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Short communication

THE ECONOMIC BENEFIT OF KAOLIN SUPPLEMENTATION IN BROILER DIETS

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ABSTRACT

The economic benefit of using kaolin (clay) as a feed additive in broiler diets was evaluated in an 8 week feeding trial. The experiment was carried out at the poultry section of Rivers State University of Science and Technology Teaching and Research farm, Nkpolu-Oroworukwo, Port Harcourt- Rivers State, South-south of Nigeria. A total of 120 Hubbard strain of broiler chicks weighing an average of 60g were allocated to four dietary treatments with 10 birds each being a replicate and 3 replicates comprising a treatment in a Completely Randomized Design (CRD).. Four diets were used comprising 0g kaolin/kg feed, 10g kaolin/kg, 20g kaolin/kg and 30g kaolin/kg representing treatments A, B, C and D respectively. The proprietary feed used in this study at both the starter and finisher phases was of top feed with protein contents of 22% for starter and 18% for finishers. They contained 2800 ME/Kcal/kg and 2900 ME/Kcal/kg respectively. Weekly weight gain and daily feed intake were recorded while the cost of feed was also determined. The result showed that significant differences ($P<0.05$) existed in feed intake and feed conversion ratio. With respect to feed intake, the control (0g kaolin/kg) recorded the highest while all the treated groups had the least and comparable intakes. Also feed conversion ratio was best in the 10g Kaolin/kg and 30g/kaolin/kg. The result showed no significant ($P>0.05$) differences in the cost/kg feed. The result also showed that the inclusion of kaolin in the diets reduced the cost of total feed consumed in all the treated groups when compared to the control. The cost for feeding in the control group accounted for ₦459.00 which is about 49.95% of the total cost of production in relation to feed consumed. Those on the treated groups accounted for ₦ 423.0 (47.91%), ₦ 441.20 (48.96%) and ₦ 432.30 (48.45%) respectively for treatments B, C and D. The result indicated that there was no mortality in all the groups suggesting the safety of using kaolin in broiler chicken diets. The results of this experiment clearly demonstrate the economic benefits of the inclusion of kaolin (clay) in broiler chicken diets. Poultry farmers are therefore advised to take advantage of the economic gain obtained by the complimentary responses of chicken fed kaolin diets.

Key words: Chicken, cost/benefit ratio, kaolin, mortality, feeding

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INTRODUCTION

The poultry industry in Nigeria has undergone a significant transformation since the early fifties, from a back yard, peasant and primitive house-hold-oriented husbandry to modern and large-scale poultry which can be found in the country side and urban centers today [1]. Though the value of livestock resources have grown in absolute terms in recent years, its overall contribution to agricultural output remains dismally low [2]. In Nigeria, animal protein, especially meat is expensive, in short supply and is out of reach for the majority of the population. Due to this reason and because there will be increase in population and demand for animal protein, different sources, one of which is poultry production (broiler in particular), are exploited towards meeting these needs.

Prohibitive increases in the cost of inputs especially that of feed is among the constraints in commercial broiler production. Feed represents 70-80% of the total cost of production of meat and table eggs and as such is the most expensive input in animal production [3, 4, 5]. It thus becomes necessary to explore other non-conventional feed materials and additives that are locally available and relatively cheaper.

Kaolin or China clay is one of such non-conventional feed additives. It is a fine, usually white clay formed by the weathering of aluminous minerals such a feldspar, a plastic clay mineral kaolinite. Dietary Kaolin (clay) is therefore a feed additive in animal production involving qualitative and/ or quantitative manipulation of animal nutrition to affect growth performance without seriously upsetting nutritional requirements of values [6]. This investigation is, therefore, intended to evaluate the cost: benefit analysis of adding Kaolin as feed additive at various levels in broiler diets.

MATERIALS AND METHODS

The experiment was carried out at the poultry section of Rivers State University of Science and Technology Teaching and Research farm, Nkpolu-Oroworukwo, Port Harcourt- Rivers State, South-South of Nigeria. One hundred and twenty (120) day-old Hubbard broiler chicks of mixed sexes were allocated randomly in the pens. The birds were divided into a group of 30 birds with 10 birds per replicate and distributed into 12 pens in a Completely Randomized Design (CRD) in an experiment that lasted for 56 days (8 weeks). Kaolin was added to commercial broiler starter and finisher diets at 0g kaolin/kg feed for treatment A, which served as the control. Treatments B, C, and D had 10g kaolin/kg, 20g kaolin/kg and 30g kaolin/kg, respectively as diet inclusions. The proprietary feed used in this study at both the starter and finisher phases was of top feed with protein contents of 22% for starter and 18% for finishers. They contained 2800 Kcal ME /kg and 2900 Kcal ME /kg, respectively. Feed and water were offered *ad-libitum*. The birds were weighed weekly, while feed intake was obtained by subtracting the amount of left over feed from that offered on daily basis. Routine management practices and vaccinations were maintained while the study

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lasted. Records taken include daily feed intake, weekly body measurements, cost of feeding and mortality. At the end of the experiment, these records were used to evaluate economic indices such as cost of total feed consumed, feed conversion ratio, cost/kg feed, cost/kg weight gain, total variable cost, net benefits, cost : benefit ratio, cost of feeding and cost reduction (%).

The cost/kg feed was obtained by dividing the cost of procuring a bag of feed (25kg) by 25. Cost of total feed consumed was calculated by multiplying total feed consumed in each treatment (with or without kaolin) with the cost/kg feed. The cost/kg weight gain was obtained by multiplying the cost /kg feed with feed conversion ratio (feed gain). The net benefits or profit index was obtained as revenue less the production cost (TVC). Cost benefit ratio was obtained by dividing the net benefit by the revenue while the % cost of feeding to total cost of production was obtained by dividing cost of feeding with total variable costs multiplied by 100.

All calculations involving costs were based on variable costs since housing, equipment and labour were provided on farm. The data collected where necessary were subjected to Analysis of Variance (ANOVA) [7] and treatment means were compared using Duncan's New Multiple Range Test (DNMRT) as outlined by [8].

RESULTS

The results of the economic benefits of using Kaolin as feed additive in broiler chicken diets is presented in **Table 1**. The result showed that significant differences ($P<0.05$) existed in feed intake and feed conversion ratio. With respect to feed intake, the control (0g kaolin/kg) recorded the highest while all the treated groups had the least and comparable intakes. Also feed conversion ratio was best in the 10g Kaolin/kg and 30g/kaolin/kg. The result showed no significant ($P>0.05$) difference in the cost/kg feed. The result also showed that the inclusion of kaolin in the diets reduced the cost of total feed consumed in all the treated groups when compared to the control. The cost for feeding in the control group accounted for ₦459.00, which is about 49.95% of the total cost of production in relation to feed consumed. Those on the treated groups accounted for ₦ 423.0 (47.91%), ₦ 441.20 (48.96%) and ₦ 432.30 (48.45%), respectively for treatments B, C and D.

The cost/kg feed for treatments A, B, C and D were ₦90.00, ₦90.02, ₦90.04 and ₦90.06. This showed that although there was no significant ($P<0.05$) differences in cost, differences existed and it increased as the level of kaolin inclusion increases. The broilers on the 20g kaolin/kg had the highest cost/kg weight gain of ₦216.10 while the control (treatment A), B and D recorded ₦209.70, ₦199.80 and ₦199.03, respectively.

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DISCUSSION

Weight gain is an important production index. Using the figures of ₦209.70 and ₦216.10 per kg of gain for the control and 10g kaolin/kg treatment C (20g kaolin/kg), one could see a tremendous opportunity to reduce the cost of total feed consumed (₦) while equally increasing the cost/kg weight gain (₦). The results obtained from this study showed that the use of kaolin as feed additive reduced cost of total feed consumed [5] who used poultry litter in rabbit diets and bitter leaf (*Vernonia amygdaline*) in broiler chicken diets, respectively, other unconventional feed ingredients and reported better economic performances.

However, Owen and Maynard.[4, 5, 9] stressed that an essential practical consideration in evaluating a ration for farm animals is its cost in terms of returns obtained for the products. The cost of feeding for the control groups as observed in this study was 49.95% as against 47.91%, 48.96% and 48.45% for Treatments B, C and D, respectively. However, name [3] reported that feed accounts for 70-80 of the total variable costs of chicken production in Nigeria and other developing countries. The high cost of feed has been largely traced to increasing costs of maize, soya bean and groundnut cake, which are the main conventional sources of energy and protein, respectively [10, 11].

The inclusion of kaolin at 10g/kg, 20g./kg and 30g/.kg levels would cost, 47.91%, 48.96% and 48.45% of feed inputs for Treatments B, C and D respectively. It would save 2.04%, 0.99% and 1.50% respectively as cost reduction. Since profit is a single index determining the economic value of keeping birds [12, 13], the profitability index in this study varied among treatments, but it is highest in the 30g kaolin/kg when compared to the control. These results show that the level of profit in broiler production enterprise may depend largely on cost of chicks, level of test ingredients used, time of feeding trial, price of feed/efficiency of ingredients and the demand for broilers among others. Considering all these factors, profitability index may therefore vary from location to location, season to season as dictated by demand of consumers for broilers meat.

CONCLUSION

The results of this experiment clearly demonstrate the economic benefits of the inclusion of kaolin (clay) in broiler chicken diets. Poultry farmers are therefore advised to take advantage of the economic gain obtained by the complimentary responses of chickens fed kaolin diets.

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Table 1: The economic effects of adding Kaolin in broiler chicken diets

Parameters	A 0g/kg	B 10g/kg	C 20g/kg	D 30g/kg
Mean initial weight (g/bird)	60	60	60	60
Mean final live weight (kg/bird)	2.25	2.18	2.10	2.23
Mean live weight gain (kg/bird)	2.19	2.12	2.04	2.17
Total feed consumed (kg/bird)	5.10[a]	4.70[b]	4.90[b]	4.80[b]
Feed conversion ratio (feed:gain)	2.33[b]	2.22[a]	2.40[b]	2.21[a]
Cost of 25kg feed (with or without kaolin) (₦)	2250.00	2250.52	2250.98	2251.44
Cost/kg feed/bird (₦)	90.00	90.02	90.04	90.06
Cost of total feed consumed/bird (₦)	459.00	423.10	441.20	432.30
Cost/kg weight gain/bird (₦)	209.80	199.80	216.10	199.03
Cost of chick (₦)	210.00	210.00	210.00	210.00
Operational cost/bird (₦)	250.00	250.00	250.00	250.00
Revenue (₦700/kg)	1575.00	1526.00	1470.00	1561.00
Total cost (TC)/bird (₦)	919.00	883.10	901.20	892.30
Net benefit/bird (₦)	656.00	642.90	568. 80	668.70
Benefit Cost ratio (BCR)	1.72	1.73	1.63	1.75
Cost of feeding (%)	49.95	47.91	48.96	48.45
Cost reduction	0	2.04	0.99	1.50
Mortality	0	0	0	0

[abc] *means in the same row with different superscripts differ significantly (P<0.05)*

Note: The prices of materials procured as indicated in the table was based on the price as at July 2011.

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