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Studies on the Performance of Layers with Different Combinations of Unconventional Feed Ingredients

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Abstract

The study was conducted on 450 birds BV- 300 of 21 weeks at department of animal nutrition, college of veterinary science and animal husbandry, Jabalpur. There were fifteen dietry treatment allotted to different groups of birds with three replicates in each treatment of equal birds. Maximum feed intake was recorded in birds fed control diet (T_1) while, it was lowest in those fed T_5 diet. Hen day production percent (HDP %) showed wide variation among all the treatments. The maximum Hen day production percent was recorded in T_7 diet, while it was minimum in birds assigned T_{14} diet. Average egg weight (g) of birds assigned different diets did not differ significantly ($P<0.05$) except in groups assigned T_9 diet in which it was minimum. Cost of feed Rs per dozen eggs was highest in groups assigned T_{14} diet and was lowest in those allotted T_5 and T_7 diets. The cost of feed Rs per kg egg also had similar pattern as cost of feed per dozen egg.

Keywords: Ragi, Sorghum, Niger cake, sesame cake and Layer poultry.

Introduction

India has 215 million layers and is the largest producer of egg in the world with annual output of 103 billion eggs. The overall growth rate of poultry industry is 15-20% per annum. The most important aspect of poultry industry is the economics of feed which accounts nearly 65-75% of the total intensive system of rearing. The most expectable poultry feed is corn-soya diet which is also known as conventional feed. Since the conventional feeds are costly and high in demand[3], there is need of alternative feed ingredients which will replace the conventional feeds. In order to give momentum to poultry industry, we have to reduce the cost of feed, which can be made true by using locally available and cheaper ingredients like sorghum and ragi in place of maize (Energy feed), til and niger cake in place of soybean[5,6] (Protein feed). Hence, in present investigation gradual replacement of cereals and by product of oil seed with or without supplemental enzymes were evaluated by studying the utilization of nutrient and performance of egg laying birds.

Materials and Methods

The study was undertaken by using 450 chicks of 21 weeks of age. These birds were distributed in to fifteen dietary treatments with three replicates in such a way so that each replicate had 10 chicks. Diets were formulated using maize, sorghum, ragi, deoiled rice polish, soybean meal, sesame cake, niger cake, fishmeal and other supplements. These ingredients were analyzed for proximate constitutes[1] before formulation of diets. Diet 1 to 15 were treatments. However, T_1 was control. Different diets have ingredients maize, sorghum. ragi soybean meal, niger cake, sesame cake, rice polish, mineral mixture and vitamin mixture (Table – 1). The study was conducted for a period of 16 weeks. During the study, biweekly body weight

and weekly feed intake was recorded. Using the data of feed consumption and body weight gain, feed efficiency ratio and performance index[2], egg production, egg quality and egg parameters were calculated. Data obtained in the study were analyzed statistically using the methods[1] and significance between the treatments was also measured[4].

Dietary treatments

1. Maize + Soybean meal + Fishmeal — Control-1
2. Maize + Soybean meal – without Fishmeal — Control-2
3. $Maize_{30}$+$Sorghum_{35}$ + Ragi/$Kodo_{35}$ + Soybean meal $_{30}$+ Niger $cake_{35}$+Sesame $cake_{35}$+Fishmeal — Control-3
4. $Maize_{30}$+$Sorghum_{35}$ + Ragi/$Kodo_{35}$ + Soybean meal $_{50}$+Niger $cake_{25}$+Sesame $cake_{25}$
5. $Maize_{30}$+$Sorghum_{35}$ + Ragi/$Kodo_{35}$ + Soybean meal $_{40}$+Niger $cake_{30}$+Sesame $cake_{30}$
6. $Maize_{30}$+$Sorghum_{35}$ + Ragi/$Kodo_{35}$ + Soybean meal $_{30}$+Niger $cake_{35}$+Sesame $cake_{35}$
7. $Maize_{15}$+$Sorghum_{42.5}$ + Ragi/$Kodo_{42.5}$ + Soybean meal $_{50}$+Niger $cake_{25}$+Sesame $cake_{25}$
8. $Maize_{15}$+$Sorghum_{42.5}$ + Ragi/$Kodo_{42.5}$ + Soybean meal $_{40}$+Niger $cake_{30}$+Sesame $cake_{30}$
9. $Maize_{15}$+$Sorghum_{42.5}$ + Ragi/$Kodo_{42.5}$ + Soybean meal $_{30}$+Niger $cake_{35}$+Sesame $cake_{35}$
10. $Sorghum_{50}$+ Ragi/$Kodo_{50}$ + Soybean meal $_{50}$+Niger $cake_{25}$+Sesame $cake_{25}$
11. $Sorghum_{50}$+ Ragi/$Kodo_{50}$ + Soybean meal $_{40}$+Niger $cake_{30}$+Sesame $cake_{30}$
12. $Sorghum_{50}$+ Ragi/$Kodo_{50}$ + Soybean meal $_{30}$+Niger $cake_{35}$+Sesame $cake_{35}$
13. $Maize_{50}$ + Ragi/$Kodo_{50}$ +Niger $cake_{50}$ +Sesame $cake_{50}$ +Lysine + Enzyme
14. $Sorghum_{50}$+ Ragi/$Kodo_{50}$ +Niger $cake_{50}$ +Sesame $cake_{50}$ +Lysine + Enzyme
15. $Maize_{15}$+$Sorghum_{42.5}$ + Ragi/$Kodo_{42.5}$ + Soybean meal $_{30}$+Niger $cake_{35}$+Sesame $cake_{35}$ (without Lysine) + Enzyme

The feed composition of experimental diets for layer birds is presented in Table 20, while, their chemical composition is furnished in Table 1.

Results and Discussion

Effects of using coarse cereals and oilseed meals instead of maize and soybean meal, respectively in laying birds was studied. The data obtained in the study has been summarized and is presented table-1.

Table 1 Cumulative performance of laying birds (21-36 weeks)

Treat.	Feed intake (g/bird/d)	Overall feed intake (kg/bird)	HDP (%)	Average egg weight (g)	FCR (kg feed/ dozen eggs)	FCR (kg feed/ kg eggs)	Cost (kg feed/ dozen eggs)	Cost (kgfeed/ kg eggs)
1.	98.68^{a}	11.05^{a}	66.97^{c}	49.93^{a}	1.77^{ef}	2.95^{e}	11.37^{c}	18.97^{d}
2.	97.93^{ab}	10.98^{a}	66.60^{c}	49.80^{ab}	1.76^{ef}	2.96^{e}	10.93^{de}	18.33^{f}
3.	95.91^{abcd}	10.74^{abc}	69.13^{b}	49.23^{ab}	1.66^{g}	2.80^{g}	10.42^{f}	17.58^{h}
4.	94.37^{cde}	10.57^{bcd}	64.77^{d}	50.03^{a}	1.78^{e}	2.96^{e}	10.76^{ef}	17.91^{g}
5.	91.22^{e}	10.22^{d}	68.63^{b}	49.83^{ab}	1.65^{g}	2.76^{gh}	9.90^{g}	16.56^{I}
6.	97.40^{abc}	10.91^{ab}	55.27^{g}	49.70^{ab}	1.98^{b}	3.32^{c}	11.78^{b}	19.75^{c}
7.	98.54^{a}	11.04^{a}	71.00^{a}	50.10^{a}	1.63^{g}	2.74^{h}	9.89^{g}	16.63^{I}
8.	91.23^{e}	10.22^{d}	67.47^{c}	49.63^{ab}	1.75^{ef}	2.94^{e}	10.54^{f}	17.70^{gh}
9.	95.56^{abcd}	10.70^{abc}	57.13^{f}	48.73^{b}	1.91^{c}	3.28^{c}	11.40^{c}	19.58^{c}
10.	94.51^{bcde}	10.58^{bcd}	66.53^{c}	50.03^{a}	1.72^{f}	2.88^{f}	10.46^{f}	17.51^{h}
11.	92.84^{de}	10.40^{cd}	61.27^{e}	50.10^{a}	1.85^{d}	3.09^{d}	11.17^{cd}	18.66^{e}
12.	95.30^{abcd}	10.67^{abc}	62.23^{e}	50.33^{a}	1.79^{e}	2.97^{e}	10.72^{ef}	17.79^{gh}
13.	97.48^{abc}	10.92^{ad}	58.10^{f}	49.40^{ab}	2.02^{b}	3.40^{b}	12.09^{b}	20.36^{b}
14.	91.73^{e}	10.27^{d}	51.90^{h}	49.70^{ab}	2.12^{a}	3.55^{a}	13.42^{a}	22.47^{a}
15.	93.29^{de}	10.45^{cd}	64.00^{d}	49.63^{ab}	1.75^{ef}	2.94^{e}	10.47^{f}	17.58^{h}

abcdefghi. Value bearing the same superscript did not differ significantly (P>0.05).

The treatment means related to feed intake (g/bird/day) of birds clearly indicated that the dietary treatments had significant effect on it. Birds maintained on T_1 and T_7 diet had statistically similar feed intake (P>0.05). Maximum feed intake was recorded in birds fed control diet (T_1), while, it was lowest in those fed T_5 diet. However, feed intake among birds offered T_5, T_8 and T_{14} diets did not differ significantly (P>0.05). Feed intake of birds offered T_9 and T_{12} diets was statistically similar (P<0.05) to those raised on control (T_3) diet.

Cumulative feed intake (kg/bird) of the birds was influenced significantly due to dietary treatments. The maximum feed intake registered in birds assigned T_1 diet was statistically similar to those allotted T_2, T_3, T_6, T_7, T_9, T_{12} and T_{13} diets. The cumulative feed intake which was lowest in groups assigned T_5 and T_8 diets was statistically similar to groups assigned T_{11}, T_{14} and T_{15} diets.

Hen day production percent (HDP %) showed wide variation among all the treatments. The maximum Hen day production percent was recorded in T_7 diet, while it was minimum in birds assigned T_{14} diet. Hen day production percent of birds allotted T_8 and T_{10} diet was statistically similar to those assigned T_1 and T_2 diet.

Average egg weight (g) of birds assigned different diets did not differ significantly (P<0.05) except in groups assigned T_9 diet in which it was minimum. It was maximum in birds allotted T_{12} diet. Among most of the groups, differences were not significant (P>0.05). Maximum egg weight registered in birds allotted T_{12} diet was statistically similar to most of the groups of birds except those allotted T_9 diet. While, minimum egg weight recorded in birds offered T_9 diet was statistically comparable to most of the groups of birds.

Feed conversion ratio as kg feed per dozen eggs was highest in group assigned T_{14} diet. The FCR of birds assigned T_3, T_5 and T_7 diets was statistically similar among each other and was lowest to other groups. Feed conversion ratio as kg feed per kg egg gave trend similar to FCR kg feed/dozen egg.

Cost of feed Rs per dozen eggs was highest in groups assigned T_{14} diet and was lowest in those allotted T_5 and T_7 diets. The cost of feed Rs per kg egg also had similar pattern as cost of feed per dozen egg[2,3].

Body weight

Body weight has not much importance in laying phase. It was just recorded to see normal health of the layer birds. It was observed that there was increase in body weight from 21 to 25 week, then it decreased from 25 to 29 week and after that it again increased as evidenced by the body weight of birds of 33rd weeks age. The body weight record of birds is presented in Table 2.

Table 2 Body weights of layers on various dietary treatments (g)

Dietary Treatment Period (WK)	21WK weight (g)	25 WK weight (g)	Weight gain Increase (g)	29 WK weight (g)	Weight gain decrease (g)	33 WK Weight (g)	Weight gain increase (g)
1.	1178.9	1347.0	168.0	1298.6	-48.4	1364.5	65.9
2.	1255.8	1413.9	158.0	1426.3	12.4	1492.6	66.3
3.	1229.1	1382.3	153.2	1361.7	-20.6	1419.7	50.7
4.	1170.7	1352.5	181.7	1274.5	-78.0	1407.4	132.9
5.	1194.4	1361.7	167.3	1312.4	-49.2	1439.9	123.9
6.	1181.1	1323.2	142.1	1306.3	-16.9	1393.9	85.1
7.	1164.0	1340.2	176.2	1305.6	-34.6	1388.7	83.1

8.	1249.0	1387.5	138.4	1346.6	-40.8	1389.5	99.9
9.	1150.9	1349.5	198.6	1312.9	-36.6	1420.3	104.9
10.	1192.9	1357.2	164.0	1320.6	-36.6	1400.2	79.6
11.	1150.4	1397.9	247.4	1301.4	-96.5	1404.8	103.4
12.	1187.9	1347.3	159.4	1307.6	-39.7	1390.0	87.6
13.	1101.4	1307.5	206.2	1295.0	-12.5	1337.7	42.3
14.	1093.0	1373.5	280.4	1280.5	-93.0	1375.3	104.2
15.	1092.8	1335.2	242.4	1270.9	-64.4	1361.9	92.0

Egg Quality Traits

Egg laid by birds offered different dietary treatments were analyzed for egg quality traits. The mean values for different egg quality parameters are presented in Table 3.

Table 3 Cumulative effect of dietary treatments on egg quality parameters

Treatment	Shape Index	Albumen Index	Yolk Index	Haugh Unit	Shell Thickness (mm)
1.	78.99^{ab}	$8.62b^{cd}$	41.21^{bc}	87.33^{a}	0.35^{abc}
2.	76.15^{defg}	8.82^{bc}	41.46^{abc}	86.67^{ab}	0.33^{c}
3.	79.17^{a}	10.18^{a}	42.84^{abc}	87.67^{a}	0.36^{abc}
4.	75.79^{efgh}	8.83^{bc}	42.70^{abc}	84.00^{cde}	0.34^{bc}
5.	77.51^{bcd}	9.37^{ab}	43.67^{a}	85.33^{abcd}	0.33^{c}
6.	75.08^{fgh}	7.73^{de}	42.28^{abc}	80.67^{gh}	0.36^{ab}
7.	78.20^{abc}	8.86^{bc}	40.82^{c}	86.00^{abc}	0.38^{a}
8.	77.11^{cde}	8.15^{cde}	42.55^{abc}	84.33^{bcd}	0.35^{abc}
9.	76.49^{def}	8.21^{cde}	41.81^{abc}	83.33^{def}	0.37^{ab}
10.	76.07^{defg}	$8.42b^{cd}$	43.41^{ab}	87.00^{a}	0.38^{a}
11.	74.34^{h}	$8.37b^{cde}$	40.89^{c}	81.67^{efg}	0.34^{bc}
12.	75.91^{defgh}	9.14^{bc}	41.79^{abc}	81.00^{fgh}	0.35^{abc}
13.	74.62^{gh}	7.38^{e}	42.91^{abc}	78.67^{h}	0.38^{a}
14.	74.47^{gh}	6.32^{f}	40.82^{c}	73.33^{i}	0.37^{ab}
15.	76.93^{cde}	8.30^{cde}	41.77^{abc}	81.67^{efg}	0.37^{a}

abcdefghi. Values bearing the same superscript did not differ significantly (P>0.05)

Dietary treatments were found to have significantly influence on the egg quality traits. However, there was no specific trend in the egg quality traits. Conversely, trends were erratic. Hence data of egg quality traits were pooled to see the specific effect of diets on it[5].

Conclusion

The diet in which 85% maize was replaced using coarse cereals and 50% soybean meal was replaced by equal parts of oilseed meals (T_7), showed best performance in laying birds. Hen day production percent and average egg weight was highest in these birds. While, lowest hen day production percent was recorded in birds assigned T_{14} diet, (maize was replaced 100% by equal proportion of sorghum and ragi and soybean meal was replaced 100% by equal part of niger and sesame cake). Use of oilseed meals (niger and sesame cake) in equal proportion replacing soybean meal at 50% level showed significantly higher hen day

production percent and feed intake, whereas, FCR and cost of feeding was significantly lower. When oilseed meals were used instead of soybean meal at 60% and 70% level (group 4 and 5) hen day production percent and feed intake had reduced significantly in comparison to those receiving 50% oilseed meals instead of soybean meal. Whereas, FCR and cost of feeding was significantly higher.

Thus, it was concluded that maize can be replaced up to 85% using equal proportion of sorghum and ragi while soybean meal can be replaced up to 70% using equal combinations of sesame and niger cake.

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