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Demonstrations on Area Specific Mineral Mixture supplementation in milch animals in Mandi district of Himachal Pradesh

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Abstract

Minerals though required in very minute quantity, hold potential to bring about remarkable changes in animal productivity. As the rainfall and mineral profile of soil varies across different regions, the mineral content of feed and fodder resources grown in that area also changes. As a result the availability of minerals for livestock feeding across different regions is also not uniform. Keeping this in view, CSK Himachal Pradesh Krishi Vishvavidyalaya has developed four different area specific mineral mixtures (ASMM) for different agro climatic zones of Himachal Pradesh. In the present Front line demonstrations the farmers' feedback on dietary ASMM supplementation in milch animals in District Mandi which falls in Zone II of Himachal Pradesh is elucidated. The results revealed that ASMM supplementation improved milk yield, hair coat and reproductive performance in milch animals but the awareness and availability of ASMM in the area need upscaling.

Key words: Area specific mineral mixture, awareness, milk yield, reproduction.

Mandi, a hilly district in north western Himalayan state of Himachal Pradesh is home to largest livestock population in state. As per 19th livestock census (2012), Mandi district has 2,21,000 crossbred/ exotic and 2,16,000 desi/local cattle. These animals are reared predominantly on crop residue, little seasonal cultivated fodder and tree foliage. In hilly areas livestock especially crossbreds, suffer from anemia and other mineral deficiency resulting in low milk yield and poor reproductive health (Singh *et al*., 2016). Minerals though required in very minute quantity hold potential to bring about remarkable changes in animal productivity. To full fill the mineral requirement and harvesting optimum milk yield from dairy animals progressive farmers are using different mineral supplements available in the market. Dietary supplementation of trace minerals from inorganic sources is a common practice in livestock industry to prevent trace mineral deficiency. However, over supplementation of inorganic minerals often results in poor bioavailability, due to mineral interaction among themselves and with other components in diet, resulting in large amount of dietary minerals being excreted in faeces which can lead to soil and surface water contamination (Gowda *et al.* 2016). CSK Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV) has also developed four different area specific mineral mixtures (ASMM) for different zones of Himachal Pradesh and the present Front line demonstrations (FLDs) elucidate the farmers' feedback on dietary ASMM supplementation in milch animals in District Mandi which falls in Zone II of Himachal Pradesh.

Materials and Methods

Fifty progressive farmers each possessing a minimum of one freshly calved animals and surplus milk were selected and provided with ASMM Zone II,

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sufficient for dietary supplementation for three months. Every day the selected animals were fed 40 - 50 g ASMM mixed with concentrates. Daily milk yield of animals and days to first estrus after calving was recorded and farmer's feedback on milk quality, body condition and hair coat of animal was collected through one to one discussion. The information so generated was analysed for drawing inferences.

Results and Discussion

Prevalent mineral supplementation practices

Out of the selected 50 farmers, 44 farmers were providing mineral supplementation but majority of farmers (36/44) feed mineral mixture only to lactating animals that too in early lactation only when milk yield of animal is relatively higher. While eight dairy farmers reported that they provide mineral mixture throughout the year. Some farmers provide liquid mineral supplements for 3-4 months after calving when the milk yield of animals is higher and later change to powdered mineral mixtures when the milk production decrease or animals are dry as they believe it is more economical. The trend may be attributed to use of tree foliage as a source of fodder for livestock in the region. Tree foliage is rich in calcium and often meet the calcium requirement of low and moderate yielders so upon mineral supplementation when farmers do not observe any improvement in milk yield they discontinue mineral supplementation.

Six farmers revealed that they do not feed mineral mixture to their animals as they believe that the concentrate feed, locally called *Darad,* in addition to dry and green fodder they are feeding is sufficient to meet all the nutrient requirement of their milch animals. Further they were satisfied with the milk yield of their animals and if any improvement occurs upon mineral mixture supplementation, they lacked easy access to market for sale of raw milk. Two among them did not fed mineral mixture at all as they have encountered problems with palatability of mineral mixtures in their animals.

For stall fed animals, feeding the mineral supplements mixed with concentrates is the best option. Otherwise mineral mixture along with some concentrate can be sprinkled over green fodder and as it becomes indistinguishable it is readily consumed by animals. All the animals involved in the study consumed ASMM mixed with concentrate feed and there was no issue of palatability.

Table 1. Composition of area specific mineral mixture (zone II)

Sr No.	Particulars	Amount
1	Moisture	5 % (max.)
2	Calcium	19 % (min.)
3	Phosphorus	9 % (min.)
4	Manganese	0.09 % (min.)
5	Iodine	0.0006 % (min.)
6	Copper	0.04 % (min.)
7	Zinc	0.4 % (min.)
8	Cobalt	0.0004 % (min.)
9	Sulphur	0.7 % (min.)
10	Acid insoluble ash	3.0 % (max.)

Table 2. Farmers profile and prevalent dietary mineral supplementation practices among dairy farmers in District Mandi, Himachal Pradesh

Parameters	Observations
Livestock holding of farmers	1 to 27 lactating animals
Milk production/day	7 to 200 L
Surplus milk/day	4 to 182 L
Mineral mixture supplementation	88 % use mineral supplements
Duration of mineral mixture supplementation	72 % provide only during early lactation. 16 % provide throughout the year
Awareness about area specific mineral mixture	0 %
Availability of area specific mineral mixture	NA

Awareness about area specific mineral mixture

All the farmers were aware about differences in soil fertility in their fields and difference in nutritive value of various feeds and fodders in their areas but heard for the first time about different mineral supplements for livestock based on the nutritional value of feed and forage resources in the area. On the other hand Tiwari *et al.* (2013) reported that in Utter Pradesh 53% dairy farmers were aware about ASMM and 74% of aware farmers are actually using it in their livestock feeding. This lack of awareness about ASMM in district Mandi may be attributed to very limited demonstrations of the technology in the area and its non availability in local shops selling veterinary drugs and feed supplements. Moreover ASMM is being manufactured in state by only CSHKHPV at Palampur and the technology has not been transferred to any commercial manufacturer. All the selected farmers readily agreed to include ASMM in their livestock feeding indicating good rapport of Krishi Vigyan Kendra and University. Free of cost supply of ASMM under FLD may have also contributed towards 100% acceptance among the selected farmers.

Effect on milk

Majority (78%) of the farmers did not observe any appreciable change in milk yield, but the six farmers who used it for the first time responded that it improved milk yield of their animals plus sustained the peak yield of animals for a longer duration. The improvement in milk yield in animals which received mineral supplementation for the first time in form of ASMM zone II, suggest that ASMM effectively supplied the minerals required for improved milk yield and no report of decline in yield indicate that its impact in terms of milk yield is comparable to other commercial mineral supplements available in the market. Tiwari *et al.* (2012) has also reported improvement in milk yield upon feeding of ASMM in milch stock. Further Tiwari *et al.* (2013) observed that ASMM supplementation not only increased milk yield but also sustained higher yield in non pregnant lactating as well as pregnant lactating animals. Similar was the trend for impact on fat content in milk as 74% farmers observed no change while 20% reported improvement. Another 6% farmers reported reduction in fat content which may be attributed to increase in milk yield as it is observed that as the quantity of milk increases the fat content tends to decrease.

Body condition and Hair coat

Farmers reported that feeding of ASMM had no apparent effect on body condition of animals but some farmers gave the feedback that it improved animal's hair coat and made it more lustrous. The effect was more pronounced in animals those who have no history of previous mineral mixture supplementation. Minerals being catalyst or important component of various enzyme complexes and hormones in body are critical components for optimal nutrition and health of animals. Trace mineral especially Cobalt deficiency makes the animal's hair coat rough (Sharma *et al.* 2007). In the present study all the animals were

Table 3. Farmer's feedback on effect of dietary supplementation of area specific mineral mixture

Parameters	Increased (%)	No Change (%)	Decreased (%)
Milk yield	22	78	00
Fat content in milk	20	74	6
Body condition	40	45	15
Hair coat luster	30	58	12

mature, so the impact on growth rate and body condition was not appreciable but animals hair coat become lustrous indicating that animals were deficient in Cobalt and ASMM supplementation helped to improve its level in body.

Impact on reproductive health

In the present study 54% animals getting ASMM in their feed displayed estrus during the three month study period. Mohapatra *et al.* 2012 and Jana *et al.* 2015 reported that ASMM supplementation significantly lowers the duration of post partum anestrus and also improve the reproductive performance in cattle. 46% animals involved in the study did not come into estrus suggesting that besides mineral nutrition other factors like reproductive infection, silent estrus or suboptimal feeding in terms of energy and protein content are also prevalent in livestock in the area which influences the duration of post partum anestrous in animals.

Farmer's willingness to purchase ASMM

After completion of the FLD on dietary supplementation of ASMM, when the farmers were enquired about their willingness to purchase and feed ASMM to their animals most of the farmers responded in affirmation. But they put forth the idea that it should be available at Govt. sale centers for seed/fertilizers, KVKs and other outstations of CSKHPKV. As majority of the farmers were also actively engaged in crop production and routinely purchase part of their agricultural inputs from Govt. sale centers and as these sale centers are located through out the district and are easily accessible to farmers it will improve its availability and also the reach of University among farmers. The sale price of ASMM is about Rs 60/kg making it cost effective compared to similar supplements available in the market, so by enhancing its production and availability through extension network/ sale centers or transfer of technology to private entities for its further up scaling, university can contribute towards reducing the cost of mineral nutrition and making dairy farming more remunerative.

Conclusion

Area specific mineral mixture supplementation is an effective technique to improve milk yield, reproductive performance and avoid over feeding of minerals which are available in sufficient amount in local feed and fodder resources. Use of ASMM will also make mineral supplementation more cost effective but for improving its awareness among dairy farmers more demonstration on ASMM need to be conducted.

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