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CANE MOLASSES IN DIETS OF GROWING BROILER CHICKENS.

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Target Audience: Poultry Farmers,Research Scientists

ABSTRACT

Four isocaloric and isonitrogenous diets differing in other essential nutrients resulting from the substitution of maize and other ingredients with graded levels of molasses (0, 10, 20 and 30%) were fed to 400 broilers (Hubbard) from 4 to 8 weeks of age. Results showed that 20 and 30% molasses reduced (P<0.05) feed in a quadratic pattern, and that the cause may be beak impaction resulting from the very dense and greasy diets. Body weight gains were observed with negative linearity as the inclusion rate of molasses increased. The quadric pattern observed in the feed intake was also found in the feed: gain ratio, indicating that feed conversion was worst in the 20 and 30% molasses diets which generally showed the poorest performance. The result, therefore demostrated that in diets for growing broiler chickens, inclusion of molasses may not exceed 10% and that adaptability of older birds may be necessary for higher levels of molasses in such diets.

Key words: Molasses, broilers, diets, growth

DESCRIPTION OF PROBLEM

Previously, remarkable efficiency of poultry production was due in no small measure to abundant supply of yellow corn and soyabean meal from the United States of America. With proper combinations of these two ingredients and the addition of methionine and vitamin/mineral premix, economical high efficiency rations were formulated for all phases of poultry production. Other ingredients in poultry feeds are justified therefore, only when their use produces an improved economy of feed utilisation compared with corn-soyabean meal diets. Molasses is used in livestock and poultry diets for binding in pelleting, dust reduction, improving palability, and as an energy source (1).

It has been reported that molasses successfully replaced a reasonable portion of feed grains in poultry feeds (2, 3,4). Results from these studies showed no differences between control birds and those fed 20 and 24% molasses in the starter phase but weight gains were significantly reduced from 4 to 8 weeks except those on 20% molasses (4). However, the laxative effects of molasses have been reported (5).

This study was therefore, to assess the performance of four week old commercial broiler chickens fed graded levels of sugarcane molasses.

MATERIALS AND METHODS

Four hundred 4 - week old birds were selected from chickens which were brooded from 1-day old for this study. The broiler chickens were brooded in electric brooder cages fitted with chick feeders and drinkers for 3 weeks. They were fed a common commercial starter diet for the first three weeks. Thereafter, the birds were transferred to pens which were cleaned and disinfected, each pen having fresh wood shavings, adult feeders and drinkers. All the required vaccinations were promptly administered at the appropriate times.

Molasses was used to formulate four experimental diets at inclusion rates of 0 (control), 10, 20, and 30% (Table 1). Apart from salt, vitamin/trace mineral premix and bone meal which were kept constant, all other ingredients in the control diet were varied to provide isonitrogenous (20%) and isocaloric diets (3200 Kcal / kg). The most important nutrients of molasses used in the formulation of the molasses diets are in Table 2. The dietary treatments were each randomised five times, resulting in the use of 20 pens with 20 birds each allocated at random. The four-week old 400 birds were about the same weight (0.42kg) and so the experimental design used was the completely randomised design.

Table 1: Composition of Molasses-based experimental diets[1]

Ingredients	0	10	20	30
Molasses	0.00	10.00	20.00	30.00
Yellow Corn	56.51	49.05	40.00	30.00
Palm Oil	5.48	6.00	7.00	8.00
Brewers dried yeast	8.30	5.40	2.00	3.20
Palm Kernel Cake	16.76	13.60	12.40	8.95
Blood Meal	5.40	8.00	12.00	12.00
Salt	0.25	0.25	0.25	0.25
Vit/Trace Min. Premix	0.20	0.20	0.20	0.20
Bone Meal	1.00	1.00	1.00	1.00
Calculated energy (ME;Kcal/g)	3.21	3.20	3.20	3.20
Calculate Protein(%)	20.00	20.00	20.00	20.00

*Vitamin/trace mineral premix provides per kilogram diet: vitamins A 20,000UI; Vitamin D3 4,000 IU; UI; Vitamin E, 20 IU; Vitamin K, 12.00mg; Vitamins B2, 12.00mg; Nicotinic acid, 50.00mg; Pantothenic acid, 20.00mg; Vitamins (B6), 3.00mg, Folic acid, 1.00mg; Vitamin B12, 0.02mg; Choline Chloride, 500.00mg; Antioxidant, 250.00mg; Fe, 50.00mg; Mn, 160.00mg; Sn, 100.00mg; Cu, 4.00mg; I, 2.40mg; Co, 0.40mg; Se, 0.20mg.

[1] *Values represent the dietary inclusion levels of molasses*

The birds were provided with the experimental diets and water *ad libitum*. Feed wastage by birds was avoided by not overfilling the troughs. At the end of each period of seven days, the birds were weighed individually and the remaining feeds weighed to determine body weight gain, feed intake and efficiency of feed utilisation (feed: gain ratio).
Final body weights were taken after the 4 weeks of experimental period. Each replicate with 20 broilers and so each dead bird was weighed on the day it died to adjust for the weekly body weight gain for the computation of feed: gain ratio. Also post-mortem examination was performed on each dead bird to ascertain cause of mortality.

All data were subjected to analysis of variance and orthogonal polynomial contrasts (6) were used to determined the most beneficial level of molasses.

TABLE 2: Nutrient composition of molasses

Nutrients	Average analysis
Moisture (%)	14.03
Crude Protein (%)	2.46
Ether Extract (%)	1.0
Crude Fibre (%)	0.22
Calcium (%)	0.41
Phosphorus (%)	0.41
True Metabolisable energy (Kcal/kg)[1]	3.110
Methionine (%)	0.03
Lysine (%)	0.08
Ash (%)	9.42

[1] Determined by the method of (7) and calculated by the method of (8).

RESULTS AND DISCUSSION

The mean body weight, feed intake and efficiency of feed utilisation (feed: gain ratio) of experimental diets are shown in Table 3. Significant ($P<0.05$) differences were observed in feed intake with lowered intake at the 20 and 30% inclusion levels of molasses. The effects were quadratic. Body weight treatment effects were observed with downward linearity as the inclusion rate of molasses increased. Also, there was significant ($P<.05$) feed: gain ratio among treatments and the pattern of responses were quadratic. The excreta from birds fed high levels of dietary molasses (20 and 30%) was watery indicating increased gastrointestinal motility.

The observed quadratic pattern of feed intake showed that the birds were able to tolerate a maximum of 10% molasses in the diet. Although the control (0% molasses) was not statistically different from the 10% molasses diet, intake fell drastically at the 20 and 30% levels. This finding agrees with another study (4) which showed that feed consumption and conversion reduced when 24% molasses diet was fed to growing broiler chickens (4 to 8 weeks) but increased when fed to starting chicks (0 to 4 weeks) in the same experiment. However, it was earlier reported that poultry could tolerate up to 34.5% dietary molasses without adverse effect in performance except feed conversion efficiency which was poor (2). While palatability may explain this phenomenon in the bird, it may be that molasses caused a more rapid emptying of the ingested feed in the crop, proventriculus and gizzard of the starting chicks than the adult. Considering that the diets were isocaloric, the poor feed intake in this study may also be caused by the highly viscous molasses used since at the 20 and 30% levels, the diets were very dense and greasy and could have caused beak impaction (3).

Table 3: Performance of birds fed graded levels of molasses1 (%)

Parameters	0	10	20	30
		% Levels		
Weekly Feed intake (gm)	$766.29^{a}\pm0.35$	$725.97^{a}\pm2.58$	$580.16^{b}\pm1.72$	$450.04^{d}\pm1.56$
Weekly Weight gain (gm)	$297.99^{a}\pm0.42$	$266.56^{b}\pm0.09$	$146.93^{c}\pm0.44$	$116.41^{d}+0.11$
Feed conversion (feed/gain)	$2.57^{a}\pm0.02$	$2.72^{a}+0.06$	$3.95^{b}\pm0.0$	$4.26^{c}\pm0.06$

1. Data are means ± SEM of 5 replicates of 20 broilers each.
a, b, c, d, Means within the rows not bearing the same superscripts are significantly P<0.05) different.

The observed negative linear body weight gain in this study indicated that body weight gain decreased as the inclusion rate of molasses increased. This finding contradicts the report of identical growth of chicks fed on the control (0% molasses) and 34.5% molasses (2). In this study, the birds on 10, 20 and 30% molasses diet gained significantly lower weight compared with the control (0% molasses). Connnor et al (4) reported no significant body weight gain in starting chicks (0 to 4 weeks) and in growing chicks (4 to 8 weeks) fed on 20% molasses diet compared with the control. It appears that chicks fed with molasses diet during the starting phase have greater adaptability for molasses diets in the growing phase only. In this study, molasses diet was introduced to the chickens from the growing phase, and this may explain why body weight gain was negatively linear while feed intake was quadratic.

The feed: gain ratio obtained for the molasses based diets indicate that feed conversion was poorer for the high molasses diets (20 and 30%) than the control. The observed poor feed conversion might have been caused by the laxative property of molasses resulting from the high concentration of potassium (5). It, therefore, suggests that the poor performance of high molasses diet may be caused by increased gastro intestinal motility which causes rapid passage of ingesta and therefore reduces digestion and absorption of feed nutrients (10).

CONCLUSION AND APPLICATIONS

1. Feed intake and feed: gain ratio reduced in the 20 and 30% molasses diets.
2. Body weight decreased as the inclusion of molasses increased.
3. Molasses may not be used at more than 10% in broiler diets during the growing phase.

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