

## Effect of temperature and humidity variations on milk production along with supplemented diet on reproductive performance of lactating buffaloes

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### Abstract

*The study was aimed at evaluating the effect of temperature and humid environment on buffalo's milk production in summer season under field conditions. The study consists 80 animals and divided into 2 uniform groups of 40 each based on farmers practice (FP) and recommended practice (RP) groups. After calving of one month all the RP groups lactating buffaloes were dewormed with Albendazole suspension (90 ml/buffalo) and supplemented with liquid Calcium and Phosphorous (100 g/day/buffalo) and mineral mixture (40 g/day/buffalos) for a period of four months (120 days) March to June. Summer season with increase in temperature, FP groups of buffaloes showed marked decrement in milk production i.e., from 6.5 to 5.4 l/day/buffalo during March to June session whereas RP group in parallel of FP group showed successful increment in milk production i.e., 7.2 to 8.3 l/day/buffalo. Under RP group, supplemented diet showed a good reproductive performance of buffaloes. Results showed that 4 animals in April, 18 in May and 30 in June month were conceived in RP group which is a quite good number in comparison to FP group. Number of estruses is also more in RP group when compared with FP groups. This study clearly stated that high temperature and humid condition showed no adverse effect in lactating buffaloes due to supplemented diet. This supplementation also showed positive effect on reproductive machinery of lactating buffaloes. Thus, mineral and vitamin supplemented diet is quite essential for lactating buffaloes to improve their milk production as well as reproduction.*

**Key words:** Lactating buffaloes; Minerals; Vitamins; Reproduction

### Introduction

During summer due to hot and humid weather conditions there is adverse effect observed in the milk production which validates the literature reports of lowest milk production. Reduction in milk production is one of the major economic impacts of climatic stress in dairy buffalo. Decrease in milk yield due to heat stress is more prominent in buffaloes. Decreased synthesis of hepatic glucose and lower non-esterified fatty acid (NEFA) level in blood during heat stress causes reduced glucose supply to the mammary glands resulting low lactose synthesis which in turn ensues low milk yield. Reduction in milk yield is further intensified by decrease in feed consumption by the animals to compensate high environmental

temperature. Reduced milk production due to heat stress is attributable only partly to decrease in feed intake. Actually 35% of reduced milk production is due to decreased feed intake while remaining 65% is attributable to direct effect of heat stress. Other factors that are responsible for lowered milk production during heat stress are less nutrient absorption, effect in rumen function and hormonal status along with increased maintenance requirement (Rhoads et al., 2009; Bernabucci et al., 2010; Wheelock et al., 2010). Minerals play a key role in supporting normal life process of animals, as they are essential for the utilization of energy and protein. Trace minerals are essential for animal health, reproduction and optimum production for milk. 21 minerals are considered to be nutritionally essential, or probably essential, to an

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animal. Depending on the quantities required by the animal, they can be grouped into macro minerals and trace (minor) elements. Of the macro minerals, the most important are calcium, phosphorus, sodium, potassium, Sulphur, magnesium and also vitamin A, D<sub>3</sub>, B<sub>12</sub> and E. The important trace elements are copper, cobalt, iron, iodine, zinc, chromium, molybdenum, manganese and selenium. Most of the major minerals and trace elements are widely distributed in the herbage and the other feeds eaten by the animal and occur in sufficient quantities to meet the requirement of animals. Balanced commercial feeds usually contain sufficient minerals and vitamins to meet the needs of buffaloes under normal conditions. Thus, keeping the aforementioned scenario, the present study was designed to see the variations in milk production and reproduction of buffaloes after vitamins and minerals supplementation in summer seasons and their correlation with heat stress.

### Materials and Methods

The present study was conducted under National Initiative on Climate Resilient Agriculture (NICRA) project organized by Krishi Vigyan Kendra, Morena (M.P.) under field conditions for evaluating the effect environment on buffalo milk production and reproduction in summer season. The trials were conducted on one month calving lactating buffalo herd of love stock owners from adopted NICRA village in summer season i.e., March-June, 2021.

The study was conducted on total eighty (80) lactating buffaloes that were divided into two uniform groups of forty (40) each based on farmers Practice (FP) and Recommended Practice (RP) groups. After calving on one month all the RP groups lactating buffaloes were dewormed with Albendazole suspension

(90 ml/buffalo) and supplemented with liquid calcium and phosphorous (100g/day/buffalo) and mineral mixture (40g/day/buffalo) for a period of four-month (120 days) March to June. The buffaloes in FP group which received diet without any supplementation served as controls. The average individual milk production (twice daily and monthly) data were recorded in both FP and RP group during summer seasons through a well-structured pretested proforma. The tabular and percentage were used to analyze the data and compared between the groups.

### Results and Discussion

A research study was conducted on total eighty (80) lactating buffaloes dividing into two uniform groups of forty (40) each based on farmers practice (FP) and recommended practice (RP) groups. Our research study was designed to check for the variations in milk production and reproduction of lactating buffaloes after vitamins and minerals supplementation were added during summer seasons. It was observed that during summer season March to June with increase in temperature, farmers practice groups of buffaloes showed marked decrement in milk production i.e., from 6.5 to 5.4 l/day/buffalo in comparison with recommended practice group. Further, RP group showed successful increment in milk production i.e., 7.2 to 8.3 l/day/buffalo than farmers practice group. Our study showed a direct correlation between supplemented diet with minerals and vitamins and heat stress means treatment of dairy animals with minerals and vitamins rich diet may have possibility to overcome the problem of less milk production due to higher temperature in summer seasons. The lowest milk production during summer seasons validates the well-known fact of adverse effect of hot and humid weather

Table 1: Effect of hot and humid temperature on buffalo milk production during summer season-2021

Months	No of lactating buffalo		Av. temp.		Av. humidity		Av. milk production		%Increase in Milk Production
	FP	RP	Min.	Max.	Min.	Max.	(Lit./day/buffalo) FP	RP	
March	40	40	13.5	31.0	28	55	6.5	7.2	10.77
April	40	40	20.0	41.0	23	37	6.0	7.4	23.33
May	40	40	25.5	44.5	26	42	5.6	7.8	39.29
June	40	40	29.0	46.5	32	46	5.4	8.3	53.70
Av./overall	40	40	22	40.75	27.25	45	5.88	7.68	30.61

FP: Farmer Practice

RP: Recommended Practice

Table 2: Effect of mineral and Vitamin supplementation on Reproductive performance in buffaloes in summer season-2021

Months	No of buffaloes		No of animals in estrus		No of animals conceived	
	FP	RP	FP	RP	FP	RP
March	40	40	0 (0)	0 (0)	0 (0)	0 (0)
April	40	40	02 (5)	08 (20)	0 (0)	04 (10)
May	40	40	12 (30)	25 (62.5)	05 (12.5)	18 (45)
June	40	40	18 (45)	32 (80)	08 (20)	30 (75)
Average/Overall	40	40	08 (20)	16.25 (40.62)	3.25 (8.13)	13 (32.5)

conditions during summer. Table 1 is shown which shows the effect of hot and humid temperature on buffalo milk production.

With mineral and vitamin supplements addition the reproductive performance was observed as shown in Table 2.

Nevertheless, conceive performance was observed in reproductive stage in RP groups in April (4) in May (18), in June (30) which was good in comparison to FP group. The number of estruses is more in comparison to FP groups. As, it is observed in previous literature that heat stress has an adverse effect on the productive and reproductive performance of dairy animals. Due to global warming and climate change the dairy sector has vulnerable consequences. Similarly in our research study we provided supplemented diet consisting of vitamins macro and trace minerals in lactating buffaloes. So, improve productive and reproductive performance of buffalos in summer season. The present results are comparable with the earlier studies under field conditions by Singh and Pachauri (2011), Singh et al. (2014). Pawar et al., (2013) and Singh (2017) reported the effect of mineral and vitamin supplementation on buffaloes milk production and its correlation with heat stress in summers.

### Conclusion

The present study concludes that oral supplementation of minerals and vitamins plays an important role to enhance the productive and reproductive performance of lactating buffaloes in hot and humid temperature during summer season. The supplementation has also shown a positive effect on the productive and reproductive performance of these lactating buffaloes. On the basis of present study, it can be recommended that buffalo keepers should regularly supplement milch animals with minerals and vitamins in proper quantity, especially during summer seasons to achieve better milk productive and

reproductive performance, so that their economic position can be improved to a considerable extent.

### References

- Bernabucci, U.; Lacetera, N.; Baumgard, L. H.; Rhoads, R. P.; Ronchi, B. and Nardone, A. (2010). Metabolic and hormonal acclimation to heat stress in domesticated ruminants. XIth International Symposium on Ruminant Physiology (ISRP), 669 September, 2009 Clermont-Ferrand (France). 4(07): 1167-1183.
- Pawar, Hitesh N.; Kumar Ravi, G.V.P.P.S. and Narang, Raman (2013). Effect of heat stress on milk production and composition in Murrah buffaloes. *Journal of Buffalo Science*, 2: 98-102.
- Rhoads M.L.; Rhoads, R.P.; Van Baale, M.J.; Collier, R.J.; Sanders, S.R.; Weber, W.J.; Crooker, B.A. and Baumgard, L.H. (2009). Effects of heat stress and plane of nutrition on lactating Holstein cows: I. Production, metabolism, and aspects of circulating somatotropin. *Journal Dairy Science*, 92(5): 1986-97.
- Singh, Satyendra Pal and Pachauri, S.P. (2011). Effect of feed supplement at different post calving days on the performance of lactating buffaloes in different seasons. *Indian J. Anim. Res.*, 45: 314-317.
- Singh, Satyendra Pal, Lende, Shweta R. and Sharma, Indu (2014). Effect of mineral and vitamin supplementation on milk production and reproduction performance and its correlation with seasonality in buffaloes. *Intas Polivet*, 15(1): 52-54.
- Singh, Satyendra Pal (2017). Effect of mineral and vitamin supplementation on buffaloes milk production and its correlation with heat stress in summers. *Intas Polivet*, 18(1): 69-71.
- Wheelock, J.B.; Rhoads, R.P.; Van Baale, M.J.; Sanders, S.R. and Baumgard, L.H. (2010). Effects of heat stress on energetic metabolism in lactating Holstein cows. *Journal of Dairy Science*, 93(2): 644-655.