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Response of Weaner Pig to Diets Containing Mollusc (*Thais coronata, Egeria radiata, Achatinaa chatina, Pachymelania aurita)*Shells

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Abstract
A comparative study was conducted to determine the response of weaner pigs to diets containing mollusk shells *(Thais coronata, Egeria radiata, Achatina achatina,Pachymelania aurita)*as an adsorbent. 30 hybrid (Landrace × Large white) weaner pigs, 8 -10 weeks old whose initial life weight ranged from (9.00 -12.20) kg were assigned to diets supplemented with 0.1 kg each of the four different mollusk shells per 100 kg diet to determine the performance and hematological indices of pigs. The pigs were randomly assigned to 5 treatments, 6 pigs each replicated 3 times with 2 pigs per replicate reared on a concrete-floored pen in a completely randomized design (CRD). The performance parameters measured were weight gain, feed intake feed conversion ratio (FCR), protein intake, and protein efficiency ratio, feed cost of weight gain were calculated. The hematological indices obtained were pack cell volume (PCV), hemoglobin (Hb), white blood cell (WBC), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and platelets. Results showed no significant ($p>0.05$) differences in the performance parameters considered. The hematological indices showed significant ($p<0.05$) differences among the treatments in PCV, platelets, eosinophil and lymphocytes. It was concluded that the inclusion of mollusk shells as adsorbents in the diets of weaner pigs was not toxic but could improve performance in term of body weight gain.

Keywords: Pig, performance, hematology, mollusk shells.

Introduction

Like other developing countries, Nigeria is faced with the challenge of scarcity of animal protein, which is increasing with the increase in population. Pig is highly prolific, good converters of feed to flesh, they have faster growth rate when compared with the cattle, sheep or goat. Intensive pig farming in southern states of Nigeria has brought about large amounts of excreta (faeces, urine, undigested feed) which has led to air pollution problem, excessive odors and gaseous emissions (Zahn *et al*., 2000). Mollusk shells litter the environments around the south-south and the riverine regions of Nigeria and constitute pollutants and health hazard to the people leaving in such areas. It is very high calcium and has high thermal capacity.

Therefore, a comparative study was conducted to determine the response of weaner pigs to diets containing mollusk shells *(Thais coronata, Egeria radiata, Achatina achatina, Pachymelania aurita)* as an adsorbent.

Materials and Methods

The experiment was conducted in the Piggery Unit of the Teaching and Research Farm, Akwalbom State University, ObioAkpa Campus, Akwalbom State, Nigeria. ObioAkpa campus is in the humid tropical region, situated between latitudes 4^0 30´N and 5^0 30´N and longitudes 7^0 30´E and 8^0 00´E of the Greenwich Meridian (SLUS-AK, 1994). Thirty hybrid (large white x landrace) weaner pigs, 8-10 weeks with initial live weight ranging between 9.00-12.20 kg were procured from three farms in Akwalbom State. They were quarantined for two weeks, weighed and allotted into five treatments of six pigs each, replicated three times with two pigs per replicate in a completely randomized design. The pigs were housed in well ventilated concrete floor pens, equipped with concrete feeding and watering troughs. Clean water was provided *adl ibitum*, routine and regular cleaning of the pens was carried out throughout the experiment. The composition of weaner pigs fed diets containing 0.1 kg of the four mollusc shells powder as adsorbent and the calculated composition is presented in Table 1

Thirty hybrid (large white x landrace) weaner pigs were weighed and allotted into five treatments of six pigs each, replicated three times with two pigs per replicate in a completely randomized design. Each replicate had two (one intact male and one female) pigs. Weight gain, feed intake, feed conversion ratio (FCR), the protein intake, protein efficiency ratio and Feed cost of weight gain were calculated. At the end of the experiment, 2mls of blood sample were collected via a vein behind the ears, using a 10ml syringe into sample bottles containing ethylenediaminetetraacetic acid (EDTA) as anticoagulant for hematological analysis according to the methods of Schalm*et al.* (1975).

Data obtained from the experiment were subjected to analysis of variance (ANOVA) for completely randomized design (Steel and Torrie, 1980). Differences between treatment means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Table 1 Composition of weaner diets containing different mollusk shells

Ingredients (kg)	Control	*T. coronata*	*E. radiata*	*A. achatina*	*P. aurita*
Maize	18.20	18.20	18.20	18.20	18.20
Wheat offal	24.00	24.00	24.00	24.00	24.00
Palm Kernel Meal	40.00	40.00	40.00	40.00	40.00
Soybean meal	14.00	14.00	14.00	14.00	14.00
Bone meal	3.00	2.90	2.90	2.90	2.90
Common salt	0.25	0.25	0.25	0.25	0.25
	0.25	0.25	0.25	0.25	0.25
Vitamin premix*	0.20	0.20	0.20	0.20	0.20
L-Lysine	0.10	0.10	0.10	0.10	0.10
DL-Methionine	-	0.10	-	-	-
Thais coronata	-	-	0.10	-	-
Egeria radiata	-	-	-	0.10	-
Achatina achatina	-	-	-	-	0.10
Pachymelania aurita					
Total (kg)	100	100	100	100	100
Calculated composition					
Crude protein	19.75	19.75	19.75	19.75	19.75
ME(kcal/kg)	2308	2308	2308	2308	2308
Fibre (%)	8.31	8.31	8.31	8.31	8.31
Calcium (%)	1.25	1.25	1.25	1.25	1.25
Lysine	1.11	1.11	1.11	1.11	1.11
Methionine	0.69	0.69	0.69	0.69	0.69

Niacin 40,000mg Calpan 10,000mg, Vit B2 5,000mg, VitB12 20mg, VitB1 20mg, Vit B6 3,500mg, Biolin 80mg, Antioxidant 125,000mg. *Each 1.25kg contains Vit A 12,000,0000I.U,VitD 33,000,000I.U, Vit E 30,000mg, Vit K3 2,500mg, Folic Acid 1,000mg

Results and Discussion

The mineral composition of mollusk shells used in the study is presented in Table 2. The mineral composition showed low sodium (Na^+) concentration. Similar variations were obtained in a study by Ademolu *et al.* (2004) with shells from Abeokuta. The low sodium concentration is an indication that its inclusion in livestock diet is safe and without complications arising from high Na^+ intake (Ademolu *et al.,* 2004).

Table 2: Mineral composition of the respective mollusk shells used in the experiments

Parameters	*T. coronata*	*E. radiata*	*A. achatina*	*P. aurita*	SEM
Calcium (%)	67.20^a	48.72^b	43.68^c	38.64^d	3.25
Magnesium (%)	26.87^a	17.48^b	17.47^b	15.45^c	1.30
Sodium (%)	0.18^c	0.33^b	0.41^a	0.42^a	0.09
Potassium (%)	0.16^b	0.12^c	0.11^c	0.20^a	0.05
Iron (%)	0.04^b	0.03^b	0.03^b	0.07^a	0.02
Zinc (%)	2.74^a	2.37^b	1.12^c	0.55^d	0.26
Phosphorus (%)	0.03^d	0.85^a	0.47^c	0.50^b	0.08

^{abc}; means of the same row with different superscripts are significantly different ($P<0.05$) SEM=standard error of mean.

The growth performance of weaner pig fed diets containing 0.1 kg of the respective mollusc shells is presented in Table 3. Results showed numerical differences in the final life weight and daily weight gain, however pigs fed diets containing *Thais coronate* shells powder had the highest numerical daily weight gain. The result got in this experiment could be the effect of the isocaloric and isonitrogenous diets fed to the weaner pig.

Results (Table 4) showed significant ($P<0.05$) differences among the weaner pigs fed mollusk shell inclusions on pack cell volume (PCV), platelets and lymphocytes. However all the values obtained fell within the normal range for pigs in this class (National Research Council 2012). The RBC fell within the normal range. This result is an indication that the diets were not toxic to the pigs and that they were no cases of anemia, excess body fluid or blood loss (Togun *et al.,* 2007).

Table 3 Performance of weaner pigs fed diets containing different mollusk shells

Parameters	Control	*T. coronata*	*E. radiata*	*A. achatina*	*P. aurita*	SEM
Initial live weight (kg)	9.23	9.35	9.38	9. 52	9.79	0.38
Final live weight (kg)	19.39	21.33	20.93	20.00	20.53	0.56
Daily weight gain (kg)	0.18	0.21	0.20	0.18	0.19	0.05
Daily feed intake (kg)	0.66	0.72	0.69	0.66	0.68	0.02
Feed conversion ratio	3.67	3.43	3.45	3.67	3.58	0.06
Daily protein intake (kg)	0.18	0.18	0.18	0.18	0.18	0.03
Protein efficiency ratio	0.94	0.85	0.85	0.95	0.58	0.01

[abc]; means of the same row with different superscripts are significantly different ($p<0.05$) SEM=standard error of mean.

Table 4: Hematological indices of weaner pigs fed diets containing different mollusk shells

Parameters	Control	*T. coronata*	*E. radiata*	*A. achatina*	*P. aurita*	SEM
Pack Cell Volume	35.65[a]	34.50[ab]	34.33[b]	32.50[c]	33.50[b]	1.25
Hemoglobin (g/dl)	13.67	12.33	12.00	12.33	13.67	0.43
White Blood Cell (%)	12.50	12.00	12.10	12.83	13.00	0.43
MCH (Pg)	20.49	16.07	15.00	14.80	21.59	0.01
MCHC (%)	38.34	35.74	34.95	37.93	40.80	0.09
Platelets	525.00[c]	613.67[a]	613.67[a]	628.33[b]	636.67[b]	21.7

[abc]; means of the same row with different superscripts are significantly different ($p<0.05$) MCV= Mean Corpuscular Volume; MCH= Mean Corpuscular Hemoglobin; MCHC= Mean Corpuscular Hemoglobin Concentration, SEM=standard error of mean.

Conclusion

The performance of the weaner pigs fed diets containing the various mollusk shells in this experiment was not significantly different among the treatment means. However weaner pigs fed *Thias coronata* shells were numerically higher in total body weight gain and FCR. The hematological analysis all fall within the normal range for pigs of this class implying that the mollusk shells were not toxic to the weaner pig.

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