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EFFECT OF REPLACING DIFFERENT LEVELS OF CONVENTIONAL MAIZE WITH HYBRID MAIZE (HPM3) IN BROILER RATION

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ABSTRACT
The present study was aimed to assess whether hybrid maize (HPM3) can substitute conventional maize as requirement of essential amino acids as well as efficient energy source in the poultry diet. Ninety healthy day old broiler chicks were allotted randomly to three replicated (n=5; 6 birds/replicate) dietary treatments in floor pens i.e. Control (0%), L1 (25%), L2 (50%), L3 (75%), L4 (100%) of hybrid maize (HPM3). All birds were given optimal environment and had free access to water and feed. At increase level in group L4 had slight high feed intake (3873±9.24 g), significantly high weight gain (1936.3±2.08 g) and better feed: gain ratio (1.88±0.003) as compare to others. Dressed carcass weight was significantly influenced with no mortality by replacing the hybrid maize (HPM3) with conventional maize. According to predominant market rate of live birds, improvement of gross (242.04±0.26) and net (73.39±0.41) return was higher with the increase level. The increased net return by 9.2% may be utilized as a broiler management. These results suggest greater amino acid availability in the diets based on high-protein maize varieties. Therefore, HPM3 can profitably be included in broiler diets with the vantage of reducing the use of imported protein sources (such as soybean meal) because of its higher protein content and consequently providing savings on feed costs.

KEYWORDS: Birds, Carcass, Maize, Hybrid, Mortality, Broiler.

I. INTRODUCTION
Over the earlier few decades' commercial broiler production enormously increased in Pakistan, as to meet the requirements of proteins for the rapid growth of human population. Three factors are responsible for the growth of the broiler; the provision of the balance feed, bird's quality and optimum environment. For livestock production maize is a preferred dietary energy source. For the dietary feed of poultry; intensively raise, maize grain is most commonly used. In a starter ration, Maize, approximately gives 65% of metabolizable energy (ME), and CP of 20% of broiler.[1]

Maize has well constituted crude protein through genetics. During a long-term experiments of Illinois selection, varieties of hybrid maize having CP constituents having a range of 4.4% to 26.6% due to the effect of 70 generations of selection [2]. Hybrid Protein Maize (Obatampa) and lysine maize have better feed conversion ratio in monogastric animals like chicken [3, 4] as judge against to normal maize. As compare to conventional maize, the new hybrid maize grains with changes nutrient traits differ in their nutritional values and their most favorable consumption needs careful investigation [5].

The same experiment discovered that methionine is 8-11%, tryptophan 2-3% and lysine 1-4% rise in the hybrids maize grains than the normal maize. For most favorable profitable returns, suitable quality and quantity feed formulation is concerned by all stakeholders in poultry and its related business. Hence, to estimate the performance of diet in conventional maize with that of HPM3, further feeding trials are necessary in poultry diets.[6]

OBJECTIVES
- Investigating the effect of step-wise (0, 25, 50, 75 and 100%) replacement of traditional maize with hybrid maize in commercial broiler feed on the overall production performance and dressed quality (percentage and amino acids composition) of broilers.
- To compare the impact of the step-wise replacement of conventional maize with hybrid maize on the economics of broiler production.
- To determine the optimum level of Hybrid Protein Maize in commercial broiler ration in terms of bird's performance and farmers profitability.

II. MATERIALS AND METHODS

2.1 Study area

The experiment was conducted at the department of poultry science FAHVS, The University of Agriculture Peshawar.

2.2 Experimental design

Ninety (90) commercial broilers (DOC) were obtained from a local market, weighted on arrival. The birds were vaccinated against Newcastle disease and infectious bronchitis on day 7th, Gumboro on 12th and 18th day while Newcastle disease again on 24th day of the experiment.

Birds were fed in 5 groups with three (3) replicates and each replicate was having six (6) birds which were available for each experimental diet. All birds were subjected to their particular treatments of diets from day seven (7) till forty two (42) days of age.

2.3 Experimental diets

For this experiment all grains were supplied by ILRI (International Livestock Research Institute). The hybrid HPM3 used in the study were taken from a specific program of breeding that was advanced at Italy having the vision of maximizing the CP germplasm of the maize. The following experimental diets were studied: a) diet which contains commercial diet of local corn has origin of maize (control, CTR). b) Diet having hybrid HPM3 at the level of 25% replacing conventional maize. c) Diet containing hybrid HPM3 at level of 50% replacing conventional maize. d) Diet containing hybrid HPM3 at the level of 75% replacing conventional maize. e) Diet containing hybrid HPM3 at the level of 100% replacing conventional maize as shown in the table 2.1.

Table 2.1 Experimental layout.

Group	HPM3 Replacement level %	Total number of birds /group			
		R1	R2	R3	
Control	0	6	6	6	18
HPM3	25	6	6	6	18
HPM3	50	6	6	6	18
HPM3	75	6	6	6	18
HPM3	100	6	6	6	18
Total experimental birds		90			

Diets were fed in 2 phases: starter (D7-D20) and the other is finisher (Day 21-Day 42). Whole experimental diets were given in the form of pellet and were given continuously.

Table 2.2 Ingredient and chemical composition of starter ration for broiler.

Ingredients	CTR	L1	L2	L3	L4
	100:0	75:25	50:50	25:75	0:100
Maize	54	40.5	27	13.5	0
High maize corn	0	14	28	42	54
Broken Rice	2.4	2.4	2.4	2.4	2.4
Cotton meal	5	5	5	5	5
Guar meal	4	4	4	4	4
Sunflower meal	3.4	3.4	3.4	3.4	3.4
Soya bean meal	10	9.5	9	8.5	8
Maize gluten meal (30%)	7.5	7.5	7.5	7.5	7.5
Fishmeal 50%	5	5	5	5	5
Rice polish	6	6	6	6	6
Molasses	1	1	1	1	1
Lime stone	0.4	0.4	0.4	0.4	0.4
Rock phosphate	1	1	1	1	1
Lysine	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1
Vitamins Minerals premix	0.1	0.1	0.1	0.1	0.1
Calculated chemical composition					
Dry matter (%)	87.2	87.8	87.6	88.2	88.2
Metabolizable energy (kcal/kg)	2997	2989	2991	2986	2995
Crude protein	21.3	21.1	21.2	21.1	21.2
Ether extract	4.2	4.18	4.19	4.17	4.19
Fiber	3.95	3.91	3.93	3.91	3.94
Ash	5.48	5.42	5.44	5.45	5.47
Calcium	0.77	0.76	0.77	0.79	0.78

Phosphorous	0.31	0.29	0.3	0.31	0.31
Lysine (% of total amino acids)	1.36	1.36	1.37	1.38	1.39
Methionine (% of total amino acids)	0.46	0.52	0.58	0.64	0.7

*D1is control diet, whereas in the other diets 25% (D2), 50% (D3), 75% (D4) or 100% (D5) of the soybean meal was replaced with silkworm meal.
Provides per kg of diet: Mn 80 mg; Zn 60 mg; Fe 60 mg; Cu 5 mg; Co 0.2 mg; I 1 mg; Se 0.15 mg; choline chloride 200 mg; vitamin A 12000 IU; vitamin D3 2400 IU; vitamin E 50 mg; vitamin K3 4 mg; vitamin B1 3 mg; vitamin B2 6 mg; niacin 25 mg; calcium-d-pantothenate 10 mg; vitamin B6 5 mg; vitamin B12 0.03 mg; d-biotin 0.05 mg; folic acid 1 mg.
† g/100 g DM until otherwise stated.

Table 2.3: Ingredient and chemical composition of finisher ration for broiler.

Ingredients	**CTR**	**L1**	**L2**	**L3**	**L4**
	100:0	**75:25**	**50:50**	**25:75**	**0:100**
Maize	59	44.5	29.5	14.5	0
High maize corn	0	14.5	29.5	44.5	59
Broken Rice	2	2.3	2.8	3.3	3.8
Cotton meal	4	4	4	4	4
Guar meal	4	4	4	4	4
Sunflower meal	2.1	2.1	2.1	2.1	2.1
Soya bean meal	10	9.0	8.0	7.0	6.0
Maize gluten meal (30%)	7.2	7.2	7.2	7.2	7.2
Fishmeal 50%	4	4	4	4	4
Rice polish	5	5.7	6.2	6.7	7.2
Molasses	1	1	1	1	1
Lime stone	0.4	0.4	0.4	0.4	0.4
Rock phosphate	1	1	1	1	1
Lysine	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1
Vitamins Minerals premix	0.1	0.1	0.1	0.1	0.1
Calculated chemical composition					
Dry matter (%)	87.3	86.7	86.9	86.8	87.6
Metabolizable energy (kcal/kg)	3027	3025	3018	3011	3006
Crude protein	20.3	20.1	20.2	20.1	20.2
Ether extract	4.2	4.21	4.23	4.19	4.24
Fiber	3.95	3.91	3.93	3.91	3.94
Ash	5.48	5.42	5.44	5.45	5.47
Calcium	0.77	0.76	0.77	0.79	0.78
Phosphorous	0.31	0.29	0.3	0.31	0.31
Lysine (% of total amino acids)	1.36	1.36	1.37	1.38	1.39
Methionine (% of total amino acids)	0.46	0.52	0.58	0.64	0.7
Cysteine (% of total amino acids)	0.34	0.34	0.33	0.33	0.33

*D1is control diet, whereas in the other diets 25% (D2), 50% (D3), 75% (D4) or 100% (D5) of the conventional maize and were replaced with Hybrid Protein Maize.
Provides per kg of diet: Mn 80 mg; Zn 60 mg; Fe 60 mg; Cu 5 mg; Co 0.2 mg; I 1 mg; Se 0.15 mg; choline chloride 200 mg; vitamin A 12000 IU; vitamin D3 2400 IU; vitamin E 50 mg; vitamin K3 4 mg; vitamin B1 3 mg; vitamin B2 6 mg; niacin 25 mg; calcium-d-pantothenate 10 mg; vitamin B6 5 mg; vitamin B12 0.03 mg; d-biotin 0.05 mg; folic acid 1 mg.
† g/100 g DM until otherwise stated.

Table 2.4 Amino acid profiles of conventional and Maize hybrid (HPM3).

	Conventional maize	Hybrid Protein Maize
Dry matter,%	87.34	87.52
Crude protein,%	7.80	10.2
Ether extract,%	3.20	4.10
Crude fiber,%	2.30	1.69
Ash,%	1.40	1.64
Nitrogen free extract,%	70.73	67.01
Metabolizable energy (kcal/kg)	3243	3274
Essential amino acid		
Lys,%	0.22	0.26
His,%	0.26	0.26
Arg,%	0.35	0.87
Thr,%	0.28	1.84
Val %	0.36	0.24
Met %	0.16	0.27
Ile %	0.27	0.05
Leu %	0.89	1.14
Phe,%	0.37	0.12
Trp,%	0.05	0.08
Non essential amino acid		
Asp,%	0.53	1.76
Ser,%	0.35	0.15
Glu,%	1.42	2.31
Pro,%	0.69	1.62
Gly,%	0.31	0.25
Ala,%	0.56	0.85
Tyr,%	0.23	0.28

2.5 MEASUREMENT PARAMETERS

2.5.1 Daily feed intake

Feed taken by the bird in 24 hours. Feed offered when subtracted from the feed refusal, daily feed intake was calculated. Intake of Feed = Offered Feed – Refusal of Feed

2.5.2 Daily water intake

Water taken by the bird in 24hours.

2.5.3 Weekly weight gain

Weekly weight gain were determined as weight gain by the birds per week and measured in grams with digital balance for each replicate.

2.5.4 Feed conversion ratio

Feed conversion ratio was determined as Feed taken in grams or kgs/ weight gain by the bird in grams or kgs for each replicate [7]. FCR was taken at the end of the study.

$$FCR = \frac{\text{Total feed consumed}}{\text{Total weight gain}}$$

2.6 Amino acid profile of feed samples.

The amino acid profile of Hybrid Protein Maize was determined (Discussed above).

2.7 Mortality

Daily mortality were recorded when birds found dead.

2.8 Economics

Farmer's profitability was determined from the optimum level of hybrid maize in the commercial ration of broilers.

2.9 Statistical Analysis

The assessment of the data was according to completely randomize design (C.R.D) using (Statistics 8.1, 1981.) and statistical difference among different levels of groups was compared using least p-value significant that was 5%. The model was:

$$Y_{ij} = \mu + D_i + \epsilon_{ij}$$

Where, Y_{ij} is the dependent variable; μ, is the overall mean; D_i, is the fixed effect of experimental diets (i = 1-5) and ϵ_{ij} is the random error.

III. RESULTS

This research study was performed to study the effect of replacement of Hybrid maize (HPM3) on the broiler chicks' performance. The following results were obtained.

3.1 Feed intake

Total and weekly intakes of feed of different levels are shown in the table 3.1. It is evident from the table that the feed intake of every group level during each week are non-significant (P>0.05), though numerically it is clear

from the table that L4 group took more feed than the other experimental and control groups but statistically of no significance.

Table 3.1. Effect of hybrid (HPM3) on the feed intake of broiler birds during experiment.

Groups	Week 2	Week 3	Week 4	Week 5	Week 6	Total
Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE
CTR	283.33±4.04	460.00±7.23	774±4.58	1167±4.58	1183.3±1.53	3860±5.78
L1	284.00 ±2.65	453.67±0.57	774±3.2	1167±3.65	1183.3±4.51	3862.7±2.31
L2	284.95±2.62	453.67±3.15	775±3.4	1168±4.06	1184.6±4.16	3863±9.62
L3	285.67±1.53	455.33±3.21	775±4.0	1168±4.50	1184.4±2.08	3867±6.51
L4	286.67±0.58	455.67±3.21	775±3.00	1170.7±2.52	1185±3.78	3873±9.24
P-value	0.55	0.11	0.99	0.76	0.93	0.58

3.2 Body Weight Gain

Table 3.2. Shows overall and weekly gain of weight of treated and control birds during study. It is illustrated from the table that the difference among treated and control groups is significant (P<0.05) during second week, with higher gain of weight (193.33g) by the group L4. It is also seen that third and fifth week are also significant (P<0.05) with (320g) and (481.33g) respectively. However birds in L4 group shows higher gain of weight during 2nd, 3rd 4th, 5th, 6th week and in the total. Week 4th and 6th are non-significant (P>0.05) of higher weight (444g) and (497.67g) respectively.

Table 3.2 Effect of Hybrid (QPM 3) on weekly and total body weight gain (g) of broiler birds during Experiment.

Groups	Week 2	Week 3	Week 4	Week 5	Week 6	Total
Mean ± SE	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**
CTR	183.07±1.68^{c}	307±0.50^{c}	442±1.00	471±1.00^{c}	493.33±1.53	1896.1±4.40^{d}
L1	183.33±2.52^{c}	308.67±0.56^{bc}	442±1.00	472±2.00^{bc}	495.67±1.53	1901.7±4.16^{d}
L2	186.67±0.58^{b}	311.33±2.52^{b}	442.67±0.58	473.67±0.58^{b}	496.33±4.93	1910.7±6.66^{c}
L3	188.33±0.58^{b}	312.33±4.04^{b}	443±1.00	479.33±1.53^{a}	497±1.00	1920±4.360^{b}
L4	193.33±1.53^{a}	320±1.00^{a}	444±0.00	481.33±0.58^{a}	497.67±2.08	1936.3±2.08^{a}
P-value	0.00	0.00	0.09	0.00	0.36	0.00
^{abc} means in columns carrying different superscripts are significantly different at P<0.05 level.						

3.3 Feed Conversion Ratio (FCR)

Table 3.3 illustrated weekly mean and total feed: gain ratio of the experiment. The FCR of week 2nd, 3rd, 5th are significant P<0.05 while the FCR of week 4th and 6th are non-significant (P>0.05). In second week, L3 and L4 groups are significantly different from the other treatments. L2 and L3 groups are significantly similar with each other while control, L1 and L2 groups are significantly similar, only numerical difference is found. In week 3, L4 group is significantly higher than other groups; L2 and L3 treatments are significantly similar with each other while control and L1 are significantly similar only numerical difference is found. In fifth week, L3 and L4 groups are significantly similar; L2 group is significantly different from control and L1 groups while control, L1 is significantly similar with each other. L4 group in each week and in total showed better feed: gain ratio related to other groups of the experiment. Control and L1 groups are non-significant while L2 and L3 groups showed similarity with each other.

Table 3.3. Effect of hybrid (HPM3) on the feed conversion ratio (FCR) of broiler birds during experiment.

Groups	Week 2	Week 3	Week 4	Week 5	Week 6	Total
Mean ± SE	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**	**Mean ± SE**
CTR	1.57±0.047^{a}	1.49±0.01^{a}	1.754±0.01	2.48±0.003^{a}	2.40±0.01	1.94±0.01^{a}
L1	1.56±0.03^{a}	1.47±0.01^{ab}	1.751±0.01	2.47±0.003^{ab}	2.39±0.01	1.93±0.008^{ab}
L2	1.53±0.01^{ab}	1.46±0.02^{b}	1.748±0.0	2.46±0.008^{b}	2.38±0.02	1.92±0.009^{bc}
L3	1.51±0.02^{b}	1.45±0.02^{b}	1.747±0.01	2.43±0.008^{c}	2.38±0.01	1.90±0.002^{c}
L4	1.47±0.03^{c}	1.42±0.023^{c}	1.743±0.01	2.42±0.009^{c}	2.38±0.00	1.88±0.003^{d}
P-value	0.00	0.00	0.70	0.00	0.28	0.00
^{abc} means in columns carrying different superscripts are significantly different at P<0.05 level.						

3.4 Mortality

Mortality percentage of each group is shown in table 3.4. This table illustrates that mortality is 5.55% in group L1, L2, L3, L4 whereas control group has 11.11% mortality. Overall mortality is 5.56% out of which 3.42% was in control group and 1.71% for each experimented group L1, L2, L3, L4. No group showed significance in mortality.

Table 3.4: Total percent mortality in broilers fed on different levels of diets.

GROUPS	Mortality	Percentage	Mean±SE
CONTROL	2	11.11	3.700±3.20
L1	1	5.55	1.85±3.20
L2	1	5.55	1.85±3.20
L3	1	5.55	1.85±3.20
L4	1	5.55	1.85±3.20
P value			0.93

3.5 Amino Acid Composition

Table 3.5, showed the amino acid composition of meat samples. Amino acids increased with the increasing level of the hybrid maize. L4 group showed more protein especially those contractile, non-contractile and metabolized proteins which are alanine (4.59%), leucine (6.45%), valine (4.31%), phenylalanine (3.18%), and tyrosine (2.84%). Lysine (6.7%) and methionine (2.1%) of L4 group were also high in percentage than the control diet.

Table 3.5. Effect of hybrid maize level on the meat amino acid composition.

No	Amino Acid	CTR	L1	L2	L3	L4
1	Alanine	4.27	4.26	4.47	4.53	4.59
2	Leucine	5.97	5.84	6.33	6.41	6.45
3	Valine	3.66	3.68	3.93	3.97	4.13
4	Arginine	4.97	5.09	5.24	5.25	5.29
5	Glutamic Acid	11.94	11.81	12.4	12.44	12.51
6	Serine	2.85	2.87	2.93	2.94	2.98
7	Glycine	3.19	3.21	3.28	3.37	3.42
8	Cystine	0.71	0.69	0.7	0.7	0.72
9	Aspartic Acid	6.96	6.98	7.33	7.34	7.46
10	Lysine	6.378	6.38	6.58	6.68	6.7
11	Methionine	2.05	2.05	2.08	2.1	2.1
12	Histidine	2.23	2.27	2.25	2.31	2.37
13	Phenylalanine	2.92	2.89	3.15	3.15	3.18
14	Isoleucine	3.58	3.63	3.86	3.86	3.89
15	Tyrosine	2.7	2.7	2.71	2.74	2.84
16	Threonine	3.26	3.21	3.31	3.39	3.45

3.6 Dressing Percentage

This study shows the effect of the treatment on the carcass yield (P>0.05) among the different groups of the experiments. There is a difference in the group of L4 (64.8%) related to the control group. Control (63.6%) and L1 (63.77%) are relatively similar to each other while L2 (63.9%) and L3 (64.3%) groups are different from each other. L4 gives the best result while L2 and L3 show almost similar results than L1 and control groups.

Table 3.6. Effect of Hybrid Maize on carcass yield (%).

Group	Dressing% MEAN±SE	P-value
CTR	63.6 ± 0.3^{c}	0.003
L1	63.7 ± 0.3^{c}	
L2	63.9 ± 0.4^{bc}	
L3	64.3 ± 0.1^{ab}	
L4	64.8 ± 0.0^{a}	

^{abc} means in columns carrying different superscripts are significantly different at P<0.05 level.

3.7 Economics

Control group showed less profit than the other experimental groups whereas group L4 (Rs.73.39), (Rs. 242.04) predominantly showed more profit. The addition hybrid maize to group L4 made it profitable than the other rations. The statistical analysis showed significance (P<0.05). The economics of different experimental groups is shown in the given table4.7.

Table 3.7. Effect of Hybrid Maize on Gross and Net return.

Groups	Mean±SE		P- value
	Gross return	Net return	
CTR	237.01 ± 0.55^{d}	67.15 ± 0.79^{d}	0.01
L1	237.71 ± 0.52^{d}	68.21 ± 0.59^{d}	
L2	238.83 ± 0.83^{c}	69.75 ± 1.06^{c}	
L3	240.00 ± 0.55^{b}	71.15 ± 0.51^{b}	
L4	242.04 ± 0.26^{a}	73.39 ± 0.41^{a}	

^{abc} means in columns carrying different superscripts are significantly different at P<0.05 level.

IV. DISCUSSION

During starter and finisher phase the potential benefits of hybrid maize (HPM3) were measured in broilers in the present study. Following results are discussed, obtained from the present study.

4.1 Feed Intake

The present study showed no effect on feed intake through-out experimental period. This result is related to high feed efficiency of the diet containing different levels of hybrid maize rather than a high feed intake by broiler. In fact, broiler fed to conventional maize and different levels of hybrid maize depicted similar results whereas better FCR were found in the broilers. Hybrid maize with higher non-essential and essential amino acid contents reported better European Production Efficiency compared with the diet containing conventional maize. Inclusion of different of hybrid maize in the diet can result better than diet having conventional maize.[6]

Trials depicted that broiler rose with different levels of hybrid maize showed same feed intake.[8] However, this study against with the work of[9] in which feed intake was significantly higher in all the diets where conventional maize was replaced with different hybrid maize diet. Present study illustrated no significance difference but slight higher intake by the groups having different levels of hybrid maize this could not be attributed to the lysine nor energy as the energy is same as normal maize diet but due to the fact that the daily intake of essential amino acids by the groups fed by the hybrid maize which is evident by the.[10]

4.2 Weight gain

High body weight of bird could be assigned to integrity of the gut and better utilization of nutrients.[11] This could be related with the improved maize might contain higher concentration of digestible amino acid, and therefore high nutritional value than the conventional maize, so HPM3 diet gave better result.[6].[4] reported significantly higher gain of weight in broilers due to replacement of conventional maize with the hybrid maize in the diet. However, [12] did not find any significant difference in the weight gain by feeding the hybrid maize diet to broilers. This study had similar result with[13],[9].[14] and [10] reported significantly higher weight gain and FCR of chickens due to replacement of conventional maize with hybrid maize diet.

In particular, the broilers which received the diets containing hybrid maize HPM3 has higher or similar gain of weight than diet was containing conventional maize.[15] reported that broilers received diet of hybrid maize showed more growth rate than those which received the conventional maize diet.

4.3 Feed conversion ratio (FCR)

Birds showed better (FCR) feed conversion ratio of hybrid maize (HPM3) than conventional maize. Statistical analysis illustrated significant ($P<0.05$) difference among treatments. This can be attributed to feed consumption and better weight gain by the broilers. Significant FCR of the 75% and 100% of hybrid maize in the broiler was due to the better gain of weight with the same feed consumption. Our results were in support of the study of[16] which stated that FCR of birds received hybrid maize was greatly significant (P-value<0.01).[15],[17] and[18] similar resulted significantly lower FCR of birds fed on the diet conventional maize.

Better to feed: gain ratio (FCR) was investigated by[6] which showed better FCR of the hybrid maize. In the present study gain of weight and feed to gain ratio (FCR) was affected by feeding hybrid maize diet at different levels with the conventional maize diet. These results were with[13][4] reported significantly higher gain of weight and FCR of broiler broilers due to replacement of conventional maize with HPM3 diet. However, the study of[12] is against our results and didn't find any significant difference with respect to weight gain, FCR and utilization of nutrients by feeding conventional diet to broiler birds as compared to those fed conventional maize diet.

4.3 Mortality

Total of 5.56% mortality occurred in this experiment. Out of which control contributed maximum percentage than the other groups. This is not related to any feed problem but only concerned with the management. High CV of the statistical analysis showed that the treatments are not dependent upon the mortality. This was confirmed by,[15,10] The optimum ratio based on hybrid maize and conventional maize was calculated and formulated, and trials showed that broilers rose with different levels of hybrid maize had the same mortality, feed intake and growth.

4.4 Amino acid profile of meat

Amino acid analysis was done in the PCSIR Laboratories. Lysine and methionine were high with increased in the level of hybrid maize. This study was supported by,[13,4] Overall, the group which had 100% level of the hybrid maize showed high contractile, non-contractile and metabolized protein than the diet which had no or low levels of hybrid maize. This result was supported by,[6]

5.5 Dressing percentage

Statistical analysis depicted significant difference among the groups. This was observed.[16] Furthermore, he argued that the dressing percentage of the control group diet could be improved if synthetic lysine was added to the diet of conventional maize diet. However this was contrast with the study of [10, 15] who observed no significant difference among the groups between conventional maize diet and different levels of hybrid maize diet only.

4.6 Economics

According to the present study the economics of the 100% level was significantly high than the diet having normal maize only. It was assumed that the HPM3 was in a high cost than the conventional maize. In the present study per kg cost was 44 rupees of conventional maize diet while the level of 100% hybrid was 43.5 rupees which depicted more economical feed formulation. This result was evident by[10,15] who suggested that it is more economical to use HPM3 incorporation in feed due to progressive reduction of fish meal. Similar results were found by.[16] Similar results were also found with[6] who suggested that inclusion of high-protein maize in broiler diets reduce the use of imported protein sources (such as soybean meal) due to its higher protein contents. Consequently, making animal products more affordable, by providing savings on the cost of feed and production.

V. CONCLUSION AND RECOMMENDATIONS

5.2 Conclusion

The conditions, under which the study was dealt, concluded that the hybrid maize integration in the diets of broilers significantly increased the performance of the broiler chicken over that of the diet having conventional maize particularly at the level of 75% and 100%. This provides savings in the production and feed cost and making the animal products more affordable.

5.3 Recommendations

On the basis of obtained results, it is recommended that;

- Use hybrid maize (HPM3) at the level of 100% in the diet of broiler chicken.

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