

EFFECT OF PARITY ON UDDER AND TEAT BIOMETRY AND ITS ASSOCIATION WITH MILK YIELD IN GIR COWS

R.H. Modh, M.M. Islam, Y.G. Patel, R.J. Modi and K.N. Wadhvani*

Department of Livestock Production Management
College of Veterinary Science and Animal Husbandry
Anand Agriculture University, Anand, Gujarat, INDIA
E-mail: knwadhvani@aau.in

Abstract: The present investigation was conducted on the milking herd of Gir cows of Anand district and the animals were selected on random basis and categorized into different parities. The objective of study was to study the morphometric characteristics of udder and teat and its association with milk yield. Udder length, width, depth and Teat Length and diameter were measured 1 hour prior to milking and after milking the quantity of milk was measured by weight balance. The average length, width and depth of udder were 61.95 ± 1.20 , 62.99 ± 1.17 , and 25.62 ± 0.43 cm, respectively. The average length of fore teats was found to be non-significantly longer than rear teats (9.26 cm VS 8.64 cm). The correlations between milk yield and udder width (0.194) and was found positive and significant ($P < 0.05$) while correlations between milk yield and udder length (0.128) and udder depth (0.157) was non-significant.

Keywords: Parity, udder, teat, Gir, milk.

Introduction

India ranks first in milk production and has witnessed white revolution attributed to its manifold increase in milk production in the world during post-independent era. Milk production has tremendously increased from 17 million tons in 1951 to 155.5 million tons in 2015-16 with a growth rate of 6.27% [2]. Udder is the first site judgment of local brokers or animal husbandry men in our country for judging the milking ability of animals. So it is more important to have knowledge of morphology of udder and teats and its relation with milk yield. Indian cattle breeds are described on the basis of colour, shape, body size, horn but very little information is available on udder characteristics. In India, systematic data on type and confirmation on teat and udder are not available for different breeds. Judging of dairy cattle is nearer to perfection [3]. The knowledge of development of udder and their association with milk production is necessary. The production records of most of the animals, particularly in villages, are not available. Therefore, in selecting economical to the uneconomical cow, it becomes essential to have some idea about the

*Received May 23, 2017 * Published June 2, 2017 * www.ijset.net*

production capacity of udder. Hence, the present study was conducted to see the effect of parity on udder and teat biometry and its association with milk yield in Gir cows.

Materials and Methods

Data for the present study was collected from 150 lactating Gir cows of different parities from different location of Anand district. All the cows considered for collection of data were apparently healthy. The cows were housed in loose or conventional sheds and were milked twice a day using either hand or machine milking. Dairy farms were visited in sequential manner and data were carefully collected/recorded personally. Observations viz; Udder length (UL), Udder width (UW), Udder depth (UD), Teat length (TL), Teat diameter (TD) and Test day milk yield (MY) were collected from each cow.

The udder length was measured with the help of measuring tape from the rear attachment of the udder, near the escutcheon, to the front of the udder where it blends smoothly with the body. The udder width was measured as a distance between two lateral lines of attachment of the udder to abdominal wall, beneath the flank. The measuring tape was kept in position on one side of the cow, under flank, near the stifle joint and it was passed over in between fore and rear teats to the other side. The udder depth was measured by subtracting distance from the barn floor to the udder floor from distance from the barn floor to the base of the udder.

Teat length was measured from the upper part of the teat, where it hangs perpendicularly from the quarter to the tip. Teat length was measured to the nearest 0.01 cm using Vernier Caliper. Teat diameter was measured at the mid- point length by Vernier Caliper to the nearest 0.01 cm. All four teats were measured individually and average length was worked out.

All the measurements were taken one to two hours before the evening milking after securing the animals properly in a standing position on a leveled pucca floor for the accuracy. All the measurements were recorded in centimeters. Statistical analysis was done using standard procedures [14].

Results and Discussion

The mean values of udder length, width and depth in different parities ranged from 50.88 ± 4.29 to 65.44 ± 5.68 , 53.83 ± 3.95 to 72.55 ± 5.88 and 24.22 ± 1.20 to 30.38 ± 3.07 cm, respectively (Table 1). Perusal of data showed significant ($P < 0.05$) increasing trend in length and width of the udder from 1st to 2nd parity at the rate of 24.3 and 9.7 %, respectively which afterwards length of udder became static and width become static up to 4th parity but increased by 15.16 % from 4th parity to 5th parity, Whereas udder depth was

at par among the parities. Reduction in udder length in 4th parity of Jersey × Red Sindhi results indicated that multiparous cows had a significant ($P < 0.05$) larger volume of udder than the primiparous cows [5 & 9]. Udder length, width and depth in different parities which ranged from 54.93 ± 1.21 to 62.56 ± 2.23 , 60.69 ± 1.22 to 69.32 ± 2.14 and 20.87 ± 0.50 to 26.58 ± 1.05 cm, respectively in crossbred cows [8]. The mean udder length, width and depth was increased from 49.2 ± 0.8 to 62.9 ± 1.2 , 55.6 ± 0.9 to 73.5 ± 1.3 and 19.4 ± 0.4 to 28.5 ± 0.7 cm, respectively in Vrindavani cattle [12] which supported the present findings.

The fore teat length (FTL) and rear teat length (cm) (RTL) (Table 2) of Gir cows in different parities ranged from 8.74 ± 0.77 to 9.82 ± 0.94 and 7.97 ± 0.74 to 8.88 ± 0.95 , respectively. Perusal of data showed a gradual non-significant increase in length of fore (7.56 %) and rear (8.28%) teat between 1st and 2nd parity whereas there was minute increment in both the teat types with the advancement of parity after 2nd parity. Similar results in Holstein crossbred cows where in fore teat length has increased with the advancement in parity [7]. Significant ($P < 0.05$) to highly significant ($P < 0.01$) effect of parity on teat length have been observed in Vrindavani cattle, Harijana cows, Tharparkar cows, Kankrej cows and Gir cows by many workers [12 & 13] are contraindicated the present findings.

Mean fore teat diameter (FTD) and rear teat diameter (RTD) of Gir cows in different parities ranged from 3.27 ± 0.20 to 4.11 ± 0.27 and 3.42 ± 0.17 to 3.97 ± 0.26 , respectively (Table 2). The differences observed in fore teat diameter and rear teat diameters in different parities were at par. There was no any definite trend in diameter with advancement of parity. There was no record of a clear definite trend in fore and rear teat diameter in Harijana and Tharparkar cows with advancement of parity [11].

Correlation coefficients observed between various udder and teat measurements and test day milk yield are shown in Table 3. Highly significant ($P < 0.01$) and positive correlations were observed among the udder measurements viz., udder length (UL), udder width (UW) and udder depth (UD). This indicates that all three udder measurements were closely inter-related. Similar results were observed in Gir cows [13 & 15], Jersey × Kankrej F₁ cows [10] and in Sahiwal cows [1]. Similarly, positive and significant ($P < 0.05$) to highly significant ($P < 0.01$) association of udder length, width and depth with average fore teat length, rear teat length, fore teat diameter, rear teat diameter, overall teat length and overall teat diameter were observed. Significant ($P < 0.05$) association of udder length, width and depth with overall teat length and overall teat diameter in Gir cows [13].

The correlations observed between various teat measurements viz., fore teat length (FTL, rear teat length, fore teat diameter and rear teat diameter were also positive and significant ($P < 0.05$) to highly significant ($P < 0.01$). Significant ($P < 0.05$) correlation reported between the teat length and teat diameter [15].

The correlations between milk yield and udder width was found positive (0.194) and significant ($P < 0.05$) but non-significantly correlated with length and depth. These findings reflected that all the three udder measurements should be the important criteria for selection of dairy cows as the udder length, width and depth decides the capacity of udder which reflects the milk yield. The various udder measurements showed positive and significant ($P < 0.05$) correlation with test day milk yield in Jersey \times Red Sindhi crossbred cows [5], in Holdeo crossbred cows [16], in Vrindavani cattle [12] in Kenana \times Friesian crossbred cows [4] supported the present findings.

In present study, all the teat measurements showed a non-significant relation with the milk yield, while working on Karan-fries cows, reported that all four teats diameter were almost same and the correlation coefficient of teat length and diameter with milk production was not encouraging [6].

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Table 1: Udder measurements (cm) of Gir cows in different parities

| Parity | N | Udder Measurements | | |
|----------------|------------|---------------------------|---------------------------|---------------------|
| | | Length | Width | Depth |
| 1 | 18 | 50.88 ^a ± 4.29 | 53.83 ^a ± 3.95 | 24.22 ± 1.20 |
| 2 | 55 | 63.25 ^b ± 1.76 | 64.47 ^b ± 1.83 | 25.48 ± 0.70 |
| 3 | 41 | 62.92 ^b ± 1.99 | 62.92 ^b ± 1.90 | 25.29 ± 0.68 |
| 4 | 27 | 64.03 ^b ± 2.81 | 63.00 ^b ± 2.68 | 25.70 ± 0.87 |
| ≥ 5 | 9 | 65.44 ^b ± 5.68 | 72.55 ^c ± 5.88 | 30.38 ± 3.07 |
| Overall | 150 | 61.95 ± 1.20 | 62.99 ± 1.17 | 25.62 ± 0.43 |

Means with different superscripts (a, b) in columns differ significantly (P<0.05)

Table 2: Teat measurements (cm) of Gir cows in different parities

| Parity | N | FTL | RTL | FTD | RTD |
|----------------|------------|--------------------|--------------------|-------------------|--------------------|
| 1 | 18 | 8.74 ± 0.77 | 7.97 ± 0.74 | 3.27 ± 0.20 | 3.42 ± 0.17 |
| 2 | 55 | 9.40 ± 0.32 | 8.63 ± 0.28 | 3.66 ± 0.13 | 3.51 ± 0.12 |
| 3 | 41 | 9.36 ± 0.36 | 8.90 ± 0.30 | 3.94 ± 0.15 | 3.83 ± 0.15 |
| 4 | 27 | 8.96 ± 0.41 | 8.64 ± 0.39 | 3.73 ± 0.13 | 3.69 ± 0.11 |
| ≥ 5 | 9 | 9.82 ± 0.94 | 8.88 ± 0.95 | 4.11 ± 0.27 | 3.97 ± 0.26 |
| Overall | 150 | 9.26 ± 0.19 | 8.64 ± 0.18 | 3.7 ± 0.07 | 3.65 ± 0.06 |

Table 3: Correlation coefficients between various udder and teat measurements and test day milk yield in Gir cows

| | MY | UL | UW | UD | FTL | RTL | FTD | RTD |
|-----|--------|---------|---------|--------|---------|---------|---------|-----|
| MY | | | | | | | | |
| UL | 0.128 | | | | | | | |
| UW | 0.194* | 0.720** | | | | | | |
| UD | 0.157 | 0.397** | 0.569** | | | | | |
| FTL | 0.143 | 0.534** | 0.463** | 0.242* | | | | |
| RTL | 0.102 | 0.488** | 0.383** | 0.223* | 0.866** | | | |
| FTD | 0.147 | 0.363** | 0.260* | 0.203* | 0.487** | 0.529** | | |
| RTD | 0.146 | 0.328** | 0.195* | 0.176* | 0.366** | 0.474** | 0.895** | |

* P < 0.05, ** P < 0.01