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SHORT COMMUNICATION

Histological Study of Mammary Lobule on Pregnant, Lactation and Involution Stage in Murrah Buffalo

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ABSTRACT

Present experiment was conducted on sixty Murrah buffalo divided into three groups : pregnant, lactating and involution stage/ Dry stage. No distinct lobulation was observed during nonlactating early pregnant stage. The ratio between maximum diameter of lobule in nonlactating mid and late pregnant stage was 4:5. Mammary lobules were oval to polygonal in shape. In lactating stage the approximate ratio between maximum diameter of lobule in colostrum stage and three months of lactation were 2:1. The number of alveoli were maximum during colostrum phase and reduced from colostrum stage to ten months of lactation. Highly significant statistical difference in the diameter of lobules and number of alveoli was noticed during different stages of lactation from colostrum to ten month. The number of alveoli was minimum during nonlactating nonpregnant stage from one to two month.

Keywords: Lobule, alveoli, diameter, lactation

The "Food and Agriculture Organization" has rightly term the buffalo as important but "an asset undervalued" (FAO, 2000). Murrah breed is most common and efficient milk producing breed of buffalo known as "Black Gold" (Balbhadra, 2013) serve as capital reserve or cash crops to rural folk by producing economic stability, livelihood security and social stability. Mammary gland is an accessory reproductive organ, act as important parameter index to judge the milk production capacity of animal. Size of mammary lobule reflect the physiological status and lactation capacity of animal. Cited literature were scanty regarding the histomormpometrical study of mammary lobule in Murrah buffalo in different stage of lactation, involution and pregnant stage. To consider the importance of Murrah buffalo in Indian economy, mammary gland lobule in sale and scant literature availability present experiment was undertaken.

The present study was conducted on mammary gland of sixty Murrah buffaloes to study the morphometry of mammary lobule. The mammary gland samples of buffalo were collected from dairy farms nearby Nagpur, Durg, Rajnandgoan and Raipur District of Maharashtra and Chhattisgarh state of India after their natural death. The samples were ensured for not having any pathological lesions. The samples were categorized into three groups as pregnant stage lactating and nonlactating/ dry by ascertaining the stage of lactation, dry period and pregnancy period. Nonlactating pregnant stage was divided into three subgroups with six sample in each: nonlactating early pregnant stage, nonlactating mid pregnant stage and nonlactating late pregnant stage. Lactating stage was

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divided into five subgroups with six samples in each: colostrum stage / phase, three months of lactation, five months of lactation, seven months of lactation and ten months of lactation. Nonlactating involution stage was divided into two subgroups with six samples in each: nonlactating nonpregnant dry stage (upto one month), nonlactating nonpregnant dry stage (from one to two month). For morphometrical study the tissue samples of 3-5 mm thickness were collected on ice in thermocol box and brought to the laboratory. Tissue samples were fixed in 10% neutral buffered formalin, processed and 4 to 7 µm thick sections were cut with the help of rotary microtome as per method of Drury and Wallington (1980). Haematoxylin and Eosin stain was done as per Singh and Sulochana (1996). Measurements of mammary lobule was carried out and analyzed (Snedecor and Cochron,1980).

The present study revealed that lobules of mammary gland were oval, elongated, flattened and irregularly triangular to polygonal in shape (Fig. 1). Lobules were separated by thick interlobular connective tissue. This observation of the present study corroborates with the findings reported by Vaish *et al.* (2015) in goat.

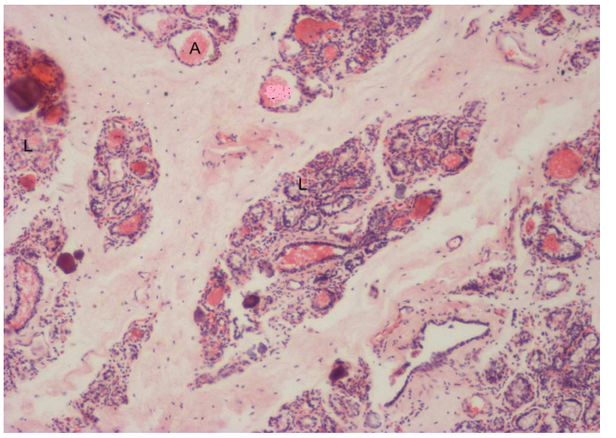

Fig. 1: Photomicrograph of mammary gland of nonlactating nonpregnant upto one month stage showing lobule (L) and alveoli (A) Haematoxylin and Eosin x100X)

Table 1: Mean (± SE) values of diameter of mammary lobule and number of alveoli in lactation stage in Murrah buffalo

Parameter	Stages in lactating buffalo					F Value
	Colostrum stage of lactation	Three Months of lactation	Five months of lactattion	Seven months of lactation	Ten months of lactation	
Maximum diameter of lobule (µm)	2540.86 ± 418.89	1315.55 ± 144.21	850.33 ± 137.37	757.30 ± 115.14	626.65 ± 75.61	13.14**
Minimum diameter of lobule (µm)	1344.00 ± 175.59	688.40 ± 101.33	583.66 ± 59.35	459.22 ± 58.61	375.20 ± 44.68	14.76**
No of alveoli per lobule	200.90 ± 29.60	138.54 ± 23.59	97.60 ± 15.99	79.36 ± 16.58	67.80 ± 12.85	6.86**

Table 2: Mean (± SE) values of diameter of mammary lobule and number of alveoli in pregnant and involution stage in Murrah buffalo

Parameter	Stages in nonlactating buffalo					F Value
	Involution stage		Pregnant stage			
	Upto one month	From one two months	Early pregnant	Mid pregnant	Late pregnant	
Maximum diameter of lobule (µm)	568.73 ± 71.12	302. 00 ± 31.07	No distinct lobulation	1349.90 ± 114.10	1680.00 ± 162.59	36.68**
Minimum diameter of lobule (µm)	258.49 ± 45.07	199.20 ± 20.14	—	559.20 ± 50.68	770.60 ± 41.46	42.47**
No of alveoli per lobule	46.10 ± 9.10	21.33 ± 2.99	No distinct lobulation	52.12 ± 7.13	70.70 ± 6.33	9.03**

**Highly significant at 1% level.

No distinct lobulation was observed during nonlactating early pregnant stage. This corroborate with the finding of Vaish *et al.* (2015) in goat. The diameter of lobule and number of alveoli revealed linear increase from nonlactating mid to late pregnant stage. A highly significant statistical difference was found in the diameter of lobules and number of alveoli with advancement of pregnancy (Table 1). In agreement with the observations recorded in the present study regarding formation of lobules, Joana *et al*. (2014) in small ruminant reviewed that branching of duct system begins to appear in the stroma and glandular lobules were formed. The alveoli were further found distended with secretion rich in fat globules and only thin sheets of connective tissue that divided the parenchyma into lobes and lobules represented stroma.

There was decreasing trend in the diameter of lobules and number of alveoli in different stages with advancement of lactation from colostrum stage to ten months of lactation (Table 2). The diameter of lobule was approximately thrice in colostrum stage than in the five months of lactation. However, in ten months of lactation the size of lobule was reduced four times in comparison to colostrum stage. Number of alveoli was maximum in colostrum stage and thrice to that of ten month of lactation. Highly significant statistical difference in the diameter of lobules and number of alveoli was noticed during different stages of lactation from colostrum to ten month. Present observations corroborate with the findings of Elsayed *et al*. (2009) in Damascus goats that the number of alveolar secretory cells increased during early and mid lactation and diminished in late lactation.

CONCLUSION

The nonlactating nonpregnant animals, showed reducing trend in the diameter of lobules as well as in number of alveoli in the mammary gland lobule up to two month stage. This reduction in the diameter of the lobules and number of alveoli in mammary gland in nonlactating nonpregnant buffalo could be attributed to the fact that alveolar and lobular tissues underwent a considerable degree of degeneration due to cessation of suckling stimulus which leads to low level of lactogenic hormones like growth hormone, thyroid hormone, cortisol and prolactin, necessary for involution of mammary gland upto two month of nonlactating stage. In nonlactating nonpregnant stage from one to two month the alveoli were smallest and minimum in number throughout the study.

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