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Research Paper

Innovative extension approach for enhancing profitability of dairy farms during winter months: A success story

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ABSTRACT

Aiming to adopt an innovative approach in farmers' field through transfer of technology, an On Field Trail (OFT) was conducted through KVK Shopian in nine villages of the district during winter months from 15th November to 15th March for two consecutive years *viz.* 2020 and 2021, wherein, fifty-four cows in their second or third gestation were selected and divided into two groups. The control group were fed normal feed/fodder available with these dairy farmers, whereas animals in experimental group were fed 200g of urea molasses mineral block (UMMB) daily above the normal course of feeding practices. There was an increase in feed intake and milk production in UMMB supplemented group, with no significant difference in milk composition among control and supplemented groups. Reproductive problems like dystocia, repeat breeding, retained fetal membrane, mastitis, uterine prolapsed, anestrous and mixed problems were reported less in animals supplemented with UMMB. There was an additional profit of Rs. 83.70 generated per animal per day, which accounted to additional profit of Rs. 6.38 generated per rupee invested by the farmers.

Key words: Innovative, research, shopian, supplementation, technology, UMMB

The dairy animals in Kashmir region are mostly stall-fed on the fodder available from cultivated land during summer and poor-quality crop residues (paddy straw) during lean months with small amount of grain byproducts (mainly brans, and oil cakes) without any mineral/vitamin supplements except for common salt (Ganai *et al.,* 2004). Hence, dairy cows depend on available feed and fodder resources for their macro and micro nutrients, which are not only insufficient but are seasonally available with poor nutritive value, low in digestibility and critically low in P, Mg, Mn, Cu, Na, K and Zn (Ganai *et al.,* 2006, Reshi *et al.,* 2016; Sheikh *et al.,* 2019; Mir *et al.,* 2019). Reshi *et al.,* (2016) reported deficiency of macro minerals (Ca, P) in cattle and sheep of district Ganderbal and dairy animals of district Anantnag were found deficient in almost all macro and micro minerals (Sheikh *et al.,* 2019). Apart from minerals, different studies carried in various districts of Kashmir have found that there is deficiency in daily dry matter intake of dairy animals which substantially limit intake of all nutrients (sheikh *et al*., 2022). Due to deficiency of these macro and micronutrients, different reproductive problems were reported by different workers in the dairy animals across the state *i.e.* abortion, dystocia, repeat breeding, retained fetal membrane, mastitis, still-birth, uterine prolapsed, anestrous and mixed problems (Mir *et al.,* 2019; Sheikh *et al.,* 2019). Hence it is need of hour to make mineral supplementation as feed and fodder offered to animals do not provide all the requisite minerals.

Progressively, dairy farmers in India are supplementing mineral mixtures to their dairy animals, which resulted improvement in their milk production plus breeding efficiency. However, as per the survey carried in different districts of Kashmir only 3-5% farmers use mineral mixtures to dairy animals (Bhat *et al.,* 2021; Mir *et al.,* 2019, Reshi *et al.,* 2016 and Sheikh *et al.,* 2019). Owing to the high cost of oil cakes, use of urea as a non-conventional source of non-protein nitrogen for ruminants is well known practice done throughout country.

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Non-Protein Nitrogen supplements like urea are cost effective, readily available and can improve the nutritive value of poor-quality crop residues. Urea is fed to large ruminants (cows and buffaloes) in the form of uromol (Langer *et al.,* 1985), urea molasses liquid supplement (Kaur, 1993) and urea-treated straw (Sheikh *et al.,* 2014). However, due to the economic constraints (labour, costs involved in the preservation, transport and feeding of the end product) made these methods unpopular and impede their wider adoption by farmers. Urea-molasses multinutrient blocks (UMMB) have the merit of providing nitrogen over a longer period of time than any other urea source, more shelf life, require less space for storage and transportation and easy to feed animals, so are generally more accepted by farmers. UMMB contains urea, molasses, mineral mixture, oil cakes, wheat bran and binding agents. Different ingredients used in UMMB have major roles in ruminant feeding such as animal gets ammonia from urea, soluble sugar from molasses, mineral from mineral mixture and some amino acid from wheat bran and oil cakes. Supplementation of UMMB under field conditions has tremendously improved the animal performance which may be associated with the "supplementary" and "catalytic" effects of UMMB promoting an optimal ammonia level for efficient microbial activity in the rumen (Perera *et al.,* 2007). Being source of readily available energy and protein, UMMB feeding may mitigate the negative energy balance or protein deficiency of dairy cattle and result in improved productive and reproductive performance of dairy cows. Shah *et al.* (2018) reported that UMM blocks are strategic feed supplement that results in increased milk yield in dairy buffaloes. Owing to shortage of quality feed and fodders during winter UMMB feeding is ideal as feeding UMMB maintains body condition and production of ruminant animals during winter on straw-based diet. There are reports of 25-30% increased feed intake and its digestibility in cattle fed UMMB (Upreti, 2008). So, UMMB is nearly a complete diet for ruminants as supplementation of deficient nutrients in the form of urea-molasses multi nutrient block has been shown to be very effective in ruminant production system (Khanum *et al,* 2006). In this direction, the present investigation has been planned to study the effect of supplementation of UMMB performance of dairy cattle during winter.

MATERIALS AND METHODS

To observe the effect of using multinutrient blocks (UMMB) formulated and prepared by the Division of Animal Nutrition, SKUAST-K, a trial was conducted by KVK Shopian in nine villages of the district of during winter months from 15th November to 15thMarch for two consecutive years 2020 and 2021. Fifty-four cows in their second or third gestation were identified from Zawora, Balpura, Marhang, Shirmal, Chanchmarg, Nasirpora, Pahnoo, Heffshirmal and Ratnipora villages of district Shopian. These animals were screened to ascertain their general and reproductive health, and nutritional status.

The control group (27 animals) were fed normal routine feed/fodder available with these dairy farmers *i.e.* about 7.50kg of roughage (paddy straw, orchard grass, oats hay) and 350g of concentrates (rice bran, wheat bran, mustard cakes). Whereas, animals in experimental group were fed 200g of urea molasses mineral block (UMMB) daily above the normal course of feeding practices done by these dairy farmers. All the animals were kept under normal management condition where lukewarm drinking waters were given to the animals throughout the experimental period.

The observations like milk yield and milk composition (Total solids, SNF, protein, lactose, conductivity, fat %) were taken at the start and then at monthly interval till end of the experiment. Feed intake of the animals were calculated on daily basis by subtracting residue left from feed offered. Proximate composition of UMMB block and dry matter estimation of feed and residue was done as per AOAC (2005). Economics of feeding was calculated on the basis of cost of supplemented UMMB consumed by the animal and increase in milk production by the animal in the feeding trial. Any reproductive problem occurring during the experimental period was recorded and treated accordingly.

The data regarding feed intake, milk production and milk composition were analyzed statistically using the Statistical Package for the Social Sciences, Base 14.0 (SPSS Software products, Marketing Department, SPSS Inc. Chicago, USA).

RESULTS AND DISCUSSION

The ingredients and proximate composition of UMMB, formulated and prepared by Division of Animal Nutrition, FVSc & AH, Shuhama, SKUAST-Kashmir by cold process method, is presented in table 1. The UMMBs were formulated using locally available ingredients (in parts per 100 parts) of urea 8.0, molasses 42.0, bran 23.0, oil cakes 10.0, mineral mixture 10.0, salt 1.0, feed additive 1.0, cement 3.0 and sodium bentonite 2.0. The average DM, CP, CF, EE and Ash percent of UMMB were 88.00, 23.00, 7.50, 2.76 and 8.90, respectively.

Table1: Ingredients and proximate composition of urea molasses mineral blocks

Treatment	Parts
Urea	8.00
Molasses	42.00
Bran	23 .00
Oil cakes	10 .00
Mineral Mixture	10.00
Salt	1.00
Feed additive	1.00
Cement	3.00
Sodium bentonite	2.00
Proximate principles	**Percent**
Dry matter	88.00
Crude protein	23.00
Crude fibre	7.50
Ether extract	2.76
Ash	8.90

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The data regarding feed intake, milk production, milk composition are depicted in table 2. The feed intake (DM basis) was higher in UMMB supplemented group; however, the difference was nonsignificant. The total DM intake was in accordance with the earlier reports (Misra *et al.,* 2006; Singh and Singh, 2003). Urea-molasses mineral block (UMMB) licks improve utilization of roughages by satisfying the requirements of rumen microorganisms, thereby creating better environment for rumen fermentation of fibrous material, which increases the production of microbial protein and volatile fatty acids (Wongnen, 2007). The average daily milk production was significantly higher ($P \leq 0.05$) in UMMB supplemented animals as compared to control. In the present study, due to UMMB supplementation, milk production of animals was sustained, which usually decreases during the extreme cold temperature of winter. There has reports of increase in average milk yield by 8.54% was found by Shah *et al.,* (2018), 8.00% Brar and Nanda, (2002) and 11% by Parera (2000), 21% by Avilla (2006), 17.7% Upreti *et al.,* (2010) and 14% per lactation by (Makkar, 2001) in UMMB fed animals as compared to control group. Similarly, Mandal *et al.,* (2001) reported that there is positive correlation between gradually increased UMMB intake and level of milk yield. Similarly, Tekeba *et al.,* (2012) also found significantly increased milk yield in UMMB supplemented group as compare to unsupplemented group. No significant difference was seen in milk lactose, fat, protein and SNF content among animals of control and supplemented group was reported. Similarly, Srinivas and Gupta (1997) reported no significant change in milk composition except increase in non-protein nitrogen (NPN) content on Urea-Molasses-Mineral Block Supplemented Crossbred Cows. There was an additional profit of rupees 83.70 generated on per animal per day, which accounted to additional profit of rupees 6.38 generated per rupee invested by the farmers supplemented 200g of UMMB to their dairy animals. It is clearly indicating that animals fed mineral block was getting higher production performance and hold peak yield for longer duration in comparison to control group with better economical returns (Pankaj and Khadda 2017).

Table 2: Feed intake, milk yield and milk composition of crossbred dairy animals fed diet supplemented with UMMB

Parameters	Control (n=27)	Treatment (n=27)
Daily Feed intake (kg)	10.32±0.32	12.54±0.22
Average daily milk yield (litres)	6.53±0.17[a]	9.32±0.19[b]
Economics		
Additional input cost/animal/ day (Rs)	-	13.11
Additional profit generated/animal/day (Rs)	-	83.70
Additional profit generated per additional rupee invested (Rs)	-	6.38
Milk Composition (%)		
Lactose	4.03±0.25	4.34±0.22
Protein	4.07±0.20	4.56±0.17
Fat	4.64±0.16	5.12±0.18
Solid not fat	9.27±0.31	10.00±0.32

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Fig1: Manual UMMB Machine

Fig 2: Making of UMMB

Fig3: Supplying UMMB to Farmers

An efficient reproductive process is a prerequisite for profitable dairy farming. Different reproductive problems (table 3) reported in the animals were dystocia, repeat breeding, retained fetal membrane, mastitis, uterine prolapsed, anestrous and mixed problems. Most prevalent reproductive problem was anestrous with 14.81% in the control group and 3.70% in UMMB supplemented animals. The second most reproductive problem reported in this study was repeat breeding and mastitis prevalent in 11.11% animals in control group and 3.70% animals in UMMB supplemented animals. Retained fetal membrane, dystocia and uterine prolapse was found in 3.70% cases in control group. No such problem was reported in animals supplemented with UMMB. Our results were corroborated well with the findings of (Pankaj and Khadda, 2017) who reported that UMMB supplementation has a positive effect on reproductive performance of zebu cattle. Singh *et al.,* (2020)

revealed an average increase of milk production from 0.8 - 1.08liter per animal per day, improvement in health and better reproductive health in animals feed UMMB 300 g per day.

Table 3: Prevalence of reproductive problems in crossbred dairy animals fed diet supplemented with UMMB

Reproductive Problems	Control (n=27)	Percent (%)	Treatment (n=27)	Percent (%)
Dystocia	1	3.70	0	0.00
Repeat breeding	3	11.11	1	3.70
Retained fetal membrane	2	7.41	0	0.00
Mastitis	3	11.11	1	3.70
Uterine prolapsed	1	3.70	0	0.00
Anestrous	4	14.81	1	3.70

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CONCLUSION

During winter months the animals are kept indoor and are conventionally fed straw with a little or no concentrate feed causing deficiency of energy, protein and minerals, which results in poor production and reproductive performance. However, the supplementation of Dairy animals with urea-molasses-mineral blocks increased the milk production, improved the reproductive health and overall health of the dairy animals during the stressful winter.

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