ADDITION OF COPRA MEAL TO COMMERCIAL FEED FOR BROILER CHICKEN PRODUCTION.

Janet Pandi[1]

ABSTRACT

Commercial hybrid broiler chickens were fed from three weeks to 53 days of age on diets in which various levels of copra meal were added to commercial finisher feed. The findings confirm that a finisher feed of commercial broiler pellets with 20-60 percent added copra meal can make a satisfactory low density feed for broiler chickens in the finishing stages. A diet of 60 percent copra meal with 40 percent broiler finisher can be fed to broilers for an additional week for them to reach a marketable weight of two kilograms. There is an economic advantage in favour of the lower intensity system as long as the ratio of the actual prices of the copra meal and commercial feed is above the calculated threshold ratio.

Keywords: *Commercial, broiler chickens, copra meal, ratio.*

INTRODUCTION

Lowering the cost of feeding or using local feeds, mainly for commercial broiler chicken production, were identified as being of high priority in Papua New Guinea (PNG) by the National Agricultural Research Institute (NARI) in its regional research prioritisation consultations (NARI 2004). Due to the need to assist smallholder broiler farmers, NARI has been doing research on the use of low nutrient density feed with increased use of local ingredients for feeding broiler chickens during the finishing stage.

Work was conducted using proportions of copra meal along with the commercial broiler finisher pellet for a lower intensity feed. The treatment rations were given to the birds during the finishing stage from day 21 to 53.

Copra meal is the by-product of the oil extracting industry done currently in two mills located in East New Britain and Madang provinces. This by-product is used in the manufacture of commercial feeds at a low rate of inclusion. It can be utilized either as a protein or energy source or both.

General recommendations propose that copra meal can be included in the diet economically up to 40 percent in poultry rations (CAB International 1987).

This project was designed to test whether copra meal can be further included in broiler finisher rations up to 80 percent, economically, without affecting overall production in a low cost feeding system. Such a low cost production system would be beneficial to poultry farmers where copra meal is available locally such as in the Madang and East New Britain provinces.

Moreover, it may also be profitable to include or substitute higher levels of copra meal as an energy or protein source in the production of low intensity feeds elsewhere leading to low cost production systems.

MATERIAL AND METHODS

Birds, feeds and management

One hundred and forty (140) hybrid broiler chickens hatched by Nuigini Tablebirds Company were used in the trial. During the first three weeks, all birds were fed commercial starter ration as a group. The treatment diets were introduced at 21 days and continued until 53 days.

There were five diets with four replicates and each experimental pen housed seven birds.

The design was a completely randomised design with the five treatment diets having the compositions shown in Table 1. Feed was offered *ad libitum*.

Live weights, feed intakes and feed residues were measured on a weekly basis and the collected data subjected to analysis of variance.

Costs

The method used for calculating the average total cost per bird per diet is illustrated by an example for the

[1] Papua New Guinea National Agricultural Research Institute

Table 1. **Chemical composition of the treatment diets used in the experiment.**

Diet	Composition	Percentage on Dry matter basis					
		Protein	Energy	Crude fibre	Moisture	Ash	Fat
1	100% BF	23.30	51.54	11.77	23.3	6.2	7.5
2	80% BF + 20% CM	20.11	51.42	15.31	19.5	6.7	5.1
3	60% BF + 40% CM	19.57	50.50	17.06	18.3	7.1	6.5
4	40% BF + 60% CM	18.88	54.21	24.20	17.2	7.1	7.0
5	20% BF + 80% CM	19.31	54.65	27.19	16.3	6.8	8.9
	Copra meal	18.03	50.41	40.80	18.4	8.4	13.0

BF = Broiler Finisher; CM = Copra Meal

100 percent broiler finisher diet. For this diet, the average finisher feed intake per bird was 4.199 kg with the diet costing K2.57 per kilogram. Each day-old chicken cost K1.78, and starter feed cost K0.95 per bird. Thus the cost of rearing a 53 day old broiler on this diet is K1.78 + K0.95 + (4.199 x K2.57) = K13.52

Threshold ratio of costs

The price (cost of feed) ratio between the high intensity (100% Broiler Finisher) feed and the lower intensity feed was determined such that the feed cost of producing a kilogram of live weight during the finishing period of a bird would be equal. This can be considered as the break-even or the threshold ratio.

Any value of the ratio of actual feed prices above the threshold would indicate an economic advantage in favour of the lower intensity system. An increase in the actual ratio would occur if the high intensity feed price rose or the cost of the lower intensity feed could be reduced relatively.

The threshold ratio is calculated as follows and is independent of the actual feed prices (Ignatius and Quartermain, 2002).

Cost of 1kg of live weight gain on the high intensity feed = $\frac{(\text{Intake H})(\text{Price H})}{(\text{Gain H})}$

Cost of 1kg of live weight gain on the low intensity feed = $\frac{(\text{Intake L})(\text{Price L})}{(\text{Gain L})}$

At the threshold,

$$\frac{(\text{Intake H})(\text{Price H})}{(\text{Gain H})} = \frac{(\text{Intake L})(\text{Price L})}{(\text{Gain L})}$$

and the ratio is $\frac{(\text{Price H})}{(\text{Price L})} = \frac{(\text{Intake L})\ (\text{Gain H})}{(\text{Intake H})\ (\text{Gain L})}$

Figure 1. **Weekly average weights of birds over the experimental phase (21-53 days)**

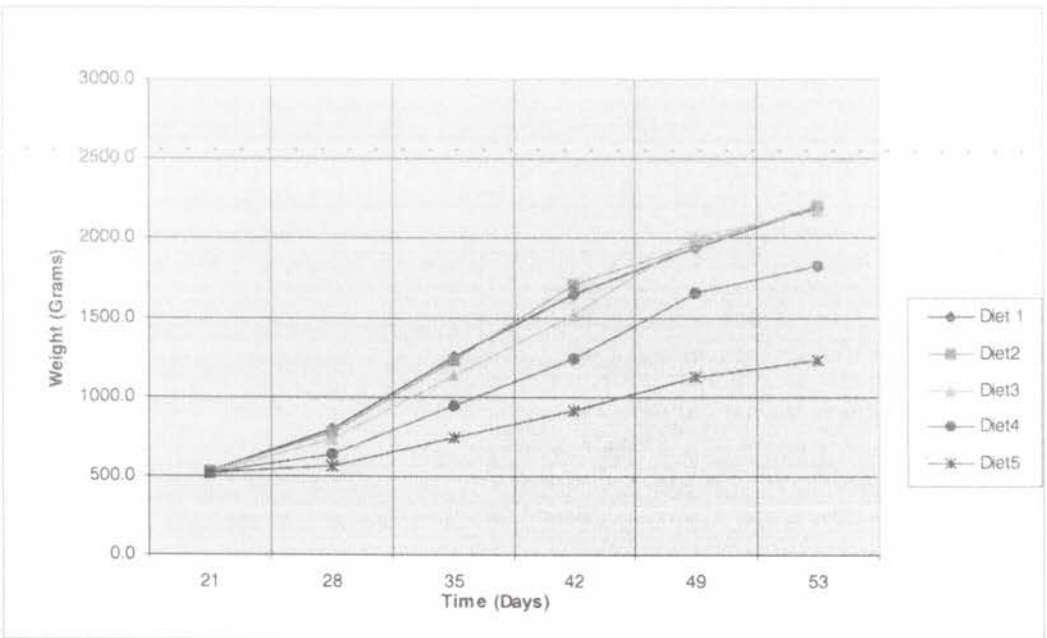

Table 2. **Live weights, overall gain, total intake and food conversion ratio per bird over the experimental phase**

Diet	Treatment diets	Initial weight	Final weight	Weight gain	Intake	FCR
1	100 % BF	0.526	2.191a	1.665a	4.199a	2.53ab
2	80% BF	0.527	2.208a	1.681a	4.024b	2.40a
3	60% BF	0.523	2.168a	1.645a	4.025b	2.45a
4	40% BF	0.524	1.823b	1.300b	3.387c	2.61b
5	20% BF	0.524	1.226c	0.702c	2.483d	3.55c
LSD		0.011	0.104	0.102	0.169	0.157

Means with the same subscript are not significantly different at the 5% level

RESULTS

Weekly weights, overall gain, intakes and feed conversion ratios

Weights

There were no significant differences between initial weights of birds. However, there were some clear distinctions between the live weights of birds on the different treatment diets in subsequent weeks. Birds on the 100, 80 and 60 percent BF diets had significantly ($p<0.05$) higher final live weights than those on the 40 and 20 percent BF diets. In turn, birds on the 40 percent BF diet had significantly ($p<0.05$) higher weights than the ones on the 20 percent BF diets (Figure 1 and Table 2). There were no differences between the final weights of birds on the 100, 80 and 60 percent BF diets.

Gains

The overall gains showed a similar trend to that observed in the final live weights. Birds on the 20 and 40 percent BF diets had significantly ($p<0.05$) lower weight gains compared to those on the 60, 80 and 100 percent BF diets. However, the birds on the 40 percent BF diet gained more than those on the 20 percent BF diet.

Intakes

The total intakes of birds showed that birds on the 20 percent BF diets had significantly ($p<0.05$) lower intakes than those on the 40 percent BF diet. These two groups in turn had significantly ($p<0.05$) lower intakes than birds on the 60, 80 and 100 percent BF diets.

Feed Conversion Efficiency

Feed conversion efficiency is measured by the ratio of feed intake to liveweight gain. Birds on 80 and 60 percent BF diets had feed conversion ratios of 2.40 and 2.45 which are lower than those on the other diets with added CM. The ones on the 20 percent BF (80 percent CM) diet had a higher ratio of 3.55. These results show that birds on the 80 percent CM diets had to eat over one kilogram of feed more to gain one kilogram of live weight than birds on the 100 percent BF and 20 and 40 percent CM diets.

Table 3. **The total production cost of a bird and the cost per kilogram of live weight**

Diets	Treatment diet	Cost	Cost per Kg
1	100 % BF	13.52a	6.18a
2	80 % BF	11.29b	5.12b
3	60 % BF	9.51c	4.39c
4	40 % BF	6.94d	3.81d
5	20 % BF	4.72e	3.85d
LSD		0.336	0.227

Means with the same subscript are not significantly different at 5% level

Costs

At the current prices for BF and CM, the birds on the 100 percent BF diet were significantly ($p<0.05$) more expensive to produce than the ones on the 20 percent BF diet (Table 3). The costs of production of birds on the other diets ranked according to the proportion of CM in the diet. It is significantly cheaper per kilogram of live weight to produce birds using the 60 and 80 percent CM diets than any of the other diets.

DISCUSSION

The results of this study indicate that broiler finisher diets which already contain some CM can have added a further 20-40 percent CM without productivity loss and with economic gain. Even birds on a 60 percent CM diet can perform quite well and should be able to reach a marketable weight of two kilograms at considerably lower cost if raised for an additional week or two as inferred from the results of this trial.

The chemical compositions of the diets on a dry matter basis in Table 1 show that the energy and crude fiber values for diets with 60 and 80 percent CM were high compared to those of the other diets. The low intakes of birds fed the 60 and 80 percent CM diets may be attributed to the high percentage of fiber in these diets or the higher energy content and possibly the palatability of the diets themselves. Palatability may be a factor affecting intakes of these diets since the CM was not pelleted and the feed was dusty. Also the oil content of the CM may have become rancid during the trial.

Even so, a diet combination of 60 percent CM with 40 percent BF can be economical and profitable as a low intensity feed ration for a small scale broiler farmer constrained by the high prices of commercial broiler finisher feed.

CONCLUSIONS

Birds on the 20 and 40 percent copra meal diets performed as well as those on the 100 percent broiler finisher diets. Production costs were inversely proportional to the percentage inclusion of the copra meal. The higher the percentage inclusion of copra meal in the diet, the lower the costs involved in raising a bird to market weights.

An inclusion rate of 50-60 percent copra meal in the diet to give a low-density feed for broiler chickens during the finishing stage is nutritionally viable and economical for a small-scale broiler chicken farmer.

A diet of 80 percent copra meal, although cheaper compared to the other diets, may not be economical as birds did not perform as well on this diet and may take too long to reach a marketable weight.

RECOMMENDATIONS

Farmers can use any diet combinations used in this experiment, except for the 80 percent copra meal diet, as long as the ratios of the actual feed prices are above the threshold ratios, indicating an economic advantage in favour of the lower intensity system. The ratios calculated from the feed intake and weight gain data for each diet are as follows:

Diet	Treatment diets	Threshold Ratio
2	80% BF + 20% CM	0.95
3	60% BF + 40% CM	0.97
4	40% BF + 60% CM	1.03
5	20% BF + 80% CM	1.40

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