International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2019; 4(2): 12-17

www.veterinarypaper.com
Received: 10-01-2019
Accepted: 14-02-2019

GD Eyoh
Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Akwa Ibom

MD Udo
Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Akwa Ibom

CA Mbre
Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Akwa Ibom

JS Ekpo A
Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Akwa Ibom

Correspondence
GD Eyoh
Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Akwa Ibom

Effect of different housing patterns on growth performance, morphological parameters and carcass characteristics of West African Dwarf Buck

GD Eyoh, MD Udo, CA Mbre and JS Ekpo A

Abstract
A study was carried out with sixteen West African Dwarf (WAD) bucks aged between 6-9 months to determine growth, morphological parameters and carcass characteristics under different housing patterns. The sixteen bucks were randomly assigned to four housing patterns which served as treatments, i.e. T_1 concrete house, T_2 mud house, T_3 bamboo house and T_4 zinc house in a completely randomised design for 56 days. Each treatment group was fed equal amounts of the three forages used which were *Panicum maximum, Centrosema pubescens* and *Aspilia africana* in addition to clean fresh drinking water. The results revealed that there were significant ($P<0.05$) differences in total weight gain, average daily weight gain and feed conversion ratio. The values showed consistent trend and were 0.75kg, 1.65kg, 0.88kg and 0.71kg, 13.39, 29.46, 15.71 and 12.68g/day and 69.45, 31.90, 54.74 and 71.76 respectively. This result indicates that mud housing pattern favours the production of WAD goats, hence should be adopted by smallholder farmers.

Keywords: Housing patterns, forages, WAD goats, performance

Introduction
Goat production in Nigeria is mostly at smallholder level and their main function is production of meat. Nigeria is endowed with 34.8 million goats yet in average Nigerian consume less than 25% of the recommended 34g/annum/day of annual protein which is less than 9g (Sonaiya, 2012) [10]. Goats are one of the earliest ruminants have been used for their milk, meat, hair, and skins over much of the world (Birteeb *et al*., 2015) [3]. They are equally reared for other reasons such as income generation, religious purpose, household consumption, hobby and security against crop failure and as model organisms for science (Ozung *et al*., 2011) [8]. According to Lebbie (2004) [6], ruminant animals play a significant role in supplying protein to humans and paying more attention to their feed supply and proper housing will be to a great extent increase their production. Goats are a very prominent feature of the subsistence rural economy in most West African homes and have proved very useful to man throughout the ages, largely because of their adaptability to varying environmental conditions (Tweneboah, 2000) [12].
Their feeding behaviour, fast maturity, reproduction efficiency, small body size and ability to adapt to various agro-climatic conditions ranging from arid dry to cold arid to hot humid are important attributes that make goat keeping a choice venture (Shafie, 1992) [9].
Goats are usually kept indoors in warm, insulated buildings during the rainy season. Housing goat in insulated, warm buildings involves high building costs yet few studies have dealt with the association between warm and cold housing management on growth performance coupled with morphological parameters and carcass characteristics of WAD goats. (Karabacak *et al*., 2015) [5].
This study, therefore, seeks to highlight the possible relationship between different housing patterns on the growth performance, morphological traits as well as carcass characteristics of WAD goats.

Materials and Methods

Housing patterns for wad goats

1. Group T_1 cement floor, zinc roof, and concrete walls.
2. Group T_2 – Four WAD goats in mud house with rammed earth floor, zinc roof, and mud walls.
3. Group T_3 – Four WAD goats in bamboo house with rammed earth floor, zinc roof, and bamboo walls.
4. Group T_4 – Four WAD goats in zinc house with rammed earth floor, zinc roof, and zinc walls.

Management and feeding of experimental animals

Twelve West African Dwarf bucks aged between 6 and 9 months, were procured from the smallholder farmers for the experiment. The goats were randomly divided into four groups of three each for the four different housing patterns viz: T_1, T_2, T_3, and T_4. The details of the housing system allotted to various experimental groups are shown in Figure 3.1 to Figure 3.4. The environment, feeding and management practices were same for all treatment groups.

Fig 31a: T_1 group in concrete house (without animal)

Fig 3.1b: T_1 group in concrete house (with animal)

Fig 3.2a: T_2 group in mud house (without animal)

Fig 3.2b: T_2 group in mud house (with animal)

Fig 3.3a: T_3 group in bamboo house (without animals) **Fig 3.3b:** T_3 group in bamboo house (with animals)

Fig 3.4a: T_4 group in zinc house (without animal) **Fig 3.4b:** T_4 group in zinc house (with animal)

The goats were fed three different (3) forages namely *Panicum maximum*, *Centrosema pubescens* and *Aspellia africana* in the ratio of 2:2:2. Clean fresh water and mineral licks was also provided.

Statistical analysis

All data were collected and were subjected to analysis of variance (ANOVA) according to AOAC (2002) [2] and comparison among treatment means were made by the Duncan's Multiple Range Test.

Results and Discussion

Table 1: Growth performance of WAD Goats in four different housing patterns

Treatment					
Parameters	**T_1 (concrete)**	**T_2 (mud)**	**T_3 (bamboo)**	**T_4 (zinc)**	**SEM**
Initial body Weight (kg)	5.75	5.75	5.50	5.62	0.81
Final body Weight (kg)	6.50	7.40	6.38	6.33	0.83
Total feed intake (kg)	52.08	52.64	48.16	50.96	
Average Daily Feed intake (kg/day)	930	940	860	910	0.66
Total Weight gain (kg)	0.75^c	1.65^a	0.88^b	0.71^c	0.18
Average Daily Weight gain (g/day)	13.39^c	29.46^a	15.71^b	12.68^c	0.76
FCR (feed/gain)	69.45^a	31.90^c	54.74^b	71.76^a	0.62

^{abc} Means in each row with different superscripts are significantly different ($P<0.05$)

T_1 – Treatment 1 (concrete house), T_2 – Treatment 2 (mud house), T_3 – Treatment 3 (bamboo house) T_4 – Treatment 4 (zinc house)

FCR – Feed Conversion Ratio, SEM – Standard Error of Mean.

The growth performance of goats reared under different housing systems is presented in Table 1 The values obtained for total weight gain were: 0.75kg (concrete), 1.65kg (mud), 0.88kg (bamboo), 0.71kg (zinc). Mud housing pattern recorded the highest weight. There were significant differences ($P < 0.05$) in their daily weight gains. The values were 13.39, 29.46, 15.71, 12.68 g/day for goats reared in concrete, mud, bamboo and zinc houses respectively. The highest daily weight gain was obtained in goat reared in mud house (T_2) which differed ($P< 0.05$) significantly from others. The daily weight gain values obtained in this study is superior to the values 13.17 and 13.40 reported by Thiruvenkadam *et al.*, (2008) [11] for goat raised under mud and slatted floor houses respectively. Feed intake did not differ ($P< 0.05$) significantly among treatment housing. This means that, the housing systems employed in this experiment did not affect their feed consumption. Feed conversion ratio showed significant difference ($P<0.05$) among the treatment groups. The values were: 69.45, 31.90, 54.74, and 71.76 for animals in concrete, mud, bamboo and zinc houses respectively. Better feed conversion ratio was observed in goats in mud house and the poorest was obtained in zinc house. This poor performance of goats in zinc house as seen in daily weight gain and FCR may be attributed to high temperature associated with zinc house. Abdelhadi *et al*., (2009) [1] reported that exposure of livestock to higher or lower temperatures than the thermo-neutral zone affects voluntary feed intake and overall performance of the animal.

Table 2: Morphological parameters of WAD goats in different housing patterns

Treatment					
Parameters	**T_1 (concrete)**	**T_2 (mud)**	**T_3 (bamboo)**	**T_4 (zinc)**	**SEM**
Body length (cm)	17.75	18.25	17.75	18.00	1.507
Height at Wither (cm)	12.50	12.75	12.50	13.00	0.990
Chest girt (cm)	$3.750^{a,b}$	4.125^{a}	3.375^{b}	$3.625^{a,b}$	0.660
Fore leg length (cm)	10.07	10.10	10.25	10.55	0.737
Hind leg length (cm)	10.35	11.00	10.87	10.80	0.823
Ear length (cm)	3.325	3.375	3.475	3.500	0.637
Neck length (cm)	3.750	4.000	4.000	4.050	0.562
Neck circumference (cm)	7.000	7.050	7.125	7.125	0.862
Face length (cm)	4.750	4.825	4.500	4.425	0.691
Tail length (cm)	4.750	4.875	5.125	5.250	0.668
Horn base circumference (cm)	2.500	2.475	2.000	2.000	0.916

[ab] Means in each row with different alphabets are significantly different ($P<0.05$)

T_1 – Treatment 1 (concrete house), T_2 – Treatment 2 (mud house), T_3 – Treatment 3 (bamboo house) T_4 – Treatment 4 (zinc house), SEM – Standard Error of Mean.

Table 2 shows the effect of the four different housing patterns considered on the morphological parameter of WAD bucks. The body length were 17.75 cm, 18.25 cm, 17.75 cm and 18.00 cm for goats placed at concrete house (T_1), mud house (T_2), Bamboo house (T_3) and zinc house (T_4) respectively. Bucks in mud house (T_2) produce higher body length which did not differ significantly ($p>0.05$) from among treatment for height at withers, goats in (T_4) zinc housing system have higher valve length (13.00 cm) compared to 12.50 cm, 12.50 cm and 12.75 cm of (T_1), (T_3) and (T_2) respectively. Cam *et al*., 2010 reported that height at wither is being influenced by sex of the animals. This was not significantly different ($p>0.05$). It was reported by Ifeanyichukwu (2013) [4], that the mean body length is higher than the treatment mean (28.082 cm). There were significant differences ($p<0.05$) for length of chest girth. Bucks in concrete housing pattern (T_1) (3.750 cm) and (T_4) zinc housing pattern (3.625 cm) produced similar length of chest girth, the highest value of chest girth was obtained in (T_2) (4.125 cm) mud housing pattern. There were no significant differences ($P>0.05$) among treatment means for fore leg length and hind leg length. Bucks housed in zinc housing pattern (T_4) had higher value of fore leg length (10.55 cm).Bucks housed in (T_2) mud housing system had higher value of hind leg length (11.00 cm).There were no significant differences ($P > 0.05$) among treatment means for ear length, neck length and neck circumference. Ear length of bucks in (T_4) (3.500 cm) had the highest value and the least was obtained in (T_1) (3.325).This is contrary to 10.88cm recorded by Ifeanyichukwu (2013) [4]. Bucks placed in (T_4) (4.050 cm) had the highest value of neck length the least length was observed in (T_1) (3.750 cm).Longer length of neck circumference was obtained from goats in T_3 (7.125 cm) and T_4 (7.125 cm) the least was obtained in T_1 (7.000 cm).There were no significant differences ($P>0.05$) among treatment mean of face length and tail length. Bucks placed in (T_2) (4.825 cm) had the highest value of face length the least length was observed in (T_4) (4.425 cm).Tail length of goats placed in (T_4) (5.250 cm) has the highest value and the least was obtained in (T_1) (4.750 cm). Ifeanyichukwu (2013) [4] observed 8.338 cm of tail length.

The carcass yield of WAD buck in different housing patterns is presented in Table 3.There were no significant difference in all the parameters tested.

Table 3: Carcass yield of wad goats in different housing patterns

Treatment					
Parameters	**T_1 (concrete)**	**T_2 (mud)**	**T_3 (bamboo)**	**T_4 (zinc)**	**SEM**
Live Weight (Kg)	6.50	6.66	6.33	6.50	1.11
Bled Weight (Kg)	6.00	6.17	5.83	6.00	1.12
Dressed Weight (Kg)	2.00	1.96	1.98	2.05	0.49
Dressing %	29.62	30.28	30.14	29.68	2.93
Shoulder (g)	207.00	189.00	206.00	225.33	0.97
Sets (g)	246.33	226.33	234.00	288.67	1.03
Thigh (g)	232.00	224.67	249.00	251.33	1.51

Head (g)	539.67	551.33	417.33	564.33	2.22
Loin (g)	218.00	178.66	210.00	216.33	0.92
Flank (g)	41.33	42.33	42.33	49.67	0.44
Rack (g)	81.00	69.67	89.00	85.33	0.46
Ends (g)	182.66	141.33	175.67	262.33	1.48
Skin (g)	432.33	383.33	416.67	466.67	1.61
Right half (Kg)	1.00	0.96	0.98	1.02	0.24
Left half (Kg)	1.00	0.96	0.98	1.02	0.24
Kidney (g)	29.33	28.33	26.67	27.33	0.10
Lung (g)	60.00	65.33	61.33	64.33	0.16
Heart (g)	34.33	35.67	36.00	33.00	0.19
Full gut (Kg)	2.42	2.55	2.10	2.40	0.26
Empty gut (Kg)	0.60	0.72	0.64	0.63	0.06
Liver (g)	165.7	121.7	116.0	135.3	0.71
Meat to Bone Ratio	2.83	2.41	2.58	2.90	0.55

T_1 – Treatment 1 (concrete house), T_2 – Treatment 2 (mud house), T_3 – Treatment 3 (bamboo house) T_4 – Treatment 4 (zinc house), SEM – Standard Error of Mean.

Heavier dressed weight was recorded by bucks in (T_4) (2.05kg) zinc housing pattern but it was not significantly different (p>0.05) from other treatments. Dressing percentage was not significantly different (p>0.05) from each other. Higher value was obtained in goats placed in mud housing system (T_2) closely followed by (T_3), (T_4) and (T_1) as the lowest. There were no significant differences (p>0.05) among treatment means for shoulder, set and thigh. Bucks housed in (T_4) (225.6g) had the highest value of shoulder, the least was recorded by bucks placed in (T_2) (189.0g). Set for bucks placed in zinc housing pattern weighed (288.6g) and the least weight was produced by bucks placed in mud housing pattern (T_2) (226.3g). Thigh of bucks placed in zinc housing system, (T_4) obtained the highest value (251.3g) followed by (T_3) (249.0g), T_1 (232.0g) and the lowest T_2 (224.6g) of bamboo house, concrete house and mud house as the lowest respectively. Bucks in concrete housing system (T_1) produced higher value of loin weight which did not differ (p>0.05) from other treatments. There was no significant difference (p>0.05) among treatment means for flank, rack, end and skin. Goats housed in (T_4) (49.67g) had the highest value of flank, the least was recorded by goats placed in (T_1) (41.33g), treatment (T_2) and (T_3) had the same weight value (42.33g). Rack of goats placed in (T_3) bamboo housing system was the highest (89.00g) and (T_2) Mud housing system was the lowest. There were no significant difference (p>0.05) among treatment means for kidney, lungs, hearts and liver. Bucks housed in (T_1) (29.33g) had the highest value of kidney weight, the least weight was observed in (T_3) (26.67g). Lungs of bucks placed in (T_2) (65.33g) had the highest value and the least was obtained in (T_1) (60.00g). Bucks placed in (T_3) (36.00g) had the highest value of heart weight the least weight was observed in (T_4) (33.00g). Liver of bucks placed in (T_1) (165.7g) had the highest value and the least was observed in (T_3) (116.0g). Empty gut did not differ significantly (p>0.05) among treatment groups. The value range (0.60-0.71kg) was comparable to 10.63% reported by (Yusuff and Fayeye, 2016) [13]. Meat to bone did not differ significantly (p>0.05) among treatments. The appreciable meat to bone ratio was obtained by bucks in (T_4) zinc housing patterns (2.903g). The least weight was observed in (T_2) mud housing pattern (2.413g). The range (2.413-2.903g) fell above the range (0.28-0.35) reported by Odemelam *et al.,* (2014) [7].

Conclusion

The result revealed that the parameters studied for growth performance, morphological trait and carcass traits, were better in (T_2) mud housing patt0ern as compared to other housing pattern. This is an indicator that mud housing pattern provide a comfort and thermal neutral zone, in which the temperature range are most comfortable and productive for the animals as evidence in the various parameters studied.

Based on the results obtained from the study, the following recommendations are made:

1. Mud housing pattern is recommended for fattening animals.
2. In relation to carcass, body length morphology can be used to determine body weight in mud housing system.

References

1. Abdelhadi 0MA, Babiker SA. Prediction of zebu cattle live weight using live animal measurements Livestock Research for Rural Development 2009; 21(133):4-6.
2. AOAC. (Assocaition of Official Analytical Chemists), Official methods of analysis 17th Edition AOAC: Washington D.C, 2002.
3. Birteeb PT, Danquah BA, Salifu AS. Growth Performance of West African Dwarf Goats Reared in the Transitional Zone of Ghana, Asian Journal of Animal Sciences. 2015; 9(6):370-378.
4. Ifeanyichukwu V. Production of body weight in using principal component factor scores in multiple linear regression model, Rabbit Genetics International Journal of the Bioflux Society Research Article. 2013; 3(1).
5. Karabacak A, Aytekin I, Boztepe S. Fattening performance and carcass characteristics of Akkaraman goats in different housing systems Indian J Anim Res. 2015; 49(4):515-522.
6. Lebbie SHB. Goats under Household Conditions. Small Ruminant Research. 2004; 51:131-136.
7. Odemelam VO, Anamefule FO, Ibeawochi IA, Ezeokeke CT. Growth performance and carcass characteristics of West African Dwarf Bucks fed *Panicum maximum* and Bambara nut (*Vigna subterranean*) seed meal supplemented diet, Nigerian Journal of Animal Production. 2014; 41:155-165.
8. Ozung PO, Nsa EE, Ebegbulem VN, Ubua JA. The potentials of small ruminant production in cross river rain forest zone of Nigeria: A review Continental J Animal and Veterinary Research. 2011; 3(1):33-37.
9. Shafie MM. Morphological and anatomical characteristics of subtropical sheep and goats as means of adaptation to hot climate. Paper Presented at 43rd Annual Meeting of the European Association for Animal Production, Madrid, Spain, 1992.

10. Sonaiya F. Animal Production and the agricultural transformation agenda Module 10, Mandatory Continuing professional education training 2012 for members of the Nigeria Inst Anim. Sc. (NIAS MCPE2012), 2012, 1-79.
11. Thiruvenkadan AK, Karunaithi K, Narendra Babu R, Arunachalam K. Comparative performance of Mecheri lambs under different management system, Indian Journal of Small Ruminants. 2018; 14(1):84-88.
12. Tweneboah CK. Modern Agriculture in the Tropics with special reference to Ghana. Co-Wood Publishers, Accra, Ghana, 2000, 195.
13. Yusuff AT, Fayeye TR. Effects of age, sex, season and breed on the body weight and zoometric characteristics of extensively managed Nigerian goats, Nigerian Journal of Agriculture, Food and Environment. 2016; 12(4):1-6.