INTERNATIONAL JOURNAL OF ADVANCED BIOLOGICAL RESEARCH

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BREWERES DRIED GRAIN FEEDING EFFECT ON ECONOMY OF PRODUCTION PERFORMANCE AND CARCASS CHARACTERISTICS IN NATIVE CHICKEN

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ABSTRACT
The effect of brewers dried grain (BDG) on the performance and carcass characteristics was studied in Aseel chicks from 4th week to 9th week of age. Three diets were formulated by inclusion of BDG at 0, 10 and 20% level by partly replacing maize, soya bean meal and deoiled rice bran of the control diet. Body weight gain of chicks was not affected (P<0.05) by the inclusion of BDG. The feed consumption of chicks increased significantly (P<0.05) due to incorporation of BDG at 10 and 20% levels. Feed conversion ratio (FCR) of chicks fed 20% BDG increased significantly (P<0.05). The fat retention decreased significantly (P<0.05) in chicks fed BDG at both the levels. The eviscerated yield percentage, relative weights of wing, neck, gizzard and thymus increased significantly (P<0.05) in chicks fed 10-20% BDG diets. The relative weight of drumstick, abdominal fat and caeca decreased significantly (P<0.05) on 10-20% BDG diets. Highest net profit was recorded on 20% BDG diet. It was concluded that BDG could be incorporated up to 20% in the diet of Aseel chicks for better carcass yield, and higher profit margin without affecting the growth performance.

KEYWORDS: Brewers Dried Grain, Performance, Carcass Characteristics, Aseel Chicks.

INTRODUCTION

The high level of competition between man and livestock for available feed ingredients has posed a great concern to nutritionists over the years particularly in developed countries. The fact that feed alone accounts for up to 70-80% of the recurrent production inputs in intensive monogastric animal production also makes the sourcing of alternative feed ingredients expedient (Ravindran and Blair 1992; Fasuyi, 2005). The traditional sources of vitamins and proteins used in poultry rations, such as fish meal, meat and bone meal, soya bean meal, groundnut cake, are becoming expensive in developed countries. The availability of such ingredients is not adequate because of the spiralling cost of raw materials and ever increasing competition with the human beings for the same food items. Hence, the search for alternative feed sources has become inevitable to reduce the feed cost. In this situation, brewery by-products like brewers dried grains (BDGs) and yeasts are worthy of consideration as potential non-conventional feeds. Fermented local and industrial by-products of brewing have been used as non-conventional feedstuffs in broiler rations, mainly as protein and energy supplements. The replacement of 20% soya protein by brewery waste protein in the diet caused no significant differences in the growth and feed intake of the chickens. When compared with soya protein fed chickens, protein efficiency ratio and net protein ratio values of the diets were very similar and the concentration of plasma and liver lipids remained about the same. Industrial by-products such as barley or maize BDG or a combination of them, could serve as the alternative energy source in poultry diet at reduced cost. According to NRC (1994) BDG contains 25.3% crude protein (CP), 6.3% crude fat and around 2080 Kcal/Kg metabolisable energy and is also a good source of B vitamins. BDG can be a potential substitute for a part of maize and soya bean meal in chick's diet. BDG in broiler diet compared to ground corn caused an improvement in body weight gain and increased profit margin (Anyanwu et al., 2008). Maize/Sorghum based BDG (MSBDG) could replace up to 50% maize in poultry diets without affecting performance. Increasing BDG levels (5%) significantly increased daily feed intake but adversely affected the growth performance (Khalili et al., 2011). Significant improvement (P<0.05) in final body weight, daily body weight gain and feed conversion ratio (FCR) was observed in broiler finisher chicks fed BDG replacing 50% maize in finisher diet (Ironkwe and Bamgbose 2011). Ileal protein digestibility was similar in broilers fed 20% BDG (Khalili et al., 2011). Ether extract digestibility did not differ among broilers fed 15-30% MSBDG (Esonu et al., 1999). There was no specific trend in carcass traits particularly internal organ weights in broilers fed increasing levels of BDG (Anyanwu et al., 2008). The cost reduction and savings were better in broilers fed urea treated and fermented BDG diets (Isikwenu et al., 2008). Aseel is a dual purpose bird with very good potential for growth with moderate egg production (Rama Rao et al., 2005). Therefore, the present study was conducted to find out the effect of feeding BDG on the performance, nutrient utilization, carcass characteristics and economics of production in Aseel chicks.

MATERIALS AND METHODS

Aseel growing chicks (96 numbers, 3 weeks old) were randomly distributed in to three equal groups with four replicates of eight chicks each. Three diets were formulated by replacing maize, soya bean meal and deoiled rice bran by incorporating 0, 10 and 20% BDG to the control diet (Table 1). The proximate composition was analysed as per AOAC (1990). Four replicates from each group were fed on one of the experimental diets ad libitum from 4 weeks to 9 weeks of age. Water was available in plenty. Weekly body weight and daily feed consumptions were recorded from 4 weeks to 9 weeks of age. The FCR was calculated as the ratio between the feed intake and body weight gain. At 9 weeks of age 3d balance trial was conducted. At the end of 9 weeks one bird from each replicate/3 birds per treatment were slaughtered after 4 hours of feed withdrawal and eviscerated weight and weights of cut up part yields, abdominal fat and organs viz., liver, spleen and heart were recorded. The relative weights of the same were calculated as (Weight of respective parts/ eviscerated weight × 100).

TABLE 1: Composition (%) of Experimental diets

Ingredients	**Experimental diets**		
	T_0	T_{10}	T_{20}
Yellow Ground Maize	50.00	46.00	43.00
Soya bean meal	28.00	25.00	21.00
Deoiled rice bran	19.00	16.00	13.00
Brewers dried grain	-	10.00	20.00
Dicalcium phosphate	1.11	1.28	1.17
Ground limestone	1.29	1.15	1.21
Common salt	0.50	0.50	0.50
L-Lysine Hcl	-	-	0.03
DL-Methionine	0.07	0.07	0.06
Vitamin mixture	0.04	0.04	0.04
Mineral mixture	0.15	0.15	0.15
Chemical composition, (%) analysed			
Dry matter	89.9	90.30	90.90
Crude Protein	20.80	21.40	21.50
Crude Fat	3.24	2.57	2.26
Crude Fibre	6.78	8.26	9.24
Total Ash	7.80	7.65	7.56
Acid insoluble ash	1.49	1.47	1.55

Statistical analysis

Data were analysed using the General lineal model for univariate analysis of SPSS 17. Significant differences ($P<0.05$) among treatments were determined using Duncan's multiple range test (Duncan 1955).

RESULTS AND DISCUSSION

Brewers dried grain contained CP 25%, Ether extract (EE) 5.06%, crude fibre (CF) 17.8%, total ash (TA) 7.5% and acid insoluble ash (AIA) 1.5% on dry matter (DM) basis. Similar composition was reported by earlier researchers (Demeke, 2007). Feeding of BDG at 20% level did not affect ($P >0.05$) the body weight gain of Aseel chicks at 9 weeks of age (Table 2). In agreement with these findings, Gondwe et al. (1999) did not observe any difference ($P >0.05$) in body weight gain of broilers fed either 5% spent grain or local brewers' grain. Similarly, body weight gain of broilers fed diet with 30% MSBDG was similar to those fed maize based control diet (Esonu et al., 1999). In contrast increased level of BDG (10-40%) reduced ($P <0.001$) body weight gain of broilers at 33d of age (Denstadli et al., 2010).The feed consumption of chicks increased significantly ($P <0.05$) due to incorporation of BDG at 10 and 20% level. FCR of chicks fed diet incorporated with 10% BDG was similar to those fed control diet. FCR of chicks fed 20% BDG increased significantly ($P<0.05$). Similarly feeding of 5% or 30% local brewers' grain or MSBDG did not affect the FCR of broilers at finisher stage (Esonu et al., 1999). In contrast, BDG at 10- 40% level of incorporation led to increased ($P <0.001$) feed: gain ratio (Denstadli et al., 2010). The DM and protein retentions did not differ among the treatment groups T0, T10 and T20 (Table 2). In agreement with these finding, digestibility's of DM and protein did not differ among broiler finishers fed maize sorghum based BDG at 15-30% level (Esonu et al., 1999) and broilers fed 5-25% BDG at different stages of growth (Khalili et al., 2011). In contrast, the apparent illeal digestibility values of protein and energy were significantly reduced by BDG inclusion at various levels i.e. 10-40% replacing wheat and soy (Denstadli et al., 2010). The fat retention decreased significantly ($P <0.05$) in chicks fed diets finding, digestibilities of DM and protein did not differ among broiler finishers fed maize sorghum based BDG at 15-30% level (Esonu et al., 1999) and broilers fed 5-25% BDG at different stages of growth (Khalili et al., 2011).

TABLE 2: Effect of Feeding Brewers Dried Grain o the Performance and Nutrient Utilization in Aseel Chicks

Parameters	T_0	T_{10}	T_{20}	SEM
Body weight(g)	1065.27	1063.87	1043.59	7.89
Feed Consumption(g)	3086.2	3184.7	3177.8	16.31
Feed conversion ratio	2.873	2.995	3.046	0.024
Nutrient retention(g/bird/3d)				
Dry matter	127.10	126.30	125.40	0.050
Protein	23.72	23.02	24.39	0.292
Fat	5.63	4.52	4.24	0.216

TABLE 3: Effect of Feeding Brewers Dried Grain on Carcass Characteristics and Organ Weights in Aseel Chicks

Parameter	T_0	T_{10}	T_{20}	SEM
Carcass traits				
Eviserated yield,%	63.90	66.3	65.8	0.43
Cut up part yields				
Breast	22.40	20.90	21.8	0.41
Thigh	15.83	16.03	15.23	0.17
Drumstick	16.20	16.43	14.87	0.30
Back	21.10	20.60	22.40	0.36
Wing	8.83	9.43	9.50	0.19
Neck	4.00	4.97	5.07	0.17
Abdominal fat	2.047	1.711	1.676	0.061
Caecal weight	1.963	1.611	1.563	0.015
Organ weights				
Liver	3.10	2.93	3.03	0.107
Heart	0.787	0.834	0.820	0.014
Gizzard	2.73	3.30	3.50	0.127
Spleen	0.276	0.261	0.278	0.006
Thymus	0.628	0.753	0.830	0.031

In contrast, the apparent illeal digestibility values of protein and energy were significantly reduced by BDG inclusion at various levels *i.e.* 10-40% replacing wheat and soy (Denstadli *et al.* 2010). The fat retention decreased significantly ($P<0.05$) in chicks fed diets reduced significantly ($P<0.05$) in chicks fed diet incorporated with BDG at both levels (Table- 3). In contrast, no difference in relative weight of abdominal fat was recorded in broilers fed different levels of MSBDG (Esonu *et al*., 1999) and caeca weights were not affected by BDG inclusion at 10-40% level (Denstadli *et al*., 2010). Organ weights *i.e.* gizzard and thymus increased ($P <0.05$) due to incorporation of BDG at both levels in the diet of chicks (Table-3). Similarly, the relative weight of gizzard increased significantly ($P <0.001$) due to inclusion of BDG at 10-40% level in the diet of broiler chicks (Denstadli *et al*., 2010). In contrast, no difference in gizzard weight was observed in broiler chicks fed different levels of MSBDG at 15-30% level (Esonu *et al*., 1999). Highest net profit was recorded in chick fed diet containing 20% BDG (Table 4). In agreement with this finding, Esonu *et al.* (1999) reported that incorporation of MSBDG at 15-30% level as a replacement for maize in broiler diet reduced the cost of feed per kg weight gain and reduced the cost of broiler production up to 50%. It was concluded that BDG could be incorporated up to a level of 20% in the diet of Aseel chicks by partial replacement of maize, soya bean meal and deoiled rice bran for better carcass traits and higher profit margin without affecting growth performance.

TABLE 4: Cost Benefit Analysis

Parameters	Treatments		
	T_0	T_{10}	T_{20}
Feed consumed per 100 birds, kg	308.60	318.50	317.80
Cost of feed/kg, Rs	23.54	21.67	19.54
Total cost of feed, Rs	7267.21	6900.21	6202.96
Cost of 100 chicks, Rs	1304.83	1304.83	1304.83
Total cost, Rs	10022.65	9655.00	8958.40
Weight of 100 birds, kg	122.20	122.10	120.00
Income from sale of birds (Rs)	12354.97	12343.36	12111.16
Misc.income(Rs)	466.33	476.01	483.10
Total income (Rs)	12821.31	12819.37	12594.27
Net profit, Rs	2798.65	3163.725	3635.86
Profit,%	27.90	32.80	40.60

REFERENCES

Anyanwu, G.A., Iheukwumere, F.C., Emerode, F.C. (2008) Performance, carcass characteristics and economy of broilers fed maize-grit and brewer's dried grain replacing maize. International Journal of Poultry Science 7: 156-160.

AOAC (1990) Official Methods of Analysis. 15th ed. Washington (DC): Association of official Analytical Chemists.

Demeke, S.(2007) Comparative nutritive value of Atella and industrial brewers grains in chicken starter ration in Ethiopia. Livestock Research for Rural Development. 19, Article #8. Available from: http://www.Irrd. org/ Id19/1/ deme19008.htm.

Denstadli, V., Balance, S., Knutsen, S.H., Westereng, B., Svihus, B. (2010) Influence of graded levels of brewers dried grains on pellet quality and performance in broiler chickens. Poultry Science, 89:2640 2645.

Duncan, D.B. (1955) New multiple range and multiple F test. Biometrics 11:142.

Esonu, B.O., Anumni, P., Obinna, K., Eneremadu, O.F. (1999) Evaluation of combinations of maize/ sorghum based brewer's grains, cocoyam corm and cassava root meals as substitute for maize in broiler finisher diets. Indian Journal of Animal Science 69: 129 130.

Fasuyi, A.O. (2005) Nutritional evaluation of cassava (*Manihot esculenta* Crantz) leaf protein concentrates (CLPC) as alternative protein sources in rat assay. Pakistan Journal of Nutrition, 4:50- 56.

Ironkwe, M.O., Bamgbose, A.M. (2011) Effect of replacing maize with brewers' dried grain in broiler finisher diet. International Journal of Poultry Science 10:710-712.

Isikwenu, J.O., Akpodiete, O.J., Omeje, S.I., Okagbare, G.O. (2008) The effects of replacing groundnut cake with urea-treated and fermented brewers' dried grains in broiler finisher diets. Electronic Journal of Environmental. Agricultural and Food Chemistry, 7: 2634 2637.

Khalili, A., Tabeidian, S.A., Toghyani, M., Ghalamkari, G., Bahrami, Y. (2011) Effect of different levels of brewer's dried grains and enzyme on performance, protein digestibility, immune response and performance of broilers. International Journal of Academic Research 3: 1153- 1157.

NRC (1994) Nutrient requirements of poultry. Washington (DC): National Academy Press.

Onifade, A.A., Babatunde, G.M. (1998) Comparison of the utilization of palm kernel meal, brewer's dried grains and maize offal by broiler chicks. British Poultry Science 39:245 -250.

Rama Rao, S.V., Raju, M.V.L.N., Sharma, S.R., Panda, A.K. (2005) Aseel, a dual purpose bird for backyard free-range rearing. In: Rural poultry farming, technical bulletin. Hyderabad (India): published by Director, Project Directorate of Poultry. p.15- 22.

Ravindran, V., Blair, R. (1992) Feed resources for poultry production in Asia and Pacific II. plant protein sources. World Poultry Science Journal, 48:205- 231.

SPSS (2003) Statistical packages for Social Sciences Version 12.0 SPSS Inc., Chicago, USA.