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RESEARCH ARTICLE

Impact assessment of mineral mixture supplementation on buffalo in Panchmahal district of central Gujarat

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Abstract

The present study was conducted on the milch buffaloes under the banner of ICAR-KVK, Panchmahal under semi arid ecosystem of middle Gujarat. Average milk yield recorded during the study was period 5.25±0.43 and 6.28 ±0.57 litre/ days in control and mineral mixture supplementation group, respectively. The results indicated that the buffaloes supplemented with mineral mixture produced 19.62 per cent more milk as compared to control without any adverse affect on the body weight and health of the animals. The increase in milk yield was significantly higher ($P<0.05$) in the animals of MMS group as compared to control. The overall extension gap was found 1.03 kg which shows that sufficient reason to popularize the technology by various agencies in Panchmahal district of central Gujarat. The adoption percentage of technology was 72.47 percent during the reporting period. The results of study revealed that 16.28 per cent reduction in cost milk production per litre in buffalo were due to the supplementation of mineral mixture under of hot semi-arid ecosystem. The supplementation of mineral mixture during experimental period indicates that benefit cost ratio 1:2.10 was recorded, which appears to be very lucrative over traditional system of feeding. Based on observations, it can be concluded that supplementary feeding of mineral mixture economically improved the milk production and reproductive performance of buffaloes under hot semi-arid ecosystem.

Key words: Buffalo, mineral mixture, milk production, reproductive performance

Introduction

India is predominantly an agrarian society where dairy animals are the backbone of rural economy and can be a powerful tool for eradication of rural poverty especially in semi arid ecosystem. The crop residues, forages and mature grass are the main source of feed and fodder for livestock feeding during most of the year in almost all parts of the country. The milk production of our livestock is mostly depends on roughage based ration. Feeding management is probably one of the important needs, because currently the country is facing a wide gap between demand and availability of nutrients. The whole gamut of the dairy industry as well as its lucratibility by and large depends upon the availability and type of feed being offered to the animals by dairy cattle owners. As about 70 -75% of the total cost of production is spent on feeding of livestock. Therefore judicious use of feed and fodder to the animals to meet their body requirement is essential. To make dairy farming profitable enterprise it is essential to reduce feeding cost of

the animal and productivity of milch animals. These feed and fodder are insufficient to support nutrients requirements, optimal reproductive performance and sustainable milk production from the dairy animals. In view of the above, a study was undertaken to assess the efficacy of Mineral Mixture supplementation on milk production and reproductive performance in lactating crossbred dairy cattle and also determined the cost effectiveness of supplements under field conditions.

Materials and Methods

The present study was conducted on the milch buffaloes under the banner of KVK-Panchmahals under semi arid ecosystem of middle Gujarat. Thirty lactating Mahasana buffaloes was divided in to two groups of 15 buffaloes in each group i.e. T1 (control) and T2 (Mineral Mixture supplementation @ 50g/ day) during 2011-12 and 2012-2013. All animals were managed under farmers own traditional system of feeding and management. The animals were selected nearly at the same lactation stage, body weight, milk yield and parity. The trainings were organized for benefitted livestock keepers by KVK scientists in respective years. In trail especial emphasis was given to proper use of mineral mixture feeding to milch buffalo ration. The feeding of selected animals in control group (T1) were consisted of 5-6kg dry fodder *viz*., Maize, Sorghum and Per millet stover with some quantity of local dry grasses and 25kg green fodder i.e. hybrid Napier and Lucerne with 2.5kg /day/animal concentrate mixture. In the treatment group (T2) in addition to the above, a regular supply of mineral mixture as supplementations was offered during the whole period of study, without interruption. The drinking water was offered ad lib. The data recording of experiment trial was carried out for 150 days. The milk was recorded daily at morning and evening. Reproductive performance with reference to onset of post-partum estrus, service period and services per conception were also recoded. After one year, a survey was conducted, 25 farmers were selected randomly those buffaloes were used for on farm trails to know about the adoption perspective of the technology. The data were analysed statistically in a completely randomized design and the significances of the difference between treatment means was determined by using the student-t test according to Snedecor and Cochran (1989). Partial budget analysis and benefit cost ratio was calculated to assess the economic profitability of mineral mixture supplementation according to Danilo (2002).

Extension gap and adoption percentage were calculated as follows:

Extension gap = (Demonstration for milk production) – (Farmers/Traditional milk production)

Adoption percentage = Ai/Ri × 100

Where; Ai= Adoption score obtained by the livestock keepers

Ri= possible maximum score obtained by the livestock keepers

Results and discussions

Effect of mineral mixture supplementation on milk yield

The effect of mineral mixture supplementation on milk yield presented in the table 1 which revealed that the initial milk yield was similar in the both groups but average milk yield recorded during the study was period 5.25±0.43 and 6.28 ±0.57 lit./day in control and MMS group, respectively. The results indicated that the buffaloes supplemented with mineral mixture produced 19.62 per cent more milk as compared to control without any adverse affect on the body weight and health of the animals, which was apparent from the improved body weight of

the buffaloes during the study period. The increase in milk yield was significantly higher (P<0.05) in MMS group as compared to control. More or less similar effects of mineral mixture supplementation on milk production were also reported by Tiwari *et al*. (2012) and Tiwari *et al.*, (2013).

Extension gap and adoption percentage

The overall extension gap was found 1.03 kg which shows that sufficient reason to popularize the technology by various agencies in Panchmahal district of central Gujarat. The adoption percentage of technology was 72.47 percent during the reporting period. The present findings are in agreement with the findings Sharma and Sharma (2017).

Reproductive performance

The service period and number of services per conception under MMS and control groups are given in (Table 2). The results of present study revealed that the mean duration of service period (88.8 ±10.67days) was reduced significantly in MMS group than the control group (123.66±15.46days and 169.4±11.7 days) under hot semi-arid ecosystem. The services per conception was also observed significantly (P<0.05) higher in non- supplemented group than the supplemented ones. The average number of service per conceptions in MMS and control group was recorded 1.32±0.20 and 3.2 ±1.12, respectively. The results showed that supplementation of miner mixture in the diet significantly (P<0.05) influenced the reproductive performance in buffaloes. The present findings of conception/ pregnancy rate on supplementation of mineral mixture to anoestrus dairy animal are in agreement with the findings of many workers (Samanta *et al*., 1995, Lalla, 2002, Upadhayay, 2004 and Tiwari *et al*., 2012). Improvement in reproductive efficiency in these buffaloes supplemented with mineral mixture containing Ca, P, Cu etc. has been attributed to various factors. Minerals have a beneficial role on endocrine system and play an important role in resumption of follicular growth and fertility in dairy cows (Smith and Akinbamijo, 2000). Phosphorus is associated with energy metabolism and its deficiency results in delayed sexual maturity, anestrus, repeat breeding and irregular estrous cycle (Quayam *et al.,* 1988). A positive interaction between Cu and reproductive hormones has been reported by (Prasad *et al.,* 1989). Hence, the improvement in reproductive efficiency in the present study may be attributed to the beneficial action of supplemented minerals on the neuro-endocrine axis and reproductive functions.

Economics of mineral mixture

A partial budget analysis measures was used in those items of expenditure and incomes suggested by Danilo (2002). Therefore, the cost of roughage, concentrate mixture and mineral mixture have been considered. The cost of labour was not considered for calculation because it was same in both groups as family members were used in management of livestock. The costs of dry fodder, green fodder, concentrate mixture and mineral mixture was calculated on basis of market rate prevalent during the study period *i.e.* @ Rs.300/ quantal for dry fodder Rs.100/quantal for green fodder, Rs.1100/ quantal for concentrate mixture and Rs.50/kg for mineral mixture. Selling price of milk received by farmers during experimental period was taken Rs. 30/ litre. The recurring cost which included feeding and income from sale of milk is presented in Table 3. The results of study revealed that 16.28 per cent reduction in cost milk production/ litre in buffalo were due to the supplementation of mineral mixture under of hot semi-arid ecosystem. The supplementation of mineral mixture during experimental period indicates that benefit cost ratio 1:2.10 was

recorded, which appears to be very lucrative over traditional system of feeding.

Based on observations, it can be concluded that the supplementary feeding of mineral mixture economically improved the milk production and reproductive performance of buffalo under hot semi-arid ecosystem. All the farmers readily accepted the practice of using mineral mixture supplementation and are also willing to continue. Mineral mixture has potential to increase the viability, dry season milk supplies, improvement in the reproductive performance of dairy animals and increase household incomes. However, awareness needs to be done among the dairy farmers about the usefulness of mineral mixture and availability should be ensured at the village level milk collection centre or state animal husbandry department.

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Table 1: Milk Productionfor mineral mixture supplementation

Average milk production liter/ day		Increase in milk production	Extension gap	Adoption per cent
T-1 (Control)	**T-2 (MMS)**			
$5.25^{b}\pm0.43$	$6.28^{a}\pm0.57$	19.62	1.03	72.47

Estimates with different superscripts differ significantly

Table 2: Mineral mixture impact on reproductive performance of milch buffaloes

Particulars	**T-1 (Control)**	**T-2(MMS)**	**Extension gap**
No. of buffaloes	15	15	--
Service period (days)	123.66^{b}±15.46	88.8^{a} ±10.67	34.64 days
No. of services (AI) per conception	3.2^{b} ±1.12	1.32^{a}±0.20	1.88

Estimates with different superscripts differ significantly

Table3: Economics of mineral mixture supplementation on milch buffaloes.

Particulars	**T-1 (Control)**	**T-2(MMS)**
Average milk yield (litre/day)	5.25	6.28
Additional increase in milk yield (litre /day)	--	1.03
Average feeding cost per days in rupees	87/-	87/-
Cost of MMS per day in rupees	--	2.50/-
Total variable cost per day in rupees	87/-	89.50/-
Average feeding cost/ litre milk production in rupees	16.57	14.25
Gross return from sale of milk in rupees	157.5	187.5
Net return in rupees	70.50	98
B:C Ratio	1.81	2.10