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## Studies on morphometric characteristics of udder and teat with the parity in Marathwadi Buffalo

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### Abstract

The morphometric characters of Marathwadi buffaloes like buffaloes udder width, length, Depth and Shape and characters of the teat like Teat Length, Diameter and Shape was measured during the Study. Five hundred Marathwadi female buffaloes from different Tahsils of Latur district of Maharashtra India were selected on the basis of number of parity and grouped into five groups; Group I (1<sup>st</sup> parity), II (2<sup>nd</sup> parity), III (3<sup>rd</sup> parity), IV (4<sup>th</sup> parity) and V (above 4<sup>th</sup> parity) with each group consist of 100 animals. There was positive correlation among the width and Depth of udder and teat length the order of parity up to fourth parity, but after that, udder width showed negative correlation with advanced parity. Bowl shape of udder with cylindrical teats is prominently observed in Marathwadi buffaloes.

**Keywords:** Marathwadi buffalo, morphometric characters, parity, teat, udder

### Introductions

There are 115.34 million buffaloes in the India (FAOSTAT, 2013) producing 65.352 million tonnes milk (NDDB, 2011-12) contributes more than 50% of total milk production of India and the highest milk producer in the world while animal husbandry and dairying play important role in the socio-economic development of rural household. Milk production is the most important trait for selection of the animals. The udder reflects the production performance of the animal. The large sized udder has large proportion of glandular tissues which results in more milk production and the size and shape of the udder is the heritable character. Marathwadi buffalo is one of the most important buffalo breed in Maharashtra mainly observed in Marathwada region of Maharashtra. Marathwadi buffaloes can exist on the grass of low quality in a mountain region. This peculiar animal dominates the small size herds in the rural areas as being a regular breeder and is mainly reared for milk production (Gujar *et al.*, 1999) [8]. Marathwadi buffalo is a sturdy breed with good potential of milk production in Marathwada region of Maharashtra, supporting the income of poor farmers up to considerable extent.

Indiscriminate breeding of the buffaloes results in loss of the purebred character of the animal. Selection of the animals based upon the phenotypic and morphometric characters of teat and udder play a role in propagation of the character in subsequent generations which has significant effect on the production of the milk. (Abdullah *et al.*, 2013 [1]; Marai *et al.*, 2001 [10]) studied reproductive and udder traits under subtropical environmental condition of Egypt in Egyptian buffalo cow and observed that the effect of lactation month is most significant on most udder traits. Teat size decreases after the four months of lactation. This is may be due the decrease milk yield of the animals. Therefore, selection of the animals based on phenotypic and morphometric characters is one of the important criteria to reduce the loss of purebred character of the animals.

In female animals Udder and teat morphology gives sure ideas regarding her supremacy for breeding purpose, its attachment and prominence of milk mirror and milk veins for lactation. But not much research has been done on the effect of udder and teat measurements on milk yield of buffaloes. Udder and teat measurements may vary in different lactations. Unfortunately, we have very little scientific information about this breed. Hence, an attempt has been designed to study the morphological variations in udder and teat morphology and their relation with parity in Marathwadi buffaloes for establishment of valid data to support the scientific categorization of this breed.

**Materials and method**

The present experiment was conducted in twenty-five villages in five Tehsil of Latur District of Marathwada region, Maharashtra, India. From each village 20 Marathwadi buffaloes with different parity were selected randomly for present study. Udder and teat measurement of total 500 Marathwadi individual female buffaloes was collected. Arrangement made to stand the animal on even surface and in normal position at the time of measurement. Measuring tape, vernier calliper and measuring metal scales were used for taking required measurements. Parameters like Udder length, width, Depth, shape, and Teat length, Diameter and shape were studied during the experiment. The data collected during the study were statistically analyzed by using standard methods described by Snedecor and Cochran (1994).

**Result and Discussion**

The results of the morphometric characters of Marathwadi buffaloes like udder width, length, Depth and Shape and characters of the teat like Teat Length, Diameter and Shape are presented and discussed as below.

**Groups:** Group I (1<sup>st</sup> parity), II (2<sup>nd</sup> parity), III (3<sup>rd</sup> parity), IV (4<sup>th</sup> parity) and V (above 4<sup>th</sup> parity) with each group consist of 100 animals.

**Udder length**

Average udder length of udder in Marathwadi buffalo is presented in Table No. 1. Udder length in Marathwadi buffalo ranged from 47.46±0.82 to 62.17±0.33 cm in parities with an average of 54.81±0.57 cm.

**Table 1:** Parity/lactation wise Udder Length in Marathwadi Buffaloes.

Groups	Udder length (cm)					Average (Mean ± SE)
	Ahmedpur (n=20)	Deoni (n=20)	Jalkot (n=20)	Nilanga (n=20)	Udgir (n=20)	
Group I(n=100)	46.50±1.42	45.60±2.46	47.00±2.41	48.60±1.38	49.62±1.17	47.46±0.82
Group II (n=100)	52.70±1.49	53.00±0.89	51.65±1.01	53.30±0.80	54.30±0.76	52.99±0.45
Group III(n=100)	57.71±1.25	56.40±1.43	58.34±0.69	56.82±0.66	58.32±0.91	57.51±0.46
Group IV(n=100)	60.78±1.07	62.07±0.78	62.75±0.64	62.90±0.61	62.35±0.36	62.17±0.33
Group V (n=100)	54.81±0.83	53.68±0.70	53.84±0.75	53.73±0.96	54.38±0.86	54.09±0.36

It was observed that positive linear correlation between udder length and parity up to fourth parity, later on it decreased with the advancement of parity order. It was also observed that, length of udder was increased by 14.71±0.57 cm up to fourth order of parity, however after fourth order of parity it found decreased by 8.08±0.34 cm.

**Udder width**

The parity wise udder width is depicted in Table no 2. In Marathwadi buffalo average udder width ranged from 30.24±0.41 to 38.36±0.39 cm. with an average of 34.35±0.40 cm. Width of udder was increased by 8.12±0.40 cm up to fourth order of parity, however after it found decreased by 5.10±0.38 cm.

**Table 2:** Parity wise Udder Width in Marathwadi Buffaloes

Groups	Udder width (cm)					Average (Mean±SE)
	Ahmedpur (n=20)	Deoni (n=20)	Ahmedpur (n=20)	Deoni (n=20)	Ahmedpur (n=20)	
Group I(n=100)	30.67±1.27	31.85±0.84	29.95±0.78	29.61±0.80	29.12±0.74	30.24±0.41
Group II (n=100)	35.25±1.71	34.80±1.02	32.27±0.99	31.54±0.96	31.18±0.46	33.01±0.51
Group III(n=100)	38.90±1.00	37.08±0.95	37.59±0.93	36.88±0.72	38.89±0.60	37.87±0.38
Group IV(n=100)	37.65±0.92	37.89±1.11	37.46±1.05	39.48±0.63	39.35±0.41	38.36±0.39
Group V (n=100)	32.06±0.70	31.99±0.74	32.38±0.68	33.95±0.69 <sup>d</sup>	35.94±1.07	33.26±0.38

From first parity there was positive correlation among the width of udder and the order of parity up to fourth parity, but after that, udder width showed negative correlation with advanced parity. Marathwadi buffalo found with Medium sized udder.

The parity wise udder depth is depicted in Table no 3. The depth of udder found minimized after fourth parity which denoted that, peak depth of udder can be measured at fourth parity. The average depth of udder in Marathwadi buffalo ranges from 8.39 ±0.09 to 12.29 ±0.08 cm. The maximum depth was observed during fourth parity as 12.29±0.08 cm.

**Udder Depth**

**Table 3:** Parity wise Udder Depth in Marathwadi Buffaloes

Groups	Udder length (cm)					Average (Mean±SE)
	Ahmedpur (n=20)	Deoni (n=20)	Ahmedpur (n=20)	Deoni (n=20)	Ahmedpur (n=20)	
Group I(n=100)	8.07±0.13	8.15±0.14	8.94±0.25	8.11±0.16	8.70±0.24	8.39±0.09
Group II(n=100)	10.18±0.26	9.91±0.30	10.55±0.31	10.37±0.27	9.95±0.27	10.19±0.12
Group III(n=100)	11.99±0.25	11.06±0.33	11.34±0.33	11.53±0.32	10.98±0.29	11.38±0.14
Group IV(n=100)	12.08±0.22	12.19±0.18	12.59±0.12	12.35±0.21	12.23±0.22	12.29±0.08
Group V (n=100)	11.28±0.16	10.77±0.18	10.99±0.24	11.03±0.19	11.07±0.19	11.03±0.08

There was average increase by 3.90 cm in udder depth up to fourth parity and thereafter, it decreased by average 1.26 cm with a particular trends of positive linear correlations with parity order.

Similar, observation was also noted by Tayade *et al.* (2010) <sup>[19]</sup> observed phenotypic characteristics of Gaolao strain of Nagpuri buffalo and reported that, with the advancement of age in udder width, depth and length increased progressively

up to 11 years of age. Prasad *et al.* (2010) [13] reported an increase in udder morphology with increase in parity in Murrah Buffalo. Abdullah *et al.* (2013) [11] observed that the Udder length showed the pattern of increasing size as lactation number increases in Nili- Ravi buffalo. However, Sahu (2016) [15] recorded average depth of udder for graded Murrah which seems to be larger recorded 9.93±0.74 cm in built than Marathwadi.

**Udder shape**

The parity wise udder shape is depicted in Table no. 4. The shape of udder in Marathwadi buffalo in its different parities showed percentile average as 19.60% Trough, 45.60% Bowl shaped, 31.00% Round and 3.80% Pendulous shaped udder.

**Table 4:** Parity wise Udder Shape in Marathwadi Buffaloes

Udder shape	Parity					Overall n=500
	Group I (n=100)	Group II (n=100)	Group III (n=100)	Group IV (n=100)	Group V (n=100)	
Trough	14% (n=14)	19% (n=19)	20% (n=20)	21% (n=21)	24% (n=24)	19.60% (n=98)
Bowl	45% (n=45)	40% (n=40)	42% (n=42)	49% (n=49)	52% (n=52)	45.60% (n=228)
Round	37% (n=37)	40% (n=40)	34% (n=34)	23% (n=24)	20% (n=20)	31.00% (n=155)
Pendulous	1% (n=1)	1% (n=1)	4% (n=4)	6% (n=6)	4% (n=4)	3.80% (n=19)

From the results it may be revealed that, bowl shape of udder was prominent and typical in Marathwadi buffalo followed by round shape and trough type. The findings are in close agreement with the report of Gubbawar *et al.* (2012) [7]. Bharadwaj (2007) [4] reported that shape of udder was associated with milk production. Significantly higher milk yield was obtained in buffaloes having long and deep udders with higher rear attachment than those having short and shallow udders with low rear attachment.

**Teat length**

The parity wise Teat Length is depicted in Table no. 5. After reading the overall results obtained for depth of udder in Marathwadi buffalo at different parities, Peak length of teat can be measured at fourth parity, the average teat length in Marathwadi buffalo ranges from 4.63 ±0.08 to 7.07±0.08 cm.

**Table 5:** Parity wise Teat Length in Marathwadi Buffaloes

Groups	Teat Length (cm) (Mean ± SE)					Overall Average
	Ahmedpur (n=20)	Deoni (n=20)	Jalkot (n=20)	Nilanga (n=20)	Udgir (n=20)	
Group I(n=100)	4.87±0.17	4.60±0.18	4.77±0.20	4.48±0.22	4.43±0.20	4.63±0.08
Group II(n=100)	5.33±0.15	5.56±0.15	5.07±0.15	5.15±0.12	5.03±0.14	5.30±0.06
Group III(n=100)	6.04±0.14	6.59±0.19	6.33±0.21	6.01±0.19	6.08±0.13	6.21±0.08
Group IV(n=100)	6.90±0.19	7.04±0.21	7.13±0.17	7.19±0.18	7.09±0.14	7.07±0.08
Group V (n=100)	6.37±0.22	6.08±0.25	6.09±0.27	5.96±0.30	5.99±0.26	6.10±0.11

It was categorically observed that, in Marathwadi buffaloes, average teat length increased from first to fourth parity of lactation, thereafter showed decreasing trend. The numerical values for different levels of improvement of any phenotypic character might be species and breed specific (Radekar *et al.* 2003 [14]; Lavania *et al.*, 2011 [9]). Prasad *et al.* (2010) [12] observed similar trend in buffaloes which might be due to advancement of age.

**Teat Diameter**

The average diameter of teat in Marathwadi buffalo ranged from 1.50±0.04 to 3.20±0.08 cm. however the order of parity showed linear correlation with diameter (Table 6). Marathwadi buffalo found with teats of medium diameter, further it was reported that, parity affects teat diameter characteristically.

**Table 6:** Parity wise Teat Diameter in Marathwadi Buffaloes

Groups	Teat Diameter (cm) (Mean ± SE)					Overall Average
	Ahmedpur (n=20)	Deoni (n=20)	Jalkot (n=20)	Nilanga (n=20)	Udgir (n=20)	
Group I(n=100)	2.93±0.19	2.79±0.20	3.01±0.16	3.17±0.19	3.11±0.20	3.00±0.08
Group II(n=100)	3.87±0.19	4.17±0.15	3.79±0.22	3.49±0.20	3.93±0.15	3.85±0.08
Group III(n=100)	4.87±0.22	4.95±0.22	5.31±0.34	4.65±0.32	4.53±0.24	4.86±0.12
Group IV(n=100)	6.45±0.38	6.73±0.38	6.27±0.43	6.17±0.39	6.47±0.37	6.41±0.17
Group V (n=100)	5.61±0.30	5.97±0.29	5.91±0.33	5.43±0.33	5.13±0.35	5.61±0.14

The teat diameter found minimized after fourth parity which denoted that, peak diameter of teat can be measured at fourth parity. Akhtar *et al.* (1999) [2] and Marai *et al.* (2001) [10] reported that parity affects udder traits in-significantly and teat size (length and diameter) tended to decrease after fourth month of lactation.

**Teat Shape**

The Average percentile frequency distribution of Cylindrical, Funnel, Bottle and Conical shaped teats observed during the study were 49.20, 24.60, 19.40 and 06.80 per cent, respectively (Table 7).

**Table 7:** Parity wise Teat Shape in Marathwadi Buffaloes

Teat shape	Parity					Overall n=500
	Group I (n=100)	Group II (n=100)	Group III (n=100)	Group IV (n=100)	Group V (n=100)	
Cylindrical	40% (n=40)	48% (n=48)	52% (n=52)	51% (n=51)	55% (n=55)	49.2% (n=246)
Funnel	23% (n=23)	22% (n=22)	26% (n=26)	28% (n=28)	24% (n=24)	24.6% (n=123)
Pear/Bottle	24% (n=24)	21% (n=21)	19% (n=19)	15% (n=15)	18% (n=18)	19.4% (n=97)
Conical	13% (n=13)	9% (n=9)	3% (n=3)	6% (n=6)	3% (n=3)	6.8% (n=34)

Maximum Marathwadi buffalo found with cylindrical teats followed by Funnel, Bottle and Conical shaped teats. Similar observations were also reported by Sonwane *et al.* (2002) [17] and Bainwad *et al.* (2007) [3] in respect to Marathwadi buffalo. However, the similar findings from Chaki *et al.* (1999) [5], Dutta *et al.* (2003) [6], Prasad and

Chauhan (2003) [11], Prasad *et al.* (2010) [13] and Sanjaykumar *et al.* (1992) [16] in concurrence to their studied in different buffalo breeds.

**Teat Tip**

**Table 8:** Parity wise Teat Tip in Marathwadi Buffaloes

Teat tip	Lactation order/Parity					Overall
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	Above 4 <sup>th</sup>	
Rounded	82% (n=82)	78% (n=78)	75% (n=75)	67% (n=67)	64% (n=64)	73.2% (n=366)
Pointed	18% (n=18)	22% (n=22)	25% (n=25)	33% (n=33)	36% (n=36)	26.8% (n=134)

The frequency distribution of Rounded and pointed type of teat tip were recorded as 82,18; 78,22; 75,25; 67,33; and 64,36% at First, Second, Third, Fourth and above fourth parity respectively in Marathwadi buffalo. The reports of Sonwane *et al.* (2002) [17], Prasad and Chauhan (2003) [11], Bainwad *et al.* (2007) [3] scientifically support the findings of present investigations.

**Table 9:** Average morphometric characterization of Udder and Teat in Marathwadi Buffalo.

Sr. No.	Morphometric Characters	Average Value
01.	Udder Length	47.46±0.82 to 62.17±0.33 cm.
02.	Udder Width	30.24±0.41 to 38.36±0.39 cm.
03.	Udder Depth	8.39 ±0.09 to 12.29 ±0.08 cm
04.	Teat Length	4.63 ±0.08 to 7.07±0.08 cm.
05.	Teat Diameter	1.50±0.04 to 3.20±0.08 cm.
06.	Udder Shape	Bowl shaped
07.	Teat Shape	Cylindrical
08.	Teat Tip	Rounded

**Conclusion**

From the Results of the resent study it is concluded that, Bowl shape of udder, Cylindrical shape of teat and Rounded shaped teat tip is prominently observed in Marathwadi buffalo. Furthermore, Development of teat and Udder traits occurs up to the fourth parity i.e. approximately up to 9 to 11 years of age thereafter shows decreasing trend in morphometric characteristics.

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