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THE EFFECT OF FEED WETTING AND FERMENTATION ON THE PERFORMANCE OF BROILER CHICK

E. N. Uchewa, P. N. Onu

Department of Animal Science, Ebonyi State University, P.M.B 053, Abakaliki, Ebonyi State,Nigeria
Corresponding author: *nnenwamazi@yahoo.com*

Abstract: An experiment was conducted to evaluate the effect of feed wetting and fermented feed on the performance of broiler chicks. Four experimental diets were used in the study. Diet 1, was a conventional commercial broiler starter feed. Diet 2 was a commercial broiler starter feed in a 1:1.2 dilution with water. Diet 3, was a water diluted commercial feed inoculated with Bactocell™ and fermented for 24 hours at 35^{o}C in an incubator. Diet 4 was fermented feed add with 6% copper sulphate solution at the rate of 1ml to 10g of feed, to then incubated for 24 hours. 180 day old Anak 2000 broiler chicks were randomly assigned to the four experimental diets in a completely randomized design (CRD). Each treatment group was replicated four times with 15 birds per replicate. Results showed that feed intake and weight gain were significantly higher ($P<0.05$) in birds fed fermented feed and non-fermented liquid diets. Birds fed dry feed consumed significantly ($P<0.05$) more water than those on liquid feed. Birds receiving liquid feed (fermented and non-fermented) showed significantly ($P<0.05$) superior feed conversion ratio over the group fed dry feed. There was no significant ($P>0.05$) difference between the birds fed liquid diets in all the response parameters measured. The results also indicated that the treatments had no significant effect on the carcass characteristics of the birds. The results of this experiment showed that feeding fermented and unfermented liquid diets improved the performance of the birds.

Key words: Broiler chicks, carcass characteristics, fermented diet, liquid diet, performance

Introduction

In Nigeria, there is a considerable decrease in annual protein supply and intake owing to high cost of animal protein sources. *Food and Agricultural Organisation (1984)* recommended that out of the expected protein intake of 65g per day, by an adult human at least 26g should be of animal origin. Contrastingly,

an average Nigeria consumes about 53.8g protein out of which animal protein contributed only 8.4g. As a result of this, efforts have been geared towards alleviating the animal protein deficit plaguing Nigerians, through improved animal production.

Nutrition is by far one of the greatest factors influencing the productivity of farm animals. This is because feeding accounts for over 70 % of the total cost of producing intensively kept animals *(Esonu, 2001)*. However, in a bid to reduce the cost of feeding, farmers resort to feeding poor quality feeds to farm animals. This has resulted lately to economic losses in poultry production in developing countries *(Aletor, 1986)*. Hence the need to focus attention on strategies for maintaining the quality of feeds at reduced to ensure improved utilization and performance of poultry.

In Nigeria, commercial poultry birds are usually fed dry mash. Wet feeding involves the addition of water to dry poultry mash before feeding. Earlier comparison between the use of dry and wet mash *(Yalda and Forbes, 1995; Kutlu et al., 1997)* showed significant increase in feed intake, body weight gain and feed efficiency of birds when the feed was mixed with up to twice the weight of water to give a porridge-like consistency. Studies by *Awojobi and Meshioye (2001) and Ogbonna et al. (2001)* showed that wet mash was more beneficial than dry mash in poultry feeding. Similar observations have been reported in growing pigs *(Brooks and Carpenter, 1990; Rayner and Miller, 1990)*. Meanwhile, fermentation of feed samples has been reported to alter both physio-chemical and microbiological properties of feed with improved performance of animals *(Moran, 2001). Newman and Newman (1985)* reported that fungal fermentation of barley with *Rhizopus oligosporus* improved the performance of broiler chickens. *Adejimni et al. (2003)* indicated that fermented cocoa husk improved weight gain of rabbits. However, there is still little of information on the feeding value of fermented liquid feed to broiler chickens.

The present study was therefore embarked upon to evaluate the performance of broiler chickens fed fermented and unfermented commercial broiler feed.

Materials and Methods

The experiment was conducted at the Teaching and Research Farm (Poultry Unit), Department of Animal Science, Ebonyi State University, Abakaliki. The experimental protocol was approved by the Animal Care and Use Committee of the Institution.

Preparation of the experimental diets. A batch of a commercial broiler starter ration was purchased and calculated per group by subtracting the initial body used for the preparation of the test diets. Four experimental diets were

prepared. Diet 1, (control) was a dry commercial broiler starter feed. Diet 2 was a dry feed mixed with water in a ratio of 1:1.2g of water solution while diet 3 was the water mixed feed inoculated with actocell™ to give a final concentration of 7 log10 CFU/ml liquid feed. Diet 4 was an equal part of diet 3 mixed with 6% copper sulphate solution in a ratio of 10:1. Both diets 3 and 4 were then kept in the incubator to ferment for 24 hours at 35^{o}C. The proximate composition of the commercial diet is shown in Table 1.

Table 1: Proximate composition of the commercial broiler starter diet used in the study

Ingredients	Inclusion (%)
Crude protein	21
Ether extract	4.0
Crude fibre	3.8
Total Ash	5.5
Methionine	0.52
Lysine	0.92
Available phosphorus	0.45
Vitamin A	15000IU Kg^{-1}
Vitamin D_3	5000IUKg^{-1}
Metabolizable energy	14MJ Kg^{-1}

Experimental animals and procedure. A total of one hundred and eighty (180) Anak 2000 broiler chicks procured from a commercial hatchery were used for the experiment. Prior to the commencement of the experiment, the birds were fed a commercial broiler starter for one week adaptation period. On the eight day they were divided into four treatment groups of birds each and each group randomly assigned to an experimental diet in a completely randomized design (CRD). Each treatment was further subdivided into three replicates of 15 per replicate were housed in pens compartment measuring 3m x 3m electric bulbs. Heat was provided to the birds using Routine poultry management practices which included daily inspection of the birds for symptoms of diseases, mortality, cleaning of troughs and supply of feed and fresh water were maintained. The experiment lasted for 28 days. The care and management of the experimental animals has been carried out by the procedure according to the recommended guidelines of *Federation of Animal Science Societies (1999).*

Data collection and analysis. A weighed quantity of feed was served to the birds. Left over feed was collected per group every morning, weighed and recorded. From this the daily feed intake of each replicate group was determined by difference between the quantity of feed served and the leftover. Weighing of the birds was done weekly on individual basis and in the morning when their crops are virtually empty. At the end of the trial, the body weight gain was calculated per group by subtracting the initial body weight from the final weight. The daily body weight gain was determined by dividing the body weight gain with the number of

days the experiment lasted. The feed conversion ratio (FCR) was computed by dividing the average daily feed intake by the average daily weight day.

Carcass evaluation. At the end of the feeding trial, five birds were randomly selected from each experimental group, weighed, slaughtered, eviscerated, dressed and cut into individual parts for carcass evaluation. The various organs were dissected and blotted free of blood and their weights taken on a G&G Electronic Scale and Mettler P 2000 weighing balance and later expressed as percentage of the body weights. Data collected were subjected to a one-way analysis of variance *(Steel and Torrie, 1980)*. Differences between the treatment means were separated using Duncan's New Multiple Range Test as outlined by *Obi (2002)*.

Results and Discussion

The data on the performance of the broiler chicks fed the experimental diets are shown on Table 2. There were significant ($P < 0.05$) differences in all the parameter measured among birds fed the control and liquid feeds respectively. Feed intake and weight gain were significantly higher ($P < 0.05$) in birds fed fermented feed and non-fermented liquid diets. These findings were in agreement with that reported by *Yalda and Forbes (1995) and Awojobi and Meshioye (2001)*. The higher feed intake of birds fed liquid feeds may be attributed to wetness of the feed which may have increased the rate of passage of the feed through the gastro intestinal tract. Interestingly, the higher feed intake resulted to higher body weight gain, thus indicating more efficient utilization of the feed by the birds.

Birds on dry feed consumed significantly ($P < 0.05$) more water than those on liquid feed. Thus suggesting that a remarkable part of the water requirement of birds on liquid feeds were met by the wet feed *(Yalda and Forbes, 1995; Awojobi and Meshioye, 2001; Ogbonna et al., 2001).*

Table 2: Performance of broiler chicks fed the experimental diets

	Treatments				
Parameters.	T_1	T_2	T_3	T_4	SEM
Initial body weight. (g)	48.3	50.1	49.8	48.4	
Final body weight (g)	1017.77^{c}	1229^{a}	1231.0^{a}	1195.83^{b}	5.57
Body weight gain (g)	969.47^{c}	1179.10^{a}	1181.28^{a}	1147.43^{b}	5.36
Daily body weight gain (g)	23.08^{b}	28.07^{a}	28.12^{a}	27.32^{a}	2.11
Total feed intake (g)	2843.62^{b}	3208.98^{a}	3285.64^{a}	3232.82^{a}	8.79
Daily feed intake (g)	67.71^{b}	76.40^{a}	78.23^{a}	76.87^{a}	2.98
Water intake (ml)	321.45^{a}	245.1	226.78^{b}	232.26^{a}	3.78
Feed conversion ratio	2.93^{b}	2.72^{a}	2.78^{a}	2.81^{a}	0.01

ab = means on the same row different superscripts are significantly different ($P < 0.05$). SEM = standard error of means. T1 =conventional dry broiler starter diet, T2= unfermented liquid diet T3= fermented liquid diet, T4 = fermented liquid feed with copper sulphate added.

Birds receiving liquid feed (fermented and non-fermented) showed significantly ($P < 0.05$) superior feed conversion ratio over the control group. The better feed conversion ratio is not surprising since it was discovered that the birds spent less time feeding on the wet feed and so expended less energy than those fed dry feed *(Savory, 1974)*. Liquid diets compared favourably ($P > 0.05$) in all the response parameters measured. In spite of the non-significant ($P > 0.05$) difference in the performance of the birds fed fermented and non-fermented liquid diets; there were tendencies for more efficient utilization of the nutrients in non-fermented liquid diets. This is seen in the marginal improvement of 2.16% of feed conversion ratio in favour of non-fermented liquid feed.

Table 3: Carcass characteristics of broiler chicks fed the experimental diets.

	Treatments				
Parameters	T1	T2	T3	T4	SEM
Final body weight (g)	1017.77[b]	1229[a]	1231.0[a]	1195.83[a]	5.57
Dressed weight (%)	86.08	86.53	86.28	86.14	0.05
Thigh[1]	13.96	14.10	14.00	14.02	0.14
Shank[1]	7.08	7.12	7.12	7.09	0.24
Wings[1]	10.45	10.60	10.65	10.56	0.36
Breast[1]	14.61	14.72	14.65	14.62	1.98
Gizzard[2]	3.30	3.81	3.79	3.58	0.65
Heart[2]	2.09	2.19	2.22	2.10	0.11
Liver[2]	2.54	2.67	2.82	2.58	0.22

[1] value expressed as gram per kilogram body weight, 2 values expressed as a percentage of body weight, T1 =conventional dry broiler starter diet, T2= unfermented liquid diet T3= fermented liquid diet, T4 = fermented liquid feed with copper sulphate added.

Data on the carcass characteristics of broiler chicks as influenced by the test diets (Table 3) indicate that average live weight, dressed weight, wings, breast, thigh, and shank were not significantly ($P>0.05$) affected by the dietary treatments. Dressed weights of birds were not significantly ($P>0.05$) influenced by the test diets, but the trend showed that the highest dressed weight was with birds fed non fermented liquid feed followed by fermented liquid feed. The relative organ weights (organ weight to body weight ratios) of broiler chicks indicated that the relative weights of liver, gizzard and heart were not significantly ($P<0.05$) influenced by the dietary treatments.

Conclusion

It is evident that the use of fermented and non-fermented liquid diets improved the performance of broiler chicks. However, there are tendencies for more efficient utilization of nutrients in non-fermented diets.

Uticaj kvašenja hrane i fermentacije na proizviodne rezultate brojlerskih pilića

E. N. Uchewa i P. N. Onu

Rezime

Cilj eksperimenta je bio da se proceni uticaj kvašenja hrane i fermentisane hrane na proizvodne performanse brojlerskih pilića. U ogledu su korišćena četiri obroka. Obrok 1, je bila konvencionalna, komercijalna starter hrana za brojlere. Obrok 2 je bila komercijalna starter smeša razređena u vodi u 1:1.2. Obrok 3 je bila komercijalna hrana razređena u vodi sa inokulantom Bactocell™, fermentisana u trajanju od 24 sata na 35 ^{o}c u inkubatoru. Obrok 4 je sadržavao feremntisanu hranu gde je dodat 6% rastvor bakar sulfata u 1ml na 10g hrane i inkubiran u trajanju od 24 sata. Brojlerski pilići Anak uzrasta od 180 dana su metodom slučajnog izbora podeljeni u 4 eksperimentalne grupe 180 дана старе Анак 2000 бројлерски пилићи су насумично додељују у четири експериментална tretmana (completely randomized design - CRD). Za svaki tretman je bilo po četiri ponavljanja - 15 grla po ponavljanju. Rezultati su pokazali da je unos hrane i prirast bili signifikantno viši ($P<0.05$) kod brojlera koji su hranjeni fermentisanom hranom i nefermentisanom hranom u tečnom obliku. Brojleri hranjeni suvom hranom su konzumirali signifikantno više ($P<0.05$) vode u poređenju sa brojlerima koji su hranjeni tečnim obrocima. Brojleri koji su hranjeni tečnim obrocima (fermentisanim ili nefermentisanim) su imali signifikantno bolju konverziju hrane ($P<0.05$) u poređenju sa grupom koja je hranjena suvim obrokom. Nije bilo signifikantne razlike ($P>0.05$) između brojlera hranjenih tečnim obrokom u svim parametrima koji su ispitivani. Rezultati su takođe pokazali da tretmani nisu imali uticaj na osobina trupa brojlera. Rezultati ovog istraživanja su pokazali da je ishrana fermetnisanim i nefermentisanim tečnim obrocima uticala pozitivno na proizvodne rezultate brojlera.

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