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Full Length Research Paper

Effect of feeding different levels of corn snack waste on broiler performance

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This study was conducted to investigate the effect of using corn snack waste on growth performance, carcass traits and economical efficiency of broiler chicks. Five hundred Ross 308 day-old broiler chicks were divided randomly into 20 pens. There were 25 chicks in each pen which consists of 4 treatments (4 levels of waste corn snack) with five replicates. Corn snack waste had been considered in grower and finisher periods in level 170, 300 and 500 g/Kg of diet. Usage of corn snack waste had reduced ($P<0.05$) feed intake and weight gain of broiler chicks. However usage of corn snack waste in broiler chick's diet in levels 170 and 350 g/Kg increased feed conversion ratio and in level 500 g/Kg, feed conversion ratio were improved ($p<0.05$). The usage of corn snack waste was induced by the negative effect on performance of carcass and weight thigh, but reduced breast meat weight also reduces abdominal fat, and had no effect on liver, heart, gastrointestinal tract ($p<0.05$).

Keyword: Corn snack waste, corn by-product, broiler performance, broiler diet.

INTRODUCTION

Feeding cost represents the major parts of total cost in poultry production. Corn is the main source of energy in formulating poultry rations. Its price is increasing because of the limited world yield in covering the demands for both humans and livestock. So, it is important to search for other alternative cheap energy sources which can solve this problem. Minimizing the feed cost could be achieved through the use of untraditional cheaper feed ingredients. On the other hand, one of the most important problems facing human societies is the increase of material and by product of food industries which the most of them are considered as a valuable source of protein and energy. The advantage of this waste is that it can reduce feed costs. Onifade and Babatunde (1998) have compared the effect of the usage of waste palm, waste of beer factories and waste corn on growth performance of broiler chickens. Rate of 10, 15 and 20 percent of each of these by products were used in the diet of broiler chicks for 35 days. The highest weight at the age of 35 days (chickens) which belong to those days had received 10 percent of corn. The lowest feed intake and the best feed efficiency was obtained from this treatment, increasing losses has shown negative effect on growth performance of chickens. Each of the above feeds was used in the diet by 29 percent. The worst feed conversion ratio belongs to some chick who had received Hominy feed while the best was gotten from broken corn fed chick.

Broiler weight gain was better than other experimental group. Davidson and Graham (1994) selected two samples of waste corn and two samples of waste wheat to determine the metabolic energy in poultry and wrote regression equations. The results revealed that metabolizable energy of waste corn is much more than metabolizable energy of waste wheat. Abdelsamif et al. (1983) substituted various wastes such as corn, corn gluten, corn meal and corn broken or completely instead of soyabean meal in diet of broilers which had no negative effects on performance of broilers. Thakur and Pradhan (1995) investigated the effect of the use of three different sources of energy, including feed Hominy, broken rice and wheat waste which were fed to 920 broiler chickens

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Table 1. Composition of diets provided by phase's starter, grower and finisher.

Ingredient	Starter	Grower				Finisher			
		%0 Corn waste	17% Corn waste	35% Corn waste	50% Corn waste	0% Corn waste	17% Corn waste	35% Corn waste	50% Corn waste
Corn	50.5	53	35.8	17.5	2.4	59.2	41.9	23.7	8.6
Corn snack waste	0	0	17	35	50	0	17	35	50
Soybean Meal	42.5	36.6	36.7	36.9	36.8	30.8	31	31.1	31.1
Oil	3	6.5	6.6	6.7	6.8	6.3	6.35	6.45	6.45
DL-Methionine	0.2	0.25	0.24	0.22	0.25	0.22	0.24	0.22	0.25
L-Lysine	0.1	0.05	0.06	0.08	0.15	0.03	0.06	0.08	0.15
Phosphate Di Calcium	1.8	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6
Oyster shell	1.1	1.1	1.1	1.1	1.1	1.05	1.05	1.05	1.05
Salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Mineral premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Nutritional composition (calculated)									
Metabolizable Energy (kcal /kg)	2900	3150	3150	3150	3150	3200	3200	3200	3200
Crude protein(%)	24	21.7	21.7	21.7	21.7	19.5	19.5	19.5	19.5
Methionine(%Digestible)	0.51	0.54	0.54	0.54	0.54	0.48	0.48	0.48	0.48
Met+Cys (%Digestible)	0.83	0.84	0.84	0.84	0.84	0.97	0.97	0.97	0.97
Lysine (%Digestible)	1.26	1.1	1.1	1.1	1.1	0.97	0.97	0.97	0.97
Calcium(%)	0.95	0.9	0.9	0.9	0.9	0.85	0.85	0.85	0.85
Available phosphorus (%)	0.48	0.45	0.45	0.45	0.45	0.42	0.42	0.42	0.42

at 8 weeks of age. The best weight gain and feed conversion belongs to some chickens, which had been fed with hominy feed, the increasing hominy feed in diet has improved feed conversion ratio. At present, the feed industry uses maize as a basic energy source in poultry diets, but its price is very high. New high-energy and cheaper feeds such as by-products from wheat and maize processing can be successfully used in broiler production. (Stock et al., 2000; Rodrigues et al., 2001; Boros et al., 2004, Slominski et al., 2004). The nutritive value of maize by-products depends on the technological processes used, such as milling, de-germing, oil extraction, and starch separation (Stock et al., 2000). One of many maize by-products is the maize grits, or hominy feed, a mixture of maize bran, maize germ, and part of the starch. Hominy feed is a by-product formed during dry maize milling for table maize meal, production of pearl hominy and maize grits. The object of this process is to separate endosperm, while removing as much of the germ and per carp as possible (Stock et al., 2000).

The corn snack waste is a by-product which is produced in puffing snack factory in three stages: Firstly expansion of wet corn in extruder process, secondly, coating of snack and thirdly packaging of snack. This work was carried out with the objective of evaluating the effect of using corn snack waste on the productive performance and carcass characteristics of broiler chickens.

MATERIALS AND METHODS

Five hundred Ross 308 day-old broiler chicks were randomly allocated into 20 pens, with 25 chicks in each pen. Chicks in each pen were randomly allocated to one of four treatments with each treatment being replicated five times. Chicks distributed in a complete randomized design.

The temperature, lighting, ventilation and humidity of house can be controlled according to standard conditions and were reared in floor. Diet guide breeding birds was adjusted in starter (0-10 days), grower (11-24 days) and finisher (25-42 days) periods. Corn snack waste was considered in grower and finisher periods at level 0, 170, 350 and 500 g/Kg. The corn snack waste was available in sufficient amounts from Lina Co. (corn snack producer). Chemical analysis was performed in the laboratories of the Animal Science Research Institute of Iran, according to the procedures outlined by A.O.A.C (1990). The experimental diets were supplemented with a minerals and vitamins mixture, DL-methionine and l-lysine to cover the recommended requirements according to Ross 308 Commercial Management Guide (2007) and were formulated to be iso-nitrogenous. After 42 days rearing period, those birds that their weights were closer to the average weight of pen were selected from each pen to slaughter in order to determine carcass yield, breast, thigh, gastrointestinal tract, liver, gizzard, heart and fat pad weights. Analysis of variance was carried out on data using MSTAC computer package and differences among treatments were compared using a Duncan's multiple range test (Duncan, 1955). Table 1

Table 2. Chemical composition of corn snack waste (%)

Chemical composition	Corn snack waste
Gross energy (Cal/kg)	4527.4
Dry matter	93.43
Crude fiber	1.15
Ether extract	7.52
Crude protein	7.46
Methionine	0.16
Cystein	0.16
Lysine	0.12
Threonine	0.25
Valine	0.35

Table 3. Means of performance characteristics of broiler chickens, in different phases, fed rations containing corn snack waste.

Item	Phase	0% Corn waste	17% Corn waste	35% Corn waste	50% Corn waste	SEM
Weight gain (g)	Starter	269	265	275	269	6.11
	Grower	739^{a}	627^{b}	565^{c}	487^{d}	15.00
	Finisher	1362^{a}	1198^{b}	1107^{b}	982^{c}	32.91
	Overall	2327^{a}	2046^{b}	1904^{c}	1695^{c}	33.46
Feed intake (g)	Starter	314	312	313	308	15.06
	Grower	1055^{a}	1128^{a}	1042^{a}	746^{b}	37.07
	Finisher	2394^{a}	2239^{b}	2052^{c}	1176^{d}	35.67
	Overall	3763^{a}	3679^{a}	3407^{b}	2230^{c}	35.97
Feed conversion	Starter	1.39	1.41	1.36	1.36	0.07
	Grower	1.43^{b}	1.81^{a}	1.85^{a}	1.53^{b}	0.08
	Finisher	1.76^{a}	1.87^{a}	1.86^{a}	1.21^{b}	0.06
	Overall	1.62^{b}	1.80^{a}	1.79^{a}	1.32^{c}	0.03

Different superscripts per row indicate significant differences ($P < 0.05$)

illustrates the composition of the experimental diets used in this trial.

RESULTS AND DISCUSSION

The chemical analysis of the corn snack waste is presented in Table 2. Table 3 shows, the usage of corn snack waste and increased negative impact on the process of broiler chick's weight ($p<0.05$). El-Yamny et al.(2003) reported that incorporating 25% bakery by product in Japanese quail diet as untraditional ingredients enhanced ($P \leq 0.05$) body weight, body gain, feed intake and feed conversion efficiency at the market age (6 weeks old) compared with other dietary treatments. Table 3 shows the presence of waste corn in broilers diets and reduced feed intake ($p<0.05$). However the reduction of feed intake can be attributed to the physical form of waste corn (large volume and light weight) which was effected on filling the gastrointestinal tract fast and reducing feed intake, so chicks cannot consume adequate feed. Although this feed consumption incurred negative impact on the process of broiler chick's weight gain, the results of Table 3 shows the use of waste corn in broilers diet; at levels 17 and 35%, conversion ratio increased, but in the level of 50% the feed conversion improved ($p<0.05$). It should be noted that despite this improvement in feed conversion, the final body weight obtained from birds was not preferred, because the body weight of treatment was 50% of waste corn in 1738 g at 42 days and this is not a desirable weight. From Table 4, we find the usage of waste corn with no significant effect on performance of carcass and thigh, but reduced breast weight and carcass fat ($p<0.05$). Analysis of carcass in Table 4 shows that the use of waste corn in broiler chick's diet had no effect on liver, heart, gastrointestinal tract and crop, which indicates that the existence of waste corn in diets, has not incurred negative effect in metabolism of chickens. Radwan (1995) found that incorporating 25% bakery by product into Baladi chick diets at level 10, 20, 30 or 40% had no detrimental effect on body weight or dressing percentage, while feed intake was increased, feed conversion ratio was impaired. On the other hand, inclusion of bakery by product into Baladi chick diets

Table 4. Means of relative weight at slaughter of guttered carcass, gutted carcass without feet and head and primal cuts at 42 days old fed ration containing corn snack waste (%).

Item	0% Corn waste	17% Corn waste	35% Corn waste	50% Corn waste	SEM
Carcass	75.1	76.8	75.0	77.7	1.69
Breast	17.5^{a}	16.7^{ab}	16.3^{ab}	15.4^{b}	0.59
Thigh	14.6	15.3	13.8	14.2	0.56
Abdominal Fat	2.60^{a}	2.24^{ab}	2.10^{b}	2.46^{ab}	0.14
Liver	1.82	1.82	1.98	1.84	0.07
Heart	0.52	0.52	0.52	0.52	0.04
Gastrointestinal tract	6.58	7.12	7.02	6.74	0.23
Gizzard	1.82	1.84	1.92	1.82	0.08

Different superscripts per row indicate significant differences ($P < 0.05$)

Table 5. Effect of using waste corn snack in broilers diet on economy of production (US$)

Item	0% Corn waste	17% Corn waste	35% Corn waste	50% Corn waste
Price of 1 kg Feed	0.45	0.40	0.36	0.33
Total Price of Feed Intake	1.68	1.49	1.22	0.74
Price to produce 1 Kg live weight	0.72	0.73	0.64	0.44
Sales income per 1 kg live weight	0.28	0.28	0.30	0.36

Journal of Animal and Feed Sciences, 18, 2009, 113–123Top of Form

resulted in a higher economical efficiency as compared to the control diet. The waste corn prices is nearly 75% of the corn prices, so Table 5 shows that the use of corn waste has reduced feed costs and increase profits. These results agreed with El-Yamny et al. (2003) who reported that the greatest economical efficiency values were obtained for diets contained 25% bakery by-product.

Conclusions

It can be concluded that waste corn snack can be used as untraditional source of energy in broiler diets to get best performance and as god source of income as the control. On the other hand, the use of waste corn has negative effects on growth, weight gain of birds and produced low weight carcasses. Since the physical form of waste corn in meal flour fill fast the gastrointestinal tract and affected the feed intake, usage of this type of waste is recommended in the pellet form diet and the mash form diet should be limited to less than 17% for grower phase.

The use of corn snack waste in broiler chicken rations during the grower period may decrease weight gain and worsen feed conversion. Corn snack waste may be used as ingredient in broiler chickens finisher phase ration up to the 35% level without harming feed conversion of birds.

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