REPLACEMENT OF ANIMAL PROTEIN AND VITAMIN-MINERAL PREMIX WITH MANURE SILAGE IN BROILER RATIONS

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The effect of substituting animal protein and vitamin mineral source with dried manure silage in broiler feeds was studied in a trial conducted on 80, 7-day-old broiler chicks. The control group was fed a standard broiler starter ration while 3 test diets contained 20% manure silage, replacing fish meal, blood meal and vitamin-mineral premix, respectively. Non-significant differences among treatments were observed in respect of weight gain, feed consumption, feed efficiency and cost of production. The results indicated that manure silage protein was comparable to animal protein sources and its vitamin and mineral content was sufficient to support optimum growth of birds in the absence of synthetic vitamin-mineral supplement.

INTRODUCTION

Traditional methods of disposing cattle manure as organic fertilizer are now considered wastage of energy. Now cattle manure is considered as one of the cheaper sources of nutrients in animal feeds (Muller, 1974). Considerable work has been conducted on the use of cattle manure in poultry feed as protein and energy source (Palafox and Rosenberg, 1961; Menear and Smith, 1973; Sial *et al.*, 1989), while it has also been considered as a good source of vitamin and minerals in poultry rations.

When cattle manure is ensiled under anaerobic conditions, the addition of urea and molasses tremendously accelerate microbial growth and thus increase its protein content (Hardy *et al.*, 1983). This biomass can be used in poultry rations as protein substitute (Ergul and Vogt, 1983; Rasool *et al.*, 1989).

This study was conducted to assess the nutritive value of manure silage as a substitute of animal protein sources viz. fish and blood meal and vitamin-mineral premix in broiler rations.

MATERIALS AND METHODS

The manure silage was prepared by fermenting the cattle manure collected from lactating cows. The manure (60%) was thoroughly mixed with cane molasses (38%) and urea (fertilizer grade, 2%) and then ensiled under anaerobic conditions for three weeks. Then the sludge was removed, sun dried and ground to be incorporated in the experimental rations. A representative sample of the ground biomass was analysed to determine its chemical composition (A.O.A.C., 1984) which is given in Table 1.

Table 1. Chemical composition of manure silage on dry matter basis

Particulars	%
True protein	16.00
Crude fibre	9.50
Ether extract	0.88
Nitrogen free extract	48.70
Total ash	12.70
Inorganic Ca	1.48
Inorganic P	0.35
Gross energy (Kcal/kg)	3000

Four isonitrogenous (20% crude protein) and isocaloric (3000 Kcal/kg) rations were formulated. Ration A served as control while in rations B, C and D, fish meal, blood meal and vitamin-mineral premix was substituted with manure silage, respectively. The composition of the experimental rations has been shown in Table 2.

Table 2. Per cent composition of experimental rations

Ingredients	Rations			
	A	B	C	D
Manure-molasses silage	-	20.00	20.00	20.00
Maize ground	50.00	25.00	25.00	25.00
Rice polishings	-	5.00	5.00	4.00
Wheat bran	-	5.00	5.00	5.00
Maize gluten meal (30%)	9.50	9.50	9.50	6.00
Sesame oil meal	8.00	6.00	6.00	8.00
Rape seed meal	3.00	3.00	3.00	3.50
Guar meal (toasted)	6.00	6.00	6.00	6.00
Cotton seed meal (Decort.)	12.00	12.00	12.00	12.00
Blood meal	5.00	5.00	-	5.00
Fish meal	6.00	-	6.00	6.00
Vitamin-mineral premix	0.50	0.50	0.50	-
Nutrient contents:				
Crude protein (%)	23.14	23.04	23.04	23.58
Crude fibre (%)	3.88	5.40	5.42	5.14
M.E. (Kcal/kg)	2990	2875	2886	2946

The experiment was conducted at Nutrition Research Centre, University of Agriculture, Faisalabad, during the months of June and July. The experiment involved 80, 7-day-old broiler chicks of mixed sexes, averaging 120 g per chick, which were reared on a commercial broiler starter ration. These chicks were randomly distributed into 8 experimental units of 10 chicks each and assigned to floor pens (2.5' x 4.0') which were in a broiler house under standard managemental conditions. Each experimental ration was fed to two pens of ten chicks each.

The experiment continued till the broilers were six weeks old. During the experiment all the birds were weighed individually at the start and at weekly intervals, thereafter. Weekly weight gained by each replicate was calculated. Weekly feed consumption was recorded for each replicate and feed efficiency was calculated. The data were subjected to analysis of variance and Duncan's Multiple Range test was applied to see significant difference among treatment means (Steel and Torrie, 1981).

RESULTS AND DISCUSSION

The chemical analysis of the dried manure silage revealed (26%) true protein, 9.5% crude fibre, 12.7% total ash and 3000 Kcal/kg gross energy. During ensiling process bacterial growth resulted in an increased protein content while crude fibre, due to its break down and utilization by the microbes, decreased considerably from 28 to 9.5%. Similar changes in the composition of manure silage have been reported by Hardy *et al.* (1977).

The data on average weight gain, feed consumption, feed efficiency and cost of production of birds fed different experimental rations during six weeks period have been summarized in Table 3.

and Vogt (1983) and its high vitamin content was sufficient to replace the supplementation of synthetic premixes in broiler feeds (Hammond, 1942).

The birds fed rations A, B, C and D consumed on an average 3192, 3222, 3237 and 3303 g feed, respectively. The birds fed control ration consumed minimum feed, and there was a slight increase in fibre content and ultimate decrease in energy content of the diets. However, these differences were non-significant. Similar non-significant changes in feed consumption of birds have earlier been reported by Surdzhiiska *et al.* (1981) when they replaced animal protein and vitamins with dried manure molasses silage in broiler rations. Rasool *et al.* (1989) also reported non-significant increase in

Table 3. Average weight gain, feed consumption, feed efficiency and cost of production of birds fed on various experimental rations

Rations	Weight gain per bird (g)	Feed consumption per bird (g)	Feed efficiency	Cost per kg live weight (Rs.)
A	1329[a]	3192[a]	2.40[a]	7.74[a]
B	1275[a]	3222[a]	2.53[a]	7.62[a]
C	1268[a]	3237[a]	2.55[a]	7.42[a]
D	1237[a]	3303[a]	2.67[a]	8.10[a]

* The same superscripts on a mean value represent non-significant differences.

Average weight gain per bird on ration A, B, C and D was 1329, 1275, 1268 and 1237 g, respectively. The differences among treatment means were non-significant statistically which led to the inference that replacement of fish meal, blood meal or vitamin-mineral premix with manure-silage did not affect the performance of birds in respect of weight gain. The microbial protein was comparable to animal protein for its utilization by birds as reported by Ergul

feed consumption of birds when dried manure-molasses biomass was incorporated upto 25% level in broiler feeds.

Average feed efficiency values of rations A, B, C and D were 2.40, 2.53, 2.55 and 2.67, respectively. Feed efficiency values on various rations in which fish meal, blood meal or vitamin-mineral premix was replaced, did not vary markedly which highlight the quality manure silage as their replacement. There was a slight decrease in

the ability of birds to utilize the feeds containing manure silage due to high fibre and low energy content of these rations which stimulate the intestinal peristaltic movements of the birds and ultimately led to increase flow rate of ingesta and decreased absorption of nutrients. The birds fed on rations containing manure silage voided comparatively loose droppings. These results are substantiated by the findings of Surdzhiiska *et al.* (1981) and Ergul and Vogt (1983) who also observed a slight decrease in the feed utilizing ability of birds on rations containing manure silage.

Although, the cost of production did not show a significantly favourable change due to the use of rations containing manure silage yet it can be termed an important addition to already available feed ingredients and further improvement in the quality of manure silage with increased microbial protein content may considerably increase the efficiency of poultry production. The use of such a feed ingredient in poultry feed can help decrease the feed cost as also reported by Muller (1974) and Mokhamed (1981), but to make it significantly more economical, further improvement in the ensiling process is needed so that the protein content of the resultant biomass may be increased and its fibre level reduced to the minimum.

REFERENCES

A.O.A.C. 1984. Official Methods of Analysis of the Association of Analytical Chemists. 14th Ed. Washington, D.C.

Ergul, M. & H. Vogt. 1983. Replacement of fish meal by bacterial bioprotein in broiler feed with high proportion of cottonseed and sunflower oil meals. Land Solk. 33 (2): 74-84. (Nutr. Abst. Rev., 54 (2-3): 569, 1984).

Hammond, J.C. 1942. Cow manure as a source of certain vitamins for growing chicks. Poult. Sci. 23: 358-359.

Hardy, C., R. Romero and A. Elias. 1977. A note on the fermentive changes of diets prepared weekly with manure silage and final molasses for growing chickens. Cuban J. Agri. Sci. 11 (1): 91-93 (Nutr. Abst. Rev., 50 (9): 3806, 1980).

Menear, J.R. and J.L. Smith. 1973. Dairy cattle manure liquid: solid separation with screw press. J. Anim. Sci. 36 (4): 788-791.

Mokhamed, El Kh. 1981. Microbial protein in diet for feeding broiler chicken. Sbor. Nauch. Rabot. Lenin. Vet. Instit. 67: 141-147 (Nutr. Abst. Rev., 54 (6): 2357, 1984).

Muller, Z. 1974. Summary of work, conclusions and recommendations on animal nutrition, feeding and utilization of byproducts and wastes. Singapore UNDP/FAO Report A.G.A. Sf/Sin 5.

Palafox, A.L. and M.M. Rosenberg. 1961. Dried cow manure as a supplement in layer and breeder rations. Poult. Sci. 30: 136-142.

Rasool, S., M.E. Babar, Z. Ali and M.A. Assad. 1989. Effect of different levels of manure-molasses biomass as maize replacement in broiler feeds. Pak. Vet. J. 9 (4): 176-178.

Sial, M.A., S. Din, A.R. Barque, G. Ali and S. Rasool. 1989. Recycling of dried buffalo manure in broiler rations. Pak. Vet. J. 9 (4): 179-182.

Steel, R.G.D. and J.H.. Torrie. 1981. Principles and Procedures of Statistics. International Student Edition. McGraw Hill Book Co. Inc., New York, USA.

Surdzhiiska, S. L. Vladimirova, M. Simovska and S. Nakov. 1981. Studies on bacterial protein. 1. Estimation of optimum amount of bacterial protein in mixed feed for broiler chickens. Zhivotno dni Nauki. 18 (3): 55-61 (Nutr. Abst. Rev., 53 (6): 2339, 1983).