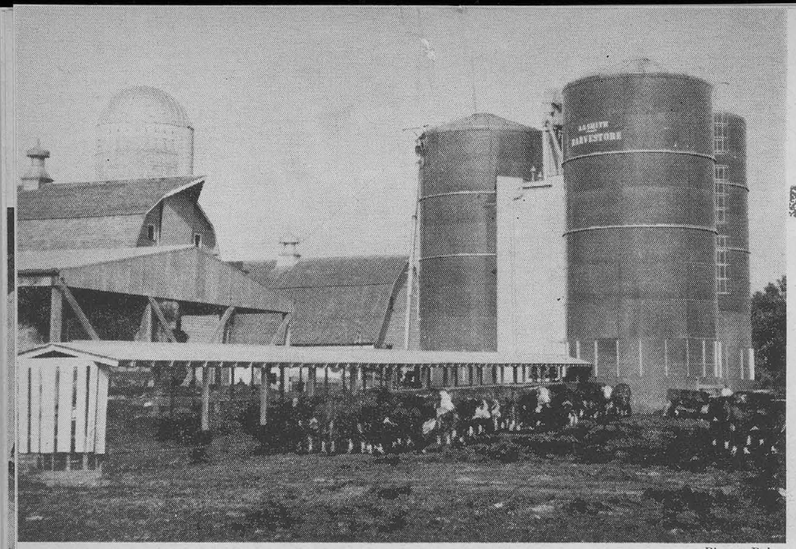


Photo: Bybee

FEED BUNK AND SILOS are nucleus of Forsberg's cattle feeding setup. He grinds hay, corn, and silage from storage into central unit every 2 or 3 months.

CONTINUED

"I've powerized my feeding"

POWER FEEDS Archie Forsberg's cattle. His feed bunk and auger run out 108 feet from a control room between the silos. Unloaders dump ground corn out of one silo, silage from another. Short augers meter these into the bunk. He drops protein supplement from two overhead bins into the auger.

Forsberg can feed any corn and silage mixture he chooses by changing the speed of the short augers. He roughs calves thru the winter on four parts silage to one part corn. Then he steps up corn and protein until he's feeding three parts corn to one of roughage. Finally, he puts cattle on full feed to finish them.

"We feed cattle and change their ration with dials in the control room," Forsberg explains. "I call that 'powerized cattle feeding'."

He sends samples of roughage to a laboratory for test—adds supplement according to quality. Corn, silage, and supplement are mixed thoroly by the feed bunk auger. Every animal gets a complete, balanced ration at each bite.

"Before we installed this system, big steers bossed the others," Forsberg says. "Now, each gets the same ration whether he comes early or late."

Forsberg cuts cash costs by buying protein supplement in bulk. He takes a truckload at a time—saves $10 to $15 per ton. Other feed is raised on the farm.

"We plan on making all the beef we can with grain and silage we raise, buying as little feed as possible," he says.

These home-grown feeds include alfalfa, corn and oats silage, hay, and corn. The 675-acre farm is owned by A. D. Hyde—operated by Forsberg. They planned the feeding system and crop program together. It calls for 300 to 350 acres of corn, mostly for grain.

Forsberg really appreciates the silos at harvest time. He picks wet corn and grinds it into the silo, handling it only once between the field and feed bunk. Last fall he picked 7,500 bushels of corn at 35 percent moisture. That practically eliminates field losses. It also gets his corn out in good weather.

"Ninety percent of the corn around here was still in the field in early November," Forsberg says. "Much of this was a total loss.

"We average 1 soft corn year in 5," he adds. "That's when you especially need this type setup. But it saves labor every year."

He harvests more corn than his silo holds. So he cribs it at 20 to 25 percent moisture. This corn keeps well thru cold weather. And he grinds it into the silo before it goes out of condition in spring. He handles that corn only twice—when picking and when grinding into the silo.

"We grind once every 2 or 3 months," Forsberg says. "Before we got the silos, we ground almost every day. Under the old system I often spent more time setting up than I did grinding."

Hay and silage are handled the same way. Forsberg raises oats as a nurse crop for alfalfa. He cuts the oats for silage. First-cutting alfalfa goes into the silos, too. He used to lose up to 50 percent of this crop because of bad weather. Now he seldom loses any.

That's because he cuts one day—ensiles it the next. Alfalfa goes into the silo wet enough to save all the leaves.

Forsberg cuts and windrows alfalfa one day. Then two men put it up the next. One runs a field chopper—the other hauls. Self-unloading wagons dump it at the silo. A blower puts it in. Two men put up 20 acres a day. It used to take four men a day to bale 10 to 15 acres. Sometimes that hay had to dry 3 to 5 days after it was cut.

When two silos are full, Forsberg bales second- and third-cutting alfalfa. He puts this into the silos after he feeds out roughage cut the previous summer. He chops baled hay and blows it into the silo. Water is added to keep down dust and make the hay more palatable.

"We're often feeding out the bottom and filling thru the top at the same time," Forsberg comments.

For example, in 1956 he put 9,000 bushels of shelled corn, 300 tons of oats silage, and 100 tons of corn silage thru one silo in one season.

"We have a good, basic central unit here that we use several different ways," Forsberg says. "Using it over and over each season gives more return on our investment, too."

Using the three silos as a central point lets Forsberg cut labor, increase volume, and boost gains with a balanced feed. This means his machinery and silos work harder for their keep. He sums it up like this:

"That's the best way I know to make any equipment pay for itself."

CONTINUED

More beef from blended feed

FEEDERS didn't know until a few years ago that cattle would make faster, cheaper gains if they got a blended ration properly balanced in roughage, grain, and protein. Some learned it for the first time when they began to use powerized mixer-feeders.

Equipment like that used by Archie Forsberg, Byron Willrett, and the Linder partnership, referred to on the two preceding pages, does more than save time and labor. With it, or with a portable mixer, a cattleman can make more beef from his feed.

It may be true that the master's eye fattens the flock. Today, however, his machines may be more important than his eye. Art and Paul Linder, O'Brien county, Iowa, would buy that idea.

Paul says they are getting at least two-tenths of a pound more daily gain than before they had machinery to feed a complete ration. Heifer gains run to 2.5; steer gains, to 3.17 pounds daily.

And they're making those gains at low cost. When I visited them last fall they had 103 heifers on feed in one lot and were starting 131 in an adjoining pen. They sold all of the 103 before December 1. Cost of feed was around $15.50 for each 100 pounds of gain. The heifers sold at $23 to $24.

Heifers in the other lot made their gains at less than $15. They weren't hit by hot weather; the first lot was.

Why will a complete feed do a better job? Nobody knows the whole answer.

It may be due, in part, to quirks in cattle appetites. Bovines may be a little like people. Some children, given the choice of all the pop, candy, milk, meat, bread, and fruit they wanted, might eat too much candy and not enough meat. Or they might go heavy on pop and light on milk.

Old-timers who watched their cattle closely were quick to tell you that some steers spent too much time at the hayrack, not enough at the grain bunk. Their ration wasn't balanced. Such animals didn't put on finish. Their gains were slow. They liked hay too well, or grain not enough. Others were too greedy. They might eat so much corn they would founder before the lot was up to full feed.

A little more than 10 years ago, a few feeders, as widely separated as Ohio and the eastern slope of the Rockies, began seeking ways to get away from founder. Colorado feeders layered silage, chopped hay, grain, and protein on a flatbed wagon or truck. They gave each shovelful a swish to fan it out in the bunk. That did a fair job of mixing and reduced founder and bloat.

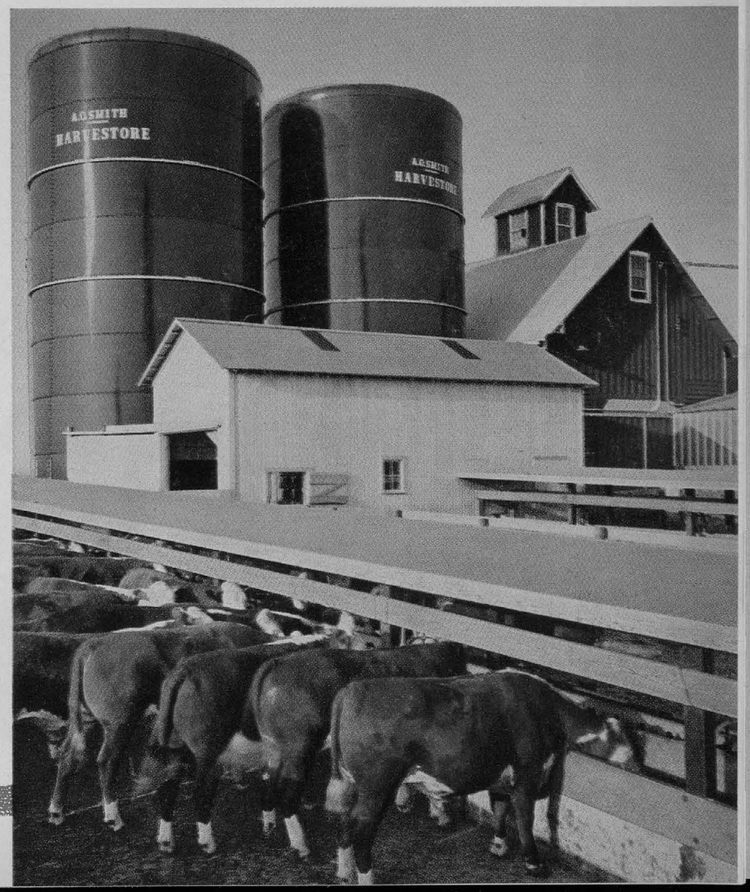
T. R. Schoonover, an Ohio feeder, made a stationary mixing plant that augered a complete ration to his steers. W. H. Monfort, Weld county, Colorado, bought a stationary mixer, mounted it on a truck for power-take-off operation, and made a conveyor to deliver the blended ration to steer bunks.

Capper's Farmer reported the work of Schoonover and Monfort in its issue of April 1949. That was the start of a new era in feeding.

James White, from whom Paul Linder got his initial idea, had picked up the Schoonover idea, and improved it.

Today, complete-ration feeding is spreading fast. On it steers make big gains. They get roughage needed for ruminant thrift, protein required for growth, energy necessary for top gains and good finish. **End**

Photo: Taylor



ELECTRICITY MIXES FEED and augers it to the steer bunks for Byron Willrett, De Kalb county, Illinois. He just sets a clock, flips switches, pushes a button.

by Clyde Zimmerman
Photos: author

HE MADE $11 AN HOUR IN THE GARDEN

Allergies blocked him out of some 4-H achievements, so this Illinois youth used a green thumb to reach the top



INSECTS give this youthful gardener a fierce battle every season. But he watches for signs of pests, and hits them before they can build up. He then follows up as needed.

WHEN he was a youngster, Ronnie Harkness, Winnebago county, Illinois, learned he had an allergy to livestock hair and barnyard dust. So many 4-H projects were closed to him. But gardening looked OK, and he gave it a try.

Last year Ronnie, 19, completed his ninth year with 4-H garden projects. He made a net profit of $432.55 on vegetables from a little less than 2 acres of garden space. He spent 39 hours of his own labor on the garden. He kept a very careful record of all income and expenses. It figured out to $11.09 an hour for his labor income.

In addition to a vegetable garden, Ronnie had income from related projects. He took in $32.50 from sale of flowers and bulbs. And he received $13.70 in prize money at the Winnebago county 4-H fair.

Ordinarily he shows vegetables at fairs in surrounding counties, but couldn't in 1957 because he was attending a 4-H camp. Besides this, Ronnie had a nice income from sale of Christmas trees. More about that later.

Ronnie marketed most of his vegetables from a roadside stand operated by Mrs. Peter Oquist. The stand is near Rockton on Highway 2. Ronnie hauled produce to the stand two or three times a week. Mrs. Oquist charged a commission of 10 percent.

Some sales were made at the farm where the produce was grown. And some vegetables were delivered.

For example, in 1957 Ronnie raised 860 pounds of a hybrid sweet Spanish onion. The onion crop, his biggest money-maker, was virtually all spoken for by midsummer. Ronnie delivered most of the onions.

The onion crop brought in $90.10. Other big items for Ronnie were cucumbers, sweet corn, and potatoes. He raised 837 pounds of cucumbers and the average selling price was $4 a bushel. For sweet corn (272 dozen) he averaged 30 cents a dozen. For potatoes (1,025 pounds) he averaged $3 a bushel, or $51.50.

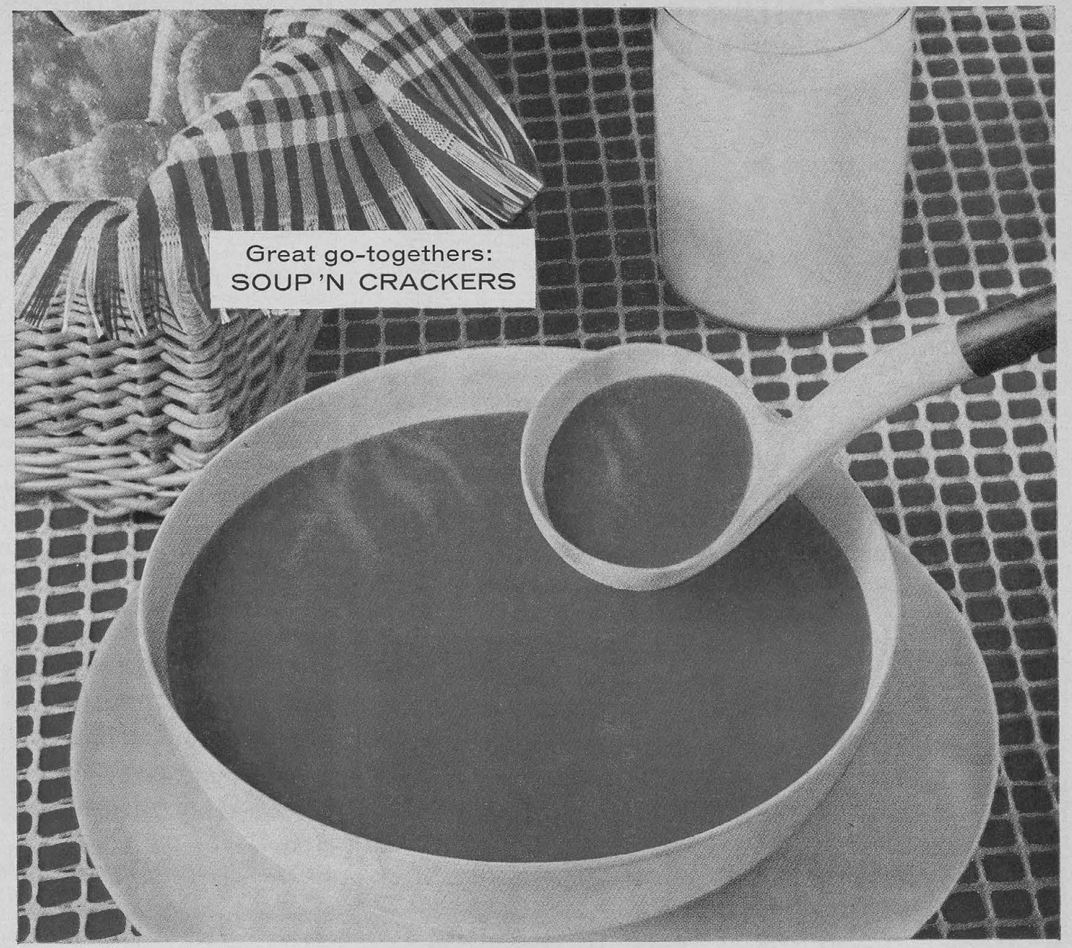
All in all, Ronnie's garden produced 4,465 pounds of food not counting melons, sweet corn, pumpkin, and cauliflower. He sold 4,215 pounds. The remainder was either used by the family, or preserved by freezing or canning.

Ronnie spent $80.20 on the garden.

CONTINUED



SELLING garden crops helped Ronnie Harkness purchase this car. He uses the auto to haul part of his produce to a roadside stand where it is sold on commission.



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CONTINUED

He made $11 an hour in the garden!

Here's his breakdown: plowing, $15; seeds and plants, $30.20; fertilizer and lime, $10; sprays and dusts, $5.50; and hired labor, $19.50.

Other crops and yields were: snapbeans, 108 pounds; lima beans, 28 pounds; red beets, 275 pounds; cabbage, 78 pounds; carrots, 212 pounds; lettuce, 125 pounds; peas, 143 pounds; peppers, 25 pounds; rhubarb, 37 pounds; squash, 550 pounds; tomatoes, 137 pounds; radishes, 236 bunches; watermelon, 35 fruit; muskmelon, 45 fruit; popcorn, 15 bushels; pumpkin, 65 fruit; Swiss chard, 25 pounds; and cauliflower, 10 head.

In general, the young gardener sticks with such old reliable varieties as Cobbler potato and Golden Bantam sweet corn. However, last year he tried a new hybrid tomato, plus a cucumber variety from Wisconsin that is relatively new.

He rotates the garden area. It is limed and fertilized according to soil test. Rows are laid out using a corn planter with



HARKNESS belongs to the National Junior Vegetable Growers Association, and has ranked as high as third in the state in the competition for Illinois honors.

empty hoppers. Length ran from 150-foot rows for sweet corn to 50-foot rows for lima beans.

Ronnie worked the rows with a tractor cultivator. He used a hand pump sprayer to control insect pests. He stakes and mulches tomato plants. He measured yields on such items as lettuce by picking and weighing a basket at a time.

As a side line, Ronnie has one of his green thumbs in the flower garden. His pet project is Ismene Peruvian daffodil, a lily-like flower. He digs the bulbs each fall and sells them to a seedhouse. He has been selling about 200 bulbs a year at $15 a hundred. Also, he sells some cut flowers for weddings and parties. These are mainly gladioli.

In the past he has shown flowers regularly at three county fairs. In fact, he is usually very busy at fair time. Last summer he won the grand champion trophy and blue ribbon in the home garden division at the Winnebago county fair. He also won blue ribbons for potatoes, sweet corn, flowers, wildlife, and forestry. And this brings us to the Paul Bunyan part of Ronnie's enterprises.

In 1950 he took on a 4-H forestry project which has been paying off handsomely. He rented 30 acres from a farmer, Everett Sharp, and started a Christmas tree planting. He set out 2,500 white pine, and 2,500 jack pine.

Two years later he established a wildlife project on 20 acres of slough land, also on Sharp's farm. He planted 3,000 red pines on this land.

His first crop was ready in 1956. Not knowing just how to peddle the trees, Ronnie put an ad in a local newspaper. He told people to bring saws, select, and cut their own Christmas trees. He sold 400 trees for $700.

The method was successful, but did take up quite a bit of Ronnie's Christmas vacation. So last season he sold part of his tree output to a commercial buyer. The trees brought in $450.

Ronnie figures that his Christmas trees still growing on the 50 acres of rented land will eventually bring in enough to make total income from trees about $8,000. So even tho he is about thru with 4-H work, he still will have income to help finance his college education.

So you see, it's not necessarily bad to have an allergy. Sometimes it will steer you in a different direction. And the final pay-off may not be bad. Not bad at all, says Ronnie Harkness. **End**

Inoculate legume seed in the field

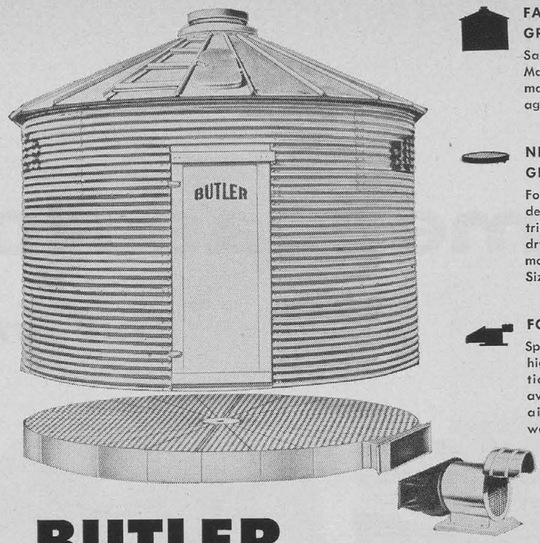
EASY way to inoculate legume seed in the field is shown below. This way the inoculant is still fresh when seed goes into the ground. Here is how V. F. Bartels of Buena Vista county, Iowa does it.

He put diagonal paddles inside a drum to stir the seed and inoculant thoroly. Next he inserted a shaft for the crank and brazed the drum together again.

Barrel and shaft mount on a framework made from 2 by 4's. Bartels puts a funnel in the bung, fills barrel with seed, and pours in the inoculant. Mixed seed is dumped out thru the same opening. Entire unit is light and easy to carry to the field.



Photo: Hadenfeldt



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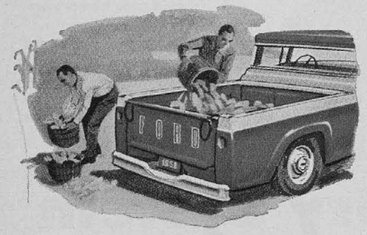
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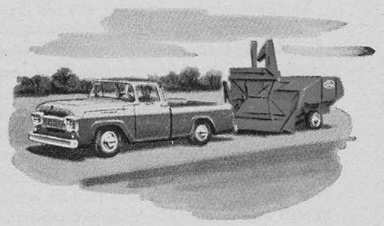
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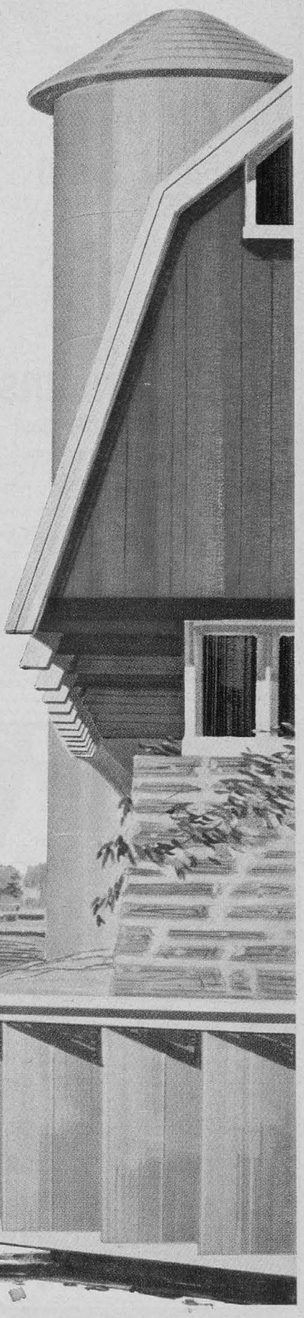
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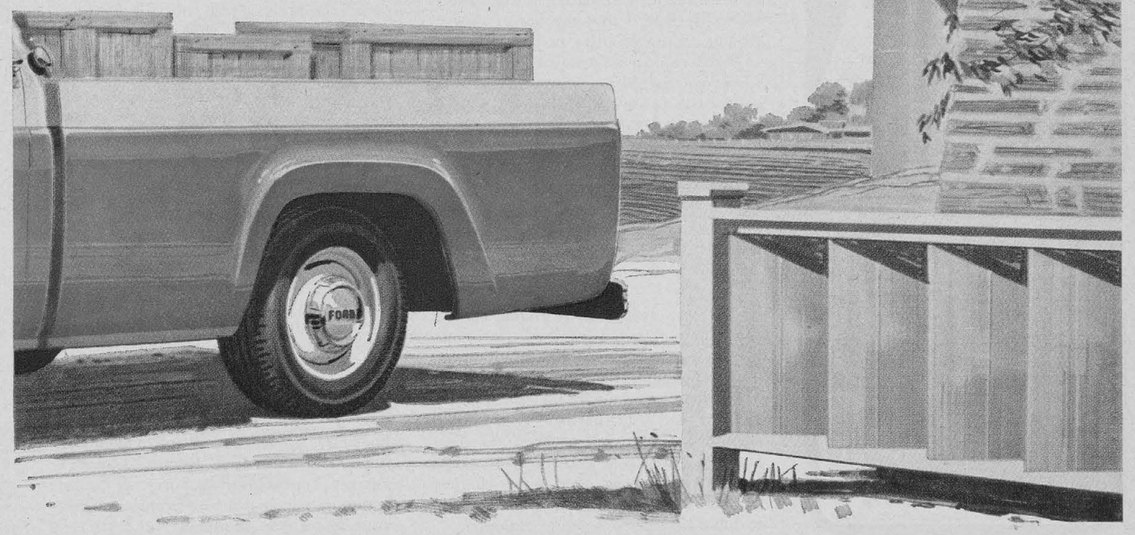


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Medical Report

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by Norman Bradley

Case history of a farmer!
A 36-year-old farmer lost all four fingers of his right hand down to the bottom joints in the moving rollers of a corn picker. And he is now able to do any task in which the right hand is needed.

Reconstructive surgery done at the Veterans' Hospital in Des Moines, Iowa, is the reason for this remarkable rehabilitation. A series of operations gave additional length and padding to the useless stumps.

Because the ring finger was extremely short, it had to be amputated. But the remaining stumps were covered with a flap of his abdominal skin. This gave him a hand like a catcher's mitt.

Next, a cleft was cut between index and middle fingers so the hand resembled a first baseman's glove. In a final operation, another cleft was made to form a "second baseman's glove" hand, with three useful fingers opposing the thumb.

The farmer now has full motion in the stumps, good sensation at the tips. He can run a tractor, pick up heavy weights.

More help for chronic constipation:
In last month's *Medical Report,* we told about dioctyl sodium sulfosuccinate, a drug available under many trade names. It is often effective in overcoming constipation because it softens the stool.

But some patients require peristaltic (bowel muscle) stimulation as well. This is especially true if they are accustomed to regular use of cathartics, says one doctor.

The doctor tried a new preparation, Peri-Colace, on a group of such patients. Drug contains a cascara derivative as well as dioctyl sodium sulfosuccinate. He achieved excellent results. All the patients had long histories of chronic constipation.

Peri-Colace was used in low dosages until normal evacuation occurred spontaneously. This usually happened within a few weeks. Side effects, such as griping, were few because of the small doses.

Knock-knees among infants:
This common trouble need not cause concern to parents. A British study indicates that knock-knees are usually outgrown. They often improve with no treatment.

More than 1,000 normal children were examined. Twenty-two percent of those between 3 and 3½ years were found to have knock-knees. They were checked again at the age of 7. Less than 2 percent still had the same amount of "knock."

New lotion for acne
was first studied in 47 patients with previously unmanageable pustular or cystic acne lesions. The lotion, called Rezamid, benefited 45. It was applied two or three times daily for 3 to 5 weeks.

Rezamid was tested on another 125 patients who had acne of varying severity. The lotion is reported to have done away with the skin disorder completely in 94 percent of the cases.

Chronic bronchitis:
Help is available for chronic bronchitis and bronchiectasis sufferers. When other, simpler measures fail, tetracycline, an antibiotic, may be injected into veins. Treatment is continued for 5 to 10 days.

Fifteen patients between the ages of 15 and 69 were tested. Ten had bronchiectasis and five, chronic bronchitis. Trial injections wiped out disease bacteria from their sputum. Improvement in the infectious process was thus indicated.

The five chronic bronchitis patients were helped even more. Tests of vital capacity and maximum breathing capacity showed marked improvement.

New help for cancer:
A promising new development in the fight against cancer is a germ-killing chemical, Chlorpactin. But it is not a treatment for cancer itself.

A major problem in cancer arises when a tumor is removed by surgery. Unseen malignant cells sometimes may be dislodged and may remain in the wound. Later there may be a recurrence.

Chlorpactin has been studied in a naval hospital. The drug has demonstrated ability to destroy cancer cells inside the abdomens of rats with no harm to normal tissue. It is now being tried in human patients—with some hope that it may do the same.

So far, 40 patients have been treated with the drug during operations for cancer of the breast, colon, thyroid, bladder, and other organs.

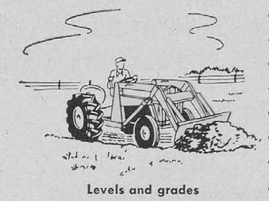
Unusual new antihistamine:
Theruhistin is unusual in its almost complete lack of side effects to date. It will soon be available for doctors' prescriptions.

Many effective antihistamines are in use for allergies. But they often produce undesirable side effects, especially drowsiness.

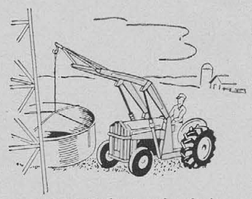
The new agent was tried in patients with rose and hay fever, year-round nasal stuffiness, hives, and allergic skin problems. Theruhistin brought relief for most of them. An almost total absence of side effects was noted, even in those who had not been able to tolerate many other antihistamines.

For source information on any of the above items, write Medical Report, Capper's Farmer, Topeka, Kansas. Sorry, we cannot advise on personal health problems. Only your doctor is so qualified.

what's it worth to SAVE YOUR BACK a HUNDRED WAYS?

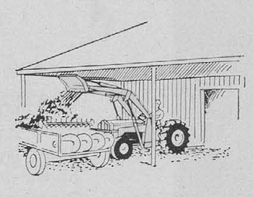

Levels and grades

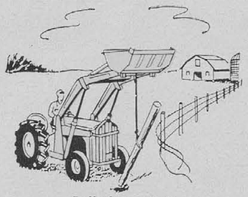

Loads fill dirt

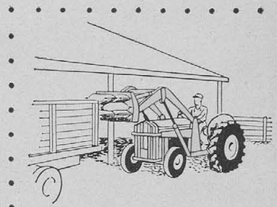

Moves tanks, troughs, sheds

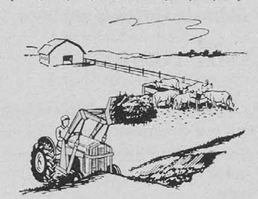

Cleans up rocks, logs, stumps


Stacks hay, tops out 21' stack


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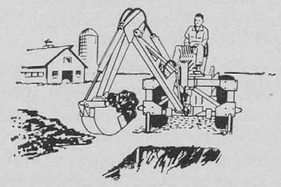
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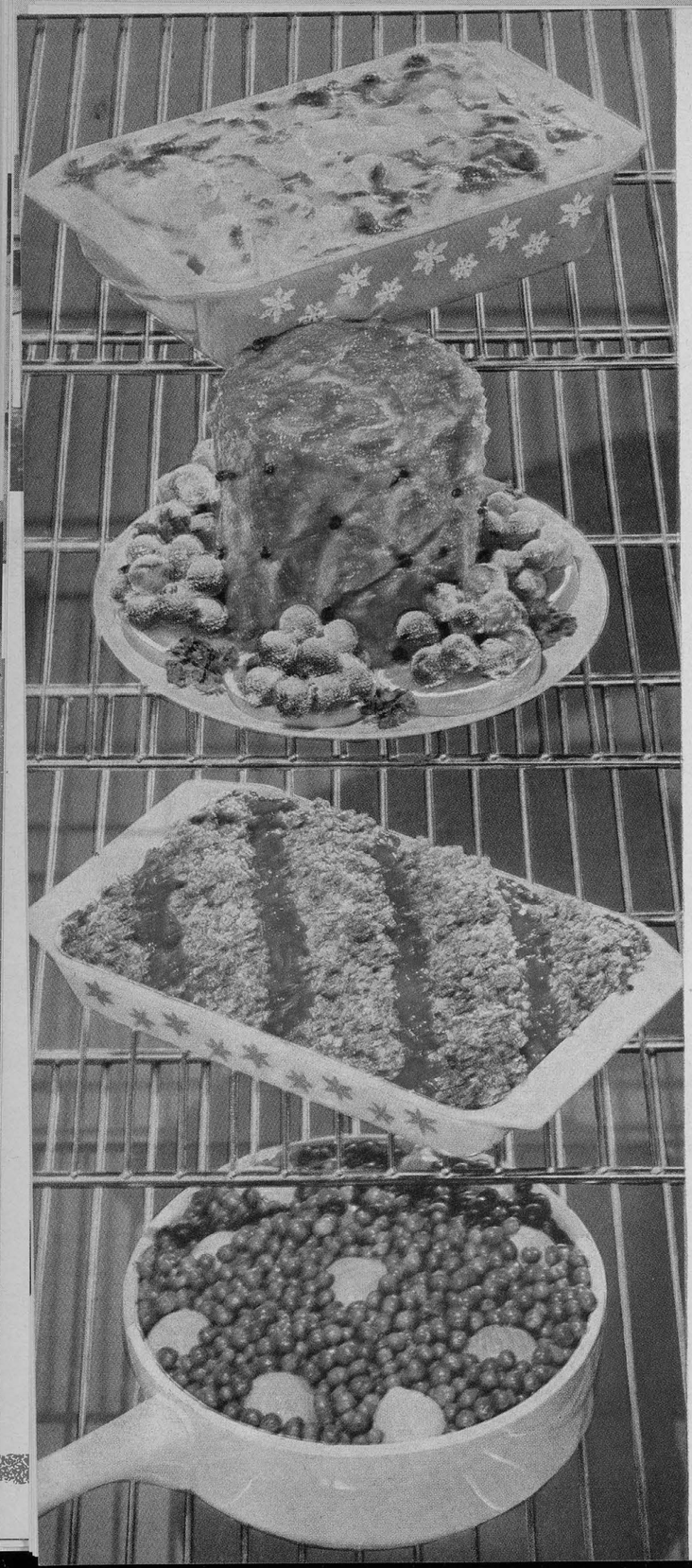
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FOUR EASY

On busy go-to-meeting days, tuck refrigerator-handy, all dad will milk to the menus below. Starred

by Faye Converse

MENU I

★ Marmalade-Glazed Ham Roll
★ Scalloped Potatoes
★ Peas and Onions
Celery and Carrot Sticks
★ Apple Candy Pudding

GLAZED HAM ROLL

Score 2-pound piece of fully cooked, rolled, boned ham; stud with whole cloves. Spread with ⅓ cup orange marmalade. Place on rack in shallow baking pan. Bake in moderate oven (350°) about 1 hour. Garnish as desired. Makes 6 servings.

APPLE CANDY PUDDING

(6 servings)

2 cans (21-ounce size) apple pie filling
⅓ cup tiny red cinnamon candies
2 tablespoons lemon juice
1½ cups quick-cooking rolled oats
⅓ cup sugar
⅓ cup melted butter

1. Combine pie filling, candies, and lemon juice in greased glass baking dish, about 9½ by 6¼ by 2¼ inches. Mix rolled oats, sugar, and butter; sprinkle over apples.

2. Bake in moderate oven (350°) for 1 hour. Serve with ice cream, if desired.

PEAS AND ONIONS

(6 servings)

2 packages (10½-ounce size) frozen peas
¼ cup water
10 to 12 tiny, whole white onions
3 tablespoons butter
Salt and pepper

Place peas in casserole; add remaining ingredients. Cover; bake in moderate oven (350°) for 1 hour.

SCALLOPED POTATOES

Prepare scalloped potatoes in greased, shallow baking dish, using thinly sliced potatoes and *hot* milk or white sauce. Bake in moderate oven (350°) about 1 hour or until potatoes are tender.

OVEN MEALS

dinner in the oven. With salads have to add is bread, butter, and dishes are shown in the photos.

Photos: Nelson, Photography, Inc.

MENU II

★ Barbecued Pork Chops
★ Fluffy Rice
★ Buttered Green Beans
Tossed Green Salad
★ Pineapple-Date Upside-Down Cake

BARBECUED PORK CHOPS

(6 servings)

6 center-cut pork chops, 1 inch thick
3 tablespoons shortening
½ cup catsup
2 tablespoons vinegar
½ teaspoon Worcestershire sauce
1 bay leaf
Salt and pepper
1 medium-sized onion, sliced

1. Brown chops in hot fat. Combine remaining ingredients, except onion, and heat to boiling. Arrange chops in casserole. Top with sauce and onions.

2. Cover; bake in moderate oven (350°) for 1 hour. Garnish as desired.

BAKED FLUFFY RICE

(6 servings)

1 cup raw rice (regular)
2½ cups water
3 tablespoons butter
1 teaspoon salt

Combine ingredients in greased 1-quart round casserole. Cover; bake in moderate oven (350°) for 1 hour. Remove cover; stir rice with fork. Top with additional pat of butter.

PINEAPPLE-DATE UPSIDE-DOWN CAKE

⅓ cup butter, melted
¾ cup brown sugar, firmly packed
1 can (20 ounces) pineapple spears, drained
Maraschino cherries, well drained
½ cup pecan halves
10 halved, pitted dates
1 package (17 ounces) white cake mix
1⅓ cups milk

1. Combine butter and brown sugar. Heat, stirring constantly, until sugar is dissolved. Pour into greased oven-glass

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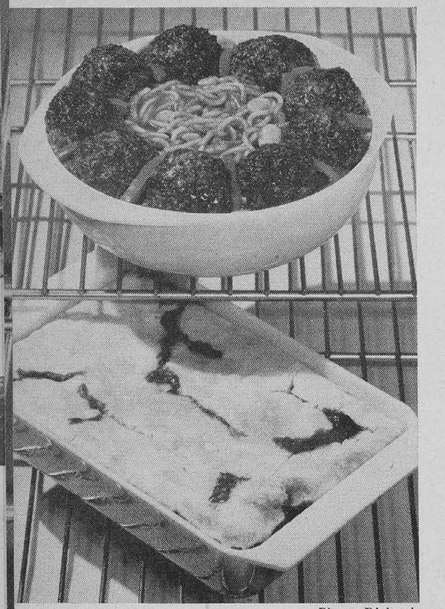


Photo: Richards

MENU III

★ Spaghetti-Lima Bean Casserole
with Meat Balls
Cabbage-Carrot Salad
★ Cherry-Pineapple Crumble



Photo: Richards

MENU IV

★ Dutch Casserole
Lettuce Wedges with Dressing
★ Dried Fruit Compote
Plain Cookies or Cake

Four easy oven meals

baking dish about 11¾ by 7½ by 1¾ inches. Arrange pineapple, cherries, nuts, and dates in sirup.

2. Beat cake mix with milk at medium speed on mixer for 4 minutes. Spread evenly over fruit.

3. Bake in moderate oven (350°) for about 1 hour. Let stand 5 minutes; turn out on serving platter. Cut in squares. Top with sweetened whipped cream, if desired. Makes 15 servings.

BUTTERED GREEN BEANS

(6 servings)

2 packages (10½-ounce size) frozen whole green beans
¼ cup water
3 tablespoons butter
1 teaspoon salt

Place ingredients in buttered casserole. Cover; bake in moderate oven (350°) for 1 hour. Garnish with pimiento strips.

CABBAGE-CARROT SALAD

(6 servings)

4 cups shredded cabbage
1 cup shredded carrots
¼ cup diced green pepper
¼ cup sliced radishes, if desired
½ cup salad dressing
Lettuce leaves

Combine prepared vegetables. Toss lightly with dressing; chill. When ready to serve, spoon into bowl lined with lettuce leaves. Garnish with carrot curls and radish roses, if desired.

SPAGHETTI-LIMA BEAN CASSEROLE WITH MEAT BALLS

(6 servings)

1½ pounds ground beef
¼ cup minced onion
1 teaspoon salt
3 tablespoons shortening
2 cans (16-ounce size) spaghetti in tomato and cheese sauce
1 can (6 ounces) tomato paste
2 tablespoons vinegar
1 teaspoon Worcestershire sauce
¾ teaspoon oregano
1 can (16 ounces) lima beans, drained
Salt and pepper

1. Combine meat, onion, and salt. Form into balls about 1 inch in diameter. Brown in hot fat. Combine remaining ingredients in greased 2-quart casserole. Place meat balls around edge.

2. Cover; bake in moderate oven (350°) for 1 to 1¼ hours. Garnish with green pepper strips, if desired.

DUTCH CASSEROLE

(6 servings)

2 pounds round steak (1 inch thick)
¼ cup shortening
¼ cup sifted flour
1 teaspoon salt
¼ teaspoon pepper
1 can tomato soup
1 soup can water
1 tablespoon Worcestershire sauce
2 teaspoons caraway seeds
6 medium-sized potatoes, pared
12 large carrots, quartered
6 medium-sized onions, peeled

1. Cut steak in 1-inch cubes. Brown in hot fat in Dutch oven. Remove meat; stir flour, salt, and pepper into drippings in pan. Stir in tomato soup, water, and Worcestershire sauce. Bring to boil; cook 2 minutes. Sprinkle in caraway seeds, stirring thoroly.

2. Arrange meat and prepared vegetables in gravy. Cover tightly; bake in moderate oven (350°) for about 2 hours or until meat is tender. Garnish with chopped parsley or parsley sprigs.

BAKED FRUIT COMPOTE

(6 servings)

1 package (12 ounces) assorted dried fruits (prunes, apricots, pears)
1 lemon, sliced
5 to 7 whole cloves
½ cup sugar
1½ cups water

Combine dried fruits, lemon, cloves, and sugar in 1-quart casserole. Pour in water to cover fruit. Cover tightly; bake in moderate oven (350°) for 2 hours or until fruit is tender. Garnish with lemon slices, if desired. Serve with plain cookies or cake.

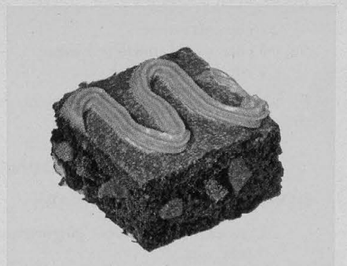
CHERRY-PINEAPPLE CRUMBLE

(6 servings)

2 cans (22-ounce size) cherry pie filling
1 can (9 ounces) crushed pineapple
1 package (9 ounces) or ½ package (19-ounce size) white or yellow cake mix
½ cup water
Cream or ice cream

1. Combine pie filling and pineapple in greased 2-quart oven-glass baking dish, 9 by 6¾ by 2¼ inches. Sprinkle dry cake mix evenly over fruit. Pour water over top.

2. Bake in moderate oven (350°) for 1 to 1¼ hours or until cake top is done. Serve warm with cream or ice cream, if desired. **End**



CHOCOLATE-FRUIT

Cake-mix cooky bars

by Faye Converse

MAKE bar cookies extra quick with cake mix. An easy mixing, one baking gives you two dozen ginger bars or four dozen of the other favorite flavors. Nutty, fruity, spicy—plain or partyish — hungry youngsters and grown-ups really go for these!

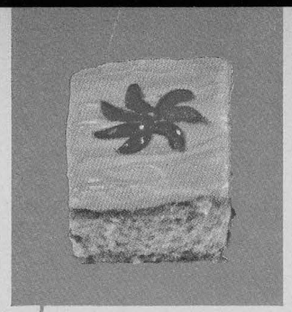
APPLE-SPICE BARS

2 eggs, slightly beaten
½ cup applesauce
1 package (19 ounces) spice cake mix
1 cup coarsely chopped pecans
Caramel-Nut Topping

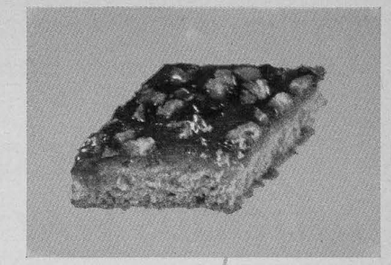
1. Beat first three ingredients in mixing bowl until well blended. Stir

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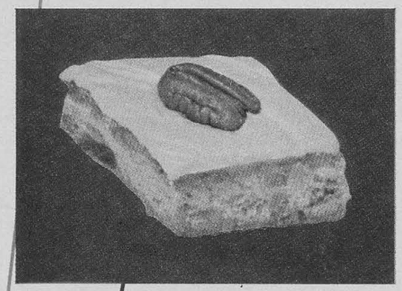
Photo: Nelson, Photography, Inc.



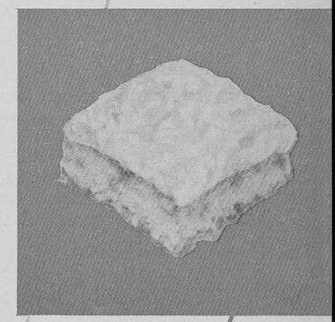
CHERRY-NUT



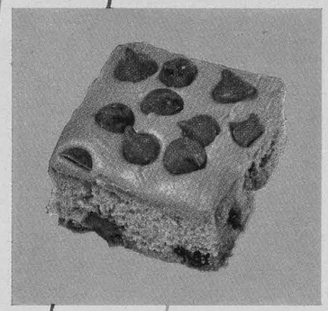
APPLE-SPICE



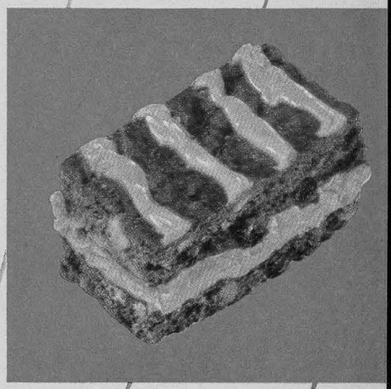
ORANGE-DATE



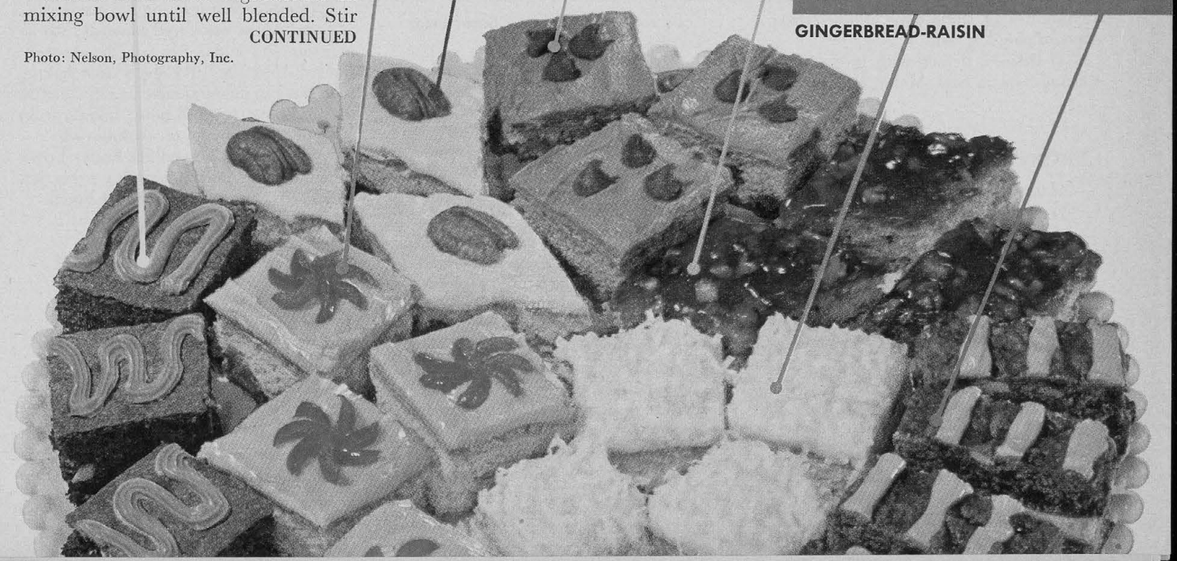
LEMON-COCONUT



BUTTERSCOTCH-PECAN



GINGERBREAD-RAISIN



Cake-mix cooky bars

THE QUICKEST, MOST DELICIOUS WAY TO FILL THE COOKY JAR!

in nuts. Spread in greased, floured 15½- by 10½- by 1-inch baking pan. Bake in moderate oven (350°) for 25 to 30 minutes or until done.

2. Spread with Caramel-Nut Topping. Broil until mixture is bubbly and browned. Let cool; cut in bars. Makes about 4 dozen.

Caramel-Nut Topping:

- ⅓ cup soft butter
- ⅔ cup brown sugar, firmly packed
- ¼ cup cream
- ½ cup chopped pecans

Combine ingredients; use as directed.

. . . MOTHER'S CHOICE

CHOCOLATE-FRUIT BARS

- 2 eggs, slightly beaten
- ½ cup water
- 1 package (17, 19, or 20 ounces) chocolate cake mix
- 1 cup (8-ounce jar) diced, mixed candied fruits and peels
- ½ cup coarsely chopped walnuts
- Butter frosting

1. Combine first three ingredients in mixing bowl; beat until well blended. Stir in fruits and nuts. Spread in greased, floured 15½- by 10½- by 1-inch baking pan. Bake in moderate oven (350°) about 30 minutes or until done. Loosen from edges of pan. Let cool.

2. If desired, drizzle with green butter frosting. Cut in bars. Makes 4 dozen.

. . . PARTY GLAMOR

LEMON-COCONUT BARS

- 2 eggs, slightly beaten
- ¼ cup water
- 1 package (19 ounces) instant lemon flake cake mix
- 1 cup flaked coconut, chopped
- Lemon butter frosting
- Flaked coconut for garnish

1. Combine first three ingredients in mixing bowl; beat until well blended. Stir in coconut. Spread evenly in greased, floured 15½- by 10½- by 1-inch baking pan. Bake in moderate oven (350°) for 25 to 30 minutes. Loosen from edges of pan. Let cool.

2. Trim crisp edges, if necessary. If desired, frost with lemon butter frosting; sprinkle with additional coconut. Cut in bars. Makes about 4 dozen.

. . . LUNCH BOX TREATS

ORANGE-DATE BARS

- 2 eggs, slightly beaten
- 1 tablespoon grated orange rind
- ⅓ cup orange juice
- 1 package (17, 19, or 20 ounces) yellow cake mix
- 1 cup (6½-ounce package) finely chopped dates
- ½ cup coarsely chopped walnuts
- Orange-flavored butter frosting

1. Beat first four ingredients in mixing bowl until well blended. Stir in dates and nuts. Spread evenly in greased, floured 15½- by 10½- by 1-inch baking pan. Bake in moderate oven (350°) for 25 to 30 minutes or until done. Loosen from sides of pan. Let cool.

2. Trim crisp edges, if necessary. Frost with orange-flavored butter frosting, if desired. Cut in bars. Makes about 4 dozen.

. . . FATHER'S FAVORITE

BUTTERSCOTCH-PECAN SQUARES

- 1 package (19 ounces) burnt sugar cake mix
- 2 tablespoons water
- 1 teaspoon vanilla
- 2 eggs, slightly beaten
- ½ cup coarsely chopped pecans
- 1 package (6 ounces) semi-sweet chocolate pieces
- Burnt Sugar Frosting
- Pecan halves

1. Dilute the burnt sugar sirup from cake mix package to ½ cup as directed on box. Beat ¼ cup of the sirup, 2 tablespoons water, vanilla, eggs, and cake mix until well blended. (Save remaining ¼ cup sirup for frosting.) Stir in nuts.

2. Spread evenly in greased, floured 15½- by 10½- by 1-inch baking pan. Sprinkle chocolate pieces over top. Bake in moderate oven (350°) for 25 to 30 minutes. Loosen from sides of pan.

3. Let cool; frost with Burnt Sugar Frosting. Cut in bars. Top each with a pecan half, if desired. Makes about 4 dozen.

Burnt Sugar Frosting:

- ⅓ cup soft butter
- 3 cups sifted powdered sugar
- ¼ cup burnt sugar sirup

Blend butter and powdered sugar. Add sirup, beating until smooth.

. . . CHEWY, SPICY GOODNESS

GINGERBREAD-RAISIN BARS

- 1 package (14 ounces) gingerbread cake mix
- 1 tablespoon grated orange rind, if desired
- ½ cup orange juice
- 1 cup chopped seedless raisins
- ½ cup coarsely chopped walnuts, if desired
- Orange-flavored powdered sugar frosting

1. Beat first three ingredients in mixing bowl until well blended. Stir in raisins and nuts. Spread in greased, floured 13- by 9-inch baking pan. Bake in moderate oven (350°) for about 20 minutes or until done. Loosen from edges of pan.

2. When cool, cut into oblong bars. If desired, stack 2 bars together with orange frosting between. Drizzle additional frosting on top. Makes 2 dozen plain or 1 dozen stacked bars.

. . . LITTLE BOYS LOVE 'EM

CHERRY-NUT BARS

- 2 eggs, slightly beaten
- 2 tablespoons maraschino cherry juice
- 2 tablespoons water
- 1 package (17, 19, or 20 ounces) white cake mix
- ½ cup drained, chopped maraschino cherries
- ½ cup coarsely chopped walnuts
- Cherry-Pink Butter Frosting

1. Combine first four ingredients in mixing bowl; beat until well blended. Stir in cherries and nuts. Spread in greased, floured 15½- by 10½- by 1-inch baking pan. Bake in moderate oven (350°) for 25 to 30 minutes or until done. Loosen from sides of pan. Let cool on cooling rack.

2. Frost with Cherry-Pink Butter Frosting and garnish with maraschino cherries, if desired. Cut in bars. Makes 4 dozen.

Cherry-Pink Butter Frosting:

- ⅓ cup soft butter
- 3 cups sifted powdered sugar
- 1 tablespoon cherry juice
- 2 to 3 tablespoons cream
- Few drops red food coloring
- Maraschino cherries

Combine butter and sugar. Add cherry juice and cream, mixing until smooth. Add coloring to make delicate pink. Spread over Cherry-Nut Bars. Garnish with maraschino cherry flowers, if desired. **End**



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Country Cooking

YAM-PINEAPPLE CASSEROLE

Use yams or sweet potatoes for this fruit-flavored favorite from Mrs. H. C. Lauridsen, Holt county, Nebraska.

6 medium-sized yams, cooked and pared
1 can (9 ounces) crushed pineapple
1 cup brown sugar, firmly packed
¼ cup butter
¼ teaspoon salt

1. Cut yams in half lengthwise. Place in buttered 2-quart casserole.
2. Combine remaining ingredients in small saucepan. Bring to boil. Simmer 3 minutes. Pour over yams.
3. Bake in moderate oven (350°) for 50 to 60 minutes, basting frequently. Makes 6 to 8 servings.

BUTTERMILK PANCAKES

"Light, fluffy pancakes—just right for these cold mornings," says Mrs. Robert Werning, Benton county, Iowa.

1¼ cups sifted flour
½ teaspoon soda
2 teaspoons baking powder
2 teaspoons sugar
½ teaspoon salt
Dash cinnamon, if desired
2 eggs, well beaten
1¼ cups buttermilk
3 tablespoons melted shortening

1. Sift flour, soda, baking powder, sugar, salt, and cinnamon into mixing bowl.
2. Combine eggs and buttermilk. Add to dry ingredients; beat until smooth. Add shortening, beating until well blended.
3. Bake on hot griddle. Makes 16 four-inch cakes.

PEAR-PINEAPPLE SALAD

Miss Theresa Wondru, Pawnee county, Kansas, sends this luscious fruit salad.

1 package lime-flavored gelatine
1 cup boiling water
½ cup pear juice
1 can (8 ounces) crushed pineapple (including juice)
1½ cups diced, drained canned pears
¼ cup miniature marshmallows
½ cup cream, whipped

1. Dissolve gelatine in boiling water. Add pear juice. Chill until partly set. Stir in pineapple, pears, and marshmallows. Chill until almost firm.
2. Fold in whipped cream. Pile lightly in 6-cup cold-water-rinsed mold. Chill until firm. Makes about 6 servings.

PARSNIPS AU GRATIN

Mrs. Ray S. Clary, Scotts Bluff county, Nebraska, makes parsnips popular with grated American cheese.

¼ cup butter
¼ cup sifted flour
2 cups milk
1 teaspoon salt
¼ teaspoon pepper
6 medium-sized parsnips, cooked and sliced
½ cup grated American cheese
Paprika

1. Make white sauce of butter, flour, milk, salt, and pepper. Pour over parsnips in greased baking dish. Sprinkle with cheese and paprika.
2. Bake in moderate oven (350°) for about 30 minutes. Makes 6 servings.

CHEESE-BEEF BIRDS

Use veal or beef steak in this recipe from Mrs. Harvey Glamann, Taylor county, Wisconsin.

1½ pounds round steak
⅓ pound mellow Cheddar cheese
Flour
¼ cup butter or margarine
Salt and pepper
1 medium-sized onion, finely chopped
1 can (8 ounces) tomato sauce
¼ teaspoon oregano, if desired

1. Cut steak into 6 strips. Cut cheese into six sticks about ½ inch in diameter. Place cheese stick on each strip of meat. Roll up; fasten with toothpick. Coat each lightly with flour.
2. Brown in butter in heavy skillet over medium heat. Season to taste with salt and pepper. Add onion, tomato sauce, and oregano.
3. Cover; simmer 20 to 25 minutes or until meat is tender. Makes 6 servings.

MARSHMALLOW SURPRISE SALAD

This dessert-type salad is a favorite of Mrs. Eltine Davis, Scurry county, Texas.

¾ cup whipping cream, whipped
⅓ cup mayonnaise
1 cup miniature marshmallows
1 cup grapes, halved and seeded
1 banana, peeled and diced
½ cup diced pineapple, drained
¼ cup coarsely broken pecans, if desired

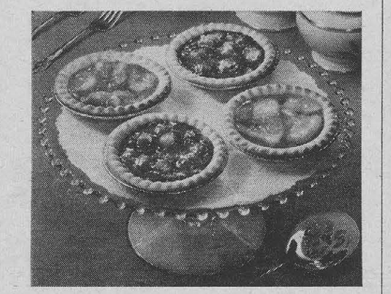
Blend cream and mayonnaise; fold in remaining ingredients. Chill thoroly. Makes about 6 servings.

We pay rural homemakers $5 for each recipe we print. Send your favorite recipe to Country Cooking, Capper's Farmer, Topeka, Kansas. Write on only one side of paper. Sorry, recipes cannot be returned.

IT'S NEW ON THE GROCERY SHELF

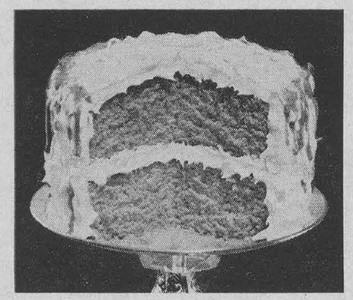
Surprise the family with a variety of hot muffins from Betty Crocker's divided package mixes. Each box contains 2 packets that make 6 to 8 muffins. Flavors include corn, raisin bran, date, and orange.

Brown rice which cooks in one-third the regular time has been introduced by MJB Company. It is claimed that MJB Quick Brown Rice loses no flavor, texture, or nutritive quality in processing. Packets of 12 and 24 ounces are being offered.



INDIVIDUAL fresh-frozen apple and cherry tarts, by Morton, are proving popular. Packaged 2 in a box, they're ready to pop into a hot oven to bake. New, also, are Coconut Custard Tarts.

For baby—high meat dinners, strained and junior styles, are being introduced by Heinz. The varieties are beef, veal, chicken, and ham with vegetables. Each requires only the additions of fruit and milk to complete baby's menu.



INSTANT Banana Cake Mix joins the line of "special flavor" mixes by Swans Down. Just add water and eggs. Nuts and spices are choices for variations.

A trio of condensed soups has been added to Campbell's line. Chicken Vegetable boasts 6 vegetables, chicken, and noodles. Minestrone is an Italian-style vegetable soup with spaghetti and a touch of cheese. Turkey Noodle contains turkey stock, egg noodles, and turkey.

Oh—that tantalizing "Yeast-Riz" Crust!

HUMPTY-DUMPTY *in a Dish*



HUMPTY DUMPTY *in a* DISH

"YEAST-RIZ" CRUST

Scald **⅓ cup milk.** Stir in **¼ cup shortening, 6 tablespoons sugar** and **¼ teaspoon salt.** Cool to lukewarm. Measure into bowl **¼ cup warm (not hot) water.** (Cool to lukewarm for compressed yeast.) Add **1 package or cake Fleischmann's Yeast, active dry or compressed.** Stir to dissolve. Stir in lukewarm milk mixture, **1 beaten egg** and **1½ cups sifted enriched flour.** Beat until smooth. Stir in an additional **1¼ cups sifted enriched flour (about).** Knead. Let rise until doubled in bulk, about 1½ hours. Punch down; divide into 3 pieces. Roll each into 10-inch circle. Press firmly into 9-inch pie pan. Press edge with tines of fork. Brush with **1 slightly beaten egg white.** (To decorate crust, place thin braid or small cut-outs of dough around rim. Brush with egg white.) Let rise until doubled in bulk, about 20 minutes. Prick with fork. Bake in oven at 350° F. for 8 minutes. Do not brown. Fill and bake—or store until ready to use. To store crust, cool, stack and wrap in foil. Hold in refrigerator 1-10 days. Makes 3.

Egg-and-Pepper Filling

Place **5 sliced hard cooked eggs** in **"Yeast-Riz" Crust.** Over low heat melt **¼ cup Blue Bonnet Margarine.** Add and blend thoroughly **2 tablespoons enriched flour, 1 teaspoon salt, ⅛ teaspoon pepper** and **¼ teaspoon dry mustard.** Slowly add **¾ cup milk,** stirring constantly to keep mixture smooth. Cook until sauce thickens and is satiny smooth. Add sauce alternately with **½ cup grated American cheese, 1 tablespoon chopped green pepper** and **1 tablespoon chopped pimiento** to egg slices in crust. Bake in moderate oven at 350° F. for 15-20 minutes. Makes 4-6 servings.

"A crust with heavenly taste and texture only yeast can give"

says Mrs. John Armstrong, prize-winning cook of Lincoln, Nebraska. "It's got a delicious different flavor that blends perfectly with the zippy egg-and-pepper filling. And imagine—you can bake the crust days ahead, then fill and brown in minutes.

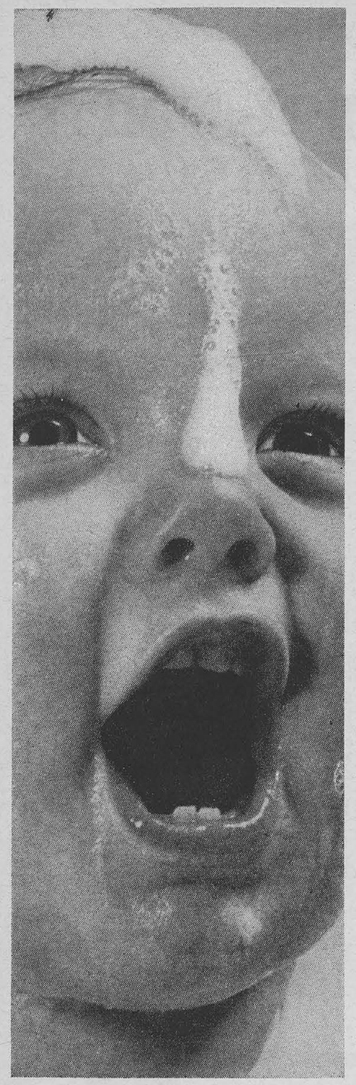
"Do try it yourself—and make the crust with Fleischmann's, the yeast prize-winning cooks prefer. Use the cake yeast—or use the handy dry kind. It keeps for months, always rises fast."



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Recipes for other delicious main dishes (pizza, too!) on the back of every "Thrifty Three." Look for the recipes when you buy Fleischmann's Active Dry Yeast.



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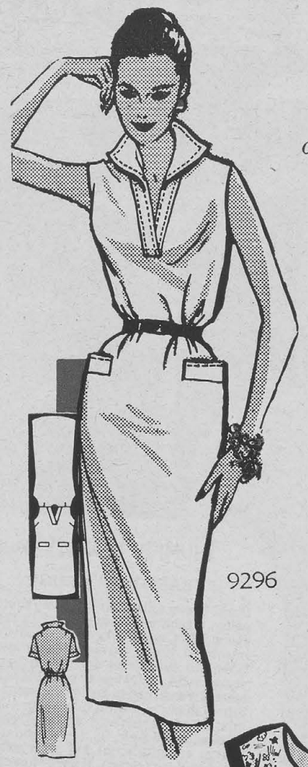
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9296

9296. Casual favorite with no waist seam; just nip with belt. Note neatly tailored open collar, pretty pocket trim. Printed Pattern in misses' sizes 10 to 18. Size 16: 3¼ yards 35-inch fabric.

4792. Empire-princess fashion with lines smooth-fitted and flared. There's a brief little bolero too. Printed Pattern in misses' sizes 10 to 20. Size 16, dress and bolero: 4 yards of 39-inch fabric.



4766



4792

Pattern 9296 is 50 cents. Patterns 4792 and 4766 are 35 cents each. Please send coins. Address Capper's Farmer Pattern Dept., Box 88, Old Chelsea Station, New York 11, N. Y.



4712

4580

4712. Blouse and six-gored skirt to mix or match! Printed Pattern in half sizes 14½ to 24½. Size 16½: blouse, 1⅞ yards 35-inch; skirt 2⅞ yards of fabric.

4580. Princess dress and jacket with the same lines. Printed Pattern, half sizes 14½ to 24½. Size 16½: dress, 5¼ yards 35-inch; jacket, 1½ yards.

4766. Saucy style for sister. Scoop neckline, perky bow trim. Waist is cinched by sash. Printed Pattern in child's size 2, 4, 6, 8. Size 6: 2½ yards of 35-inch.

Pattern 4712 is 35 cents. Pattern 4580 is 50 cents. Address given on preceding page.



Who gave the party for Mary?

Her parents, of course. And they had the help of hundreds of other people—men and women that Mary's parents don't even know.

These people helped Mother bake the cake and cook the party food. They helped freeze the ice cream, sew Mary's dress, and wash and iron it. They helped heat, light and clean the house for the party.

These busy people are the men and women who supply electric service for Mary's house. It's hard to imagine life without the electricity they provide—for everyone depends on electricity for dozens of jobs all over the house.

If you add up all the ways *you* put electricity to work, you'll be surprised. Can you think of anything else that gives so much value, day in and day out, for so little cost?

America's Electric Light and Power Companies*

*Company names on request through this magazine



CLABBER GIRL'S

DUTCH APPLE CAKE

Yield: 6 servings

Sift together 2 cups sifted *all-purpose flour*, 2½ teaspoons *Clabber Girl Baking Powder*, ¼ cup *sugar*, ¾ teaspoon *salt*, and 1 teaspoon *nutmeg*. Cut in ⅓ cup *butter or margarine* until mixture is fine. Combine 1 *egg*, beaten with ¾ cup *milk;* pour over dry ingredients; stir to make a soft dough. Toss together 2 cups thinly sliced, pared *cooking apples*, ⅓ cup *sugar*, 1 teaspoon *cinnamon*, and 1 teaspoon *grated lemon rind;* spread on bottom of greased *8 x 8 x 2-inch baking pan*. Drop dough over apples; spread carefully to cover apples. Bake in a 350° F. (moderate) oven 30 to 40 minutes or until lightly browned. Let cool 5 minutes. Invert on serving plate. Cut in squares. Serve warm, apple side up, with *whipped cream*, if desired.

You should know THIS about baking!

It's the BALANCE of ingredients in baking powder that governs its leavening action. Only when these are scientifically *balanced* can you be sure of uniform action in the mixing bowl plus that final, *balanced* rise to light and fluffy texture in the oven . . . That's the story of Clabber Girl's double action . . . Better baking everytime!

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CLABBER GIRL

EXCLUSIVELY KNOWN AS THE BAKING POWDER WITH THE BALANCED DOUBLE ACTION



What! No Lazy Susan?

Storage dares to be different in this remodeled kitchen-utility room

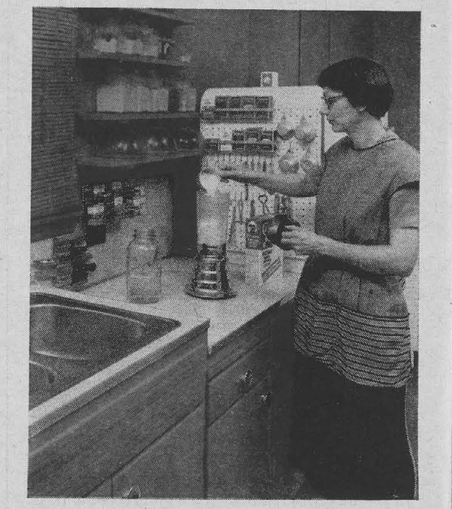
SHE had a 19-cubic-foot freezer, a new automatic washer and dryer. Laura Bamesberger, Hamilton county, Nebraska farm wife and mother, should have been sitting pretty! Instead she was *walking plenty!*

The catch? The washer was in the kitchen, the dryer in the hall, and the freezer in the basement. As for storage in her work area—it was hit and miss—mostly missing!

That was until Laura, her husband, Gordon, and her sister-in-law, Erma Bamesberger, a home planning and color consultant from Wichita, Kansas, teamed up to remodel the back part of the house.

The space hog was soon spotted. It was the big, old pantry that adjoined the kitchen. The Bamesbergers took out the partition, re-planned the space.

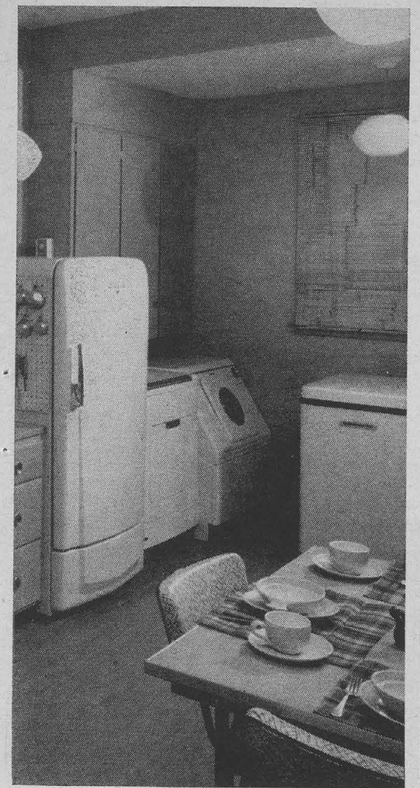
Careful calculation, down to the last quarter inch, enabled them to fit freezer, washer and dryer into the former pantry. They even managed a bonus of three storage cabinets!



When it came to kitchen built-ins, Laura and Erma had ideas of their own. They used conventional lower cabinets to encase double sink and dishwasher. Instead of upper cabinets they hung adjustable open shelves over mix center and range. More open shelves went on wall beside the dining table.

Conventional upper cabinets and storage drawers below were used across the east end of kitchen. No corners anywhere—so no Lazy Susans! End

OPEN-PLAN MIX shelves are 4, 5, and 6 inches wide. Three shelves over range are 5 inches wide. Laura says pegboard bolted to refrigerator wall really works fine.

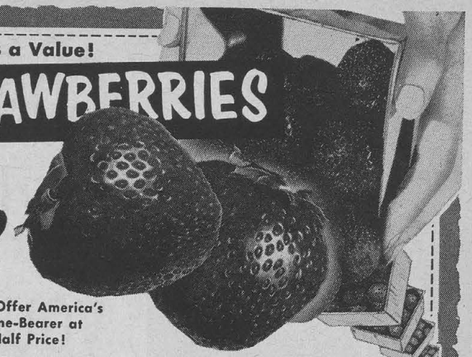


ALL TOGETHER NOW! Cooking, laundry, serving and storage are efficient for the Bamesbergers since pantry yielded utility space. Area lighting and adjusted working heights are other good points.

by Eula Mae Kelly

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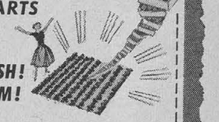
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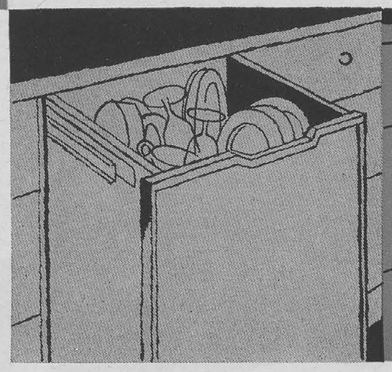
CITY & STATE _____

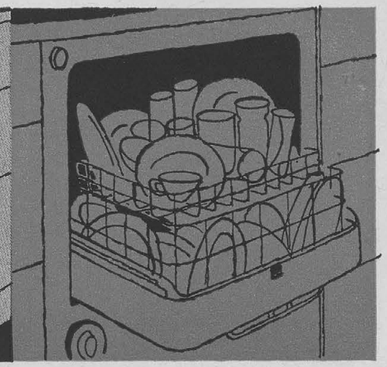
Fourth of a series

Check and choose your new dishwasher

by Julia Kiene







Sterile-Clean Dishes
Fewer Colds
More Leisure

Less Dish Breakage
No More Nicked China
More Time With the Family
Saving on Water and Detergent

You will wash 340 tons of dirty dishes in your lifetime! The Great Wall of China, for sure. Worse yet, those dishes aren't really clean. That's why you are wise to buy an electric dishwasher.

Clean dishes need water much hotter than the hands can stand. Health officials require restaurants to wash all tableware in water at least 150 degrees. The law also states that any dish with more than 100 bacteria is not suitable for human use.

Some hand-washed dishes showed a count of 5,820 bacteria, according to a study by Ohio State University. Tests showed that the highest count on machine-washed dishes was only 87 bacteria. The common cold and strep busybodies are quickly destroyed at 150 degrees.

So—an electric dishwasher not only rids you of that "Great Wall of China" but provides an important health warranty for your family.

Let's go shopping

You have a choice of four types. Undercounter front-opening, undercounter top-opening dishwasher-sink combination, and mobile.

Most dishwashers are 36 inches in height and 24 inches in width. One 30-inch-wide model is available which is excellent for large families.

You can buy an undercounter front-opening type with either gravity or automatic pump drains. The automatic pump eliminates bothersome plumbing problems and can save up to 50% in installation costs.

If you are considering a new sink, you would be wise to investigate the combination sink and dishwasher.

Renting? You need not do without a dishwasher. You can buy a mobile type. Most models are designed so they may be permanently installed later if you move to a home of your own.

The mobile dishwasher is fully automatic and equipped with booster heaters to bring water to a safe germ-killing temperature. A retractable hose snaps onto the hot water faucet. Used water is pumped out thru a discharge nozzle into the sink. Since faucets vary, a special adapter is furnished.

A slick feature of the mobile dishwasher is ball-bearing casters. They make it easy to roll the dishwasher to the table for loading dirty dishes, or for setting the table with clean dishes.

It's hard to believe that with a mobile dishwasher you can pre-rinse, wash, and get three other rinses for as little as 6.3 gallons of water. Average water consumption varies from 8 to 10 gallons for the full cycle.

Water pressure is no problem. Pressure may vary from 16 to 120 pounds. One manufacturer can provide an adapter to operate on 12 pounds pressure.

No special wiring is needed since all dishwashers operate on 115 volts. Booster water-heating elements vary from 750 to 850 watts. These booster elements also dry the dishes.

Ask the dealer for the specification sheet of the model in which you're interested. You will find complete directions for installing and roughing-in. Also have a definite understanding about possible radio and TV interference. Most models are interference-free.

Extra features on some models are two detergent cups, one for the wash and one for the final rinse. One type has an ejector which automatically adds the proper amount of a special liquid to a final rinse. This causes water to drain off easily, preventing formation of water droplets. This feature is particularly good in an extreme hard-water area.

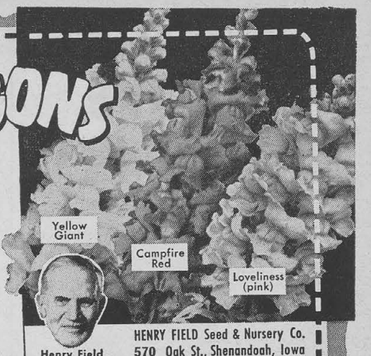
All dishwashers are automatic. A turn of the control dial and your job is finished. Most indicator dials show the cycle in which the dishwasher is operating. Any part of the cycle may be skipped or repeated as desired.

Dish racks should be vinyl-covered to protect dishes. Vinyl-lined dishwashers are available for protection of dishes and ease of cleaning. You'll find a wide range of

CONTINUED

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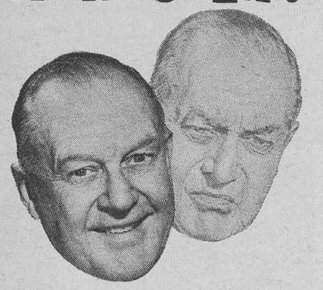
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Hours after original relief many laxatives start working again, bringing distress and discomfort. Others cause painful cramps and griping, disrupt *normal* regularity, make you *feel* constipated when you're not!

You suffer none of this "laxative hangover" with Dr. Caldwell's Senna Laxative. Dr. Caldwell's contains no harsh drugs. Its extract of Senna is one of the finest *vegetable* laxative products known. Gives gentle, *natural-like* relief of temporary constipation. Get Dr. Caldwell's today!

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SENNA LAXATIVE
Contained in Pleasant-Tasting Syrup Pepsin



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ALL AMERICA WINNER, TRY IT
Resistant to heat and sun. Medium size. Solid crisp heads. Send postal for big packet and New Seed & Nursery Catalog. **FREE**
R. H. SHUMWAY Seedsman, Dept. 322, Rockford, Illinois



All quiet on the **teething** front...
Apply medically-formulated Num-Zit Teething Lotion to baby's gums for quick, safe relief of teething pain. *At all drug counters*

NUM-ZIT
Teething Lotion
COMMENDED BY THE PARENTS' MAGAZINE
For toothache, denture irritation, neuralgic pains, ask for NUM-ZIT *Adult Strength.*
Products of PUREPAC Corporation

CONTINUED

Check and choose your new dishwasher

colors, also copper, chrome, and natural wood panels.

Now you have your dishwasher

Sit yourself down with your instruction book and study it carefully before you ever wash a dish. The dishwasher can't think. It can only wash dirty dishes.

Pay particular attention to proper loading. You didn't stick things hit or miss in the dishpan. Nor do you in your new dishwasher.

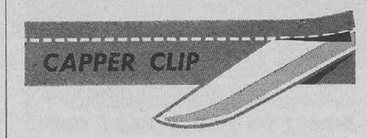
Never use anything but recommended dishwasher detergents. You'll find several different kinds for your dishwasher. Use only the amount recommended. All dishwasher detergents are excellent but some perform better in certain water than others. Should you find some spotting on glassware, try another brand.

Use your dishwasher to sterilize baby bottles, Mason jars, jelly glasses. You will find it can even wash the cream separator!

There are few things not safe to wash in the dishwasher. Lightweight plastics, hand-painted glassware and china are best washed by hand.

But why tell you this? You have already learned it from your instruction book.

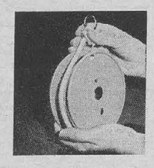
You are a thrifty homemaker! By merely turning a dial you have clean dishes and a healthy family. **End**



Sometimes a glass stopper "freezes" in the bottle. When that happens, you'll find it is practically impossible to remove the stopper. Don't risk snapping it off, possibly cutting yourself. Drop a little glycerin all around the rim of the stopper. Let set awhile, then try again. By that time, you should be able to unscrew the top of the bottle with ease.

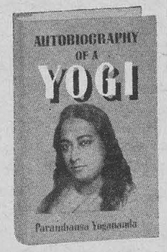


Does the take-down clothesline in your basement or utility room get snarled and kinked when not in use? If so, don't stow it away in a drawer or leave it lying around loose. Instead, wind the line on an electric wire reel as pictured. You can get this flat metal reel from your hardware dealer. He will probably just give it to you.



A MAN WHO FOUND GOD

AUTOBIOGRAPHY of a YOGI



by **PARAMHANSA YOGANANDA**
A Spiritual Classic

"These pages reveal, with incomparable strength and clarity, a fascinating life, a personality of unheard-of greatness. The author undertakes the unique task of instructing the Western reader in the practical application of yoga, setting the example in his own life . . . in these pages is undeniable proof that only the mental and spiritual striving of man has lasting value, and that he can conquer all material obstacles by inward strength . . . We must credit this important *Autobiography* with the power to bring about a spiritual revolution." SCHLESWIG-HOLSTEINISCHE TAGESPOST, *daily newspaper of Germany.*

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R. H. SHUMWAY Seedsman, Dept. 324, Rockford, Illinois

PIN-WORMS MAY BE A FAMILY AFFAIR

Fidgeting, nose-picking and a tormenting rectal itch are often telltale signs of Pin-Worms . . . ugly parasites that medical experts say infest *one out of every three* persons examined. Entire families may be victims and not even know it.

To get rid of Pin-Worms, these pests must not only be destroyed, but destroyed in the large intestine where they live and multiply. That's exactly what Jayne's P-W tablets do . . . and here's how they do it:

First—a scientific coating carries the tablets into the bowels before they dissolve. *Then*—Jayne's modern, medically-approved ingredient goes right to work—*kills* Pin-Worms quickly and easily.

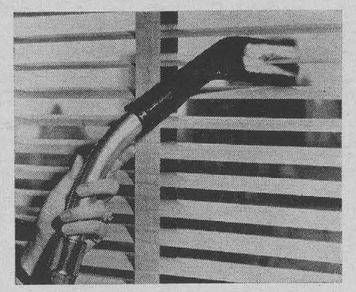
Don't take chances with this dangerous, contagious condition. At the first sign of Pin-Worms, ask your druggist for *genuine* Jayne's P-W Vermifuge . . . the small, easy-to-take tablets perfected by famous Dr. D. Jayne & Son, specialists in worm remedies for over 100 years.

JAYNE'S P-W (TRADEMARK)
for PIN-WORMS

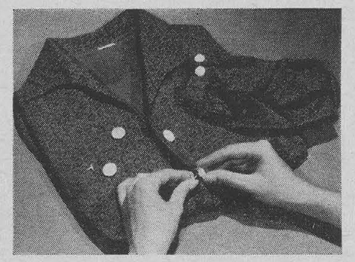
Homemaking News



Family-size refrigerator-freezer has an 85-pound frozen food chest, 10.7-cubic-foot fresh food compartment, and over-all capacity 13.1. Shelves and egg trays in doors. (Kelvinator, Detroit 32.)

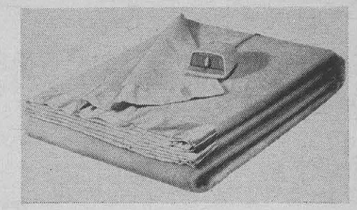


Venetian blind dusting attachment cleans both sides of slats at a time. Fits hose of most vacuum cleaners. The fluffy Dynel dusters can be removed for washing. (W & W Mfg. Co., Grandview, Missouri.)



So you dislike button sewing? These nylon resin buttons need no sewing. Simply insert the sharp point of the shaft; lock in place. Buttons come in a wide range of colors. (Jiffy-Lok Fastener, Kad Co., 37 West 17th St., New York 11.)

Scotch tape is now twice as sticky! It is double-coated with adhesive on both sides, yet they won't stick to each other. Use for pasting stamps, recipes, snapshots, packages, torn wallpaper; for any invisible seal. Comes in rolls, ½-inch width. (Minnesota Mining & Mfg. Co., 900 Fauquier Avenue, St. Paul 6, Minnesota.)



You'll have a fit over fitted, automatic blankets. The box-like lower corners are said to give more foot room. Fabric is washable, mothproof cotton and rayon; nylon binding. Wide range of colors. Dual or single controls, illuminated dial. (General Electric, Bridgeport 2, Connecticut.)

You've heard of home hair-cutting with a bowl on the head! This gadget gives a neater look. Simply roll it along natural contour of head. (Machined Prod., 4031 N. E. 13th Ave., Ft. Lauderdale, Florida.)



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FOR YOUR MOST INTIMATE MARRIAGE PROBLEM
Tested by doctors . . . proved in hospital clinics



A NORWICH PRODUCT

Tested by doctors • Trusted by women

1. **Antiseptic** (*Protective, germicidal action*) Norforms are *safer and surer than ever!* A highly perfected new formula releases antiseptic and germicidal ingredients *right in the vaginal tract.* The exclusive new base melts at body temperature, forming a powerful protective film that permits long-lasting action. Will not harm delicate tissues.

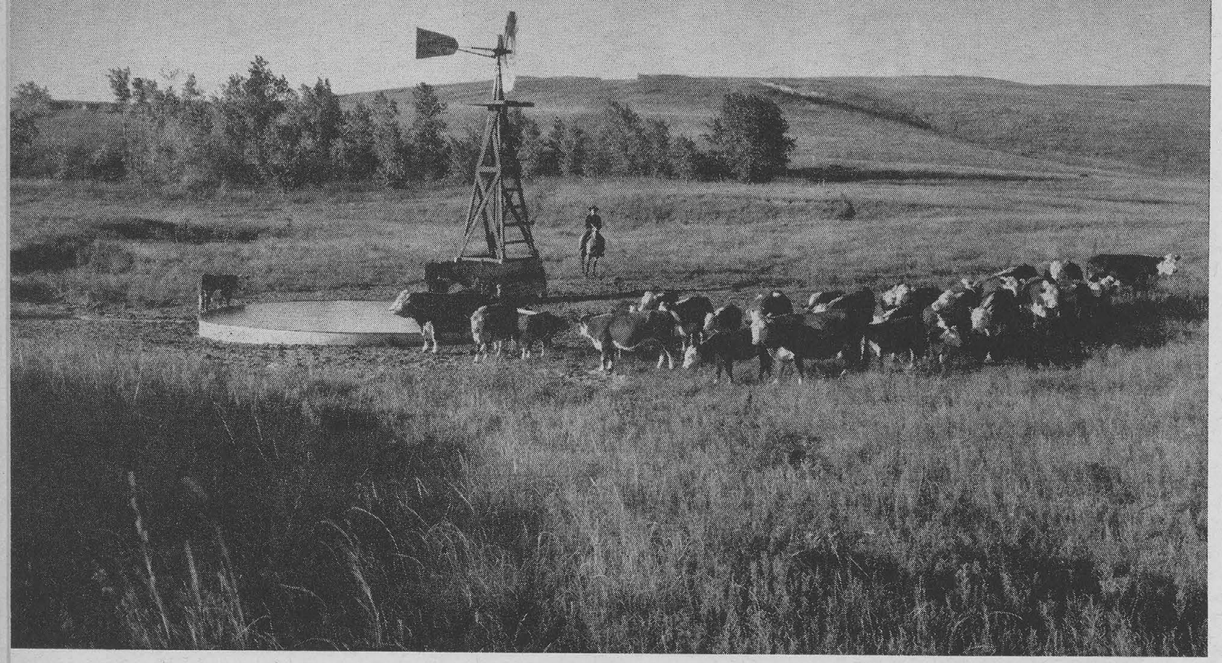
2. **Deodorant** (*Protection from odor*) Norforms were tested in a hospital clinic and found to be more effective than anything it had ever used. Norforms are deodorant—they *eliminate* (rather than *cover up*) embarrassing odors, yet have no "medicine" or "disinfectant" odor themselves.

3. **Convenient** (*So easy to use*) Norforms are small vaginal suppositories, so easy and convenient to use. Just insert—no apparatus, mixing or measuring. They're greaseless and they keep in any climate. Your druggist has them in boxes of 12 and 24. Also available in Canada.

***FREE** informative Norforms booklet*
Mail coupon to: Dept. CA-82, Norwich Pharmacal Co., Norwich, N. Y. Send Norforms booklet, in a plain envelope.

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It takes grass, guts, give-and-take . . .



To keep a family ranch like the E Bar thriving 80 years in the Nebraska Sand Hills

by Eula Mae Kelly
Photos: Hawks

GRAPPLING with the violent Sand Hills country and wresting a living and a life from its hard-blown expanses is no business for a prima donna.

And gentle, 68-year-old Dora Wisner, who heads up the highly successful E Bar hay and cattle ranch in Lincoln and McPherson counties of Nebraska, was first to say so.

"It's the rugged old cow, the right combination of grass and hay land, and loyal help that count."

Just the same, E Bar Ranch, founded by her late husband's father, William E. Wisner, in the 1870's, would never have survived 80 years without the resolution, business sense, and remarkable give-and-take of Dora Wisner.

In the 31 years since the sudden death of her husband, Dewey Wisner, the 1,940 acres have quintupled to 11,000. About 5,000 acres are north of North Platte, where ranch headquarters is located, and 6,000 acres in the Sand Hills near Tryon.

Cattle count and quality have been steadily stepped up. Grass has been reseeded, pasture and hay land kept productive. And all accomplished with a woman in the foreman's seat—a ranch-raised woman dedicated to the high standards of management and integrity of her husband.

Dora was left with daughters, not sons—Edith, 18, and Hazel, 8. Now in 1958, her daughters' husbands (Claud "Buck" Halligan and Ross Haase) are equal sharers in a three-way partnership. A nephew, Herschel Ansel, operates Tryon ranch; a grandson, Harrison Halligan, also helps on the south ranch.

Still another enterprise is the Holstein dairy, located in the bottom land in Lincoln county. Chris Dahlinger leases the dairy on a three-fifths—two-fifths basis.

This large, happy-working ranch has its saga of survival, like any other Sand Hills ranch.

Interwoven in its success fabric are deep discouragement, personal sorrows, losses from blizzards, lightning, prairie fires, even rustlers.

Folks in the Sand Hills learn to hang on to a few old cows and start all over again. They learn to look to the same hills, that seemingly have betrayed them, for courage to go on.

When Dora's husband died in 1926, there was not only indebtedness, there

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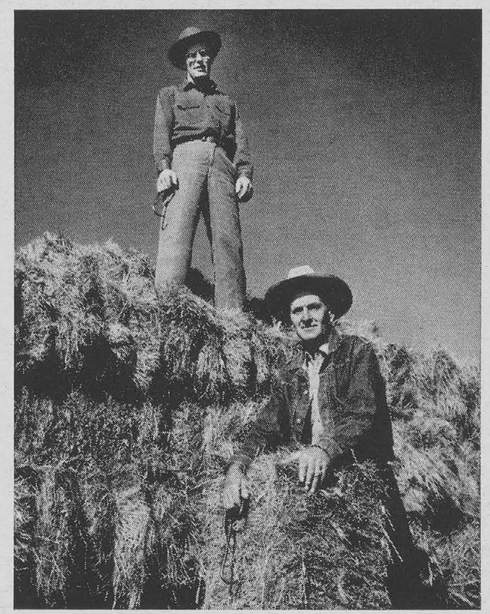
LEFT: Cattle count at E Bar is around 500 head, handled on a cow herd-feeder calf basis. Between 250 and 300 cows are run with 25 herd bulls. Shown at right of tank is a Zato Heir sire. Ranch has 22 wells and windmills. Grasses are gramma, switch, sand reed, bluestem, love, blue, buffalo.

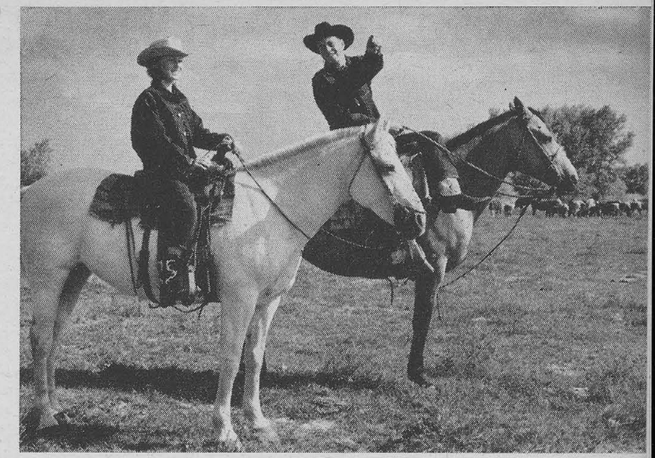


ABOVE: E Bar families line up in driveway of Wisner-Haase home. From left to right: Mrs. Wisner; Edith, Harrison, and Buck Halligan; Hazel, Rossell, and Ross Haase; Pat, Mary Kay, and Herschel Ansel. Herschel has spent his summers on his aunt's ranch since he was a boy of 8.

RIGHT: Good eating here! Hazel Haase, foreground, and Edith Halligan often "put together" meals—this time in Hazel's kitchen. Family cuts and wraps own beef, Pat Ansel supplies poultry for three big freezers. Hazel is national secretary-treasurer of Cow Belles and helps with E Bar records.

BELOW: "All summer we put it up and all winter we pull it down," says Ross Haase, left, to Buck Halligan. Meadows, naturally subirrigated, and 100 acres of alfalfa supplied 50,000 bales in 1957. Another 180 tons made 30 stacks. Bunched hay saved E Bar cattle in 1949 blizzard.





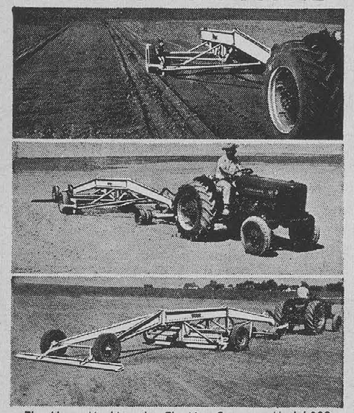
ABOVE: Fourth generation of E Bar family, Rossell Haase and Harrison Halligan, love to ride together. They are shown in the meadow fenced off for Harrison's 11 purebred cows and heifers.



BELOW: "Will we let those calves go at 26 cents or hold 'em a week?" That's the question as partners Dora, Buck, and Ross meet in Mrs. Wisner's lovely living room to make big decision. The E Bar brand, one of oldest in Nebraska, is set in stone fireplace.



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WITH AN Eversman LAND LEVELER and DIRT MOVER
Greatly Increase
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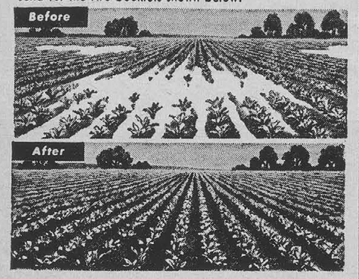
Eversman engineered fields mean more profits for farmers through greatly increased production per acre. Now the average farmer with his own tractor and at low cost can—

1 Shape fields by grading down high spots, filling in low areas and pot holes that gather water and drown out crops.

2 Build farm-over drainage ditches or grass water ways when needed to get excess rainfall off the land quickly.

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There are 7 all purpose (mechanical or hydraulic) Eversman Models for all standard farm tractors... for Automatic Land Smoothing, Dirt Moving and Seed Bed Preparation.



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CONTINUED

It takes grass, guts, give-and-take

was hay to be put up on the home section in Lincoln county. Cattle were waiting to be sold on the 1,300 acres, 50 miles away, near Tryon in McPherson county.

Dora was strongly advised to sell out. Bowed as she was by grief and shock, it took her just a week to make her decision. She was staying.

"I can't describe my feeling, but with my girls beside me, love for E Bar prevailed. Somehow I felt that nothing could shatter us."

Going back into E Bar history, Dora recalled a disastrous 3-day blizzard in March 1913 when 150 of their cows were smothered, leaving only 17 old cows with which to carry on. Dewey had just bought the Lincoln county place. He was counting on cattle to help meet his obligations.

"He said to me," Dora continued, " 'the Lord has left me my wife and little girl (Edith) and that's enough. We'll make it.' I trusted him as always. He was a wonderful hand with stock.

"We were on the upward trail when he died. Edith went one year to Colorado State College at Greeley then declared she was staying home to help ranch. Hazel was then a little girl I tucked under my wing and took with me everywhere.

"Those were the days when we kept two hired men the year round and extra hands at haying time. At one time we milked 40 cows to make ends meet. I can't say I worked too hard, I only led the way.

"When I was left a widow, I resolved never to let myself get harsh or man-like. It was a part of me to keep up personally."

True words these. Dora is the gracious lady, the soft-spoken one who lets the men bid at a cattle sale.

Soon after Edith's return to the ranch, she married Buck. Buck grew up near North Platte, as a boy played in Buffalo Bill's famed barn, now a part of Scouts Rest Ranch. Buck became the cow man.

"During the depression of the '30's," Dora went on, "the north ranch was sold, but we had to take it back 3 years later. Two local bankers, the late Ray Langford and Frank Mooney, had enough confidence in me to go my bond. I was able to buy up other Sand Hills land cheap."

Hazel attended the University of Nebraska and taught a few years. Her first school was old District No. 10 in the Sand Hills (where Dora once taught for $25 a month). Then she married Ross Haase. He had been farm-raised, but was then employed as a mechanic in North Platte.

Hazel and Ross lived in North Platte for 2 years and then came to the ranch to live. The Haases reasoned that since they would share the ranch sometime they wanted to work it and learn it.

Again there was much shaking of heads.

"Yes, you and Buck have made it all right for a long time," the wiseacres said, "but don't press your luck any further. It will never work."

But it has, admirably. Ross is German, Buck is Irish. They are good for each other, according to Dora.

Ross is mechanically inclined, careful with detail. He is the ranch mechanic, the grass specialist.

Buck is more impetuous in nature, more apt to push the job along.

"This is a kind of cattleman's paradise, you might say," Buck told me. "We never seem to have a complete failure. If pasture dries up, there is hay from the valley and



"DRIVING THE PASTURES" to check wells and supplies, or spot critters in trouble is a job close to Dora's heart. Binoculars help scan the vast pastures.

meadow to pull us thru. Just the same, it isn't all sunshine. A cattleman can never look back.

"We try to hold most of the young stuff down here on the south ranch during the winter. I'd say that about half of our cows are kept in the hills the year round. None of our stuff ever sees the inside of a shed. We like our calves here by the end of March.

"All dehorning and castrating is done by the time calves are 3 weeks old. We hold a branding day at each place during May, try to sell cow stuff in July. All feeders are sold off the place. We've always stuck with the cow herd because we believe in it for this part of the country."

Housing on E Bar has been worked out in rather a unique way. The Halligans live in the big house on the south ranch that was built in 1931. An old milkhouse and a honey house were remodeled and combined to make a separate home for the Haases when they came to the ranch.

In 1951, a spacious 5-room wing was attached to the Haase house for Dora.

It was Edith who remarked, "It seems we are always fixing up separate apartments and houses around here, but we don't stay put very well! We're always running in and out and ending up together."

End

"The Original Flail-Type Harvester"

LUNDELL OFFSET CHOPPER

performs 4 Big Farm Jobs for the price of a machine that does just one!

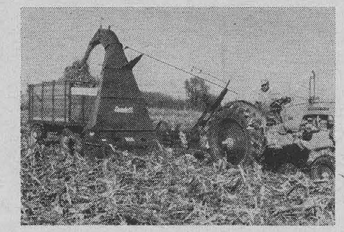


Cut Your Operating Costs and Save Time with This Low-Cost MULTI-OPERATION Machine

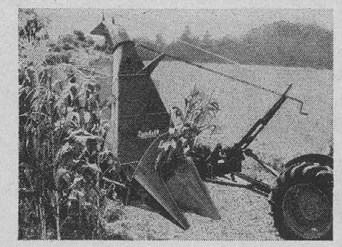
Just one machine — the Lundell Offset Chopper and attachments will do four heavy, important jobs on your farm. You have only *one* cost instead of four. With the Lundell, you can chop grass or row crops for silage or green feeding. You can shred stalks to help improve soil fertility and condition. You can shred a more highly absorbent bedding for livestock. And *in one operation* you can mow, crush and windrow hay — all ready to be picked up. There isn't another machine on the farm today that does so much. That's why more farmers are buying the Lundell Offset Chopper!

Lundell "Flailed-Shred" — The exclusive cutting action of the Lundell Chopper actually lacerates and shreds material. Leaves no sharp edges, packs better in the silo, eliminates chances for air spaces. Shredded bedding has more absorption power. Chopped stalks decompose faster in the field. **Lundell is the original, patented flail-type harvester.**

Here's how the Lundell can do 4 Big Jobs so economically—



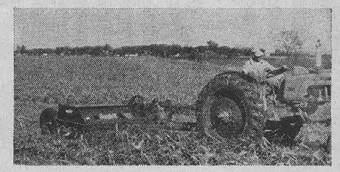
1. As a CHOPPER—Use it for green feeding or to chop grass silage, row crop silage or stalks in the field—or to put up stalks for bedding.



3. As a CHOPPER for ROW CROPS—With the addition of the economical Corn Head Attachment you can put up corn, soy beans, sorghum or any row crop for silage.



2. NEW Addition to Lundell's Multi-Operation System! Low-Cost, Time-Saving WINDROWER ATTACHMENT—Now you can mow, crush and windrow in one pass. Adjustable spout lets you put three rounds into one windrow. With the Windrower and Lundell's exclusive lacerating cut, the machine becomes a hay conditioner. You save time, gasoline and wear on baling equipment or loaders.



4. As a SHREDDER — Just remove spout and you can use machine for mulching or mowing pastures. Shreds stalks and crop residue for faster decomposition. Improves soil condition.

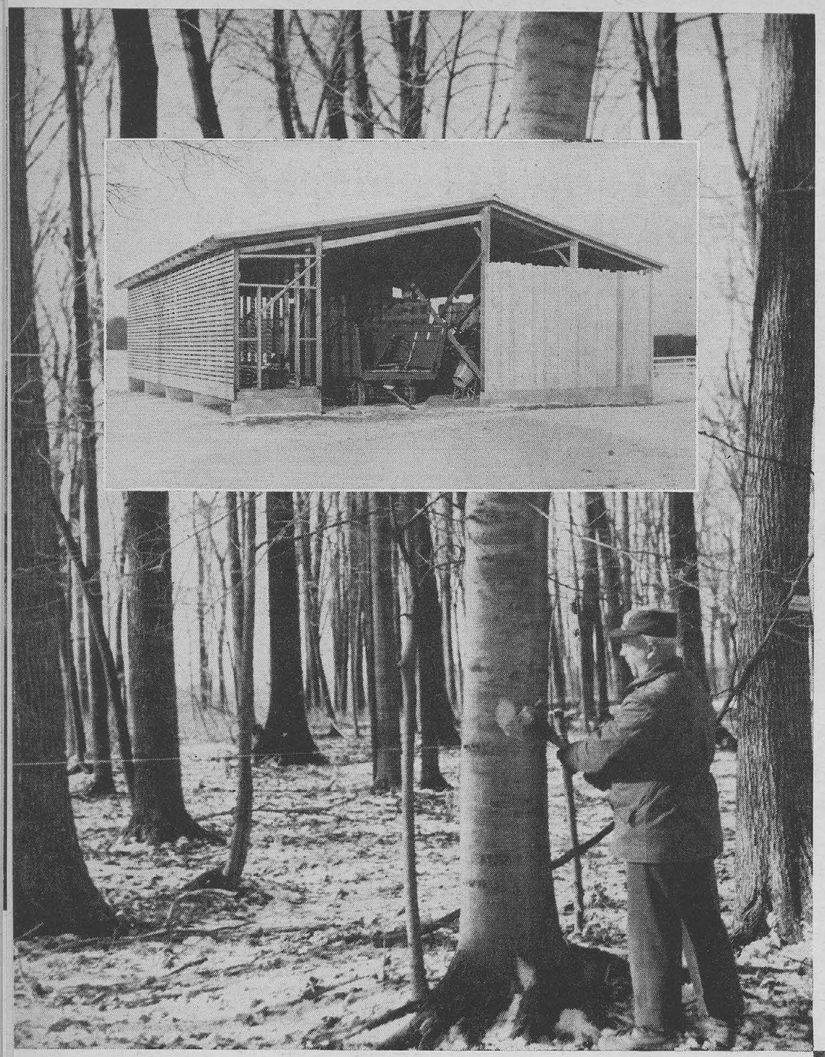
Write today for complete information about the Lundell Offset Chopper. Or see your nearby Lundell Dealer.

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Manufacturing Company, Cherokee, Iowa

Write Dept. C-2



by Norman Reeder
Photos: author

MACHINE SHED (inset) nears completion on the Smelzer farm. It is framed and sided with home-grown lumber from logs too small for real commercial value. Main items in the $700 outlay for the building were: sheet metal roofing, $273; saw bill and millwork to finish siding and door lumber, $180; door hangers and track, $150; cement blocks and mortar used in foundation, $87.

LEFT. Make a bill of materials, and choose the trees you need. Your county agent, extension forester, or custom sawmill operator can help you pick low-value trees that will yield top lumber.

This crooked, small beech will cut two 8-foot logs good for studding. Big basswood will cut a high yield of clear, 16-foot lumber for house siding, cabinet work, any use for which your building plans may indicate pine. If you don't need trees like these, you can always sell the logs to help pay saw bill.

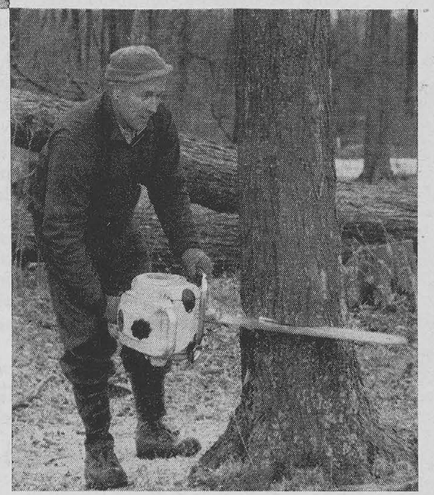
BELOW. Use power at every step. If you don't own a chain saw, rent one or borrow. Or hire the felling done. A chain saw will save time and effort, too, in working up treetops for cordwood. If you don't burn wood, you can sell it. Cut all logs 6 inches longer than you want the lumber. Allow for end checking. Safety note: Drop trees when air is still; even a light wind can upset your calculations on direction tree will fall.

CUT YOURSELF A BUILDING!

Looking for lumber? It may be standing in your wood lot. These tips may help you get good building material from your trees

ON THE FARM of Steve and Bob Smelzer in Medina county, Ohio, there's a new 40- by 40-foot implement shed with corncrib under the same roof. The out-of-pocket cost was only

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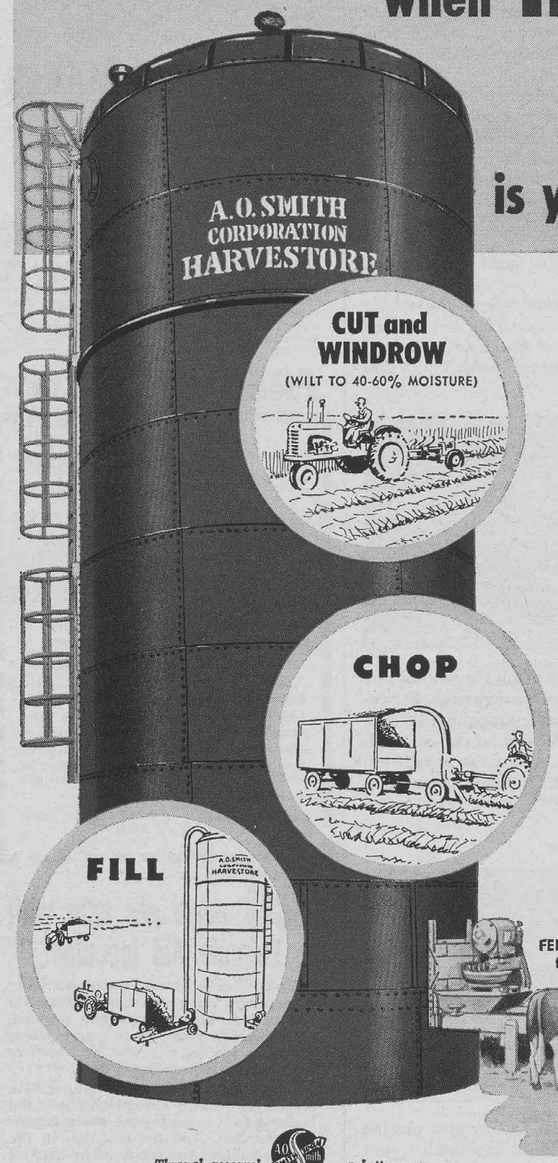


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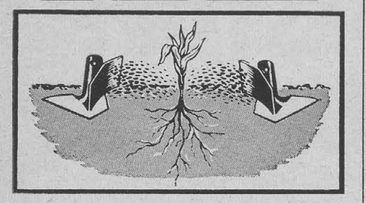
Please send me the "Why Make Hay" and "Farm Profit Plan" booklet. I'm interested in increasing my profits through Vertical Farming.

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NEW LANTZ SWEEPS COVER WEEDS *IN THE ROW*



Eliminate root pruning and throw dirt where you want it

Ideal for both first and last cultivation. Patented sweep deflector on Lantz Row Sweeps throws dirt farther in a more uniform flow—even covers weeds and grass between hills in the rows. Faster cultivating speeds are possible because sweeps can be set farther from row—preventing root pruning. Fit all leading tractor cultivators. Adjust dirt control with simple twist of shank. Proven effective shallow cultivation for corn, soybeans and other row crops. Extra yield from one acre will more than pay for your Lantz Row Sweeps.

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Please send me special field report folder and other illustrated literature on the sensational new Lantz Row Sweeps.

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My favorite Farm Implement Dealer is_____

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. . . if I couldn't get another." That's how Earnest Grimes of Waynesburg, Pennsylvania, feels about his 80-inch cut Wood's rotary cutter. He says, "Never saw anything equal it in cutting brush—cut Locust, Hickory and Wild Cherry 3½" in diameter—walks right through it. Use it for stalk shredding, too." Wood's PTO-operated rotaries mow, shred, and mulch anywhere at lower cost, at higher speeds, with less maintenance than by other methods.

25 MODELS—42" to 114" Cut

42" under-mounted for Farmall Cub, Lo-Boy, Super A, 100, 130 and A-C G. 42" rear-mounted for Fast-Hitch Cub and Lo-Boy. 60", 61" and 80" rear-mounted for larger Fast-Hitch Farmalls (using 3-point adapter), 60" for A-C, D-14 and WD-45, and all standard 3-point hitch tractors (Ford, Ferguson, Oliver Super 55, etc.) and jeep. 60", 61", 80", and 114" drawbar pull-type for any 2, 2-3 and 3-4 plow tractors and jeeps. 80" offset model (2-3 plow) for working under trees. All have free-swinging blades.

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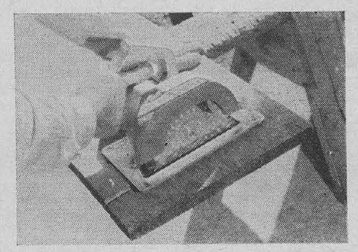
CUT YOURSELF A BUILDING!

$700. The Smelzers didn't win a contest that paid off in building materials. But they did make their own farm wood lot pay off. And they used their own labor and equipment to get out the logs and haul them to a mill. Finally, they did most of the actual construction.

In harvesting timber, the Smelzers selected many small to medium size trees which were mostly unsalable to lumber mills. They air-dried the lumber at home.

Framing lumber went into the structure rough-sawed. Material for siding and doors was planed both sides and center-matched (tongue-and-groove) at a nearby planing mill. Corncrib siding was finished on one side only.

The Smelzers made these cost-cutting shortcuts without sacrificing sound, solid construction. Their building of mixed hardwood is strong and rigid. End



BUILD IT YOURSELF for greatest saving. Use power tools to save work. For extra strength and no splitting, use bolts or drill small holes for nails at ends of hardwood boards. Use square-cut nails if less strength is needed. Or you can blunt nails on a grinding wheel. These drive easier.



CUSTOM-FINISH lumber at a planing mill. Even small mills can fashion your lumber to any pattern. Some idea of variety of patterns shows here in picture of storage bins at a custom mill in Michigan. Here finished materials are exchanged for green logs. Customers don't wait for sawing, drying, and milling. Have your lumber kiln-dried if you use it as hardwood floors, trim, or paneling.

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And Saves You $450 a Year!

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You receive double value on your cover crops when you use LEGUME-AID INOCULANT: bigger crops and nitrogen replenished in your soil . . . as much as $20 extra income per acre for less than 15c per acre inoculation costs.

LEGUME-AID INOCULANT'S patented plastic liner inside the carton allows the bacteria to breathe in cool, moist humus and charcoal. And the moisture in the carton keeps LEGUME-AID INOCULANT ready to use as is, without time-consuming mixing of added moisture.

Look for LEGUME-AID INOCULANT'S attractive cartons on your seed dealer's shelves in the convenient 1 bushel, 100 lb. and 300 lb. unit sizes.

AGRICULTURAL LABORATORIES, INC.
Legume-Aid Division., 1147 Chesapeake Ave., Columbus 12, Ohio

Self-help boar test

FIFTY purebred hog men in 13 western Illinois counties are not asking others to build and operate a swine testing station for them. They're self-starters and they plan to get down the improvement road under their own power.

They poured 3 concrete slabs, each 200 feet long and 17 feet wide, on land donated by Western Illinois University. A 200-foot shed was put on one side of each slab. That will give shelter and outdoor pens for 300 hogs.

Capper's Farmer is glad to see testing take such a turn. One of its articles was the first to advocate boar testing units such as this. (See "Let's Start a Boar Testing Station," *Capper's Farmer, December* 1953.) Acting on the suggestion, the Forrest Swine Improvement Association, Forrest, Illinois, within a week, started the first such station in this country, possibly the first one anywhere.

Last summer there were 13 such stations in Illinois. Those who benefit pay the bills.

Standards for the new unit have been set high. The station will not accept pigs unless they are from a litter that meets production registry requirements for the breed. They must arrive at the station 60 to 65 days old. Two boars and a barrow will be fed out from a single litter. That will give no chance to put in the big growthy pigs from several litters.

Each boar will be fed out in a separate pen 5 feet wide. That will give accurate feed data for each.

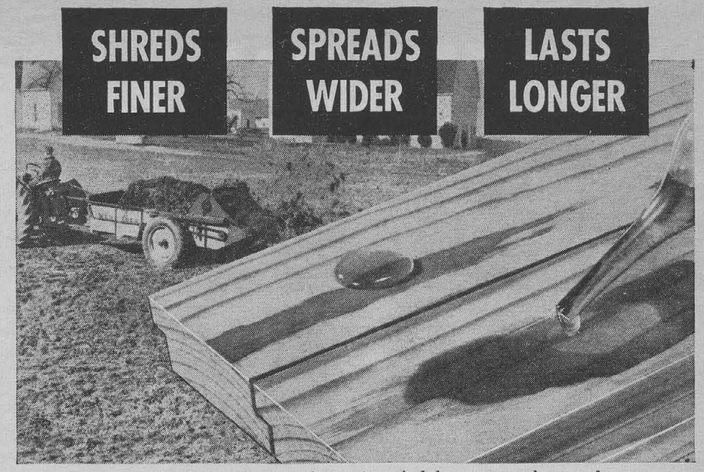
The barrows will be grouped five to a pen and will be butchered for carcass data at 190 to 210 pounds. With each pen containing 85 square feet, it is felt that it may be desirable to put two boars to a pen later to double the number that may be tested.

Those who got together to set up the station paid a $100 membership fee. Banks, feed companies and others who want to promote the hog business are making donations to help the project along.

The farm manager for a bank in Macomb, Illinois, where the station is located, has been hired as secretary-treasurer. A full-time station manager will work under the direction of the board of directors. Robert Beatty, Avon, is president and Eugene Woods, Good Hope, is vice-president.

Breeds owned by those putting up the station are Hampshire, Duroc, Landrace, Poland China, Spotted Poland, Chester White, Tamworth, and Berkshire.

There was a waiting list of eight breeders who wanted in by the time the buildings were up. Loren K. Robinson, animal husbandman at the university, adviser to the group, says another unit may be added if the waiting list continues to grow.



One way NEW IDEA adds years of spreading. At left, water stands on surface of water repellent Penta-treated board. At right, untreated board absorbs moisture. This NEW IDEA treatment assures longer, rot-free life.

The Spreaders With Built-In Extra Years

Good reasons why successful farmers prefer NEW IDEA spreaders

For nearly sixty years, NEW IDEA spreaders have been first choice of experienced farmers because they last longer, do the best job.

Last longer. Today NEW IDEA spreaders are built to rigid standards after being tested and re-tested to the breaking point on the NEW IDEA torture track. On-farm testing proves both long life and performance. With NEW IDEA spreaders you have lower upkeep, many added years of spreading service.

Spread better. Every NEW IDEA spreader shreds finer because the blade-like U-teeth are triple staggered to tear up the manure thoroughly. Famous NEW IDEA replaceable paddles are scientifically designed to slice through manure and deliver a wider, more uniform pattern.

Most popular. Experienced farmers know there's nothing like a NEW IDEA spreader to help them do a better job of soil conditioning. That's why more farmers use NEW IDEA spreaders than any other make.

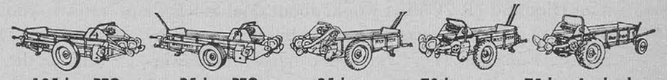
Extra years are added. Sturdy "A" hitch, of deep formed steel members extends back and ties into the main frame for extra stability and support.

Extra years of slam-bang loading. Heavy gauge steel flares strengthen box, withstand shocks of mechanical loading.

Extra years added to business end. Larger tubular distributor shaft is stronger and takes shock loads with less danger of damage.

Extra years of built-in strength. Rugged, one-piece steel endgate helps resist twisting. Protects against hydraulic loader damage.

See the newest NEW IDEA spreader at your NEW IDEA dealer's.



125-bu. PTO | 95-bu. PTO | 95-bu. | 70-bu. | 75-bu. 4-wheel

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Dept. 383, Coldwater, Ohio

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DECISION

WHAT'S HAPPENING ON THE WASHINGTON SCENE TODAY THAT WILL HELP YOU PLAN FOR TOMORROW.

by Jay Richter CAPPER'S FARMER *Washington Correspondent*

Some big money hangs on the outcome of the dairy support fight. Benson's slash in props, if it takes effect as scheduled on April 1, will mean about 25 cents a hundred less than now for factory milk and a 2½-cents-a-pound drop in butterfat.

Over-all loss to dairymen will be $250 million a year, claims Mike Norton, Secretary, National Milk Producers Federation. "The dairyman must look to Congress to ease the squeeze," says Norton.

Norton says it is wishful thinking "to suppose the President will turn Benson around" as he did 2 years ago. In 1956, also an election year, Ike raised dairy supports after the Secretary had announced they would be lowered.

"That time the Department's announcement was not cleared in advance with the White House," Norton told *Capper's Farmer*. "This time it was."

Dairy state Republicans and Democrats are joining forces to back legislation which not only would maintain supports but increase them by about 25 cents a hundred for factory milk.

The suggested increase, however, is strictly for bargaining purposes, legislators confide. The objective is to keep props where they are now. Even this in face of a veto would be difficult.

One almost certain result of the Secretary's latest dairy move will be serious consideration of a new "self-help" program. (See "The farm outlook from Capitol Hill," page 106.)

Administration-sponsored legislation already introduced by Senator Capehart (R., Ind.) and Congressman Hiestand (R., Calif.) would about double REA's present 2 percent interest rate. The bill is opposed by Senator Fulbright (D., Ark.), chairman of the powerful Senate Banking and Currency committee.

The committee will hold hearings on the bill, Fulbright said, but indicated it has small chance for passage because it would put "more burdens upon the farmer" at a time his prices are low and costs rising.

Should REA be taken out of the USDA? Some electric co-op leaders have been talking up this idea since last summer when Secretary Benson ruled that all REA loan requests of more than $500,000 must be cleared by his office.

Legislation to make REA an independent agency may be introduced, but is not expected to pass. Leaders of the electric co-ops' national association are leery about pushing such a bill. They fear it would be amended by Administration forces in such a way as to curb generation-transmission loans and hike REA interest rates.

Man can and will some day control the weather. So says the Federal Advisory Committee on Weather Control, headed by Captain Howard T. Orville. Basic studies of the atmosphere, the committee believes, will reveal ways to control "weather patterns" over large areas. Not only could we then influence rain and the winds, but also temperatures, bringing heat or cooler weather to growing areas, according to need.

We have barely scratched the surface of vast possibilities, says Orville. Lawmakers will urge the government to put more money and brainpower behind weather control research.

Social Security payments going up? It could be. Talk of a 5 to 10 percent increase in benefits is being taken seriously on Capitol Hill. Many lawmakers are anxious to "do something for the old folks" because it is an election year—and the life span of voters has been increasing dramatically.

Benson's status in the cabinet remains an active subject of conversation in Washington. Administration insiders now tell you—altho not for direct quotation—that the Secretary will be kept on thru this congressional session. If he fails to get anywhere with the lawmakers, and farmer complaints continue, the plan is to accept his "resignation" before the fall elections.

A new agriculture secretary could not change things overnight, if ever, it is admitted. But, as one Republican put it: "The psychology might have desirable effects." And a new top hand at the department could take one or two dramatic actions calculated to have appeal, such as a program of direct government purchase of live hogs.

Are fewer farmers the answer to agriculture's ailments? Some folks here appear to think it is, but economists who have reviewed U. S. Census figures are skeptical. They point out that you could move 40 percent of the nation's smallest operators off the farm, but cut production only 5 percent. That could help considerably since our over-all surplus is only about 4 percent of total production.

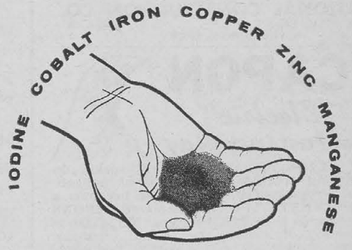
But many of the cutbacks would come in the wrong places, say the economists. And small farms as well as small farmers also would have to be retired. Otherwise larger operators would take over the land and simply add to our present surplus load.



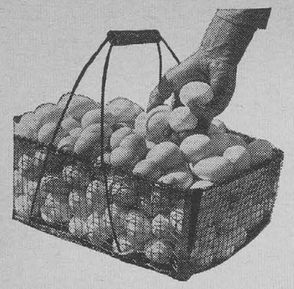
At pickup time you know for sure that Morton Trace-Mineralized Salt helps your feeding program pay off...

Even if you use other minerals, Morton T-M Salt increases feed efficiency so that all your other feeds do a better job. Thus, you end up with lowered feed costs and with more milk, meat and wool to sell. That's because your animals stay healthier and gain faster when they get essential trace minerals in their salt every day. Morton T-M is a superior product because only top-quality compounds proved by research are used as the sources of the trace minerals.

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In the bag with the big blue Pilot Wheel
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EARLIANA TOMATO



"KING OF THE EARLIES"
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BUYERS CAN GET EGGS from Harry Hard's machine at any hour, day or night.

Machine sells his eggs

by Verne L. Garrison
Photo: Elmer Shaw

LIKE to sell your eggs at retail prices? "Sure," you say, "but it takes too much time."

Harry Hard, poultryman in Larimer county, Colorado, sells at retail. Often he may not see the customer! At the suggestion of Dr. Henry Hudeck and others at the Colorado Agricultural Experiment Station, he bought a refrigerated egg-vending machine.

Hard's poultry farm is on the outskirts of Ft. Collins. "I keep about 5,000 layers," says Hard, "and still sell most of my eggs wholesale to Denver. "But the machine is getting me a good retail price for 175 to 200 dozen a week. I put only AA Large and AA Medium in the machine, which will handle only two sizes. The large bring 60 cents a dozen.

"I am ready to try an idea that should widen my market.

"Here it is: I am placing near the machine in daylight hours other eggs of both small and jumbo grade, with prices marked for each.

"Close by, will be a box from which to make change. That puts the buyer on his honor. It makes it possible for him to buy if he lacks the change.

"In the past, about 10 percent of the buyers lacked change and had to come to me to get it or go away with no eggs."

Hard bought his machine about a year ago. One of his big problems was deciding the best place to put it.

"I thought about placing it at a gas station or an outdoor market but decided to keep it close by, at least long enough to see that the machine operated right. I'm glad that I did now. I believe customers associate noise from my layers with the idea of really fresh eggs. And they are fresh, too. Even tho the machine is refrigerated, I never sell an egg that is more than 48 hours old.

"Most of the eggs go to repeat customers. But new ones are added each week. Rainy weather hurt sales the first month. I averaged only 40 dozen per week. People became aware of my 24-hour service. In 2 months sales were up to 75 dozen a week.

"Part of my increase came from advertising in the local newspaper.

"I had no real trouble with the machine," says Hard, "outside of a few loose bolts and some minor adjustments in the coin mechanism. In rainy weather, tho, the cardboard cartons swelled and sometimes stuck in the machine. I trimmed them down and put wax paper between to help them slide out. I have had no trouble since. But I am working with the company that makes the machine to develop a better carton.

"Even with the time I need to trim down the cartons, it still takes only a half hour a day to carton the eggs and load the machine. I check it twice a day to see how sales are going, but the rest of the time I can forget about it. It is a salesman all by itself."

The machine has a capacity of 120 dozen. It automatically vends in the popular carton, either Large AA or Medium AA grade eggs according to customer's wants.

The coin mechanisms, which can be changed by a simple screwdriver adjustment, permit any selling price up to $1.10 with any combination of quarters, dimes, and nickels. The machine requires a 110-volt outlet for operation.

There are close to a dozen egg-vending machines for sale. They vary in size from 40 to 200 dozen. Prices range from $800 to $4,000. Almost all of the manufacturers offer their machines on terms with one-fourth down payment.

Ted Hartung, extension poultryman at Colorado Agricultural Experiment Station, says: "A good feature about egg-vending machines is that their use allows the farmer-poultryman to sell his eggs retail during busy summer months.

"The quality of store eggs is lower in the summer than at other times of the year. So people look to the farms for fresh eggs. A poultryman who sells retail at this time of year should do a good business." End

289 -EGG AVERAGE
by new SKY-HI 314A

	SKY-HI 314A	CROSS A7	CROSS B1	CROSS B5	CROSS C24	CROSS C52
Mortality 1 to 150 Days (%)	2.3	4.5	2.2	4.5	4.2	3.3
Average Body Wt.—150 Days (Lbs.)	4.02	4.01	4.29	4.02	4.12	4.08
March Egg Wt. (Oz.)	26.2	26.7	25.7	25.5	26.1	24.8
March Body Wt. (Lbs.)	4.5	4.5	4.6	4.5	4.6	4.8
Laying House Mortality (%)	1.4	5.3	2.7	6.6	6.6	7.3
Hen-Housed Production (Eggs)	289.8	274.9	273.7	271.6	276.2	275.1
Feed Per Doz. Eggs (Lbs.)	3.83	3.98	3.96	3.75	3.92	4.04

Swift's new white egg producer tops 107 other layers

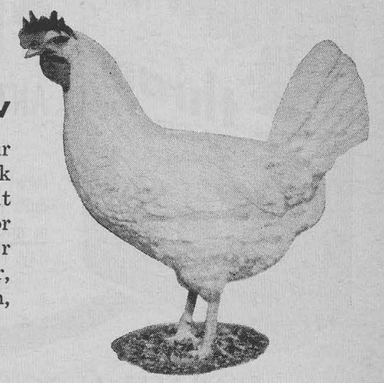
Swift's new SKY-HI 314A topped 107 other strain crosses in recent extensive tests at three breeding research farms thousands of miles apart.

Final results show the SKY-HI Layers averaged 289.8 eggs per bird. At just 30¢ per dozen, this would mean an egg income of $724 from each 100 Swift's Layers.

In the chart above, which shows the records of the top six crosses in the tests, note the excellent feed efficiency, low mortality and the good egg weight and body size of the SKY-HI 314A.

SEE YOUR SWIFT CHICK DEALER NOW

Before you order chicks for your flock, ask your Swift Chick Dealer for full details about the new SKY-HI 314A—ideal for either floor or cage flocks. For the name of the nearest dealer, write Swift's Hatchery Division, Chicago 9, Illinois.



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stays tight...no sag or bulge

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TRADEMARK

ANTI-PICKING SPRAY

New! Easy, economical way to curb cannibalism. Spray flocks in minutes—picking ends next day. Non-irritating, non-toxic to poultry.

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POULTRY

Floor flock or hens in cages?

ARE YOU debating whether caged layers or a floor flock is best? Then you'd be interested in visiting Mr. and Mrs. Mark Hund. They have both at their farm in Wabaunsee county, Kansas. The cage house is 30 by 80 feet and has room for 1,680 hens. The floor building, 40 by 70, houses 1,400.

Right there, you may think, cages hold the edge—280 birds more in 400 square feet less space. But wait. There are two decks of cages in the smaller house. The dropping boards under the top deck have to be cleaned once in 2 weeks. The other house is cleaned once a year.

Feeding in the cage house also takes more time. So it goes. For each claimed advantage of each system, there's an offsetting factor.

Caged layer feed costs more a ton. But it's the high energy type, and it does a bigger job. The feed cost per dozen eggs may be a little less for hens in cages.

Some claims for cages won't stand up, the Hunds say. Take egg handling.

"Cage eggs aren't clean," Mrs. Hund said. "I wash every egg laid by both flocks."

Hund picked up several cage eggs. Half of them had stains. Washing might be easier for cage eggs, for none are broken to smear other eggs. Special cleaning is needed to remove yolk from shells.

Another claim for cages hasn't stood up. Rate of lay isn't higher in cages for the Hunds. They can't beat 62 to 65 percent production for a year in the cages.

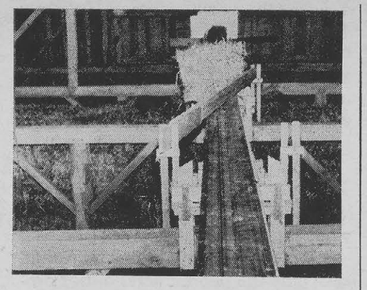
They feel they might get more than 80 percent from a new pullet flock for 7 months or longer, but you have to renew a cage flock gradually, and it's the newly added hens that haven't yet started to lay that cut down the average.

"We haven't found a way yet to fill the house with hens that start laying as soon as they go in," they told me. "We brood four times a year, and we ought to do it at least six times. That takes more work than brooding once a year for the floor birds."

Big edge for cages at the Hund farm is a higher price for eggs. They have a hookup that spells out the prices they are to receive. Around the first of the year, they were getting 2 cents more for the cage eggs. That's about 4 percent. The biggest spread was 12 cents a dozen when eggs were low.

Extra egg money is needed. They built the house by plans put out by the egg buyer, and the cost for the electric ventilators, insulated building, and cages was high.

Then there's the electric bill. It runs around $1 a day in winter when it is lowest. And it mounts to $2 a day in summer for the egg room and the ventilators.



DEFLECTOR BOARD in slots pushes bales off conveyor into mow. Board is moveable—dumps bales anyplace in mow.

Mow conveyor cuts haying labor

Photos: Schaal

ELIMINATE at least one man's labor at haying time with a conveyor in your haymow. Charles Grube, Licking county, Ohio, built this one from junked parts. He says it paid for itself in two years by cutting labor and speeding haymaking.

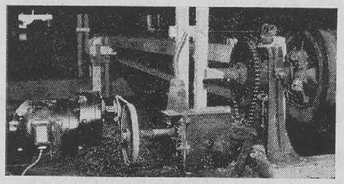
One man outside loads bales on a conventional elevator. The conveyor dumps them into the mow where one man handles the bales easily. It used to take at least two men in the mow.

Key to the system is the moveable deflector board shown above. It fits into a slot—pushes bales off the conveyor into any area of the 36- by 70-foot mow. One man can stack them as fast as they come in.

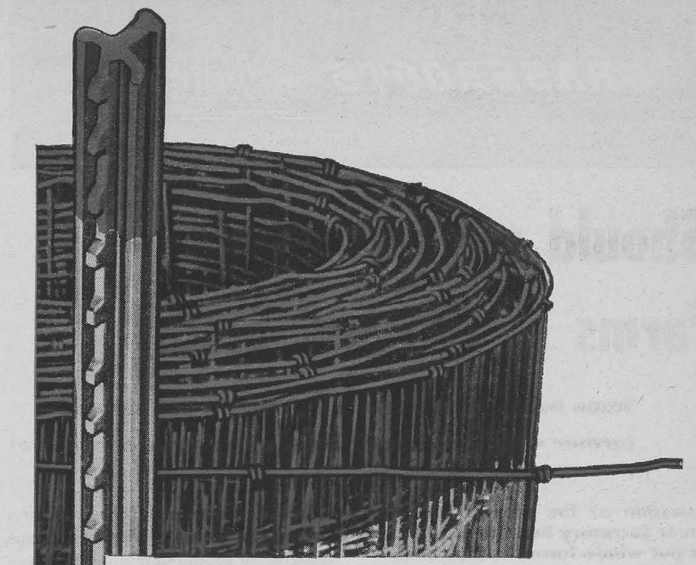
Grube's conveyor takes four or five bales per minute. That's faster than the elevator can send them up. Using this conveyor and one portable elevator, Grube puts up 4,000 bales each season. And he never moves the elevator outside.

He first built slots for deflector boards over each of the three areas in his haymow. Then he installed the 56-foot conveyor. It is a 12-inch-wide belt riding on rubber rollers. A ½-horsepower electric motor geared to a junked auto transmission drives the belt.

The old transmission has three forward speeds plus a reverse. That lets Grube run the conveyor backwards and take bales out of the mow for winter feeding.



ELECTRIC MOTOR at left drives conveyor thru old auto transmission and drive chain. Reverse takes bales out of mow.



DOUBLE* guarantee of quality

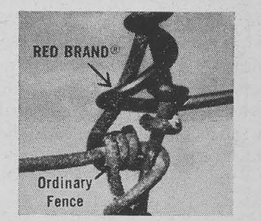
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To farmers everywhere, the name of Red Brand means top quality. It means fence that gives you valuable years of service. Just the right amount of copper is used in Red Brand wire. Red Brand is easy to handle, yet withstands livestock abuse far longer than ordinary fence.

But best of all, Red Brand fence is Galvannealed. *Only* Red Brand undergoes this exclusive Keystone process. Galvannealing doubly guarantees Red Brand quality by fusing rust-fighting zinc deep into the wire.

You get the same quality guarantee with Red Brand barbed wire. Red Top Steel fence posts also give you equal value. Look for the top red wire and the new metal sign identifying Red Brand fence.



This unretouched photograph taken on the Paul A. Nobbe farm, Waterloo, Illinois, shows the difference between Galvannealed Red Brand and another fence after eight years of use. Each roll of fence was new when spliced together. Today, you can see Red Brand has kept its top quality.

Look for the RED BRAND Quiz in next month's issue of this magazine.

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GRASSROOTS WIRE

Should we put whole farms in the soil bank?

Some believe it's worth a try; others say it adds further weight to heavy hand of government control

Question of the month: Do you favor Secretary Benson's test plan to put whole farms in the conservation reserve and increase maximum payment on any one farm to $10,000 as a quick means of reducing crop surpluses?

SENTIMENT for and against Secretary Benson's four-state test of putting whole farms in the conservation reserve is about evenly divided in replies to Grassroots Wire.

Robert E. Johnson, Jr., of *Vermillion county, Illinois,* thinks the plan is the best one so far proposed to reduce farm output. "It would appeal principally to owners of marginal farms that were brought into production by incentive payments during the war," says Johnson. "Removal of these farms from production, I believe would reduce crop surpluses substantially."

Another who believes putting whole farms in the conservation reserve would definitely reduce surpluses is George McHugh, *Nelson county, North Dakota.*

"Owners should be required to continue living on the farms," McHugh wires, "in order to stabilize rural communities. Payments should be geared to cost of living as well as agricultural income, so that co-operators could share in the increased farm income they might have helped create."

Operators as well as land should be taken out of production, in the opinion of Kermit Lewis, *Newton county, Missouri.* "I favor leasing whole farms and raising the maximum payment to $10,000 if the law states the farmer and/or his wife cannot actively engage in any type of farming operation during the period of the lease," Lewis wires.

Leo H. Hostetler, *Harper county, Kansas,* would like to see whole farms taken out of production and put in legumes. "It is better to store surpluses in fertile soil where they can be drawn upon as needed than to put them in bins where they will spoil before they are needed," Hostetler observes.

Urges compulsory compliance, too

"The plan is feasible if it is backed by compulsory compliance to acreage control on all crops in surplus," wires M. R. Lay, *Clay county, Nebraska.* "If the plan is to be the solution, maximum payment should be raised to $10,000 to give it a workable base.

"In turn Benson should guarantee that corn and wheat will be supported at present prices, and that acres placed in the reserve will be deducted from the national allotted acres and not be resubmitted to noncommercial acreage."

A. C. Mustain, *Boone county, Missouri,* sees these two advantages in the "whole-farm" plan: (1) It would eliminate the substitution of other feed crops such as barley and grain sorghums; (2) it would do away with the 15-acre free wheat fields which each participating farm is now entitled to even tho it has no wheat base.

"Anything is worth trying before we have compulsory controls," says Robert Rees, *Lapeer county, Michigan.* Rees thinks the "whole-farm" idea would eliminate some of the undesirable practices that have developed in the acreage reserve.

He's in favor of running the test, but he wants a close check on results to see how much surplus reduction per dollar we get, says Alton Rysdahl, *Yellow Medicine county, Minnesota.*

Payments would have to be large enough to induce marginal farmers to make a permanent shift from farming, Rysdahl believes. "Too many farmers are not making an adequate living, but still produce enough to create an overall surplus," he observes.

Most objectors to the "whole-farm" idea think it would fail in effecting real reduction in farm output because it would attract only the poorer land.

Payment of $7 to $11 an acre would take only the poorest acres out of production in his area, Rhoda Chaloupka, *Custer county, Nebraska,* wires. However, he thinks the plan might get reduction in wheat in the Great Plains.

Scheme to control farmers

"It's nothing but a last-ditch move to control farmers and another of Benson's schemes to reduce farmers to a still smaller minority by moving tenants off farms," declares Ben F. Conrady, *Logan county, Illinois.*

"If Benson is sincere here is a simple plan that would do the job: 1. Remove government ACP payments. 2. Put one-fourth of farming ground in legumes and keep it idle. 3. Allow a maximum of one-half the remaining acres in corn. 4. Reduce the huge ASC and PMA staffs which drain the agricultural budget with farmers getting blamed."

"Tenant farmers would be forced off farms and into cities where jobs are scarce now," warns Harry W. Crisman, *Charles Mix county, South Dakota.*

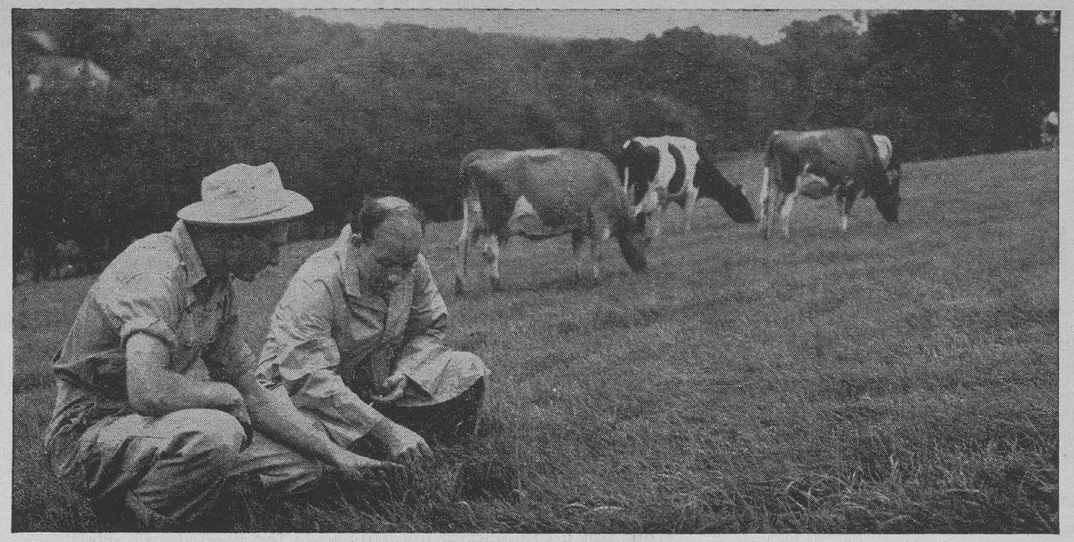
"In our locality 95 percent of farms are too small to draw a payment large enough to provide a living unless acreage payments are increased," wires Crisman. "Conservation reserve benefits only the owner with a lot of marginal land or a wealthy retired owner who is looking for more easy money."

"Experience proves that the only way to reduce surpluses is to cut bushels, not acres," says Owen W. Temple, *Harper county, Oklahoma.*

"I favor allotting each farm a specified number of bushels to sell at a guaranteed fair price. All excess would be the farmer's responsibility."

The plan wouldn't work for a dairyman, in the opinion of John Ruemmele, *Saint Croix county, Wisconsin.* He couldn't put his cows and equipment on standby. Neither could he find income for his family in the oversupplied labor field.

"This plan could be a bonanza for the speculative landowner in the large acreage areas," says Ruemmele. "The renter could be sent into the labor pool and the land split up into units, with each unit eligible for $10,000."



He got a three-way yield from hillside pasture! Grover Schellinger (left) explains the fertilizer and soil management plan that paid off in 5,971 lbs. of milk per acre, plus 310 cow-days grazing (dry cows) plus 500 lbs. of hay. Read below about this money-making plan:

5,971 lbs. of Milk Per Acre From Pasture Too Steep To Renovate:

Spencer "Mr. N" Ammonium Nitrate is part of the simple, 4-step program that produced these amazing results . . .

ON Grover Schellinger's farm near Stitzer, Wisconsin, there's a hillside pasture that's nearly knee-deep in bluegrass . . . pasture that produced close to 6,000 pounds of milk last year. It's beautiful, productive land. But it wasn't always that way.

Just a couple of years ago, this pasture had reached the point where it "wasn't much better than an exercise lot." And it was too steep to renovate. But Mr. Schellinger went to work on it.

He followed a simple, four-step management program and got some results folks are still talking about:

In one season, that pasture produced 5,971 pounds of 4.5% milk, plus 310 cow-days grazing (dry cows) per acre. And, this same land yielded 500 pounds of 17.5% protein hay per acre!

How did he do it? Here's Grover Schellinger's four-part program:

1. Soil test.
2. Fertilize according to the soil test report.
3. Rotation grazing.
4. Clipping following grazing, and fertilizing when production dropped or a soil test showed the need for it.

Mr. Schellinger will tell you that a big part of the success of his management program was applying the fertilizer his land needed.

He applied 500 lbs. of 0-20-20 and 250 lbs. of Spencer "Mr. N" Ammonium Nitrate in August of 1955. In April of 1956, he applied 265 lbs. of Spencer "Mr. N" per acre, followed by another 140 lbs. in July, and 235 lbs. more in September.

Last year, Mr. Schellinger applied three applications. The record to August 25 was 5,585 pounds of milk, with the prospect of grazing for two or more months!

With results like these, it's easy to see why Mr. Schellinger is going to stick to Spencer "Mr. N" Ammonium Nitrate as his source of nitrogen.

Spencer "Mr. N" pays off big on other crops, too. For example, agronomists tell us that on wheat, 40 pounds of Nitrogen has produced an average of ten extra bushels per acre! What's more, the earlier you apply "Mr. N", the more your return should be.

If you grow corn, don't forget that a Spring plow-down of Spencer "Mr. N" is the easy way to get bigger corn yields — even in dry years!

Here is why "Mr. N" is the Midwest's largest-selling brand of ammonium nitrate:

While there are many different sources of Nitrogen, Spencer "Mr. N" Ammonium Nitrate gives you certain extra advantages:

"Mr. N" is easier to handle — it's made in round, uniform prills that won't cake or clog your spreader.

Spencer "Mr. N" is guaranteed to flow freely, even after a full year's storage under proper conditions. That's because "Mr. N" is packed in polyethylene-lined bags for 100% dryness.

This year, do as many of your neighbors are doing and switch to Spencer "Mr. N" Ammonium Nitrate.



Get all the Nitrogen you pay for! Apply Spencer "Mr. N" Ammonium Nitrate Fertilizer. You can see it, feel it, even weigh it. And "Mr. N" is guaranteed a full 33.5% Nitrogen. No waiting for custom application. You apply "Mr. N" with your own equipment! Spencer Chemical Co., Kansas City 5, Missouri. (ADVT.)

MORE MONEY FROM MORE TESTS!

It costs more these days to guess wrong. Both private and state laboratories provide a growing number of services to take the guesswork out of your operations

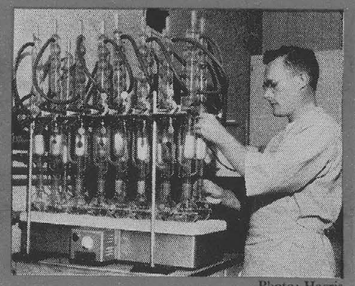


Photo: Harris

HOW MUCH CAROTENE in hay or silage? This battery of extractors—a small part of one laboratory's scientific equipment—will give you an accurate answer.

by Clyde Zimmerman

EVERY farming enterprise has now definitely graduated from the "by guess and by gosh" class. "Either you are being scientific everywhere along the line, or you are lost, economically speaking." I heard a college farm management specialist make this statement; it is hard to dispute.

How can you be more scientific? The road is well marked. Thousands of dairymen have proved that you can't beat cow testing to improve herds and production. For hundreds of thousands of farmers, soil testing is routine. These men wouldn't think of trying to farm without a thoro report on what their soils need to produce crops.

The next step is to apply this same procedure to other phases of your business. But once-over-lightly management neglects to go even as far as soil testing. Yes, let's face it, even such a basic practice as this is skipped by some farmers. And we're just beginning to make real use of other kinds of testing.

If you test soil, why not test feed? It makes sense to Broer Immega, Walworth county, Wisconsin. He knows that feed makes up 60 percent of the cost of producing milk. So it follows that one sure way to cut his costs is to do a better job of feeding dairy cows.

Immega milks 80 cows, and he relies heavily on home-grown roughages to cheapen milk production. He says:

"There is one time when your forage is really ready for harvest. If you can somehow get it cut then, and get it into your buildings, you have taken a giant step toward cutting your feed costs."

So Immega strives, not just in a grassland farming way, but in a "young grassland" approach, to get his roughage at peak of quality and nutrients. He cuts grass when young and tender.

And he doesn't stop there. He wants to know how good his feed is. So he sends samples of hay and silage to a commercial laboratory. The lab sends back a report. Immega knows just what is in the forage, and how to supplement it so that he gets cows fed economically for high production.

Such tests cost little, and they can save you a lot. James Fellows, Nobles

CONTINUED

What can a commercial laboratory do for you? Here's what a private testing service in Nebraska told *Capper's Farmer:*

WE RUN TESTS on silage to determine the total dry matter, protein content, fats, fiber, nitrogen-free extract, mineral matter. We also check for Vitamin A and proteins.

We can test alfalfa for carotene, vitamin A and proteins. And we analyze sugar beets for sugar content.

In checking soil samples we determine the pH (acid or alkali content), amount of soluble salts, phosphate, potash, nitrogen, magnesium, aluminum, and sulfur.

In the test on leaf analysis, we take the plant during its growing process and test it to see which nutrients are being utilized. Therefore we find out which nutrients in the soil are available.

Our trace element test is an extensive check. We test fertilizers, well water, and irrigation water.

Here are tests one state university makes:

OVER THE PAST 5 YEARS, we have tested and analyzed more than 10,000 water samples. Some samples sent us are polluted from oil wells, refineries and mines. Polluted streams and ponds also need to be tested to determine whether the water is fit for human consumption.

The widespread use of insect sprays, weed killers and defoliants has created a growing demand for testing food and farm products for toxic residues. Farmers often ask that feed mixtures be tested for nutritional value or for poisonous contamination.

We have soil testing laboratories in each of the counties, and tests are made thru the county agent's office. Special problems in soil testing are referred back to the university; tests are made here and results sent back thru the county agent or directly to the farmer.

Water is analyzed to determine whether it is fit for irrigation.

University specialists test for plant diseases and poisonous plants, free of charge. Sometimes they go out into the state to inspect plant diseases and counsel with growers and agents. Many farmers send in weeds to have our men determine whether they are poisonous.

Our entomology department receives an average of 5 letters a day asking help on identifying insects. Farmers send in specimens, either in a small bottle of alcohol, or in the case of hard-bodied insects, in a box which prevents crushing. Our department of veterinary medicine handles questions from livestock farmers on a somewhat similar basis.

Some of these services are free, and others must necessarily carry a nominal charge.



Bob Holub, Firestone Dealer, delivers a "loaner" to Fred and John Ullmann.

"WITH FIRESTONE FREE LOANERS WORK TIME IS NEVER LOST,"

say Fred and John Ullmann, Johnstown, Colorado

Firestone's FREE LOANER service makes a big hit with Fred and John Ullmann, who rate high among Colorado's leading sugar beet growers. The instant tire trouble develops, a call to their Firestone dealer, Bob Holub of Longmont, Colorado, starts him on the way with Firestone FREE LOANERS to keep equipment rolling while other tires are being repaired or retreaded.

Here is what the Ullmann brothers say about Firestone service: "For our money, you can't beat Firestone on-the-farm service . . . particularly the FREE LOANER service. We never lose a bit of work time because the loaner tires go on the same time others come off the rims, which keeps equipment on the job. It's that special kind of service that sold us on Firestones."

The Ullmann brothers, like the majority of farmers, have found that Firestone service and quality Firestone tires are their insurance against downtime due to tires.

See your Firestone Dealer or Store today. Turn downtime into work time with Firestone FREE LOANERS.

Firestone

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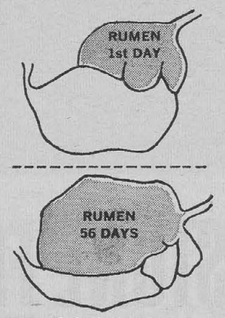
Dry feed, not milk, builds the rumen—

DOUBLE RUMEN SIZE IN JUST 56 DAYS

with Calf Manna, Suckle, and Hay



Calf Manna assists rumen development immediately because it is the only pelleted calf feed built to be fed the day the calf is dropped. *And rumen size is doubled in only 56 days with 42 lbs. of Calf Manna, 20 lbs. of Suckle, and hay.* This means you have a big, roughage-eating calf at 2 months of age for only $7.56 plus your hay and grain – and you'll save double this cost in milk alone!



Only the rumen bacteria digest coarse grain and roughage

EASIEST CALF FEEDING PROGRAM

Calf Manna, fed with colostrum for 4 days; then fed with Albers Suckle until the calf is eating 1 lb. of Calf Manna per day (approximately 20 days); then fed with hay and grain, *develops far bigger, sturdier calves at 50% less cost* than a regular milk diet – and puts them in your milking string *3 to 4 months earlier.*

See your Calf Manna-Suckle Dealer today, or write us for the 40-page booklet on "How to Raise Better Calves."

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ANTISEPTIC OINTMENT

CONTINUED

More money from more tests!

county, Minnesota, thinks the $5 lab fee he pays to check a sample of his hay or silage is some of the best money he spends.

The test gives him a report on moisture, protein, and crude fiber with an accurate estimate on the digestible protein and total digestible nutrients in a sample of hay or silage. Without this knowledge, Fellows thinks he would be operating too much in the dark.

Such tests as those used by Immega and Fellows are routine at many private laboratories, and some colleges do them on less broad scale.

In addition to standard tests, however, you may run into special problems. Here again a laboratory can help you—and perhaps prevent a substantial loss. Here are some examples taken from the files of commercial laboratories:

1. An Iowa cattle feeder lost 35 head of steers immediately after using a new barrel of molasses. Samples of the molasses were tested and an insecticide, parathion, was found.

Further investigation indicated that a supplier had used improperly cleaned barrels for molasses and these had been supplied to the feeder. In a lawsuit, the farmer obtained judgment for damages.

2. A South Dakota farmer suspected that he was being supplied an inferior grade of tractor fuel. He submitted samples to a laboratory, and it was shown that one source of supply was definitely inferior. In fact, this fuel was responsible for his motor maintenance problems.

3. In preparing a tank for 2,4-D spraying of weeds, a peculiar siphoning action was set up in a farm water system. All of the herbicide was siphoned back into the well while the operation was unattended. A laboratory developed a system of treating the well so that the chemical could be removed and the well operated.

4. A Kansas dairy farmer lost a cow, and reason for death wasn't apparent. Examination of rumen material and tissues indicated a high contamination of lead.

Checking around the farmer noted that a large outdoor sign in a pasture had recently been painted. A considerable quantity of excess paint had been dumped on the ground around the sign. Cleaning up the residue saved loss of other animals.

5. High bacteria counts were plaguing a Minnesota dairyman. Bacteriologists were called in. After a thoro investigation, they discovered an unknown defect in some of the milk pipelines which made it impossible to carry out thoro cleaning.

These are special problems, and you may never run into anything of this nature. But if you do, remember there are labs that can help solve the problem.

Where are these services? You probably go to your county lab or state college for soil testing. But there are some commercial labs around the country that also do soil testing. Generally speaking, commercial labs cost more, but give quicker service.

A commercial lab in Nebraska charges $2.50 for the regular soil test and $25 for the trace element test. Some state colleges make soil tests for $1.50 a sample. Some commercial labs say they can't compete with the colleges with this kind of a charge.

Soil tests ordinarily available thru state labs are phosphorus, potassium, acidity, and occasionally, nitrogen. A very few states are giving wide range tests of the other plant food elements.

Some fertilizer manufacturers offer soil testing to farmers. This service varies from portable kits in the dealers' hands to very good central testing facilities.

Along this line, we'll probably do much more tissue testing in the future. It is a good way to check on available nutrients during the growing season. We'll probably see a lot of tissue testing done by county agents, and some of it undoubtedly will be done by commercial labs.

Testing for minor elements will also be much more common than it is now. How slow we are going on this is evidenced by the fact that soils men in one Midwest state do not publicly admit the existence of multiple trace element deficiences in that state.

Seed testing for purity and germination is usually a subsidized activity of the states. This was started to improve the seed being planted by farmers, not only to improve yields and avoid disease outbreaks, but to control noxious weeds.

Because of the seasonal nature of this work, and the low state charges, it has not been an attractive field for private labs. But some seed companies have labs that will take in farm samples.

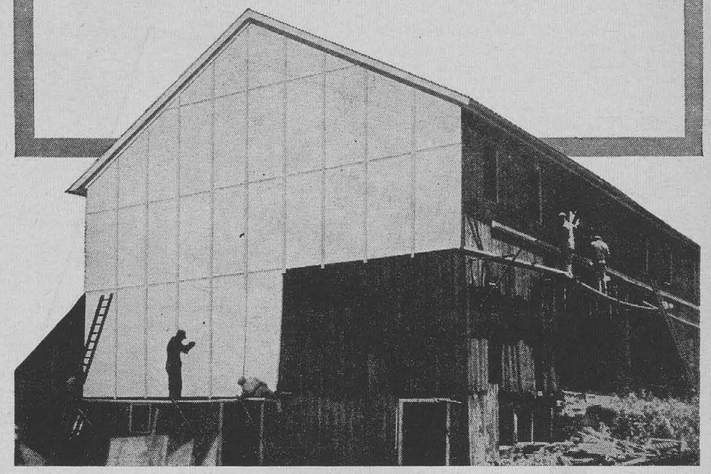
Dairy products are normally purchased from the farmer on a test basis. This is now going beyond the fat test stage. Under the Grade A program some milk plants and municipalities contract the testing and farm inspection with private labs.

The various state departments of agriculture also have labs which concern themselves with many kinds of tests, primarily of a chemical nature. For example, you would probably send a sample of drinking water to your state lab.

You can investigate the laboratory facilities in your area and determine which offers the best deal for tests you want.

Don't overlook the veterinary labs at your state college. Some of these labs try to confine themselves to cases referred by a practicing veterinarian. But usually they won't turn you away—and the service is practically free. **End**

Nothing to Saw! Nothing to Paint!



Two good reasons why more and more farmers are remodeling old service buildings with Ruberoid Stonewall Board . . . it ends the two hardest jobs in re-siding.

Ruberoid Stonewall Board is the *ideal* farm building and remodeling material for other reasons, too.

- **Stonewall is *economical*** – costs only a little more than a new paint job. Farmers testify Stonewall pays for itself in a few years in reduced maintenance.
- **Stonewall is *fireproof*** – all-mineral asbestos-cement content reduces fire hazards to a minimum.
- **Stonewall *needs no maintenance*** – it's rotproof, peck-proof, resists all barnyard acids and alkali. Cuts building maintenance costs to pennies.
- **Stonewall is *easy to apply*** – Score it, snap it, nail it up. That's all there is to it! The big 4 x 8 sheets go up in a hurry. Nothing to saw. Nothing to paint.

See your Ruberoid building materials dealer today. Find out how you can give your farm buildings a fresh new look *and* eliminate practically all maintenance costs.

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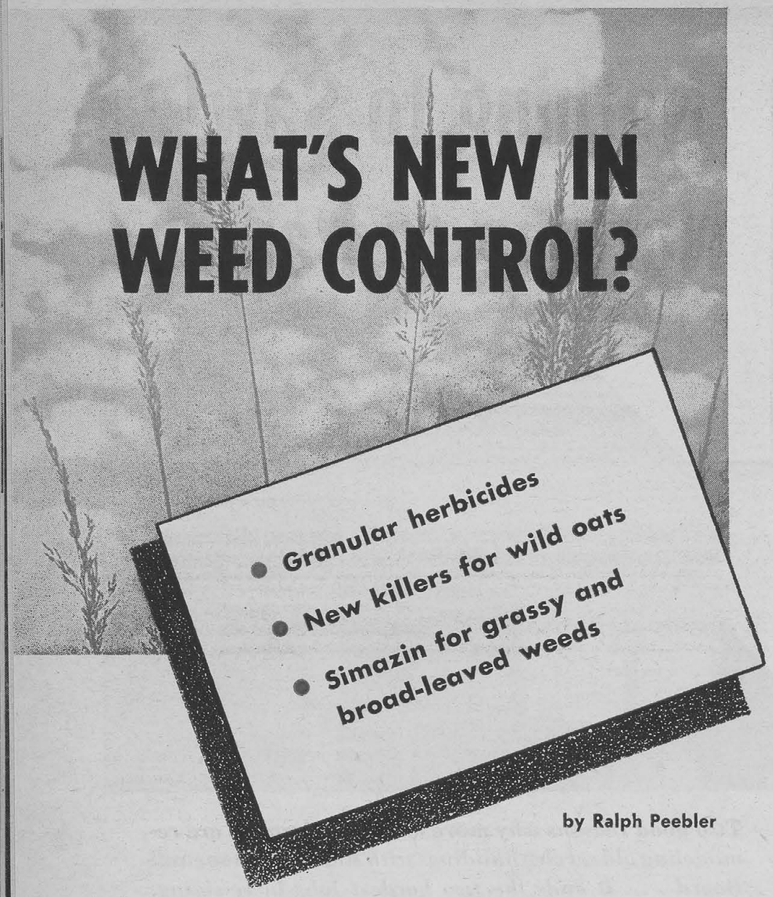
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CF-258



by Ralph Peebler

NEW herbicides and new ways to put them on were described at the recent North Central Weed Control Conference.

Latest idea is applying weed killers in granular form. Old and new chemicals were tested in a host of crops. Weed control generally was as good as spray formulations.

Granules have several advantages:

They're easy to apply. No water to haul, no mixing. Should give you much longer residual weed kill.

You can rotary hoe or harrow them in right after a crop is planted. In one test, a new chemical in dry form was applied with nitrate fertilizer.

If rains come right after granular treatment, you can expect plenty of dead weeds. If the weather's dry—which often causes pre-emergence sprays to be less effective—you can move in and hit weeds with cultivation. The next shower will start granulars working.

Right now, granulars are more costly than liquid sprays. Further, they may be harder to put on evenly in the top few inches of soil. You'll see more work on ways to apply this new weed killer.

Hottest new chemical for use in corn is Simazin. Some 50 weed scientists tested it this past year.

Simazin remains active for at least 6 months. In most tests, 2 pounds per acre have controlled weeds practically all season. Corn and some truck crops were the most tolerant.

It's necessary to apply enough water to carry the chemical down to the root zone where it's absorbed. E. O. Schneider, Geigy Chemical Company scientist, said 2½ to 3 pounds per acre may be needed when used on organic soils.

Simazin also looks good for quackgrass control. Four to 8 pounds per acre have been effective in northern states.

Another new pre-emergence material —Stauffer Chemical Company's EPTC—should find wide use for weeds in corn. Band treatments as well as granular forms have knocked out grassy weeds. Moisture has had little action on its effectiveness, except to slow it down.

EPTC has been effective on wild oats. Six of seven weed scientists reported good to excellent results. Rates varied from 2½ to 15 pounds per acre. Flax, field peas, and certain vegetables showed no harmful effects.

Released for testing last year, Dow M-757 (tetrachlorobenzene) is specific on wild oats. It's a granular material, somewhat volatile. Losses can occur in warm soils. Fall treatments in cool soils in the Red River Valley gave the same control as May applications.

Control of wild oats with 2½ to 30 pounds per acre of Dow M-757 was described as fair to excellent in 9 tests. Small grains, except flax, were injured.

Gibberellic acid is being tested as a possible aid in weed control. Neal Shafer, University of Nebraska, foliar sprayed leafy spurge and ironweed. Idea behind this work is that winter hardiness might be affected by GA.

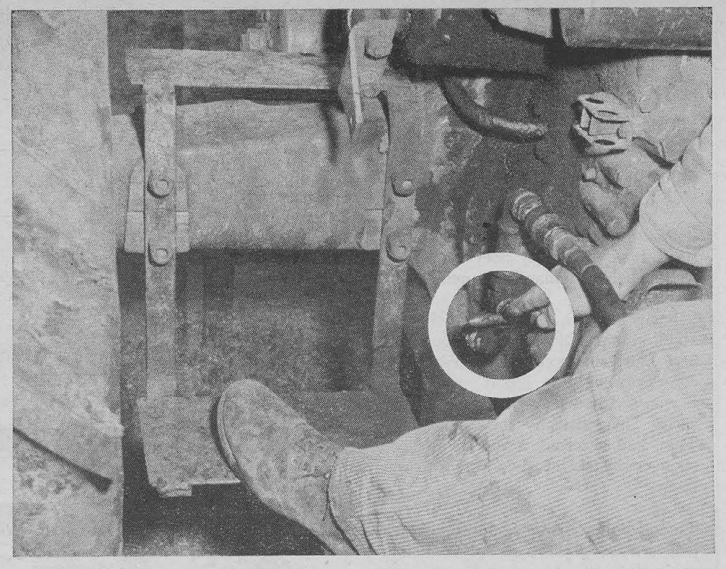
If it is, you might treat certain weeds as they go into the fall hardening period, get active growth, and hope for 20 below zero temperatures to kill 'em off. Or, you could treat in spring and have good growth before you spray with weed killers.

If you've tried bandspraying, results of Illinois studies may help you do a better job. E. C. Spurrier said a nozzle height of 10 inches causes the least wind drift. Metal shields also help cut drift.

Band-spraying attachments mounted behind press wheels worked better than those fitted in front of planter shoes.

Illinois tests show some sort of covering device may be essential for bandspraying. Scientists used a blade to move dirt over the band to seal in the herbicide. A loop of chain dragging behind the press wheel caused less evaporation of Randox and EPTC—especially when applied in dry weather. Covering EPTC tripled weed kill.

Among 6 chemicals tested, Randox in-creased sorghum yields the most in recent Minnesota tests. Treatments were made at the 2-leaf stage and when sorghum was 6 inches high. Six pounds of Randox per acre was slightly better than 4 pounds. Weed growth was mainly grassy weeds. DNBP at 4 pounds per acre, applied at the 2-leaf stage, gave good control of grass and nongrass weeds. **End**



STEP takes the strain out of getting onto his tractor for Victor Bartel. His special hydraulic valve is at the right of step in circle. It gives him more boost on his wagon hoist.

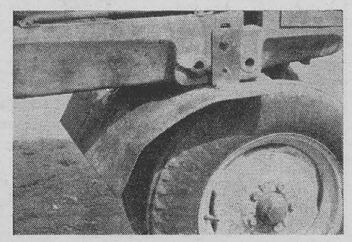
IT'S HANDY FOR TRACTORS

TODAY'S tractors pack plenty of power. Convenience is generally built in, too. But every farmer has special needs; often he can "tailor" his tractor to fit them.

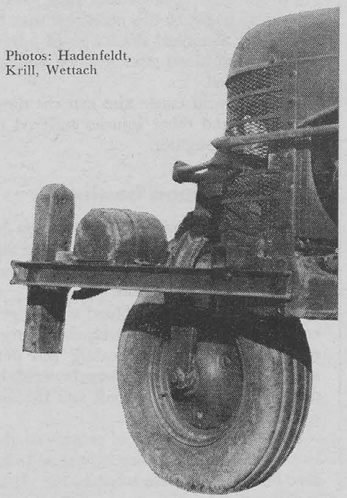
An extra step helps Victor Bartel of Buena Vista county, Iowa get onto his tractor. He welded it from scrap iron, bolted it to the axle.

He also spliced a valve into the tractor hydraulic system. It increases the push on his wagon hoist. When using hoist, he cuts off the fluid line to his front-mounted loader. Then the hydraulic reservoir's full supply goes to hoist his wagon. Without this valve, hydraulic fluid lifts loader first, and remaining fluid actuates wagon hoist.

These pictures show other ways farmers have made their tractors more comfortable and efficient.

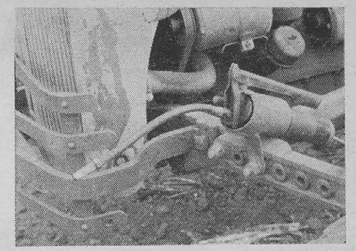


Photos: Hadenfeldt, Krill, Wettach

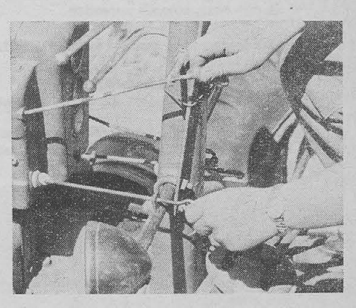


THIS BUMPER pushes loaded wagon. George Stephens, Columbiana county, Ohio, bent channel iron to fit tractor front. Then he bolted on sturdy wooden post to push against wagons. The 200-pound steel weight behind post keeps front end from rearing up when he pushes heavy loads.

METAL PLATE protects tractor operator from mud and manure that splash up from front wheel in bad weather. Sheet metal is wide enough to deflect mud from front wheels and is curved to their shape. Two bolts hold it firmly so it won't rattle.



GREASE GUN is always handy with this holder. Weld 6-inch long pipe to strap iron and bolt it to tractor. Pipe fits snugly around grease gun and is mounted at angle so gravity holds gun in place. Welded grille beside holder protects radiator from damage caused by hard knocks.



UNHANDY tractor controls now are easy to reach from seat. Wayne Kruse, Buena Vista county, Iowa, had to lean over to operate choke or ignition switch. So he welded rod to choke. Then he bolted another to switch so he can turn it easily. Brackets prevent rods from vibrating loose.

CUT EXHAUST PIPE at angle sloping toward front of tractor as shown below. That deflects fumes—cuts down amount of exhaust that blows back into your face, says Max Harris, Louisa county, Iowa.



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VETERINARY

New drug to tame cattle

YOU'VE heard a lot about the new tranquilizing drugs in human medicine—how they calm nervous people, how they help cure the old ulcer by reducing worry. Now it looks like they may be useful for livestock. It's evident they can calm a steer as well as help a human being get on top of his nerves.

Early in 1958, veterinarians should be able to obtain Diquel, which Jensen-Salsbery Laboratories plan to distribute. At a conference held to report on the drug, movies pictured steers just trucked to new yards. They patiently chewed their cuds. They had received a shot. Presence of strangers in the lots didn't seem to worry them.

Those who have been testing the material believe a shot given feeder cattle when they are loaded will cut down milling and worry in shipment, that cattle will arrive less fatigued, and that they will eat and drink more at stopovers. They also should calm down sooner in the lot, and go on feed in shorter time.

There also is hope the drug will reduce the amount of dark-cutting beef. Many veterinarians figure this condition may be caused by abnormal discharge of adrenalin into the blood stream when animals are frightened.

Calming wild cattle also can cut down on bruises and other injuries suffered on the way to slaughter.

Proteins speed healing

WORK at the University of Georgia indicates that wounds heal better in an animal on a high protein ration than in one eating feed low in protein.

When protein in the blood was 20 percent below the normal level, the Georgia workers found wound healing was definitely slowed. When it was lowered by two-thirds, edema occurred, and the animal died.

Doubling the amount of protein needed to maintain body tissues is needed to insure healing of severe wounds, the report indicates.

Sure way to stop pig anemia

IF YOU HAVE pigs hit by anemia, your best bet is iron dextran, which is given by syringe in the pig's ham muscle.

Better yet, you can prevent anemia in pigs raised on concrete with a one-shot treatment. This material, sold by Armour Laboratories under the name Armidexan, costs more than some other iron treatments, but it is sure and requires only one handling of the pigs. It should be given no later than

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Special Offer! Free 35¢ package of Tri-Dent Brushless Denture Cleaner. Send only 10¢ for postage and handling. Offer expires Mar. 31, 1958. Plasti-Liner, Inc., Dept., MM, 1075 Main St., Buffalo 9, N. Y.

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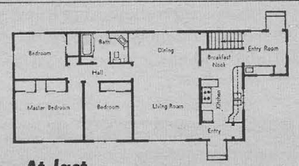
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Capper's Farmer, Topeka, Kansas
Ask for Plan No. 33.

the second day after birth. It can be bought at feed stores or a drugstore.

Paul V. Jensen, manager of a farm in Clinton county, Missouri, owned by A. H. Myers and Son, has used it on about 1,000 pigs. He says those injected with it grow about 10 percent faster to weaning. The injection was made by hands at the farm.

In a Wisconsin test, several preventives were tried. Pigs that got no iron weighed 11.1 pounds when the trial ended. Those that got the iron dextran by syringe weighed 15.3 pounds. Those getting a squirt of liquid containing iron weighed 12.4 pounds, and those that got iron pills four times weighed 15.1 pounds.

In a Michigan station test, pigs with acute anemia made much better recovery when they were given the iron dextran by syringe than others that got iron in other forms. Blood of the injected pigs returned to normal in about a week.

Pigs have no store of blood iron at birth, and sow's milk contains little. Some men feed sod, but it is not always easy to get in winter when ground is frozen.

A number of hog men who have tried the injectible iron find that it prevents nutritional scours, with which their hogs were troubled before they got iron injections.

Vibrio hits sheep

VIBRIOSIS, a disease that causes heavy abortion losses in cattle, may also affect pregnant ewes. They may get it by mouth.

Workers at the Idaho station drenched 12 ewes with material containing vibrio-infected tissues about 3 months after they were bred. Eleven aborted, and the other was not pregnant. Twelve were used as a check lot. All of the latter lambed but one. That one aborted for other causes.

This would indicate it isn't safe for bred ewes to graze pastures in which vibrio-infected cattle are kept.

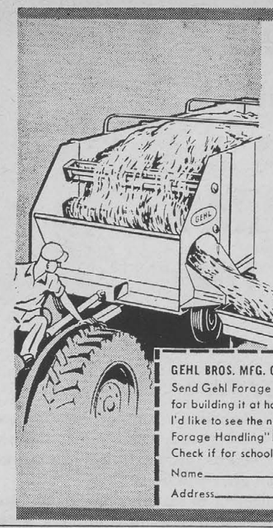
Pig trembles not inherited

PIG trembles may be caused by incorrect feeding of the sow, Scandinavian investigators believe. After examination of the central nervous system, they reported there was no basis for believing that the cause was hereditary, or that it was caused by a virus. There had been no cholera vaccination and no cholera condition to alter the picture.

Sprinkle salt on lambs

SPRINKLING salt on newborn lambs may have a special benefit, a test reported from Peru indicates. There, 320 lambs were allotted to two groups. Salt was sprinkled on one group at birth. Dams of the salt-sprinkled lambs licked them drier.

There were fewer deaths from chilling and more ewes, especially younger ones, claimed their lambs. Whether ewes had been deprived of salt before lambing is not reported.



unloads by itself automatically...from side or rear

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"EASY" TO BUY "EASY" TO MOUNT



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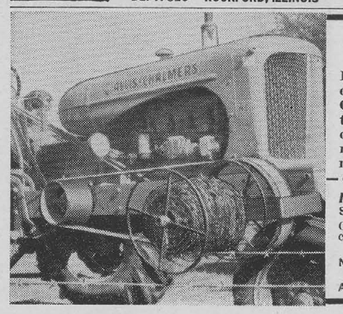
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"I am enclosing pictures of 2 different catfish we caught using Gypsy Fish Bait Oil on our bait. One fish my brother is holding weighed 8½ pounds and the other one weighed 7¾ pounds. We fish the Fox River near Mineral Springs, Ill., where we have a summer cottage."
Miss Dorothy Gribing
6052 S. Fairfield
Chicago 29, Ill.

MYSTERY SCENT EXCITES FISH FEEDING BY SMELL

Fishing scientists are just learning what wandering Gypsies knew 100 years ago . . . many kinds of the most wanted fish such as catfish, bull heads, carps, snappers, are "smell" feeders. Gypsies invented this amazing scented oil formula that excites these fish through the thousands of the tiny smell organs covering their bodies. A whiff while feeding and these fish streak madly for your bait. They all fight over it and usually the largest fish wins. Just dab mystery scented Gypsy Fish Bait Oil on your bait . . . fish lakes, rivers, creeks, ponds, or the ocean . . . still fish with pole and bobber, cast, troll or spin . . . if yours isn't the biggest smell feeder catch in the entire party, your money back. Say we're crazy. Be skeptical as you like. But let us send you the DOUBLE STRENGTH GYPSY FISH BAIT OIL to try at our risk.

Fish "On Approval"—Send No Money

Send for the new DOUBLE STRENGTH GYPSY FISH BAIT OIL (double size) for $1.98 or 3 for $4.98. On arrival deposit your money plus C.O.D. postage thru postman. Cash orders sent prepaid. If you don't catch at least 300 smell feeding fish (big ones too) before all the Gypsy is used up return empty bottle for money back.

FREE! Handy water-resistant fisherman's pouch for matches, lunch, tobacco, etc. included free to keep even if you return empty bottle. Accept this friendly challenge. Write today to

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Very first use of soothing, cooling liquid **D.D.D. Prescription** positively relieves raw red itch—caused by eczema, rashes, scalp irritation, chafing other itch troubles. Greaseless, stainless. 45¢ trial bottle must satisfy or money back. Ask druggist for **D.D.D. PRESCRIPTION.**

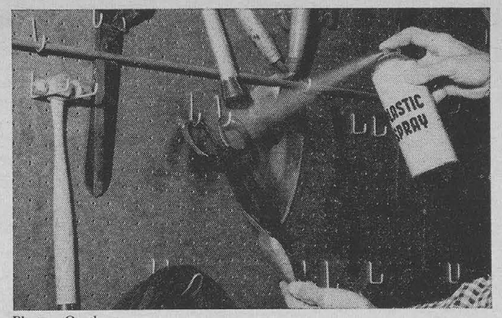
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Now there is a new modern Non-Surgical treatment designed to permanently correct rupture. These Non-Surgical treatments are so certain, that a Lifetime Certificate of Assurance is given.

Write today for our New FREE Book that gives facts that may save you painful and expensive surgery, and tells how non-surgically you may again work, live, play and love and enjoy life in the manner you desire. There is no obligation.
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Now you can SPRAY IT ON



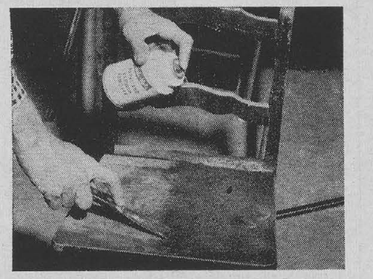
Photos: Oertle

Spray-type

. . . cans eliminate brushes, solvents, and messy mixing cans. There are no thinners to mix before you start a job—no brushes to clean after you finish.

Remember to read directions, tho. Most aerosol cans must be held upright. A few are turned upside down, however. Neither will work unless held as directed.

Never before has such a useful variety been offered for farm as well as home use. We can show only a few of the dozens now available. Here are some to illustrate the useful variety now offered.



Remove paint

. . . or varnish without tedious sanding. Just spray on remover and scrape surface. It softens paint or varnish for easy removal. Another cuts dirt and oil grime off engines.

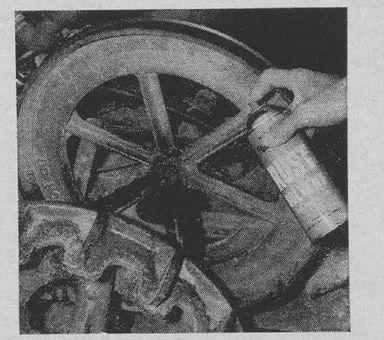


Fire extinguishing

. . . spray works on all blazes. Can shoots 12-foot stream. Here's a handy way to provide fire extinguishers for all major buildings. Extinguishers are always charged, too.

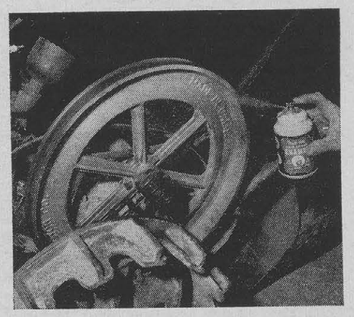
Plastic spray

. . . coats tools—prevents rust and corrosion. Coat both sides and spray into crevices of shears, tin snips, and pliers. Also waterproofs tool chests, exposed electrical terminals, or your engine ignition systems.



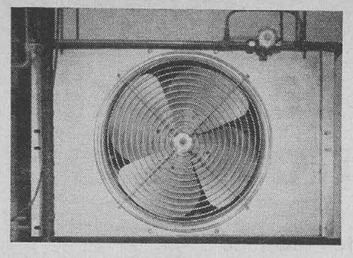
Rust solvent

. . . gets into tight corners, cleans surfaces, and frees rusted bolts and nuts. Use it to free rusted drive chains, clean metal before painting or to protect idle machinery.



Paint spray

. . . protects your machinery. Use another type on wood. You can choose your colors—eliminate messy mixing cans and cleaning brushes by spraying direct from can.



FAN exhausts heat from bulk tank unit into milkroom when milk is being cooled.

BULK TANK HEATS MILKROOM

Photos: Edwards

WARM your milkroom at the same time you cool your milk. Lloyd Bacon, Clinton county, Missouri, does this with an easy-to-install system.

When Bacon bought his new bulk tank, he got the usual cooling equipment. This included a fan to exhaust the heat from the tank during the cooling process.

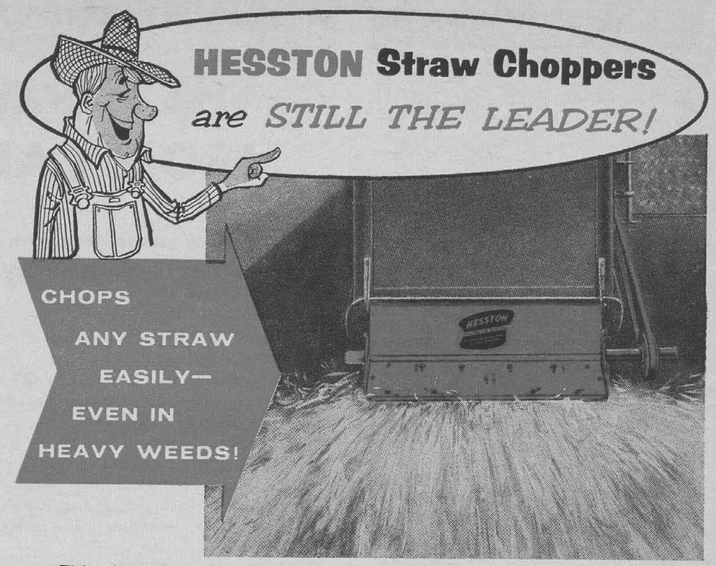
Instead of exhausting the heat outdoors and wasting it, Bacon installed a louver between the tank room and his milkroom. He opens this in cold weather so heat from the tank warms the milkroom. In summer he closes off the louver, and the heat is exhausted outside.

Bacon gets 1 ton of milk daily from his 50 cows. The bulk tank unit cools the milk down to 36 degrees within 15 minutes after he finishes milking. Heat blows into the milkroom while Bacon is milking and warms that room.

After each milking the room gradually cools off. However, it stays well above freezing all the time.

LOUVER lets heat into milkroom to make it comfortable during winter months.





This chopper is one of the finest combine attachments manufactured today. Will chop and shred heaviest straw in small pieces! Actually adds humus content to soil. WILL NOT CLOG! Used by more farmers than any other chopper. Will often eliminate one plowing! See it at your nearest Hesston Dealer!

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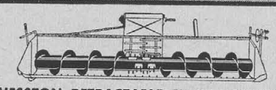
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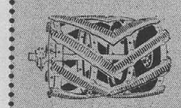
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- ☐ ROW-CROP SAVER
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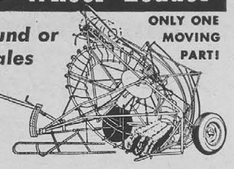
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WASHINGTON REPORT:

THE FARM OUTLOOK FROM CAPITOL HILL

Here are some items with a fair chance to get thru the congressional mill this session

CONGRESS already has before it hundreds of farm bills. Only a few are to receive serious attention; fewer still will be passed. Important legislation, with a chance for approval, includes:

Feed grains. General sentiment is for tying into a single new package-program all feed grains, including corn. Benson favors this approach, along with looser acreage controls, providing price props are lowered.

Some corn and feed grain men are talking up a vast land retirement plan, featuring incentives great enough to win growers' co-operation.Surplus feeds might be used to help compensate those who go along. (See "A bold program to remove surpluses," page 14.)

What Congress will do, if anything, almost surely will call for (1) less production, (2) lower market prices, and (3) more government assistance.

Soil bank. Dual decision facing Congress is whether to end the acreage reserve and expand the conservation reserve. Many favor the latter to retire 50-60 million acres, or about one-seventh of all U. S. cropland. Partial test is now being made of the conservation reserve's effectiveness in pulling whole farms out of production in Illinois, Nebraska, Tennessee, and Maine.

Whether this Benson "bid" plan works and will be tried across country depends on the answers to two questions: Are any substantial number of farmers interested in banking whole farms as the program provides? Will the USDA accept fair and reasonable bids from farmers even tho the total cost runs high?

The acreage reserve is authorized to run thru 1959. Funds for next year's operations, however, have not yet been voted.

Much opposition to acreage reserve has come from the South, whose lawmakers, in key positions on Capitol Hill, contend that Dixie has had the short end on payments. In addition, some southerners say, banking of cotton land has slowed down the economies of entire communities.

Exports. To keep surplus sales abroad at a high level, Congress is almost certain to extend Public Law 480 for another year. Without this law, allowing the government to accept "soft" foreign money for our surpluses, the record exports of the past year would have been impossible.

There is little or no opposition in sight to the appropriation of about $1½ billion by Congress to continue 480.

Checkoff. Idea of this legislation is to clear the way for deductions of 5 to 10 cents a head from stockman's checks for promotion of red meat sales. Many livestock producers think the checkoff would increase demand and help solve surplus problems. Underconsumption of livestock and products, it is argued, accounts for the feed grain surplus.

The checkoff is being pushed by many state and local groups, but there is strong opposition from the Farm Bureau, Farmers Union, and USDA.

Dairy. Watch the new "self-help" plan backed by the Grange and National Milk Producers Federation. This proposal has received more attention since Secretary Benson said he will drop dairy supports to 75 percent of parity on April 1.

Federation and Grange leaders indicate producers could expect an increase of about 35 to 45 cents a hundred for milk under their program. It would also increase retail prices by perhaps 1 cent a quart for milk and 5 to 7 cents a pound for butter.

The self-help plan is based on this twin proposition: that dairymen should control their own surpluses and consumers should pay "realistic" prices.

Meat packers. A hot fight is sure on whether USDA or the Federal Trade Commission should ride herd on packers. Issue is whether the department should continue to supervise wholesale trade practices of packers, or turn this authority to the FTC.

Advocates of the transfer argue that USDA inactivity in the wholesale meat field has hurt farm prices and tends toward big-packer monopoly. Opponents deny the charges.

Wheat. Domestic parity or "two-price" legislation probably has a better chance than ever, but success is far from certain. Prices under the program might be about $2.25 for wheat used at home, and a dollar or less on that produced for export.

Home markets could absorb just about half of national production.

Domestic parity legislation has strong backing from the Grange and the new National Conference of Commodity Organizations. It is opposed by Benson and the Farm Bureau.

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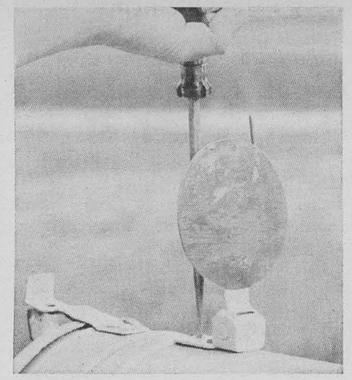
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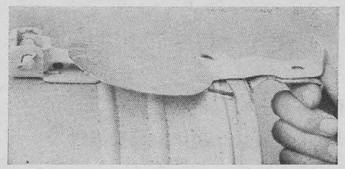
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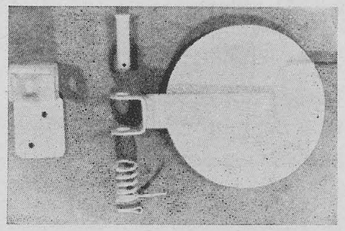
Bolt signal to mailbox as shown. It springs up to this position when box is opened. Disk 5 inches in diameter is painted red. You can see it more than 200 feet away regardless of which side of the road your mailbox is on.

Signal saves needless trips to mailbox

Photos: Hadenfeldt



Catch pin soldered to signal hooks under door flange. That holds signal down until door is opened. Then it springs up. After you get mail, return signal to this position. Then it's ready to show when mail arrives the next day.



Parts used to make signal. All came from farm junk pile. Fasten base to mailbox with stove bolts. Pin and cotter key hold spring in place. Use spring that's strong enough to raise disk and hold it firm in strong wind. Braze or weld parts together.



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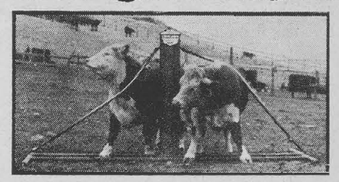
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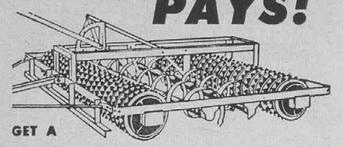
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LIVESTOCK

More 1958 meat than expected!

MAYBE there won't be a cut in meat production in 1958 after all. Reasons: Soft corn! A corn-hog price ratio sure to bring a big pig crop! More broilers than ever!

Soft corn has spurred a beef feeding boom. It has made growers feed hogs to heavy weights. Here's what's going on:

Western Corn Belt areas that got a lot of sappy corn frosted are loading up on feeder cattle. From July to November, Iowa, Minnesota, South Dakota, and Nebraska took on 418,985 more cattle than in the same 5 months of 1956, when drouth cattle were surging to market.

The 9 principal feeding states in that period bought 5 percent more stockers and feeders than the previous year. It had been expected they would fatten fewer.

A hog man with soft corn wants to convert as much of it as he can into pork. So at some markets 65 percent or more of the barrows and gilts received range from 240 to 360 pounds. Big numbers from the late spring, summer, and fall crops have been fed to heavy weights. You can expect the trend to continue.

Holding back these hogs may swell 1958 pig numbers. If growers had been rushing hogs to market, many gilts that will farrow this year would have been sold before the craze to expand burst into full fury.

And look at broilers! Late in 1957, every week showed increases from 9 to 15 percent above the like week a year earlier.

Pigs that nurse sow more disease-resistant?

PIGS that nurse the sow 4 weeks or more may have greater power to fight off disease than those weaned early.

At the Michigan station pigs were allowed to nurse the sow 4 days. Then they were lotted. One lot continued to nurse the sow, one went on a complete synthetic milk diet, and a third got a commercial sow milk replacer. Those that continued to nurse the sow were superior in antibody (disease fighter) production.

Tested boars sell at a premium

PRICES for boars tested for efficiency, growth rate, and backfat thickness at the Iowa swine-testing station are climbing. The average for those sold at the first sale was $164. Price climbed to $176 for boars that qualified in the second test and jumped to $251 for those that met the standards in the third sale.

About 65 percent of those tested have met the standards set. The others have been castrated. The number of Berkshires, Chester Whites and Tamworths to qualify has been low. Berks generally have shown slow growth rate. Many Chesters and Tamworths have shown too much fat, too little lean.

Those in charge of the test haven't yet worked out a means of placing proper stress on prolificacy and other brood sow performance traits, which can mean the difference between profit and loss to a market hog man.

Berks and Polands, probably the least prolific breeds, both produce good carcasses, but Polands outsell Berks because of better milking ability and superior growth rate.

Additives don't change beef quality

FEEDING steers stilbestrol or aureomycin, or both in combination, has no significant effect on marbling, tenderness, or other eating qualities of the beef, a test at Florida station shows.

That was true whether the cattle got a full feed or a limited feed of grain; whether they were fed in dry lot or on grass.

Further, these additives didn't affect cooler shrink, carcass grade, percentage of hide or liver, dressing percentage, carcass length, thickness of chuck, length of leg, or circumference of round.

There were significant differences, however, between full-fed and limited-fed cattle, and between those fed in dry lot and those fed on grass.

Those fed on pasture had larger rib eyes and larger rounds than dry lot cattle, and the meat wasn't as tender. The test included 128 steers.

How much alfalfa should bred sows get?

HOW much sun-cured alfalfa hay can you afford to put into sow rations? In a Montana station test, a group of sows was equally divided into 3 lots. One lot got 20 percent; the second, 50 percent; and the third got only long alfalfa hay in racks. Eighty-nine percent of sows on the 20 percent hay ration produced litters. They were hand-fed, and ate 8.41 pounds of feed daily apiece.

The 50 percent ration was self-fed. Sows ate 9.92 pounds apiece daily, and 77.7 percent of them produced litters. Sows that got nothing but hay ate only 3.76 pounds apiece daily. Only 61.1 percent of them farrowed, and 55.5 percent weaned pigs.

The 20 percent ration produced most pigs a litter, both for sows and gilts. But gilts on the 50 percent ration weaned more pigs and heavier litters than those on the 20 percent ration.

Most surprising thing in the test is that any of the sows which got only 3.76 pounds of alfalfa a head daily were able to produce litters. All sows were treated the same after their pigs were born.

CROPS

Coming: High-amylose corn, blight-resistant hybrids

THE STARCH industry—and corn surpluses—are sparking interest in breeding high-amylose corn. This type of corn contains starch fitted to the manufacture of films and fibers. It could offer an outlet for 40 to 100 million bushels of corn annually.

M. S. Zuber, University of Missouri corn breeder, says inbred lines have been found that contain 80 percent amylose. Regular hybrids have about 27 percent.

Pushing the amylose content up from 80 percent to 95 or 100 percent will be a tougher job, Zuber says. Individual genes carrying high amylose will have to be isolated. These lines will then be selfed, later crossed with other good corn inbreds.

Leaf blight won't be taking the cut out of corn yields it has in the past. Scientists have turned up several inbreds that have resistance to helminthosporium fungi. Some of these lines retain resistance when crossed. Others lose much of it.

USDA plant pathologist R. R. Nelson, reporting at the American Seed Trade's hybrid corn conference, described witchweed —a new corn pest found in the South.

Like dodder and mistletoe, witchweed is a parasite. It can wipe out a field of corn. After germination, roots grow toward the host plant. Tubes with bell-shaped attachments, which draw out water and nutrients, are sent into plant tissues.

Nelson says witchweed is small—rarely over 18 inches high. Has orange to red flowers and square stems. It's sensitive to soil moisture and temperature. Seed requires a pre-soaking of 10 to 20 days before it will germinate. Ninety-degree temperatures are optimum for germination.

You can control this parasite with 2,4-D at ½ to 1 pound per acre just prior to flowering. Or use "trap crops"—soybeans or cowpeas which induce germination but aren't suitable hosts.

A. J. Ohlrogge, Purdue agronomist, told the group about new tests on fertilizer placement. He and co-workers uprooted corn at the 4- and 5-leaf stage. One feeder root was put in a nitrogen-phosphorus solution from which corn got all of its nutrients. After the shock of transplanting, plants did as well as other corn.

Purdue scientists plan other fertilizer uptake studies—best position of fertilizer bands, band volume, fertilizer movement into roots, and ion competition of nitrogen sulfate and nitrogen chloride.

First-year tests showed nitrogen sulfate increased the phosphorus uptake in corn. Nitrogen chloride slowed it down compared to where P was applied alone.

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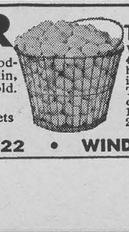
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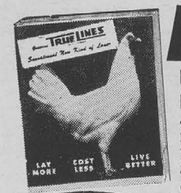
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Rank in 1956-'57 Tests

Entry	Calif.	Mo.	N.Y.C.	Tenn.	Utah*	Ave. Rank
K-137 Kimberchiks	4	4	6	5	2	**4.2**
Strain A	3	10	—	10	1	**6.0**
Strain B	11	16	2	3.5†	4	**7.3**
Strain C	5	18	18	12	5	**11.6**
Strain D	—	6	24	—	10	**13.3**
Strain E	38	3	25	15	3	**16.8**
Strain F	23	20	—	7	18	**17.0**
Strain G	—	25	27	11	13	**19.0**

*Incomplete. To 557 days of age. †Average of 2 entries.

The consistent, profitable performance of the K-137 in such a variety of environments is assurance that no matter where you live the K-137 will do well on your ranch.

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least half heavies.....	$5.90	ing, mostly males,	$1.90

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Already 12 in. in plastic pot, budded, ready to bloom indoors. White gardenias, thick green leaves. Starts free membership in largest gardening club plan. Tremendous savings. Free monthly magazine, dividends, bonuses. No dues. Cancel anytime. Write for free information.

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Save Money. Buy Allen's hardy Northern grown fruit trees including peaches, apples, pears, plums. Best money-making varieties. Heavy bearers. Also everbearing and June bearing strawberries, red and black raspberries, blueberries, grapes, shrubs, roses, evergreens, shade trees, nut trees, flower and vegetable seeds. Everything necessary to successfully plant your garden or farm. Special quantity discounts. Free catalog contains hundreds of nursery bargains. Everything guaranteed. Write today. Allen's Nurseries and Seed House, Box 57, Geneva, Ohio.

Berry's New Improved Gro-Coated Brand, a registered trademark, means greater seed savings per acre for you this year. This original exclusive development now has CM-957 added. Berry's offer new alfalfa blends for every purpose, new mixtures and newest varieties. Prices as low as $17.40 a bu. on alfalfa; $7.80 on sweet clover; $22.80 on red clover; all freight prepaid or with freight allowances and quantity discounts. 150 different farm seed grades and varieties to choose from, offered direct to you at wholesale. Write for big free catalog, samples and price list today. We guarantee to save you money and give you satisfaction. Berry Seed Co., Box 411, Clarinda, Iowa.

Sensational Stark Dwarf Fruit Trees—grow Giant-size apples, peaches, pears on small ornamental trees for personal use or market. Also faster-growing, quicker-bearing Stark-Burbank standard fruit trees, roses, landscaping shrubs, etc. Big color-photo catalog free. Stark Bro's, Dept. 30628, Louisiana, Missouri.

Special Offer—February only: 50 glorious mixed blooming size gladiolus bulbs or 25 mammoth red rhubarb roots, only $1.00 each postpaid. Write for our 1958 big color catalog featuring 17 top-notch strawberry varieties, ornamentals, fruits, flowers. Rider Nurseries, Farmington, Iowa.

Finest Arkansas certified strawberry plants: Special offer: 25 each Blakemore, Bellmar, Aroma, Tenn. Beauty $1.75 postpaid. Write for free catalog and planting guide. Waller Bros., Box 6, Judsonia, Arkansas.

Buy Direct and Save: Hardiest, most drouth-resistant, high yielding, U. S. verified northern grown Rhizoma, Cossack, Ladak, Ranger and Vernal alfalfa; improved pasture and hay grasses. Free catalog. Sam H. Bober & Sons, Box 751-C, Rapid City, South Dakota.

Strawberries—Plant Superfection for berries this year. New methods with everybearers give outstanding results. Allen's 1958 Berry Book describes best varieties—best methods. Free copy. Write today. W. F. Allen Company, 64 Pine Street, Salisbury, Maryland.

25 Colorado Blue Spruce: only $3.75 postpaid. Select 3 yr., 8" to 12" plants. Growing into outstanding trees as boundary markers, windbreakers, etc. Densely pyramidal—from bluish-green to shining blue. Prefers sun. Musser Forests, Inc., Box 30-BC, Indiana, Pennsylvania.

Grafted Thin Shell Black, English and Hardy Carpathian walnuts. Perennials, shrubs, berries, fruits. Send for price list. Marr's Hill Nursery, Route 3, Bentonville, Arkansas.

Free Plant Catalog—Write today. Cabbage, onions ready now. Cherokee Plant Farm, Troup, Texas.

Sorghum Almum grows ten to fifteen feet, sweet and tender. Will run more cattle per acre than any grass. Buy direct from producer and save. Free information. Ed L. Schur, Route 1, Vernon, Texas.

Free Rose Catalog—2-year-old, field-grown, everblooming varieties. Full color illustrations. Ty-Tex Rose Nurseries, "Since 1924," Box 532-1E, Tyler, Texas.

Tomato, Onion, cabbage plants. Also pepper, lettuce, broccoli, eggplant, cauliflower, sweet potato. Write for free catalog with bargain offers. Piedmont Plant Company, Dept. 204, Albany, Georgia.

We Sell on the Installment Plan. Best varieties Peach and Apple Trees, low as 20c; Grapevines 8c; Shrubs 13c; Evergreens 20c; Berries and plants. Catalog free. Benton County Nursery, Box 505, Rogers, Arkansas.

Tree Seeds — Special — 2,000 seeds, (customers choice) Colorado Blue Spruce, or Scotch Pine $1.00, plus informative catalog. Catalog alone 10c. Ransom Seed Company, San Gabriel, California.

Free Vegetable plant folder—cabbage, onions ready. Ideal Plant Farm, Route 5, Jacksonville, Texas.

Watermelon Seed 80 varieties; watermelon, cantaloup and cucumber, supreme quality Spergon and Arasan treated seed. Beautiful catalog free. Willhite Farms, Poolville or Weatherford, Texas.

Strawberries are ideal family income projects. One tenth acre yields 650-900 quarts. Allen's 1958 Berry Book tells the best varieties and how to grow them. Free copy. Write today. W. F. Allen Company, 64 Pine Street, Salisbury, Maryland.

For Sale: New certified blight-resistant seed potatoes. Plymouth, Merrimac, Saco, Kennebec. Also Katahdin. Crop nearly booked. Thompson Farms, Clymer 4, Clymer, New York.

Seed—All Kinds—varieties, Ranger Alfalfa, $15.70 bu., Corn Grower, $16.80 bu., Comet Beans, Minhafer & Garry seed oats. Write Farco Seeds, 226—19th St. S.W., Mason City, Iowa.

Ginseng—Greatest Cash Crop. Free information and instructions. Use wasteland. Ginseng, Asheville, North Carolina.

Write for Free plant prices—cabbage, onions now ready. Troup Plant Farm, Troup, Texas.



Tall Early-Blooming Tulip Tree — $1

Healthy, U. S. nursery grown. These tulip trees are 2 yrs. old and 2-3 feet tall ready for transplanting to your lawn this spring. Magnificent fast growing shade tree often reaching 80 ft. heights with lovely tulip-like blooms, each flower about 2½ inches across set off by dense green foliage. Have been known to reach 100 year ages. Only $1 each (3 for $2). Red Ozier Dogwood (Cornus Stolinfera) also nursery grown from seed, 1 or 2 years old, 1-2 ft. tall, FREE of extra cost. So order tulip trees on this final offer. If C.O.D. postage extra. Cash orders add 35c and we ship postpaid. Satisfaction or return in 10 days for purchase price refund.

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20 MILLION TREES A YEAR!

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Evergreen Seedlings — Transplants, Fruit and Shade Trees — Shrubs and Rhododendrons

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Free CATALOGUE and PLANTING GUIDE

Seedlings and Transplants-direct from growers. Pine, Spruce, Fir, etc. Quality Stock.

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Raise your own trees and shrubs from SEEDS. Beautiful Evergreens, lovely trees and shrubs for shade, windbreak, snow fence, erosion control, ornament, etc. For FREE planting guide and price list write

WOOD LOT SEED COMPANY, NORWAY 8, MICH.

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Geraniums—Save by ordering now direct from our famous greenhouses. Zonals for beds and borders, reds, pinks, white, all named, 4 for $1.65. Sturdy plants 4" to 8" tall shipped postpaid, safe arrival guaranteed. Write for new color-illustrated free catalog of 148 varieties, including fancy leaf, dwarf, vining (ivy), scented, etc., also house plants. Wilson Brothers, Roachdale C-2, Indiana.

Large Gloxinia bulbs, sprouted for quick bloom. Twelve best colors and combinations, prepaid with complete indoor-outdoor growing instructions. Your choice; 3—$1.00; 12—$3.50. The Owls Nest, Dunedin, Florida.

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$4,000.00 for 1913 Liberty head nickel. Uncirculated dollars 1804—1839, 1893-S, 1895-P, 1903-O pay $100.00 — $5,000.00. Certain dates — Lincoln Cents before 1932—$100.00; Flying Eagle Cents—$500.00; Indian Cents—$140.00; Dimes before 1943—$2,000.00; Quarters before 1924—$1,000.00; Half Dollars before 1905—$1,000.00; 2c Pieces—$100.00; 3c Pieces—$130.00; Halfdimes—$500.00; hundreds of others worth $10.00—$1,000.00. Canadian Coins—1921—5c Silver—$100.00. 1875 Quarters—$75.00. 1921—50c—$500.00. Wanted—20c pieces, gold coins, paper money, etc. Our large illustrated guarantee buying-selling catalog, giving complete allcoin information—send $1.00. Purchase catalog before sending coins. Worthycoin Corporation, K-429-C, Boston 8, Massachusetts.

Book by R. S. Yeoman—Handbook of U. S. coins, prices paid by dealers. $1.00 postpaid. Send stamped envelope with list of your coins for free appraisal. Gordon Coin & Supply, Gordon Bldg., 3672 Mt. Diablo Blvd., Lafayette, California.

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Cash for Coins, collections! What have you? State price? Torrie, Box 768, Largo, Florida.

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2 VALUABLE BOOKS

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They're Both Free—Send Today

EMLONG NURSERIES, Inc.
Box 191, Stevensville, Mich.

LIVING FENCE



Amazing Fast Growing Rose Hedge

See the sensational Red Robin Living Fence (**Gloire Des Rosomanes**) that's sweeping the country. Surround your property with beauty and protection for as little as 12c per foot. Plant **this spring**; have a vigorous **living fence** bursting with fragrant red roses **this summer.** Grows to 6 feet if desired. Keeps out intruders, noise. Not available elsewhere. Send for **free** full-color book today!

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Allen's 1958 Berry Book tells best varieties for home and market, and how to grow them. *Free copy. Write today.*

W. F. ALLEN COMPANY
64 Evergreen Ave., Salisbury, Maryland

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Rabies—Distemper—Hepatitis—Vaccinated pups. Genuine English Shepherd, Border Collies, Scotch Collie. (Guaranteed heeldrivers.) (No fooling.) Years trial—training instructions. (65,000 satisfied customers.) 46 years same farm. (Spayed females—females—males, $15.00.) Ducks—Geese (30 varieties). Stock — eggs. Runft Waterfowl Judge, Reinbeck, Ia.

Genuine English Shepherd Pups—(Distemper vaccinated) Guaranteed heelers, years trial. Training instructions. Males, females, spayed females. Highview Kennels, Cedar Falls, Iowa.

Shomont Collies. White and colors. Workers, companions, guards. Guaranteed. Shepherd puppies. Free price lists. Shomont Kennels, Dept. C, Monticello, Iowa.

English Shepherds — Border Collies. America's most useful dogs. Puppies all ages. Both sexes. Choice colors. Faithful workers. Satisfaction guaranteed. We breed and sell our own stock. Fairmount Farms, Cedar Falls, Iowa.

P. R. German Shepherd Police pups. Good hunting, watch and cattle dogs. Send 25c for pictures. H. Schumacher, Ottertail, Minnesota.

Beautiful Golden Collies, registerable, A.K.C. Purebred English Shepherds. Barnes Farm, Collyer, Kansas.

Genuine English Shepherd and "special price" on Scotch Collie puppies, Distemper vaccinated. Dean Fleming, Atkinson, Nebraska.

Registered English Shepherd Puppies. Guaranteed heelers, farm raised. Priced reasonable. Clifford Taylor, Shelbyville, Missouri.

Rat Terrier Puppies and all other popular breeds of puppies. Send dime for photos and literature. Kenny's Kennels, St. John, Kansas.

German Shepherds. Registered. Large, husky pups. $25 up. Picture, 10c. Onahill Kennels, New Hartford, Iowa.

Rat Terrier Puppies. Bred for ratters. Crusader Kennels, Stafford, Kansas.

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Highest Cash Paid for old gold, jewelry, watches, diamonds, silver, gold teeth. 100% full value paid immediately. Satisfaction guaranteed. Mail articles today. Information free. Established 1900. Chicago Gold Smelting Co., 6 E. Monroe St., Dept. 252, Chicago 3, Illinois.

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Billfold Prints 20 for $1.00. Doubleweight prints from any photo or negative. 3-day service. Special studio offer: 20 billfolds plus six 3x5 doubleweight prints for $2.00. Send cash with order. Hawkeye Film, Dept. CF, Box 812, Des Moines, Iowa.

8-Hour Service on deluxe jumbo prints. 8-exposure roll developed and 8 jumbo prints, 40c; 12-exposure, 55c; 16-exposure, 70c; 35mm. 20-exposure, 75c; 36-exposure, $1.20. Jumbo deckledge reprints, 4c each. Contact prints made if specified. Bay Photo Service, Box 210, Oakland, California.

2 for the Price of 1. Introductory offer: Send this ad with your roll and the regular amount of money, 50c for 8-exposure rolls, 60c for 12-exposure rolls and we will send you two complete sets of dated jumbo prints in an attractive new style folder. Owl Photo Company, Dept. 5, Weatherford, Oklahoma.

Superior Quality Developing, finishing—eight double-negative size dated prints in pockette album, 50c; 12—16-exposure rolls, 65c. Fast service. Satisfaction guaranteed. Free mailers. Specials on enlargements. Supertex Photo Service, Box 812-CF, Fort Worth, Texas.

Kodachrome Processing, $1.25. Anscochrome and Ektachrome, $1.00. All 35 mm. mounted. 8 mm. roll movie film, $1.50. 8-exposure roll Kadacolor, developed and enlarged, $2.95. 12-exposure roll, $3.95. Color prints, 29c. Free mailers. Kolour Labs, Inc., Box 333, Boise, Idaho.

Copy of Your favorite photo and 10 bills, 65c. Reprints, 3c each; 8-exposure roll, 2 prints each, 38c. Jumbos, 4c each, 12-exposure roll, 50c. 3 5x7 enlargements, 50c; 4 8x10 for $1.00. This ad is worth 10c on a 50c order. Summers Studio, Unionville, Missouri.

Fastest Service—Lowest prices—quality electronically controlled. All prints enlarged, 8-exposure black and white, 35c; 12 exposures, 50c. Jumbo Kodacolor prints, 25c. Transparencies printed 2x 39c, 3x 55c. Leo's Studio, Box 2772, Denver, or Box 1406, Odessa, Texas.

Free 5x7 with each roll developed, 8 jumbo prints 35c; 12 or 16 jumbo prints 50c in album. Reprints 4c each. Free mailers. Price List. Coupon. One day service. C-Lect Photo, Box 4507, Dept. P., Dallas, Texas.

One Set of "Deckeledge" Jumbo prints from each 12-exposure roll, 55c. Two sets—90c. "Deckeledge" reprints, 4c. Jumbo reprints, 5c. Brown Photo Company, 4011-35 Washington, Minneapolis, Minnesota.

Finest Developing, Finishing—Eight jumbo prints, 50c; 12- to 16-exposure rolls, 65c. Also expert color developing, printing. Send for free mailers. Crown Studios, Box 10032-C, Dallas, Texas.

Rolls Developed, 8 prints, 35c; 12, 45c; Jumbo prints, 8, 50c; 12, 60c. Davenport Finishers, Davenport, Iowa.

From Roll or negatives: 12 Jumbos and one 5x7 enlargement for this ad and 60c. Square Deal Photos, Hutchinson, Kansas.

12-Exposure Rolls, 39c, Jumbo prints. Guaranteed work, one-day service. Lincoln Studios, Dept. A, Box 13, Lincoln, Nebraska.

Beautifully Colored 8x10 Enlargement from negative, photograph—$1.00; four $3.00. Surgal's, Box 849, Chicago.

Roll Developed, 8 beautiful enlarged prints, 25c; 12—35c. (Trial) 10 reprints, 40c. Quick Service. Willard's, Box 2553E, Cleveland, Ohio.

12 Jumbos from roll developed, 35c; 8 jumbos, 29c. with this ad only. CF Skrudland, Lake Geneva, Wisconsin.

WANTED TO BUY

Highest Cash for Old Gold, broken jewelry, gold teeth, watches, diamonds, silverware, spectacles. Free information. Rose Refiners. Heyworth Building, Chicago 2.

Cream Shipped in plastic bags, supplies furnished free. Write Galva Creamery Company, Galva, Illinois; or Kansas City, Missouri.

Sensational Tomato Customers Report 2 BUSHELS To a Vine



Actual Photograph as grown by Walter J. Madson, Tulsa, Okla.

Grow the world's most amazing Tomato right in your own garden and get a bushel or more of delicious, ripe tomatoes from a vine.

BURGESS CLIMBING TRIP-L-CROP

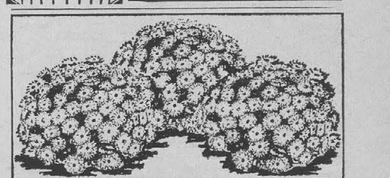
TOMATO Vine grows 10 to 18 feet and outyields all other known varieties. Huge, meaty, solid fruit, wonderful flavor. Some weigh as much as 2 pounds. Excellent for slicing and canning.

TRIAL PACKET 10c
Postpaid. Order Today
3 Packets for 25c

LOOK FOR THE 10c BONUS COUPON ON EACH PACKET.

FREE Catalog with valuable information about "BLIZZARD BELT" Seeds, Bulbs and Plants for the "BEST GARDEN IN TOWN."

BURGESS SEED & PLANT CO.
109-B, Galesburg, Mich.



10 CUSHION MUMS, $1

Order now, pay this spring when delivered. Each normally develops bushel basket size covered with hundreds of dazzling 1 to 2 inch flowers, a giant ball of color. Assorted colors as available. Propagated from Michigan nursery-grown stock, shipped with root top growth started. 10 for $1 (30 for $2.50) plus C.O.D. postage. Cash orders add 35c—we ship postpaid. Bloom first year or replaced free.

MICHIGAN BULB CO.
DEPT. CA.-1425 GRAND RAPIDS 2, MICH.

COLORADO BLUE SPRUCE

Select 3 yr., 8-12" plants. Grow into outstanding trees as boundary markers, windbreakers, etc Densely pyramidal—from bluish-green to shining blue. Prefers sun

Postpaid planting time

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Burpee Seeds Grow

Send postcard or letter for the Burpee Seed Catalog **FREE**

W. ATLEE BURPEE CO.
Address: 509 Burpee Building—*at nearest city:*
Philadelphia 32, Pa. *or* **Clinton, Iowa** *or* **Riverside, Calif.**

Special Offer--All 4 for Only 10c



Climbing Tomato
SAVE GARDEN SPACE

Enormous Fruits, perfect in form. Thick, **solid and delicious** flavor. Weigh from **1 to 3 lbs.** each. Attains height of 12 to 15 feet. Bears large quantities of very delicious fruits. Fine for slicing or for salads.

Yd. Long Beans



An excellent variety and a very **interesting curiosity.** Vines are rampant growers. Produce an **enormous crop** of long slender round pods, 2 to 4 ft. long, that are of excellent quality for snap beans. Are of very fine flavor.



Vine Peach

Ripe fruit in 80 days. Resemble oranges, color, shape and size. Grow on vines like melons. **Beautiful, tempting** appearance when canned. Make delicious **preserves, sweet pickles.** Fine for pies or jelly. Easy to grow

New Climbing Cucumber



Vines climb readily on fences, poles, etc., saving **valuable space** in small gardens. **One hill will** keep a good sized family **supplied all summer.** Bear **early** and continue to produce fruit through out the season. One plant will bear from forty to fifty fruits. **Delicious flavor.** To introduce our **catalog of rare and unusual** seeds we will mail **all 4 Pkts.** for only **10c and 4c Postage.**

Special Offer To Introduce Our Spring Catalog 12 Pkts. for 25c and 6c Postage

E. J. MURVON SEED CO., Dept. 5, NORWALK, CONN.

NEW! POWERFUL
500 FT. INTERCOM PHONE SET



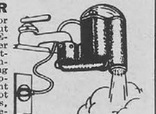
SAVE NEEDLESS STEPS, just buzz and talk. Perfect for communication between main house and tenant house, barn, shop or to other distant points on farm. Conversation is loud and clear.

250 FT. WEATHERPROOF WIRE. No installation problems—wire is easily strung anywhere—even on the ground for temporary use. More wire can be added for operation up to one mile.

HAS BUILT-IN BUZZER, powered by flashlight battery which fits in case. Costs nothing to operate. Phones are standard size—designed for one handed talking and listening. Rugged—practically unbreakable.

READY TO USE. Satisfaction guaranteed. Nothing else to buy. (Item 321-C) Wt. 9 lbs. Spec. Factory price. **$9.95**

FAUCET WATER HEATER



Instant hot water from any faucet for just pennies—sounds unbelievable, but it's true! You just slip MASTER MECHANIC'S new Faucet Water Heater over any water faucet, plug it in wall outlet and you've got hot running water instantly for dishes, shaving, washing baby's bottle, etc. Simple and safe—operates on ordinary 110 v. house current—costs only 2½ cents per hour for hot water. Ideal for homes, barns, cabins, trailers, etc. Easily regulated from lukewarm to full hot. Fully guaranteed! (Item 408) Wt. 2 lbs. Factory price, only **$4.95**

MASTER MECHANIC D-C ARC WELDER



Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to ¾" plate using ¼" rods. Built-in air-cooling system. Arc is easy to strike and hold, because of especially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 14 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, gear and triple V belt or flat pulley. You can pay more, but you can't buy a better welder. Wt. 110 lbs. $400 value at **$119.50**

WELDING KIT. Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at **$10.50**

Big New Catalog Free with order. Prices f.o.b. Factory.
10 day Money Back guarantee. Send check or M. O.
Master Mechanic Mfg. Co., Dept. L-28, Burlington, Wis.

FARNAM TRAK-TOR Sprayers



As Low As $69.50 COMPLETE

Powered by NYRO "Nylon Roller" Pump! Plenty of pressure and volume for any and all spraying jobs.

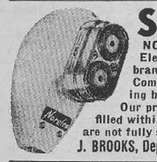
UP TO 350 POUNDS PRESSURE
Volume — 4½ Gals. Per Minute At Normal PTO Speed!

BETTER BUILT Sprayers with all brass fittings, neoprene spray hose, "leak-proof" ferruled hose connections! Complete with controls, gauges, hose, fittings, and connections. Quality-built throughout, yet priced for less!

WRITE For Catalog showing variety of Trak-Tor Sprayers! High pressure "gun-type" sprayers for livestock, orchards, buildings. "Wide-Jet" field & crop sprayers. Also All-Purpose sprayers that handle *any* and *every* spray job. *ALL at new low prices!* write —

FARNAM CO. Dept. TS-44 **OMAHA, NEBR.**

SAVE $10.00



NORELCO "Speedshaver" Men's Electric Shaver. Latest model, brand new and fully guaranteed. Complete with case, cord and cleaning brush. Regularly retails at $24.95. Our price $14.95 postage pd. All orders filled within 24 hrs. Your money back if you are not fully satisfied. Send check or M. O. to:
J. BROOKS, Dept. 895, Box 212, St. Louis 3, Mo.

Nu-Way AUTOMATIC OILER



KILLS LICE, TICKS, FLIES! CONTROLS GRUB! STOPS DESTRUCTIVE RUBBING! Lowest Cost Fully Automatic oil release from supply tank, onto huge non-destructive cable. Proven by stockmen everywhere to be the best for less! Write for literature and special free offer.

Nu-Way Box 552 Sioux City, Iowa

Free oiler will be shipped to first one who mails the above advertisement to us. G-1

SEPTIC TANK TROUBLE?

NORTHEL Reactivator keeps septic tank and cesspool clean. Bacterial concentrate breaks up solids and grease — prevents overflow, back-up, odors. Regular use saves costly pumping or digging. Simply mix dry powder in water, flush down toilet. Non-poisonous, non-caustic. Guaranteed to reactivate septic tank, cesspool. Six months supply (23 ozs.) only $2.95 postpaid.

NORTHEL DISTRIBUTORS, CF-2
P. O. Box 1103 Minneapolis 1, Minnesota

FARM MACHINERY AND EQUIPMENT

Gigantic Surplus Sale—Tremendous Savings. Government, and excess inventory, power plants, hydraulic cylinders, air compressors, pumps, weed sprayers, binoculars, astronomical telescopes, tools, plastic water pipe, geared wagon unloading motors, speed reducers, winches, telephones, electronics, surveyors transit-levels, attic fans, hundreds others. Illustrated catalog free. Surplus Center, 899 "O" Street, Lincoln, Nebraska.

Brower Feed Mixer saves you $8-$16 a ton by mixing your own feeds. Perfect mixes in ten minutes. Five sizes, 700 to 4,000 pounds capacities. World's largest seller . . . over 10,000 in use. Sold on 30-day trial. Priced low, cash or time payments. Free catalog. Brower Manufacturing Co., Box K-76, Quincy, Illinois.

Buy Tractor Parts direct at dealer's discounts. America's largest combination stock guaranteed new and rebuilt parts. Free 1958 catalog. Central Tractor Parts Co., Des Moines, Iowa, or Hastings, Nebraska.

Subscribe to Government Surplus Weekly, lists all sales. Buy jeeps, tractors, etc., direct from government. Next 10 issues $2. Government Surplus, Paxton 8, Illinois.

Garden Tractors—$109.00. 4 h.p. Winter special. Universal Manufacturing Company, 324 West Tenth, Indianapolis 2, Indiana.

Irrigating system, used one season, real cheap. Write for information. Clarence Jensen, R. 1, Box 86, Cherry Valley, Illinois.

Buy U. S. Government surplus. Wholesale prices! Illustrated catalog free. Box 22D55, Thomasville, Pennsylvania.

FARM LAND

3,460 Acres Here! Large hay and pasture spread with 2 creeks, several year-round springs, 15 ponds! Fine setup for hogs, sheep, cattle or cash crops. 300 acres tillable includes 125 bottom. 3,000 wooded, all now in pasture, woven, barbed-wire fencing. Good 4-room flagstone home, fireplace—see picture in catalog. Two other houses. Includes gas range, refrigerator, gas heater. Three barns, poultry house, garage, corral, loading and branding chutes. On all routes, adjoins game refuge, close to famous fishing lake. Be the master of your own estate for $47,500, less than half down. Free winter catalog, bargains coast to coast! United Farm Agency, 2825-CF Main St., Kansas City 41, Missouri.

Free Strout Catalog! Farms, homes, businesses, resorts, retirement properties—over 2900 values in 34 states. 57 years' service . . . world's largest! Write Strout Realty, P. O. Box 918 (PF), Springfield, Missouri.

Canadian Farm Lands—New and improved land in productive soil areas. Reasonably priced. Good settlement opportunities. Free information from Canadian National Railways, Room T-100, Union Station, Winnipeg 1, Canada.

Free "Information about the Ozarks," Farm list with actual photos. Owensby, Realtors, Buffalo, Missouri.

Oregon Farms, Ranches. Mild Willamette Valley climate. 25c for illustrated catalog. Willamette Valley Realty, Box 267-N, Corvallis, Oregon.

Farms, Homesteads, Home Sites. Government land, 24 states, Alaska. Write Sledge Surveys, Macon 5, Mississippi.

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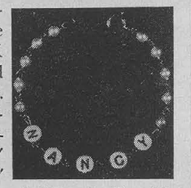
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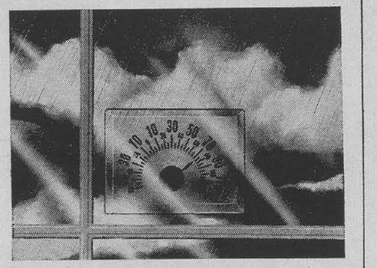
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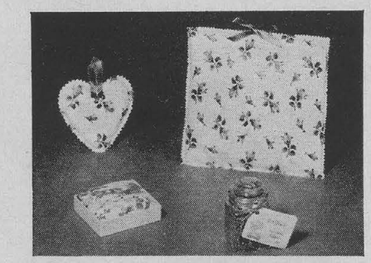
Baby's hospital identification beads can be made into a bracelet for that baby girl, mother, or grandmother. Beads are joined with 14K gold-plated links and tiny simulated pearls. Company will furnish the beads if desired. Choice of 6" (child size) or 7" (adult size). $3.50 ppd. Sherry's, Box 11-CF, Buena Vista, Miami 37, Florida.





Look-thru thermometer tells you the outside temperature from indoors. Attach to windowpane by self-adhesive frame. Clear dial is 2" by 3". $1 ppd. Sunset House, 57 Sunset Bldg., Los Angeles 16, California.

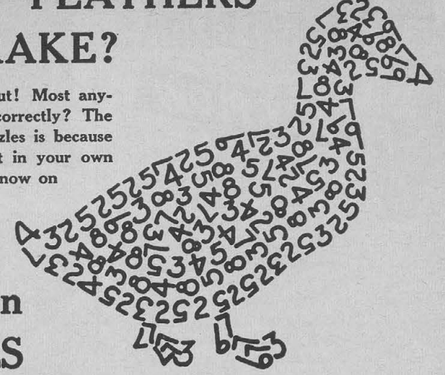
Valentine, Easter, and other holiday designs are easy with a new book of stencils. Kids will think of dozens of uses. Mom will like the stencils for textile painting and other decorating. Book has 25 different designs. $1.50 ppd. Home Service Publications, Dept. CF, Ft. Collins, Colorado.



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Add up the figures and find out! Most anybody can add but can you add correctly? The reason people like number puzzles is because they are fascinating. Fun right in your own home, and CASH AWARDS (now on deposit) for the WINNERS.

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FIRST PRIZE $2,000 including $500 bonus for promptness (see rule 3)

Second Prize	$1000.00	9th to 13th Prize, each	$100.00
Third Prize	$500.00	14th to 18th Prize, each	$50.00
Fourth Prize	$350.00	19th to 44th Prize, each	$25.00
5th to 8th Prize, each	$200.00	45th to 75th Prize, each	$10.00

HERE ARE SIMPLE INSTRUCTIONS AND CONTEST RULES

1. This is entirely a contest of numbers, strictly a Game of Skill. Add together the numbers that make up the drawing of the Drake and get the SUM TOTAL of the figures. The picture is made up of single digits: 2, 3, 4, 5, 7, 8 and 9. There are no sixes, no ones, no zeros. There are no double numbers like "23", etc. Just add 2 plus 3 plus 5, etc., and get the SUM TOTAL. In real life, of course, a Drake has no feathers on the beak, legs and feet but for the purposes of this puzzle all of the figures in the drawing should be added.

2. There are no tricks to this puzzle, just a problem in addition. It is not so easy but if you are careful you may get it exactly right. Only persons sending a $5.00 contribution to our Scholarships Program are eligible for these Cash Prizes. No additional donation will be required at any time during the contest. **Checks and Money Orders should be made payable to 'SCHOLARSHIPS, INC.' Send cash if you prefer. Write us for additional puzzle sheets if you need them.**

3. Scholarships, Inc. is a nonprofit corporation entirely managed by members of a local unit of a national veterans organization which was granted the Scholarships charter in 1954. Under the charter they are required to devote receipts in excess of prizes, advertising and legitimate expenses to nurses training, child welfare and other tax exempt worthy purposes.

4. First prize is $1,500. If you send your contribution before the date printed on the entry blank you will qualify for the $500 Promptness Bonus, making the total First Prize $2,000. The Promptness Bonus will be added to the first prize only.

5. You should check and recheck your solution carefully before mailing. **Once it has been sent it may not be changed or withdrawn.** A contestant may submit an additional entry in this contest with an improved score provided each such entry is accompanied by the required $5.00 contribution. We will acknowledge receipt of your entry and contribution promptly.

6. This contest is confined to persons living in the United States, its territories and possessions including Alaska, Hawaiian Islands, Guam, Canal Zone, Puerto Rico and Virgin Islands. Persons directly connected with Scholarships, Inc., their advertising agency and members of their immediate families are ineligible. Prize winners of $500 or more in our previous contests are ineligible.

7. Entries will be accepted from January 1 to April 20, 1958. Entries postmarked April 20 will be accepted.

8. In case of ties on this Drake Puzzle the winners will be decided by a tiebreaker number puzzle consisting of drawing a path across a chart of numbers to arrive at a high total. The contestant's position in the winning list will be determined by the best scores submitted; the best answer will receive First Prize, the second best answer will receive Second Prize, etc. In case of ties on the tiebreaker puzzle, prizes will be reserved for the positions of tied contestants and their final order of finish determined by additional tiebreaker puzzles until a definite winner for each prize is chosen. Seven days will be allowed for working the first tiebreaker puzzle and three days for each subsequent tiebreaker. If ties remain after seven tiebreaker puzzles, duplicate prizes will be paid.

9. It is permissible for any contestant to receive help from relatives or friends but ONLY ONE SOLUTION may be submitted to the tiebreaker puzzle by any group working together and any solution known to have been submitted in violation of this rule will be rejected. The sponsors of this contest reserve the right to decide any questions that may arise during the contest and persons who enter agree to accept these decisions as final.

10. Just as soon as the winners have been determined a complete Final Report of this contest including the names and scores of all winners, will be mailed to everyone who enters. Here is a contest soon over and soon paid off. The rules are simple and complete. It's entirely a contest of numbers, strictly a game of skill. A pencil is the only tool required and you start on an equal basis with everyone else. No pictures to identify, no statements to write. If you have never taken part in a number puzzle contest why not give it a try. Give yourself a fair chance to succeed. This may be the hobby you have been looking for.

11. Miss Jane Hartman is one of over 65 nurses aided under our scholarships and writes: "I would like to take this opportunity to express my appreciation to those who have made it possible for me to fulfill my desire to become a nurse. My grateful thanks to Scholarships, Inc."

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IT'S HANDY

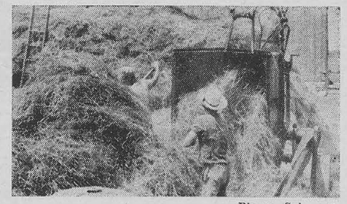


Photo: Schwartz

Blows it up

OLD threshing machine blower still works for Chris Biberstein, Adams county, Indiana. Biberstein took back, or blower, part off old thresher and uses it to stack hay or straw. Roughage is hauled from field and pitched into machine. It blows forage into the mow or stacks it in the barnyard.

Works all year

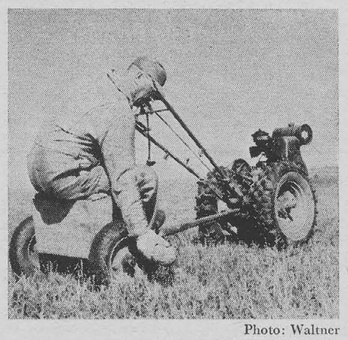


Photo: Waltner

GARDEN tractor works in winter as well as summer for B. J. Fliginger, Turner county, South Dakota. Fliginger put wheels on a box and hitched it behind tractor. He hauls assembly to field in pickup truck. Then he sets tractor at slow throttle and picks up rocks without stopping. Fliginger also uses tractor and seat to bring in cows or carry small objects, eliminating legwork.

Release brake easily

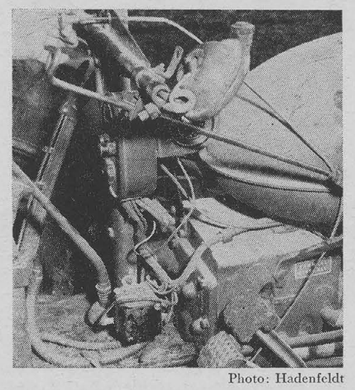


Photo: Hadenfeldt

TRACTOR brake is easy to release. Ralph Spooner, Buena Vista county, Iowa, attached one end of flexible cable to brake lock, mounted other end on tractor dash. To lock brake he presses it down, pulls out knob. Reverse process releases brake easily. This eliminates stopping or hard tugging.

Builds own digger

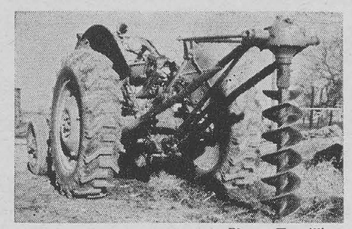


Photo: Terwilliger

MOUNTED posthole digger built by Russell Scheeler, Moniteau county, Missouri, uses old auto differential to transfer power from tractor PTO to auger. Scheeler welded auger to one axle—hooked rod from PTO to old drive shaft. Sturdy frame is made from 2-inch heavy-duty construction pipe.

Fences at fingertips

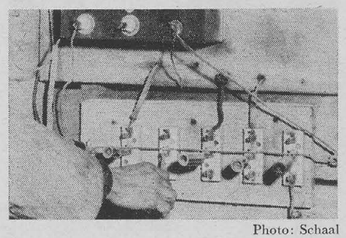


Photo: Schaal

CONTROL five electric fences easily with a homemade panel. Floyd Lampkin, Frederick county, Maryland, built this panel with five knife switches. He can turn any fence on and off at barn and rotate cattle to new pasture without leaving barn. It's easy to check for short circuits this way, too.



An Extra Load from each bushel!

Hybrids differ greatly in their performance.

Two bushel bags of seed, side by side, look much alike. Yet, by your simple choice of one hybrid over another—by *one* right decision—you may harvest an *extra* wagon load of sound, quality corn, from *each* bushel of seed you plant!

This is what happens when you choose Funk's G-Hybrids. Weigh and compare figures all over America are proving Funk's G-Hybrids 5 to 15 bushels better, time after time. In a big scale, 5-year, side-by-side comparison in Illinois, for instance, 118 Funk's G-Hybrid yields were *weighed* and *compared* with 197 yields of other brands of hybrid corn.

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Out-performs them all! Prove it in your fields . . . WEIGH AND COMPARE

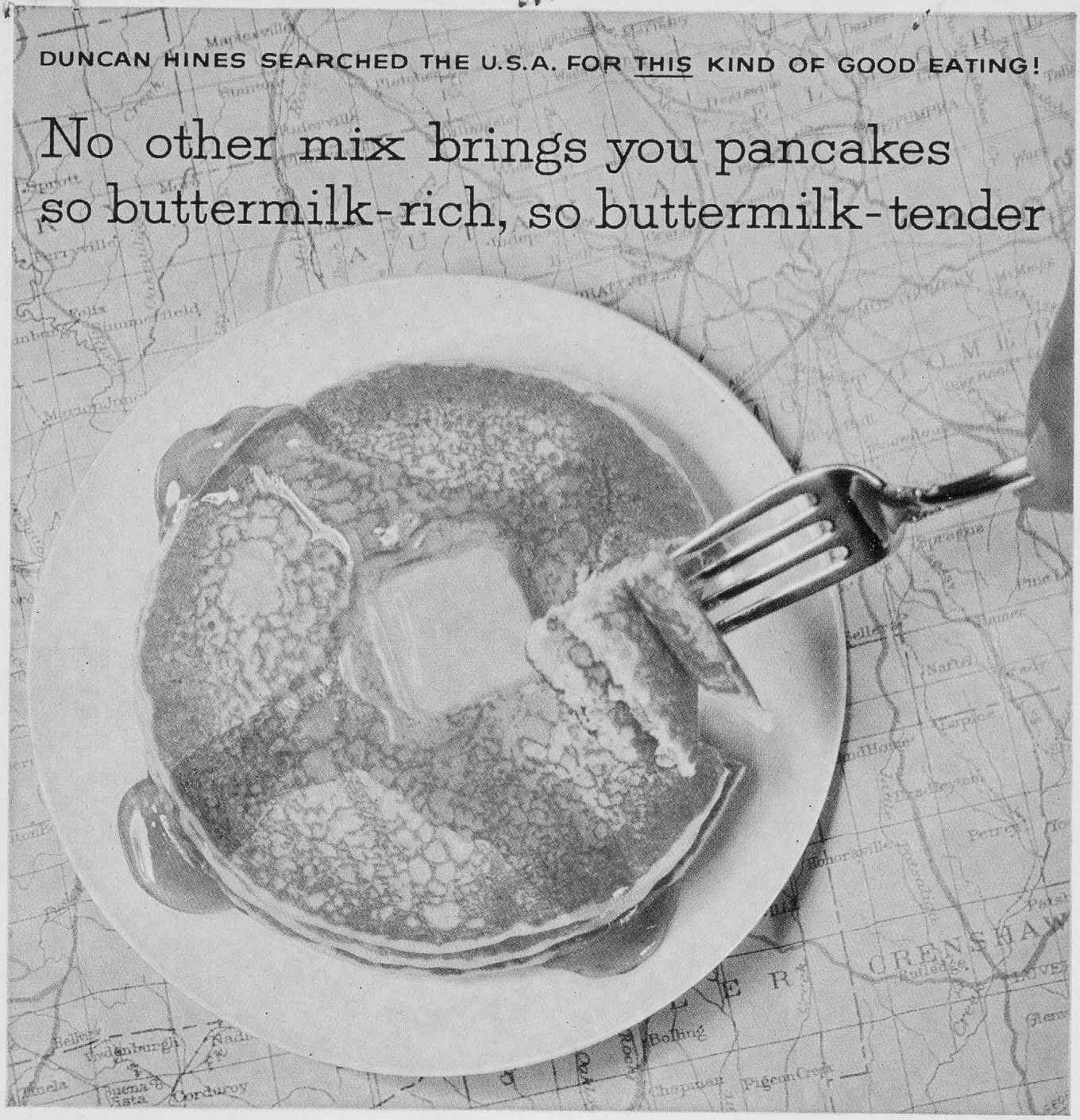
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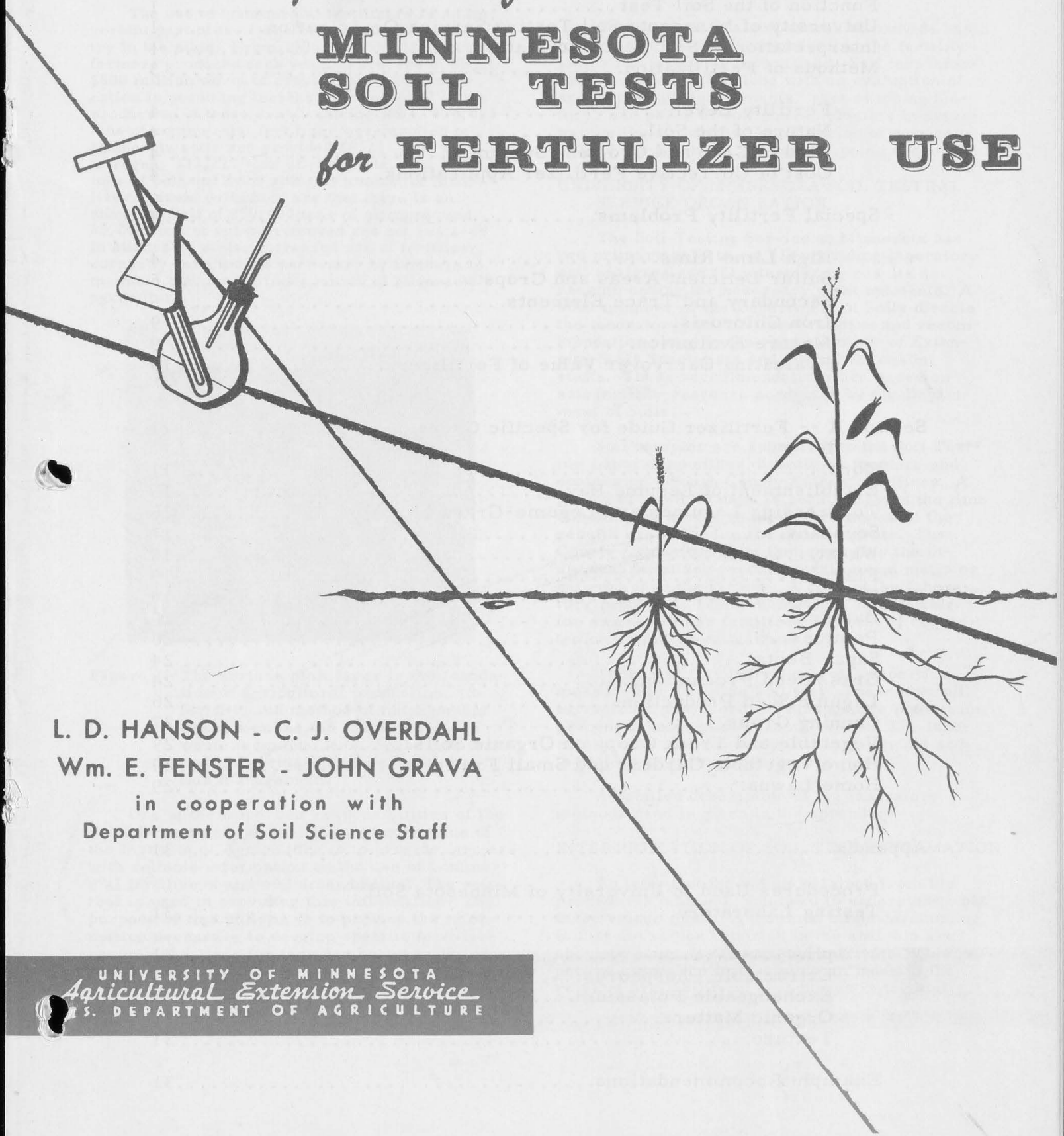


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SPECIAL REPORT 1

REPRINTED 1967

Interpretation of MINNESOTA SOIL TESTS *for* FERTILIZER USE



L. D. HANSON - C. J. OVERDAHL
Wm. E. FENSTER - JOHN GRAVA
in cooperation with
Department of Soil Science Staff

UNIVERSITY OF MINNESOTA
Agricultural Extension Service
U.S. DEPARTMENT OF AGRICULTURE

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Interpretation of Minnesota Soil Tests for Fertilizer Use

L. D. Hanson, C. J. Overdahl, M. V. Halverson, and John Grava, In cooperation with Soils Department Staff

The use of commercial fertilizers is an important part of the large crop production industry in the state. From 1956 to 1959, Minnesota farmers produced each year an average of about $800 million worth of crops. Fertilizer application is becoming increasingly essential in the production of these crops. During 1963, 614,621 tons of commercial fertilizer were applied to Minnesota soils and provided 80,211 tons of nitrogen, 114,227 tons of phosphate, and 77,448 tons of potash. Even with this amount of fertilizer, recent estimates are that there is an annual deficit of 250,000 tons of nitrogen and 65,000 tons of potash removed and not replaced in Minnesota soils. Increased use of fertilizer, correctly selected, is necessary by farmers to maintain the competitive position of Minnesota's agriculture.



Figure 1. The surface plow layer is the foundation of agricultural production. Its fertility and method of management can determine the efficiency of the whole farm business. Sound soil tests and interpretation are essential to this management.

One of the important responsibilities of the Soils Department and the Extension Service of the Institute of Agriculture is to provide farmers with reliable information on the use of commercial fertilizers and soil amendments. The soil test is used in providing this information. The purpose of this bulletin is to provide the information necessary to develop specific fertilizer recommendations for farmers based on University of Minnesota Soil Testing Laboratory analyses and related Soils Department research.

SECTION I

PRINCIPLES OF SOIL TESTING and FERTILITY

FUNCTION OF THE SOIL TEST

The purpose of a soil test is to provide basic information essential in evaluating the fertility status of a cropping unit of land. Soil test information is then used along with an evaluation of specific crop requirements, past cropping history, and physical soil characteristics in determining the amount and combination of nutrients needed for a certain crop or cropping sequence.

UNIVERSITY OF MINNESOTA SOIL TESTING SERVICE ORGANIZATION

The Soil Testing Service at Minnesota has two primary objectives: (1) providing laboratory soil analyses and (2) interpreting results and recommending the necessary plant nutrients. A staff member of the Department of Soils directs the laboratory and the interpretation and recommendation phase is the responsibility of Extension Soils Specialists and County Extension staffs. These recommendations are based on soil fertility research conducted by the Department of Soils.

Soil samples are submitted to the Soil Testing Laboratory either directly by farmers and dealers or through County Extension offices. A period of about 10 days is required from the time the samples arrive in the laboratory until the results are mailed to the county agents. The County Extension Agent then prepares the individual fertilizer recommendation and mails or delivers it to the farmer. A copy of the laboratory report and recommendations is available for others such as fertilizer dealers, if requested on the information sheet.

There are five individual soil properties measured in a routine soil test. These are: pH, extractable phosphorus, exchangeable potassium, percent organic matter, and texture. The laboratory uses modern analytical instruments and is staffed by trained personnel.

A detailed description of the laboratory methods used is given in the appendix.

INTERPRETATION OF SOIL TEST INFORMATION

To interpret the values obtained from the procedures outlined, you need to understand what these values mean. A common misunderstanding is that the values reported in the analysis are absolute amounts of available nutrients. This is not the case. The test value is an index to the relative availability of phosphorus in the soil.

Table 1. Available soil phosphorus as determined by chemical tests*

Fertilizer	Total P_2O_5 applied +	Bray's 2 extractable P	Bray's 1 extractable P	Thornton's method for available P	"A" ++ values P
	lbs./acre	lbs./acre	lbs./acre		lbs./acre
None	---	25	18	Med. -	34
Concentrated superphosphate	240	48	41	Med. +	59
Rock phosphate	600	104	21	Very high	34

* Caldwell, A.C. et. al. SOIL SCIENCE SOC. AMER. PROC. 20:25-28, 1956.
\+ Fertilizer applied in equal amounts over a period of 6 years.
++ Legume hay, second sampling. Kenyon silty clay loam, Mower Co. - pH 5.4-6.3.

A 10-pound test for phosphorus, for example, does not mean that there are 10 pounds of phosphorus available for a crop during the growing season. One crop, such as corn, may remove 30 pounds of phosphorus while oats on the same soil would remove 9 pounds per acre. The laboratory test values become meaningful only when they are calibrated with the availability of a nutrient to growing plants. This is done in controlled soil test correlation experiments.

The designation of the relative level of the soil test values, i.e. high, medium, and low, is the result of summaries of experimental data which give the average yield increases from a specific nutrient on different soils having different tests.

Preliminary to calibration of a test, the selection of the soil test method is based on greenhouse, field, and laboratory experiments. Table 1 shows a comparison of four phosphorus tests from a soil receiving different fertilizer applications.

Table 2. Interpretation of phosphorus and potassium contents of Minnesota soils

Relative level	Extractable phosphorus* (P)	Exchangeable+ potassium (K)
	lbs./acre	lbs./acre
Very low	Less than 6	Less than 60
Low	6 - 10	60 - 90
Medium	11 - 20	91 - 220
High	21 - 30	221 - 260
Very high	More than 30	More than 260

* As determined by using Bray's No. 1 extracting solution.
\+ As determined by using neutral 1N ammonium acetate extracting solution and Perkin-Elmer Flame Photometer.

The amount of phosphorus extracted by the Bray's No. 1 method corresponds well with "A" values. The "A" value measures "biological" or "plant" available phosphorus and is used as a standard for evaluating chemical tests.

Selection of the Bray's No. 1 phosphorus extractant was based on this and similar information. Because Minnesota has large areas of calcareous soils that are low in available phosphorus, the stronger acid extractants (Bray's No. 2 and Thornton's method) are not suitable because they give relatively high phosphorus readings on these phosphate responding soils.

Table 2 shows the general interpretations of phosphorus and potassium test values for Minnesota soils.

The low test levels are reserved for conditions where the chances of getting a profitable increase from fertilizer recommended are overwhelmingly in favor of a farmer. The amount of increase from fertilizer on two different fields with the same test level probably will not be the same because factors other than fertility may influence the results, but the chances are that both increases will be profitable. On fields with high soil test levels the odds are against receiving a profitable increase for heavy fertilization.

For some crops moderate rates of fertilizer are recommended even at high levels because the indicated soil fertility is often not available early in the growing season.

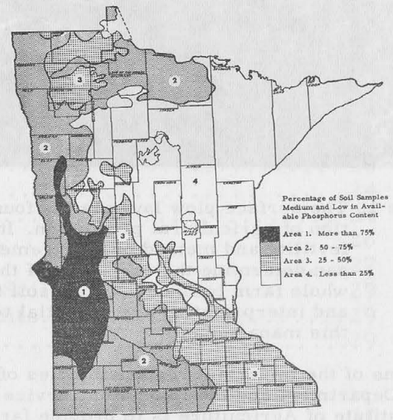


Figure 2. Phosphorus levels of Minnesota soils.

Relationship of Soil Tests and Soil Characteristics

In general there are rather consistent relationships between the parent material, soil morphological characteristics, geographic location, and the average fertility status. For example, the following relationships usually are true unless the soil has been altered by heavy fertilization or by lime.

Acid medium and sandy textured soils developed from outwash are usually low in organic matter, medium to high in phosphorus, and medium to low in potassium.

Clay loam Clarion-Webster and Barnes-Aastad prairie soils in the south and west are usually medium to high in organic matter, low to medium in phosphorus, and medium to high in potassium.

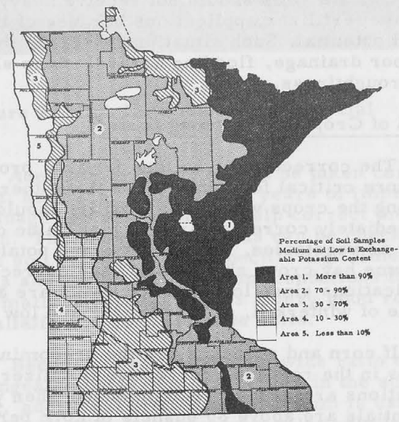


Figure 3. Potassium levels of Minnesota soils.

Silty clay and clay lacustrine prairie soils of the Red River Valley are predominantly medium to low in phosphorus and high in potassium.

Because of the extreme differences in soils in the state it is recognized that there is reason to interpret soil tests in relation to the type of soil. For example, a 40-pound test for phosphorus on a calcareous clay loam soil probably means more available P than if the 40-pound test were an acid sandy soil. This is because part of the high test from acid soils represents unavailable iron and aluminum phosphates.

One of the goals of the soil test correlation program and other Soils Department research is to evaluate the differences in soil tests from different soil areas and incorporate this information in fertilizer recommendations.

Now the same value is given to the phosphorus and potassium analysis regardless of soil type until more information is obtained.

METHODS OF FERTILIZATION

As a result of many new developments in fertilizer technology and soil fertility research, the opportunity for alternative methods of using fertilizer has been markedly increased in recent years.

One of the main decisions in soil management is to what extent the soil is fertilized in contrast to what extent the crop is fertilized. Fertilizing the soil means broadcasting rather large amounts of fertilizer which is designed to build up the available nutrient level of the soil. Fertilization of the crop refers to applying a relatively lower rate near the seed at planting time.



Figure 4. Trailer for broadcasting

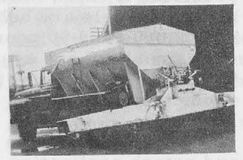


Figure 5. Bulk truck for direct application. New equipment for fertilizer application is constantly being developed. Recommendations should take into account the equipment available.

It is difficult to decide whether to use phosphate and potash in moderate annual applications or heavier broadcast treatments applied less often. Nitrogen is less stable in the soil, and its application rates are specifically adjusted to the kind of crop and crop sequences with less attention to soil buildup over a period of time. Nitrogen, therefore, is usually applied annually for nonlegume crops.

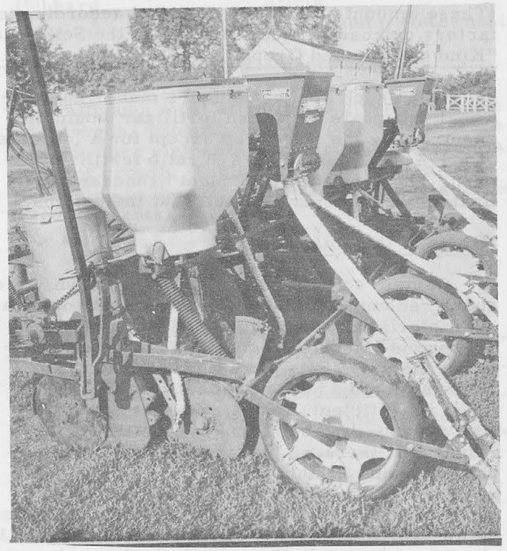


Figure 6. Corn planter with insecticide, herbicide, and fertilizer attachments.

Important factors to consider in choosing the method and the amount of phosphate and potash application are:

1) Fertility level as determined by soil test.
2) Nature of the soil.
3) Kind of crop and cropping system.

A discussion of these factors follows.

Fertility Level

Whenever phosphate and potash application in 1 year exceed approximately 60 pounds and 100 pounds per acre respectively, we are in effect using a corrective or buildup program. Even lesser rates will contribute to increased fertility levels, but the lower the rate the more gradual the buildup.

These applications are needed on low fertility fields to make efficient crop production possible. A rapid buildup is desirable where soil test levels are below 6 pounds per acre for phosphorus and 90 pounds per acre for potassium. Occasionally there are requests from farmers with unlimited capital for immediate buildup recommendations.

Table 3 is a guide for corrective phosphate and potash application designed for immediate and practical buildup of the soil fertility and test level.

Table 3. Guide for corrective fertilizer application

P soil test	P_2O_5 per acre	K test level	K_2O per acre
4-6	140	60-90	180
0-3	240	0-59	240

(These amounts should be modified according to factors discussed under "Nature of the Soil" and "Kind of Crop and Cropping System"

When such applications are made, no additional phosphate or potash fertilizer would be required for the first crop except for a low rate of a 1-4-4, 1-4-2, or 1-4-0 ratio fertilizer for corn. The need for subsequent broadcast fertilization would depend on soil test indications.

Nature of the Soil

Certain soil characteristics may modify the above recommendations. The two most important characteristics are texture and soil reaction. Texture is important especially for potash recommendations since potassium will leach in sandy soils; and heavy applications are, therefore, not efficient. Leaching is not a problem with phosphorus, but extreme (low or high) pH values will increase fixation of available phosphorus to unavailable forms.

Therefore, whenever the pH is above 7.8 or below 5.6, applications recommended in table 3 should not be used. For potash the heavy broadcast application in table 3 should not be used on loamy sands or sand textured soils.

In cases where the pH is below 5.6, lime should be applied as recommended except for special crops. When lime is applied and the P test is below 6, the corrective phosphate applications can be followed with reasonable assurance of high efficiency.

Certain soils should not receive heavy corrective fertilizer applications because of low yield potential. Such situations would be those of poor drainage, flooding hazard, steep slope, or droughtiness.

Kind of Crop and Cropping System

The corrective or buildup fertility program is more critical for some crops than others. Among the crops where low fertility should be immediately corrected are the high value crops such as vegetables, sugar beets, and potatoes. Legume hay crops should also have corrective applications since low fertility levels are a main cause of winterkill, stand failure, and low yields.

If corn and soybeans are the predominant crops in the rotation, corrective fertilizer applications are usually recommended when yield potentials are above 85 bushels of corn per acre and soil tests are low.

Corrective, heavy fertilizer applications should not be recommended when the main crops are small grains. For these crops phosphorus is usually the limiting element rather than potassium, and efficient yields can be raised with moderate phosphate rates placed with the seed.

Cost of Corrective Fertilizer Applications

When heavy corrective applications are made, the cost should not be considered a cost charged to one crop. It is rather in the nature of a capital improvement such as drainage or liming so it should be capitalized over a period of several years.

SPECIAL FERTILITY PROBLEMS

High Lime Rims

The nearly level soils in the Clarion-Webster and Barnes-Aastad soil association areas often have a surface accumulation of lime. This condition has developed in the process of evaporation of drainage water that collects in these areas. A probable explanation is that there has been a differential rate of evaporation and $CaCO_3$ precipitation around the outside edge of the ponded water. In some of these sites up to 25 percent of the soil weight in these rims is $CaCO_3$.

This abnormal soil condition causes certain soil fertility problems. In general, the plants on these areas, unless fertilized, are phosphorus and potassium deficient. This is especially true of corn, but other crops are also affected.

Recommendations to help correct problems associated with high lime or "alkali" soils include drainage, fertilization, and selection of less or nonsensitive crops.



Figure 7. High lime rims cause special fertility problems.

Adequate drainage should be taken care of first; however, a number of years of improved drainage are necessary to help correct the situation. The phosphorus status can be checked with soil tests from the specific high lime locations and the standard recommendations followed. Normally phosphate causes a very good response on alfalfa and corn on these soils.

Because of the extremely wide ratio of exchangeable potassium to calcium in the surface soil, additional fertilizer potassium is usually needed.[1] This condition of a relatively large amount of calcium available to the plant root compared to potassium causes an imbalance in the plant.

In the case of corn there are indications that broadcast treatments of potash fertilizer have not adequately supplied potassium. Therefore, a combination of 100 to 120 pounds of K_2O broadcast plus small amounts of potash applied near the row at planting time is suggested on these soils. Row or starter potash should be from 10 to 20 pounds per acre. This is recommended on all potassium tests below 300 when the high lime situation exists. Level land and a pH above 7.4 can be used to identify such cases. When K tests are above 300, use only the row starter fertilizer.

Small grains are more tolerant of these calcareous rims but will respond to phosphate. The fertilizer guide tables can be followed for small grains and alfalfa.

Sulfur Deficient Areas and Crops

Sulfur is an essential secondary element for plants. In most areas of the state it is present in adequate supply either in the soil or in precipitation.

However, there is a considerable area in north central Minnesota where sulfur response to alfalfa and other legumes and in some cases to oats has been measured. At the present time a routine test for sulfur is not available so recommendations are based on the soil area and crop.[2]

1 Overdahl, C. J. "Potassium Problems." Soils Fact Sheet No. 6. University of Minnesota.
2 Overdahl, C. J. and Caldwell, A. C. "Sulfur for Minnesota Soils." Soils Fact Sheet No. 5. University of Minnesota.

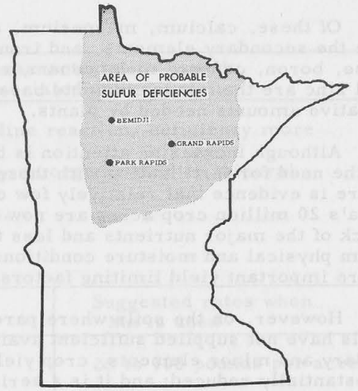


Figure 8.

Since yield responses have been inconsistent on small grains, alfalfa and clovers are the only crops on which sulfur is recommended. If potassium, phosphorus, and lime have been adequately supplied but legume growth is still poor, gypsum (calcium sulfate) should be applied. This should be at the rate of 300 pounds per acre or an equivalent amount of some other sulfur-bearing material.

The soils on which sulfur response would be expected are Nebish, Rockwood, Brainerd, NoKay, Menahga, and Chetek. These recommendations apply to the following counties:[3]

East Polk	Cass
Clearwater	Crow Wing
Beltrami	Morrison
Becker(east one-half)	Itasca
Otter Tail (northeast)	St. Louis (west tier of township)
Wadena	
Hubbard	Aitkin
	Mahnomen (two townships)

Secondary and Trace Elements

Although most attention is given to the use of nitrogen, phosphorus, and potassium, there are 13 other elements that are just as essential to plant growth. Table 4 lists these elements according to the source and the relative amount used by plants.

Table 4. Essential nutrient elements and their sources

Used in relatively large amounts			Used in relatively small amounts	
Mostly from air and water	From soil colloids		From soil colloids	
Carbon	Nitrogen	Calcium	Iron	Copper
Hydrogen	Phosphorus	Magnesium	Manganese	Zinc
Oxygen	Potassium	Sulfur	Boron	Molybdenum
				Chlorine

3 Refer to current ASC Conservation Guide.

Of these, calcium, magnesium, and sulfur are the secondary elements, and iron, manganese, boron, copper, molybdenum, chlorine, and zinc are the minor elements based on the relative amounts needed by plants.

Although increasing attention is being given to the need for fertilization with these elements, there is evidence that relatively few of Minnesota's 20 million crop acres are now deficient. Lack of the major nutrients and less than optimum physical and moisture conditions are much more important yield limiting factors.

However, on the soils where parent materials have not supplied sufficient available secondary and minor elements, crop yields are substantially reduced; and it is a serious problem for the individual farmer.

Calcium and magnesium are largely taken care of by the lime recommendation. Most of the agricultural limestone used in Minnesota is a dolomite rock that contains both magnesium and calcium carbonate.

Sulfur recommendations are based on area and crop as discussed previously.

Recommendations on minor or trace elements will depend on the variety of a specific crop and soil situations. At the present time there are no routine soil tests available for these nutrients. Research is being conducted to better establish minor element fertilization needs and diagnostic techniques useful in predicting these needs.

In evaluating the possibility of a minor element problem it is important to consider a major nutrient deficiency, insufficient or excessive moisture, diseases, or insect problems. Following is a guide to the general conditions associated with minor element deficiencies and the range of suggested rates of application. It is suggested that new minor element recommendations for large acreages be called to the attention of soils specialists or soils department staff.

Boron

Function in plant	Soil characteristics usually associated with deficiency
Affects the flowering and fruiting process, cell division, and pollen germination; is a constituent of membranes and acts as a buffer.	Mineral soils low in organic matter and medium or sandy in texture. Deficiencies noted have been in southeast, northeast, and central Minnesota. Organic soils unless previously fertilized with boron.

Crops of possible deficiency in Minnesota	Deficiency symptoms	Suggested rates when B is used
Plants most sensitive to deficiency -- alfalfa, sweetclover, sugar beets, caggage, celery, apples, cauliflower, rutabagas. Tolerant crops to deficiency -- barley, corn, wheat, oats, soybeans, strawberries, potatoes.	Alfalfa--orange-colored top leaves, terminal bud dead. Multibranching at top of plant. Root crops-heart rot of roots. Corn - short plants and poorly filled or barren ears.	Alfalfa and vegetables--20 pounds per acre of borax or 2 pounds of boron. Corn - 5 to 10 pounds of borax; not more than 10 pounds per acre. Boron containing materials should be broadcast.

Manganese

Function in plant	Soil characteristics usually associated with deficiency
A constituent of respiratory enzymes. May be concerned with nitrogen metabolism; assists with the synthesis of chlorophyll.	Alkaline reaction, deficiency more likely on organic than on mineral soils.

Crops of possible deficiency in Minnesota	Deficiency symptoms	Suggested rates when Mn is used
Potatoes, oats, alfalfa, soybeans, onions, and peas. Few established cases of Mn deficiency have been reported in Minnesota.	A chlorosis between the veins of net-veined leaves; on leaves with parallel veins, general chlorosis or "gray speck" on oats.	25 to 100 pounds per acre of $MnSO_4$. If soil is very high in pH (7.5+), higher rates can be used.

Iron

Function in plant	Soil characteristics usually associated with deficiency
A catalyst in production of chlorophyll.	High-lime, low-lying mineral soils in south central and western Minnesota. Excessive phosphate, bicarbonate, and heavy metals contribute to iron deficiency.

Plants of possible deficiency in Minnesota	Deficiency symptoms	Suggested rates when Fe is used
Soybeans, flax, corn, gladioli, roses, spiraea, flowering crab, strawberries, apple, plum, maple, elm, boxelder, larch, and birch.	Yellowing of intraveinal leaf tissue with veins remaining green.	One percent $FeSO_4$ as spray on foliage or 5 to 10 pounds per acre of chelates DTPA or APCA as soil treatment (Chel-330 Fe or chel-138 Fe).

Copper

Function in plant	Soil characteristics usually associated with deficiency
Not well established except that it is a constituent of many enzymes. Is concentrated in rootlets and chloroplasts.	Deficiency most likely on organic soils with pH below 5.5.

Crops of possible deficiency in Minnesota	Deficiency symptoms	Suggested rate when Cu is applied
Lettuce, onions, spinach, carrots, alfalfa, grasses, and oats. Deficiencies have been noted on organic but not mineral soils.	Not readily apparent on most crops. Tips of small grain leaves are white or yellow.	On mineral soils 5 to 25 pounds per acre of $CuSO_4$; on organic soils 20 to 30 pounds of $CuSO_4$.

Molybdenum

Function in plant	Soil characteristics usually associated with deficiency
Essential for N fixation by microorganisms and nitrogen transformation processes in plants.	Characteristics not well defined. Low organic matter and acid pH are likely. Liming can correct deficiency. A recent greenhouse experiment with Anoka, Barnes, Nicollet, Fayette, and Hegne soils showed no Mo response on alfalfa.

Crops of possible deficiency in Minnesota	Deficiency symptoms	Suggested rate when Mo is used
Alfalfa--Response reported on one experiment at Rosemount.	Alfalfa leaves are pale green and leaf margins appear gray, limp, and wilted. Upper leaves are affected first.	Eight ounces of Mo per acre as $(NH_4)_2\ MoO_4$. This can be applied as a spray or as a seed treatment.

Zinc

Function in plant	Soil characteristics usually associated with deficiency
Necessary component of several enzyme systems. It is needed for formation of auxins which are growth promoting substances.	Zinc deficiencies appear to be associated with alkaline soil in this area.

Crops of possible deficiency in Minnesota	Deficiency symptoms	Suggested rate when Zn is applied
Most sensitive crops--corn, lima beans, flax, soybeans. Moderately sensitive--potatoes, tomatoes, onions, sugar beets. Deficiencies have been observed on a number of limy soils.	Chlorosis of interveinal tissue, particularly lower leaves. Causes striping of corn leaves; plants are stunted with severe deficiency.	15 to 25 pounds of $ZnSO_4$ per acre can be used on trial basis either broadcast or in the row. Nitrogen-containing fertilizer should be used with zinc application.

Iron Chlorosis

Some fields of soybeans and flax in southern and western Minnesota are subject to an available iron deficiency called iron chlorosis. The problem is characterized by yellow leaves on these crops as well as some ornamental plants. The field crop problem is usually most severe in the month of June and is largely restricted to high-lime, low-lying soils.

Extensive research has shown that the reasons for the iron deficiency are very complex and involve a number of soil and soil-climate characteristics. Chelated iron compounds, organic iron carriers, have been effective in correcting the iron deficiency. However, the 10-to 20-pound rates of the materials that are needed are too expensive for general use on field crops. Two materials that have been effective are chelates DTPA and APCA (Chel-330 Fe and Chel-138-Fe) which can be applied as a broadcast on a trial basis at the 10-pound-per-acre rate. There is some indication that these materials can be used effectively as a seed treatment for soybeans which also may be tried on a small acreage. The most practical recommendation is to use a 1 percent ferrous sulfate solution spray on the foliage of the affected plants. Such treatments have to be repeated about every 10 days until the chlorosis disappears.

Manure Evaluation

One of the difficulties in making fertilizer recommendations is to properly evaluate manure recently applied to a field in question. This is because of the variability in the amount and availability of nutrients in the manure and the general lack of specific information as how much manure has been or will be applied.

For routine soil test recommendations where there is no chance to talk to the farmer the most practical method is to credit each ton of manure with 6 pounds of nitrogen and 10 pounds of potash. This amount should be deducted from the needed total indicated on the guide tables for a given soil test. However, do not eliminate the first 10 to 20 pounds of row potash for corn even though the total potash need might be satisfied from the manure applied. The phosphate applied in manure may vary from 3 to 6 pounds per ton but is ignored in calculating the fertilizer to be applied for row crops and small grains. This is because the amount of phosphate is usually not high and the placement is not as effective as the phosphate applied as commercial fertilizer. Also, the manure phosphorus is not readily available. Where placement is not as critical, such as for legumes, the phosphate can be credited at the rate of 5 pounds per ton.

In cases where more information is available about the kind of manure applied the following information will be helpful in evaluating the fertility value of manure.

Decomposition of manure must occur before nitrogen and phosphorus are released, but is not necessary for the release of potassium. For this reason it is estimated that 30 to 60 percent of

nitrogen and phosphorus is released to the crop in the year the manure is applied. All of the potassium, 8 to 10 pounds per ton, is considered available the first year.

Well rotted manure from feed bunk areas or cattle sheds will have about 60 to 70 percent of the N and P available while the 30 to 40 percent figure is more appropriate for dairy barn manure with bedding.

Poultry manure has a higher nutrient value than swine and cattle manure. A value of 25 pounds of nitrogen, 15 pounds of phosphate, and 10 pounds of potash per ton should be used.

Evaluating Carryover Value of Fertilizer

In general past fertilization with phosphate and potash will be reflected in higher soil test values for P and K so no adjustment has to be made in the recommendations.

There are three situations, however, where some estimates have to be made of the amount of nutrient carryover or credit for past fertilization. These are:

1) Applications of greater than 60 pounds of P_2O_5 and K_2O have been made within 12 months of the crop for which recommendations are being made. In this case the fertilizer is not likely to have been adequately mixed with the soil measured by the soil test.

2) A recommendation is to be made from soil test information from samples taken before fertilization. This would usually be a case where a second or third year crop after testing was to be fertilized.

3) Situations where a crop failure occurred the previous year and an estimate is to be made of the value of carryover to determine the next year's fertilization.

A number of soil and climatic factors affect the absolute amount of carryover fertility. Such factors which would tend to decrease fertilizer carryover would be above-average rainfall, coarse-textured soil, acid soils, high yields, and erosion.

As a general guide for carryover fertility, it can be considered that 20 percent of the N, 20 percent of the P_2O_5, and 50 percent of the K_2O can be credited for the second crop if rates of 60 pounds per acre or greater were used. When a crop failure occurred, which would be most applicable for corn, the credit for N and P_2O_5 can be doubled. See table 5.

Table 5. Guide for credit of carryover of past fertilization *

Nitrogen	Rate of N applied per acre	Carryover after normal crop lbs. N per acre	Carryover after crop failure lbs. N per acre
	40	0	0
	60	10	20
	80	15	30
	100	20	40
Phosphate	**Rate of P_2O_5 applied per acre**	**Carryover after normal crop lbs. P_2O_5 per acre**	**Carryover after crop failure lbs. P_2O_5 per acre**
	40	0	0
	60	10	20
	80	15	30
	100	20	40
Potash	**Rate of K_2O applied per acre**	**Carryover after normal crop lbs. K_2O per acre**	**Carryover after crop failure lbs. K_2O per acre**
	40	0	0
	60	30	30
	80	40	40
	100	50	50

* Do not eliminate all starter fertilizer for corn or drill-placed phosphate because of the carryover contribution.

Note: The figures are rounded off to the nearest 5 pounds.

SECTION II

FERTILIZER GUIDE for SPECIFIC CROPS

The guide tables in the following section are organized to vary the amount of plant nutrients according to: 1) soil test levels of organic matter, phosphorus, and potassium; 2) yield goal; and 3) previous soil management.

The final recommendation should follow the guide figures quite closely but some changes can be made. Adjustments, for example, should be made in order to recommend a minimum number of grades for one farm. When a change in amount of plant food is made, it is usually in the farmer's interest to recommend more than the crop guide indicates rather than less because the additional residual effect will be profitable.

It is important to avoid making different recommendations for soil tests from the same field.

The guide figures give nutrient amounts that are expected to result in the greatest average return per acre over a period of years. Some of the nutrients recommended, particularly in the case of the low category for P and K, are intended to gradually increase the supply of the nutrients for succeeding crops. A rapid buildup program with corrective treatments is discussed earlier in the bulletin.

In the case of a person with limited capital who must have the greatest return per dollar invested in fertilizer, the amount of phosphate or potash can be decreased to that recommended for the medium categories where soil tests are low. The greatest return per acre should result by following the recommendations.

Changes from the guide recommendations should not be made without discussion with the operator. In most cases, if capital is limited, fewer acres at the recommended rate should be fertilized rather than a lower rate per acre. At least part of the field should be fertilized at the proper rate for comparison with lower rates.

Certain assumptions are made in arriving at the recommended nutrient rates concerning other crop and soil management practices. These practices would include: soil drainage, weed control, planting rate, adapted variety and hybrids, and water and erosion control. In the case of corn these variables are handled by having different fertilizer recommendations in three yield goal categories.

For other crops management, practices are those recommended by the Minnesota Agricultural Extension Service.

CORN

Proper fertilization of corn is particularly critical because of relatively high cost of corn production and the high potential yield increase from applied nutrients. Yield increases of 50 bushels are not uncommon and quality often is improved with adequately fertilized corn being higher in protein and phosphorus and lower in moisture.

Of the three primary nutrients, nitrogen deficiency probably causes the greatest loss of potential yield. With a total requirement of about 150 pounds of nitrogen for 100 bushels, 120 pounds of which is needed during the 2-month midseason period, soil released nitrogen is usually not adequate for efficient yields.

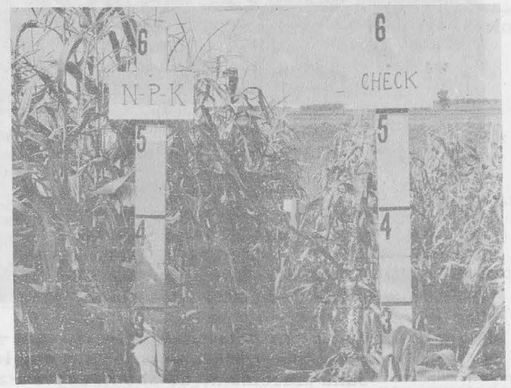


Figure 9. Field soil test correlation plots have been used to determine fertilizer recommendations.

Nitrogen

The recommended rate of nitrogen for corn varies with the yield goal, relative amount of soil organic matter, and nature of the preceding cropping soil management. Unless corn follows a legume crop or the field has been manured, the total amount of nitrogen recommended is usually in excess of 40 pounds per acre. At this or a higher rate it is usually economical to apply most of the nitrogen as a straight material.

The effect of different times of application and differences in nitrogen sources has been extensively investigated. This research shows that nitrogen can be applied either in the fall, in the spring before planting, or as an early sidedress on most soils with little difference in efficiency. The exception is on sandy soil (loam or coarser) where sidedressing is recommended because of substantial losses by leaching. There is also some evidence that surface applied nitrogen on soils that become extremely wet for an extensive period undergoes some loss by a volatilization to the atmosphere.

For this reason incorporation of the nitrogen in the soil, regardless of the form, is good insurance against loss where soil surfaces tend to be frequently wet.

It is common to apply nitrogen before plowing corn stalks to hasten the decay process. Although stalk decomposition may be hastened by a fall nitrogen application, subsequent corn yields are about the same with fall or spring application. Therefore it is most efficient to apply all of the needed supplemental nitrogen at one time--fall, spring, or sidedress--rather than a higher cost split application. With row fertilizer placed 2 inches to the side and below the seed high nitrogen grades can be used to supply the total nitrogen need at planting time.

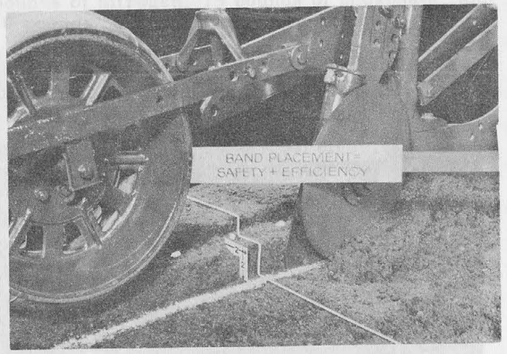


Figure 10. The trend today in fertilizer placement for row crops is toward single band placement, as shown above--a safe, efficient way to place planting fertilizer. The single band is about 2 inches to the side, 2 inches below the seed. It is safe because the fertilizer salts do not contact the germinating seeds or tender seedlings .... efficient because the fertilizer is placed where the feeder roots can soon reach the plant nutrients and the band is down where the soil is more likely to be moist.
Courtesy: American Potash Institute

There is a wide selection of nitrogen materials. These include the following:

Nitrogen	Form	Percent N
Ammonium sulfate	Solid	21
Ammonium nitrate	Solid	33½
Low pressure solutions	Liquid	21 to 32
Pressure solutions	Liquid	28 to 41
Urea	Solid	45
Anhydrous ammonia	Liquid(stored)	82½
	Gas (applied)	

Tests have shown that applying these materials has essentially equal effects on corn yield per pound of nitrogen. The choice by the buyer will depend on the convenience of application and price. In general, the materials that are applied below the soil surface, pressure solutions and anhydrous ammonia, become cheaper per pound of nitrogen as rate per acre is increased when the cost of application is included.

Phosphorus

Corn growth and yield response to phosphate fertilizers in Minnesota have been frequently measured, and the use of phosphate fertilizer on corn is widely accepted. The commonly observed "starter effect" is largely the stimulating effect of phosphorus on early growth. Even though the amount of phosphorus used by young corn plants is small (1 pound of P_2O_5 per acre in first month), lack of an early available supply in the immediate root area inhibits plant development throughout the season. For this reason at least 20 pounds of P_2O_5 placed near the seed is recommended for all soils that test below 100 pounds of P per acre.

When higher rates than 40 pounds of P_2O_5 are applied for corn, the recommendation is usually to apply a portion of the fertilizer as starter and larger amounts as a broadcast application. Broadcast phosphate, especi. lly if plowed down, has the advantage of being in a good position for late season use; and application costs and labor are minimized. However, recent research has shown good utilization of higher rates of phosphate in row placement so the choice of method of application above 20 pounds in the row depends largely on the difference in time, labor, and application cost.

Yield increases from phosphorus fertilizers in general are quite consistent but not as large as those from nitrogen. Also, applied phosphorus does not move out of the soil and, therefore, may be available for succeeding crops.

Table 6 gives a summary of average yield increases from phosphate fertilizer on corn when nitrogen and potassium were adequate.

Table 6. Yield increase from 100 pounds of P_2O_5 on soils of different soil tests *

Soil test range		Corn yield increase	Number of fields
20 to 200+	High	3.8	53
10 to 19	Medium	4.5	50
6 to 9	Low	10.0	30
0 to 5	Very low	19.5	15

* Data from 1959 and 1960 soil test correlation plots.

Potassium

The need for potassium for corn in Minnesota is increasing both in respect to soil areas and the rate per acre. This is because of more precise information on the location of potassium deficient soils, higher potassium requirement with higher yields, and the continual depletion of native available soil potassium.

The potash yield response on potassium deficient soils is substantial, often greater than 20 bushels per acre. In the medium soil test category, 90 to 200 pounds per acre, the yield response is quite variable. Soil moisture and temperature are very important in the release

of available soil potassium with availability decreased with moist conditions and increased availability with drying. Therefore, seasonal differences in potash response is often noted, especially on fine textured soils.

In addition to the yield effect, applied potash tends to increase resistance to lodging and improves grain quality.

Potash placement is not so critical as phosphate because potassium is more mobile in the soil. However, indications are that row placement of amounts less than 30 pounds per acre is more desirable than broadcast placement. Also, when soils are poorly drained or high in lime, 15 to 20 pounds of K_2O in the row provides potassium when soil potassium is slowly available.

Table 7 gives a summary of yield response to potash fertilizer on soils of various levels of exchangeable potassium.

Table 7. Yield increase with 100 pounds per acre of K_2O *

K soil test level		Corn yield increase	Number of fields
221 to 600+	High	3.1	34
151 to 220	Medium-High	3.8	36
91 to 150	Low-Medium	4.6	54
0 to 90	Low	15.1	20

* Data from 1959 and 1960 soil test correlation plots.

Table 8. Corn (yield goals of 60 to 80 bushels)

Soil test organic matter	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Soil test phosphorus	Phosphate P_2O_5	Soil test potassium	Potash K_2O
	nitrogen ++ recommended lbs./acre				recommended lbs./acre		recommended lbs./acre
High	50	30	10	100 to 200+	0	301+	0
Medium				21 to 99	20	220 to 300	20
and	60	40	10				
low				0 to 20	40	91 to 220	40
						0 to 90	80

* Key to nitrogen categories (crops grown before corn):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (credit manure with 6 pounds of N and 10 pounds of K_2O per ton)
Grass sod	++Nitrogen-fertilized, drought-stricken crop	
Small grain without green manure	Corn with above 80 rate of nitrogen applied	
	N deficient crops plus manure	Organic soils, peat, and muck

\+ If the split-boot fertilizer attachment is to be used, limit the total of N and K_2O to 40 pounds per acre. Any amount of fertilizer can be applied in the row if placed 2 inches below and 2 inches to the side of the seed. However, broadcasting part of the fertilizer has the advantage of being in a better position for carryover effect. If no fertilizer is row applied, increase the 20-pound rate to 40 and the 40-pound rate to 60 pounds per acre.

++ Do not give credit for past nitrogen fertilization on loamy sands and sands.

Table 9. Corn (yield goals of 80 and 110 bushels per acre)

Soil test organic matter	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Phosphorus +: Soil test phosphorus	Phosphate P_2O_5	Potassium: Soil test potassium	Potash K_2O
	nitrogen ++ recommended lbs./acre				recommended lbs./acre		recommended lbs./acre
High and Medium	70	50	10	21+	20	300 to 600+	0 or 20 (see ++)
				11 to 20	40	221 to 300	20
				6 to 10	50	151 to 220	40
Low	100	70	15	0 to 5	80	91 to 150	60
						0 to 90	120

* Key to nitrogen categories (crops grown before corn):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 tons of manure (credit manure with 6 pounds of N and 10 pounds of K_2O per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without green manure	Corn with above 100 rate of nitrogen applied	
	N deficient crops plus manure	

\+ If the split-boot fertilizer attachment is to be used, limit the total of N and K_2O to 40 pounds per acre. Any amount of fertilizer can be applied in the row if placed 2 inches below and 2 inches to the side of the seed. However, broadcasting part of the fertilizer has the advantage of being in a better position for carryover effect. If no fertilizer is applied as starter, increase the 20-, 40-, and 50-pound rates by 20 pounds per acre.

++ Level, fine textured soils with pH above 7.3 should have 10 to 20 pounds of K_2O in the row with this test. These textures are silty clay loam, clay loam, silty clay, and clay.

Table 10. Corn (yield goals of 110 to 140 bushels per acre)

Soil test organic matter	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Phosphorus +: Soil test phosphorus	Phosphate P_2O_5	Potassium: Soil test potassium	Potash K_2O
	nitrogen recommended lbs./acre				recommended lbs./acre		recommended lbs./acre
High and Medium	100	80	30	21+	30	301 to 600+	20
				11 to 20	60	221 to 300	30
				6 to 10	80	151 to 220	60
Low	130	100	40	0 to 5	100	91 to 150	100
						0 to 90	140

* Key to nitrogen categories (Crops grown before corn):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 tons of manure (Credit manure with 6 pounds of N and 10 pounds of K_2O per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without green manure	Corn with 100 rate of nitrogen applied	
	N deficient crops plus manure	

\+ If the split-boot fertilizer attachment is to be used, limit the total of N and K_2O to 40 pounds per acre. Any amount of fertilizer can be applied in the row if placed 2 inches below and 2 inches to the side of the seed. However, broadcasting part of the fertilizer has the advantage of being in a better position for carryover effect. Always recommend a complete starter fertilizer for this yield goal.

ESTABLISHMENT OF LEGUME HAY
(Alfalfa, Clovers, and Grass Mixtures)

Legume hay continues to be important as a source of high quality forage for livestock and as the foundation of soil conserving rotations.

Alfalfa is the preferred species of hay in all areas of the state. Nutrient requirements are substantial; a 4-ton yield will require 180 pounds of N, 40 pounds of P_2O_5, and 180 pounds of K_2O. The N is largely obtained from the air while the phosphorus and potassium needs must be supplied by fertilization or by soil reserves.

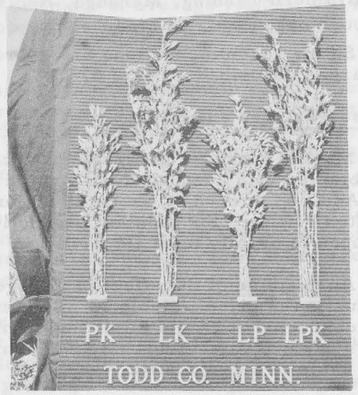


Figure 11. The combination of adequate lime, phosphorus, and potassium is necessary for alfalfa. Lime and potassium are often deficient in central Minnesota.

Fertilization of alfalfa and other forage legumes should consist of an initial application at seeding and annual topdressing as needed to maintain yields and stand. The initial application at recommended rates will be sufficient for the year of establishment and the first production year. During the second and later years of production a maintenance application based on the initial soil tests and table 12 should be followed.

Yield response to phosphate and potash is consistent on soils testing medium and low in these nutrients. This is illustrated in the results of a 10-year experiment at Rosemount where 31 different combinations of nutrients, rates, and times of application were compared. The soil was a Port Byron silt loam testing 110 in potassium, 14 in phosphorus.

Results of Selected Treatments *
Alfalfa Fertility Study - Rosemount

Annual treatment	Yield--annual average	Annual average increase
	tons/acre	tons/acre
Check	3.13	----
0+40+0	3.83	0.70
0+40+40	4.70	1.57
10+40+40	4.06	0.93

* MacGregor, J. M. The Effect of Rate, Time, and Kind of Fertilizer on Yield of Alfalfa at Rosemount. Soil Series 51. 1959.

Table 11. Establishing new seedings (alfalfa, clover, and legume-grass mixtures)
Nutrients to be applied, pounds per acre

Companion crop	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Phosphorus: Soil test phosphorus	Phosphate P_2O_5	Potassium: Soil test potassium	Potash K_2O Textures-silt loam and finer	Potash K_2O Textures-loam and coarser
Oats +	30	20	0	30+++	0	220+	0	0
Flax	30	20	0	20 to 29	30	150 to 219	60	60
Barley	30	20	0	10 to 19	60	90 to 149	90	120
Wheat	50	30	0	0 to 9	100	0 to 90	120	240
None	0	0	0					

* Key to nitrogen categories:

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (Credit manure with 6 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without green manure	Corn with above 100 pound rate of nitrogen applied	
	N deficient crops plus manure	

\+ Recommend no nitrogen if a lodging problem is indicated or known.

++ With P tests above 30 pounds recommend 30 pounds of P_2O_5 per acre only in the following soil association areas: Zimmerman-Isanti-Peat, Milaca-Brainerd-Hibbing, Menahga, Nebish-Redwood.

Table 12. Topdressing established legume and legume-grass mixtures*

Soil test phosphorus	Phosphate P_2O_5, lb./acre apply annually	Soil test potassium	Potash, K_2O lb./acre apply annually	
			Textures	
			Silt loam and finer	Loam and coarser
30 to 200+	0	220 to 600+	0	0
20 to 29	30	150 to 219	30	60
10 to 19	60	90 to 150	60	90
0 to 9	100	0 to 90	120	180

* Nitrogen at rate of 30 to 50 pounds per acre should be used when stand is primarily grass.

\+ With P tests above 30 pounds recommend 30 pounds of P_2O_5 per acre only in the following soil association areas: Zimmerman-Isanti-Peat, Milaca-Brainerd-Hibbing, Menahga, Nebish-Rockwood.

TOPDRESSING LEGUMES AND LEGUME-GRASS MIXTURES

The correct ratio and rate of phosphate and potash for alfalfa and other legumes makes possible more consistent dollar returns than with most other crops. Weather hazards are considerably less for forage crops than for seed producing crops.

Topdressing of legume forages can be done anytime of the year, but early spring or fall is preferred for maximum response.

Fertilizers containing at least 2 percent boron may be needed for alfalfa in some areas in the state. If boron deficiency is observed, and this is more likely on the loamy sand and sandy loam soils of Anoka, Benton, Sherburne, Isanti, Stearns, Mille Lacs, Pine, Aitkin, Kanabec, Morrison, Todd, Wadena, and Crow Wing Counties, a boron containing fertilizer should be recommended. A word of caution is necessary regarding boron in fertilizer that may be used on boron sensitive crops such as corn. Corn may need boron, too; but it is more sensitive to heavier application rates than is alfalfa. Use boron on corn only on a trial basis. (See page 6).

Sulfur recommendations are appropriate in the areas described on page 5.

Grass Pastures and Hay

Marked increase in forage production can be obtained with adequate fertilization of grasses. Addition of each of the three major nutrients is often required for efficient production, but nitrogen is usually most important.

An example of the effect of nitrogen on grass production is given in table 13. This experiment was conducted at Grand Rapids on a mixed native grass pasture, and yields were measured by the feed value to a dairy herd.

Table 13. Effect of nitrogen on TDN and equivalent hay production

Pounds of N* applied per acre	TDN+ per acre	Equivalent tons of hay per acre
0	1,500	1.5
50	2,600	2.6
100	3,600	3.6
200	4,300	4.3

* Adequate phosphate and potash was added to the entire area.

\+ Total digestible nutrients.

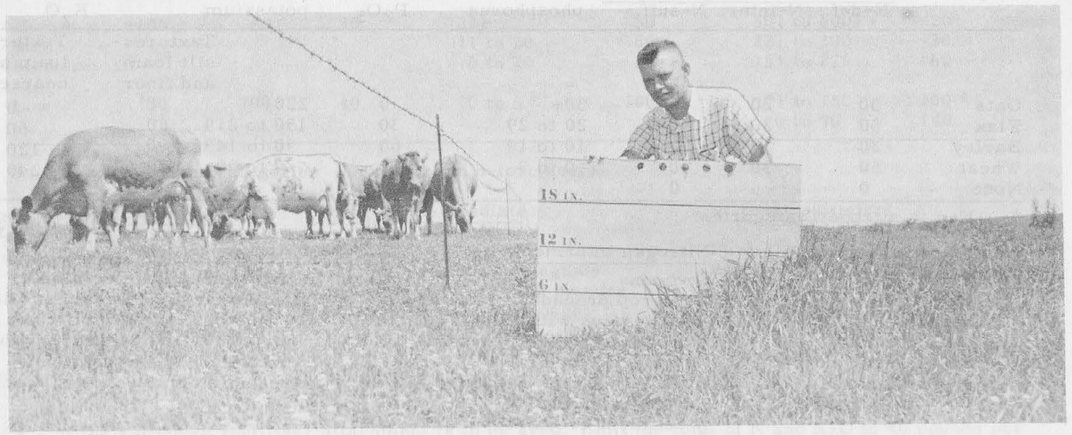


Figure 12. Good pasture management must include soil fertility. Ration-a-day grazing is used here on nitrogen fertilized grass.

Table 14. Permanent grass pasture and hay

Soil * condition	Nitrogen: Annual nitrogen application lbs./acre	Phosphorus: Soil test phosphorus	Phosphorus: Phosphate, P_2O_5 recommended lbs./acre	Potassium: Soil test potassium	Potassium: Potash, K_2O recommended lbs./acre
Peat and muck soils	0				
Droughty soils	35	20 to 200+	0	220 to 600+	0
Moderate moisture soils	70	0 to 20	30	150 to 219	30
Adequate moisture soils	100	-------	--	0 to 149	90

* The three soil condition categories are intended to describe the average soil moisture condition. Use estimate of average rainfall and nature of the soil to determine this. Sandy soils or those on steep slopes would be considered droughty regardless of rainfall.

Phosphorus and potassium requirements of grass are very similar to those of legume forages with corresponding yields. However, grasses have not been as responsive to phosphate as legumes.

In addition to yield effects, grasses fertilized with nitrogen are much higher in protein, and some species such as reed canary are more palatable to livestock.

It is important that intensive grazing management systems be used to utilize increased production from fertilized pastures. This would include grazing before heading of the grasses and periodic clipping to prevent grasses from maturing and becoming less palatable.

All forms of nitrogen materials may be used on grass, but spacing of ammonia and liquid injector knives of the soil should not be greater than 16 inches.

Applications of nitrogen can be made as split applications or as one application late in the fall or early spring. Split applications allow adjustment to soil moisture conditions.

On medium productive grass pastures with good spring growth the nitrogen application can be delayed until after the first spring lush growth or early June. This will extend the grazing period.

SOYBEANS

Soybeans are one of the most important crops in Minnesota. In 1960, 2,009,000 acres of soybeans were harvested with an economic value of about $105 million.

As with other crop plants, soybean growth and yield is dependent on the level of soil fertility. Plant food requirements for a 30-bushel yield are 135 pounds of nitrogen, 33 pounds of phosphate, and 60 pounds of potash. Since soybeans are a legume, nitrogen is supplied from the air through symbiotic bacteria. However, presence of the specific bacteria should be insured by inoculation of the seed. Nitrogen deficiency may also result when soils are acid; pH should be brought above 6.2 with lime applications.

Soybeans are grown primarily in rotations involving corn and small grains. Since soybeans are efficient in making use of carryover fertility from fertilizer applied on the preceding crop, previous fertilization should be taken into account in making recommendations.

When soybeans are to follow corn, it is sound management to apply 20 or 30 more pounds of phosphate and potash to the corn and eliminate direct fertilization of the soybeans. An exception may be on the sandy or other extremely potassium deficient soils where broadcast applications of potash are made directly for the soybean crop.

Both phosphate and potash are necessary when the fertility level is low in direct fertilization of soybeans.

Table 15. Typical soybean yield in western Minnesota with fertilization--Morris

Annual treatment	Four-year average 1956-1959 yield	Soil test
Check 0+0+0	24.5	pH - 7.2
N 20+0+0	24.7	p - Low
P 0+40+0	28.5	K - High
K 0+0+40	24.2	----------
NPK 20+40+40	29.1	----------

In addition to yield effect, fertilization hastens maturity and improves quality of soybeans. In most cases where yield is increased, maturity is earlier and moisture content of the grain is lower with fertilization. Potash on potassium deficient soils is especially effective in this respect.

The fertilizer can be applied in the row with proper placement a few inches away from the seed. The tables of recommended rates are based on this method of application. If fertilizer is to be broadcast, the 30-pound rates indicated should be doubled to 60 pounds per acre. The 90-pound rate of potash suggested for a low test level should be adequate for either a broadcast or properly placed row application. Soybeans are very sensitive to potash when it is allowed to come to contact with the seed.

Table 16. Soybeans

Nitrogen		Phosphorus		Potassium	
Organic matter	Nitrogen lbs./acre	Soil test phosphorus	Phosphate P_2O_5 recommended lbs./acre	Soil test potassium	Potash K_2O recommended lbs./acre
Medium and high	0	16 to 200+	0	151 to 600+	0
Low	10	0 to 15	30*	90 to 150	30*
				0 to 90	90

* With split-boot type of application equipment, do not recommend more than 30 pounds of N and K_2O as starter fertilizer. Double the 30-pound rates of P_2O_5 and K_2O if the fertilizer is broadcast. (This does not apply to the 90-pound rate of K_2O.)

WHEAT

With high potassium testing soils usually in the major wheat growing area nitrogen and phosphate have been found to be the most needed nutrients for wheat.

With a trend toward less reliance on legume and summer fallow for nitrogen, nitrogen use is increasing. Profitable yield increases from 20 to 60 pounds of nitrogen in research plots frequently have been recorded. Although many of the wheat area soils are high in organic matter, because these soils are slow to warm up, soil released nitrogen from organic sources usually comes too late in the season for optimum growth.

Below is a summary of wheat yield response to nitrogen over a 3-year period in the Red River Valley. Five experiments are represented; all were conducted on soils having textures ranging from silt loam to clay loam and cropped the preceding year to grain, potatoes, or sugar beets. Selkirk was the wheat variety in all cases.

Nitrogen * lbs./acre	Average yield	Yield increase bu./acre
0	21.1	----
20	31.6	10.5
40	35.7	14.6
80	40.2	19.1

* Adequate phosphate was applied.

Nitrogen can be applied on non-sandy soils either as a plowdown in the fall, in the spring before or at seeding time, or as a topdress on the growing crop. Unless the surface soil is dry, up to 40 pounds of N can be applied with a drill fertilizer attachment.

Soils testing below 150 in K will likely benefit from potassium fertilization in yield and grain quality.

Table 17. Wheat (without legume seeding)

Nitrogen				Phosphorus			Potassium		
Organic matter	Previous management*			Soil test phosphorus	Phosphate, P_2O_5		Soil test potassium	Potash, K_2O	
	N-def.	N-int.	N-suff.		Drilled	Broadcast		Drilled	Broadcast
	nitrogen recommended lbs./acre				recommended lbs./acre			recommended lbs./acre	
High	50	20	10	51+	0	0	151+	0	0
Medium or low	60	30	10	21 to 50	15	30	91 to 150	15	20
				11 to 20	30	45	0 to 90	30	40
				0 to 10	40	60			

* Key to previous management categories (Crops grown the year before wheat):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (Credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without legume	N deficient crops plus manure	
	Corn with more than 70 pounds of N	
	Small grain with more than 40 pounds of N	

FLAX

Direct fertilization of flax does not increase yields as consistently as with the small grains. Recent trials in both Minnesota and North Dakota seldom show an economic increase from phosphate or potash fertilization at the medium or higher soil test level. Soils testing in the low level may give a profitable response.

Nitrogen gives a more consistent yield increase, but weed control should accompany nitrogen fertilization of flax. See Minnesota Extension Folder 191 for recommendations on weed control.

Salt damage to the flax seedling often occurs even with phosphate fertilizer. No more than 25 pounds of P_2O_5 should be applied with the seed. When nitrogen and potash are applied, the fertilizer should be broadcast.

Table 18. Flax (without legume seeding)

Nitrogen				Phosphorus		Potassium	
Organic matter soil test	Previous management* N-def.	N-inter.	N-suff.	Soil test phosphorus	Phosphate P_2O_5	Soil test potassium	Potash † K_2O
	recommended nitrogen lbs./acre				recommended lbs./acre		recommended lbs./acre
				11 to 200+	0	91 to 600+	0
All	30	10	0	0 to 10	20	0 to 90	60

* Key to previous management categories (crops grown the year before flax):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (Credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grains without legume	Corn with more than 70 pounds of N	
	Small grain with more than 40 pounds of N	

† All except 10 pounds of nitrogen and potash should be broadcast.

OATS

Oats responds well to fertilizer. Poor economic returns with oats are often the result of low yields due to weather conditions or low fertility.

Drill applied fertilizer is preferred, but most of the oat acreage is in areas where fertilizer drill attachments are not common. Except for the Tama-Downs and Fayette soils of southeast Minnesota nitrogen deficiency is usually a serious problem. In the southeast area nitrogen fertilization can usually be eliminated if there has been alfalfa within 2 years.

A typical situation regarding the effect of nitrogen and phosphate on oats in the south central and southwest part of the state is shown in table 19.

Table 19. Effect of nitrogen and phosphate on oats on Clarion, Webster, and Moody soils *

Treatment	Yield per acre
0+0+0	42
0+40+0	44
10+40+0	48
20+40+0	51
40+40+0	57

* MacGregor, J. M. "Fertilizing Oats Often Pays in Minnesota," Farm and Home Science. February 1950.

Summary of work from 1956 to 1960 at Waseca show returns over fertilizer cost are usually higher when harvested as silage rather than grain.

Oats can effectively use carryover fertility from corn and soybeans. When nitrogen rates of 80 pounds or greater have been applied the previous year, additional nitrogen is not likely to be needed for oats unless the soil is coarse textured.

Table 20. Oats (without legume seeding)

Organic matter	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Phosphorus: Soil test phosphorus	Phosphate, P_2O_5: Drilled	Broadcast	Potassium: Soil test potassium	Potash, K_2O: Drilled	Broadcast
	nitrogen recommended lbs./acre +				recommended lbs./acre			recommended lbs./acre	
High	30	20	10	51+	0	0	150 to 600+	0	0
				21 to 50	15	30	90 to 149	15	30
Medium or low	40	30	10	11 to 20	20	40	0 to 89	30	40
				0 to 10	30	40			

* Key to previous management categories (crops grown the year before oats):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Continuous corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (Credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without legume	Corn with more than 70 pounds of N	
	Small grain with more than 40 pounds of N	
	N deficient crops plus manure	

\+ Increase nitrogen rate by 20 pounds if crop is to be used for silage except for N-sufficient category.

BARLEY

As in the case of wheat, nitrogen and phosphorus are the nutrients which most consistently improve barley yields. Although nitrogen occasionally contributes to lodging, nitrogen deficiency in barley is widespread.

Phosphorus fertilization is usually necessary for optimum barley yields. Rates recommended are the same as those for wheat. Placement effect is also the same as wheat with a higher efficiency of fertilizer possible with drill placement. Maturity is often earlier on phosphate fertilized barley. Phosphate also contributes to seed quality.

POTATOES

USDA estimates made in October 1960 place Minnesota potato production in sixth place nationally with an acreage of 100,300 and a production of 12,731,000 cwt. In 1959, 69 percent of the state's total production was centered on the lake-laid soils of the six northwest counties immediately adjoining the Red River. Anoka and Hennepin Counties with substantial acreages of irrigated sandy soils contributed 6.6 percent, and production on the organic soils of the Hollandale area in Freeborn county accounted for another 9.2 percent of the seasonal total.

Basis for Recommendations

Potatoes have a high requirement for mineral nutrients. Failure of the soil to supply nutrients in adequate amount will result in reduced yields unless fertilizers are added. Chemical soil tests, past cropping history, and soil texture are used in estimating availability of the major nutrient elements. Ideally, such information should be correlated with the results of extensive field fertilizer trials to provide the best possible basis for fertilizer recommendations. To date only limited correlation work has been accomplished with the potato crop in Minnesota. However, a considerable fund of experience with potato fertilization on Minnesota soils is available. This work currently provides the basis for fertilizer recommendations made by the Department of Soils and the Agricultural Extension Service.

Table 21. Barley (without legume seeding)

Organic matter	Nitrogen: Previous management* N-def.	N-inter.	N-suff.	Phosphate: Soil test phosphorus	Phosphate, P_2O_5: Drilled	Broadcast	Potassium: Soil test potassium	Potash, K_2O: Drilled	Broadcast
	nitrogen recommended lbs./acre				recommended lbs./acre			recommended lbs./acre	
High	30	10	10	51+	0	0	150 to 600+	0	0
				21 to 50	15	30	90 to 149	15	30
Medium or low	40	20	10	11 to 20	20	40	0 to 89	30	40
				0 to 10	30	40			

* Key to previous management categories (crops grown the year before barley):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Continuous corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (Credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	Organic soils, peat, and muck
Small grain without legume	Corn with more than 70 pounds of N	
	Small grain with more than 40 pounds of N	
	N deficient crops plus manure	

Nutrient Requirements

Dunn and Rost measured nutrient removal by the potato crop at 23 Red River Valley locations and concluded that nutrients in the foliage and tubers of a crop yielding 150 cwt. per acre would approximate 100 pounds nitrogen, 25 pounds phosphate (P_2O_5), 170 pounds potash (K_2O), 44 pounds calcium, 32 pounds magnesium, and 12 pounds sulfur. Forty to 50 percent of the nitrogen and potash, 35 percent of the phosphate, practically all of the calcium, and about half of the magnesium were contained in the foliage and hence returnable to the soil. Higher yields would affect proportionally greater amounts of nutrient removal.

Place of Potatoes in the Crop Rotation

In the Red River Valley area the potato crop usually follows a small grain crop or black or legume summer fallow. On the sandy irrigated areas near the Twin Cities a 2-year rotation of rye and potatoes or continuous cropping to potatoes with a fall planted rye cover crop constitute common practice.



Figure 13. Potatoes respond to high rates of phosphate in the Red River Valley. Nitrogen and potash were also effective on this field.

Fertilizer Experiments

In 1942 Dunn and Rost demonstrated potato yield responses to phosphate fertilizer on the Fargo, Bearden, and Ulen soil types of the Red River Valley. In addition, the sandy Ulen soils responded to potash. No soil test information was available. Treatments and yields were as follows:

Treatments, lbs./acre			Potato yield, cwt./acre (1942)		
N	P_2O_5	K_2O	5 Fargo soils	4 Bearden soils	4 Ulen soils
0	0	0	134	139	100
0	60	0	158	154	133
0	60	120	151	155	153

In 3 years' work at the Red River Valley Potato Research Farm near East Grand Forks, Caldwell and Kramer have consistently demonstrated economical yield responses to high rates of row placed phosphate fertilizers. The soil is a silty clay loam testing low (10 pounds per acre) in phosphorus. On the Pontiac variety in 1958 the maximum economical application rate was not reached at 240 pounds P_2O_5 per acre. The maximum economical rate for the Norland variety was about 200 pounds P_2O_5 per acre. In the 1959 work yields of No. 1 grade Pontiac potatoes increased from 136 cwt. per acre to 192 cwt. per acre to 250 cwt. per acre when 0, 100, and 500 pounds P_2O_5 per acre were used together with moderate amounts of nitrogen and potash. The 60+500+40 treatment yielded an increased return-after-fertilizer cost of $53 per acre over the check figuring potato values at $1 per cwt.

These data would indicate that the potato plant is a "weak feeder" on both soil and fertilizer forms of phosphorus. If the phosphorus composition data of Dunn and Rost are strictly applied, the 250 cwt. per acre yield attained with the 500 pounds per acre P_2O_5 rate would

contain no more than 42 pounds P_2O_5 in the vines and tubers.

On soils of moderate to high organic matter content substantial amounts of available nitrogen accumulate following black or legume summer fallow. Economical yield response to high rates of nitrogen applications on such soils is unlikely. Soils with a history of nitrogen depleting crops the preceding season, however, frequently exhibit paying yield responses to nitrogen fertilization.

John Hansen at the North Dakota Station concluded after 3 years' study on soils cropped the previous season to small grains that 60 pounds nitrogen per acre produced maximum marketable yields. Yields at four rates of nitrogen averaged over the 3-year period follow:

Nitrogen lbs./acre	Marketable yield cwt./acre
0	139
30	168
60	180
90	179

In 1960 Turnquist and Daellenbach conducted demonstration work with potatoes on a Hammerly silt loam soil in Clay County. Cobbler was the variety. Phosphate at 100 pounds P_2O_5 per acre was row placed throughout. Three rates of nitrogen and four rates of potash were replicated four times, broadcast, and plowed under. Soil test information and yield results were as follows:

pH: 8.2 Extract. P: 1 low 1959
O. M.: 46 percent Exch. K: 190 med. crop:
Med. soybeans

Table 22. Main effect of nitrogen on yield of marketable potatoes

N rate, lbs./acre	Yield, cwt./acre	Increase
0	137.0	----
40	154.7*	17.7
80	159.4*	4.7

* Differ significantly from check.

Table 23. Effect of potash at three nitrogen rates upon yield of marketable potatoes

K_2O	Yield, cwt./acre		
	O N	40 N	80 N
	pounds per acre		
0	133.7	147.6	163.1
40	141.2	149.8	157.7
80	148.7	164.5	148.6
120	124.3	156.7	168.4

Both the 40- and 80-pound nitrogen rates increased yields significantly over check, but the yield associated with the 80-pound rate did not differ significantly from that at the 40-pound rate.

The main effect of potash upon yield was not a significant one; however, there was a tendency for potash to increase yield substantially in the absence of nitrogen while apparent yield depressions occurred with increasing potash rate at the 80-pound nitrogen rate. The interaction did not prove to be significant. A comparison of the chloride and sulfate forms of potassium at common rates of 100 pounds P_2O_5 per acre and 40 pounds N per acre showed almost identical effects upon yield. From a practical view failure to achieve placement of nitrogen and potash comparable to that affected by standard potato planter fertilizer attachments would appear to constitute valid criticism of this work.

Quality and Maturity Aspects

Differences in season, soil type, and fertilizer treatment can influence the dry matter content of potatoes as indicated in tables 24, 25, and 26. Dunn and Rost studied these variables at 21 locations on three Red River Valley soil types of a 3-year period. Seasonal and soil differences had the most pronounced effect on percent dry matter. Phosphate at 60 pounds P_2O_5 per acre tended to increase dry matter content, but the effect was not significant. Potassium in the chloride form significantly depressed percent dry matter on all soils and in all seasons (except on two Ulen soils in 1953), an effect that was attributed to the chloride ion and accompanied by large increases in chloride content of the tubers. Overall decreases in percent dry matter were substantially less on the potash responsive Ulen soils than on the more potassium sufficient Fargo and Bearden soils. Consistent decreases in percent dry matter failed to occur when potassium was added in the sulfate form. In the more recent work of Caldwell and Kramer potash fertilizers, when accompanied by high rates of phosphorus, have not adversely affected potato quality as measured by specific gravity of the tubers.

Recent evidence indicates that potatoes fertilized with potassium sulfate tend to fry darker when processed into chips. This is based on observations the extension horticulturist has made in tests of chipping quality.

Table 24. Effect of soil type on percent dry matter in potatoes in 1942 (after Dunn and Rost), no fertilizers added

Soil type	Percent dry matter on tubers
5 Fargo soils	21.1
4 Bearden soils	23.4
4 Ulen soils	22.9

Table 25. Effect of season and/or differences among soils of one type on percent dry matter in potatoes (after Dunn and Rost), no fertilizers added

Four Bearden soils 1942	Four Bearden soils 1943	Two Bearden soils 1944
23.4	22.2	19.8

Table 26. Effect of fertilizers on percent dry matter in potatoes grown on three Red River Valley soil types in 1943 (after Dunn and Rost)

Treatment	Two Fargo soils	Averages from four Bearden soils	Two Ulen soils
0+0+0	20.7	22.2	21.9
0+60+0	21.1	22.5	22.2
0+0+120	20.1	20.4	21.7
0+60+120	19.7	20.5	21.7

Excessive amounts of nitrogen can delay maturity of potato vines and tubers. At rates giving economical yield increases the effect of nitrogen upon maturity and specific gravity has varied with the soil and season. The Horticulture Department at the North Dakota Station studied the effect of nitrogen rate upon tuber skinning and specific gravity throughout the 3-year period 1956-1958.

In 1956 all nitrogen application rates resulted in less skinning. Specific gravity increased as the nitrogen rate went up to 60 pounds per acre, but the 90-pound rate caused a slight reduction. In 1957 the amount of skinning increased and specific gravity showed a slight but gradual reduction as nitrogen rate was increased. In 1958 neither skinning nor specific gravity were influenced by application of nitrogen in the ammonium nitrate form while tuber set was markedly increased.

In general any treatment which tends to delay maturity of the potato plant will result in lower dry matter of the tubers.

Method and Time of Fertilizer Application

Essentially all fertilizers used on the potato crop in the Red River Valley are applied at planting time through planter attachments. On the sandy irrigated soils of low organic matter and potassium content in the Hennepin-Anoka County area much of the total potash requirement is broadcast before spring plowing and the remainder (together with phosphate and some nitrogen) is row placed with the planter attachment. Nitrogen is usually added in some combination of broadcast preplant, sidedress, and planter attachment application. Potash used on the organic soils of Freeborn County is often split between the preplant broadcast and planter attachment methods of application, while the nitrogen and phosphate requirements are most commonly applied in the row.

In trials conducted by the North Dakota Station, sideband application was significantly more effective than broadcast. Yield and tuber set were increased by nitrogen application at planting time but not by later sidedressings. Caldwell, working on a silty clay loam soil at Grand Forks, found that combined rates of nitrogen and potash exceeding 200 pounds per acre placed in the row resulted in yield decreases.

At rates in common use on Red River Valley soils sideband application of the total fertilizer requirement at planting time would appear to be desirable in most cases. On sandy and organic soils with high potash and/or nitrogen requirements the combined rate of nitrogen and potash should probably not exceed 200 pounds per acre sidebanded with the balance applied broadcast or sidedress.

Table 27. Potatoes on Red River Valley soils (without irrigation)

Nitrogen, lbs./acre			Phosphorus		Potassium	
Previous Management*						
N-def.	N-inter.	N-suff.	Soil test phosphorus	Phosphate, P_2O_5 recommended lbs./acre	Soil test potassium	Potash, K_2O recommended lbs./acre
			Above 21	60	Above 300	30
60-90	30-50	20-30	11 to 20	90	151 to 300	60
			0 to 10	120	91 to 150	90
					0 to 90	120

* Key to nitrogen categories:

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	
More than 2 years small grain without legume	Grain or corn with above average rates of nitrogen applied	
	N deficient crops plus manure	

Note: Any combination of the N, P_2O_5, and K_2O rates listed in this table can be applied safely through the planter fertilizer attachment. If some of the N is applied separately, either apply before planting or sidedress before plants are 10 inches high.

Table 28. Potatoes on sandy loam and loamy sand mineral soils and organic soils (500 to 600 bushels goal)

Nitrogen		Phosphorus		Potassium	
Previous management and soil classification	Nitrogen recommended lbs./acre	Soil test phosphorus	Recommended phosphate (P_2O_5) lbs./acre	Soil test + potassium	Recommended potash (K_2O) lbs./acre
Mineral*					
N-def.	150++	101+	60	300+	30
N-inter.	80	21 to 100	120	221 to 300	60
N-suff.	40	0 to 20	180	91 to 220	120
				0 to 90	240
Organic					
Muck or dark colored decomposed peat	20	51+	80	301+	80
Brown or fibrous peat	40	0 to 50	120	150 to 300	120
				0 to 150	240

* Key to nitrogen categories (crops grown before potatoes):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	
More than 2 years small grain without legume	Grain or corn with above average rates of nitrogen applied	
	N deficient crops plus manure	

\+ Magnesium deficiency may occur in the Anoka sand plain area. This can be corrected by applying 300 to 600 pounds per acre of dolomitic limestone or substituting sulphate of potash-magnesia (21 percent K_2O) for potash needs. All potash above 60 pounds per acre should be broadcast; the first 60 pounds or less should be row applied.

++ Irrigation is assumed on the sandy textured soils. Without irrigation do not apply more than 80 pounds of N per acre.

Recommendations for all nutrients are somewhat higher on irrigated soils out of the Red River Valley area. In the case of nitrogen and potassium, rates are higher because some of these nutrients are leached away with the irrigation water. Phosphorus rates for corresponding soil tests are also higher on the sandy soils than the heavier Valley soils. This is because these soils are frequently acid and some of the tests indicated phosphorus is unavailable.

SUGAR BEETS

Sugar beets have become an important crop in southern and western Minnesota as well as the Red River Valley area.

Nutrient requirements are relatively high with 150 pounds of N, 60 pounds of P_2O_5, and 170 pounds of K_2O required for an acre yield of 20 tons. Because of the nature of the soils, phosphate is usually the element needed in greatest amount. Most of the phosphate should be broadcast and worked in the soil, but an advantage of rapid early growth is obtained by placing some phosphate near the seed. However, the blocking and thinning operations may displace some of this fertilizer so the individual operator should not place more than 20 to 30 pounds of P_2O_5 in the row.

There is evidence that large amounts of fertilizer nitrogen lowers the percent of extractable sugar so recommendations are restricted to 40 pounds of nitrogen or less per acre. The main source of nitrogen should be that released from previous legumes or summer fallow.

Sugar beet fertility experiments have not been conducted on potassium deficient soils in Minnesota, but evidence from other crops indicates a potash need when tests are below 220 pounds of K per acre.

GRASS SEED PRODUCTION[4]

Information on the use of commercial fertilizer for the production of bluegrass, timothy, and bromegrass seeds is quite limited in Minnesota. Research studies are underway at the present time. Practically all of the grass seed is produced in northern Minnesota, but some bromegrass seed has been produced in western and southwestern parts of the state. The production of high quality or certified brome seed is almost impossible unless the field is entirely free of quackgrass. Bromegrass seeds and quackgrass seeds cannot be separated because they are similar in size, shape, and weight. This is not true of bluegrass and timothy seeds.

4 P.M. Burson, Professor, Dept. of Soils.

Supplemental table for Special Report 1.

Table 29. Sugar beets

Nitrogen			Phosphorus		Potassium	
Organic matter soil test	Previous management*			Soil test phosphorus	Phosphate, P_2O_5 recommended lbs./acre	Soil test potassium	Potash, K_2O recommended lbs./acre
	N-def.	N-inter.	N-suff.				
Less than 8.5 percent	40	20	0	21+	20	300+	0
				11-20	80	220-300	40
				6-10	100	91-220	80
More than 8.5 percent	10	10	0	0-5	120	0-90	120

* Key to previous management categories (crops grown the year before sugar beets):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Corn	Soybeans	Pure stand of alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Grass sod	Small grains with green manure	10 tons of manure (credit manure with 6 pounds of N and 10 pounds of K_2O per ton)
Small grains without legume	Corn with more than 70 pounds N	
	Small grain with more than 40 pounds N	

\+ Of the total fertilizer requirement apply only the phosphate with a planter attachment. Apply all N and K_2O and phosphate above 40 pounds per acre broadcast. Twenty to 40 pounds of P_2O_5 can be row applied.

The nutrient requirements are similar to other crops. Phosphate and phosphate-potash should be applied according to soil test. However, nitrogen must be added to obtain maximum yields. Proper fertilization with nitrogen, phosphate, and potash besides giving increased seed yields develops more and larger seed heads on bluegrass, longer and larger seed heads on bromegrass and timothy, with heavier and more uniform seed quality.

More nitrogen per acre can be added to bromegrass and timothy than to bluegrass because they do not lodge as readily. If bluegrass lodges, there will be a poor seed set and the production will be low. This accounts for the lower recommended rates of nitrogen per acre on bluegrass. If nitrogen is applied to a bromegrass field having quackgrass, the quackgrass will respond as well or better than the bromegrass. Timothy seed and quackgrass seed separation is not a problem. Timothy gives excellent response to nitrogen fertilization.

The following table gives the increase in yields of bromegrass with different rates of nitrogen fertilizer. For each pound of additional nitrogen there was an increase of 10 pounds of brome seed per acre.

Table 30. The effect of nitrogen fertilizer on bromegrass seed production in western Minnesota

N applied per acre	Yield per acre
pounds	pounds
Check	213
20	413
40	625
80	897

Table 31. Fertilizer recommendations for grass seed production, bluegrass, timothy, bromegrass

Crop	Nitrogen*	Phosphate		Potash	
		Soil test	P_2O_5*	Soil test	K_2O*
Bluegrass	60 to 80	31+	0	220 to 600+	---
Timothy	60 to 120	10 to 30	40	150 to 219	30
Bromegrass	60 to 120	0 to 9	60	90 to 149	60
				0 to 90	120

* Nutrients to be applied, pounds per acre.

LEGUME SEED PRODUCTION[5]

Legume seeds of alsike, medium red, and sweetclovers can be produced in all parts of Minnesota. Lime, phosphate, and potash are essential soil treatments. Their need should be determined by soil tests. In addition to proper soil treatments, there must be the control of harmful insects and adequate pollination if successful seed production is to be obtained.

5 P. M. Burson, professor, Department of Soils

Legumes are very sensitive to soil fertility variations. A minimum pH of 6.5 is necessary for successful seed production along with adequate amounts of phosphate or of phosphate-potash.

Legumes constitute a part of a good cropping system. They can be used for a hay crop or a seed crop whichever is more desirable. For example, in the southern two-thirds of Minnesota the first crop of medium red clover can be used for hay and the second crop taken for seed. Because of the shorter season in northern Minnesota it is best to let the first crop go for seed.

Eight years of study on the fertilization of all legume seed crops in northern Minnesota have shown that proper soil treatments based on soil tests have increased yields many times over and have improved the size, uniformity, and quality of seed. With adequate fertilization the activity of pollination has increased and this in turn has increased seed yields.

Fertilizer can be applied at the time of seeding the legume crop with a companion crop of small grain, or it can be applied as a topdressing in late fall or in early spring of the seed producing year. If there is a good stand established, topdressing has been just as effective as when the fertilizer was applied at the time of seeding. If the fertility level of the soil is low, proper fertilization applied at the time of seeding will improve the stand. Recommended rates of fertilizer applications are given in table 32 according to the need indicated by the soil test.

Table 32 shows the response of phosphate and phosphate-potash on seed production as applied according to the soil test.

Table 32. The effect of fertilizer on legume seed production

Soil treatment	Sweet-clover*	Alsike clover+	Medium red clover++
Check	881.0 lb.	181.0 lb.	315.0 lb.
0-60-0	1,126.0	693.4	---
0-60-60	1,270.0	611.0	---
0-100-0	1,236.0	711.0	380.0
0-100-100	1,216.0	618.4	394.0

Soil Test:
* pH 7.1 -- Phosphorus 7 (low), Potassium 150 (medium).
\+ pH 7.6 -- Phosphorus 8 (low), Potassium 200 (medium).
++ pH 7.4 -- Phosphorus 15 (medium), Potassium 200 (medium).

Table 33. Fertilizer recommendations for legume seed production, sweetclover, alsike clover, medium red clover

Nitrogen	Phosphate		Potassium	
	Soil Test	P_2O_5	Soil Test	K_2O
None	30 to 200	---	200 to 600	---
None	20 to 29	30	150 to 219	30
None	10 to 19	60	90 to 149	60
None	0 to 9	100	0 to 90	120

CANNING CROPS

Green peas and sweet corn account for the bulk of all Minnesota acreage planted to canning crops. In 1959, 86,200 acres of sweet corn and 41,000 acres of green peas with a combined value of $9½ million were harvested.

Most canning crops are harvested in immature condition and may, therefore, remove less total nutrients than field crops. Their frequently higher value, however, makes attention to the fertility needs of nutrient deficient soils especially important.

Canning Peas

Hofman and Halverson cooperated with Birdseye Frozen Foods, Inc. on demonstration work with canning peas in Waseca County in 1959. The soil was a clay loam of pH 6.0 testing medium (19 pounds per acre) in phosphorus and medium (200 pounds per acre) in potassium. Four rates of phosphorus fertilizer were applied prior to planting, and yields measured at harvest time. Results were:

P_2O_5 lbs./acre	Yield cwt./acre	Value acre at $4.60/cwt.	Seed, harvesting, and fertilizer cost*	Return over seed, harvesting, and in fertilizer costs/acre
0	25.4	$116.84	$35.15	$81.69
30	29.0	133.40	38.15	95.25
60	30.6	140.76	41.15	99.61
90	30.3	139.38	44.15	95.23

* Seed cost--$34.50 per acre. Harvesting cost--$1.15 per acre. P_2O_5 valued cost--$.10 per pound.

Table 34. Canning peas*, lima beans, and snap beans

Nitrogen			Phosphorus		Potassium	
Previous management+			Soil test phosphorus	Phosphate, P_2O_5 lbs./acre recommended	Soil test potassium	Potash, K_2O lbs./acre recommended
N-def.	N-inter.	N-suff.				
Nitrogen recommended, lbs./acre						
			Over 40	0	200+	0
			26 to 40	30	91 to 200	30
30	15	0	11 to 25	60	0 to 90	60
			0 to 10	90		

* If placement equipment capable of separating fertilizers from the seed is not available, the fertilizers should be broadcast and disked into the seedbed before planting.

\+ Key to nitrogen categories:

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Continuous corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilized, drought-stricken crop	
Small grain	Grain or corn with above average rates of nitrogen applied	
	N deficient crops plus manure	

Table 35. Sweet corn

Soil test organic matter	Nitrogen: Previous management* N-def. Nitrogen++	N-inter. lbs./acre	N-suff. recommended	Phosphorus: Soil test phosphorus	Phosphate, P_2O_5 lbs./acre recommended: Organic and Mineral	Potassium: Soil test potassium	Potash, K_2O lbs./acre recommended: Mineral	Organic
High	50	30	10	100 to 200+	0	220 to 600	0	40
Medium				21 to 99	20	91 to 219	40	80
and low	60	40	10	11 to 20	40	0 to 90	80	120
8.5+ organic soil	0	0	0	0 to 10	60			

* Key to nitrogen categories (crop previous to sweet corn):

Nitrogen deficient	Nitrogen intermediate	Nitrogen sufficient
Continuous corn	Soybeans	Pure stand alfalfa or clover
Potatoes	Any crop preceded by legume	Black or legume summer fallow
Sugar beets	Small grains with green manure	10 or more tons per acre of manure (credit manure with 6 pounds of N and 10 pounds of potash per ton)
Grass sod	Nitrogen-fertilizer, drought-stricken crop	
Small grain	Grain or corn with above average rates of nitrogen applied	
	N deficient crops plus manure	

\+ If the split boot fertilizer attachment is used, limit the total of N and K_2O to 40 pounds per acre. Any amount of fertilizer can be applied in the row if placed 2 inches below and 2 inches to the side of the seed. However, broadcasting part of the fertilizer has the advantage of being in a better position for carryover effect.

++ The figures are in terms of total nitrogen needed. Amounts of 30 pounds per acre or less are usually applied with the mixed fertilizer. Higher amounts are usually applied as straight nitrogen materials. The amount of nitrogen to be applied as a separate application should be the total less that applied in the starter or broadcast application.

Table 36. Vegetable and truck crops on organic soils

Crop		High P (30-200+) High K (200-600+) lbs. per acre N*	P_2O_5	K_2O	Low-med. P (0-29) High K (200-600+) lbs. per acre N	P_2O_5	K_2O	High P (30-200+) Low-med. K (0-199) lbs. per acre N	P_2O_5	K_2O	Low-med. P (0-29) Low-med. K (0-199) lbs. per acre N	P_2O_5	K_2O
Asparagus, Cabbage, Cauliflower, Carrots, Peas, Radishes, Table beets	0:1:3 Ratio	0 +	50 +	150	0 +	100 +	150	0 +	50 +	300	0 +	100 +	300
Celery		50 +	100 +	200	50 +	200 +	200	50 +	100 +	600	50 +	200 +	600
Onions	0:1:1 Ratio	50 +	100 +	100	50 +	200 +	100	50 +	100 +	200	50 +	200 +	200
Beans, Lettuce, Mint, Parsnips		0 +	50 +	50	0 +	100 +	50	0 +	50 +	100	0 +	100 +	100

* Use nitrogen on newly cultivated peat and highly decomposed muck. On most other organic soils nitrogen is not necessary except for celery and onions.

VEGETABLE AND TRUCK CROPS ON ORGANIC SOILS

In the culture of high value truck crops it is important to maintain high fertility levels of phosphorus and potassium. Since the organic soils contain and release substantial quantities of nitrogen, it is usually not necessary to add fertilizer nitrogen. There is also the possibility of excessive nitrogen causing adverse quality effects of some vegetables.

The routine soil testing methods adapted for use primarily on mineral soils have some shortcomings for use on organic soils and specialized crops. However, the soil test information can be of some value in determining the relative nutrient status of P and K.

Table 36 is a guide for determining which areas should have a corrective treatment of phosphate and potash. The grouping of species into categories of P;K ratios is done on the basis of Michigan State University recommendations. Additional information is available in Special Bulletin 425 from Michigan State University.

HOME VEGETABLE GARDENS AND SMALL FRUITS

A practical fertilizer recommendation for home gardens is generally one that involves one grade of fertilizer that can be applied at different rates depending on the phosphorus and potassium fertility. For this reason only two categories of soil tests are considered: 1) P and K are both high or 2) one or both P and K are medium or low. If manure is applied to gardens, no fertilizer is recommended unless P or K are in the low category (below 10 for P and below 90 for K).

Fertilizer for gardens should be applied as a broadcast before planting and worked into the soil. Fertilizer for fruits such as strawberries and raspberries should be applied early in the spring. Research work on the effect of fertilizers on small fruits is very limited.

Recommendations from other states indicate that complete fertilizers are most practical.

HOME LAWNS

The preparation of a fertilizer recommendation for lawns on the basis of soil tests has been difficult because it is not practical for the average home owner to buy grades that fit different soil test situations. Lawn fertilizers are usually complete so there is no chance to adjust P_2O_5 and K_2O rates.

The home owner needs information about methods of fertilizing a lawn, about time of application, and a list of available grades and rates of application.

To meet this need a standard recommendation form has been prepared in the Fact Sheet series that can be sent to the lawn soil test client. This form provides two alternative fertilizer plans, one of which can be recommended on the basis of the soil test.

Plan 1 uses complete grades that would be recommended whenever there are these P and K situations.

1. P is medium, K is high.
2. P is medium, K is low.
3. P is low, K is high.
4. P is low, K is medium.
5. P is low, K is low.

Plan 2 uses only nitrogen fertilizers and would be recommended for these P and K soil test situations:

1. P is high, K is high.
2. P is medium, K is high.

One of the plans would be checked on the recommendation form corresponding to the appropriate soil test situation.

Table 37. Home gardens, small fruits, and ornamental plantings

Plants	P and K tests high +30 for P +220 for K: Amount of * 12-12-12 per acre	Amount of 12-12-12 per 1,000 sq. ft.	P or K medium or low, less 30 for P, less 220 for K: Amount of * 12-12-12 per acre	Amount of 12-12-12 per 1,000 sq. ft.
Home garden	250	6	500	12
Strawberries and raspberries	250	6	800	18
Shrubbery	400	9	800	18
Trees	Fertilize only if growth is unsatisfactory or if leaves are light green. Use 12-12-12 or 10-10-10 at rate of 2 pounds per inch of trunk diameter. Apply in 18 inch holes in circle at a distance similar to the crown of the tree. Mix fertilizer with about 3 to 4 times as much soil and pour this in the holes. Space the holes about 24 inches apart.			

* 12-12-12 is used as an example. Grades of ratios 1-2-2 can also be used for high tests. For low tests grades with 1-2-2 and 1-4-4 ratios can also be used.

The fact sheet can also be used for those who want a lawn fertilizer recommendation but do not have a soil test. In this case Plan 1 would usually be used unless considerable plant nutrients had been used in the past.

The lawn fertilizer guide table used in this fact sheet follows.

Fertilizer grades and rates for lawns

☐ Plan 1. Soils with a deficiency of phosphorus or potassium
(Use one of the grades listed)

Ratio	Grades	Amount per 1,000 sq.ft.	Time of application	Maintenance nitrogen
1:1:1	8-6-6 8-8-6 8-8-8 10-10-10	25 lbs. once a year	Early spring is best but can be used any time during growing season	Usually this will supply N. If color is light green, use an application of fertilizer listed under Plan 2
	12-12-12 14-14-14 15-15-15	16 lbs. once a year		
2:1:1	10-5-5 10-6-4 12-6-6 14-7-7 16-8-8	12 lbs. twice a year	Apply the first application early spring and the second in early July	These fertilizers supply adequate N. After 2 years of this plan, you can use fertilizers listed under Plan 2
3:1:1 and 4:1:1	15-5-5 18-6-6 20-8-8 20-10-5 20-8-8	9 lbs. twice a year		

☐ Plan 2. Soils adequate in phosphorus and potassium, maintenance nitrogen only
(Apply one grade three times per year)

Ratio	Grades	Name	Amount to apply, lbs. per 1,000 sq.ft.		
			March or early April	Early June	September
1:0:0	45-0-0	Urea	$3\frac{1}{2}$	$1\frac{1}{4}$	2
	38-0-0	Urea form	4	2	3
	33-0-0	Ammonium nitrate	5	2	3
	21-0-0	Ammonium sulfate	8	4	4
	16-0-0	Sodium nitrate	10	5	5

The fertilizer grades cited are examples only. Other equally effective grades are commonly available.

APPENDIX

PROCEDURES USED IN UNIVERSITY OF MINNESOTA SOIL TESTING LABORATORY

Before testing, all samples are dried to a uniform moisture, crushed, and sieved. This usually takes from 5 to 7 days. This makes handling easier and assures consistent results. The samples are dried at room temperature and humidity.

Following is a general description of laboratory procedures used:[6]

pH

Soil pH is a number that indicates the relative acidity or alkalinity of the soil. Values below 7 are acid, above 7 are alkaline. The pH is measured with a pH meter on a paste water-soil mixture of a sample.

Extractable Phosphorus

The soil phosphorus measured is that which is extracted by a solution consisting of 0.025 N HCl and 0.03 N NH_4F, commonly referred to as Bray's No. 1 extractant. One gram of soil and 10 milliliters of extractant are shaken for 1 minute.

The amount of phosphorus extracted is determined by measuring the intensity of the blue color developed in the extract when treated successively with hydrochloric acid-ammonium molybdate and amino-napthol-sulfonic acid solutions. A spectro-photometer is used to measure this color which is converted to pounds of phosphorus per acre on the basis of 2 million pounds of soil in the surface 6 inches of an acre. The phosphorus measured does not represent all of the phosphorus that may be available for plant growth, for example, organic phosphorus may become available upon mineralization.

Exchangeable Potassium

Potassium is extracted from the soil samples with 10 milliliters of 1.0 N ammonium acetate mixed with 2 grams of soil. The amount of potassium removed by this reagent in 1 minute is designated as exchangeable potassium and is measured by passing the filtered extraction solution through a flame photometer. This instrument is calibrated with standard solutions so that a direct reading of pounds of potassium per acre can be made.

Organic Matter

The percent organic matter in the samples is determined by oxidation of the organic material with chemical reagents. These reagents are 2.0 N potassium dichromate and concentrated sulfuric acid. The resulting color of a mixture of these reagents and soil is a function of the amount of organic matter. This color is measured in a colorimeter.

Texture

The relative amounts of sand, silt, and clay are estimated by the feel of the soil in a plastic condition. Soil texture is the most important single property of a soil since it affects the capacity to hold water and the capacity to store and supply plant nutrients.

EXAMPLE RECOMMENDATIONS

A complete fertilizer recommendation should include the amount and kind of plant nutrients needed and suggestions on the proper method and time of application. This information should be in a form that's easy for farmers to understand and doesn't discriminate against any particular fertilizer brand.

There are two methods of expressing a fertilizer recommendation, that of total plant food per acre such as 0+60+60 and a rate of certain grade such as 300 pounds of 0-20-20. There are advantages to expressing each recommendation in both forms. The total plant food method shows that the important information is that certain amounts of nitrogen, phosphate, and potash are needed for the crop. The rate and grade form then shows one method of applying this plant food. Most farmers understand the rate and grade form more easily than the plant food per acre form.

Effort should be made to make the plant food per acre concept more widely understood because this allows the operator flexibility in buying fertilizers. Also, a significant amount of fertilizer is bulk mixed and spread and the total plant food per acre method is appropriate for this.

Well designed recommendation forms or individual letters should be sent with each laboratory test report. With a large number of samples in a county a standard form letter approach is most satisfactory, but as much individual attention as possible should be given to each cooperator. Fertilizer recommendation forms are available on request to the Extension Soils Specialists' office.

It is the policy of the Soil Testing Laboratory and Extension Service to provide an extra copy of the soil test report and fertilizer recommendation to fertilizer dealers or others if this is requested on the information sheet. This is sent from the county extension office.

Following are examples of how recommendations should be made for different crop and soil situations.

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6 Adapted from "Soil Analysis Methods as Used in the University of Minnesota Soil Testing Laboratory." John Grava. Form 15-G, Institute of Agriculture, University of Minnesota, June 1957.

Crop and soil situation -

Organic matter	4.6M	Past crops	Corn preceded by beans
pH	6.8	Manure	No
Extractable P	12	Crop to be fertilized	Corn
Exchangeable K	170	Yield goal	100 bu.
Texture	Clay loam		

Equipment available -

Disk planter attachment	X
Split boot attachment	
Broadcast	X

Recommendation -

Total plant nutrient need:

100 pounds of nitrogen per acre

40 pounds of phosphate per acre

40 pounds of potash per acre

This can be applied as:

Example of grade	Amount pounds per acre	Method of application	Time of application
5-20-20	200	Planter attachment	At time of planting
None		Broadcast	Fall or spring
90 pounds of nitrogen		Supplemental N sidedress or broadcast	Fall, spring, or June

Comments -

Generally it is best to recommend the supplemental nitrogen as pounds of N per acre. Do not recommend specific grades such as 33-0-0, 41-0-0, or 82-0-0. When supplemental N is to be used, limit the starter N to 10 to 12 pounds.

If no planter attachment was available, increase the phosphate 20 pounds per acre or 40 pounds in this case.

Crop and soil situation -

Organic matter	2.5L	Past crops	Alfalfa
pH	5.9	Manure	No
Extractable P	40	Crop to be fertilized	Corn
Exchangeable K	105	Yield goal	85 bushels
Texture	Sandy loam		

Equipment available -

Disk planter attachment	
Split boot attachment	X
Broadcast	X

Recommendation -

Total plant nutrient need:

15 pounds of nitrogen per acre

20 pounds of phosphate per acre

80 pounds of potash per acre

This can be applied as:

Example of grade	Pounds per acre	Method of application	Time of application
8-16-16	125	Planter attachment	At planting time
0-0-60	100	Broadcast	Fall or spring
None		Supplemental N broadcast or sidedress	

Comments -

(1) It is impractical to recommend a broadcast rate of less than 100 pounds of fertilizer per acre. For this reason the amount of K_2O recommended is increased from the 60 pounds given on table 9 to 80 pounds per acre. If table 8 were used, the 40 pounds of K_2O would be increased to 80 pounds.

(2) If a disk attachment were available, all of the fertilizer would be recommended as a starter. Two hundred pounds per acre of 5-10-30 could be used.

Crop and soil situation -

Organic matter	5.3 M	Past crops	Oats and sweetclover
pH	7.1	Manure	5 tons
Extractable P	8	Crop to be fertilized	Corn
Exchangeable K	230	Yield goal	125 bushels
Texture	Clay loam		

Equipment available -

Disk planter attachment	X
Split boot attachment	
Broadcast	X

Recommendation -

Total plant nutrient need:

70 pounds of nitrogen per acre

80 pounds of phosphate per acre

12 pounds of potash per acre

This can be applied as:

Example of grade	Pounds per acre	Method of application	Time of application
6-24-12	100	Planter attachment	At time of planting
0-45-0	120	Broadcast	Fall or spring
65 lbs. of N		Supplemental N broadcast or sidedress	Fall, spring, or June

Comments -

In this case some potash is recommended in the starter even though manure may add about 50 pounds of potash. Reasons for this are discussed in section on manure. Manure is credited for 30 pounds of N, so the total recommended as fertilizer is 100-30 or 70 pounds.

Crop and soil situation -

Organic matter	2.3 L	Past crops	Corn
pH	6.4	Manure	None
Extractable P	16	Crop to be fertilized	Oats and alfalfa
Exchangeable K	140	Yield goal	--
Texture	Silt loam		

Equipment available -

Disk planter attachment	
Split boot attachment	
Broadcast	X
Grain drill attachment	

Recommendation -

Total plant nutrient need:

30 pounds of nitrogen per acre

60 pounds of phosphate per acre

90 pounds of potash per acre

This can be applied as:

Example of grade	Amount pounds per acre	Method of application	Time of application
8-16-24	374	Broadcast	Fall or spring or after cutting

Comments -

Here a 1:2:3 ratio is called for if the guide is followed and one fertilizer is used. If a fertilizer such as 8-16-24 is not available, a grade such as 10-20-20 could be used at 350 pounds per acre. This would apply 35 pounds of N, 75 pounds of P_2O_5, and K_2O which would be acceptable. If the K tests were closer to the low level, the full 90 pounds of potash should be applied.

Crop and soil situation -

Organic matter	5.2 M	Past crops	Wheat
pH	7.4	Manure	None
Extractable P	8	Crop to be fertilized	Barley
Exchangeable K	500	Yield goal	50 bushels
Texture	Silty clay loam		

Equipment available -

Disk planter attachment	
Split boot attachment	
Broadcast	
Drill fertilizer attachment	X

Recommendation -

Total plant nutrient need:

40 pounds of nitrogen per acre

32 pounds of phosphate per acre

0 pounds of potash per acre

This can be applied as:

Example of grade	Amount pounds per acre	Method of application	Time of application
24-20-0	165	Drill attachment	Seeding

Comments -

Recommendation assumes a medium to fine textured soil adequately supplied with moisture at seeding time. On fine textured soils in dry condition apply phosphorus requirement down the spout using a mixed fertilizer having a 1:4 ratio of N to P and apply balance of nitrogen broadcast preplant. On sandy soils do not exceed 30 pounds per acre of N and/or K_2O in down-the-spout application under any soil moisture condition.

The separate nitrogen application method would also be used when it is known that grades such as 24-20-0 are not available.

The example recommendation of grade and amount should agree with the total plant food figures given. In this case the 32-pound phosphate figure is used rather than 30 pounds because of the grade used.

Crop and soil situation -

Organic matter	4.8 M	Past crops	Sweetclover fallow
pH	6.8	Manure	None
Extractable P	17	Crop to be fertilized	Sugar beets
Exchangeable K	370	Yield goal	14 tons
Texture	Clay loam		

Equipment available -

Disk planter attachment	X
Split boot attachment	
Broadcast	X

Recommendation -

Total plant nutrient need:

10 pounds of nitrogen per acre

80 pounds of phosphate per acre

0 pounds of potash per acre

This can be applied as:

Example of grade	Pounds per acre	Method of application	Time of application
10-20-0	100	Planter attachment	Planting time
0-46-0	175	Broadcast	Fall or spring

Comments -

The situation here is quite straightforward. One alternative would be to broadcast all the fertilizer in which case the nitrogen could be eliminated because the 10 pounds would not have a significant effect unless placed near the row.

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