

## **EFFECTS OF AGE, SEX, REPRODUCTIVE STATUS, SEASON AND COAT COLOUR ON BODY WEIGHT OF WEST AFRICAN DWARF GOATS IN NORTHERN PART OF PLATEAU STATE, NIGERIA**

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### **Abstract**

A study was conducted in two local government areas (Jos South and Riyom) in northern part of Plateau State, Nigeria in 2018 to determine the effect of sex, age, reproductive status, coat colour and season on weight gain of West African Dwarf goats. A total of 810 goats were randomly sampled on repeated basis for seven months and grouped into five according to sex, age, reproductive status, coat colour, and season. The goats were restrained, identified by colour, characteristics and diagnosed (i.e whether pregnant, lactating or dry) and weighed using simple weighing scale on repeated measurement basis for 7 months and all parameters were recorded and analyzed. The result showed an overall mean weight of  $11.97 \pm 0.24$ kg for all the animals sampled. There was a significant difference ( $P < 0.001$ ) in body weight of goats according to age. Goats with age  $\geq 8$  months had the highest weight (13.81kg) than those  $\leq 7$  months (10.14kg). There was a significant difference ( $P < 0.001$ ) in body weight of goats according to sex, age, reproductive status and season. Coat colour had no influence on body weight of the animals. The study concluded that sex, age, reproductive status and season has effect on body weight of the animals and recommends that sex, age, reproductive status and season be considered in any breeding programme.

**Key words:** Sex, Age, Reproductive status, Coat colour

### **Introduction**

Livestock play a key role in food security of small holders in most African countries and vast majority of people in rural areas especially women who rely on investment in their livestock with small ruminants especially goats serving as current accounts (Chinchilia, 2018).

The marketing and trade of goats in Africa is based on subjective estimates of body weight because the access to livestock scales is very limited, traders often underestimate body weight to lower the price of animals which adversely affects the farmers because they

receive less money for their animals than they really worth (Walugembe et al 2014).

Studies have revealed that the weight gain of animals is affected by certain factors amongst which are sex, age, reproductive status and even season. Peter et al (2015) reported a mean yearling weight of 11.9kg in West African Dwarf Goats above those below or equal to 7 months with 10.14kg which indicated weight difference due to age.

A research was conducted on 30 West African Dwarf Goats (15 males and 15 females) reared intensively to determine effects of sex on feed intake, apparent

digestibility, body weight, weight gain, feed conversion ratio and reproductive performance; the mean intake values obtained for the male and the female goats were 2.03kg and 2.77kg respectively indicating that experimental does consumed more feed than the bucks and a significant difference ( $P < 0.001$ ) were observed.

Zahradeen et al. (2008) reported that season has a significant effect on daily weight gain of goats born in the dry season having a higher weight gain of  $98.95 \pm 4.65$ kg than those born in the wet season  $88.15 \pm 5.31$ g and gave factors responsible for the decrease weight gain in the wet season as increase rate of diseases and tethering which restricts the movement of animals to farmlands (inadequate grazing period). A similar study was carried out to evaluate the effects of crossbreeding programmes and season on pre-weaning weight and body linear measurement for Nigeria pure bred goats and the West African Dwarf goats and Savanna eco zone. Weaning weight was significantly highest ( $P < 0.05$ ) in early rainy season (April to June).

Otuma and Nwakpu (2007), Nsoso et al.(2003) reported that body weight of goats was significantly higher during the wet season than the dry season 4.79kg. Avjit et al. (2016), reported that during pregnancy, there is an increase in body weight of does and gave reason for increase weight as a result of developing fetus which may be single or multiple.

The study evaluates the effects of season, sex, age, reproductive status and coat colour on the body of West African dwarf goats in the studied area.

## **Materials and Methods**

### **Location of the Study**

The study was conducted in two local government areas (Jos South and Riyom) in northern part of Plateau State, Nigeria. Plateau State is located on latitude  $08^{\circ} 24'$  N and longitude  $008^{\circ} 32'$  and  $010^{\circ} 38'$  E. Plateau State falls largely within the northern

guinea savannah zone, it consists mainly of short trees and grasses. It is characterized by a near temperate climate on the Jos Plateau, hot and humid on its lower parts.

Generally, weather are warmer during the rainy season (April – October) and much colder during the harmattan period (December – February). Mean annual temperature range between  $20^{\circ}\text{C}$  to  $25^{\circ}\text{C}$  while the mean annual rainfall figures ranged from 131.75cm in southern part to 146cm on the Jos Plateau. Altitude range from 1200 metres (4000ft) to a peak 1829 metres above sea level and a total area of 26899 square kilometers (Blench, et al., 2003).

### **Sample Size**

The total of 810 West African Dwarf goats sampled were grouped into 5 according to sex (male and female), reproductive status (pregnant, lactating, pre-pubertal, dry), age ( $\leq 7$ months,  $\geq 8$ months), coat colour (black, brown and mottled), location (Gyel, Duu, Vwang, Kuru, Gana-wuri, Riyom, Bachit) and season (early rain, early dry and late dry).

### **Identification of Animals/Age Determination**

The West African Dwarf goats were identified by their features such as black/brown skin coat and occasionally white, dwarf, short legs and are patched pied as reported by Ngere et al. (1994).

The age determination was done based on the method described by Coombs (2002) with further confirmation by available information given by owners of the animals.

### **Pregnancy Diagnosis**

The signs of pregnancy in the matured female goats were done by palpation of the gravid uterus through the relaxed abdominal wall of the standing doe by placing hand on either side of the abdomen and squeezing or lifting upward (Lionel, 2002).

### Animal Restraint and/ Body Weight Determination

The animals were individually restrained and weighed using a simple weighing scale according to the groupings (i.e age, sex, reproductive status, parameter such as season, location and coat colour were taken from each group and recorded on repeated basis for seven months. Sample representation according to location – Gyel 98, Duu 82, Kuru 98, Vwang 72, Gana-wuri 240, Riyom 120 and Bachit 100.

### Data Analysis

The results were subjected to statistical analysis using Microsoft Excel program (Microsoft xp, 2007) and statistical package for social science (SPSS Version17). The statistical tools used were, chi – square test and Analysis of Variance (ANOVA).

Duncan multiple range test was used for the separation of means that were significantly different.

### Results

**Table 1: Mean weight of West African Dwarf Goats December - June**

Variable	N	SEM	Weight (kg)
Month			***
December	73	.330	11.98 <sup>bcd</sup>
January	72	.302	11.54 <sup>cd</sup>
February	72	.334	12.25 <sup>bc</sup>
March	124	.291	11.08 <sup>e</sup>
April	112	.333	11.78 <sup>de</sup>
May	198	.280	12.74 <sup>a</sup>
June	159	.302	12.45 <sup>ab</sup>
Total	810		11.97 ± 0.24

a , b , c , d , e = Means with different subscripts letter within the column are significantly (p<0.001) different.

\*\*\* = P<0.001

n= Number of Observations

**Table 2: Mean weight of West African Dwarf goats by Location in Northern Part of Plateau State**

Variable	N	SEM	Weight (kg)
Location			***
Gana-wuri	240	.268	11.45 <sup>c</sup>
Du'u	82	.534	12.15 <sup>bc</sup>
Riyom	120	.312	11.86 <sup>ab</sup>
Bachit	100	.319	11.74 <sup>ab</sup>
Kuru	98	.324	12.08 <sup>ab</sup>
Gyel	98	.317	11.85 <sup>ab</sup>
Vwang	72	.363	12.69 <sup>a</sup>
<b>Total</b>			

\*\*\*=P<0.001

n= Number of observations.

kg= kilogram

**Table 3: Mean of Body Weight of West African Dwarf Goat as influenced by age, sex, reproductive status and coat colour in northern part of Plateau State.**

Variables	No. of Observation	SEM	Body Weight (kg)
			***
Sex	297	.336	11.50 <sup>b</sup> ±
Male	513	.208	12.45 <sup>a</sup> ±
Female			
			***
Age			
≤ 7months	149	.331	10.14 <sup>b</sup> ±
≥ 8months	661	.196	13.81 <sup>a</sup> ±
			***
Reproductive Status			
Prepubertal	369	.208	9.41 <sup>d</sup> ±
Pregnancy	52	.390	14.21 <sup>a</sup> ±
Lactating	33	.459	12.78 <sup>b</sup> ±
Dry	356	.281	11.50 <sup>c</sup> ±
			NS
Coat Colour			
Black	472	.236	11.92 ±
Brown	294	.244	12.10 ±
Mottled	44	.390	11.90 ±

\*\*\* (P < 0.001), ≤ = less or equal to. ≥ = greater or equal to, kg = kilogram, a,b,c,d = means within sub groups with different superscript letters differ significantly (P < 0.001).

## Discussion

The result on Table 3. showed an overall mean weight of 11.97 ± 0.24kg for all goats sampled which agrees with the findings of Nsoso et al. (2003) who obtained a mean weight value of 11.97kg. On age basis, the mean weight of goats differed significantly (P < 0.001) according to age. Goats with age 8months and above had the highest mean weight (13.81kg) than those below or equal to 7months with mean body weight (10.14kg) indicating that age has influence on body weight, this agrees with the findings of Peter et al. (2015) who obtained a mean weight of 11.9kg in yearling West African Dwarf goats and 10.14kg in those below or equal to 7months.

The mean body weight of goats differ significantly (P < 0.001) according to sex. The

females had the highest mean body weight (12.45kg) than the males (11.50kg) signifying body weight difference due to sex Table 3. However, the weight value obtained in this study is lower than the figure obtained by Charles et al. (2016) for the does which ranged 20 to 35kg,

The study revealed that there was a significant difference (P < 0.001) in the mean body weight of goats in relation to reproductive status. The pregnant does had the highest mean weight 14.21kg, followed by lactating 12.78kg, the dry 11.50kg and the least pre-pubertal 9.41kg, Table 3. The increase in body weight of does at pregnancy agrees with the findings of Avjit et al. (2016) who reported that during pregnancy there is an increase body weight of does due to presence of single or multiple fetus. Table3. Means within subgroups with different

superscripts letters differ significantly ( $p < 0.001$ ). indicating that the mean weight of male and the female goats are significantly different with the female goats having mean body weight of  $12.45 \pm \text{kg}$  higher than the males ( $11.50 \pm \text{kg}$ ). Similarly there is a significant difference in weight according to age, goats with age  $\leq 7$  months had  $10.14 \pm \text{kg}$  while those  $\geq 8$  months had  $13.81 \pm \text{kg}$  higher than those aged  $< 7$  months. Reproductive status has significant effects

on weight gain, the pregnant, lactating and dry differs significantly according to weight with the pregnant  $14.21 \pm \text{kg}$  while the least is the prepubertal  $9.41 \pm \text{kg}$ . Coat had no significant (NS) effects on weight gain.

There is a significant difference ( $P < 0.001$ ) in body weight of animals according to month and season. The mean weight of goats by month shows that they had the highest mean weight  $12.74 \text{kg}$  in May and least in March  $11.08 \text{kg}$  this agrees with the findings of Nsoso who reported that body weight of goats was significantly higher in the wet season which does not agree with that of Zahradeen et al. (2008) who reported that season has significant effect on daily weight gain of goats born in dry season than those in the wet season due to increase rate of diseases and tethering in the wet season. Coat colour had no significant effect on the mean body weight of goats.

### Conclusion

The study concluded that sex, age, reproductive status and season has effects on body weight gain of West African Dwarf goats in the study area and recommended that sex, age, reproductive status and season be considered in any breeding programme.

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