THE USE OF CASSAVA IN BROILER FEEDING IN THE SOUTH PACIFIC

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Summary

An experiment was conducted to investigate the nutritional and economic effects of complete replacement of maize with sun-dried cassava (SDC) in the diet of broiler chickens raised from one day of age to seven weeks. The complete replacement of maize by SDC resulted in a 10 percent reduction ($p < 0.05$) in final bodyweights (1.91 vs 1.72 kg); and a 5 percent reduction ($p > 0.05$) in average feed intake (4.01 vs 3.81 kg). Feed efficiency was not affected ($p > 0.05$). Cost per kilogramme of feed was reduced by nearly 30 percent and cost per kilogramme of bodyweight gain lowered by about 26 percent by using SDC diet.

Relative profit return after accounting for cost of feed and cost of day old chick was higher by 11 percent on the SDC diet. It was concluded that despite the reduction in final bodyweight, the attractive economic return obtained from using SDC, a locally produced ingredient, may be justified in place of maize which is imported.

(Key Words: Cassava, Maize, Broiler Feeding, Nutritional and Economic Performance)

Introduction

An earlier report from our laboratory indicated that the replacement of 40 percent of maize in broiler diet with sun-dried cassava (SDC) neither affected ($p > 0.05$) performance as measured in terms of final body weights, feed consumption and feed efficiency nor carcass quality as assessed by carcass yield and dressing percentage (Ochetim, 1987). However, of more significant interest was the fact that the use of SDC reduced cost of feed and cost of raising broilers. Since cassava is produced locally in many countries of the South Pacific region, unlike maize which has to be imported, it would seem to be more desirable and advantageous if cassava could be used to wholly replace maize in broiler feeds. This experiment was therefore designed to test the effects of complete replacement of maize with SDC on the nutritional and economic performance of broiler chickens raised from one-day to seven weeks of age.

Materials and Methods

Ingredients

Fresh cassava was purchased from a farm in the Apia area. The unpeeled cassava was chopped into chips using a bush knife, and dried in a simple on-farm type solar drier for two days. The dried chips were ground using a hammer mill equipped with a 2 mm sieve screen. Maize and the other ingredients were purchased from Samoa Feed Mill.

Diets

Two diets were formulated (table 1). One diet, MD, had maize as its basal energy, while the other, SDC, contained sun-dried cassava. Since cassava is lower than maize in protein content, the SDC diet was supplemented at a higher level with meat and bone meal. Both diets were formulated to be iso-nitrogenous and isocaloric and were fortified with minerals and vitamins to standard levels (NRC-NAS, 1971).

Birds and Management

Ninety, one-day old Shaver broiler chicks were used. The birds were randomly divided into six groups, with each group comprising of 15 birds. Three such groups were randomly assigned to

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TABLE 1. COMPOSITION OF EXPERIMENTAL DIETS

	MD[1]	SDC[2]
Ingredients (%)		
Maize	52.5	–
Sun-dried cassava meal	–	48.0
Coconut oil	5.0	6.0
Fish meal	15.0	15.0
Meat and bone meal	17.0	20.5
Copra meal	10.0	10.0
Salt	0.3	0.3
Trace mineral vitamin premix	0.2	0.2
Calculated		
Crude protein (%)	22.8	22.7
ME (kcal/kg)	3200	3200
Ca :P	2 : 1	2 : 1

[1] Diet based on maize as basal energy source.
[2] Diet based on sun-dried cassava as basal energy source.

each dietary treatment. Each group of 15 birds were housed in a pen and provided with their respective diet on an *ad libitum* basis. Water was available from automatic waterers at all times.

Birds in each pen were weighed as a group at the beginning of the trial and then thereafter every seven days until the termination of the feeding trial at seven weeks of age. At the end of the feeding trial, five birds were randomly chosen from each pen and slaughtered for the determinations of carcass yield and value.

Chemical and Statistical Analysis

Maize and cassava as well as the formulated diets were analysed for proximate contents by the standard methods (A.O.A.C., 1980). Data obtained on final bodyweights, feed intake, feed efficiency, carcass weights and dressing percentages were compared using Least Significant Difference test with significant differences reported at the 5 percent level (Steel and Torrie, 1980). The economic parameters were assessed in terms of percentage change in cost or revenue derived from using SDC diet over MD diet.

Results and Discussion

Chemical Analysis

The results on the chemical composition of maize and cassava as well as the diets are presented in table 2. The data obtained on the ingredients used are typical to those reported elsewhere (Fetuga and Oluyemi, 1976; Agudu and Thomas, 1982), and show particularly the low level of protein in cassava.

The calculated nutritional data presented in table 1 were based on earlier analytical data obtained from our laboratory (Ochetim, 1987). The analysed protein values in the experimental diets shown in table 2, very closely concur with calculated values.

Bodyweights, Feed Intake, Feed Efficiency and Carcass Yield

The data obtained on nutritional performance in terms of final bodyweights, feed intake and feed efficiency are presented in table 3. The complete replacement of maize with sun-dried cassava resulted in a 10 percent reduction in final bodyweights, 1.91 vs 1.72 kg. This reduction in final bodyweight was statistically significant. Although there was a 5 percent reduction in feed intake by feeding SDC diet, this was not significant ($p > 0.05$). Similarly, there were no significant differences in feed efficiency between the two diets.

Data obtained on carcass information indicated

TABLE 2. CHEMICAL COMPOSITION OF TEST INGREDIENTS AND EXPERIMENTAL DIETS

	Chemical compositon (%)			
	Dry matter	Protein	Fat	Fibre
Ingredients (%)				
Maize	88	9.0	3.7	2.0
Cassava	89	3.6	0.5	2.1
Diets (%)				
MD	88	23.1	7.5	4.5
SDC	88	23.0	7.3	4.4

TABLE 3. PFRFORMANCE AND CARCASS QUALITY OF EXPERIMENTAL BIRDS

	MD	SDC	
Performance			
Final liveweight (kg)	1.91	1.72	*[1]
Feed intake (kg)	4.01	3.81	ns[2]
Feed conversion ratio Feed/gain	2.11	2.21	ns
Carcass Yield			
Dressed carcass Wt (kg)	1.35	1.22	*
Dressing percentage	71	71	ns

[1] Treatment means are significantly different ($p < 0.05$).

[2] Treatment means are not significantly different ($p > 0.05$).

that carcasses obtained on the MD diet were heavier ($p < 0.05$) than those fed SDC diet. There were, however, no significant differences in dressing percentage between the two dietary treatments. The internal organs, livers and gizzards were all of normal consistency and appearance.

These findings on the nutritional performance concur with some earlier reports, (Mueller et al., 1974; Ochetim, 1989). The reduction in final body weight noted on SDC diet appeared to have been related more in terms of feed intake rather than feed efficiency. The cassava used in the feeding trial was not peeled. Thus, it might have been possible that cyanide, a toxic principle in cassava, could have limited the intake on SDC diet. Unfortunately, no analysis was undertaken on cassava for cyanide content due to technical problems. Studies from other parts of the world have implicated cyanide as a factor responsible for lower intake on diets containing high levels of cassava (Johnson and Raymond 1965; Gerpacio et al., 1974). Secondly, it has been suggested that the lower bulk density of cassava, is also a contributory factor to lower feed intake on cassava-based diets. Apparently this seems to be related to faster gut fill but on lower feed intake because of the light and bulky nature of cassava (Gerpacio et al., 1974).

The differences obtained in carcass yield were a reflection of differences obtained in final bodyweights rather than dietary treatments. This is because no differences existed in dressing percentages between the two dietary treatments. This kind of relationship has been observed and reported upon (Ochetim, 1987; Hutagalung et al., 1974).

Economic Evaluation

Data on economic parameters assessed are presented in table 4. There was a reduction in cost per kilogramme of feed by nearly 30 percent when maize was replaced by SDC. This reduction in cost per kilogramme of feed coupled with reduction in feed consumption led to the reduction in feed cost of raising birds fed SDC diet.

TABLE 4. ECONOMIC EVALUATION OF BROILER PERFORMANCE

	MD	SDC	% Change[1]
Feed cost per kg (WS$)	0.85	0.60	−29
Total feed cost per bird (WS$)	3.41	2.29	−33
Dressed carcass weight (kg)	1.35	1.22	− 9
Price of dressed carcass per kg (WS$)	6.00	6.00	0
Revenue per dressed bird (WS$)	8.10	7.32	+ 9
Feed cost per kg dressed Wt (WS$)	2.53	1.87	-26
Cost of day old chick (WS$)	1.70	1.70	0
Feed plus day old chick costs (WS$)	5.11	3.99	−22
Revenue less feed and day old chick costs (W$)	2.99	3.33	+11
Increased relative profit (less feed and day old chick costs) per bird on SDC diet over MD diet (WS$)	--	0.34	–

[1] Expressed as percentage change from using cassava (SDC) based diet over using maize (MD) diet.

The reduction in feed cost of raising broilers on the SDC diet was in the order of 33 percent when compared with birds fed MD diet. In terms of relative profit after accounting for cost of feeds and day old chicks, SDC diet produced nearly 11 percent higher profit return. This represented a saving of some W$ 0.34 per bird from using SDC over MD diet. These calculations are based on the current practice where whole chickens are sold merely on the basis of dressed weight valued at W$ 6.00 per kilogramme. There is no system of grading whole chicken carcass in Western Samoa.

These attractive economic gains obtained from replacing all of the maize with sun-dried cassava is certainly interesting and has great potential value for the region. At the moment high feed cost is the major factor limiting commercial broiler farming in the region.

In many countries of the region, e.g. Fiji, Solomon Islands, Vanuatu, Tonga and Western Samoa, there is a fair amount of cassava cultivation in excess of human food requirement, and further possibilities for increased production still exist. Such surplus cassava could be utilised in poultry feeding to replace the currently imported expensive maize. In this way, poultry feed could become cheaper and more dependent on locally produced cassava.

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