EFFECT OF INTENSIVE v. SEMI-INTENSIVE REARING AND OF A VITAMIN-MINERAL PREMIX ON CHICKENS FED A RATION BASED ON INGREDIENTS GROWN IN PAPUA NEW GUINEA

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ABSTRACT

A factorial experiment with 300 Australorp and Rhode Island Red chickens from 5 to 10 weeks old is described. There were six duplicated treatments—two management types, intensive and semi-intensive, each with one of three diets all with approximately 18 per cent crude protein. The diets were a control containing imported ingredients and two diets based on locally grown sorghum, soybean and peanut either with or without a vitamin-mineral supplement.

The locally grown diet without vitamins and minerals supported poor growth and efficiency under intensive management. Semi-intensive management caused a slight improvement only. The vitamin mineral supplement improved performance on this diet almost to the level obtained on the control diet.

It is recommended, when a ration composed of locally grown ingredients is fed, that this be supplemented with a vitamin-mineral premix and that management be of the intensive deep litter type.

INTRODUCTION

Village poultry in Papua New Guinea is, more often than not, run under an open range system of management, that is, there is very little food or shelter provided for chickens. However in some areas, village poultry owners have been encouraged to intensify their management by providing shelter and feed of various types. The most sophisticated level of management which could still be considered as village or subsistence production is the intensive, deep litter system in which the birds are housed in a native material shed with a deep litter floor and all feed is supplied to the birds as a mixed ration. A less sophisticated form of management is the semi-intensive system in which birds are housed and fed in much the same way as under the intensive system but the chickens have access to a grassed outside run from which they should be able to obtain some nutrients.

Poultry can be profitable in Papua New Guinea when reared under intensive management and fed a properly balanced ration which must either be imported or purchased from one of the few feed mills operating in this country. For a small-scale village farmer in a remote area the cost of purchasing and transporting this feed is generally prohibitive. There is therefore a need for a cheaper and simpler but probably less productive management system to be developed which will be suitable in this case.

A system of semi-intensive rearing and feeding a ration which can be almost completely home grown may be suitable for this purpose but there is no reliable experimental evidence of the effectiveness or otherwise of such a system. It is probable that a vitamin and/or mineral deficiency could result in poor performance on a simple home grown diet. An imported premix can be fed to overcome any expected adverse effects but the economics of such a practice need examination. It may well be that the provision of an adequate outside

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area for the chickens as would be the case under semi-intensive management is sufficient to allow the birds to meet their requirements for minerals and vitamins. If such were the case then the feeding of a premix under this system of management would not be necessary.

The experiment described here was aimed at determining the relative importance of semi-intensive rearing and supplementation with a vitamin-mineral premix for chickens fed a simple ration composed of home grown ingredients.

It was anticipated that from the results of the trial it would be possible to design a simple, low cost management-feeding system which could be applied for small-scale village farmers.

MATERIALS AND METHODS

Three hundred unsexed Rhode Island Red and Australorp chickens were fed from day-old to 5 weeks of age on a commercial 21 per cent protein starter ration. At 5 weeks of age the chickens were distributed at random to 12 pens, each about 100 sq ft in area, so that each pen contained 25 chickens. Of these 12 pens, 6 had an outside run attached which was approximately four times the area of the pen, constituting a semi-intensive management system. The other 6 enclosed pens constituted an intensive management system. Within the two management systems, three different experimental diets were fed to separate pens, with two replications (design was 2 x 3 fractorial).

Table 1.—The composition and analysis of the experimental diets

Ingredients	% Composition		
	Diets		
	1	2	3
Sorghum	61.5	68.0	66.6
Wheat	20.0		
Soybean meal	7.5		
Fish meal	5.0		
Meat meal	5.0		
Soybean (unextracted)		22.0	22.4
Peanut (unextracted)		10.0	10.0
Premix*	1.0		1.0
Crude protein (N x 6.25)	18.0	18.7	19.5

* Premix comprises the following per kg of feed:—
11,000 I. U. vitamin A; 1,250 I.U. vitamin D_3; 4mg vitamin E; 4 mg menadione $NaHSO_3$; 4 mg riboflavin; 10 mg pantothenic acid; 1 mg pyridoxine; 2 mg folic acid; 0.02 mg vitamin B_{12}; 300 mg choline chloride; 1 mg copper; 0.4 mg iodine; 30 mg iron; 45 mg manganese; 30 mg zinc; 0.5 g DL-methionine; 2.0 g NaCl; 125 mg antioxidant; made up to1.0 per cent with pollard.

Composition of the experimental diets is shown in *Table* 1. Diet 1 was used as the control diet and all the ingredients were imported with the exception of the sorghum which was grown in the Markham Valley. Diets 2 and 3 were the experimental diets composed of ingredients grown in Papua New Guinea. Diet 2 did not contain a vitamin-mineral premix while diet 3 was supplemented with the premix. A coccidiostat, Pancoxin, was added to all diets at the rate of 1 lb per ton.

Both soybeans and peanuts were heated prior to mixing into the diets. This was carried out by roasting the seed over an open fire in a 44-gallon drum cut lengthwise. Roasting continued for 30 minutes during which time the seeds were mixed with a shovel to ensure that all seeds were equally well cooked. After roasting, the soybeans and peanuts were mixed with milled sorghum in the required proportions and the mixture was then hammer-milled. It was necessary to mix the ration before milling as the soybeans and peanuts contain too much oil to be milled individually. After milling, the Pancoxin in the case of diet 2, and the Pancoxin and premix for diet 3 were mixed into the ration. Sufficient feed for about 10 days was mixed at a time.

The experiment continued until the chickens were 10 weeks of age. The chickens were weighed at weekly intervals and the feed intake

Table 2.—Liveweight gain, feed intake and feed conversion efficiency from 5 to 10 weeks of age

Treatment	Mean Liveweight Gain per Chick (g)	Mean Feed Intake per Chick per Day (g)	Mean Feed Conversion Efficiency (Feed/Gain)
Intensive			
Diet 1	656.5 a*	70.2 a	3.85 a
Diet 2	135.4. b	52.3 a	13.94 b
Diet 3	467.7 c	55.4 a	4.26 a
Semi-intensive			
Diet 1	684.2 a	67.4 a	3.56 a
Diet 2	180.0 b	54.5 a	10.86 c
Diet 3	451.0 c	58.2 a	4.71 a
Mean intensive	419.8 d	59.3 b	7.35 d
Mean semi-intensive	438.4 d	60.1 b	6.38 e
Mean diet 1	670.3 e	68.9 c	3.70 f
Mean diet 2	157.7 f	53.4 d	12.40 g
Mean diet 3	459.3 g	56.8 cd	4.49 f

*Within groups, means not followed by a common postscript are significantly different ($P < 0.05$).

was also recorded on a weekly basis. Calculations were made of the weight gain per chick, feed intake per chick and the feed conversion efficiency calculated as g of feed consumed per g of body weight gain.

Mortalities were recorded and post mortems carried out on all birds which died.

RESULTS

The results of the experiment are summarized in *Table* 2. The analysis of variance technique was used in conjunction with Duncan's Multiple Range Test to detect significance.

There was no significant effect on growth rate of type of management, but type of diet had a large and significant effect on growth. The control diet promoted faster growth than either diets 2 or 3 and the addition of vitamin-mineral premix (diet 3) produced a significant improvement in growth compared with diet 2 (*Figure* 1).

Feed conversion efficiency follows a similar trend to that of liveweight gain but due to the high variability of the feed intake figures the only significant effects on F.C.E. are those arising from the very poor efficiency on diet 2 and the general improvement in efficiency with semi-intensive management. The only significant difference in feed intake was between the higher intake of diet 1 compared with diet 2.

Only five birds died during the course of the trial. Four of these deaths were due to trauma not associated with any treatment. The fifth death was from a suspected case of coryza and was likewise not attributable to any experimental treatment.

DISCUSSION

The chickens fed the locally grown ration without premix (diet 2) under intensive management exhibited a very poor growth rate and efficiency. This was improved by semi-intensive management, the response only being significant for efficiency which improved from 13.94 to 10.86.

However this is well below the response in both growth and efficiency caused by the addition of the vitamin-mineral premix to diet 2.

Growth on the supplemented diet was still inferior to that on the control diet. In terms of efficiency, the apparent 18 per cent greater efficiency of feed conversion on diet 1 over diet 3, although not statistically significant, was probably genuine.

It may be that the lower level of production with diet 3 is more economic than that obtained with diet 1 since the former ration is probably cheaper to produce. This experiment does not lend itself to any economic analysis

primarily because the premix used was not commercially available and could not be reliably costed. Further experiments are planned using similar diets with intensive management and commercially available premixes which will provide valuable economic data relevant to this level of poultry management.

CONCLUSION

With chickens fed a locally grown ration it is not possible to provide the vitamin and mineral requirements from a grassed outside run as under semi-intensive management. From a technical point of view it is therefore recommended that intensive deep litter systems be used that the locally grown ration be supplemented with a vitamin-mineral premix. The economics of such a practice will be tested in future experiments.

ACKNOWLEDGEMENTS

Thanks are due to Mr L. Vaiba, Livestock Officer, who was responsible for most of the recording of the results and Mr N. Clark for his assistance in providing the facilities of the Tropical Pig Breeding and Research Centre, Goroka, where the trial was carried out.

(Accepted for publication August, 1972.)

Printed and published by G. W. Reid, Government Printer, Port Moresby.—3345/5.73.