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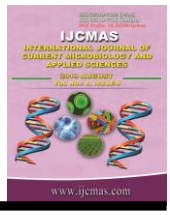

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Udder Morphology Relationship with Milk Yield in Singlet and Twins Bearing Surti Goat

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A B S T R A C T

The goat contributes 3.5 % of the total milk and 19% of the total meat production in India. As Goat is called a poor man's cow because it provides milk, manure and protein source at low cost. Goat is gaining recognition in the backyard industry because of fewer space necessities and better efficiency than cattle's. Production performances supposed to vary with twin or singlet kidding in goats. The present investigation was undertaken to study the production performance in a singlet and twin kid bearing Surti goats. The milk yield in twin bearing goats was significantly ($P<0.01$) higher on 7 (528.57±31.99 Vs 314.28±58.84), 15 (714.28±40.40 Vs 414.28±50.84), 30 (500±92.58 Vs 314.28±40.40) day of kidding. Udder length (40.00±0.53 Vs 35.57±1.32) in doe was significantly higher ($P<0.05$) in twin bearing goats on 45 days of kidding. Other udder parameters were also higher in twin but it was not significant. The result shows the udder development and milk production higher in twin bearing doe hence value also related to parity.

Introduction

India has witnessed a white revolution during the seventies which attributed to manifold increase in milk production. India is at number one in milk production. However, the productivity of India is still very low as compared to developed countries. Total registered breed of goat in India is 34 (NABGAR, 2018). India ranks second in goat population. The total population of goat in India is 135.17 (GOI, 2012-13). The production and reproduction performance of various Indian goat breeds were described in

details but it is scanty on Surti goats in its breeding tract. (Ahmed *et al.,* 2007; Alam *et al.,* 2008; Lawar *et al.,* 2008; Rao *et al.,* 2009; Singh *et al.,* 2009). An increasing number of corpora lutea may contribute more release of estrogen and progesterone secretion, which lead to stimulation of mammary gland development in goat bearing twin kid. In sheep also increase in litter size related to a rise in progesterone and better mammary development (Butler *et al.,* 1981). Low conditioned ewe can induce deleterious effects on fetal and newborn lambs by adversely affecting placental size, fetal growth, deposition of fetal fat reserves for use after birth, maternal udder development and colostrums and milk production (Mellor, 1983; Mellor, 1988).

Scanty reports are available on Milk production concerning variation in size and shape of the udder. Also, very few studies carried out on Surti breed of goat**.** In view of the need to address these researchable issues in a holistic manner, it is designed to critically examine the change in morphology of udder related with milk production especially for singlet and twin kid bearing Surti goat.

Materials and Methods

The present study was conducted in the Department of Livestock Production and Management. The experimental animals were maintained at Livestock Research Station, Navsari Agricultural University, Navsari. Navsari is geographically located at an altitude of 11.89 M above mean sea level, at a latitude of 20°57'0" north and longitude of 72°54'0" east. The research was carried out on 14 Surti goats after kidding and grouping of the dams based on singlet and twin kid birth of 7 each. Udder biometry was taken with measuring tape. Udder height, udder circumference, udder width and udder length were measured on 0, 7, 15, 30, 45 and 60 days of postpartum. Milk was collected on 0, 7, 15, 30, 45 and 60 days. Data were analyzed using correlation, t-test and DMRT for comparison of a mean as per standard statistical procedures (Snedecor and Cochran, 1994).

Results and Discussion

The results of the change in milk yield/day have been presented in Table 1. The mean values of singlet bearing group were 485.71±98.63, 314.28±58.84, 414.28±50.84, 314.28±40.40, 285.71±67.00 and 228.57±47.38 on 0, 7,15,30,45 and 60 day after parturition respectively. The mean values of milk production in twin bearing group were 628.57±99.31, 528.57±31.99, 714.28±40.40, 500±92.58, 285.71±85.71 and 444.28±76.93 on 0,7,15, 30,45 and 60 day after parturition respectively. Goats that produced twin yielded more milk and had longer lactation (Carnicella *et al.,* 2008) length. Does with multiple kids produced more milk than those with single kids was also reported by Hassan *et al.,* (2010). This data are shown in table 1.

The mean values of Udder length in Surti doe was significantly higher (P>0.05) in twin bearing goats on 45 days of parturition as compared to a singlet. While comparing within-group the mean values of udder length were similar on all test days of parturition in singlet and twin group. Overall udder length varies from 35.35 to 37.35 cm. The mean values of udder circumference in Surti doe did not differ significantly (P>0.05) between singlet and twin group though it was higher in twin group. The mean values of udder circumference in Surti doe were similar on all test day of parturition in singlet and twin group. Overall udder circumference varies from 35.14 to 37.07 cm. The mean values of udder depth in Surti doe did not differ significantly (P>0.05) between singlet and twin group although it was higher in the twin group. While comparing within-group the

mean values of udder depth were similar on all test days of parturition in singlet and twin group. Overall udder depth varies from 32.71 to 34.57 cm. The mean values of udder width in Surti doe did not differ significantly (P>0.05) between singlet and twin group, Mean values of udder width were higher in twin as compared to singlet group on 7, 15, 30 and 45 days of kidding.

While comparing within-group the mean values of udder width significantly differ on 7 and 60 days of parturition in singlet group.similar mean values of udder width were observed on 7, 15, 30 and 45 day; 0 and 60 days of parturition in singlet group. However, in twin, the similar mean values of udder width on 15, 30, 45 and 60 days of parturition were observed. Overall udder width varies from 10.28 to 11.42 cm.

Udder morphological characters are important indicators of milk production potential as several studies have attempted to estimate the relationship. Even a prediction equation has been developed for milk yield estimation using different morphological udder measurements in goat by Akporhuarho *et al.*, (2010). Upadhyay *et al.*, (2014) claimed higher udder volume in multiparous animals might be due to complete growth and active phase of the mammary system with advancement of parity. The present results were in agreement with Gall (1980) who found that udder volume increased with parity.

Further, parity also significantly affected the average daily milk yield (ADMY) and total milk yield (TMY). Conversely, Amao *et al.*, (2003) concluded that parity had no significant effect on udder traits.

Table.1 Results of change in milk yield/day

Parameters	Groups	0 (Day)	7	15	30	45	60
Milk yield (gm)	Singlet	485.71±98.63^{b}	314.28±58.84$^{a\ b**}$	414.28±50.84^{b**}	314.28±40.40$^{a\ b**}$	285.71±67.00$^{a\ b}$	228.57±47.38^{a}
	Twin	628.57±99.31$^{a\ b}$	528.57±31.99$^{a\ b**}$	714.28±40.40^{b**}	500±92.58$^{a\ b**}$	285.71±85.71^{a}	444.28±76.93$^{a\ b}$
	Over all	557.14±70.09	421.42±61.28	564.28±81.60	407.14±54.93	335.71±54.07	271.42±58.76

Mean bearing different superscript within same row differ significantly (abcd P <0.05)
Mean bearing * within same column significantly (* P <0.05)

Table.2 Udder morphological characters

Parameters	Groups	Days					
		0	7	15	30	45	60
Udder length (Cm)	Singlet	32.28±1.40^{a}	32.71±1.26^{a}	34.14±1.12^{a}	34.14±1.35^{a}	34.57±1.32^{a*}	34.14±1.40^{a}
	Twin	40.42±0.42^{a}	38.00±0.37^{a}	39.57±0.61^{a}	39.57±0.42^{a}	40.00±0.53^{a*}	40.42±0.57^{a}
	Over all	37.35±1.10	35.35±0.99	36.85±0.97	36.85±1.01	37.28±1.01	37.28±1.13
Udder circumference (Cm)	Singlet	35.14±1.10^{a}	33.71±1.12^{a}	34.71±1.04^{a}	34.85±1.07^{a}	34.85±1.07^{a}	35.85±1.07^{a}
	Twin	39.16±0.98^{a}	36.57±0.89^{a}	37.28±0.86^{a}	37.28±0.86^{a}	37.28±0,86^{a}	38.28±0.86^{a}
	Over all	37.00±085	35.14±0.79	36.00±0.74	36.07±0.74	36.07.±0.74	37.07±0.74
Udder depth (Cm)	Singlet	33.42±1.23^{a}	31.71±1.18^{a}	33.14±1.12^{a}	34.85±1.07^{a}	33.00±1.04^{a}	33.07±1.04^{a}
	Twin	35.71±0.71^{a}	33.71±1.04^{a}	35.00±0.97^{a}	37.28±0.86^{a}	34.28±0.52^{a}	35.57±0.81^{a}
	Over all	34.57±0.75	32.71±0.80	33.07±0.75	33.64±0.58	33.64±0.58	34.57±0.69
Udder Width (cm)	Singlet	11.42±0.52^{bc}	10.14±0.40^{a}	11.14±0.40$^{a\ b\ c}$	10.28±0.28$^{a\ b}$	10.28±0.28$^{a\ b}$	11.57±0.36^{c}
	Twin	11.14±0.34^{a}	10.42±0.48^{a}	11.28±0.48^{a}	10.28±0.35^{a}	10.28±0.35^{a}	11.28±0.35^{a}
	Over all	11.28±0.30	10.28±0.30	11.21±0.28	10.28±0.22	10.28±0.22	11.42±0.25

Mean bearing different superscript within same row differ significantly (abcd P <0.05)
Mean bearing * within same column differ significantly (* P<0.05)

Table.3 Effect of parity on singlet and twin kid bearing Surti goats		
Pattern of kidding	**Mean ± S.E of Parity**	**P-value**
Singlet	1.00±0.00*	0.04
Twin	3.85± 0.63*	

Similar to present result Kala and Prakash (1990) found peak yield in the third week period in Jamunapari goats. Rout *et al.*, (1999) reported that Jamunapari can produce 4.9 liters of milk daily with average lactation yields 1.5 liters/day.

Milk yields increased up to the end of two months and then started to decline with an average lactation length of 260 days. The peak milk during the 4th week was reported by Louca *et al.*, (1975) in Damascus goats followed by a steady decline.

The daily milk yield was different between stages of lactation. This supported Strzalkowska *et al.*, (2009).

Similar to our result Laes-Fettback and Peters (1995) evaluated three Egyptian goat breeds like Baladi, Zaraibi and Damascus and concluded that all the three breeds had high persistency with a slightly higher yield during the initial part of lactation in Zaraibi and Damascus

Effect of parity on a singlet and twin bearing goat have been presented in Table 3. Twinning was significantly (P<0.05) higher in multiparous goat as compared to a uni-parous goat.

In the present experiment all the singlet kid bearing goats were of first parity and 6 animals of twin kid bearing goats were multiparous and one goat was a uni-parous category.

The milk yield in twin bearing goats was significantly (P<0.01) higher on 7, 15 and 30 days of parturition as compared to singlet bearing Surti does. The mean values of milk yield decreased after 15 days of parturition in both singlet and twin bearing group. Udder length in doe was significantly higher (P>0.05) in twin bearing on 45 days of parturition as compared to the singlet, the bearing does. Udder characteristics of twin bearing Doe were higher compared to single bearing doe. Consequently, their udder characteristics were more developed than singlet bearing doe. Mammary growth and development increased with parity number.

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