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INFLUENCE OF WATTLE GENE ON UDDER AND MILK YIELD CHARACTERISTICS IN RED SOKOTO GOATS

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Abstract

The Influence of Wattle Gene on Udder and Milk Yield Characteristics in Red Sokoto Goats was studied using records from 166 Red Sokoto goats consisting of 6 adult bucks and 60 adult does and 100 kids/progenies comprising 47 males and 53 females. The data were collected over a 3 years period (December, 2015 to December, 2018) at the Teaching and Research Farm of the Department of Animal Production Technology, College of Agriculture and Animal Science, Division of Agricultural Colleges, Ahmadu Bello University, Mando Road, Kaduna. The data were analysed using the General Linear Model (GLM) SAS. The udder morphological traits recorded were udder height (UH), udder circumference (UC), Teat length (TL), teats circumference (TC) and distance between two teats (DT). The milk yield characteristics measured were average daily yield (ADY), Initial yield (IY), Peak yield (PY), total yield (TY), Last test day yield (LTDY), peak days (PD) and Lactation length (LL). The results revealed that the mean value for udder morphological traits for wattled and non-wattled does were 14.00cm (UH), 26.95cm (UC), 3.62cm (TL), 4.05cm (TL), 8.0cm (DT) and 11.73cm (UH), 24.07cm (UC), 2.53cm (TL), 2.93cm (TC), 6.60cm (DT) respectively. While the mean value for milk yield characteristics for wattled and non-wattled does were 402.38g (ADY), 503.10g (IY), 681.42g (PY), 59.80kg (TY), 80.95g (LTDY), 33.40days (PD), 117.07days (LL) and 339.07g (ADY), 328.33g (IY), 457.67g (PY), 48.08kg (TY), 77.33g (LTDY), 33.09 days (PD), 113.17days (LL) respectively. Wattled gene significantly ($P<0.01$) affected udder morphological traits and milk yield characteristics. Wattled does produced significantly ($P<0.01$) higher milk yield (59.80g) compared to non-wattled does (48.08kg). it is recommended from the outcome of this research that livestock keepers and breeders should breed does with wattle for increase milk production in Red Sokoto goats.

Keywords: udder height (UH), udder circumference (UC), Teat length (TL), teats circumference (TC) and distance between two teats (DT)

Introduction

The Red Sokoto goats contribute to 70% of the country's goat population (Osuhor *et al* 2002). The Red Sokoto goat is uniformly dark red in colour, horns are present in both sexes, ears are short, medium width and usually carried horizontally (FAO, 2009, Abubakar *et al* 2019).

Wattle represents the congenital thumb-shaped appendages on the ventral throat and was common in domestic goats (Reber *et al.*, 2015). The presence of wattle is controlled by autosomal dominant gene (W) with complete or incomplete penetrance (Gasu *et al.*, 1970). Many production traits are correlated with presence or absence of wattle. Gasu *et al.*, (1970) observed in Sardinian breed of sheep that ewes with wattle produced more milk than ewes without wattle; and the lambing rate were higher in ewes with wattle than in ewes without them. Shongjia *et al.*, (1992) linked possession of wattle with reproductive traits such as higher prolificacy, higher milk yield, higher litter size and conception rate in Saanen, GuanLang and Crossbred goats.

There are scarce information on Influence of Wattle gene on udder and milk yield characteristics in Red sokoto goats. This study was therefore carried out to determine the influence of wattle gene on udder and yield characteristics in Red Sokoto goats.



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Materials and Methods

Experimental Site

The study was conducted at the Teaching and Research Farm of the Department of Animal Production Technology, College of Agriculture and Animal Science, Division of Agricultural Colleges, Ahmadu Bello University, Mando Road Kaduna. The College is on latitude 10°35'-13°58'N and longitude 7°25'-26°41'E (www.google.com). The rainfall in this area varies between 1000mm and 1500mm per annum and rainy season lasts for 150-200 days and dry season starts from October to early April. The mean annual temperature is about 34°C with hottest months being from March to April (40°C) and the coolest period (13°C) which is between December and January during severe harmattan (NIMET, 2015).

Animals and their Management

Sixty (60) lactating Red Sokoto does of parities between one to five were randomly selected for the research work. The goats were housed in a well-ventilated pens. They were identified using ear tags, and were kept under semi-intensive management system. The animals were released for grazing in batches or groups. The animals were supplemented with maize offals, cowpea husks and groundnut haulm; which gave 87.6% dry matter, 7.9% ash, 17% crude protein, 2.3% ether extract and 12.6 % crude fibre. Mineral lick was also provided. Water was given *ad libitum*. All the animals were de-wormed and vaccinated at the beginning and during the period of the research. The experiment lasted for thirty-six months (December 2015-December, 2018).

Milk Production and Evaluation

Milk production was monitored on both parents and offsprings populations for three years (2015-2018). After parturition, the kids were allowed to suckle their dams for seven days to enable them receive colostrum before the milking of the does commenced. The does were hand milked for 120 days. Milking was done twice daily; in the morning and evening and milking was also carried out twice in a week (Wednesdays and Saturdays). On the night preceding the milking day, the kids were separated from their dams and rejoined only after the evening milking. During the period of separation, the kids were bottle-fed with the goats' milk to avoid starvation. The does were milked by gently palpating the udder until milk letdown. Milking continued until the two halves of the udder were dried. The yield of each milk sample from the does were measured using a scale and values recorded in gram/day (g/day). The following determination were made; initial yield, peak yield, days at peak, total yield, (Akpa *et al.*, 2012).

- Initial Yield:- this was the first week average daily yield estimated as the average of the 2 days yield of the week.
- Peak yield:- the highest recorded test day yield within the sampling period.
- Peak day:- the first day, out of the recorded test days that had the highest yield.
- Days at peak:- these were days within the peak production after which it declined.
- Weekly total = $\frac{W + S}{2}$

Where

W = Wednesdays, S = Saturdays

$$\text{Total yield} = \sum_i^n \bar{X}_{ij} = X_1 + X_2 + \dots + X_n$$

X_i = number of weeks in 120 days of lactation

$$\text{Average daily yield} = \frac{\sum X_i}{N}$$

N = number of days of lactation.



Udder Morphology

The udder morphological characteristics of the does were taken once a week (Saturdays) prior to the milking of the does in the morning. The following udder morphological traits were measured and values recorded in centimeters (cm):

- Udder height:- The udder external features that were measured from the rear attachment of the udder to the point where it blends with the body.
- Udder circumference:- This was measured at the widest point of the udder around it.
- *Teat Length* (TL):- This was measured as the distance from the upper part of the teat, where it hangs perpendicular from the udder to the tip of the teat.
- Teat Circumference (TC):- This was measured at the widest point round the teat.
- Distance between two teats (DT):- This was measured as the space between the base of the two teats (Adewumi *et al.*, 2017).

Statistical Data Analysis

The data for this study were analysed using the General Linear Model (GLM) procedure of statistical analysis (SAS, 2012). The fixed effect includes type of birth, sex, effect of dam and month of birth. Significant differences were separated using Duncan's Multiple Range Test (Duncan, 1955).

Dam Model: the data were analysed using the following dam model:

- $Y_{ijk} = \mu + W_i + U_j + M_k + E_{ijk}$
- Y_{ijk} = any observation
- μ = the overall mean
- W_i = effect of wattle gene
- U_j = effect of udder dimensions
- M_k = effect of milk yield
- E_{ijk} = the random error term

Results and Discussion

The udder morphological traits for wattle and non-wattled Red Sokoto goats are shown in Table 1. Wattle and non-wattled condition significantly ($p < 0.01$) affected UH, UC ($p < 0.05$), TL, TC, and DT. Wattle does were observed to record higher values for all the traits measured, compared to non-wattled does.

Table 1: Udder Morphological Traits for Wattled and Non-wattled Red Sokoto Goats

Traits	N	UH(cm)	UC (cm)	TL(cm)	TC(cm)	DT(cm)
Wattled	30	14.00 ^a	26.95 ^a	3.62 ^a	4.05 ^a	7.95 ^a
Non wattled	30	11.73 ^b	24.07 ^b	2.53 ^b	2.93 ^b	6.60 ^b
LOS		**	*	**	**	**
S.E.M		0.13	0.34	0.10	0.10	0.12

* $p < 0.05$, ** $p < 0.01$, UH= udder height, UC = udder circumference, TL = teat length, TC = teat circumference, DT=distance between teat, LOS= Level of Significance, S.E.M= Standard error mean.

This might be probably due to the fact that possession of wattle was linked with higher production capacity (Shongjia *et al.*, 1992). The mean values for udder morphological traits recorded in the present study are comparable to the values reported by Zahraddeen *et al.*, (2007) and Benji and Osinowo (2009). These values are also within the range reported by Adewumi *et al.* (2017).



The mean \pm S.E. for lactation performance of wattled and non-wattled Red Sokoto goats are shown in Table 2. In this study, wattle significantly ($p < 0.01$) affected ADY, IY, PY and TY. There were also significant ($p < 0.05$) effect of wattle on LTDY, PD and LL.

Table 2: Mean Values of Lactation Performance of Wattled and Non-wattled Red Sokoto Goats.

Characteristics	Wattled	Non-wattled	LOS	S.E.M
ADY(g)	402.38 ^a	339.07 ^b	**	9.30
IY(g)	503.10 ^a	328.33 ^b	**	9.11
PY(g)	681.43 ^a	457.67 ^b	**	9.80
TY(kg)	59.80 ^a	48.08 ^b	**	1.11
LDY(g)	80.95 ^a	77.33 ^b	*	1.96
PD(days)	33.40 ^a	31.09 ^b	*	0.70
LL(days)	117.07 ^a	113.17 ^b	*	0.52

ADY=average daily yield, IY = Initial yield, PY=peak yield, TY= total yield, LDY = last day yield, PD=peak days, LL = lactation length, LOS= Level of significance, S.E.M=Standard error mean.

These are in agreement with the reports of Ijomanta (2012) in Red Sokoto goats who reported that wattled does significantly produced more milk (277.8mls/day) compared to non-wattled does (250.8mls/day); Williams *et al.* (2015) reported in West African Dwarf (WAD) goats that wattled animals produce significantly higher milk yield (297.72g/day) compared to their non-wattled counterparts (255.11g/day) and Hermiz *et al.*, (2016) in Shami goat who reported that does with wattle produced more milk (280.920kg) than those without wattle (225.475kg). Shongjia *et al.*, (1992) observed in Saanen does with wattle yielded higher milk than does without wattle. The higher value for wattle does compared to the non-wattled does obtained in this study is in line with the report of Gasu *et al.*, (1970), in Sardinian breed of sheep that ewes with wattle produced more milk than ewes without wattle.

Conclusion

- The wattled does produced significantly higher milk yield (59.80kg) compared to non-wattled does (48.08kg) during the lactation period.
- It was also seen that wattled does were superior in udder morphological traits examined in the present study; with wattled does recording higher values compared to non-wattled does.

Recommendation

It is recommended from the outcome of this research that livestock keepers and breeders should breed does with wattle to increase milk production.

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