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PRELIMINARY ON–STATION STUDY OF GROWTH PERFORMANCE OF GROWER PIGS ON ENSILED CASSAVA PULP AND DRIED CASSAVA LEAVES

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ABSTRACT: *The performance of grower pigs on diets containing graded levels of cassava pulp, cassava peels and dried cassava leaves was studied. Twenty-four Large White grower pigs at an average initial live-weight of 20 kg were distributed over six diets by the completely randomized design. The pulp was preserved by ensiling in polyethylene bags for a period of three months before use. The pigs were group-fed once-daily for five weeks. The average daily gains (ADG) of the pigs were 0.27, 0.19, 0.28, 0.26, 0.15 and 0.20 kg live-weight gain/day on diets 1, 2, 3, 4, 5 and 6 respectively. The cost of feed were 0.16, 0.15, 0.15, 0.13, 0.12 and GH¢0.10 per kg of feed for diets 1, 2, 3, 4, 5, and 6 respectively. The corresponding economy of gain (EG) were 0.58, 0.74, 0.53, 0.49, 0.72 and GH¢0.49. The highest inclusion rate was 30% for the pulp and 20% for the leaves. The pigs were weighed weekly over a five week period. Whereas the ADG of the pigs in this study was best on diet 3 (25% pulp), the EG was best on the diets 4 (30% pulp) and 6 (20% cassava leaves).*

ORIGINAL ARTICLE

Key words: *Ensiled Cassava Pulp, Dried Cassava Leaves, Large White Grower Pig, Average Daily Gain, Economic of Gain*

INTRODUCTION

The Ayensu Starch Company Factory (ASCo) at Bawjiase in the Central Region has a capacity to produce 20,000 MT of starch per year. With a cassava to starch ratio of about 4:1 it becomes apparent the quantities of pulp and by-products potentially to be generated by ASCo. Even with current production at below the installed capacity pollution of the environment around the factory is becoming a matter of great concern.

Initial attempts by some pigs farmers in the Central Region near ASCo at feeding the pulp to their animals resulted in casualties and the production of unacceptably fatty carcasses. However cassava and its by-products have been found to be potential replacement for maize as energy sources in pig diets (Fleischer, 1975; Sonaiya et al., 1982; Barnes and Oddoye, 1985; Sonaiya and Omole, 1983; Ogbonna and Oredein, 1998; Phuc and Lindberg, 2000; Phuc et al., 2000 and Rhule et al., 1998). Samples of pulp analysed in the laboratory of Animal Research Institute had average composition of 84.8% moisture, 4.80% ash, 0.38% ether extract, 2.56% crude protein and 3.51% crude fibre.

The high moisture content of the pulp at about 85% predisposes the pulp to very rapid deterioration resulting in reduced shelf-life. The initial step in the study was to evolve methods of preserving the material for it to be evaluated for pigs feeding.

The pulp has a low CP content just as cassava peels and whole cassava. Their substantial inclusion in pig diets would require good but low-priced sources of CP to provide for the requirements of the pigs. There are several oilseed cakes available in Ghana to be used to augment the protein level in the cassava-based diets (Rhule, 1996; Rhule, 1999). Dried cassava leaf has been found to be a good source of CP, minerals and vitamins. The protein of cassava leaf has been found to vary between 17.0 and 40.0% with 0.85 of the CP being true protein (Ravindran, 1993). Cassava leaf has higher content of most essential amino acids, apart from sulphur amino acids, than soyabean meal (Eggum, 1970; Gomez and Valdineso, 1984). Cassava leaves has been found to be a potential replacement for soya bean meal and fish meal in pig diets (Preston 2001). On the other hand there is a dearth of information on the use of pulp for feeding pigs.

The objectives of this study were to evolve a method of preserving the pulp for feeding over a period and determine safe levels of inclusion in pigs diets.

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MATERIAL AND METHODS

Preservation method

Freshly produced pulp was collected from the factory and ensiled at the Frafraha station of the CSIR-ARI. A plastic sheet was used for the process. The material was kept for a period of three months before being fed to the pigs. Sub-sample of the pulp was kept for a period of three months in tightly capped plastic sample bottles. Over the period, a bottle of sample was taken weekly and physically examined for growth of mould and colour changes after its pH had been recorded.

Animals

Twenty-four Large White grower pigs at an average initial live weight of 20 kg were distributed over the six diets. Each treatment was replicated four times with a pig per pen in a completely randomized design.

Treatments

Six diets were formulated incorporating the ensiled pulp and other cassava by-products. The six diets were made to be as similar as possible in the crude protein content. The composition of the diets is shown in Table 1. With the exception of the pulp, the respective ingredients of the various diets were mixed in bulk. The calculated dry equivalents of the pulp were weighed in the morning and mixed with the previously compounded diets before feeding.

The pigs were restricted-fed daily a ration equivalent to 5% of the total group-weight. Water was provided *ad libitum.* The pigs were individually weighed weekly. The weekly group feed allowances were adjusted after the weekly weighing and calculated on the total group live weight. The pigs were fed the respective diets over a five-week period.

Table 1 - Composition of Cassava-Pulp Diets fed to Grower Pigs (%)

Ingredient	Dietary treatments					
	1	2	3	4	5	6
Maize	33.30	-	-	-	-	-
Wheat bran	30.0	-	-	-	-	-
Cassava pulp	-	15.00	25.00	30.00	20.00	20.00
Whole cassava	-	20.30	12.30	7.30	9.30	5.30
Cassava peels	-	17.00	15.00	10.00	20.60	14.60
Cassava leaves	-	5.00	5.00	5.00	10.00	20.00
Palm kernel cake	30.00	30.00	30.00	30.00	30.00	30.00
Fishmeal	1.00	3.00	3.00	3.00	3.00	3.00
Soya bean meal	4.00	8.00	8.00	8.00	5.40	5.40
Oyster shell	1.00	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50	0.50
Premix*	0.20	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00	100.00
Determined composition						
Moisture	10.97	44.32	61.30	63.62	50.75	48.64
Dry matter	89.05	55.68	38.70	36.38	49.25	51.36
Crude Protein	16.89	14.19	13.45	15.37	13.82	14.27
Ether Extract	10.34	5.46	4.70	9.21	6.94	6.06
Ash	4.80	8.89	5.81	8.59	8.59	7.73
Crude Fibre	9.20	18.03	18.64	23.37	20.69	21.96

*Composition of vitamin/mineral premix per kg: Vitamin E, 25mg; Vitamin A, 6250 IU; Vitamin D3, 1250 IU; Vitamin K3, 25mg; Vitamin B1, 25mg; Vitamin B2, 60mg; Vitamin B6, 40mg; Vitamin B12, 2mg; Elemental calcium, 25mg; Elemental phosphorus, 9mg; Elemental magnesium, 300mg; Iron, 400mg; Selenium 1.0mg, Iodine 20mg, Copper 60mg, Magnesium 100mg, cobalt 10mg, Zink, 150mg; Sodium Chloride, 1.5mg; Choline Chloride, 500mg; Live Lactobaccillus spore, 0.2 million cfu; Niacin, 40mg; Folic Acid, 10mg; d-Biotin, 5mcg.

Statistical analysis

Data was analysed statistically using analysis of variance (ANOVA) technique and SPSS version 16.0 (Steel et al., 1997).

RESULTS AND DISCUSSION

The analyzed composition of the diets is shown in Table 1. The diets containing the pulp had very high moisture levels compared to the control diet, being highest in diet 4. All the test D2 to D6 had similar CP levels and lower than the control (D1). The determined CP levels of the pulp diets could be considered low compared to D1 (NRC, 1998) with the ether extract (EE) of the control (D1) also being higher. Increasing levels of the pulp in the diets resulted in increasing level of the crude fibre in the diets and much higher than the value of 6.0% for pigs. The lower EE values of the diets with pulp would lead to lower energy values compared to the control. The performance of grower pig is shown in Table 2.

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Table 1 - The performance of grower pig fed cassava pulp based diets

Parameters	Dietary Treatment						
	1	2	3	4	5	6	SEM
Initial wt (kg)	20.00	20.50	20.50	21.25	21.00	20.50	0.76
Final wt (kg)	27.50	25.88	28.38	28.88	25.25	26.00	0.99
ADG kg/day	0.27a	0.19ab	0.28a	0.27a	0.15b	0.20ab	0.01
FCR kg feed/kg.l.wt gain	3.72	4.94	3.56	3.75	6.43	4.87	-
Unit cost/kg feed Gh₵	0.16	0.15	0.15	0.13	0.12	0.10	-
Economy of gain (Gh₵ kg l.wt gain)	0.58	0.74	0.53	0.49	0.72	0.49	-

Means in a column with similar or no superscript are not significantly different at P>0.05); SEM: standard error of means

Although there were no significant (P>0.05) differences in the final live-weights of the pigs on the diets, the ADGs of the pigs were found to be significantly (P<0.05) different being 0.27, 0.19, 0.28, 0.27, 0.15 and 0.20 kg/day on D1, D2, D3, D4, D5 and D6 respectively. The ADG of the pigs on D1, D3 and D4 were similar and significantly (P<0.05) higher than those pigs on D2 and D6, which were also similar. The pigs on D5 had the lowest ADG. Both D1 and D4 had the recommended CP values (NRC, 1998), hence the ADG observed. Diets 3 and 4 had the high inclusion levels of the pulp leading to higher CF values of 18.4% in D3 and 23.37% in D4 compared to the value of 9.2% in D1. The results indicated that the composition of CF in the pulp could be more important than only the level. Such observations had been made in previous studies (Sarwat et al., 1988; Eustace and Dorothy, 2001). There could also be a protein sparring influence from the energy of the pulp with the resultant ADG as observed, indicating optimum use of the protein for growth. The ADGs of the pigs indicated that 30% pulp and 5% dried cassava leaf would be the optimum for the grower pig. The ADGs on D3 and D4 being higher than D5 and D6 despite the higher CF could be attributed to the higher levels of the dried cassava leaf in the later diets. Cassava leaf contains saponins and tannins which are known to adversely affect the digestibility and absorption and utilization of the feed (Gohl, 1982; Bressani, 1993). The ADGs of 0.19 kg/d on D2 (14.19% CP) and 0.20 kg/d on D6 (14.27% CP) were similar. The combination of high levels of cassava peels and cassava leaf in D5 coupled with the low CP and high CF could have contributed to the observed ADG of the pigs on the diet. The ADG of the pigs on D1, D3 and D4 were, however ,considered lower than values obtained on similar studies (Tewe and Oke, 1983; Rhule, 1996; Rhule, 1998).

The FCR of the diets by the pigs are shown in Table 2. The values on D1, D3, and D4 were similar and higher than D2 and D6, which in turn were similar. Diet 5 had the lowest FCR. The highest FCR was obtained on D3. The FCR obtained on D3 was higher than values obtained on other studies (Rhule, 1996; Rhule, 2001).

There was a progressive decrease in the unit cost of the feed with increasing levels of both the cassava pulp and dried cassava leafs in the diets (Table 2), with as much as 20% reduction in the unit price. These were occasioned by the drastic reduction in the levels of both fishmeal and soyabean and the complete elimination of the expensive energy source, maize in the diet.

The economies of gain (EG) of the pigs on the diets are shown on Table 2. Diets 4 and 6 had the best and similar EG. Diet 4 had the highest inclusion level of 30% pulp while D6 had the highest inclusion levels of 20% cassava leaves.

CONCLUSION

The study indicated that ensiled cassava pulp, dried cassava leafs could completely replace maize in the diets of grower pigs. Whereas pigs on D3 had best ADG and FCR, EG was best on D4 and D6.

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