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Assessment of Udder Size and Milk Yield of West African Dwarf (Wad) Goats Reared Under Semi Intensive Management System in Humid Nigeria

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ARTICLE INFO	ABSTRACT
	Studies on udder size of twenty lactating doe of West African Dwarf (WAD) goats were conducted to determine their Partial Daily Milk yield (PDM). Data were collected for the first twenty five days of lactation on daily basis Udder and teat traits studied were udder length (UL), udder width (UW), udder circumference (UC), teat length (TL), teat width (TW)I teat, circumference (C), teat height from ground (THG), and distance between the teat (DBT). The results of the study showed that there was a significant and high positive phenotypic correlation (P<0.05) between udder and teat traits. Regression analysis revealed that udder circumference (UC) was the most important single measurement accounted for over 22 percent of variation of partial Daily Milk yield (PDM) in this breed of goat. Hence, in predicting milk yield udder circumference is therefore not recommended to farmers. The multiple regression analysis reveals that yield and udder width were significant at both linear, Quadratic and cubic function while udder length was significant at quadratic and cubic functions. **Keywords**: Assessment, Udder size, Milk yield, West African Dwarf Goat.

INTRODUCTION

The main Nigeria breeds of domestic goat (*Capra hircus*) are the West African Dwarf (WAD), the Red Sokoto maradi (RS) and the white Bornu (WB) breeds. The West African Dwarf (WAD) goats are found in the South, which is the humid forest area (Hodges, 2002). The small ruminants are important genetic resource not only for Nigeria but also for all of West Africa, of the 16.25 million goats in Nigeria (Adu *et al.,* 1979), the West African Dwarf (WAD) goats account for 1.25 million (Osinowo, 1992). This breed, the West African Dwarf (WAD) goats have some special attributes which make their further development as productive breed, imperative (Odo *et al.,* 2000). The special attributes include being the only breed that is able to survive and successfully reproduce in the trypanosomiasis infested humid forest area of west and central African i.e it is trypanotolerant. It is a hardy breed and can

handle very coarse fibrous and aromatic feeds and survive other conditions inimical to other ruminant stock (Osaikwe, 2004). It is a highly prolific breed, litters of triplets are common and litters of 5 have been observed (Ngere *et al.,*1984). It breeds all year round i.e. not a seasonal breeder and 3 kid crops in 2 years is easy to achieve (Seykora and Mcdanile, 1983)

Mackenzie (1980) reported that goat milk has a lower bacterial content than cow milk. Goat milk among milk from other livestock species is unique because it contains enough nutrient and some antibodies. Milk yield per doe varies between individuals breed, as well as with stage and number of lactations, season and nutrition (Devendra and Mcleroy, 1982). The essence of goat improvement with respect to milk production is to increase the utilization of milk and milk related products by livestock and human populace. Measures that can be used to predict milk production will aid the farmers in taking management decision of such measures. There is therefore, the need to study the pattern of growth of the mammary gland in relation to their milk production. The pattern of growth of the mammary gland during pregnancy and lactation has been studied qualitatively for many years using parameters such as wet weight, dry fat-free tissue (DFFT) and DNA contest (Tucker, 1987).

However, Amao (1999) used udder volume to estimate milk production in goat. This study also intends using similar parameter, since the visible and measurable size of the udder largely reflects milk secretion capacity (Gall, 1980). Therefore this study has its objective to assess the mathematical relationship between udder size and milk yield of West African Dwarf (WAD) goats under semi, intensive management system.

MATERIALS AND METHODS

The study was conducted at the Goat Research unit of the Department of Animal Science Faculty of Agriculture, Delta State University, Asaba Campus. Delta State falls within the humid tropics of Nigeria and Asaba precisely lies between longitudes 6°E and 8°E, and Latitude 06° 49" North of the Equator. Asaba has its rainy season from March to September, with a mean annual rain fall of 1500-1849.3 mm. It has a moderate climate with very high temperature during the dry season (October to February) with it mean annual temperature and precipitation of 28°C ± 6 °C and 1117 mm; respectively.

The breeding animals were purchased direct from the open market in Asaba cattle market. Selection at this stage was by visual appraisal. Only animals that were structurally sound, free from obvious physical defects and appeared healthy were purchased. Initial herd of 20 pregnant does of WAD goats were purchased and transported to the experimental site. All the routine management practice such as inoculation, prophylactic application of certain drugs and chemicals to prevent incidence of disease as well as curative measures were applied as and when necessary. The goats were maintained on forage with a supplementary concentrate ration. Occasionally, they were sent out to graze around the goat unit containing grass species and browse plants *Andropagon gayanus, Cynadon nemfluenesis* and *Panicum maximum* as grasses, legumes *Centrosema pubescen, Impomea batata* and *Arachis hypogea* amongst others.

Data Collection and Analysis

Data were collected for twenty-five days; the measurement was taken using a flexible canvas tape, on the following parameters. Udder length (UL), udder width (UW), udder circumference (UC), distance between teat (DBT), teat height from the ground (THG), teat length (TL), teat width (TW) and teat circumference (TC).

All the measurement were done in the morning every day for twenty five days, before the animals were turned out to pasture and milked. Udder volume (UV) was derived by using the formula UV = 4/3 r^3 were $= 22/7$, r = (UL + UW)/4 as described by Amao (1999). Following parturition, does were milked on daily basis for 30 days. Does in particular are

temperamental and may refuse to let down milk if separated from their kids as such the kids were introduced twice a day (9am and 5pm) to suckle the dam in order to stimulate milk let down. As soon as the milk start letting down the Kids wereremoved and replaced by manually milking the dam milk into a clean measuring cylinder. Good sanitary measure was observed while milking. The milk collected after measurement were offered to the kids using a plastic feeding bottle, the milk obtained was defined as the partial daily milk yield (PDM). The PDM (in ML or G) was determined by a calibrated measuring cylinder and electronic weighing scale.

The data generated were subjected to Analysis of Variance using the GLM procure (SAS, 1999). Significant differences between means were separated using Duncans multiple range. Regression, of udder traits on milk yield was done to determine the measurement that can best predict milk yield of the goats.

RESULTS AND DISCUSSION

Parameter estimates from pair-wise regression analysis of udder measurements on milk yield of WAD goats are shown in Table 1 while the milk yield and udder measurement of West Africa dwarf (WAD) goats for the first 25 days of lactation are in Table 2. Udder Circumstance had the highest coefficient of determination (R^2) value 22.80 Udder Length and teat width measurement could only account for less than 11% of the variance in milk yield of the goats, However, Udder Width, teat Length and teat Height from Ground with coefficient of determination (R^2) value of 00.06, 00.03 and 00.76 respectively, they were not good for use in predicting milk yield of West Africa dwarf goats. The multiple regression analysis results in Table 2 revealed that yield and Udder Width were significant at both linear, Quadratic and cubic function while Udder Length was significant at quadratic and cubic functions.

Table 1: Parameter Estimate of Pair-Wise Regression Analy $15 of Udder measurement on Milk Yield of Wad Goat

Variables	Parameter Estimates		
	A	b ± SE	R^2 (%)
UDL	239.34	8.45 ± 2.27	10.13
UDW	259.89	0.35 ± 1.27	00.06
UDC	233.71	3.06 ± 0.51	22.80
TTL	261.33	0.22 ± 1.09	00.03
TTW	254.63	6.55 ± 1.68	11.04
TTC	254.46	4.30 ± 1.65	05.26
THG	271.38	-1.47 ± 1.51	00.76
DBT	267.83	-2.40 ± 1.40	02.22

YLD = Yield,UDL = Udder Length, UDW = Udder Width, UDC = Udder Circumstance, TTL = teat length, TTW Treat width, TTC = treat circumference, THG = treat height from ground, DBT = distance between treat.

The result of this present study showed clearly that there was highly positive significant phenotypic correlation between udder and teat traits (Except UW, TL and THG) during the 25 days of lactation. This work supports the observation of Montaldo and Martinez-Lozano (1993) and Amoa (1999). This could be a basis for selecting udder traits in indigenous goats as phenotypic correlations are essential for predicting indirect response in a multiple traits selection programme provided that the genetic basis is ascertained in milk yield where udder circumference can explain up toor above 22 percent of variation of milk yield in West Africa Dwarf (WAD) goat. Udder length and teat width measurement could only explain far less than 11 percent of the variation in milk yield of the goat. While udder width, teat length and teat height from ground could not explain up to 1 percent of the variation. Hence in predicting

milk yield measurement of udder circumference is sufficient. This observation confirms the finding of Dijkstra *et al.,*(1997) and Das and Sidhu (1975) in which udder circumference length, width and depth were significantly (P<0.01) correlated (r 0,465 to 0.866) with milk yield in Babari goat in India.

Table 2: Multiple Regression of Yield and Udder Measurements of West Africa Dwarf (WAD) Goats for the First 25 Days of Lactation

Dependent	Model	b^o	b^1	b^2	b^3	R^2	Sig.
YLD	LIN	252.59	0.69	-	-	0.86	**
	QUA	249.38	1.41	-0.03	-	0.92	**
	CUB	254.06	-0.56	0.16	-0.01	0.98	**
UDL	LIN	2.64	-0.00	-	-	0.00	NS
	QUA	2.15	0.11	-0.00	-	0.83	**
	CUB	2.32	0.04	0.00	-0.00	0.89	**
UDW	LIN	5.35	-0.03	-	-	0.30	**
	QUA	4.67	0.13	-0.01	-0.01	0.91	**
	CUB	4.92	0.02	0.00	0.00	0.95	**

YLD = Yield, UDL = Udder length, UDW = Udder width, Lin = Linear, QUA = Quadratic, Cub = Cubic

CONCLUSION

The result of the present study tends to show that substantial Increase in dimension of udder and teat traits of WAD goats occurred during early lactation. Rapid decline was also observed after the peak till the end of 25 days of lactation, though it fluctuates towards the end. The size of udder and teats during lactation could be significant determinant of average partial Daily milk yield (PDM) per lactation than the rate of increase while the rate of udder regression during lactation is as well important to average PDM. The result from this study can be utilized by farmers to assess milk yield in this breed of goats.

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