

Short Communication

Effect of cassava peel meal on ejaculate characteristics and gonadal/extragenadal sperm reserves in mature cockerels

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Forty cockerels, 24 weeks of age fed varied levels of cassava peel meal were evaluated for ejaculate characteristics, gonadal and extragonadal sperm reserves. The diets were 1 (0%), 2 (10%), 3 (20%) and 4 (30%) cassava peel meal inclusion levels. The average sperm volume recorded for diets 1, 2, 3 and 4 were 0.311 ± 0.021 , 0.313 ± 0.003 , 0.346 ± 0.003 and 0.347 ± 0.220 ml respectively. The mass activity (1-5) were 3.732 ± 0.128 , 3.561 ± 0.141 , 3.738 ± 0.147 and 3.543 ± 0.163 for diets 1, 2, 3 and 4, while the sperm motility averaged 72.93 ± 2.921 , 73.17 ± 3.221 , 76.875 ± 2.967 and 70.320 ± 3.182 for the respective diets. The sperm concentration ($\times 10^9/\text{ml}$) was 0.14 ± 0.01 , 0.15 ± 0.01 , 0.13 ± 0.01 and 0.14 ± 0.01 , while the total sperm/ejaculate ($\times 10^9/\text{ml}$) was 0.14 ± 0.01 , 0.15 ± 0.01 , 0.13 ± 0.01 and 0.14 ± 0.01 , and the total sperm/ejaculate ($\times 10^9/\text{ml}$) included 0.052 ± 0.007 , 0.031 ± 0.005 , 0.045 ± 0.006 and 0.052 ± 0.006 for the various inclusion levels. The gonadal sperm reserves averaged 3.10 ± 0.43 , 2.48 ± 0.39 , 2.77 ± 0.35 , 1.93 ± 0.42 while the epididymal and ductus deferens sperm reserves for diets 1, 2, 3 and 4 were 0.83 ± 0.17 , 1.23 ± 0.22 , 0.88 ± 0.18 , 1.04 ± 0.14 and 1.51 ± 0.23 , 1.24 ± 0.18 , 1.30 ± 0.16 , 1.20 ± 0.24 respectively. Sun-dried cassava peel meal has no adverse effect on ejaculate characteristics as well as the gonadal and extragonadal sperm reserves of Bovans cockerels. Semen samples were collected twice weekly, that is, Tuesdays and Fridays for 5 weeks between 08.00 and 10.30 hours from each cock. One gram of the testicular sample was homogenised in 100 ml of normal saline while 1 g each of ductus deferens and epididymal samples respectively were also homogenised in 10 ml of normal saline. The number of sperm cells counted was multiplied by a factor of 10,000,000 to determine the gonadal and extragonadal sperm reserves.

Key Words: cassava peel meal, ejaculate characteristics, gonadal/extra-gonadal sperm reserves, ockerels

INTRODUCTION

Poultry holds a vital position in bridging the animal supply and demand gap in the developing countries like Nigeria. The poultry industry also has a potential in realizing the protein demand of the country due to its fast growth rate, high creation of employment opportunities, high turn over rate of animal protein, as well as provision of high quality meat and eggs for human consumption (Smith, 1990).

Feed makes up at least 60% of the cost of production for all feed animal species and sometimes as much as 80% (Gill, 2003). Conventional feed ingredients such as maize has become insufficient for livestock feeding. In order to reduce the cost of poultry production, the nutritional potential of unconventional feed sources mainly energy and poultry, which are cheap and locally available, need to be investigated. Although cassava

peels which are the main by-product of cassava based industries are available in large quantities in the country, not much is really utilised and as such cassava is classified among the class of non-conventional feedstuffs. Reports (Osei and Duodu, 1988; Ogbonna, 1991; Ogbonna and Adabowale, 1993) have shown that cassava peels can replace maize in poultry rations without marked adverse effects on the performance of birds. Incorporation of processed cassava peel meal into cockerel ration reduced the cost of production without adverse effect on the carcass quality and economy of

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Table 1. Percentage composition of diets.

Diets				
Feed stuff	1	2	3	4
Cassava peel meal	0	10.00	20.00	30.00
Groundnut Cake	25.00	25.00	25.00	25.50
Maize	55.00	50.00	46.00	39.41
Rice Offal	16.23	11.15	5.01	-
Palm Oil	-	-	-	1.00
Bone Meal	3.00	3.00	3.10	3.18
Premix (Grower)	0.25	0.25	0.25	0.25
Lysine	0.10	0.15	0.16	0.17
Methionine	0.17	0.20	0.23	0.24
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude Protein %	17.00	17.00	16.84	16.74
Energy (Kcal/Kg ME)	2707	2674	2656	2657
Calcium %	1.08	1.08	1.11	1.18
Total Phosphorus %	0.80	0.79	0.80	0.81
Available Phosphorus %	0.60	0.60	0.62	0.63
Methionine + Cystine %	0.60	0.60	0.61	0.60
Lysine %	0.70	0.70	0.70	0.70
Crude Fat %	3.70	3.60	3.43	3.34
Crude Fiber %	8.44	8.54	8.25	8.36
Hydrogen Cyanide (g/kg)	0	1.00	2.00	3.00

Pfizer Grower Premix at the rate of inclusion provides the following additional nutrients per kg of diets: Vitamin A 3.200 i.u, Vitamin D₃ 640 i.u., Vitamin E 2 i.u., Vitamin K 0.8 mgr., Thiamin B₁ 0.6 mgr., Riboflavin, B₂ 1.6 mgr, Pyridoxine B₆ 0.6 mgr., Niacin 6 mgr., Vitmain B₁₂ 0.004 mgr., Pantothenic Acid 2 mgr., Folic Acid 0.2 mgr., Biotin 0.008 mgr., Choline Chloride 0.08 gr., Antioxidant 0.05 gr., Manganese 0.032 gr., Zinc 0.02 gr., Iron 0.008 gr., Copper 0.002 gr., Iodine 0.00048 gr., Selenium 0.08 mgr and Cobalt 0.08 mgr.

feed conversion of the birds (Aina, 1990). This search was therefore conducted to evaluate the effect of cassava peel meal on ejaculate characteristics as well as gonadal and extragonadal sperm reserves.

MATERIALS AND METHODS

Twenty four-weeks old Bovans cockerels of between 1.83-2.07 kg were assigned at random to four experimental diets: 1, 2, 3 and 4 containing 0%, 10%, 20% and 30% cassava peel meal (Table 1). The cassava peels were washed and sun-dried for a period of 5-7 days and hammer-milled for use. Each of the four treatments was replicated twice and each pen housed 5 birds. The birds were given water and corresponding diets ad libitum for eight weeks. Semen samples were collected twice weekly (Thursdays and Fridays) between 08.00 and 10.30 hours from each cock. Collections were done by a modified method of Egbunike and Oluyemi (1979) and evaluated for semen volume, sperm motility, mass activity, sperm concentration and total sperm/ ejaculate.

Evaluation of gonadal and extragonadal sperm reserves were done according to methods of Egbunike (1980) and Bitto (1989). The data collected was subjected to analysis of variance and the means that were significant were separated using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Table 1 shows the percentage composition of experimental diets. Diet 1 was the control diet with no cassava peel meal inclusion, while diets 2, 3 and 4 contained 10, 20, and 30% cassava meal inclusions. Table 2 shows the effect of sun-dried cassava peel meal on ejaculate characteristics, gonadal and extragonadal sperm reserves of Bovans cockerels. Ejaculate volume increased as the level of sun-dried cassava peel meal increased, though the values were not significantly different from one another. Other ejaculate parameters: mass activity, sperm motility, sperm concentration and total sperm per ejaculate were significantly ($P>0.05$) not affected by the sun-dried cassava peel meal. Processed

Table 2. Effect of cassava peel meal on ejaculate characteristics, gonadal and extragonadal sperm reserves of Bovans cockerels (Mean \pm Sem)*.

Parameter	Diets				ns
	1 (0%)	2 (10%)	3 (20%)	4 (30%)	
Volume (ml)	0.311 \pm 0.02	0.313 \pm 0.003	0.346 \pm 0.03	0.347 \pm 0.22	
Mass Activity (1-5)	3.732 \pm 0.13	3.561 \pm 0.14	3.738 \pm 0.15	3.543 \pm 0.16	
Motility (%)	72.930 \pm 2.92	73.17 \pm 3.22	76.88 \pm 2.97	70.32 \pm 3.18	
Sperm Concentration ($\times 10^9$ /ml)	0.14 \pm 0.01	0.15 \pm 0.01	0.13 \pm 0.01	0.14 \pm 0.01	
Total sperm/Ejaculate ($\times 10^9$ /ml)	0.52 \pm 0.01	0.03 \pm 0.03	0.05 \pm 0.05	0.05 \pm 0.01	
Gonadal Sperm Reserves ($\times 10^8$)	3.10 \pm 0.43	2.48 \pm 0.39	2.77 \pm 0.35	1.93 \pm 0.42	
Epididymal Sperm Reserves ($\times 10^9$)	0.83 \pm 0.17	1.23 \pm 0.22	0.88 \pm 0.18	1.04 \pm 0.14	
Ductus Deferens Sperm Reserves ($\times 10^9$)	1.51 \pm 0.23	1.24 \pm 0.18	1.30 \pm 0.16	1.20 \pm 0.24	

SEM: Standard error of the means*; P>0.05.

cassava peel meal did not also significantly (P>0.05) affect the gonadal and extragonadal sperm reserves.

Values of ejaculate volume (0.31-0.35) obtained in this research compare favourably with the range of 0.20-0.50 earlier reported (Lake, 1971; Sturkie, 1970). However, values of sperm concentration, total sperm/ejaculate obtained in this experiment were lower than those earlier recorded (Sturkie, 1970). Further investigation should be carried out to compare the values of progressive sperm motility and total sperm/ejaculate. The sperm concentration recorded in this experiment was lower than the values recorded by Sturkie (1970), which is 3-5 million per cu.mm of semen. Sturkie (1970) also reported that the number of spermatozoa in a given ejaculate ranges from about 1.7 to 3.5 million. These values may be comparatively lower because of age, breed and composition of diets. The total sperm reserve recorded in this study was contributed in the following proportions by gonads (54.89%), epididymis (19.51%) and ductus deferens (25.60%) respectively. Thus, it can be deduced that the inclusion of sun-dried cassava peels up to a level of 30% to replace maize does not have any deleterious effect on cockerel production.

Conclusion

The replacement of maize with a maximum of 30% sun-dried cassava peel meal has no adverse effect on the reproductive potentials of Bovans cockerels.

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