

## SHORT COMMUNICATION

### Effect of testicular type on semen characteristics of Uda Rams

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#### Abstract

Uda is one of the most important breed of sheep in Nigeria and distributed in most West African counties. It has been the most ignored and less studied breed of sheep in Nigeria, the paucity information regarding their fertility based on scrotal division and performance under feedlot conditions, hence the need to be studied. In view of this, the study was designed to investigate the effects of testicular type (bipartite and non-bipartite) on the linear body measurements and semen characteristics of Uda rams. Twelve apparently healthy Uda rams aged 1-1.5 years were divided into two groups with six animals each according to their testicular types; bipartite and non-bipartite (rams with scrotal bipartition and without scrotal bipartition) in a completely randomized design. The semen samples were collected from all the rams on monthly basis for three consecutive months. The samples were evaluated for semen volume (VM), percentage semen motility (MT), vitality (VT) and pH. The morphometric traits of body such as girth circumference (GC), height at wither (HtW) and scrotal measurement; testicular length (TL), testicular circumference (TC) were measured in centimeter using flexible measuring tape. All data observed were subjected to t-test and Pearson's correlation analysis. The result (33.72 vs 33.20 for bipartite and non-bipartite rams) revealed that the testicular type had no influence on average weight gain ( $p > 0.05$ ) whereas influenced some body morphometric traits (Back length, Height at wither and Neck length). It also revealed that the average weight gain had positive relationship with semen volume ( $p > 0.05$ ). The semen motility and livability (67.67 vs 62.50) and (76.33 vs 71.67) of the bipartite Uda rams were higher ( $p < 0.05$ ) than non-bipartite rams and therefore concluded that bipartite Uda rams have better egg fertilizing potential than non-bipartite.

**Key words:** Uda-rams, Testicular type, Body weight, Semen characteristics.



#### Effet Du Type Testiculaire Sur Les Caractéristiques Du Sperme Des Béliers Uda

#### Résumé

Uda est l'une des races de moutons les plus importantes du Nigeria et est répandue dans la plupart des pays d'Afrique de l'Ouest. Cependant, c'est aussi la race la plus négligée et la moins étudiée au Nigeria, avec un manque d'informations concernant sa fertilité en fonction de la division scrotale et ses performances en conditions d'engraissement, d'où la nécessité de cette étude. Dans cette optique, cette recherche a été conçue pour étudier les effets du type testiculaire (bipartite et non-bipartite) sur les mesures corporelles linéaires et les caractéristiques spermatiques des béliers Uda. Douze béliers Uda apparemment en bonne santé, âgés de 1 à 1,5 ans, ont été répartis en deux groupes de six animaux chacun selon leur type testiculaire : bipartite et non-bipartite (béliers avec ou sans bipartition scrotale), dans un dispositif complètement randomisé. Des échantillons de sperme ont été prélevés mensuellement sur tous les béliers pendant trois mois consécutifs. Les échantillons ont été évalués pour le volume spermatique (VM), le pourcentage de motilité (MT), la vitalité (VT) et le pH. Les traits morphométriques corporels tels que le périmètre thoracique (GC), la hauteur au garrot (HtW) et les mesures scrotales (longueur testiculaire (TL) et circonférence testiculaire (TC)) ont été mesurés en centimètres à l'aide d'un ruban flexible. Toutes les données ont été analysées par test t et corrélation de Pearson. Les résultats (33,72 vs 33,20 pour les béliers bipartites et non-bipartites) ont montré que le type testiculaire n'avait pas d'influence sur le gain de poids moyen ( $p > 0,05$ ), mais affectait certains traits morphométriques corporels (longueur du dos, hauteur au garrot et longueur du cou). Ils ont également révélé que le gain de poids moyen avait une corrélation positive avec le volume spermatique ( $p > 0,05$ ). La motilité (67,67 vs 62,50) et la viabilité (76,33 vs 71,67) du sperme des béliers Uda bipartites étaient significativement plus élevées ( $p < 0,05$ ) que celles des béliers

*non-bipartites. Ainsi, on conclut que les béliers Uda bipartites ont un meilleur potentiel de fécondation que les non-bipartites.*

**Mots-clés :** Béliers Uda, Type testiculaire, Poids corporel, Caractéristiques spermatiques.

### **Introduction**

In Nigeria, Uda has been the most ignored and less studied breed of sheep compared to Balami, Yankasa and West African dwarf (Blench, 1999). The role of ram in influencing fertility and genetic progress has been recognized for a long time (Endale *et al.*, 2009). Successive reproduction of a herd depends, among other factors, on the choice of a good breeder that will transmit its characteristics to its future offspring. Among the factors to be assessed in the male morphological aspects of the testicles (size, shape) which are important phenotypic indicators of breeding soundness in animal production system. In the practice of animal reproduction, especially ruminants, a limited number of males with peak reproductive efficiency are selected to impregnate many females in the same breeding system (Barth & Waldner, 2002). The basis for a sound knowledge of the male reproductive biology in any species lies in the detailed morpho-functional study of its reproductive organs (Segatelli *et al.*, 2015). Morphometric analysis of on the testes of any species or breed is necessary in predicting not only sperm production, but also the storage potential and fertilizing ability of the male (Adebayo *et al.*, 2009). Therefore, a proper assessment of the reproductive efficiency of the male is very important. Assisted reproductive technique (ART) is an important method of improving livestock production, animal breeding and conservation (Nash *et al.*, 2019). However, it is essential to obtain necessary reproductive data to develop the right set of tools for application of ART (Holt and Lloyd, 2009). The production rate is the most important factor in determining profitability in sheep enterprise. Well-established semen collection and evaluation protocols increase success rates of breeding program through ART (Pukazhethi and Wildt, 2004). There are different methods to evaluate the breeding potential of male farm and companion animals. The evaluation of semen quality is the most important step in the routine examination of breeding soundness (Ax *et al.*, 2000). The soundness of the male reproductive system can be

determined by various methods, including ultrasound examinations of the reproductive tract, especially the testis (Ortiz-Rodriguez *et al.*, 2017). Rarely, endocrine evaluation of circulating hormones such as follicle stimulating hormone (FSH), luteinizing hormone (LH), testosterone and estradiol may help determine the breeding capacity of some animal species (Dickson and Sanford 2005 ). Testicular size (which is represented either by testicular weight or volume) has been reported to be a good indicator of present and future sperm production in different animal species (Togun and Egbunike, 2006; Adebayo *et al.*, 2009). According to Mickelsen & Memon (2007), testicular size correlates, not only with spermatozoa production, but also with scrotal circumference. Therefore, this study was carried out to investigate the effect of testicular type on weight gain, morphometric and semen characteristics of Uda rams.

### **Materials and Methods**

#### ***Experimental Site***

The experiment was carried out at Demonstration Farm of Small Ruminant Unit, Department of Animal Health and Production, Federal Polytechnic Bauchi, between February and May, 2024.

#### ***Experimental Animal and Management***

A twelve Uda rams aged 1 to 1.5 years were purchased from livestock market of Gamawa local government area of Bauchi State and used for the study. Two weeks period was given for animal adaptation for both the feed and environment. The rams were fed groundnut hay in the morning and wheat bran, sorghum chaff and cowpea husk in mixture at evening hours, feeds and water were given for three months.

#### ***Semen Collection***

Semen samples were collected at morning hours from 8:00 am to 9:00 am three times throughout the period of the experiment at one month interval using a portable battery power electro-ejaculator method.

#### ***Semen evaluation***

Ejaculate were collected at the experimental farm and maintain at 37°C. The semen samples were

evaluated for Volume, pH, Semen Motility and Vitality.

#### **Procedures**

The high-powered electro ejaculator was set and made ready for use alongside the graduated collection tube and tissue paper. The semen volume was directly recorded from the graduated test tube immediately upon collection.

#### **Vitality (VTL)**

The percentage of live spermatozoa was subjectively estimated by stain method using eosin nigrosine. The spermatozoa motility was estimated by mixing a drop of prepared phosphate B saline with semen and a fixed volume was placed a warm glass slide and covered using cover slip. The mixture examined at x400 magnification.

The pH was obtained using pH strips and the colour change on the paper was compared with the standard strips directly without dilution.

#### **Body and scrotal measurements**

The linear body and scrotal measurement were measured using flexible tape in centimeters. The linear body measurement was measured as described by Alphonsus *et al.* (2009). The body traits considered were Average Weight (AW), Girth Circumference (GC), Height at Withers (HtW) as well as the scrotal measurements such as Testicular Length (TL) and Testicular Circumference (TC).

#### **Statistical analysis**

Student t-test was used to compare the means while correlation analysis was used to determine the relationship between the variables.

#### **Results**

Table 1 showed the outcome of the findings on semen characteristics between bipartite and non-bipartite Uda rams and indicated that the average body weight gain statistically differed ( $p < 0.05$ ) with bipartite Uda rams having the higher mean values.

Table 2 shows the correlation analysis between body linear measurement and semen characteristics of bipartite and non bipartite Uda rams it was revealed that there was positive relationship between semen volume, vitality, motility and PH with all the linear body measurements

Table 3 the table showed correlation analysis between testicular measurements and semen

indices of bipartite and non bipartite Uda rams and It was observed that a positive correlation exist between all the variables.

#### **Discussion**

The outcome of this findings revealed that the live weight had significant ( $p < 0.05$ ) influence on body measurement which agrees with the finding of Hassan. (2022) on Norduz breed of sheep. And Akpa *et al.* (2012) on Yankasa ram. Other parameters; Semen volume (0.86 vs 0.89), testicular circumference (23.67 vs 25.32), testicular length (13.88 vs 13.55), Girth circumference (78.80 vs 77.04), of bipartite and non bipartite Uda rams respectively were similar ( $p < 0.05$ ) though the semen values (0.86) and (0.89) observed in this study were not in agreement with (1.4ml) reported by Bamanga *et al.* (2011) in his work characteristics of Uda rams semen in Maiduguri and Hany *et al.* (2020) this could be attributed to the age, size of the animal or season of semen harvest. The motility value (67.67%) of bipartite Uda rams observed in this study, was higher than the value (63.08%) reported by Hany *et al.* (2020) and less than 80% reported by Bamanga *et al.* (2011) and not within the range (93.00 – 96.33%) given by Agbaya *et al.* (2021) in Nigerian breeds of sheep. The mean percentage semen vitality (VTL) observed in this study (76.33 vs 71.67) of bipartite and non bipartite Uda rams respectively were within the range (60%) reported by researchers as an average for successful chance of conception and less than (80%) reported by Olurode *et al.* (2018). The value (76.33) obtained in bipartite Uda rams was higher than (71.67) found on non bipartite Uda rams and differed significantly ( $p < 0.05$ ). This outcome coincides with the expectation and prove the theory that the sertoli cells of the testicular bipartitioned sheep support a greater quantity of cells of spermatozoa generated in each cycle of seminiferous epithelium. Also the differences observed between two groups in spermatogenesis yield might have occurred due to the differences in spermatogenic line process in bipartitioned animals, because in this animals, there may be less apoptosis and their testes have a greater evaporation surface, favoring the testicles heat regulation process thereby, give higher chances for semen vitality and other characteristics quality of the spermatozoa.

The average weight found in this study had a positive relationship with semen volume this signifies that the larger the ram the more semen produce during ejaculation or semen harvest. This finding is in line with the report of Akpa and Alphonsus (2012) who found similar scenario. Testicular circumference and length were also influenced by animal weight and this is in

agreement with the finding of Palasz *et al.* (2005) who stated that testicular size was ultimately correlated with capacity for sperm production, number of sperm ejaculate and sperm reservoirs. It was confirmed also by Akpa *et al.* (2012) that the testicular size is a good indicator of sperm production capacity.

**Table 1: Relationship between semen, body and scrotal parameters of bipartite and non-bipartite udu rams**

Parameters	Bipartite	Non Bipartite	Mean Combination	Mean Difference	Significance
AW(kg)	33.71	33.20	33.45	0.51	0.79
SV(ml)	0.86	08.89	0.88	0.03	0.64
MT(%)	67.66	62.50	65.08	5.16	0.00
TC(cm)	23.66	25.31	24.49	1.65	0.31
TL(cm)	13.88	13.55	13.71	0.33	0.71
pH	6.11	6.15	6.13	0.03	0.76
VTL(%)	76.33	71.67	74.00	4.67	0.00
GC(cm)	78.80	77.04	78.04	1.52	0.55
BL(cm)	57.02	58.48	57.75	1.47	0.29
HtW(cm)	70.96	72.93	71.97	1.97	0.14
NL(cm)	29.50	31.02	30.25	1.52	0.26

Average weight (AW), Semen Volume (SV), Semen Motility (MT), Testicular Circumference (TC) Testicular Length (TL), Semen Ph (pH), Semen Vitality (VTL), Girth circumference (GC), Back Length (BL), Height at Wither (HW), Neck Length (NL)

**Table 2: Correlation between body measurement and semen characteristics of udu rams**

Testicular types	Parameters	SV	MT	VTL	PH
		(mL)	(%)	(%)	
<b>Bipartite</b>	AW(cm)	0.05	0.64	0.28	0.23
	GC(cm)	0.29	0.79	0.96	0.02
	BL(cm)	0.99	0.92	0.36	0.78
	HtW(cm)	0.10	0.72	0.90	0.01
<b>Non bipartite</b>	AW(cm)	0.01	0.09	0.55	0.22
	GC(cm)	0.03	0.35	0.68	0.76
	BL(cm)	0.17	0.15	0.99	0.07
	HtW(cm)	0.05	0.16	0.79	0.24

Average Weight (AW),Girth circumference (GC), Back Length (BL), Height at Wither (HW), Neck Length (NL) Semen Volume (SV), Semen Motility (SM), Semen Vitality (VTL), Semen pH(pH)

**Table 3: Correlation between testicular measurements and semen characteristics**

Testicular types	Parameters	SV	MT	VTL	SPH
		(mL)	(%)	(%)	
<b>Bipartite</b>	TC(cm)	0.19	0.15	0.73	0.96
	TL(cm)	0.59	0.42	0.17	0.80

	TC(cm)	0.10	0.54	0.71	0.39
<b>Non bipartite</b>	TL(cm)	0.11	0.55	0.79	0.45

Testicular Circumference (TC), Testicular Length (TL), Semen Volume (SV), Semen Motility (MT), Semen Vitality (VTL), Semen Ph (SPh)

### Conclusion

In conclusion, this finding could serve as a base line for distinguishing the breeding capability between the two testicular types; bipartic and non bipartic Uda rams and to established a fact that testicular types had no influence on animal growth whereas body size determined semen volume and bipartic Uda rams semen had a higher egg fertilizing potential than non-bipartite.

### Acknowledgement

We cannot quantify the level of appreciation given to the tertiary education trust fund (Tetfund) for the intervention through the directorate for research and development Federal Polytechnic Bauchi Institutional Based Research (IBR). We also appreciate the colleagues in the Department of Animal Health and Production and staff of Science Laboratory Technology for contribution to the success of this research.

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Date received: 6<sup>th</sup> October, 2024

Date accepted: 12<sup>th</sup> April, 2025