

AJGA 2009109/5404

## Effect of substitution of maize with brewer's dried grain in pig starter diet on the performance of weaner pig

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(Received September 18, 2009)

**ABSTRACT:** Twenty four (24) weaner pigs and aged 8 weeks made up of mixed sexes with initial body weight between 8.0kg and 8.2kg were used to investigate the effect of substituting maize with Brewer's Dried Grain on their feed intake and growth performance. The weaner pigs were randomly allotted to four treatment groups of six pigs per treatment. The treatments were replicated three times with each replicate having two (2) weaner pigs. The weaner pigs were fed diets containing 0%, 10%, 20% and 30% Brewer's Dried Grain of treatment D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub> respectively. The chemical composition of the test ingredient was determined prior to its use in the diets. Data were collected on final body weight, average daily weight gain and feed conversion ratio. There were no significant ( $P>0.05$ ) difference in the above listed parameters. Weaner pigs fed diet 1, 2 and 3 had the highest daily feed intake while weaner pigs fed diet 4 is statistically similar but slightly less than 1, 2 and 3. It is thus concluded that the results suggest that 20% substitution of maize with Brewer's Dried Grain produced no negative effect on the production performance of weaner pigs.

## Introduction

Nigerian pig industry is facing tremendous set back and on the verge of collapse arising from high cost of pig feed, which accounts for 70-80% of the total cost of pig production in Nigeria and other developing countries (Olomu, and Oboh, 1995). The escalating market price of cereal grains especially maize which forms the bulk of pig diet, is highly competitive and not readily available because of the high demand by human populations as food and its industrial use.

Agro-by-products are noted for high fibre content which is a major problem for their efficient use in monogastric animals nutrition. Monogastric animals such as pigs and poultry have low capability of handling cellulose, hemicellulose and lignin which form the major components of agro-industrial products. However, efforts are being made to hydrolyze these structural carbohydrates and protein so as to make their active ingredients available in monogastric animal nutrition's. This has been through exogenous enzyme supplementation, addition of fat, milling and sieving, fermentation and addition of probiotics in monogastric animal diets containing high level of fibre. Brewer's spent grain is the by-product of brewing industry, the residue containing rice grits, corn grits, corn starch, wheat starch, sorghum grits, oat and barley grits as well as husks produced as by-product in the production of beer (Japanese Standard feed ingredients 1987). Brewers spent grain was found to be a satisfactory source of energy in finishing pigs and poultry rations (Yeong, 1986; Formunyam and Tegbe 1985; Truinin, 2001; Madubuike, 1988; Deltoro – Lopez, 1981).

Brewer's spent grain has been found to contain several essential nutrients, which are required in feed formulation for pigs. Couch (1978) reported a proximate constituent of over 20% crude protein, about 6% ether extract, over 15% crude fibre and 4% Ash. The objective of this study is to investigate

the effect of substituting maize with brewer's dried grain in pig starter diet on the performance of weaner pigs.

## **Materials and Methods**

### **Study Site**

The experiment was conducted at the piggery unit of the Delta State Polytechnic, Ozoro. It is located within the Polytechnic which is on latitude  $5^{\circ} 30'$  and  $5^{\circ} 45'N$  of the equator and longitude  $5^{\circ} 40'$  and  $6^{\circ}E$  of the Greenwich Meridian. The area has an annual rainfall of between 2500-3000mm and mean temperature at the unit was  $27.4^{\circ}C$  with the range of  $20^{\circ}C$  to  $30^{\circ}C$  all through the period of the study.

### **Sources of experiment ingredients**

The brewer's spent grain used was sourced from the consolidated Brewer's Plc the producer of "33" Export Lager Beer, Awomama. The brewer's spent grain was sun dried and passed through a hammer mill to ensure size suitable for incorporation into weaner pig diet. It analysis according to AOAC, (1998). This was used to replace maize at levels 0,10,20 and 30% and D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub> respectively maize and other feed stuffs were purchased from Owerri main market and Agro-Allied enterprise.

### **Housing and Management of Animals**

Twenty four (24) weaner pigs to both sexes of large white breed of eight (8) weeks of age were used for this experiment. The pigs were reared in intensive system of management. A total of 6 pens, with an allowance of one feeder and one drinker per pen was used. The floor of the house was made with rough concrete. Each group was placed in a pen with an area of  $9.4m^2$  ( $2.5m \times 3.75m$ ). The average weight per pig at the start of the experiment was 8.1kg. One week pre-experimental feeding period was allowed to enable experimental animals adjust to the experimental diets. The animals were marked for individual identification with permanent marker. This operations was done every five days. Good hygiene environment and other management practices were maintained the experiment lasted for twenty eight (28) days.

### **Experimental Diets**

Four experimental diets were formulated for weaner diet. The percentage composition of the diet is shown in Table 1. Diet 1 served as control and did not contain Brewer's Dried Grain (BDG) while the other three diets were formulated such that in Diet 2,10,% of the maize was replaced with BDG, I Diet 3, 20% of the maize was replaced with BDG, in Diet 4, 30% of the maize was replaced with BDG.

### **Experimental Design**

At the commencement of the experiment, the pigs were weighed and randomly allotted to 6 similar groups (on equal weight basis) of 4 pigs each. two of such pens constituted a replicate feed and water were supplied *ad libitum*. A Completely Randomized Design (CRD) was used for this experiment.

The linear model is as follows:

$$X_{ij} = \mu + T_i + E_{ij}$$

$X_{ij}$  = Value of any observation

$\mu$  = Unknown constant: population mean common to all treatments.

$T_i$  = The  $i$ th treatment effect

$E_{ij}$  = Error term

## **Data Collection and Analysis**

The pigs were weighed with balance scale and feed intake was recorded on weekly basis. Data obtained were subjected to Analysis of Variance (ANOVA) and significant means were separated using Duncan's Multiple Range Test (Steel and Torrie, 1980) at 5% level of significance.

## **Results and Discussion**

The proximate composition of Brewer's dried grain (Table 2) showed that moisture content (8.50%), crude protein (19.68%), crude fibre (17.80%), ether extract (6.80%), Ash (5.00%) and NFE (50.00%) are comparable to those of (Madubuike and Obidimma, 2009). Furthermore, Table 1 showed that as Brewer dried grain increase in the diet, caloric value of the diet decreased. This result also was in agreement with the findings of Madubuike and Obidimma (2009) that weaner pigs adjusted their feed consumption according to energy and crude fibre content of the feed provided. From the results in table 3, it revealed that there was a gradual increase in average daily feed intake of the weaner pigs as the Brewer's dried grain in the ration increased. However, there was a decrease in the feed intake of experiment Diet 4 which had the highest level of Brewer's dried grain inclusion of 30%, followed by Diet 1 (95758g), Diet 2 (79534g) and Diet 3 (85015g) which had the highest feed intake. The drop in feed intake in Diet 4 may be attributed to high crude fibre content, which is in agreement with the report of Kornegay (1973), and Yaakugh and Tegbe (1990), who reported that high Brewer's dried grain levels in weaner pigs diet depresses feed intake due to higher level of fibre.

The average daily weight gain of weaner pigs fed treatment Diet 1 (0%), Diet 2 (10%), Diet 3 (20%) and Diet 4 (30%) are 3770g, 3220g, 3470g and 2873g/day respectively. Diet 1 containing 0% Brewer's dried grain gave the best performance while treatment Diet 4 recorded the least. However, there was no significant difference among the daily weight gain across the treatment diets. The lower weight gain in Diet 4 with 30% inclusion will be due to the high fibre content, which reduces digestibility and utilization of nutrients, contained in the feed. This findings agreed with Deltoro and Fernandez (1982) who reported that depression in body weight of weaner pigs had only been reported when Brewer's dried beyond 20% level. The results on Feed Conversion Ratio (FCR) revealed that diets 1,2,3 and 4 recorded average feed conversion ratio values of 2.54, 2.47, 2.45 and 2.51 respectively. However, there was no significant difference ( $P < 0.05$ ) among feed conversion efficiency of all the animals fed on the four diets.

The overall performance of weaner pigs fed various levels of diets in which Brewers dried grain substituted maize at 10%, and 20% showed that there were no significant difference ( $P < 0.05$ ) in final body weight, average daily weight gain and feed conversion ratio among the treatments. This suggest that Brewer's dried grain can be included in the weaner pigs diet up to 20% without adverse effect on performance, provided that the energy and protein component of the feed was properly balanced.

The marked difference between the prices of maize and BDG must have resulted in the significant in the feed cost per kg diets recorded in this experiment.

## **Conclusion and Recommendations**

From the results of this experiment carried out in this study, it can be concluded that with substitution of maize with 30% BDG, depression in body weight occurred in weaner pigs. Therefore, it is recommended that weaner pigs could be fed up to 20% Brewer's dried grain in the diet without adverse effect on the performance of the pigs. However, if the interest is to cut cost of production, then inclusion of BDG up to 30% can be allowed but for attainment of weight at a starter period up to 20% inclusion of BDG is advisable.

**Table 1:** Percentage Composition of Experimental Diets of Weaner Pigs.

Ingredients	Diets			
	0% (Diet 1)	10% (Diet 2)	20% (Diet 3)	30% (Diet)
Maize	60.55	54.49	48.44	42.38
Brewer's Dried Grain	0.00	6.06	12.11	18.17
Wheat Bran	10.00	10.00	10.00	10.00
Soya Bean Meal	21.00	21.00	21.00	21.00
Fish Meal	5.00	5.00	5.00	5.00
Bone Meal	2.00	2.00	2.00	2.00
Limestone	0.75	0.75	0.75	0.75
Common Salt	0.50	0.50	0.50	0.50
Premix <sup>1</sup>	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00
Calculated composition.				
Crude Protein (%)	20.09	20.80	21.43	22.11
DE (kcal/kg)	3308	3247	3185	3123
Cost Per Feed (₦)	39.90	33.14	35.42	30.05

Supplied per kg diet: Vit A 7500 IU; Vit D 750 Vit K 3mg; Thiamine 2mg; Riboflavin 5mg; Niacin 20mg; Pantothenate 15mg; Vit Bk 22 mcg; Biotin 100mcg; Choline 300mg; magnesium 500mg; Lodine 0.20mg; Zinc 100mg; Iron 90mg; Copper 10mg; Manganese 20mg; Selenium 0.15mg; Antioxidant 0.2mg; Antimould 20mg; Growth Promoter 0.20mg; Carrier 2.2mg; Methionine 0.28% and Lysine 1.00%

**Table 2:** Proximate Composition of Brewer's Dried Grain (BDG).

Composition g/100gdm	Brewer's Dried Grain
Moisture Content (%)	8.50
Crude Protein (%)	19.68
DE (Kcal/kg)	2520
Crude Fibre (%)	17.80
Ether Extract	6.80
Nitrogen Free Extract (NFE)	50.06
Total Ash	5.00
Mineral Composition Calcium	0.18
Phosphorus	0.42
Magnesium	0.08

**Table 3:** Performance of Weaner Pigs on Substituting Maize with Graded Levels of Brewer's Dried Grain (BDG).

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	SEM
Average initial weight (kg)	8.1	8.1	8.2	8.0	1.32
Average final weight (kg)	18.6 <sup>a</sup>	17.1 <sup>a</sup>	18.3 <sup>a</sup>	16.0 <sup>b</sup>	3.02
Average final body weight gain (kg)	10.5 <sup>a</sup>	9.0 <sup>a</sup>	10.1 <sup>a</sup>	8.0 <sup>b</sup>	1.05
Average final daily feed intake (g)	95758	79534 <sup>ab</sup>	85015 <sup>a</sup>	72112 <sup>c</sup>	16.11
Average daily weight gain (g)	3770	3220	2470	2873	12.04
Feed conversion ratio	2.54 <sup>a</sup>	2.47 <sup>a</sup>	2.45 <sup>a</sup>	2.51 <sup>a</sup>	0.06
Feed cost/kg per body weight (₦)	418.95	298.26	357.74	240.40	-

a,b,c means with different super script in the row are significantly difference (P<0.05).

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