

The use of sun dried poultry manure in broiler diets, II- Effect on meat bone yields, non-carcass components and carcass chemical composition

M. TIBIN and I. G. A. KOKO

Institute of Animal Production, University of Khartoum, P. O. Box 32,
Khartoum North, Sudan.

SUMMARY

As has been mentioned in the first part of this study (Tibin and Koko, 1989) the effect of using sun dried poultry manure (S.D.P.M.) in broiler diets as a source of crude protein on broiler performance and eviscerated yield component parts was investigated. The present study 'dealt with the effect of using S.D.P.M. on meat and bone yields, non-carcass components and carcass chemical composition. Design of the experiment and diet treatments were reported in part (I) of this series. Results obtained have shown that as the level of S.D.P.M. increased, the bone yields of commercial cuts increased significantly, while the muscle yield decreased. On the other hand, the weight of head, shank and total viscera as a percentage of liveweight increased as the level of S.D.P.M. increased in the broiler diets. However, the use of S.D.P.M. did not affect liver, gizzard and heart weights expressed as percentages of liveweight. Carcass chemical composition showed that with the increase of the level of S.D.P.M. in broiler diets, carcass crude protein decreased, carcass ash and carcass fat increased, while the carcass moisture was not affected.

INTRODUCTION

Generally there is a positive correlation between the carcass weight and meat yield obtained, while there is a negative correlation between the live-weight and the non-carcass components. Grawly et. al. (1980) observed a negative correlation between the weight of head, shank and total viscera to the liveweight, increase in liveweight resulted in decrease in head, shank and total viscera as a percentage of liveweight, while with the increase of body weight, heart, liver as a percentage of liveweight remained constant. On the other hand different types of diets fed to broilers have a direct effect on the

chemical composition of broiler meat. Summer et. al. (1965) reported that carcass protein linearly increased with the decrease in carcass fat in relation to the increase in the level of dietary protein. However, increasing dietary energy resulted in a decrease in carcass protein and to an increase in carcass fat. Attempts have been made (Tibin and Koko, 1989) to determine the effect of including sun dried poultry manure in a broiler diets on performance and eviscerated yield component parts. This study is a continuation to the same study to determine the effect of poultry manure on meat bone yield, non-carcass components and on the carcass chemical composition of broiler chickens. »

MATERIALS AND METHODS

The experiment involved 120 day - old chicks. Origin of the chicks, the diet, treatments and experimental design have been reported by Tibin and Koko (1989) in the first part of this study. A random sample of 5 carcasses of each pen were used for dissection. The eviscerated carcass was weighed, dissected and the different cuts were weighed individually and deboned, and the meat and bones were weighed separately. , Five samples from each treatment were randomly selected for chemical analysis. The right side meat of the carcass including skin, tendons and sub - cutaneous fat were cut into small pieces, minced twice in an electric meat mincer, thoroughly hand mixed, wrapped, labelled and frozen at - 18 °c. In chemical analysis the samples were thawed for 24 hours in a refrigerator and duplicate samples were used analysed for fat, protein and moisture contents according to the (A. O. A. C., 1975). Four replications were done for each parameter. Statistical analysis: The different commercial cuts (thigh, breast and drumstick) were expressed as a percentage of cold carcass and non-carcass components (such as head, shank, total viscera, abdominal fat, liver and gizzard) were expressed as percentage of liveweight. Meat and bone were expressed each as a percentage of the weight of its cut. Data collected were analysed by using analysis of variance and difference between means tested by least significant difference (Snedecor and Cochran, 1965).

RESULTS

Muscle and bone yields: . Table I shows the effect of S.D.P.M. on the average yield of meat and bone from breast, drumstick and thigh. Values are means of four replicates and there are 10 birds in each replicate. The increase in the level of S.D.P.M. in broiler diet resulted in a decrease in muscle yields and increase in bone yield from breast, thigh and drumstick. The birds which were fed on diets with 8% S.D.P.M. produced significantly ($p < 0.05$) greater bone yield and less meat yield from drumstick, thigh and breast than those which were fed on diets that contained 0% S.D.P.M. However, there was no significant ($p > 0.05$) difference between birds which were fed on diet that contained 4% S.D.P.M. and those fed on diet that contained 0% S.D.P.M. in bone and meat yields of breast, thigh and drumstick. Effect of sun dried poultry manure on non-carcass components." Table 2 shows the mean value and standard error of non-carcass components (head, shank, liver, gizzard, abdominal fat and heart) as percentage of final body weight. The use of S.D.P.M. in broiler diets did not have any significant ($p > 0.05$) effect on liver, gizzard and heart weight as a percentage of final body weight. However, the weight of head, shank and total viscera as the percentage of final body weight have significantly ($p < 0.05$) increased as the level of S.D.P.M. increased from 0% to 8%. The birds which were fed on diets that contained 8% S.D.P.M., gave significantly ($p < 0.05$) heavier head, shank and total viscera than those which were fed on diets that contained 0% S.D.P.M. However, there was no significant difference ($p > 0.05$) between birds that were fed on the diets which contained 4% S.D.P.M. and those which were fed on the diets that contained 0% and 8% S.D.P.M. The birds which were fed on the diet that contained 4% S.D.P.M. gave significantly ($p < 0.05$) lower abdominal fat content than those fed on diets with 0% and 8% S.D.P.M. However, there was no significant difference between birds that were fed on diets with 0% and 8%.

Table 1: effect of using sun dried poultry manure on yields of meat and bone from, thigh, breast and drumstick.

Items	0% SDPM	4% SDPM	8% SDPM	S.E..
Drumstick				
Muscle%	70.38 ^a	69.19 ^{ab}	67.19 ^b	0.13*
Bone%	29.06 ^{ab}	30.66 ^{ab}	32.09 ^b	0.50*
Breast				
Muscle%	80.61 ^a	79.11 ^{ab}	78.33 ^b	0.96*
Bone%	18.12 ^a	18.55 ^a	19.68 ^a	0.81NS
Thigh				
Muscle%	73.32 ^a	72.17 ^{ab}	71.81 ^b	0.21*
Bone%	24.31 ^a	25.86 ^{ab}	27.62 ^b	0.18*

Table 2: The effect of sun dried poultry manure on non-carcass components as percentage of final body weight.

Items	0% SDPM	4% SDPM	8% SDPM	S.E.
Head and shank	8.75 ^a	9.59 ^{ab}	10.01 ^b	0.18*
Total viscera	8.39 ^a	8.90 ^{ab}	9.10 ^b	0.28*
Liver	2.15 ^a	2.19 ^a	2.33 ^a	0.20NS
Heart	0.50 ^a	0.54 ^a	0.53 ^a	0.02NS
Gizzard	2.41 ^a	2.89 ^a	2.93 ^a	0.13NS
Abdominal fat	1.73 ^a	1.39 ^b	1.76 ^a	0.15*

The effect of sun dried poultry manure on carcass chemical composition: Table 3 shows the carcass chemical composition, values are means of 4 replicates of each treatment. There were significant ($p < 0.05$) difference between treatments in carcass crude protein. The increase in the level of S.D.P.M., in broiler diets resulted in a significant ($p < 0.05$) decrease in carcass crude protein. On the other hand, an increase in the level of S.D.P.M. in broiler diets resulted in a significant ($p < 0.05$) increase in carcass fat and carcass ash. However, treatments didn't affect the moisture content of the carcass.

Table 3 : The effect of sun dried poultry manure on carcass chemical composition.

Item	0%SDPM	4%SDPM	8%SDPM	S.E.
Crude protein	20.40 ^a	18.05 ^b	17.68 ^c	0.82*
Ether extract	6.10 ^a	9.90 ^b	12.80 ^c	0.60*
Ash	0.88 ^a	0.93 ^b	1.30 ^c	0.50*
Moisture	68.60 ^a	68.7 ^a	68.02 ^a	0.3NS

DISCUSSION

The use of S.D.P.M. has resulted in a significant ($p < 0.05$) decrease in muscle yields and an increase in bone (of the thigh, breast and drumstick) yields. This could be due to the significant ($p < 0.01$) decrease in live weight gain, feed consumption and efficiency of feed utilization which resulted from S.D.P.M. in broiler diets (Tibin and Koko, 1989). Jull (1951) reported that edible meat yields of commercial cuts decreased with the decrease in final body weight. On the other hand, the increase in bone yields resulted from using S.D.P.M. in broiler diets could be attributed to the fact that diets which contained S.D.P.M. had higher percentage of calcium and phosphorus compared to the control (Tibin and Koko, 1989). The effect of sun dried poultry manure on non-carcass components: There was a significant ($p < 0.05$) increase on the weight of head and shank, total viscera as a percentage of final body weight with the increase in the level of S.D.P.M. in broiler diets (table 2). These results could be due to the fact that the use of S.D.P.M. had significantly ($p < 0.01$) reduced the live body weight (Tibin and Koko, 1989), so that the head and shank, total viscera as a percentage of live body weight were increased. These findings agreed with Grawly et. al., (1980) who observed an increase in percentage of head, shank and total viscera with the decrease in body weight. The increase in the level of S.D.P.M. in broilers diets resulted in a decrease in carcass abdominal fat from 1.74% to 1.36% for 0% and 4% of S.D.P.M. This finding could be due to the decrease in feed consumption and decrease in dietary protein

which might have led to an increase in fat metabolism and decrease in abdominal fat. These results agreed with Spring and Wilkenson (1957) who reported that the decrease in body protein was associated with the an increase in carcass fat and a decrease in abdominal fat. On the other hand, there was no significant difference between birds which were fed on diets that contained 0% and 8% of S.D.P.M. This could possibly be due to the high percentage of vegetable oil used with the diets that contained 8% S.D.P.M. to adjust the energy value of the experimental diets. The effect of sun dried poultry manure on carcass chemical composition: Table 3 shows a significant ($p < 0.05$) decrease in carcass crude protein with the increase in the level of S.D.P.M. from 0, 4 and 8% (20.4, 18.05 and 17.68) respectively. This decrease in carcass protein could possibly be due to the reduction in feed consumption which resulted from the use of S.D.P.M. that contained only about one - third of crude protein as true protein. These findings were supported by those of Summer et. al. (1965) who reported that carcass crude protein decreased with the decrease in dietary protein. However the increase in the level of S.D.P.M. resulted in an increase in carcass fat. This could be due to the decrease in dietary protein which resulted from using S.D.P.M. This result was in agreement with Summer et. al. (1979) and Scott et. al. (1970) who observed an increase in carcass fat with the decrease in dietary protein. Also there was an increase in the carcass ash with the increase in the level of S.D.P.M. in broiler diets. This might possibly be due to the high ash contents of the diets that contained S.D.P.M. The bone yields of commercial cuts increased significantly, while the muscle yield decreased as the level of S.D.P.M. increased in the broiler diets. on the other hand, the weight of head, shank and total viscera as a percentage of liveweight increased as the level of S.D.P.M. increased in the diet. However, the use of S.D.P.M. did not affect liver, gizzard and heart weights expressed as percentage of liveweight. Carcass crude protein decreased carcass ash and carcass fat increased while the carcass moisture was not affected with the increase of S.D.P.M. in the broilers diet.

REFERENCES

- A. O. A. C. (1975). Official methods of analysis. 12th ed. Association of official analytical chemist. Washington, D. C.
- Grawly, S. W., Saloan, D. R. and Rale, K. H. (1980). Yields and composition of edible and inedible by — product of broiler processed at 6, 7 and 8 weeks. *Poult. Sci.*, 59 (10): 2243 - 2246.
- Jull, M. A. (1951). "Successful 'poultry management'" 2nd. ed. McGros Hill Brook Company. Inc.U.S.A.
- Scott, H. M., Kummeraus, F. A. and Rand, N. T. (1976). The relationship of protein, fat and energy on the amount, composition and origin of chick carcass fat. *Poult. Sci.*, 56: 1151 - 1158.
- Snedecor, G. W. and Cochran, W. G. (1965). Statistical methods. 6th. ed. The Iowa State Univ. Press. U.S.A.
- Spring, J. L. and Wilkison, (1957). The influence of dietary protein and energy level on body composition of broiler. *Poult. Sci.*, 36: 1159 - 1164.
- Summer, J. D., Slinger, S. L. and Ashton, G. E. (1965). The effect of V dietary energy and protein on carcass composition with a note on methods of estimating carcass composition. *Poult. Sci.*, 44: 501 - 507.
- Summer, J. D. and Leeson, S. (1979). Composition of poultry meat as affected by nutritional factors. *Poult. Sci.*, 58 (3): 56 - 52.
- Tibin, I. M. and I. G. A. Koko, (1989). The use of sun -dried poultry manure as an ingredient in broiler diets. I- Effect on performance and eviscerated yield component parts. *Sudan j. anim. prod.*, 2: 89 - 97.