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Replacement of Fishmeal with Reject Infertile Egg Meal: Effects on the Growth Performance of Broiler Chicken

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Abstract
Two hundred and ten one-day old broiler chickens were used in a study to assess the feeding value of two forms of reject infertile egg meal, with shell(REGS) and without shell (REG) used at 0,30,60 and 100% levels of replacement of 72% fishmeal. Broiler birds were brooded for 10days after which they were distributed on the experimental diets in a 2 X 4 factorial arrangement. Feed and water were supplied *ad libitum*. The main effect of the levels of REG and REGS was reduced ($p<0.05$) body weight gain of broiler at 100% of replacement of fishmeal. However, feed intake and feed conversion were not affected ($p>0.05$). Feed cost and feed cost per kg gain of broilers was reduced ($p<0.05$) with the increase use of REG and REGS in replacing fishmeal in the diet of broiler chicken. There was no difference ($p>0.05$) in most performance indices measured in broiler fed REG and REGS, except the cost of feed per day, which was higher ($p<0.05$) in REG. It was therefore concluded that reject infertile egg meal, with or without shell, could be used to completely replace fishmeal (72%) in the diet of broilers to save feed cost.

Keywords: Reject infertile egg meal, egg shell, broiler, performance, feed cost

Introduction

Protein is a major component of poultry diets which must be supplied in adequate proportion to meet the requirements in the diet for body maintenance, growth, production and reproduction. There is presently, scarcity and high cost of conventional animal protein sources; such as fishmeal, meat meal, feather meal e.t.c, thereby calling for a search into alternative sources of animal protein. Rejected infertile egg, a waste from the poultry hatchery industry is an animal protein source which could be looked into as an alternative protein source in poultry diet. As opined by Hazarika and Baruah, 1993, fish meal could be replaced by animal by-products such as meat meal, blood meal, poultry by-products and hatchery by-product meal, to save on feed cost.

Eggs contain ideal protein from which healthy and vigorous chicks are formed; therefore it is rich in high quality protein and calcium. Many research work have report the contribution of hatchery waste to the performance and reducing the cost of feeding in poultry rearing (Abiola*et al.,* 2012;Ilian and Salman, 1986). But there is paucity of information on the use of infertile eggs, which is a major component of the hatchery waste, in terms of its nutrient composition. The use of infertile egg meal can give better improvement in broiler production at reduce cost, which will increase farmers' profit margin and reduced cost of poultry products.

This study assessed the feeding value of reject infertile egg meal, with shell and without shellasreplacement for fishmeal

Materials and Methods

This research was carried out at the poultry farm of Dynamic Initiative Farm Plot 5A Road 16 Owode Estate Abeokuta Road Ibadan, Oyo State, Nigeria for the period of 8weeks. A total of 210 day-old Marshal broiler chicks were purchased from reputable hatchery. The chicks were brooded together for ten days intensively; antibiotics, vitamin and electrolyte deworming drugs, Vaccines (Gumboro and Lasota) were used when due. At ten day of age the birds were allotted randomly into 7diets each having 30birds per treatment and further divided into 3 replicates with 10 birds per replicate. The rejects infertile eggs were divided into two batches. Batch one were broken to collect the liquid portion of the eggs with the exclusion of shells (REG) and were whisked and pour into tray and oven-dried at temperature of 65ºC.While those in the second batch were broken with their shells (REGS) and oven dried. Milling to fine powder was done after drying to about 12% moisture.

The test ingredient was processed into two forms of infertile eggs – reject infertile without shell (REG) and with shell (REGS) at 0%, 30%, 60% and 100% levels of replacement of fish meal in the diets. Detail of inclusion of level of infertile meal were as follows: REG- 0% of infertile egg meal, REG-30% of infertile egg meal, REG-60% of infertile egg meal, REG-100% of infertile egg meal; REGS-0% of infertile egg with the shell, REGS-30% of infertile egg meal with shell, REGS-60% of infertile egg meal with shell and REGS-100% of infertile egg meal with shell as shown in Table 1; forming a 2 x 4 factorial layout. Data was taken on daily and weekly basis on the performance of the birds for daily feed intake; daily body weight gain and weekly body weight gain were analyzed using one-way analysis of variance.

Table 1: Ingredients composition of the experimental diets

	REG	REGS

Ingredients	0%	30%	60%	100%	30%	60%	100%
Maize	590	590	590	590	600	600	600
Fishmeal 72%	50	35	20	-	35	20	-
Egg meal	-	15	30	50	-	-	-
Eggmeal (shell)	-	-	-	-	15	30	50
Wheat bran	20	20	15	10	20	10	10
Limestone	10	10	10	10	10	10	10
Bone meal	30	30	30	30	20	20	10
Soya meal	290	290	295	300	290	300	310
Lysine	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Premix	3	3	3	3	3	3	3
Salt	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Methionine	2	2	2	2	2	2	2
Total	1000	1000	1000	1000	1000	1000	1000
Analysis							
ME	2915.30	2910.80	2909.55	2913.30	2934.00	2925.50	2930.50
Protein	21.778	21.468	21.298	21.306	21.414	21.294	21.106
Fat	3.800	4.109	4.415	4.819	4.045	4.245	4.549
Fiber	2.850	2.860	2.852	2.813	2.914	2.918	3.029
Calcium	1.296	1.296	1.243	1.209	1.066	1.097	0.879
Phosphorus	0.604	0.604	0.605	0.608	0.467	0.462	0.325
Lysine	1.780	1.737	1.708	1.678	1.716	1.671	1.608
Methionine	0.582	0.575	0.569	0.564	0.566	0.552	0.535

REG – Reject infertile Eggs without shell; REGS- Reject infertile Eggs without Shell

Results and Discussion

The main effect of infertile Egg forms and levels of infertile egg forms on the performance of broilers is shown in Table 2. There was reduction($p<0.05$) in the final body weight of birds when fed diets combining the two forms of reject infertile eggs meal (REG and REGS) at 60% and 100% replacement of fishmeal in broiler diet. But weight gain was only negatively affected ($p<0.05$) at 100% replacement of fishmeal. Feed intake was not however affected ($p>0.05$) when birds are fed diets combining the two forms of reject infertile eggs meal (REG and REGS) up to 100% level of use. Abiola and Onunkwor (2004) and Abiola *et al*. (2012) however report reduced feed intake with the use of hatchery waste in broiler diet.

Table 2: Main effect of egg forms and levels on the growth performance and cost benefit of broiler

	Egg form			Levels					
Parameters	REG	REGS	P	0%	30%	60%	100%	P	SEM
Initial body weight (g)	261.25	261.25	1.000	261.67	261.67	260.83	260.83	0.946	0.620
Final body weight (g)	2489.17	2457.18	0.430	2591.67^{a}	2485.19^{ab}	2420.00^{b}	2395.83^{b}	0.013	23.20
Weight gain/day (g)	45.34	44.57	0.361	47.55^{a}	44.35^{ab}	44.33^{ab}	43.59^{b}	0.017	0.480
Feed intake/day (g)	118.46	117.92	0.333	119.32	118.29	117.94	117.21	0.072	0.291
FCR	2.603	2.663	0.220	2.513	2.663	2.664	2.692	0.054	0.026
Cost of feed cons/ day(₦)	12.55^{a}	12.34^{b}	0.003	13.32^{a}	12.74^{b}	12.23^{c}	11.47^{d}	0.000	0.158
Cost of feed/gain(₦)	275.44	278.20	0.588	280.60^{ab}	287.04^{a}	276.23^{ab}	263.38^{b}	0.031	2.800

Also, with the use of hatchery waste, Rasool (1999), reported that maximum feed consumption was observed on diet containing fishmeal without hatchery waste meal. This might be due to the higher quantity of egg shell and feather common in hatchery waste compared to reject infertile eggs meal. Feed utilization by broilers was not adversely affected ($p>0.05$) by the levels of reject infertile eggs, with or without shell (REG and REGS) when used to replace fishmeal. Cost of feed per gain was reduced ($p<0.05$) in broiler fed reject infertile eggs with or without shell (REG and REGS) at 100% level of use. Cost of feeding broilers was higher ($p<0.05$) with REG diets compared to REGS diets. This is partly because REGS increase the quantity of infertile eggs needed and also reduced the amount of bone meal needed in the compounding of feed because of the supply of egg shell along with the protein. The cost of feed per day reduced significantly from ₦13.32 to ₦11.47 with increase in inclusion of the combine forms of infertile eggs in the diets of broilers. Feed cost per kg weight gain reduced ($p<0.05$) from N287.04at 30%

used to N263.38 of 100% use. This is in line with the report of Abiola and Onunkwor (2004) and Handa *et al*. (1996) reported that as the level of inclusion of hatchery waste meal increases, there was reduction in the cost of feed production. The lowest feed cost consumed per day and the lowest feed cost per kg weight gain was observed in the diet containing 100% use of the combine forms of infertile egg meal. Cost of feed consumed to produce per kg live weight reduced as a result of low cost involved in processing of reject infertile egg meal. This in agreement with Babiker *et al*. (1991) and Abiola, (2001) that there was reduction in feed cost of producing 1kg live weight of broiler birds, observed on the inclusion of hatchery waste meal.

The interaction of REG, REGS with their levels of use on the performance of broiler chicken are shown in Table 3. The levels of REG and REGS used had no impact (p>0.05) on the performance of broilers, including the cost of feed per kilogram body gain**.**

Table 3: Interaction of REG, REGS with their levels of use on the performance of broiler chicken

Parameters	REG				REGS					
	0	30	60	100	0	30	60	100	SEM	P
Initial weight (g)	261.67	260.00	261.67	261.67	261.67	261.33	260.00	260.00	0.620	0.551
Final weight (g)	2591.67	2500.00	2448.33	2416.67	2591.67	2470.37	2391.67	23875.00	23.20	0.963
Weight gain g/day	47.55	44.69	45.15	43.98	47.55	44.01	43.50	43.20	0.418	0.916
Feed intake g/day	119.32	118.93	118.43	117.18	119.32	117.65	117.45	117.25	0.291	0.770
FCR	2.513	2.605	2.626	2.665	2.513	2.712	2.701	2.718	0.026	0.086
Feed Cost (₦)/day	13.32	12.82	12.37	11.69	13.32	12.68	12.10	11.25	0.158	0.077
Feed Cost (₦)/gain	280.60	280.97	274.24	265.93	280.60	293.12	278.22	260.84	2.800	0.701

Conclusion

From this study it was concluded that the use of reject infertile eggs with or without shell did not significantly affect the performance of broiler chickens. Therefore reject infertile eggs can be used to replace 72% Fishmeal normally used in broiler diet in order to reduce feed cost with almost similar performance of broiler chicken.

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