The Haryana Veterinarian (March, 2024) **63(SI),** 92-94 ISSN 0033-4359 (P) **Research Article**

EVALUATION OF UDDER TRAITS OF JAMUNAPARI GOATS AT DIFFERENT LACTATION STAGES

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ABSTRACT

The present study was conducted with the aim of establishing the basic data about gross morphometric measurements of udder of Jamunapari she-goats at different lactation stages and its relationship with milk production. Udder and teat shapes and teat placement were also evaluated. In Jamunapari goats, udders were of bowl and cylindrical shaped and teats were bottle or cylindrical or funnel shaped. Gross morphometric parameters such as udder length (UL) (cm), udder diameter (UDi) (cm), udder depth (UD) (cm), teat length (TL) (cm), average teat diameter (TDB), inter teat distance (ITD) (cm), teat floor distance (TGD) (cm) and inter teat angle (in degree) were recorded at different stages of lactation. Length and diameter of the udder was significantly decreased from early to mid-lactation period whereas non-significant changes were recorded in length and width of teat. Milk production was significantly correlated with udder length and highly significantly correlated with udder diameter and teat length.

Keywords: Jamunapari, Lactation stages, Morphometry, Teat, Udder

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Anatomical knowledge of the mammary gland at different stages is desirable, to understand the background information in the physiology, pathology, surgery, medicine, livestock production and management and genetics. Since the mammary glands are very prone for traumatic injury, infection and other diseases, the basic anatomy plays a crucial role in understanding to access the damage of tissue and approach in treating and restoring the normal condition of the udder and teat provide base-line information from which the animals could be selected for milk production and milking ability. Among the 20 classified breeds of goats found in India, Jamunapari Goat is one of the important milch breed. Although a majority of studies report the effect of udder health on milk yield, milk composition and other properties in cow and sheep, however, these research findings cannot easily be adapted to our goat breeds due to variation in genetic makeup, climate, vegetation and feeding regimen. So, the present study was designed to correlate the udder traits of Jamunapari goats at different lactation stages with milk yield.

MATERIALS AND METHODS

The study was conducted in goat farm of DUVASU, Mathura, Uttar Pradesh. 40 healthy Jamunapari goats with symmetrical udder were reared for this study. In order to evaluate udder conformation, the animals were kept in a standing position on slope-free ground. Measurements for udder characteristics were taken one hour before milking with the help of vernier callipers and measuring tape. The measurements were taken at early (45 days), mid (75 days) and late lactation (125 days) stages. Udder diameter/ circumference (UDi) at the base, middle and at the level of intermammary Groove, Udder length (UL) from base of the gland to the base of the teat, Udder depth (UD) from base to inter mammary groove were measured with the help of measuring tape. The gross anatomical parameters of teats *via*, (TL) teat length (distance between base and tip) teat diameter at base (TDB), teat diameter at tip (TDT), the inter teat distance (ITD) at the base and inter teat angle at the base of the teats were measured using a measuring tape and vernier calliper (Margatho *et al.*, 2020). Teat to floor distance (distance between the apex of the teat to the ground) for both right and left teats was recorded by using measuring tape. SPSS26.0 for Windows was used for statistical analysis of data.

RESULTS AND DISCUSSION

The udder and teat of Jamunapari goats were categorized on the basis of their shape. Various shapes of the udder *viz.* bowl and cylindrical shaped and teat *viz.* Funnel, cylindrical and bottle shaped were observed in Jamunapari goats as observed in Barbari goats (Gupta *et al.*, 2022). In West African Dwarf (Wad) goats, bowl, cylindrical and funnel shaped udder were noticed by James *et al.* (2009). Number of goats with bowl shaped udder was more than cylindrical shaped udder which is in accordance with the observation of James *et al.* (2009) in West African Dwarf (Wad) goats and Gupta *et al.*, 2022 in Barbari goats. Montaldo and Lozano (1993) found that bowl-shaped udder was the most desirable with respect to milk production as well as mammary gland health. Whereas, Contreras *et al.* (1999) noticed that the globular-shaped udder was the most predominant in commercial dairy goat. In the present

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study funnel type of teats were predominant over bottle and cylindrical shaped teat. This result was harmony with Gupta *et al.* (2022) in Barbari goats.

Gross morphometric parameters such as udder length (UL) (cm), udder diameter (UDi) (cm) and udder depth (UD) (cm), teat length (TL) (cm), average teat diameter (TDB), inter teat distance (ITD) (cm), teat floor distance (TGD) (cm) and inter teat angle (in degree) were recorded at different stages of lactation in Jamunapari goats (Table 1). Length and diameter of the udder was significantly decreased from early to mid-lactation period as reported earlier by Peris *et al.* (1999) and Pawlina *et al.* (2005) in goats. Rovai *et al.* (1999) in Manchega and Lacaune dairy sheep reported that Udder depth and length declined throughout lactation ($P<0.001$), reaching the maximum in the first week. Cividini *et al.* (2016) in French Alpine goats also found decrease in udder depth and width with the advancement of lactation. Udder length was highly significantly (1% level of significance) correlated with udder diameter. Udder length was also significantly (5% level of significance) correlated with udder depth and teat length and negatively with inter teat angle. In Manchega and Lacaune dairy sheep, all stages of lactation, positive correlations were observed between udder size measurements (depth, length and distance between teats) and milk production ($r = 0.33$-0.72; $P<0.05$) and in Manchega breed, between udder size and teat length and width ($P<0.05$) (Rovai *et al.*, 1999). In West African Dwarf does and ewes, significant ($p<0.001$) positive phenotypic correlations were reported between udder dimensions; but not between udder dimensions and teat dimensions (James *et al.*, 2009). The correlation observed for each of UC and UL were positively significant ($P<0.01$) with milk traits in Black goats and correlations of UL, DBT and MY in Meriz were also positively significant (Merkhan and Alkass, 2011). Udder and teat characteristics of hairy goats of turkey were found positively correlated with milk production characteristics both 30^{th} and 180^{th} days of the lactation period (Okan and Özdal, 2016). In Jamunapari goat milk production was significantly correlated with udder length and highly significantly correlated with udder diameter. It might be concluded that an increase in milk production is related to wider and higher udder than longer udders. Keskin *et al.* (2005) reported that udder circumference was in the highest correlation with the goat milk yield compared to other external udder measures. Although, they found a relatively weak relationship between the morphological traits of udder and milk production. Cedden *et al.* (2008) and Upadhyay *et al.* (2014), noticed that there were high phenotypic correlations ($r = 0.6$-0.8) between external measures defining udder size (circumference, depth, and width of the udder) and milk yield. Despite the positive correlation with the daily milk yield, Cividini *et al.* (2016) in French Alpine goats observed that there was a significant negative correlation between udder depth and udder width and duration of lactation udder depth and width decreased with the advancement of lactation.

Non-significant changes were recorded in length and width of teat of goats with advancement of lactation whereas in dairy ewes teat size (length and width) decrease between the 1^{st} and 4^{th} month of lactation (Seykora and McDaniel, 1986) probably caused by lower yield throughout lactation. In contrary to this Pawlina *et al.* (2005) in goats recorded that teat length and width increased with advancement of lactation. Teat length, diameter and inter teat distance were non-significantly changed with advancement of lactation stages. Papachristoforou *et al.* (1981), Purroy *et al.* (1982), Gallego *et al.* (1983), Arranz *et al.* (1989) and Rovai *et al.* (1999) in sheep noticed that distance between teats did not show any changes in the first 6 weeks of lactation although its size reduced after the lambs weaning ($P<0.001$). They suggested that the productive capacity of the ewe is related to the distance between teats. In present study, statistically significant difference was recorded in teat angle from early to mid-lactation and teat ground distance from mid to late lactation stages. Inter teat angle was negatively significantly ($p>0.5$) correlated with udder length, diameter, depth and teat length and diameter. Similarly, teat ground distance was negatively highly significantly correlated with teat length and diameter. Inter teat distance was significantly correlated with udder diameter indicating that wider udders show a horizontal position of teats. Milk yield was highly significantly correlated with teat length. Whereas, in sheep no relationship was observed between milk production and teat morphology (Rovai *et al.*, 1999). These authors reported that milk production was correlated significantly with udder depth and distance between teats during all months of lactation. This shows that the larger milk production is related to a bigger udder size (Labussière *et al.*, 1981). Keskin *et al.* (2005) and Upadhyay *et al.* (2014) in goats recorded that the morphological traits of teats are positively correlated with the quantity of milk produced. Milk yield was highly significantly correlated with the circumference of teats.

It can be concluded that in Jamunapari goats milk production was highest during first 30 days of lactation. It was highly significantly correlated with udder diameter and teat length. Udder length and diameter decreased with advancement of lactation whereas angle between teats increased which was negatively highly significantly correlated with other parameters of udder and teat.

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Table 1. Comparative values (Mean±SE) of linear parameters of udder and teat of Jamunapari goats during different lactation stages

Days	30.0	90.0	120.0
MY^{NS}	600.96±45.520	568.46 ±37.45	521.54±27.14
UL	16.9±0.7^{b}	13.8±0.5^{a}	13.4±0.3^{a}
UDI	24.7±0.8^{b}	19.5±0.6^{a}	19.1±0.6^{a}
UD^{NS}	2.3±0.2	1.9±0.1	2.1±0.1
TL^{NS}	8.2±0.4	8.3±0.4	8.1±0.4
TD^{NS}	5.0±0.2	4.9±0.2	5.0±0.4
TA	102.2±5.1^{a}	128.6±4.2^{b}	121.9±4.9^{b}
TGD	33.1±0.8^{a}	33.0±0.8^{a}	35.5±0.8^{b}
ITD^{NS}	8.1±1.3	6.0±0.3	7.0±1.1

n = 40 NS- non significant, a, b, c, superscript showed the significant different between lactation days

Table 2. Correlation coefficient between different udder traits and milk yield in Jamunapari goats

	MY	UL	Udi	UD	TL	TDi	TA	TGD	ITD
MY	1								
UL	.248*	1							
Udi	.298**	.660**	1						
UD	0.093	.265*	0.185	1					
TL	.331**	.231*	0.041	0.213	1				
TDi	0.195	0.193	0.143	0.194	.605**	1			
TA	-0.16	-.439**	-.375**	-.558**	-.298**	-.236*	1		
TGD	-0.205	-0.2	-0.046	0.01	-.308**	-.327**	0.16	1	
ITD	-0.023	0.139	.242*	-0.188	0.005	-0.009	-0.125	-0.104	1

**Shows highly significant (at the 0.01 level), *Significant (at the 0.05 level)

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