

FEEDLOT PERFORMANCE AND CARCASS TRAITS OF YANKASA RAMS. 2 — EFFECT OF PARTIAL REPLACEMENT OF MAIZE WITH BREWERS' DRIED GRAINS OR PALM KERNEL MEAL.

A.S. KWATU,⁺ N.N. UMUNNA and C.N. CHINEME⁺⁺

Department of Animal Science,
Faculty of Agriculture,
Ahmadu Bello University, P.M.B., 1044,
Zaria, Nigeria.

SUMMARY

Thirty-five Yankasa rams about 1½ years old and of average weight 27kg were randomly assigned to five experimental diets which were (1) a control with 60% concentrate, diets 2 and 3 and 4 and 5 had the corn replaced by 20% and 40% brewers' dried grain (BDG) and palm kernel meal (PKM) respectively. All animals were individually fed the diets for the 70 days of the study. Average daily gain (ADG) was significantly ($P = 0.05$) depressed only at the 40% BDG level when compared with that of the control. Dressing percentage and percentage yield of wholesale cuts were not affected by the treatments. Nitrogen digestibility was significantly ($P = 0.05$) depressed at the 40% BDG level. Based on the total performance and cost considerations, it was economical to use 20% BDG and up to 40% PKM in ram fattening diets.

+ Ministry of Natural Resources, Minna, Niger State, Nigeria.

++ Department of Pathology and Microbiology, Faculty of Veterinary Medicine.

INTRODUCTION

In Nigeria, as well as in many other developing countries, maize and/or guineacorn are conventional energy sources used for fattening purposes. These two ingredients are expensive and scarce and their use is questionable since they are a staple food of the population. Since in intensive systems feed cost constitutes a major portion of total production cost, the cost of ration components (especially major components such as energy and protein sources) may become important determinants of the profitability of such system (Nik-Khak and Assadi-Moghaddan, 1975). It is therefore necessary to seek other alternative energy sources. Both brewers' dried grains (BDG) and palm kernel meal (PKM) fall into this class.

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Brewers' dried grain are the dried residue of the wet spent grain (Brewers' grain). Total production in Nigeria was recently estimated at 47,000 metric tonnes (Adebowale and Ademosun, 1981) but since then many more and larger breweries have come into production, increasing the total quantity available for livestock feed. Its contents of both gross energy and protein were reported to be higher than those of maize (21.03KJ/g vs 17.66KJ/g, 23.62% vs 10.15%) respectively (Adebowale and Ademosun, *ibid*). The product had been tested in swine (Babatunde *et al.*, 1975a) and poultry (Ademosun, 1973) diets with some success. With cattle, Preston *et al.*, (1973) obtained a net energy value comparable with maize.

PKM is the main by-product of the palm oil industry and Nigeria is a major producer. On account of the poor feed efficiency, reduced growth rate and feed intake it effected in pigs, Babatunde *et al.* (1975b) recommended the restricted use of PKM in pig diets. Umunna *et al.* (1980) also evaluated both BDG and PKM as sources of protein for growing ruminants and obtained good results.

Since the gritty nature of PKM, the high crude fiber and unpalatable attributes of both by-products restrict their use in monogastric feeding (Oyenuga, 1968), and whereas both are affordable alternatives to maize and guineacorn, it was desirable to evaluate them as partial replacements for maize for fattening rams.

MATERIALS AND METHOD

Thirty five Yankasa rams, about 1½ years old were used in this trial. Based on initial weights they were assigned at random to five experimental diets formulated to differ in the source and proportions of energy concentrates. The five experimental diets were (1) a control diet with 60% concentrate, diets 2 and 3 and 4 and 5 had

the corn replaced by 20% and 40% BDG and PKM respectively. *Chloris gayanus* hay (approx. 6% CP) was fed at 40% of the dry matter intake as the roughage. Molasses was added to all the diets at the rate of 10% to improve the acceptability of the diets. A commercial mineral lick was provided *ad libitum* since no salt was added to the diets. The detailed composition of the diets is shown in Table 1.

TABLE 1
Percentage Composition of the Diets.

	Treatments				
	Control	BDG		PKM	
		20%	40%	20%	40%
Bonemeal	1.00	0.50	0.50	0.50	0.50
Trace minerals	0.15	0.15	0.15	0.15	0.15
Vitamin A ⁺	+	+	+	+	+
Sugarcane molasses	10.00	10.00	10.00	10.00	10.00
Cottonseed cake	14.85	9.18	3.10	8.78	2.50
Maize	34.00	20.17	6.25	20.57	6.85
Palm kernel meal	—	—	—	20.00	40.00
Brewers' dried grains	—	20.00	40.00	—	—
Hay	40.00	40.00	40.00	40.00	40.00
Analyzed gross energy (MJ/kg DM)	17.12	17.18	18.79	17.36	17.82
Analyzed crude protein	15.63	15.38	15.50	15.86	16.25

⁺ Was added to provide 10,000 iu/head/day

Prior to the commencement of the study, the animals were fed the experimental diets for two weeks so that they would get accustomed to the feeds. They were individually penned and fed throughout the 70-day experimental period. Both feed and water were provided *ad libitum*. The rams were weighed bi-weekly and these were taken after fasting (without feed and water) for about 15hr. The initial and final weights were the average of weights taken on two consecutive days at the beginning and end of the study respectively.

At the end of the study, five rams were selected from each treatment for carcass analysis. The rams were fasted overnight and weighed before slaughter (Adu and

Brinckman, 1981). They were then dressed and chilled (5°) overnight. Each chilled carcass was then re-weighed and then split into two along the spinal column before jointing into wholesale (prime) cuts which were also weighed. The carcass dressing percentage was based on the hot carcass weight while the percentage yield of the various outs was based on the chilled carcass weight.

Digestion trial:

Two digestion trials were undertaken using 10 and 15 rams respectively. The rams were fitted with faecal collection harnesses and then placed in metabolism cages. They were fed to appetite with the assigned diets once daily throughout the 15-day preliminary and 10-day total

faecal collection periods.

Analysis of feeds, faeces and orts for the relevant proximate components were according to A.O.A.C. (1970). The data were analyzed statistically and treatment means compared by Duncan's Multiple Range test (Steel and Torrie, 1960).

RESULTS

The results of the feeding and digestibility trials are shown in Table 2.

The ADG of rams on the 40% corn replacement with BDG (treatment 3) was significantly ($P < 0.05$) lower than the daily liveweight gains of rams on the both the 20% and 40% (treatments 4 and 5) corn replacements with PKM. The BDG of rams on the control diet did not significantly ($P < 0.05$) differ from those of rams on any of the BDG diets. Significant difference did not occur within the two levels of replacements with PKM.

TABLE 2

Results of the Fattening and Digestibility studies

	Treatments					SE
	Control	BDG		PKM		
		20%	40%	20%	40%	
Number of animals	7	7	7	7	7	
Mean initial weight (kg)	26.9	27.1	27.1	27.0	27.1	± 0.04
Mean final weight (kg)	32.5	32.2	30.4	33.5	33.9	± 0.55
Mean dail gain (g/day)	80.2 ^{ab}	72.4 ^{ab}	48.0 ^a	94.0 ^b	83.4 ^b	± 7.79
Mean daily DM intake (g/day)	1079.5 ^{bc}	1088.1 ^c	1091.8 ^c	1067.2 ^{ab}	1075.9 ^a	± 6.70
Feed: gain	13.5 ^a	14.9 ^a	23.2 ^b	11.4 ^a	12.6 ^a	± 3.2
Dry matter digestibility (%)	72.5	73.1	67.7	72.7	71.9	± 1.07
Nitrogen digestibility	74.8 ^b	72.4 ^b	65.4 ^a	69.9 ^{ab}	69.9 ^{ab}	± 1.72

^{a,b,c}Mean in the same row bearing different superscripts are significantly different ($P < 0.05$).

Dry matter intake was significantly affected by the treatments. It was significantly ($P < 0.05$) lower on the 40% PKM treatment than on the control and the BDG treatments. Intake of rams on the PKM diets were also significantly ($P < 0.01$) lower than for the rams on the BDG diets; but there was no significant difference in intake within levels of replacement.

Feed efficiency was similar across all treatments except for the 40% BDG treatment which was lower ($P < 0.05$). Rams on the PKM diets tended to utilize feed more efficiently than those on the BDG

diets (12 vs 14.2), and feed utilization was significantly ($P < 0.05$) better on the 20% than on the 40% BDG diets.

Dry matter digestibility was not significantly affected by the treatments, but nitrogen digestibility was. The 40% BDG treatment was significantly ($P < 0.05$) lower than the control or the 20% BDG treatments.

The data on the carcass traits are shown in Table 3. None of the traits examined (dressing percentage, percent yield of prime cuts, kidney and mesenteric fat) was affected by the treatments.

TABLE 3
Carcass traits

	Treatments					SE
	Control	20%	40%	20%	40%	
Mean dressing %	44.7	43.5	43.1	43.1	42.6	± 0.34
Mean % yield of whole sale cuts ⁺	96.1	96.9	96.9	96.5	97.3	± 0.48
Mean kidney fat (kg)	0.50	0.40	0.34	0.29	0.33	± 0.08
Mean mesenteric fat (kg)	0.67	0.67	0.57	0.55	0.57	± 0.03

⁺ Included the long leg.

DISCUSSION

Based on the performance data (ADG, feed intake and feed conversion) and carcass results, BDG at 20% and PKM at both 20 and 40% inclusion supported comparable growth as the maize based control diet. The inclusion of PKM at 20 and 40% levels yielded better liveweight gains than BDG and the control diets. Therefore PKM offers a favourable alternative to maize which is a very expensive food ingredient and is the staple food of the population. Umunna *et al.* (1980) reported favourable results with both BDG and PKM. These workers showed both products to be good sources of protein for growing calves and lambs, but PKM consistently gave better results in terms of ADG and food conversion.

Several reports have shown that the limiting factors in the use of BDG include its unpalatability (which results in low intake), chaffiness, and high crude fiber content, all of which result in poor utilization (Oyenuga, 1968; Ademosun, 1973, Babatunde *et al.*, 1975a; Adebowale and Ademosun, 1981; Umunna *et al.*, 1980). The present report shows that 20% BDG could be incorporated into fattening diets but that levels as high as 40% would

detrimentally affect performance. This is similar to the finding of Adebowale and Ademosun (1981). Since in this study the intake of the 40% BDG diet was the highest and given the comparable energy value of maize and BDG (Preston *et al.*, 1973) the poor performance of rams on that diet could not be blamed on poor intake nor on energy insufficiency. Rather poor digestibility could be responsible and this had been shown to be due to the high crude fiber content of BDG (Babatunde *et al.*, 1975a). Similarly the poor nitrogen digestibility could be attributable to this factor too.

One would have expected the BDG diets to give better results on account of the protein being fairly insoluble and of low degradability (Wohlt *et al.*, 1973; Crawford *et al.*, 1978, Adama, 1982) in which case it would get to the lower tract unaltered. The problem could be that the quality of this extra protein would be poor on account of its poor amino acid balance.

In general, none of the carcass traits was significantly affected by the treatments. It is worthy of note that both the kidney and mesenteric fat values decreased with the inclusion of BDG and PKM.

TABLE 4
Relative cost of Production

	<i>Treatments</i>				
	<i>Control</i>	BDG		PKM	
		<i>20%</i>	<i>40%</i>	<i>20%</i>	<i>40%</i>
Total feed consumed per animal (kg)	75.56	76.16	76.43	74.70	73.70
Total wt gained per animal (kg) ..	5.61	5.07	3.30	6.58	5.86
Feed cost per ton dry matter (N) ..	207.7	165.1	121.1	165.5	121.8
Cost of feed consumed per ram (g)	15.70	12.70	9.30	12.40	9.00

Relative cost calculations which are shown in Table 4 does not include labour cost. Since the experimental conditions demanded high level of labour than can be justified under farm conditions this factor was omitted. An important advantage in the use of both BDG and PKM was the reduction in the cost of feed per metric tonne they effected. While it cost N207.7 per tonne (DM) to produce the control diet, it cost N165.1, N121.2, N165.5 and N121.8 to produce the 20 and 40% BDG and PKM diets respectively. Based on the gains and the feed cost reductions effected by both BDG and PKM, both products could be economically incorporated in sheep fattening diets.

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