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OFT (On Farm Testing) on the Area Specific Mineral Mixture on the Milk Production of Murrah Buffaloes under Climatic Conditions of Tonk District

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Abstract

Mineral mixture supplementation plays a vital role to improve milk production in dairy buffaloes. The mineral mixture named as "Avikaminimix" was provided from Central Sheep and Wool Research Institute, Avikanagar, Tonk, Rajasthan. 3 buffaloes of each farmer were selected to conduct this study in which 2 buffaloes fed by us and one buffalo fed by the farmer for the duration of 63 days. We provided total 6 kg Avikaminimix mineral mixture to each farmer for the feeding of 2 buffaloes in which 50 gm mineral mixture daily per buffalo. The reading of milk production noted daily in the morning and evening. The average production of T3 in Akodia village was 5.88±0.285 and weekly performance was increasing also but under T1 (4.47±0.25) & T2 (5.64±0.32) performance was lower. The average production of T3 in Bahakva village was 6.50±0.31 and weekly performance was increasing also but milk production under T1 (7.50±0.25) & T2 (7.35±0.30) was slightly lower. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Bahakva village was 6.50±0.31 and weekly performance was increasing also but under T1 (4.75±0.30) & T2 (5.90±0.32) performance. The average production of T3 in Bahakva village was 6.50±0.31 and weekly performance was increasing also but milk production under T1 (7.50±0.25) & T2 (7.35±0.30) was slightly lower. Milk production status under Bhanvati and Rajputon ki Dhandi was highest and Newai village performance was poorest because of Bad water & fodder quality and managmental factors.

Keywords: Area Specific Mineral Mixture, Milk Production, Murrah Buffaloes, Climatic Conditions

Introduction

In tropical and subtropical regions dairy cattle usually depend exclusively on native or introduced pastures as their only source of nutrients, and in particular, during critical periods of the year, such as the winter or dry season, the animals cannot fulfill their nutrient requirements because forage is either scarce or of low quality (Soto et al., 2001).

Minerals are required by dairy animals for their metabolic functions, growth, milk production, reproduction and health. Animal cannot synthesize minerals inside its body and usually feeds and fodders fed to the dairy animals do not provide all the minerals in the required quantity. Therefore, animal should be supplemented with adequate amount of good quality mineral mixture in their ration. Level of minerals in feeds and fodder varies from region to region, thus mineral availability to the animal also varies. So, it is necessary to produce region specific mineral mixture accordingly.

India today, stands first in the area of milk production at the world level, with an annual growth rate of about 4%. The country's milk production in

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2010 was estimated to be 110 million tones (Singh et al 2012). The productive improvements among dairying animals can be made through proper management, feeding and handling, etc. which may influence expression of productive characters as per its heritability nature (Singh et al 2013). Goat population of our country increased from 47.14 million in the year 1951 to 124.5 million during 2005 (Singh and Sharma, 2013). Improvement can be made through proper management, feeding, handling and other environmental conditions which will influence expression of characters but a limit of which is set by heredity of individual (Singh et al 2013). Goats are integer part of livestock production and play a vital role in the socio-economic structure of rural poor. (Singh and Sharma, 2014). Various government and non-government organization have also recognized the importance of poultry farming as employment generating enterprise and are engaged in motivating more and more entrepreneurs to take up this enterprise (Singh et al 2014). Goats play a vital socio-economic role in Asian agriculture, particulately for resource poor people living in harsh environment (Singh et al 2014). Non-cattle milk accounts for approximately 15% of the total milk consumption by humans worldwide (Singh et al 2014). Goats are more often poorly managed and this is attributed to their ability to survive under harsh conditions and also because most people in rural areas rear goats for their subsistence purposes to support their families (Singh et al 2014). Goat milk contains less lactose than cow's milk, so is less likely to trigger lactose intolerance (Singh et al 2014). The goat was domesticated as early as 6-7 BC, as evidenced by archaeological remains collected in western Asia (Singh et al 2014). Major population of India is primarily depends on agricultural based system for their daily life including goat keeping that constitute an important rural business of small marginal farmers and landless labours (Singh et al 2014). Reproductive management of an animal is governed through a number of parameters, viz. age at first conception, age at first calving and first gestation length etc. (Singh et al 2014). Goat milk contains less lactose than cow's milk, so is less likely to trigger lactose intolerance (Singh and Sharma, 2015). It has since played a significant socioeconomic role in the evolvement of human civilization around the world (Singh and Sharma, 2015). Farmers preferred Deda over Kona because it has more biomass (Singh and Sharma, 2015). A very important aspect in this regard is the awareness of risk by resource-poor farmers and their emphasis on minimizing it (Singh and Sharma, 2016). The country is endowed with large and biologically diverse population of goats. (Singh and Sharma, 2016). Goat milk has more calcium (Ca), phosphorus (P), potasium (K), magnesium (Mg) and chloride (Cl) and less sodium (Na) and sulphur (S) contents than cow milk (Singh and Sharma, 2016). India ranks first in terms of milk production (129.7 million tonnes), however, the productivity is quite low mainly because of scarcity of feeds and fodders (Singh et al 2017). Animals reared in intensive production systems consume a considerable amount of protein and other nitrogen-containing substances in their diets (Singh et al 2017). This benefit is often not shown in national statistics because of informal trading and slaughtering (Singh and Sharma, 2017). Asia contributes approximately 59% to world goat milk production (Singh et al 2018). The typical character of the breed is a highly convex nose line with a tuft of hair, yielding a parrot mouth appearance (Singh et al 2017). The consequence of domestication was a change in the phenotypic characteristics of wild goats, which resulted in the development of a multiplicity of goat breeds or types (Singh and Sharma, 2017). Over recent decades the poultry industry has made tremendous adjustments to meet the increasing demand for inexpensive and safe supply of meat and eggs (Singh, G. 2019). Severe acute cases can be fatal, but even in cows that recover there may be consequences for the rest of the lactation and subsequent lactations (Singh and Singh, 2020). The dairy livestock owners who raise cattle and buffaloes are yet ignorant with scientific management practices (Singh and Somvanshi, 2020). In tropical and subtropical regions dairy cattle usually depend exclusively on native or introduced pastures as their only source of nutrients, and in particular, during critical periods of the year, such as the winter or dry season, the animals cannot fulfill their nutrient requirements because forage is either scarce or of low quality (Singh, G. 2019). The goat is thought to

have been the earliest domesticated ruminant and of all the species of domesticated animals except dog, has the widest ecological range. Originating in Asia, goats have spread over all the continents and inhabit almost all -climatic zones from arctic - circle to the equator (Singh, G., 2024). Man, Animal and Nature are in symbiotic relationship for their survival and sustenance. The balance maintained among the three for several millennia has been disturbed by over exploitation of natural resources for meeting the demands of increasing population of men and animals (Singh et. al., 2024).

The importance of minerals in regulating biological systems, growth, production and reproduction is well documented (Underwood, 1999), however, livestock in India do not receive mineral/ vitamin supplements except for common salt and calcite powder (Garg, 2008). Hence, dairy animals depend on forages for their mineral requirements (McDowell, 1992). A number of researchers in the world have reported high incidences of forage and blood serum samples below the critical levels for different mineral elements, especially copper (Cu), zinc (Zn) and phosphorus (McDowell, 1993). Soils from all over country are getting depleted for one or more mineral elements in soil, plants and animals (Miles, 1983). The quantity of minerals, thus, present in forages may not be sufficient for optimum growth, milk yield and reproduction efficiency of dairy animals (McDowell, 1992). In order to avoid macro and micro-minerals imbalances in the ration, a study on assessment of mineral status of lactating buffaloes was undertaken in Sabarkantha district.

It has been reported that there can be a dramatic disbalance between the output (mainly in the form of milk) and the input of trace minerals involved in diverse metabolic processes, which ultimately impact productive and reproductive variables (Wilde, 2006).

Supplementation with complexed trace minerals is a frequent practice in dairy cattle nutrition programs. Feeding of zinc methionine complex to dairy cows reduced the somatic cell count, increases milk yield and improved integrity of hoof tissue (Bicalho et al., 2007). Moreover, if this complex is complemented with Mn-, and Cu-specific amino acids complexes and cobalt glucoheptonate, further improvement of milk production, reproductive performance and claw integrity is observed (Bicalho et al., 2007). Several studies have also reported improvements in reproductive performance, immune response and hoof health in ruminants supplemented with these minerals (Margerison et al., 2002).

Previous researches showed that adequate copper and/or zinc input may be used as a strategy to optimize immune system function by the reduction of the metabolic and oxidative stress (Cortinhas et al, 2010), and milk production performances (Evans and Halliwell, 2001).

Methodology

The area under this study is Tonk District, Rajasthan, which is located in Eastern part of the state between 75 0 07’ 00" E to 760 19’00" E and 25 0 41’ 00" N to 26 0 34’00" N. The total geographical area covered by the District is 7194 km^2. The climate of the area is semiarid type. The average annual rainfall of the district is 598 mm. The area is having general flat to undulating topography. The Banas River, 135 km in length, is major one running through Tonk district (Sharma et al., 2015).

The study was conducted at villages of Newai tahsils (11 Akodia, 2 Rajputon ki Dhandi, 2 Devli Bhanchi, 2 Bhanvati, 2 Bahakava, 2 Jujharpura and 1 Newai) of Tonk district of Rajasthan during 2014. The mineral mixture named as “Avikaminimix” was provided from Central Sheep and Wool Research Institute, Avikanagar, Tonk, Rajasthan. 3 buffaloes of



each farmer were selected to conduct this study in which 2 buffaloes fed by us and one buffalo fed by the farmer for the duration of 63 days. We provided total 6 kg Avikaminimix mineral mixture to each farmer for the feeding of 2 buffaloes in which 50 gm mineral mixture daily per buffalo. The reading of milk production noted daily in the morning and evening.

Results and Discussion

It was observed from Table 1 that the effect of area specific mineral mixture on milk production of murrah buffaloes was significantly affected under farm rearing conditions of Tonk district.

The average production of T3 in Akodia village was 5.88±0.285 and weekly performance was increasing also but under T1 (4.47±0.25) & T2 (5.64±0.32) performance was lower. Our results are similar with Rabiee et al 2010 who have reported that the organic trace mineral supplementation could improve production in lactating dairy cows. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Akodia village was 5.88±0.285 and weekly performance was increasing also but under T1 (4.47±0.25) & T2 (5.64±0.32) performance. The level of milk production was moderately higher than other villages rearing conditions.

The average production of T3 in Rajputon ki Dhandi village was 9.32±0.27 and weekly performance was increasing also and under T1 (6.00±0.24) & T2 (6.70±0.30) performance was good. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Rajputon ki Dhandi village was 9.32±0.27 and weekly performance was increasing also but under T1 (6.00±0.24) & T2 (6.70±0.30) performance. The level of milk production was higher than other villages rearing conditions.

The average production of T3 in Devli Bhanchi village was 7.24±0.29 and weekly performance was increasing also and under T1 (5.75±0.27) & T2 (6.95±0.31) performance was moderately good. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Devli Bhanchi village was 7.24±0.29 and weekly performance was increasing also and under T1 (5.75±0.27) & T2 (6.95±0.31) performance. The level of milk production was moderately higher than other villages rearing conditions.

The average production of T3 in Bhanvati village was 9.79±0.275 and weekly performance was increasing also and milk production under T1 (7.50±0.25) & T2 (7.35±0.30) was excellent. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Bhanvati village was 9.79±0.275 and weekly performance was increasing also and under T1 (7.50±0.25) & T2 (7.35±0.30) performance was excellent. The level of milk production was highest than other villages rearing conditions. Our results was fully corroborated with Kincaid and Socha (2004) who have reported a tendency for increased milk production in dairy cows receiving trace mineral supplements, as did Siciliano-Jones et al. (2008) when dairy cattle were fed different sources of trace elements.

The average production of T3 in Bahakva village was 6.50±0.31 and weekly performance was increasing also but milk production under T1 (7.50±0.25) & T2 (7.35±0.30) was good. The statistical analysis revealed that a significant

Table 1: Milk production (in kg) status of Buffaloes

S. No.	Name of Village	Overall Average (T1)	Overall Average (T2)	Weekly milk production status (T3) I	II	III	IV	V	VI	VII	VIII	IX	Overall Average (T3)
1.	Akodia	4.47±0.25	5.64±0.32	3.00	3.25	3.75	4.50	5.01	5.67	6.50	7.13	7.89	5.88±0.285
2.	Rajputon ki Dhandi	6.00±0.24	6.70±0.30	7.12	7.57	8.35	8.86	9.23	9.94	10.06	10.84	11.89	9.32±0.27
3.	Devli Bhanchi	5.75±0.27	6.95±0.31	5.26	5.68	5.98	6.15	6.95	7.47	8.59	9.38	9.71	7.24±0.29
4.	Bhanvati	7.50±0.25	7.35±0.30	7.55	8.36	8.85	9.36	9.93	10.22	10.82	11.16	11.89	9.79±0.275
5.	Bahakva	4.75±0.30	5.90±0.32	4.13	4.32	4.68	4.90	5.03	5.58	6.28	6.39	6.54	6.50±0.31
6.	Jujharpura	4.50±0.28	4.85±0.33	4.09	4.22	4.45	4.51	5.11	5.55	5.69	6.34	6.78	5.80±0.305
7.	Newai	4.13±0.29	4.60±0.28	4.10	4.24	4.76	4.59	5.19	5.53	5.72	6.03	6.56	5.19±0.285

difference existed in the milk production of T3 in Bahakva village was 6.50±0.31 and weekly performance was increasing also and under T1 (4.75±0.30) & T2 (5.90±0.32) performance was good. The level of milk production was moderately higher than other villages rearing conditions. Our results are similar with Tufarelli et al. (2011) found supplementation with trace elements complex had a direct, positive effect on milk production of grazing dairy ewes. Likewise, fat and protein production milk were slightly higher (p = 0.21 and p = 0.15, respectively) for the cows fed the C-2.5 diet than the other dietary groups.

The average production of T3 in Jujharpura village was 5.80±0.305 and milk production under T1 (4.50±0.28) & T2 (4.85±0.33) was moderate. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Jujharpura village was 5.80±0.305 and weekly performance was increasing also but under T1 (4.50±0.28) & T2 (4.85±0.33) performance was not good. The level of milk production was poor than other villages rearing conditions. Our results are similer with Singh at al., 2014 who have reported the calcium percentage in the milk of Jakhrana breed under field and farm rearing conditions in summer, rainy and winter seasons was found to be 0.136±0.0019 and 0.142±0018, 0.140±0.0018 and 0.146±0.0019 and 0.144±0.0023 and 0.151±0.0018, respectively. In case of Jamunapari breed under field and farm rearing conditions for aforesaid seasons, the calcium per cent was found to be 0.142±0.0018 and 0.148±0.0018, 0.146±0.0019 and 0.150±0.0019 and 0.147±0.0019 and 0.155±0.0020, respectively.

The average production of T3 in Newai village was 5.19±0.285 and weekly performance was increasing also but milk production under T1 (4.13±0.29) & T2 (4.60±0.28) was slightly lower than other villages performance. The statistical analysis revealed that a significant difference existed in the milk production of T3 in Newai village was 5.19±0.285 and weekly performance was increasing also but under T1 (4.13±0.29) & T2 (4.60±0.28) performance was not good. The level of milk production was poorest than other villages rearing conditions. Our results are similar with (Singh and Sharma 2016)

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