Effects of feeding maize-soybean meal based diets with a tanniferous additive (A. karroo leaf meal) to broiler chickens.

S. Hafeni, I. Mpofu and P. Patricia

Department of Animal Science, University of Namibia, Private Bag 13301, Windhoek, Namibia

Introduction

Balanced nourishment is a must in broiler production like in any animal production enterprise. While animals have a right to feed and water without any restrictions the farmer must guard against animals putting too much fat. The feed should have all the nutrients that the animal needs (protein, carbohydrate, lipids, minerals and vitamins) but nowadays consumers demand leaner meat. Broiler chickens are known to produce cheap, lean meat, as a result of least-cost production in the broiler industry. Due to an increase in consumer health awareness, people tend to opt for broiler meat which is healthier due to its leanness, making broiler meat a very important source of animal protein for the Namibian consumers. During the finisher phase higher levels of energy source are used and this has a tendency of producing fatty carcasses. Permitted additives of an organic matter seem to be the answer. Tannins have a negative effect on protein metabolism and decrease palatability of feeds at high levels (Barry & Manley, 1986) but at very low levels most are beneficial (Foo *et al*., 1996). *Acacia karoo* is said to be widespread, abundantly available during the dry season and has about 4.52 % DM levels of condensed tannins (Mashamaite, 2004; Ng'ambi et al., 2009). There was no study done in Namibia to determine the performance of broiler chickens fed PM and A. karroo leaf meal as an additive to broiler diets. Therefore, the objective of the present study was to investigate the effects of feeding maize-soybean meal based diets with a tanniferous additive (*A. karroo* leaf meal) mainly on the fat deposition of broiler chickens under Namibian environmental conditions

Materials and Methods

The experimental design used in this trial was a Completely Randomized Design (CRD). Fresh water and feed was always given ad libitum between 8 and 9 AM every day. Standard maize-soya bean meal based broiler finisher diet (T0) was formulated as the control as per BIS (1992) to meet the nutritional requirements listed by the NRC (1994). Birds were marked, and the body weight of individual chickens, and feed conversion ratio were recorded per replicate at weekly intervals while feed intake measurements were taken daily by recording weights of feed given and weight of left-overs (refusals). The efficiency of feed conversion ratio was calculated as feed intake per unit body weight gain. At the end of feeding trials, birds were randomly chosen for slaughter at six (6) weeks of age and seven (7) weeks of age. Statistical analyses were performed using the General Linear Model (GLM) procedure of IBM SPSS Statistics 20 (2011) package. Before comparing the experimental means homogeneity of variance was assessed based on the Levene Test.

Results and Discussion

The determined crude protein content of A. karroo leaf meal was 130g per kg, which is slightly higher than 120 g per kg reported by Ngambi et al. (2009). The present study observed that different A. karroo leaf meal levels added to maize based diets had no significant ($P > 0.05$) effect on weight gain and feed conversion ratio (FCR) (g feed/g live weight gain) of broiler chickens from 21 to 49 days of age. Adding 5 g/kg and 20 g/kg levels of A. karroo leaf meal to broiler chicken diets had no effects on the feed intakes of the chickens.

Table 2. Effects of *A. karroo* leaf meal level of addition on maize based diets on feed intake (g/bird/day), weight gain (g/bird/day) and feed conversion ratio (FCR) (g feed/g live weight gain) of Cobb 500 broiler chickens from 21 to 49 days of age

Treatment	ADFI	ADG	FCR
21 to 42 days of age			
T1	62.3±2.62[a]	49.6±2.37	1.30
T2	75.5±2.94[b]	51.7±1.18	1.46
T3	59.3±3.55[a]	51.5±1.64	1.15
21 to 49 days of age			
T1	64.0±2.56	53.9±1.83	1.19[b]
T2	77.7±2.83	56.5±1.08	1.38[a]
T3	60.6±3.47	54.4±1.25	1.11[b]

[a-b]Means within a column without a common superscript differ significantly ($P < 0.05$). T1= Control (no *A. karroo* leaf meal added); T2 = Maize-based diet with 5 g/kg supplementation level of *A. karroo* leaf meal; T3 =. Maize-based diet with 20 g/kg supplementation level of *A. karroo* leaf meal. ADFI = Average daily feed intake; ADG= Average daily gain.

Regardless of the age at slaughter, there was no significant difference ($P > 0.05$) in the abdominal fat deposition, weight of thighs and gizzards for the broilers fed maize-based diet (control diet) and the ones with A. karroo leaf meal additive. However, chickens fed maize based diets with 20 g/kg of A. karroo leaf meal had significantly ($P = 0.006$) lower breast. Addition of 20 g/kg of A. karroo to broiler diets reduces growth rates with a tendency to significantly reduce ($P = 0.058$) the fat deposition (considered at $P<0.05$ level of significance). More than 5 g/kg of A. karroo leaf meal should be added in order to achieve a significant reduction of fat deposition in Cobb 500 broiler chickens. A study by Ngambi et al. (2009) observed that supplementing diets with 9 g/kg and 12 g/kg levels of A. karroo leaf meal reduced fat pad weights by 26 and 29 % in female and male Ross 308 broiler chickens.). Some studies have shown that A. karroo contains condensed tannins that tend to bind with dietary protein and other nutrients, which reduces feed intake and digestibility in animals (Dube, 1993; Makkar, 2003).

Conclusion

Addition of 5 g/kg and 20 g/kg A. karroo leaf meal to broiler diets had no effects on the feed intakes, growth rate and feed conversion ratio of the broiler chickens. However, addition of 20 g/kg of A. karroo leaf meal to broiler diets has shown a marginal reduction ($P = 0.058$) in fat deposition. More than 5 g/kg of A. karroo leaf meal may be added in order to achieve a significant reduction of fat deposition in Cobb 500 broiler chickens.

Recommendations

In this study, treatments were imposed on the finisher stage of maturity. Therefore, research is recommended to test the treatment from day old chickens. Repeated feeding trials on a larger scale is recommended before A. karroo can be safely used by feed manufacturers. The same research should be done with different broiler breeds (indigenous chickens).

References

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