

**COMPARATIVE STUDY ON PERFORMANCE OF BROILER CHICKS FED ON
DIFFERENT LEVELS OF MASH AND PALLET POULTRY FEED**Gulnaz Tasleem¹, Aisha Saleem^{1*}, Sara Chaudhry¹ and Iqura Tariq²¹M. Phil Researcher, School of Zoology, Minhaj University Lahore, Pakistan.²M. Phil Researcher, The University of Lahore, Pakistan.***Corresponding Author: Aisha Saleem**

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ABSTRACT

The study determined the impact of feeding various ratios of feed types on the growth of broiler chicks. Poultry meat is contributing about 19% of the complete meat creation in the nation and is giving reasonable creation of good quality nutritious creature protein. Pellets and mash feed are two different types of feed that are employed. Pellets or crumbles are generally slightly more expensive than the same ration in mash form. Mash is one of the categories of complete feed that is wretched and mixed to make it difficult for birds to identify nutrients; each bite of meal deliver a well-balanced diet. A total of 250 poultry broiler chicks were used, with 50 chicks each group, in a five-way totally randomized design. The broiler chicks were grown for eight weeks. From the first week to the eighth week, the live body weight (BW), weight growth (WG), feed intake (FI), and feed conversion ratio (FCR) were all monitored on a weekly basis. Different ratios of birds given pellets exhibit similar feed conversion rates and improved growth responses to those of different ratios of birds fed mash. The findings demonstrated that broilers fed various ratios of pellet poultry feed had higher production indices than those fed various ratios of mash feed. In comparison to different ratios of mash broiler feed, the feed efficiency of poultry broilers fed varied ratios of pellet feed was higher.

KEYWORDS: Broiler Chicks, Mash, Pallet feed, Feed convention ratio.**INTRODUCTION**

In Pakistan, poultry is viewed as one of dynamic segment of domesticated animal area which gives immediate as well as backhanded work to more than 1.5 million individuals. Right now, around 700 billion speculations is available in poultry industry. This field is filling in as spine of horticulture as it utilize more than 7,000,000 metric tons agro-deposits, hence an adjusting power of mind sheep and meat costs in country. Practically 32% of all out meat creation of Pakistan comes from poultry. Business layer, raiser, and oven stocks exhibited documented growth of 7, 5, and 10%, respectively, whilst provincial poultry only showed a 1.5% increase from 2015–16. The assessed production of company and provincial poultry and goods for the past three years has exhibited progressive growth, truly revealing a gap in the organic market.^[1]

Poultry meat is contributing about 19% of the complete meat creation in the nation and is giving reasonable creation of good quality nutritious creature protein.^[2] Protein derived from animal sources is similarly more nutritiously complete than protein derived from plants because it contains the essential amino acids in higher quality.^[3] The honor for macronutrient utilization by

people proposes acquiring 45-65% of the day to day caloric requirement from carbs, 10-45% from fat, and 10-35% from protein. As indicated by the Dietary Reference Intake (DRI) gave by the Institution of Medicine of the US food and Nutrition Board, grown-ups need to eat around 60g of protein each day^[4]. Poultry undertakings have grown quickly in Pakistan.^[5]

Pellets or crumbles are generally slightly more expensive than the same ration in mash form. Mash is one of the categories of complete feed that is wretched and mixed to make it difficult for birds to identify nutrients; each bite of meal deliver a well-balanced diet. The mash form of feed requires a simple manufacturing technique. Mash diets result in better growth unification.^[6] Proteins taken from creatures are meat dinner, meat and bone feast, blood dinner, fish meat and quill dinner. Creature proteins that are produce for human utilization are under consistent tension, due to appeal. With an increment interest of creature protein, feed need additionally expanded, so the fixing interest (which has elevated degree of protein and energy) likewise expanded.^[7]

Feed Form Specification By mechanically pressing mushes into a stiff, dry form, pellets are created. We get

crumble and mash, respectively, when we ground pellets into the smallest and tiniest fragments. Comparing pellets to mash, there are a number of benefits, including improved feed conversion, feed intake, and broiler performance^[8]. Dissolvable fiber has been displayed to make hurtful impacts, albeit this issue can be settled by including compounds that separate fiber. Starch absorbability rose while fiber-corrupting chemicals were added to the wheat abstains from food. This recommends that fiber is forestalling the absorption of starch.^[9]

Poultry meat contributes a critical piece of the hole among organic market for proteins, which can be expanded by expanding maker productivity and bringing down retail costs. The poultry business' current framework can possibly close the hole among organic market for proteins.^[10] Hereditary determination achieved by business rearing organizations is liable for most of the upgrades in grill development.^[11]

The improvement of the gizzard is worked with by coarse particles, and its development and regular usefulness might be hampered by their nonattendance or just halfway incorporation. Enormous maize molecule size further develops execution and feed effectiveness in squash layer abstains from food, crush grill consumes less calories, and pelleted oven slims down.^[12] The cost of producing broilers is currently 60–65% covered by feed. In order for broilers to produce enough meat, the physical shape of the feed mash, pellets, and crumble is crucial. The feed is stimulated to be consumed by crumbling it, according to results that are similar. The FCR improvement in broilers up to 6 weeks of age is influenced by pelleted feed, according to the findings.^[13]

The rate and effectiveness of growth are increased when whole pellet meals are given to meat birds.^[14] The development of skeletal muscle is related to broiler growth, and betaine may take part in the metabolism of

proteins and energy as well as serve as an organic constituent to protect cells from being affected. Because of its lipid based and growth-enhancing properties, betaine is referred to in animal nutrition as a "carcass modulator." Betaine may help broilers grow more quickly and produce more muscle, according to some reports.^[15] Pelletizing feed has several advantages, including lessening feed segregation, making it easier to handle, improving feed through the feed processing units and feed forming instruments, reducing food microbial load, and lowering feed costs because it enables the use of substitute feedstuffs.^[16]

MATERIAL AND METHODOLOGY

The current study was conducted in a private poultry farm named AL-NAFAY protein farm located about 11 km away in 325 E.B from main city of Burewala with two complete availability of power supply and cooling aerating system.

Plan of work

A complete number of 250, day old business grill chicks were bought from nearby markets which were utilized in the current preliminary. The Chicks were separately gauged and haphazardly relegated to 5 trial gatherings/medicines. The average body weight of all chicks was about 39g. All experimental Chicks were treated with NDV and were kept/ housed on sawdust based. The accessibility liberated from feed and clean water was guaranteed all through the trial period which went on for 48 days. The motivation behind this study was to assess the impact of feed structure with their various levels on development rate and feed productivity of oven chicks.

Apparatus: Sawdust, Iron rods, Water drinkers, Food containers, Automatic thermometer for temperature detection, Air coolers for constant air supply, weighing machine



Figure 01: Continuous power supply with temperature check.

Experimental design

The experiment was performed in accordance with the standard procedure at a private poultry/ protein farm. Two types of feeds, pellet and mash with standard protein and energy levels were purchased from local market. Five feeding groups/ types were made and 250 chicks were randomly allotted to these five groups having 50 chicks in each group and placed in separate

partition. The record of daily feed offered and refusal for each group was maintained on daily basis and weekly weight of chicks was also recorded to calculate the feed efficiency and weight gain.

The feeding groups and the percentage of different feed offered to chicks are shown as given in table-1

Table 01: Feed types used for experiment.

| Group | Feed type | Percentage used |
|---------|---------------|-----------------|
| Group 1 | Pellet | 100% |
| Group 2 | Mash | 100% |
| Group 3 | Pellet + mash | 50% + 50% |
| Group 4 | Mash + pellet | 75% + 25% |
| Group 5 | Pellet + mash | 75% + 25% |

Experimental procedure

The experiment was started as per plan by placing the day old broiler chicks in separate labeled partitions allocated for them is an isolated space reserved for them. Fifty (50) chicks for each group were allotted/ placed in their designated partition where all had free access to food and water. The chicks were vaccinated in the beginning of the experiment and afterwards regularly with NDV and Ghomboro main vaccines to protect them from microbial and attack of other diseases.

Feed intake

All the sanitary measures were adopted in and around the experimental place. The chicks were offered feed in groups in feeding troughs and clean water in water pots. Regular availability of feed and water was censured by visiting the farm regularly. The mixing of both feed was done at the farm by hands as per the percentage for each group.

Mortality

The mortality of chicks in each partition group was noted/ recorded on daily basis. Remaining bird data was updated by subtracting the dead birds as 50 birds were used for each group at the start of the trial.

Data collection

All the chicks were weighed before placing them in the partitions and weekly weight was recorded thereafter on every Thursday. Similarly the record of amount of daily feed offered was taken for each group regularly to calculate the feed consumed by each groups of chicks.

Laboratory test of samples

The feed samples were got analyzed in from the nutrition laboratory of University of Veterinary and Animal Sciences (UVAS) Lahore to determine the nutrient and protein contents of different combination of feeds used.

RESULTS

The effects of feed types on body weight of all the chick groups were determined. Weight gain was measured related to types of feeds used. Five groups/ treatments were made where pellet feed was used as a base in all feeding groups. 100% pellet feeding was kept as control called group-1, whereas the other groups consisted of 100% mash feeding (group- 2) ,50% pellet+50% mash feeding (group-3), 75%pellet + 25% mash feeding (group-4) and 25% pellet+ 75% mash feeding (group-5). For first 10 days ground (small particle size pellet feed was used in feeding groups and after wards large particle sized pellet feed was fed to chicks in all groups. The physical structure of feeds was not significantly ($P<0.01$) affected on weight gain among groups for first week of the trial. But the weight gain was significantly different ($P<0.01$) from 3rd week to onwards of the trial.

Average Weight Gain of Experimental Groups (grams)

The initial average body Initial body weights of all birds in all groups were 41.85 ± 05 . Increased body weight was observed of all birds in all the groups after one week of trial. The data of weight gain in birds of all groups is at table- 02.

Table 02: Average weight gain in all groups of broiler chicks on weekly basis (grams).

| | Group 1 100% pellet(control) Grams. | Group 2 100% mash Grams | Group 3 50% pellet+ 50% mash Grams | Group 4 75% mash +25% pellet Grams | Group 5 25% mash + 75% pellet Grams |
|-------------------|--|----------------------------------|---|---|--|
| Initial wt. (gm.) | 39.00 | 39.80 | 40.10 | 50.15 | 40.20 |
| Week 1 | 166.75 | 152.0 | 160.86 | 164 | 155.47 |
| Week 2 | 459.47 | 450 | 448 | 442.62 | 453.25 |
| Week 3 | 847 | 798.76 | 810 | 816 | 833 |
| Week 4 | 1385 | 1105 | 1170 | 1296 | 1320 |
| Week 5 | 1665 | 1490 | 1550 | 1440 | 1617 |
| Week 6 | 1890 | 1750 | 1710 | 1620 | 1840 |
| Week 7 | 2437 | 2350 | 2270 | 2360 | 2410 |
| Week 8 | 3032 | 2850 | 2901 | 2885 | 2947 |

From the data on weight gain in the 1st week of trial, it was observed that the birds in all groups gained rapid growth rate with an average weight of 119.02 ± 05 grams

compared to initial average weight of 41.85 gm. Highest growth rate ($p<0.001$) was observed in control group in comparison to all other groups and among other groups,

highest growth ($p < 0.001$) was noted in 75% pellet + 25% mash feeding chicks (group-4), however, the lowest growth rate ($p < 0.001$) was observed in 50% pellet + 50% mash feeding birds (group-3).

From 2nd week till the end of experiment at 8th week of the trial, the birds fed 100% pellet (control group) gained highest body weight ($p < 0.001$) compared to other groups. During 2nd to 7th week of trial, weight gain of bird of all groups. Average weight gain in the last week of the trial, the feeding group of 100% pellet feed

(control group) scored highest weight ($p < 0.001$) than other combination of feeds.

However, the lowest gain ($p < 0.001$) absolutely was observed in 50% pellet + 50% mash feeding group and among other three groups combination of 75% mash + 25% pellet feeds showed better performance of birds in this group of feeding. From the data and its statistical analysis, the results revealed that broiler birds fed 100% pellet based diet proved best performer than 100% mash fed birds and other combinations of both feeds.

Table 03: Average weight gain in grams in broiler chicks on weekly basis.

| | Group 1 100% pellet(control) Grams. | Group 2 100% mash Grams | Group 3 50% pellet+ 50% mash Grams | Group 4 75% mash +25% pellet Grams | Group 5 25% mash + 75% pellet Grams |
|--------------------|--|-------------------------------|---|---|--|
| Initial wt. | 39.00 | 39.80 | 40.10 | 50.15 | 40.20 |
| Week 1 | 166.75*** ↑ | 152.0*** ↑ | 160.86*** ↑ | 164*** ↑ | 155.47*** ↑ |
| Week 2 | 459.47*** ↑ | 450*** ↑ | 448*** ↑ | 442.62*** ↑ | 453.25*** ↑ |
| Week 3 | 847*** ↑ | 798.76*** ↑ | 810*** ↑ | 816*** ↑ | 833*** ↑ |
| Week 4 | 1385*** ↑ | 1105*** ↑ | 1170*** ↑ | 1296*** ↑ | 1320*** ↑ |
| Week 5 | 1665*** ↑ | 1490*** ↑ | 1550*** ↑ | 1440*** ↑ | 1617*** ↑ |
| Week 6 | 1890*** ↑ | 1750*** ↑ | 1710*** ↑ | 1620*** ↑ | 1840*** ↑ |
| Week 7 | 2437*** ↑ | 2350*** ↑ | 2270*** ↑ | 2360*** ↑ | 2410*** ↑ |
| Week 8 | 3032*** ↑ | 2850*** ↑ | 2901*** ↑ | 2885*** ↑ | 2947*** ↑ |

Note: *** $p < 0.001$. Increase in value Decrease in value

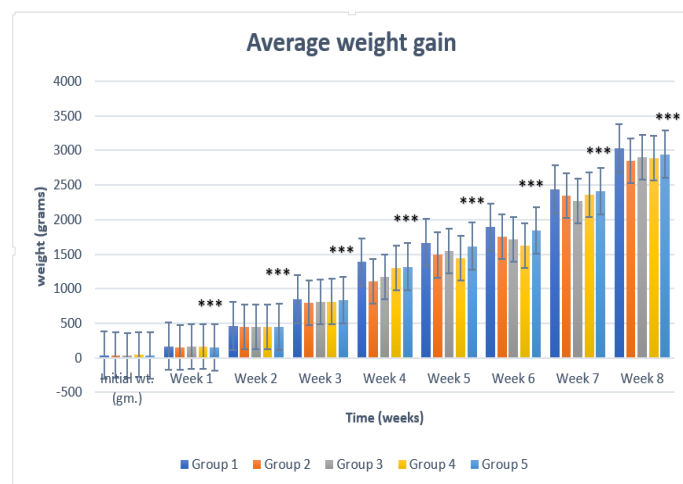


Figure 02: Results demonstrated as the mean \pm SEM (n=10). Values significantly increased were represented as * $p < 0.001$.**

Feed consumption ratio in grams in all experimental groups

All the broiler birds in all the groups were provided equal amount of feed. Birds preferred granular form of

food compared to powdered form. Initially, the chicks refused small fractions of food. But later on feed refusal ratio became very low. As birds gained weight, their feed intake demand also increased.

Table 04: Average feed consumption rate in broiler chicks on weekly basis (gm.)

| Week | GROUP 1 | Group 2 | Group 3 | Group 4 | Group 5 |
|------|---------|---------|---------|---------|---------|
| 1 | 37 | 27 | 36 | 33.8 | 35.65 |
| 2 | 189 | 173.464 | 176.63 | 180 | 184.40 |
| 3 | 360 | 326.53 | 336.73 | 343 | 359 |
| 4 | 480 | 418.97 | 439.59 | 455.8 | 464 |
| 5 | 568 | 490.61 | 541.22 | 539.2 | 558 |
| 6 | 785 | 693.87 | 714.28 | 725 | 772 |
| 7 | 1170 | 1040.81 | 1102.85 | 1142.85 | 1150 |
| 8 | 1550 | 1420.57 | 1510.40 | 1479.59 | 1451.8 |

The data on feed consumption showed that the chicks fed 100% pellet based feed (group-1) consumed highest quantity of feed ($p < 0.001$) compared to all other combinations of pellet and mash feeds. Among other feeding groups, the chicks fed 100% mash feed consumed the least amount ($p < 0.001$) of feed compared

to other three combinations of both feeds. Among different combinations of pellet and mash feeding groups, the chicks received 25% pellet+75% mash feed consumed less feed ($p < 0.001$) compared to other combinations of both feeds showing better combination to be used for commercial feeding of birds.

Statistical analysis of feed consumption ratio

Table 05: Average feed consumption ratio in grams on weekly basis.

| Week | Group 1 100% pellet(control) Grams. | Group 2 100% mash Grams | Group 3 50% pellet+ 50% mash Grams | Group 4 75% mash +25% pellet Grams | Group 5 25% mash + 75% pellet Grams |
|--------|--|-------------------------------|---|---|--|
| Week 1 | 37 | 27 | 36 | 33.8 | 35.65 |
| Week 2 | 189***↑ | 173.464***↑ | 176.63***↑ | 180***↑ | 184.40***↑ |
| Week 3 | 360***↑ | 326.53***↑ | 336.73***↑ | 343***↑ | 359***↑ |
| Week 4 | 480***↑ | 418.97***↑ | 439.59***↑ | 455.8***↑ | 464***↑ |
| Week 5 | 568***↑ | 490.61***↑ | 541.22***↑ | 539.2***↑ | 558***↑ |
| Week 6 | 785***↑ | 693.87***↑ | 714.28***↑ | 725***↑ | 772***↑ |
| Week 7 | 1170***↑ | 1040.81***↑ | 1102.85***↑ | 1142.85***↑ | 1150***↑ |
| Week 8 | 1550***↑ | 1420.57***↑ | 1510.40***↑ | 1479.59***↑ | 1451.8***↑ |

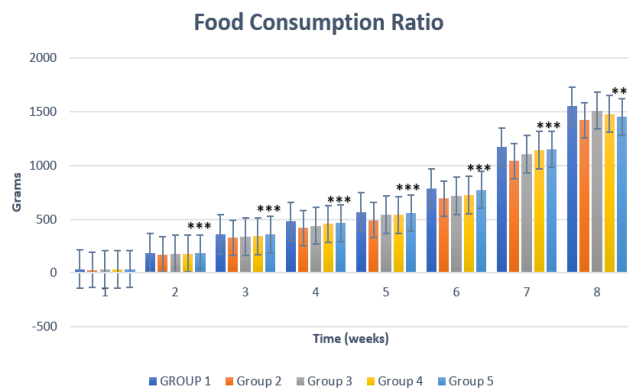


Figure 03: Results were expressed as the mean \pm SEM (n=10). Values significantly increased were represented as * $p < 0.001$.**

Feed conversion ratio in chicks fed on different combinations of Pellet and Mash

The data on average feed conversion ratio in broiler chicks was calculated by using following formula is

illustrated as below;

FCR=Average Feed consumed by birds (gm.) in a week

Average weight gain in chicks (gm.) in a week

Table 06: Average feed conversion ratio (gms.) in different groups of chick groups on weekly basis.

| Weeks | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 |
|-------|---------|---------|---------|---------|---------|
| 1 | 0.23 | 0.177 | 0.21 | 0.20 | 0.22 |
| 2 | 0.41 | 0.38 | 0.38 | 0.40 | 0.41 |
| 3 | 0.42 | 0.40 | 0.42 | 0.42 | 0.43 |

| | | | | | |
|---|-------|------|------|------|------|
| 4 | 0.35 | 0.37 | 0.38 | 0.35 | 0.35 |
| 5 | 0.34 | 0.32 | 0.35 | 0.37 | 0.35 |
| 6 | 0.415 | 0.39 | 0.41 | 0.44 | 0.42 |
| 7 | 0.49 | 0.44 | 0.48 | 0.48 | 0.47 |
| 8 | 0.51 | 0.49 | 0.50 | 0.49 | 0.49 |

From the data on feed conversion ratio and its results from statistical analysis for different groups fed different combinations of pellet and mash feeds indicated that there was a significant difference ($p < 0.001$) among control and other groups and there was also a significant difference ($p < 0.001$) among chicks fed different combinations of pellet and mash feeds. Although the

chicks fed 100% pellet feed showed higher ($p < 0.001$) performance in weight gain, but the feed efficacy was comparatively better ($p < 0.001$) in chicks fed 75% pellet+25% mash feeding group compared to all other groups/ combinations of different feeds indicating best combination of feeding which can successfully be used by commercial poultry farmers.

Table 07: Average feed conversion ratio in chicks on weekly basis.

| Weeks | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 |
|--------|-----------------------------------|-----------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| | 100% pellet(control) Grams. | 100% mash Grams | 50% pellet+ 50% mash Grams | 75% mash +25% pellet Grams | 25% mash + 75% pellet Grams |
| Week 1 | 0.23 | 0.17 | 0.21 | 0.20 | 0.22 |
| Week 2 | 0.41** ↑ | 0.38** ↑ | 0.38** ↑ | 0.40** ↑ | 0.41** ↑ |
| Week 3 | 0.42** ↑ | 0.40* ↑ | 0.416* ↑ | 0.42* ↑ | 0.43* ↑ |
| Week 4 | 0.35** ↓ | 0.37* ↑ | 0.38** ↑ | 0.35** ↑ | 0.35** ↑ |
| Week 5 | 0.34* ↓ | 0.32* ↑ | 0.35* ↑ | 0.37* ↑ | 0.35 ↑ |
| Week 6 | 0.41** ↑ | 0.39* ↑ | 0.41* ↑ | 0.44** ↑ | 0.41** ↑ |
| Week 7 | 0.48* ↑ | 0.44** ↑ | 0.48* ↑ | 0.48** ↑ | 0.47** ↑ |
| Week 8 | 0.51** ↑ | 0.49** ↑ | 0.50* ↑ | 0.49* ↑ | 0.49* ↑ |

Note: *** $p < 0.001$.

↑ Increase in value

↓ Decrease in value

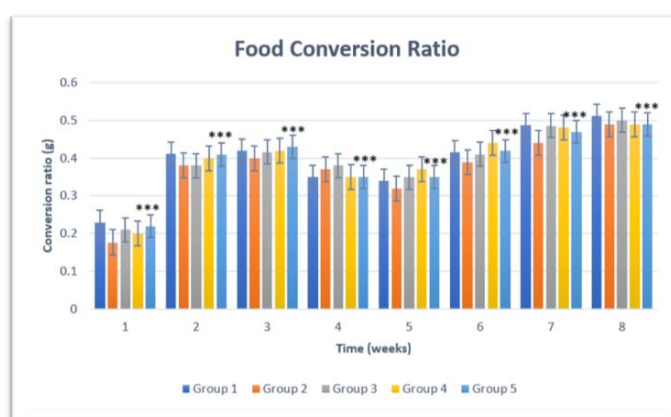


Figure 04: Results were represented as the mean \pm SEM (n=10). Values significantly changed are represented as * $p < 0.001$.**

DISCUSSIONS

The present work revealed that weight gain in chicks in all feeding groups increased ($p < 0.001$) throughout the trial period and physical form of feed did not affect the gain in weight among and within groups. This significant

difference among groups is highlighted in table 02. The groups assigned different feed forms, no significant difference ($p < 0.05$) in broiler in gain of weight throughout the trial period of 21 days was noted.^[17] Regression analysis of the result data revealed that as the

amount of pellets in the diets increased, improvements ($P < 0.05$) in feed intake and FCR were observed. In this study the mash feeding group of chicks showed increased weight gain but lesser than 100% pellet feeding group.^[18] The study elaborated that the birds had very high ratio of feed to meat conversion which showed that is why maintaining a successful broiler poultry business required high-quality feed.^[19]

The results of current study revealed that the chicks fed 100% pellet feed gained highest ($p < 0.001$) live weight compared to all other combinations of pellet and mash feeds and among other combinations of feeds, the chicks fed 100% mash feed gained less ($p < 0.001$) weight than other combinations of feeding groups. The results further revealed that the live weight gain in 75% pellet+ 25% mash feeding chicks was comparatively higher ($p < 0.001$) compared to other two combinations of chick feeding groups. The Physical feed type did not significantly ($p < 0.05$) influence feed intake. In contrast, broilers consumed a pellet feed had a statistically higher ($p < 0.05$) gain of weight and feed consumption compared to birds fed a mash feed because birds prefer to eat larger feed particles.^[20] In present study chickens in all groups fed different levels of feed forms did not show significant difference ($p < 0.001$) among groups in relation to feed form and feed intake except week 2 as there was rapid increase in weight and feed intake compared to remaining weeks of the experiment. The poultry birds received an adequate amount of protein from plant and animal sources, including corn, vegetables, grains, milk, liver, meat meal, dried blood, and other forms of plant protein.^[21]

The findings of present work represented that chicks fed 100% pellets consumed more ($p < 0.001$) feed compared to all other combinations of feeding groups of chicks and lowest feed consumption in chicks fed 100% mash feed. The results and their statistical analysis further revealed that among other feeding groups of chicks, the combination of 75% pellet +25% mash feed showed the best ($p < 0.001$) feed conversion ratio and feed efficiency.^[22]

The results of current work done narrated that there was no outstanding change in feed transformation extent and its productivity when chicks were taken care of pellet and crush takes care of, but the chicks took care of pellet feed consumed more ($p < 0.05$) amount of feed than the chicks took care of squash feed over the whole exploratory period of 42 days.^[23] Chicken fed 100% pellet feed, chicks fed 50% mash and 50% pellet exhibit inferior growth performance. When poultry were fed 100% mash feed, there was a significant difference in their body weight gain and feed consumption. Their findings are consistent with the current study's findings, which show a significant difference in feed intake and body weight growth in hens who were fed 100% pellets, and lower performance ($P < 0.001$) in groups that received 100% mash feed. They also showed significantly lower

feed intake and body weight gain when compared to group 3 (which received 50% mash and 50% pellet feed).^[24]

The data indicated chicks fed pellets were heavier than those fed mash ($p < 0.001$), and they also required less feed to increase their live weight. When compared to broilers given mash, the processed feed recipients were noticeably heavier ($p < 0.01$). The broilers given processed feed and those given mash did not differ significantly in the amount of feed needed to increase live weight. The study was concerned with current study where chickens were did best performance at $p < 0.0001$ in group 1 where birds were fed on 100% pellet feed but 100% mash feed played not significant role in weight gain compared to pellet feed.^[25]

CONCLUSION

The present study depicts that 100% pellet feed is more successful $p < 0.001$ in terms of weight gain, feed consumption and feed conversion ratio. In Other groups the weight gain and feed efficiency was not significantly different among groups having 25%, 50%, and 75% pellet feeds however, the weight gain and feed efficiency remained lowest at $p < 0.001$ in chicks fed 100% mash feed. The results of this study further indicated that the chick fed 75% pellet and 25% mash feed was more successful ($p < 0.001$) than other combinations of feeding groups.

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