The use of sun dried poultry manure in broiler diets I- Effect on performance and eviscerated yield component parts

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SUMMARY

The effect of using sun dried poultry manure in broiler diets as a source of crude protein **on broiler** performance and eviscerated yield component parts was investigated. 120 day old unsexed broiler chicks (Lohman) were used in this experiment. The chicks were divided into three groups of 40 chicks each to be fed on three isocaloric and isonitrogenous broiler diets which contained 0%, 4% and 8% of sun dried poultry manure respectively.

Results obtained from the experiment showed that the use **of** sun dried poultry manure in broiler diets resulted in a significant decrease in feed consumption, weight gain and feed conversion ratio.

The slaughter data showed that as the level of sun dried poultry manure increased, eviscerated carcass weight, dressing percentage and the yield of commercial cuts (thigh, breast and drumstick) were significantly decreased.

INTRODUCTION

In Sudan, like most other developing countries, there is a high competition between man and animal for food which led to a continuous increase in food prices. Avila and Cuca (1974) reported that most of tropical and sub tropical countries have shortage in protein sources.

Recently, the increase of poultry farms around the cities have accumulated large quantities of manure which has created pollution problems. Some authors (Couch, 1974; Avila and Cuca, 1974; Biely and Stapletov, 1976) have mentioned that poultry manure contain some of the nutrients needed by the birds; it could be treated by heat and used in poultry diets.

The objective of this study was to investigate the effect of sun dried poultry manure (S.D.P.M.) in poultry diets on performance and eviscerated yield component parts of broiler chickens.

MATERIALS AND METHODS

formulation of experimental diets:

Three isocaloric and isonitrogenous experimental diets containing 0%, 4% and 8% of S.D.P.M. were used in this experiment. The diet with 0% poultry manure was taken as a control. The poultry manure, which. was collected from broilers batteries and sun dried, was obtained from the Sudanese Kuwaiti company about 25 miles south of Khartoum. Random samples from this manure were regularly analysed and the overall average is shown in table 1.

Table 1: Chemical composition of sun dried poultry manure.

Item	Percentage
Moisture	10.32
Crude protein	25.8
Crude fibre	14.8
Fat	1.08
Ash	21.22
NFE	26.78

Gross energy - 980 Kcal/ kg.

The three experimental diets containing 0%, 4% and 8% of S.D.P.M., are described in table 2. The three diets were formulated to give 21.5% crude protein and 3000 Kcal/ kg metabolizable energy. Vegetable oil was added to the diets to adjust the energy value. The three diets were chemically analysed according to A. 0. A. C., (1975), (table 3). The experiment was conducted in

an open sided house with twelve pens that contained dry wood shavings as litter materials to a depth of 5 cm.

Table 2: The ingredients of the experimental diets as fed.

Components	Diet 1 (%)	Diet 2 (%)	Diet 3 (%)
Sorghum .	64.00.	62.00	60.00
Wheat bran	2.75	2.75	1.50
Sesame cake	•13.00	12.00	11.50
Groundnut cake	13.00	12.00	11.00
Super concentrate*	5.00	5.00	5.00
Sun dried poultry manure	0.00	4.00	8.00
Oyster shell	1.00	1.00	1.00
Vegetable oil	1.25	1.25	2.00

** Super concentrate contains:*
43 51 crude protein, 2000 Kcal/ kg ME, Lysine 11.4%, methionine 1.0%, + cystine 1.3, Ca 103, P 5%, Vit A 300000 i.U/ kg, Vit D 60000 i.U, and traces of minerals.

150 one - day old unsexed commercial broiler chicks (Lohman) were obtained from the Sudanese - Kuwaiti company. 120 healthy chicks were selected, weighed and randomly distributed *into* 12 pens. The pens were then randomly allocated to the three experimental diets.

A randomized complete block design was used. Each of the three experimental diets was replicated four times (block) and each replicate involved ten birds. The experiment was conducted in March 1987 and continued for nine weeks.

Light, feed and water were provided all the time. Feed intake and liveweight gain of each pen were recorded weekly. All birds were vaccinated against Newcastle disease at 30 days of age. Vitamins and minerals (Euravit) was occasionally in the water.

Table 3: Chemical analysis of the experimental diets, as fed.

hem	0% SDPM	4% SDPM	8% SDPM
Crude protein	21.01	21.29	22.18
Cmde fibre	3.92	4.28	4.91
Ether extract	4.43	4.91	5.22
Ash	12.20	14.06	14.91
N.F.E.	58.44	55.46	52.78
Calcium	1.11.	2.51	2.81
Phosphorus	0.52	0.91	1.20
Lysine	1.031	1.011	0.982
Methionine + cysitne	0.626	0.594	0.563

At the end of 9 weeks, birds were individually weighed after overnight fasting (except for water) and then slaughtered, scalded, hand picked, washed and drained. The head, feet and shanks were removed.

Birds were eviscerated and the carcasses, heads, shanks, total viscera, abdominal fat, livers, gizzards and hearts were individually weighed and expressed as percentages. A random sample of 5 carcasses from each pen were dissected and the drumstick, thigh and breast were separated, individually weighed and expressed as a percentage. Each cut was deboned and the meat and nes were weighed separately.

he data collected were analysed using analysis of variance and differences between means were tested by least significant difference (Snedecor and Cochran, 1965).

RESULTS

Table 4 shows the initial weight, feed consumption, liveweight gain and feed conversion ratio of the experimental birds fed on the three diets. Values are means and standard error of 4 replicates (10 birds in each replicate). The use of S.D.P.M. in broiler diets significantly ($p < 0.01$) affected the broilers body weight. There was a significant decrease in broilers body weight with

the increase in the level of S.D.P.M. in broiler diets and in live weight gain.

Birds which were fed on diet that contained 0% S.D.P.M. consumed significatly ($p < 0.01$) more feed than those fed on diet with 4% S.D.P.M., and these consumed more feed than those fed on the diet that contained 8%, but the difference was not significant ($p > 0.05$).

Table 4: The effect of sun dried poultry manure on broiler performance.

Item	0% SDPM	4% SDPM	8% SDPM	S.E.
No. of binds	40	40	40	
Initial weightkg/bird	0.0566	0 0565	0 0565	
Final body Wt., kg/bird	1.5020 [a]	1.1280 [b]	1'0400 [b]	0.22**
Live Wt. gain, kg/ bird	1.3450 [a]	0.9760 [b]	0.8850 [b]	0.12*
Feed consumption, kg/bird	3.50 [a]	2 99 b	2.91 b	0.13**
Feed conversion ratio	2.42 [a]	2.65 b	2.79 b	0.24*

S.D.P.M. - Sun dried poultry manure.

Live weight gain of the birds that were fed on control diet was significantly higher than those which were fed on diets that contained S.D.P.M. However, there was no significant ($p > 0.05$) difference between birds which were fed on the diets which contained S.D.P.M.

Feed conversion ratio of the birds that were fed on control diets was significantly ($p < 0.05$) better than those which were fed on diets that contained S.D.P.M. Birds which were fed on the diet that contained 4% S.D.P.M. gave better feed conversion ratio than birds that were fed on diet that contained 8% S.D.P.M. but the difference was not significant ($p > 0.05$).

The effect of adding different levels of S.D.P.M. in broiler diets on average carcass weight, dressing percecntage and yield of commercial cuts are given in table 5. Birds which were fed on the control diet gave significantly ($p < 0.01$) heavier hot and cold carcass weights than birds that were fed on diets that contained S.D.P.M.

The birds which were fed on the diet that contained 0% S.D.P.M. gave significantly ($p < 0.01$) higher dressing percentage than those which were fed on diets that contained S.D.P.M. However, there were no significant difference ($p > 0.05$) between birds which were fed on diets with 4% and 8% S .D. P. M.

Table 5: The effect of using sun dried poultry manure on eviscerated carcass weight, dressing percentage and yield of commercial cut (thigh, breast and drumstick).

Item	0% SDPM	4% SDPM	8% SDPM	S .E.
Hot eviscerated carcass Wi, kg/ bird°	1.080 [a]	0.820 [b]	0.790 b 0.735 [b]	0.14*
Cold eviscerated carcass Wt, kg/ bird	0.990 [a a]	0.790 [b b]		0.11**
Dressing percentage (hot)	69.80	64.50	64 22.12	0.18**
Breast as % of cold carcass	26.16 [a]	22.92 [b]	30 [b]	0.38**
Drumstick as % of cold carcass	15.42 [a]	15.78 [a]	15 62 [a]	0.20**
Thigh as % of cold carcass	19.08 [a]	15.68 b'	15 .18 b	0.36**

The treatment did not significantly ($p > 0.05$) affect the drumstick weight as a percentage of cold eviscerated carcass weight. However, a significant ($p < 0.01$) difference in proportion of thigh and breast was observed between treatments. The birds which were fed on the diet that contain 0% S.D.P.M. gave significantly heavier thigh and breast weight than those which were fed on diets that contained 4% S.D.P.M., while birds which were fed on the diet that contained 4% S.D.P.M. gave heavier thigh and breast than those fed on the diet with 8% S.D.P.M. but the difference was not significant ($p > 0.05$).

DISCUSSION

In this experiment 0%, 4% and 8% of S.D.P.M. were included in broiler diets as a cheap and available source of crude protein and other nutrients in order to study its effect on performance and carcass yield component parts.

It was observed that the increase in the percentage of S.D.P.M. in broiler diet resulted in a significant ($p < 0.01$) decrease in feed consumption, weight gain and feed conversion ratio (table 4). This effect had been observed by other workers, (Regal and Zindel, 1972; Beely et. al., 1972; Biely and Stapleton, 1976) who reported that an increase in the level of S.D.P.M. in broiler diets resulted in a decrease in feed consumption and growth rate of the birds. This could be attributed to the fact that only one - third of crude protein of hen manure exists as true protein, but the remainder is assumed to be mostly uric acid and ammonium salt (Ruben et. al., 1947). Maximization of utilization of ammonium salt and urea by chicks could be achieved when diet contain a balanced sufficiency but not excess of essential amino acid (McNab et. al., 1972). In the present work the decrease in growth rate might be due to a decrease in nitrogen utilization which resulted from tissues damage caused by ammonium toxicity (Biely and Stapleton, 1976), and/ or due to a decrease in the palatability of the diet that contained S.D.P.M.

On contrast, those results disagreed with (Rose et. al., 1947 and Shannon, 1972) who observed an improvement in growth rate of the birds that were fed on the diet that contained S.D.P.M. This could be attributed to the fact that S.D.P.M. was added in those experiments ,to diets suboptimal in protein, content.

The birds which consumed diets that contained 0% S.D.P.M. gave significantly heavier eviscerated carcass weight and higher dressing percentage than those fed on diets with 4% and 8% S.D.P.M. (table 5). This could be due to the lower weight gain which resulted from using S.D.P.M. (table 4). These findings agreed with Forrest et. al., (1957); Preston and William, (1973) who reported that cold eviscerated carcass weight and dressing percentage decreased with the decrease in live body weight.

Reference has been made to the decrease in food consumption and feed conversion efficiency consistent with level of S.D.P.M. in the diets.

The increase in the level of S.D.P.M. from 0% to 8% in broiler diets significantly ($p < 0.05$) decreased the thigh and breast weight. However, there was no significant ($p > 0.05$) difference in drumstick weight between treatments (table 5). These results particularly agreed with Jull (1951) who concluded that as the carcass weight decreased, breast as a percentage of carcass weight decline with corresponding increase on the other portion of the body namely legs.

REFERENCES

A. 0. A. C. (1975). Official Methods of Analysis, 12th ed. Association of official analytical chemist. Washington, D. C.

Avila, G. E. and Cuca, G. M. (1974). Potential for the better utilization of crop residues by monogastric animals in Central America. F. A. 0. Animal Production and Health, 50: 51 - 55.

Beely, J., Song, R., Seller, L. and Pope, W. H. (1972). Dehydrated poultry waste in poultry ration. Poult. Sci., 51: 1502 - 1506.

Biely, J. and Stapleton, P. (1976). Dried poultry manure in chicken starter ration. Brit. Poult. Sci., 17: 5 - 12.

Couch, R. J. (1974). Evaluation of poultry manure as feed stuff ingredients. Feedstuff, 46: 12 - 15.

Regal, G. J. and Zindel, H. C. (1970). The utilization of poultry waste as feedstuff for growing chicks. Poult. Sci., 49: 590 - 595.

Forrest, J. C., Aberrle, E. L., Hdrick, H. B., Judge, M. S. and Market, K. A. (1975). Principles of meat science: 82 - 127W.

Jull, M. A. (1951). "Successful poultry management" 2nd. ed. McGrow Hill Brook Company. Inc. U.S.A.

McNab, J. M., Lee, D. J. W., Shannon, D. W. F. and Blair, R. (1972). The growth of broiler chiken fed low protein diet containing diammonium citrate and dried poultry manure. Brit. Poult. Sci., 13 (4): 357 362.

Preston, D. H. and William, W. M. (1973). Eviscerated yield component parts and meat - skin - bone ratios in chicken broiler. Poult. Sci., 52: 718 - 722.

Rose, W. C., Smith, L. C., Womack, R. and Shane, M. (1949). The utilization of nitrogen of ammonium salt or urea and certain other component in synthesis of non - essential amino acid. J. of Biolog. and Chem., 181: 307 - 316.

Ruben, M. X., Blird, H. R. and Irving, R. C. (1947). Growth promoting factors for chickens in faeces of hen. Poult. Sci., 25: 526 - 528.

Shannon, L W. E., McNab, J. M. and Lee, D. J. W. (1972). Effect on