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A Study on Relationship between Parity and Milk Yield, Fat and Solids-Not-Fat Percent in Murrah Graded Buffaloes under Field Conditions

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A B S T R A C T

The present experiment was carried to study the relationship of animal parity with milk yield, fat and solids-not-fat percent in murrah graded buffaloes under field conditions. In this,150 murrah graded buffaloes of different parities (1st to 6th parities) from different commercial farms of Guntur and Krishna districts were selected. Various parameters like parity related to average milk yield, fat percent, SNF percent was taken into consideration for the present study. There was an increase in udder length, udder width and from 2nd parity to 6th parity but there is decrease from 1st parity to 2nd parity. Udder depth increased from 1st parity to 6th parity. Average daily milk yield increased from 1st to 6th parity. There was an increase in fat and SNF per cent from 1st to 5th parity and there is decrease from 6th parity. High positive correlation was observed between parity and milk yield and SNF percent.

Introduction

The world buffalo population is found to be 199.784 million (FAO 2015) and 56.6% Buffaloes are in India. During the last 10 years, an annual growth of buffalo population was 1.49% and 1.53% in the world and India respectively. There are 108.70 million buffaloes in India which contribute 21.23% of the total livestock population in India. The female buffalo population has increased by 7.99% over the previous census and the total number of female buffalo is 92.5 million in 2012 (19th livestock census). India ranks first among the world's milk producing nations with production of 146.3 million tons during 2014-15 and contributing 17.4% of world milk production.

The buffalo milk alone contributes 51% of the total milk production in the India. Andhra Pradesh endowed with buffalo population of 10.6 million with a milk production of 7.4 metric tonnes (GOI 2017). About 72% of the milk produced in Andhra Pradesh comes from the buffaloes. It is one of the major buffalo milk producing states of the country.

Buffaloes are preferred over cattle in India because of their distinctive qualities such as better feed conversion efficiency, more resistance to diseases and higher milk fat

percentage than in cows. Moreover, buffalo can efficiently convert low quality feed stuffs like straws and agro industrial waste into human food and improve soil structure through bio fertilizer.

When the buffalo rearing has shifted from the backyard to commercial farms, popularity of buffalo milk has ensured buffalo production as a main stay in the path of the dairy industry in India. However, for this species to perform optimally under the pressure of intensive production systems, the animals have to be improved with clear focus on the desired output.

Materials and Methods

A total of one hundred and fifty lactating Murrah graded buffaloes with different parities of various buffalo farms located at various villages like Balusulapalem, Bhattiprolu, Nagaram, Borravaripalem, Dosapalem, Pudivada and Uppuluru were utilized for this study and presented in the Table 1.

Test day milk yield, fat and snf per cent

The test day milk yield of the particular buffalo was measured and recorded on the same day. The milk samples were collected for estimation of fat per cent and this was done by using the automatic milk fat analyzer on the same day at the local collection centres.

The SNF content of the milk was estimated by using the following Richmond's formula.

$$SNF \% = \frac{CLR}{4} + 0.21\,F + 0.14$$

CLR: Corrected Lactometer Reading
F: Fat per cent

Results and Discussion

Effect of parity order on udder measurements milk yield, fat and snf percent

Frequency of parity order

Distribution of experimental animals according to various parities were presented in the Table 2. Among 150 Graded Murrah Buffaloes 43 buffaloes are in 3rd parity, 41buffaloes are in 4th parity, 28 buffaloes are in 5th parity, 23 buffaloes are in 2ndparity, 10 buffaloes are in 6th parity and 5 buffaloes are in 1st parity.

Udder and Teat measurements according to their parities

Different Udder measurements according to parity order in Murrah Graded Buffaloes are presented in the Table 3. In this study the Udder Length and Udder width ranged from 46.00±0.75 and 40.86±0.76 cm to 51.30±1.3 and 45.50±1.52 cm, respectively. Udder depth also varied from 11.6±0.18 to 12.25±0.18 cm. Udder Length and Udder width in 1st parity buffaloes were 46.40±1.63 and41.20±1.02 cm, 2nd parity buffaloes were 46.00±0.75 and 40.86±0.76 cm, 3rd parity buffaloes were 46.69±0.55 and 41.41±0.70 cm, 4th parity buffaloes were 48.80±0.70 and 43.51±0.69 cm, 5th parity buffaloes were 50.10±0.51 and 44.82±0.57, 6th parity buffaloes were 51.30±1.35 cm and 45.50±1.39 cm. Similarly, the Udder depth in 1st parity was 11.6±0.18, 2nd 11.65±0.11,3rd 11.65±0.09, 4th 11.82±0.10, 5th 12.00±0.08 and 6th 12.25±0.18 cm, respectively.

It is concluded that there was an increase in Udder length and Udder width from 2nd parity to 6th parity but there was decrease from 1st parity to 2nd parity. Udder depth increases from 1st parity to 6th parity. Teat

lengths of various parities in Murrah Graded Buffaloes are presented in the Table 4. There is increase in measurements from first parity to sixth parity. Maximum teat lengths were observed in sixth parity with the mean values of right fore teat, left fore teat, right rear teat and left rear teat as 5.76±0.03, 5.95±0.06, 6.14±0.06 and 6.38±0.07 cm respectively. As the parity increases, there was increase in length of teats. Teat diameter of various parities was presented in the Table 5. Maximum teat diameter was observed in sixth parity with the mean values of 2.56±0.03, 2.72±0.03, 2.92±0.04 and 3.12±0.07 cm respectively for Right Fore teat, left fore teat, right rear teat and left rear teat. It was observed that as the parity increases the diameter also increases.

Table.1 Table showing the number of animals assessed in the villages of Guntur and Krishna districts

Village	District	No. of animals assessed
Balusulapalem	Guntur	1 0
Bhattiprolu	Guntur	40
Nagaram	Guntur	20
Borravaripalem	Guntur	20
Dosapalem	Guntur	20
Pudivada	Guntur	20
Uppuluru	Krishna	20

Table.2 Distribution of animals according to parity in Murrah Graded Buffaloes

Parity	No. of animals	Percentage
1	5	3
2	23	15
3	43	29
4	41	27
5	28	19
6	10	7

Table.3 Udder measurements (cm) according to parities in Murrah Graded Buffaloes (Mean±S.E)

Parity	Udder Length	Udder width	Udder depth
1	46.40±1.6	41.20±1.02	11.60±0.18
2	46.00±0.75	40.86±0.76	11.65±0.11
3	46.69±0.55	41.41±0.70	11.65±0.09
4	48.80±0.70	43.51±0.69	11.82±0.10
5	50.10±0.51	44.82±0.57	12.00±0.08
6	51.30±1.35	45.50±1.39	12.25±0.18

Table.4 Teat Lengths according to various parities in Murrah Graded Buffaloes (Mean±S.E)

Parity	Right Fore	Left Fore	Right Rear	Left Rear
1	5.20±0.08	5.32±0.08	5.46±0.06	5.62±0.08
2	5.21±0.04	5.39±0.04	5.43±0.13	5.74±0.07
3	5.33±0.04	5.51±0.01	5.67±0.02	5.86±0.03
4	5.48±0.03	5.67±0.03	5.82±0.03	6.00±0.04
5	5.57±0.03	5.72±0.03	5.91±0.03	6.13±0.04
6	5.76±0.03	5.95±0.06	6.14±0.06	6.38±0.07

Table.5 Teat diameter according to various parities in Murrah Graded Buffaloes (Mean±S.E)

Parity	Right Fore	Left Fore	Right Rear	Left Rear
1	2.32±0.02	2.40±0.05	2.50±0.14	2.6±0.10
2	2.38±0.01	2.46±0.01	2.55±0.03	2.61±0.03
3	2.44±0.01	2.56±0.01	2.67±0.02	2.83±0.03
4	2.50±0.01	2.61±0.01	2.74±0.02	2.89±0.02
5	2.58±0.01	2.74±0.01	2.86±0.02	3.08±0.03
6	2.56±0.03	2.72±0.03	2.92±0.04	3.12±0.07

Table.6 Daily milk yield according to parity order in Murrah Graded Buffaloes (Mean±S.E)

Parity	No. of animals	Daily milk yield(kg/day)
1	5	7.00±0.39
2	23	7.69±0.25
3	43	8.21±0.23
4	41	8.93±0.27
5	28	9.48±0.24
6	10	9.63±0.54

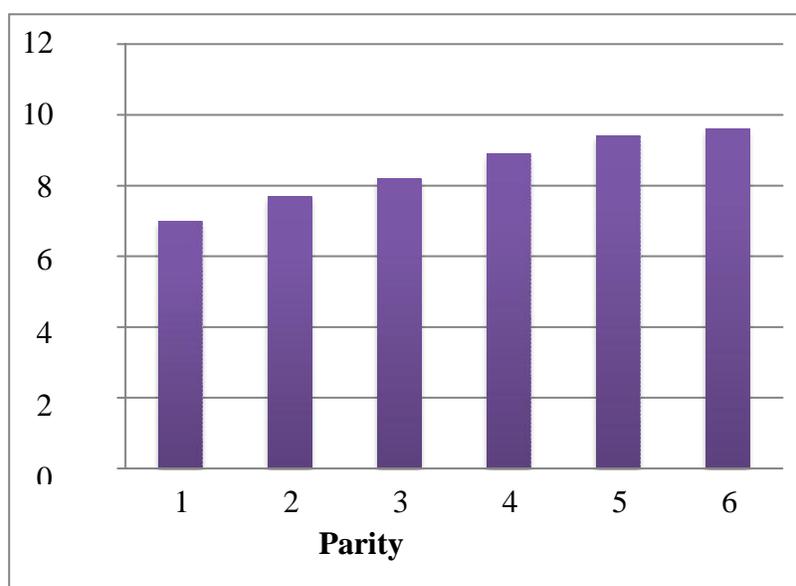**Table.7** Fat and SNF per cent according to parities in Murrah Graded Buffaloes

Parity	No. of animals	Fat percent	SNF percent
1	5	7.00±0.14	9.31±0.06
2	23	7.38±0.09	9.36±0.04
3	43	7.43±0.07	9.41±0.03
4	41	7.53±0.07	9.44±0.02
5	28	7.54±0.05	9.47±0.02
6	10	7.48±0.10	9.43±0.04

Table.8 Relationship of parity with daily milk yield, fat, SNF and lactational yield in Murrah Graded Buffaloes

Parameter	Parity	Milk yield	Fat	SNF
Parity	1	0.42^{**}	0.17^{*}	0.18^{*}
Milk yield		1	0.49^{**}	0.45^{**}
Fat			1	0.78^{**}
SNF				1

** Significant at ($P<0.01$)

Fig.1 Average milk yield (kg/day) in different parities in murrah Graded Buffaloes

Average milk yield, fat and SNF per cent according to parity orders in Murrah Graded Buffaloes

Milk yield in various parities were presented in the Table 6. It could be observed from the table that daily milk yield ranged from 7.00±0.39 to 9.63±0.54 kg. The average milk yield in 1st parity was 7.00±0.39, 2nd 7.69±0.25, 3rd 8.21±0.23, 4th 8.93±0.27, 5th 9.48±0.2 and 6th 9.63±0.54 kg, respectively. Maximum and minimum milk yield were observed in 6th parity and 1st parity respectively. It was concluded that there is increase in milk yield from 1st to 6th parity.

Fat percent and SNF per cent according to various parities are presented in the Table 7. The fat and SNF values range from 7±0.14 to 7.54±0.05 and 9.31±0.06 to 9.47±0.02 per cent respectively. Fat and SNF per cent in 1st parity were 7.00±0.14 and 9.31±0.06, 2nd parity 7.38±0.09 and 9.36±0.04, 3rd parity 7.43±0.07 and 9.41±0.03, 4th parity 7.53±0.07 and9.44±0.02, 5th parity 7.54±0.05 and 9.47±0.02 and 6th parity 7.48±0.10 and 9.43±0.04 respectively. It was concluded that there is increase in fat and SNF per cent from 1st to 5th parity and there is decrease in 6th parity.

Correlation of parity with daily milk yield, fat per cent and SNF per cent in Murrah Graded Buffaloes

The relationship of parity with daily milk yield, fat and SNF per cent was presented in the Table 8. There was positive correlation of daily milk yield, fat and SNF per cent with parity. Parity showed high positive correlation with milk yield (0.42) and SNF per cent (0.18).

Parity effect on udder and teat measurements, milk yield, Fat per cent and SNF per cent in Murrah Graded Buffaloes

It could be informed that the udder length and udder width was ranged from 46±0.7597 and 40.86±0.7630 to 51.30±1.359 and 45.50±1.526 cm. Similarly, udder depth was 11.6±0.1871 to 12.25±0.1863 cm, respectively. It was concluded that there is an increase in udder length, udder width and from 2nd parity to 6th parity but there is decrease from 1st parity to 2nd parity. Udder depth increases from 1st parity to 6th parity. It was observed that there is increase of measurements from first parity to sixth parity. Maximum teat lengths were observed in sixth parity with the mean values of Right Fore Teat, Left Fore Teat, Right Rear Teat and Left Rear Teat were 5.76±0.03, 5.95±0.06, 6.14±0.06 and 6.38±0.07 cm, respectively. From Table 5 it was found that maximum teat diameter was observed in sixth parity with the mean values of Right Fore Teat, Left Fore Teat, Right Rear Teat and Left Rear Teat were 2.56±0.03 cm, 2.72±0.03 c, 2.92±0.04 c and 3.12±0.07 cm. The results are in accordance with Akhtar *et al.,* (1998) observed that the mean values of udder length, width, were 40.56 ± 0.15, 35.11 ± 0.16, respectively. The length and width of the udder increases upto fourth lactation. Al-Hered *et al.,* (2005) observed that parity affected height and circumference of udder significantly (p<0.01). Deng *et al.,* (2012) revealed that udder measurements increased with parity order. Zwertvaegher *et al.,* (2012) suggested that teat length and diameter increased with parity, although the increase in teat length was not significant from second parity onwards in front teats. Bharti *et al.,* (2015) concluded that udder morphological traits of Murrah Buffaloes varied from lactation to lactation order as the age advances. Khatri *et al.,* (2017) concluded that multiparous Buffaloes had a significant (P<0.05) larger volume of udder than the primiparous Buffaloes.

Daily milk yield, Fat per cent and SNF per cent in different parities in murrah Graded Buffaloes

It was observed that the mean±S.E of test day milk in various parities were ranges from 7.00±0.39 kg to 9.63±0.54 kg. Maximum and minimum milk yield was observed in 6th parity and 1st parity. It was concluded that there is increase in milk yield from 1st to 6th parity showed in Figure 1. It could be found that the mean ± S.E of Fat per cent and SNF per cent according to various parities were ranges from 7±0.14 to 7.54±0.05 and 9.31±0.06 to 9.47±0.02 respectively. It was concluded that there is increase in Fat per cent and SNF per cent from 1st to 5th parity and there is decrease from 6th parity. It was found that parity showed positive correlation with daily milk yield, Fat and SNF per cent.

Thiruvenkadan *et al.,* (2014) showed parity had a highly significant (P<0.01) effect on the yield increased from first to fourth parity and from there on it started declining. The 305-day milk yield and lactation milk yield increased up to third parity, was maintained at fourth parity, and declined thereafter. Javed *et al.,* (2013) Fat percentage was showed a positive association with age, body weight and lactation number. Singhai *et al.,* (2013)

found that cows in third parity have higher average daily milk yield followed by second, fourth and first. SNF percent was decreased order from first to fourth lactation whereas Fat % does not show any trend which was contrary to present findings.

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