NARDF Technical Paper Series Report

on

Promotion of small scale rural dairy farmers through participatory verification and scaling-up of the technologies in the catchment areas of private dairy industries

(NARDF Reference number 803/2010/2011)

Submitted To

National Agricultural Research and Development Fund

NARC Plaza, Singha Durbar, Kathmandu

Nepal

Prepared and Submitted by

Agriculture Research Station (Goat)

Chhap, Bandipur, Tanahun

Abstract

Undernutrition is a one of the major causes of low productivity of the dairy animals in Western hills. A project was implemented to verify and disseminations of the technologies in order to improve the feeding regimes of the dairy animals in Tanahun district. The study was undertaken in two milk producers' co-operatives of Purkot and Jamune of the district. The project had collected the baseline data from both of the co-operatives and the farmers were selected. Following the farmers' selection, a couple of inception meetings were done in the sites and the technologies were verified. Altogether four technologies; urea-molasses-mineral block (UMMB), silviculture, additional row fodder maize production and plastic bag silage production were adopted and verified in order to increase the milk production in the sites. The farmers were technically guided and monitored during the entire period of technology adoption and verification process. The results of the study revealed that adoption of technologies were successful for increasing the milk yield and quality of the dairy animals at both of the sites. Furthermore, the project had selected the appropriate fodder species for silviculture system, compared the tested four technologies according to the farmers' preference and assessed the effect of the UMMB supplementation on milk yield and quality. The result of the study revealed that the napier, signal and molasses were more preferred by the farmers for the silviculture system. While comparing those four tested technologies, urea-molasses-mineral block technology was highly preferred by the farmers of both of the co-operatives. The animals supplemented with urea-molasses-mineral block had produced significantly higher milk yield than non-supplemented group in the one month UMMB feeding study in both of the sites ($p<0.001$). Likely, fat content and lactometer reading (solid-not-fat content) were also significantly higher for the animals supplemented with UMMB in both of the sites ($p<0.001$). The adoption of the verified technologies in the farmers' field improved the plane of nutrition to their dairy animals which resulted substantial improvement in the milk productivity of the farmers' dairy herds. The model of these four technologies can be used as a strategy for the improvement of milk production and productivity in Western hills.

Keyword

Milk producers, technology, productivity, verification, dissemination

1. Introduction

Tanahun district is one of the agrarian hilly districts of Western Development Region of Nepal. It shares the boarder with Chitwan and Gorkha in the east, Syanja and Kaski in the west, Kaski and Lamjung in the north and Nawalparasi and Palpa in south. The district is situated in 27°14" to 28°13" N and 83°94" to 84°56" E with the very wide range of altitude, varies from 210 masl (Devghat) to 2325 masl (Chimkeshwori). Accordingly, the minimum and maximum temperature varies from 3 to 5°C and 38 to 48°C, respectively with the average annual rainfall of 1761 mm (CBS, 2012). The district is rich in the natural resources required for the ruminant production. It has 43946 ha agricultural land, 62654 ha land under forest, 719 ha pastureland and 27281 ha land for other purpose (41.4, 40.5, 0.1 and 17.6% of total lands in the district, respectively). Among the agricultural lands, 50296 ha are the uplands (CBS, 2012). These agricultural lands and forest areas are the potential areas of fodder resources to the ruminants. In this district 54221 families are engaged in agriculture, and out of total population of the district 284601 people

depend on agriculture.

Tanahun district is rich in dairy animal populations. It has 88821 heads of cattle and 113675 heads of buffaloes, although, the population includes all categories of cattle and buffaloes including oxen. The district has the good numbers of milking cattle and buffaloes, 14664 and 34804 heads, respectively in which improved breeds and crossbreds are in good proportion. But, the productivity of those animals is considerably low. These animals produce only 8142 and 31200 mt of cow and buffalo milk in a year, respectively (MoAD, 2013). Crossbred buffaloes and improved cows had 500 to 2500 and 800 to 2500 liters of average milk production per lactation, respectively (DLSO-Annual Report, 2009). It is below afar from the potentialities of those genotypes (Upreti *et al.*, 2010), and there are wide variations in their productivity.

The district is very much potential for dairy farming. The areas are rich in natural resources (like, land, mandarin orchard etc), easily accessible from three main cities (Kathmandu, Pokhara and Narayangardh), more suitable for dairy farming due to suitable climate, road accessibility, electrification etc. There are several milk producers' co-operatives and chilling/collection centres in the district which indicate the efforts to production and marketing of the milk in the districts. Furthermore, the district is the catchment areas of large-scale milk processing industries situated in Pokhara and Chitwan, which are suffering from the severe milk deficit situations. The marketing of milk is not the problem in the areas.

The farmers of the Tanahun district are very much enthusiastic to develop the dairy enterprises and are rearing significant numbers and good proportion of improved dairy cattle (Holstein-Friesian and Jersey) and crossbred buffaloes (Murra cross) in the areas (Upreti *et al.*, 2010). In the context of comparatively very low productivity of dairy animals in the areas in spite of huge potentials of dairy pockets, the project team had made the interactions with the farmers of the proposed areas on these issues. The farmers had responded that the poor plane of nutrition is the first reason of low productivity. The nutrient deficit is further critical in winter season in the areas. The reason was further supported by Upreti *et al.* (2010). The findings were obtained by the authors in a study in the proposed project areas and their vicinities.

The project, therefore, implemented to verify the dairy animals feeding technologies for increasing their milk productivity and also to disseminate those verified technologies.

2. Materials and methods

The project was designed in close participation of the several related stakeholders. The members of the milk producers' co-operatives, District Livestock Development Office (DLSO), Tanahun and Agriculture Research Station (Goat), Bandipur, Tanahun were involved since the need identification, analysis and planning and proposal construction phase. Accordingly, the project was implemented in close participation with the farmers and DLSO, Tanahun collaborated in implementing the activities.

The project verified four feeding technologies for the improvement of the feeding regime of the dairy animals in order to increase the milk productivity. Urea molasses mineral block (UMMB) technology, additional row fodder maize production technology, silviculture technology and plastic bag silage production technology were verified through adoption in two dairy co-operatives in the first part of the project. After evaluating the impact of the technologies on milk productivity in those two co-operatives, the technologies were disseminated in other ten dairy co-operatives of Tanahun district. The project team including collaborator had monitored and actively assisted to

the farmers with economic and technical backstopping for a couple of years of project period.

Initially the project had covered two milk producers' co-operatives of Purkot and Jamune of Tanahun district. Altogether 40, 20 from each co-operative were involved in technology verification process. The baseline data was collected from the functional members of the both of the co-operatives of Purkot and Jamune. On the basis of collected information, the farmers were selected. All together 40, 20 farmers from each co-operative were selected for the verification of the technologies in the first part of the project. Then project inception meetings and a couple of follow up meetings were organized in both of the co-operatives.

Following the meetings, verification of urea molasses mineral technology was undertaken for the lean season of fodder production. The *in-situ* trainings to the farmers of both of the co-operatives were conducted. After the trainings, the farmers started to produce UMMB themselves under the supervision of the project. The experimental animals were allowed to licking UMMB for three months. The size of the UMMB was of 2.5 to 3 kg and each block was used for 15 days. After the manufacture of the UMMB and drying, the farmers were guided to feed it to their dairy animals. An animal was allowed to approximately 200-300 g UMMB day^{-1}.

Likewise, the silviculture technology was verified by the project. The prominent fodder species on silviculture were tested. Different shed tolerant/shed loving species of forages; forage peanut, molasses, signal, napier, kudzu, blue panic, joint vetch, glycine were tested under the shade of *Dalbergia sissoo* and *Melia azedarach*. The trainings were organized in both co-operatives to train them about the packages of cultivation practices of the distributed forages. Only five forages were tested in each dairy co-operative and participatory evaluation was accomplished. The farmers had developed the criteria themselves to evaluate the forage species. Then after, two way matrix ranking methodology was used for evaluation. Detail discussions were made on their responses during the evaluation of species. The farmers had produced different species of fodders under silviculture system and fed to their dairy animals.

Additional row fodder-maize production technology was also verified in both of the co-operatives. Farmers were guided to plant their summer and winter maize in line sowing of recommended spacing (75 cm x 25 cm). An additional line (row) of fodder maize in between the main-crop maize (With the spacing of 37.5 cm x 25 cm) was sown. After the approximately 45 days of sowing, the extra line was harvested and fed to their animals. The summer maize was planted in Falgun and the fodder was harvested in Chaitra and Baishakh, and winter maize was planted in Bhadra and harvested in Kartik. A part of fodders from winter maize were used by the farmers for the plastic bag silage making.

The farmers were trained to prepare the plastic bag silage in both of the co-operatives. In summer, a part of the cultivated extra-row-maize-fodders and napier was used for the training of plastic bag silage production. Prepared plastic bag silage from the winter fodder maize was used to feed their dairy animals in the lean seasons. The plastic bags of 12 kg capacity were used by the farmers and a bag was used to feed one animal for a day.

The farmers were technically guided and monitored for adoption of the technologies, production of UMMB, production of forages in silvicultural system, production of additional maize fodder by using extra rows and production of plastic bag silage in both of the co-operatives. The data were collected in milk production and fat and lactometer readings in the households and in the milk collection centres. After the analysis of the data, comprehensive impact of the technologies was assessed, and on the other hand the technologies were compared.

After the verifications of the technologies, they were disseminated to the other 204 farmers from ten dairy co-operatives, at least 20 farmers from each. Altogether, four one-day in situ trainings, followed by documentary show and distribution of publications were undertaken. After the completion of the verification process and screening of the technologies, two publications (*Prabidhi pato* and *lessioned learned*) were published and distributed by the project in Nepali language. And, also an audio-visual documentary was also produced by covering the methodological details, adoption and impact of the technologies during the verifications process. The technologies were further disseminated by organizing the workshop in the later part of the project.

3. Results

Fodder species evaluation for silviculture system

The results of the evaluation of several species in both of the sites are presented in Table 1. Napier was ranked first in both of the sites under the partial shade of *Dalbergia sissoo* and *Melia azedarach*. At Purkot, molasses and signal had occupied second and third ranks, and joint vetch and glycine were least preferred by the farmers. Similarly, the farmers had provided second and third ranks to signal and forage peanut at Jamune, where as blue panic and kudju were least preferred by the farmers.

Table 1. Farmers' preference for different fodder species under the partial shade of *Dalbergia sissoo* and *Melia azedarach*.

SN	Rank	Fodder species	
		At Purkot	At Jamune
1	First	Napier	Napier
2	Second	Molasses	Signal
3	Third	Signal	Forage peanut
4	Fourth	Joint vetch	Blue panic
5	Fifth	Glycine	Kudju

The results of the farmers' preference on four technologies are presented in Table 2. At both of the co-operatives, urea molasses mineral block technology was most liked by farmers. Inter row fodder maize production technology and plastic bag silage production technology had followed to UMMB at Purkot site. But, silviculture technology was least preferred by the farmers of Purkot. Likewise in the case of Jamune site, the farmers' evaluation ranked silviculture and inter row fodder maize production as second and third. The farmers of Jamune had given less preference to the plastic bag silage production technology.

Table 2. Farmers' preferences on the comparison of adopted technologies in the farmers field.

Rank	Technologies	
	At Purkot	At Jamune
1	Urea molasses mineral block technology	Urea molasses mineral block technology
2	Inter row fodder maize production	Silviculture
3	Plastic bag silage production	Inter row fodder maize production
4	Silviculture	Plastic bag silage production

The change in milk collection in the both of the co-operatives was compared by the project (Table 3). During the ten months period of technology adoption, the increment in the milk collection of the co-operatives was increased by 26.08% compared to the similar duration of the previous year. In the same period of previous year (Shrawan to Baishakh, 2068/69) the milk collection was 136800.60 lits which was increased to 172479.87 lits in the similar duration of 2069/70.

Table 3. Change in milk collection of both of the milk producers' cooperatives after the intervention of the project.

SN	Duration	Milk collection, lits
1	2068/69 Shrawan to Baishakh	136800.60
2	2069/70 Shravan to Baishakh	172479.87
3	Increment	26.08%

Effect of urea molasses mineral block technology on milk production

The result of feeding UMMB on the milk yield of the farmers' herds, fat content and lactometer readings are presented in Table (4). At the Purkot site, the milk yield was increased significantly ($p<0.001$) due to the feeding UMMB during the one month experimental period. The animals before feeding UMMB had a mean milk yield of 9.94 lits animal^{-1} day^{-1} which was increased to 12.55 lits animal^{-1} day^{-1} upon the feeding UMMB for four weeks. The milk production was continuously increased in every of the four week of feeding UMMB. Likely, fat and SNF contents were also increased with UMMB supplementation ($p<0.001$). During the four weeks of UMMB feeding period at Purkot, the mean fat content was increased from 3.47% to 4.32% and lactometer reading was increased from 24.60 to 25.95, respectively. The increment in milk production, fat content and lactometer reading were gradual for the different weeks.

Table 4. Effect of UMMB supplementation on milk yield of the dairy animals, fat content and lactometer readings at Jamune and Purkot of Tanahun district.

SN	Duration of UMMB feeding	Purkot (Mean±SD)			Jamune (Mean±SD)		
		Milk yield (lit. animal^{-1} day^{-1}	Fat content (%)	Lactometer Reading	Milk yield (lit. animal^{-1} day^{-1}	Fat content (%)	Lactometer Reading
1	Before feeding UMMB	9.94±0.16	3.74±0.06	24.60±0.10	9.66±0.04	4.35±0.01	28.11±0.14
2	First week of feeding UMMB	10.48±0.28	3.73±0.11	24.73±0.25	10.33±0.24	4.45±0.13	28.91±4.43
3	Second week of feeding UMMB	11.20±0.26	3.96±0.55	25.23±0.58	10.87±0.17	4.68±0.11	29.61±0.10
4	Third week of feeding UMMB	11.79±0.21	4.14±0.06	25.47±0.59	10.88±0.11	4.85±0.09	29.53±0.15
5	Fourth week of feeding UMMB	12.55±0.29	4.32±0.05	25.95±0.12	10.76±0.39	4.85±0.02	29.72±0.14
6	F-Probability	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

The milk yield was gradually increased up to second weeks of UMMB feeding ($p<0.001$) and remained constant in third and fourth weeks at Jamune site. Accordingly, the milk yield was increased from 9.66 lits to 10.87 lits animal^{-1} day^{-1}, from non supplementation to two weeks of UMMB supplementation. Likewise, the fat content was increased up to third week and remained constant. The fat content during non-supplementation was 4.35%, and was increased to 4.85% in the third week of feeding UMMB. In the case of lactometer reading, it was continuously increased in every week of four week duration of UMMB supplementation at Jamune site. It was increased from 28.11 to 29.72 during the four weeks of UMMB feeding period.

4. Discussion

The results of the experiment of different fodder species under partial shade of *Dalbergia sissoo* and *Melia azedarach* had revealed that all the species were successfully cultivated in silviculture systems. But, results of the comparison of the fodder species on the basis of farmers' perceptions and their responses showed that the farmers had ranked top to napier among the species used. The larger tillering capacity, better biomass production than other species in dry seasons and

persistent to frequent cuttings were some positive attributes because of which the farmers from both of the co-operatives had most preferred the napier. The signal was also preferred by the farmers for larger biomass production, but ranked below than napier due to lower fodder intake by the animals, although, it has a better nutrient compositions. Molasses was also preferred by the farmers of Purkot site because of its vigorous growth in summer months and moderate yield in the winter months. Likely, forage peanut was also moderately preferred by the farmers. Very good growth was obtained in the partial shade, but farmers felt that the persistency to frequent cutting and palatability was moderate to forage peanut. The reason why the farmers had moderately liked it. Joint vetch and glycine were less preferred by the farmers. They responded that these species could provide the fodders for the short duration of summer, and less biomass supply in the winter harsh seasons. Likewise, blue panic and kudju were also less preferred by the farmers because of their lower yield in winter dry seasons and its poor performances in the deprived soils.

Although, four technologies were used as a package for improvements in the feeding regimes of the dairy herds of both sites, the comparison of the adopted technologies on the basis of farmers' perceptions was done (Table 2). In both of the sites, urea molasses mineral block technology was ranked first by the farmers. Immediate response of adoption of UMMB in milk yield, easiness and less time required to prepare the blocks and less outfield works requirement were some preferred attributes of UMMB technology in order to rank it at top by the farmers. The inter row fodder maize production technology at Purkot and silviculture technology at Jamune were ranked second by the farmers because of their fodder supply potential in the harsh dry seasons. The plastic bag silage production technology was least preferred by the farmers because of requirement of the special plastic bag, obligation of more labour and outfield works from fodder production to silage preparation phase, and due to the hazards by the rat in storage.

The changes in total milk put on the collection centres by the farmers in the similar period of two consecutive years, where the numbers of milking animals were kept intact by the farmers, were compared (Table 3). The cumulative milk sold by the farmers had substantial increment of 26.08% after the technological interventions by the project. The increment in the milk sell by those farmers could have considered as the improvement in milk productivity of their dairy animals. The technologies might have increased the plane of nutrition of the dairy animals in their feeding regimes. The reason why the milk production was increased in the sites.

The UMMB feeding experiment of one month duration had revealed that the milk yield of dairy animals and fat content and lactometer readings of the milk were significantly increased at both sites ($p<0.001$). The milk yield of animals was continuously increased for four weeks of UMMB feeding period at Purkot site. Likely, the fat content and lactometer readings of the milk from UMMB fed animals were also incessantly increased ($p<0.001$). The substantial increment in the milk yield, fat content and lactometer readings of the milk were gradual in each of four weeks at the Purkot site. Similarly, at Jamune site, the milk yield was continuously increased up to the second weeks of UMMB feeding, and remained constant onwards. The fat content was also increased up to the third week of feeding UMMB and remained constant in fourth week. Likewise, the lactometer readings of milk produced from the animals fed with UMMB at Jamune site was constantly increased from first to fourth weeks, as in the case of Purkot site. The similar results were obtained by the other authors in their different studies. Cheng *et al.* (1993) had obtained increased milk yield from 1 to 1.5 kg day^{-1} from the crossbred cattle fed with UMMB. An another study conducted in the smallholder farmers' dairy cows in Bangladesh revealed that feeding UMMB had increased milk yield by 32 to 33% (Akbar *et al.* (2006). The ruminants have the unique ability to convert non protein nitrogen compounds (urea) in presence of readily available source of energy to microbial protein of high biological value (Trishna *et al.*, 2012). The rate of milk production and quality of basal diet (especially fat content of the diets) influences the protein

and/or amino acid requirements of the dairy animals (Leng, 1989).

In addition to increase in milk yield and quality, feeding UMMB could results better reproductive performance and lowers the intercalving period of the animals (Cheng *et al.*, 1993), which data could not be acquired in the present study due to the shorter project duration. But, the farmers involved in the present experiment reported that the feeding of UMMB as a supplement to normal diets increased the health and body conditions of the dairy cows. In another study in India, the author reported that the supplementation with UMMB for 30 days in buffalo with delayed onset of puberty induced oestrus in 33% of heifers during the summer season and in 93% of the heifers during winter season. Similarly, in the case of anoestrus adult buffaloes, UMMB supplementation induced ovarian activity in 40% of buffalo during the summer season and in 90% buffalo during the winter season (Brar *et al.*, 2006).

Fodder intake and digestibility of dry matter was obtained higher in UMMB supplemented groups of Sahiwal cattle when fed with berseem or maize as green fodder (Khanum *et al.*, 2006). Several other authors have reported that UMMB supplementation can lead to increase in feed intake and digestibility of straws and fodders (Habib, 1991; Hendratno, 1991). The UMMB contains rumen degradable and undegredable (bypass) protein, degradable carbohydrates, non-protein nitrogen and some minerals (Roxas, 1997), can assist in meeting the nutrient requirement of rumen microbes and ruminant livestock. The supplementation of UMMB lick in the ration of dairy animals helps in overcoming the malnutrition or undernutrition, increase the production at farm level and generate better returns for dairy farmers (Trishna *et al.*, 2012).

5. Conclusion and implication

Inclusion of some simple feeding technologies had increased milk yield, fat content and SNF content of the milk in the areas. Improving the plane of nutrition to their dairy animals had shown the positive impact on the milk production and milk quality of undernourished improved and crossbred dairy animals of the farmers. The improvements in the feeding regimes of dairy animals by the interventions of the verified technologies contributed to the substantial increment in milk yield and quality.

The present study had constructed and verified a model of four technologies for the improvement on the productivity of the dairy herds in the Tanahun district, especially for the lean seasons of fodder productions. The dissemination and adoption of the model in the other areas of the Western hills could make substantial increment in the milk production and productivity. It could be more beneficial for the dairy farmers of the regions, larger milk processing industries of the areas and the nation.

6. Acknowledgement

The project is grateful to National Agricultural Research and Development Fund, NARC Building, Ramshahpath, Kathmandu for providing the funds for the project. All the members of milk producers' co-operatives of Purkot and Jamune are highly acknowledged for their tireless efforts in implementing the project activities. Without their active and enthusiastic participations, the project would not be succeeded. Similarly, the project team is grateful to local institutions and local leaders of project areas of Tanahun district for their graceful supports and ideas for the implementation and accomplishment of the activities. Likewise, the project is thankful to the other leader farmers who had provided untiring efforts in the project. The aspiration of the project is to

thank all the related stakeholders who had made efforts and inputs in designing, implementing, reporting and other activities of the project.

7. References

Akbar, M.A., T.U. Ahmed and M.M. H. Mondal. 2006. Improving animal productivity and reproductive efficiency: Development and testing medicated urea-molasses multinutrient blocks in rural farms of Bangladesh. *Improving Animal Productivity by Supplementary Feeding of Multinutrient Blocks, Controlling Internal Parasites and Enhancing Utilization of Alternate Feed Resources.* FAO and IAEA, IAEA-TECDOC-1495.

Brar, P.S., A.S. Nanda and P.D. Juyal. 2006. Reproductive performance of dairy buffalo receiving supplements of urea-molasses multinutrient block. *Improving Animal Productivity by Supplementary Feeding of Multinutrient Blocks, Controlling Internal Parasites and Enhancing Utilization of Alternate Feed Resources.* FAO and IAEA, IAEA-TECDOC-1495.

CBS. 2012. *Tanahun District.* Central Bureau of Statistics. http://cbs.gov.np/wp-content/ uploads/ 2012/District%20Profiles/District%20profile_38.pdf

Cheng, Y.Z.; H. Wen; X. Ma; Y. Li; Z. Gao and M.A. Peterson. 1993. Multinutrient lick blocks for dairy cattle in Gnsu Province, China. *Livestock Research and Rural Development* 5 (3): 60-63.

DLSO-Annual Report. 2009. Annual Report-DLSO Tanahun 2065/66. District Livestock Service Office, Damauli, Tanahun.

Habib, G.; A.S., Basit; S., Wahidullah; G. Jabbar; G. Ghufranullah. 1991. The importance of urea-molasses bocks and bypass protei in animal production: The situation in Pakistan. *Proceedings of Symposium on Isotope and related Technical Animal Production and Health Section*, Vienna, Austria, pp. 133-144.

Hendratno, C.; J.V. Nolan and R.A. Leng. The importance of urea-molasses multi-nutrient blocks for ruminant production in Indonesia. *Proceedings of Symposium on Isotope and related Technical Animal Production and Health Section*, Vienna, Austria, pp. 157-169.

Kahnum, S.A.; M. Hussain; R. Kausar; A.J. Makhdoom; T. Yaqoob; S. Sadaf; R. Ahmad; S. Rehman and M. Abbas. 2006. Sustainable improvement of livestock production through strategic supplementation with urea-molasses multi-nutrient block and other feed resources available in Pakistan. *Improving Animal Productivity by Supplementary Feeding of Multinutrient Blocks, Controlling Internal Parasites and Enhancing Utilization of Alternate Feed Resources.* FAO and IAEA, IAEA-TECDOC-1495.

MoAD. 2013. *Statistical information on Nepalese agriculture 2012/13.* Ministry of Agricultural Development, Singha Durbar, Kathmandu, Nepal.

Leng, R. A. 1989. Feeding strategies for improving milk production of dairy animals managed by small-farmers in the tropics. Eds. A. Speedy and R. Sansoucy. *Proceedings of the FAO Expert Consultation* held in Bankok, Thailand. http://www.fao.org/docrep/003/ t0413e/T0413E08.htm

Roxas, D.B.; M. Wanapat and M. Winugroho. 1997. Dynamics of feed resources in mixed farming system in South East Asia. In: *Crop Residues in Sustainable Mixed Farming System*, eds. C. Renard. CAB International, Wallingford UK.

Trishna, B.; S. Dutta and R.R. Roy. 2012. Impact of supplementation of UMMB licks in the ration of dairy animals. *VETSCAN* 7 (1), http://vetscan.co.in/v7n1/Impact-of-Supplementation-of-UMMB-Licks-in-the-Ration-of-Dairy-Animals.pdf

Upreti, S., S. Paudel, R. Bhari and C.R. Upreti. 2010. Economic analysis of milk production in Tanahun district. *Proceedings of Eighth National Workshop on Livestock and Fisheries Research*, National Animal Science Research Institute, Khumaltar, Lalitpur, June 7-8, 2010. (Abstracts)