THE INFLUENCE OF SORGHUM DISTILLERS' WASTE ON THE PERFORMANCE OF PIGS

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ABSTRACT

The effect of sorghum distillers' waste (SDW) inclusion in the diets of weaner and growing pigs were investigated in two feeding trials that lasted for 14 weeks with two weeks of adaptation period. In experiment one, 24 weaner pigs of average liveweight of 8.90kg were fed graded levels of SDW included at the rate of 0, 10, 15 and 20% in their rations for a period of six weeks. The pigs were divided into 4 groups of 2 replicates on the basis of weight. The average daily feed intake (ADFI) and feed conversion ratio (FCR) increased significantly ($P<0.05$) as the level of SDW inccusion increased. The pigs were redistributed for the second trial. In the second trial SDW was fed at 0, 10, 20 and 30% inclusion in the ration of the pigs in the growing stage. The average daily feed intake, the average final weight attained, the average daily gain and the feed conversion ratio were significantly ($P<0.05$) affected by the dietary levels of SDW. The carcass parameters measured, namely, carcass length, carcass weight, and backfat thickness decreased significantly ($P<0.05$) as the level of SDW increased. Other parameters measured such as loin-eye area, percent lean cut and fat cut were not affected. The use of SDW above 20% inclusion level did not support good growth performance in pigs.

Keywords: Sorghum distilers' waste, weaner pigs, growing pigs.

INTRODUCTION

The high cost of cereals in animal feeds has motivated livestock nutritionists with the search for alternative ingredients as sources of energy. Agro-inductrial by-products such as wheat offal, brewers grain, cassava flour, palm kernel meal, cassava peels, garri sievate, maize duzza, rice bran are some alternatives that have been extensively studied (Babatunde *et al* 1975; Collins and Temalilwa 1981; Tegbe, 1985; Dairo, 1988; Fashina-Bombata and Tewe, 1994). Sorghum distillers' waste is a residue obtained during the brewing of "burukutu" a local beer native to people of the Middle Belt and Northern Nigeria. The sorghum distillers' waste is similar to brewers dried grain (BDG) in appearance and processing. The use of BDG up to 15% in pigs diet was reported by Babatunde *et al* (1975). However, Tegbe (1985) linked the tolerant level of BDG by pigs to he level of crude protein in the diet. He reported that young pigs can tolerate up to 10% BDG in a 20% and 18% crude protein diet and 20% in a 15% crude protein diet. This study was conducted to investigate sorghum distillers' waste in young pigs ration at 0, 10, 15 and 20% and 0. 10, 20 and 30% in growing pigs.

MATERIALS AND METHODS

Preparation of experimental diets

The sorghum distillers waste was collected wet from the local brewers of "burukutu" beer at the Ikeja Military Cantonment in Lagos State of Nigeria. The colletions which were in batches were sundried to a moisture content of 11.60% and later pooled for inclusion in the experimental diets. The proximate analysis of the SDW

was determined (Table 1)..The SDW was then included in the starter diet at 0, 10, 15 and 20% and 0, 10, 20 and 30% for the growers to replace maize and groundnut cake in the ration (Table2).

TABLE 1 PROXIMATE COMPOSITION OF SORGHUM DISTILLERS' WASTE (% DM)

Crude protein	24. 67
Crude fibre	12. 64
Fat	4. 50
Dry matter	83.0
Gross energy kcal/kg	4890.7

Experimental animals

Twenty-four weaner pigs of large white breed of equal sexes weighing averagely 8.90kg were randomly alloted to 4 groups of 2 replicates at the beginning of the experiment. The sorghum distillers' waste included at the graded levels of 0, 10, 15 and 20% constitute the treatments on which were fed each of the 4 groups and 2 replicates. The diets were isonitrogenous containing 18% crude protein for starter phase (experiment one) and 16% CP for growing phase (experiment 2). The pigs were fed weighed quantity of feed twice daily. The remnant were collected, air-dried and weighed to obtain the actual intake. The pigs were allowed access to water *ad libitum* throughout the experiment. During the starter phase, the feed intake, body weight and feed conversion ratio were the paremeters measured, while in the growing phase, feed intake, body weight, feed conversion ratio and carcass' characteristics such as carcass weight, carcass length, percent lean cut and fat, backfat thickness and the loin-eye area were also measured. The data collected for the starter and growing phases were analysed separately using ANOVA while the least significant difference was used to estimate the differences between treatment

TABLE 2 COMPOSITION OF EXPERIMENTAL DIETS

	STARER PHASE Inclusion levels of SDW (%)				GROWING PHASE Inclusion levels of SDW (%)			
INGREDIENTS	0	10	15	20	0	10	20	30
Maize	53.0	47.76	45.11	42.49	46.26	41.01	35.76	30.51
Maize offal	23.0	23.0	23.0	23.0	33.0	33.0	33.0	
Groundunt Cake	19	14.14	11.89	9.51	18.24	13.49	8.74	3.99
Sorghum distillers waste	-	10.0	15.0	20.0	-	10	20	30
Blood meal	3.0	3.0	3.0	3.0	-	-	-	-
Bone meal	1.5	1.5	1.5	1.5	2	2	2	2
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chemical Analysis								
M. E. Kcal/kg (calculated)	2856.1	2568.1	2439.1	2300.1	2895.1	2607	2319	2031
Crude protein (%)	18	17.96	18.01	18.3	15.78	15.98	15.98	16.01
Crude fibre (%)	4.99	5.10	6.10	6.35	6.0	6.53	8.50	9.55
Lysine (%)	0.63	0.64	0.65	0.65	0.44	0.45	0.46	0.48
Methionine (%)	0.23	0.23	0.23	0.23	0.18	0.18	0.18	0.21

***Premix contain per kg diet;**

vit. A 3.6x106; Vit.D_3 4x107; Vit.E6g; Vit. k 0.8g Vit.B_2 1.20g; Nicotine 6g; Calcium D Panthothimate 3.20g; Vit. B_6 0.80g; Vit. B_{12} 8mg; Folic acid 0.20g; Biotin 0.20g; Choline chloride 40g; Zinc Bacitracin 20g, Mg 10g; Fe 50g; Zn 58.50g; Cu 10g; I_2 31g; Co 35g; Se $4x10^{-2}$g.

means (Little and Hills, 1978).

RESULTS AND DISCUSSION

Starter Phase

The chemical analysis of SDW used in this study is shown in Table 1. The crude protein and crude fibre were 24.67% and 12.64% respectively. The values obtained by Dairo (1988) were 14.98% CP and 16.90% CF. This indicate inconsistency in the nutrient composition of the SDW and this might be as a result of the processing method employed by the different local brewers as the days or hours allowed for fermentation and steeping may differ slightly among brewers. The inclusion rate of SDW in the diet expectedly increased the fibre in the ration (Table 2). The performance of the weaner pigs fed SDW at 0, 10, 15 and 20% is presented in Table 3. The average daily feed intake (ADFI) was influenced significantly ($P<0.05$) by the SDW inclusion. Weaner pigs on 15% SDW had the highest ADFI of 0.99kg while 0% SDW recorded the lowest intake. Although the average daily gain (ADG) values were not significantly affected during the starter phase. The feed conversion ratio (FCR) mean values were significantly($P<0.05$) influenced by the dietary levels of SDW but followed no particluar trend ($P<0.05$) influenced by the dietary levels of SDW but followed no particular trend. Weaner pigs on the control diet i.e 0% SDW, had the best FCR of 3.16. The dietary levels of SDW on the pigs during the starter phase did not show any effect ($P>0.05$) on the body weight. Frank *et al* (1983) and Tegbe (1985) in their work noted the depressed feed intake of the young pigs correspondingly with increased fibre level, which is contrary to the observation during the starter phase of this experiment. However, the result agreed with the findings of Linderman *et al* (1986) who fed peanut hulls to growing-finishing pigs. Dietary fibre effect on pig intake has been found to be somewhat dependent on the source of fibre (Baird *et al*, 1975; Linderman *et al* 1986). Li *et al* (1994) did not observe any effect of fibre on intake when a 93% cellulose material was fed to pigs. It is known that the method of processing have profound effect on the utilizatin of fibre. Milling or wet processing to some extent expose fibre to attack by micro-organsim (Crampton and Harris, 1968) therefore could be digestible in nature. The wet processing that the SDW was subjected to may possibly have had an effect on its intake. The fibre of the experimntal diet increased correspondingly as the SDW inclusion level increased which resulted n bulkiness of the feed and low available energy. This led to a concommittant increase in the pigs

TABLE 3. THE INFLUENCE OF SORGHUM DISTILLERS WASTE ON THE PERFORMANCE OF WEANER PIGS

Parameters	DIETARY LEVELS OF SDW (%)				S.E.M.
	0	10	15	20	
Average Initial wt. (kg)	8.73	9.03	9.26	8.63	0.25
Average Final wt. (kg)	19.85	20.93	19.95	21.69	0.30
Average daily gain (kg)	0.25	0.27	0.25	0.25	0.02
Average daily feed intake (kg)	0.90^{b}	0.92^{b}	0.99^{a}	0.98^{a}	0.012
Feed conversion ratio	3.16^{b}	3.36^{b}	3.95^{a}	3.33^{b}	0.045

Mean values with different superscripts on the same row differ significantly ($P<0.05$).

consumption to meet their caloric need. The ADG values were not affected, apparently due to the bulkiness of the feed.

Growing-Finishing Phase

At the growing-finishing phase, the ADFI, ADG, final body weight and FCR were all significantly (P<0.05) affected (Table 4). which also contained blood meal. The increased fibre in the diet and the low protein could have been responsible for the lower weight gain as the SDW inclusion increased (Tegbe 1985; Sauer *et al*, 1991).

Carcass Characteristics

The carcass characteristics is presented in

TABLE 4. THE INFLUENCE OF SORGHUM DISTILLERS' WASTE ON THE PERFORMANCE OF GROWING PIGS

Parameters	DIETARY LEVELS OF SDW (%) 0	10	20	30	S.E.M
Average initial wt. (kg)	20.77	22.03	20.01	20.99	0.30
Average final wt. (kg)	40.15[a]	40.64[a]	39.96[c]	37.71[b]	0.25
Average daily gain (kg)	0.51[a]	0.48[a]	0.43[b]	0.38[c]	0.01
Average daily feed intake (kg)	1.47[a]	1.47[a]	1.43[b]	1.44[b]	0.004
Feed conversion ratio	2.82[b]	3.10[c]	3.96[a]	4.81[a]	0.058

Mean values with different superscripts on the same row differ significantly (P<0.05).

TABLE 5 THE INFLUENCE OF SORGHUM DISTILLERS WASTE ON THE CARCASS CHARACTERISTICS OF GROWING PIGS

parameters	DIETARY LEVELS OF SDW (%) 0	10	20	30	S.E.M.
Carcass wt. (kg)	27.27[a]	27.77[a]	26.87[b]	25.35[c]	0.28
Carcass length (cm)	67.32[a]	67.51[a]	66.00[b]	65.77[b]	0.12
Loin-Eye Area (cm2)	29.35	25.60	25.05	26.26	1.92
Lean Cut (%)	70.90	73.74	74.19	73.26	0.82
Fat Cut (%)	29.15	26.27	25.12	26.74	0.82
Back fat thickness (cm)	3.15[a]	2.84[b]	2.53[c]	2.58[c]	0.032

Mean values with different superscripts on the row differ significantly (P<0.05).

Pigs on 0% and 10% SDW had the highest values of ADFI (1.47kg), final body weight (40.64kg) while those on 0% SDW had the best ADG (0.51kg) and FCR, 2.82. The observed decrease in ADFI might be due to the feeding of SDW now at higher inclusion levels of 10, 20 and 30%. Fibre levels of 7.64% and 8.56% were recorded for 20% and 30% SDW inclusion. The groundnut cake (GNC) used in the ratio formulation of the second feeding trial decreased from 18.24% for 0% SDW to 3.99% GNC for 30% SDW when compared to experiment 1 of 19.0 to 9. 51 GNC

Table 5. The carcass weight and lenght were depressed significantly (P<0.05) as the level of inclusion of SDW increased. The highest carcass weight and length of 27.77kg and 67.51cm respectively were recorded by growers fed 10% SDW while those on 30% had the lowest 25.35kg and 65.77cm. The backfat thickness was significant (P<0.05) with the highest value; 3.15cm recorded by pigs fed 0% SDW and the lowest 2.53cm by 20% SDW. The lean cut, fat cut and loin-eye area (LEA) were not significantly (P>0.05) affected. Pigs fed 20% SDW had highest value of lean cut

and the highest fat cut was also recorded on the control diet. Sorghum distillers' waste did not support fat deposition when fed to pigs.

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