Use of Tannery Wastes in the Diet of Broiler

M. J. Alam*, M. R. Amin, M. A. Samad, M. A. Islam[1] and M. A.Wadud[2]
Department of Animal Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

ABSTRACT : Tannery waste contained 90.93% DM, 77.02% CP, 0.77% CF, 2.83% EE, 7.19% ash and 3,450 kcal ME/kg DM. A total of 144 day-old broiler chicks were divided into three dietary groups; D_1 (Containing 10% protein concentrate-PC), D_2 (Containing 5% PC+5% tannery waste-TW) and D_3 (Containing 10% TW) having 3 replicates of 16 chicks in each. The birds were fed broiler starter diet containing 22% CP, 3,000 kcal ME/kg and broiler finisher diet containing 21% CP, 3,100 kcal ME/kg up to 42 days of age, and meat yield traits were measured from the representative birds from each replication to asses the feasibility of using tannery waste in the diet of broiler. Feed intake, live weight, feed conversion efficiency and livability did not differ between diets ($p>0.05$) but the cost of production and profitability differed significantly ($p<0.001$). Profitability of D1, D2, and D3 diets were 2.98, 9.90 and 14.04 Taka/kg respectively. Diets did not affect on meat yield traits ($p>0.05$), except gizzard, shank and feather weight ($p<0.01$). Gizzard and shank weigh were improved with increasing level of tannery wastes in the diet, hence tannery waste can be used without any harmful effect in the broiler diet. ***(Asian-Aust. J. Anim. Sci. 2002. Vol 15, No. 12 : 1773-1775)***

Key Words : Broiler, Protein Concentrate, Tannery, Waste, Growth, Meat, Profitability

INTRODUCTION

The poultry industry is gradually increasing in Bangladesh where imported costly protein concentrates are used in formulating poultry diet that increased production cost. As feed cost is about 65% of the total production cost (Singh, 1990; Banerjee, 1992). Currently poultry nutritionists are looking for cheaper inconventional energy and protein sources to formulate least cost ration. Various types of inconventional feeds (e.g. Marine Wastes, Frog Wastes, Shrimp Wastes, Rumen Ingesta, Kitchen Wastes, Banana leaf meals and *Leucaena* leaf meal and Tannery Wastes etc.) are available in Bangladesh, most of which are regarded as wastes and research has been done incorporating it in diets for poultry (Rahman and Reza, 1983; Islam et al., 1994).

There are 277 tanneries in Bangladesh where 240 metric tons hides and skins are processed every day. "Hazaribagh Tannery Industry" Dhaka the capital city of Bangladesh alone process 220 metric tons hides and skins a day with a total of 8.47 million liter liquid 98 metric tons solid tannery wastes produced (FAO, 1991 cited by Salam and Billah, 1998). These wastes are very potential to pollute the environment and pollute underground water through leaching which may affect human beings with cancer, skin diseases and other serious problems. Tannery wastes are used in the diet of poultry in some developed and developing countries, but no work has been done using tannery waste in poultry diet in Bangladesh. Imported protein sources like fish meal (40 Taka/kg), soybean meal (16 Taka/kg), *Seasame* oil cake (12 Taka/kg) and Jasoprot (protein concentrate-45 Taka/kg) were very expensive which enhance the production cost. Whereas the cost of tannery waste (collection, processing and storing cost) was 3.20 Taka/kg. Tannery waste composed of excess fat, fascia and flesh (Subcutenious tissue), unnecessary portions of the hides and skins (Trimmings) and shavings or splits materials from vegetable tanned leather. Final products of the Leather Industry are wet blue, crust and finished leather. The present study was undertaken to evaluate the value and feasibility of using tannery wastes in the diet of broiler.

MATERIALS AND METHODS

Tannery waste in the form of solid was obtained from the "Hazaribagh Tannery Industry" Dhaka, capital city of Bangladesh.

Processing and storing

Collected tannery wastes were cleaned in the fresh water to remove salt, dust or other foreign particles, and boiled at 100°C for 4-5 h. Then it was dried in the sun and ground by a grinding machine, shieved, packed and stored for 6 months in the Laboratory, Department of Animal Science, Bangladesh Agricultural University (BAU), Mymensingh.

Toxicity test

Before using this waste in the diet of broiler, aflatoxin test of the sample was performed in the Science Laboratory, Bangladesh Council of Scientific and Industrial Research, Dhaka and chromium, tannin and other heavy metals in the Laboratory of Bangladesh College of Leather Technology.

* Corresponding Author: M. J. Alam. E-mail: endolap@global-bd.net
[1] Poultry Production Research Division, BLRI, Savar, Dhaka, Bangladesh.
[2] Department of Poultry Science, BAU, Mymensingh-2202, Bangladesh.
Received April 18, 2002; Accepted July 31, 2002

Dhaka, Bangladesh. No toxicity was found in tannery waste samples.

Chemical composition

The chemical components of tannery waste taking 3 samples in each case was carried out at the Laboratory of Animal Science, BAU, Mymensingh and Bangladesh Council of Scientific and Industrial Research, Bangladesh as per method of AOAC (1990). The sample was placed in the oven at 100°C temperature for 24 h to determine the dry matter. Protein concentrate-Jasoprot imported from USA which contained 93%DM, 60%CP, 4%CF, 10%EE, 8.2%ash and 3,230 kcalME/kg.

Feeding trial

A feeding trial was performed at BAU Poultry farm for a period of 6 weeks with 144 day-old Starbro broiler chicks divided in to three dietary groups. D_1 (Diet with 10% protein concentrate-PC), D_2 (diet with 5% PC+5% tannery wastes-TW) and D_3 (diet with 10% TW) with 3 replicates of 16 chicks. Replacement of tannery waste was made on the basis of crude protein content leading to price value. Since it contained higher percentage of CP (77%) so, the replacements were made by 5 and 10% as sun dried basis. The birds were fed *ad libitum* a diet of 22% CP, 3,000 kcalME/kg at starter and 21% CP, 3,100 kcal ME/kg at finisher. The birds were housed with a stocking density of 0.093 sq.m./bird on rice husk littered floor providing continuous light for 24 h. The birds were vaccinated against Newcastle disease, Gumboro and infectious bronchitis and the following parameters were recorded during the experimental period:

1. Weekly body weight and feed consumption.
2. Mortality recorded daily.
3. Cost of production (Tk./kg) was calculated including feed cost, labour cost, mortality, litter, medicine, vaccine and electricity cost.
4. Profitability was calculated from the price of per kg broiler and production cost.

One male and one female broiler at 6 weeks of age in each replication was randomly selected and slaughtered to analyse the meat yield traits. Temperature and relative humidity were 33°C and 87.5%, respectively, during the experimental period.

The total time was required by one year for collection, processing, storing, toxicity test, chemical analysis of tannery waste, feeding trial and investigation of meat yield traits.

Statistical analysis

Data were subjected to MSTAT Computer package program with Least significant difference (LSD) calculated to compare between diet means.

RESULTS AND DISCUSSION

Chemical composition of tannery waste (TW) contained 90.93%DM, 77.02%CP, 0.77%CF, 2.83% EE, 7.19% ash and Energy 3,450 kcalME/kg respectively. Brownish colour, meaty aroma, 10.07% water content and 180 days storing capability were observed in this study.

Growth performance and profitability

Feed consumption of the chicks in the different diets: D_1 (10% Protein concentrate-PC), D_2 (5% PC+5% Tannery Wastes- TW) and D_3 (10% TW) were similar ($p>0.05$). Live weight, feed conversion ratio and survivability were also similar between dietary treatments ($p>0.05$), but production cost and profitability were different ($p<0.001$) (Table 1). However, feed conversion tended to be highest on diet D_2 followed by D_1 and D_3, whereas survivability was higher on D_2, intermediate on D_3 and lowest on D_1. Production cost significantly decreased with the increasing level of tannery waste in the diet. Profitability was found to be highest from diet D_3, intermediate with D_2 and lowest from diet D_1.

The similar feed intake, body weight and feed conversion between diets in this study, supported by Koh et al. (1998), Gill et al. (1992) and Delic et al. (1982). The higher survivability from diet D_2 and D_3 to the control diet D_1 were consistent with findings of Tikhonovskaya and Snitsar, 1992. It appears that given diet D_3 showed the best

Table 1. Growth performance and profitability of broiler at 6 weeks of age given diets with protein concentrate replaced by tannery wastes at various levels

Parameters	Diet			LSD value and Level of significance
	D_1	D_2	D_3	
Feed consumption (g/bird)	2,948.7±43.6	2,969.9±9.8	2,950.6±23.3	NS
Live weight (g/bird)	1,252.5±24.6	1,259.6±45.4	1,232.2±49.0	NS
Feed conversion ratio (Feed intake/Live weight)	2.4±0.1	2.3±0.0	2.4±0.1	NS
Survivability (%)	91.7±7.2	95.8±7.2	93.8±6.3	NS
Production cost (Tk/kg live weight)	57.0	50.1	46.0	2.1***
Profitability (Tk/kg live weight)	3.0	9.9	14.0	2.1***

Sale per kg live broiler: Tk.60/=, NS=Non significant difference ($p>0.05$), *** $p<0.001$. D_1=Diet containing 10% protein concentrate (PC). D_2=Diet containing 5% PC+5% tannery waste (TW), D_3=Diet containing 10% TW.

Table 2. Meat yield traits of broiler at 6 weeks of age given diets with protein concentrate replaced by tannery waste at various levels

Parameters	Diet			LSD value & Level of significance
	D_1	D_2	D_3	
Live weight (g/bird)	1,252.6	1,259.6	1,232.2	NS
Dressed weight (%)	60.6	60.9	60.3	NS
Neck weight (%)	3.1	2.6	3.3	NS
Breast meat weight (%)	6.1	5.9	6.0	NS
Thigh meat weight (%)	6.0	5.9	6.0	NS
Drumstick meat weight (%)	5.4	5.7	5.5	NS
Heart weight (%)	0.8	0.8	0.1	NS
Liver weight (%)	2.9	2.8	2.9	NS
Head weight (%)	3.5	3.4	3.6	NS
Gizzard weight (%)	3.4	4.4	4.6	0.2**
Shank weight (%)	4.4	4.6	4.6	0.2**
Blood weight (%)	2.7	2.8	2.8	NS
Feather weight (%)	7.4	7.2	7.6	6.3**

NS=Non significant difference ($p>0.05$), ** $p<0.01$, D_1=Diet containing 10% protein concentrate (PC), D_2=Diet containing 5% PC−5% tannery waste (TW), D_3=Diet containing 10% TW.

profitability and survivability, followed by D_2 and D_1 with the increased tannery wastes in the diet, was in agreement with the findings of Kushak et al. (1990) and Tikhonovskaya and Snitsar (1992).

Meat yield traits

Live weight, dressing percentage, neck, breast, thigh, drumstick, heart, liver, head and blood weights were almost similar between diets ($p>0.05$), supported by Tikhonovskaya and Snitsar (1992). Gizzard, shank and feather weight differed ($p<0.01$) between diets (Table 2). The highest percentage of gizzard and shank weight was found on diet D_3, intermediate on D_2 and the lowest on D_1. The highest percentage of feather was of chicken from diet D_3 followed by D_1 and D_2. Rede et al. (1983), and Gill et al. (1992) also observed significant difference between diet containing tannery wastes.

CONCLUSION

The present investigation reveals that tannery waste is better than imported protein concentrate in respect of chemical composition, and it may be used in the diet of broiler replacing costly protein concentrate without deleterious effect. But more studies are needed on collection and processing method, toxicity and metal test, storing period, inclusion level, use in layer or ruminant, and digestibility of tannery waste to find out the potentiality of its using in the diet of poultry or livestock.

REFERENCES

AOAC. 1990. Official Methods of Analysis. Association of Official Analytical Chemists. 15th Ed. Vol. 2, Washington DC.

Banerjee, G. C. 1992. In: Poultry. 3rd Ed. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi. Bombay. Calcutta.

Delic, I., M. Cuperlivic, N. Vucurevic, S. Stojanonic, R. Rede, M. Vukie and V. Beljanski. 1982. Skin and meat meal as a source of protein in diets for fattening chicken. Poult. Abstr. 36:55-69.

Gill, S. A., S. M. Chowdhury and Z. Hossain. 1992. Comparative study on the effect of protein from meat processing for broiler ration. International J. Agric. Sci. 28:26-27.

Islam, M. A., M. D. Hossain, S. M. Bulbul and M. A. R. Howlider. 1994. Unconventional feeds for broilers. Indian Vet. J. 71: 775-780.

Koh, K., K. Sakurai, Y. Hirako and Y. Karasawa. 1998. Digestibility and nitrogen retention of chickens fed on limed split diets. Anim. Sci. and Tech. 69:62-64.

Kushak, R. I., I. L. Travid, N. A. Basova, E. N. Yukhno, L. P. Filipchenkova, G. E. Isidorov and A. R. Val'dman. 1990. Dolady Vsesoyuzhoi Ordena Lenina Iordena Trudovogo Krasnogo Znameni Akademiisel' skhozyaistvenny auk in. V.I. Lenina. No. 6:51-54.

Rahman, M. A. and A. Reza. 1983. Study on the effect of unconventional sources of protein and energy for poultry. M. Sc.Thesis. Dept. of Anim. Nutr., Bangladesh Agricultural University, Mymensingh, Bangladesh.

Rede, R., I. Delic, V. Pribis and G. Vujkovic. 1983. Skin and meat meal as a source of protein in diets for fattening chickens. Effect on yield and quality of meat. Poult. Abstr. 9:66.

Salam, F. M. A. and S. M. R. Billah. 1998. Leather Industry: Environmental Pollution and Mitigation Measures. Society for Environment and Human Development (SEHD), 44/8 West Panthapath (2nd Floor), North Dhanmomdi, Dhaka-1205, Bangladesh, pp. 1-68.

Singh, R. A. 1990. In: Poultry production. 3rd Ed. Kalyany Publishers, New Delhi, India.

Tikhonovskaya, N. D. and A. I. Snitsar. 1992. Use of fish offals (meal) with protein concentrates in the diet for broiler chickens. Proceedings 19th World Poultry Congress, Amsterdam, Netherlands. pp. 620-621.