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Supplementary Feeding of Urea Molasses Multi-Nutrient Blocks to Ruminant Animals for Improving Productivity

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The productivity of the livestock in most of the developing countries is much below the potential productivity. The main constraint to livestock development in developing countries is the scarcity and fluctuation of the quality and quantity of the year-around animal feed supply.In developing countries including Ethiopia, Livestock feed depend on Fibrous feeds mainly crop residues and low quality pasture that are deficient in crude protein, minerals and vitamins. Urea Molasses Multi-nutrient Block is an excellent supplementary feed that can be formulated and used to increase digestion of roughages, provide protein, energy and minerals to ruminant animals. Urea Molasses Multi-Nutrient Blocks (UMMB) are lick blocks containing urea, molasses, vitamins, minerals and other multi-nutrients.Urea molasses multi-nutrient urea block feed helps the growth of microorganism in the rumen, increases the digestion and consumption of fibrous feeds, allowing the animal to maintain, and often increase productivity of ruminant animals.UMMB supplementation is an effective means of correcting nutrient deficits in poor quality roughages. The encouraging significant positive effect on rumen microbial growth, feed intake, digestibility, live weight gain, growth rate and (1-1.5 kg/ day) milk production nutrient production and utilization further justify the need for the use of the multi-nutrient blocks as supplements for cattle ,sheep and goat.In developing countries like Ethiopia, commercializing (UMMB) in livestock feed industry technology as business and job opportunities for the producers and feed benefits for the farmers through proper strategic direction to make it a reality.Considerable additional research is still needed in order to fully exploit the benefits of the blocks.

Key words: Fibrous feed, Ruminant, UMMB, Utilization

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INTRODUCTION

The world's population is expected population to reach more than 9 billion by 2050 and will have to produce 60% more food and we believe that animal protein production will grow even more, meats (poultry/swine/beef) will double, as well as dairy, and fish production will almost triple by 2050 (FAO, 2016).Livestock raising and the consumption of animal products make a crucial contribution to the economic and nutritional wellbeing of millions of people around the world. Animal feeds play a leading role in the global food industry and feed is the largest and most important component to ensuring safe, abundant and affordable animal proteins (IFIF, 2016). Global livestock production is constrained by the inadequate supply of feeds and forages for optimum production. At the same time land devoted for forage production does not likely to increase in the near future due to urbanization, industrialization etc.(Mahesh et al., 2014).

The productivity of the livestock in most of the developing countries is much below the potential productivity. The main constraint to livestock development in developing countries is the scarcity and fluctuation of the quality and quantity of the year-around animal feed supply.An adequate supply of livestock feed is crucial to the livelihoods of millions of people across the developing world, and not just for smallholders, but also for pastoralists and the large number of landless who depend mainly on common land for grazing (Sanford et al., 2008).

Livestock production in developing countries is largely dependent on fibrous feeds mainly crop residues and low quality pasture that are deficient in crude protein, minerals and vitamins. These roughages are unbalanced in terms of nitrogen (N), mineral and vitamin content, and they are also highly lignified. Consequently, their dry matter (DM) digestibilityis reduced. These characteristics keep voluntary dry matter intake (DMI) and productivity low, and consequently the quantity of animal products (meat, milk, and draught power, wool) is limited or nil. (Bresciani, and Valdés, 2007).In Ethiopia, natural pasture grazing was the main feed source for livestock. At this time, the natural grazing land is become reduced due to fast growth of the country's population with increasing land demand for crop cultivation (CSA, 2010). Now the main feed resource for livestock in traditional production system is crop residues which is low quality high fiber content, low digestibility of roughage as a result livestock productivity will decreased due to reduction of malnutrition with reduction of disease resistance (Malede and Takele, 2014). As cited by Tekeba et al. (2013) an average 35 % deficiency in feed supply can be expected in Ethiopia even during normal years and this figure may rise to 70 % during drought years (ELDMPS, 2010). Earlier, the main focus was on increasing the straw utilization by ruminants. However, straw is available in large quantities but it is low in its nutritive value due to presence of high lignocellulose content, small amounts of crude protein and essential minerals. In order to find out suitable supplements for optimizing rumen fermentation so that enhanced production and reproductive performance can be achieved, another technique used was, to supplement the diet with more readily available energy and protein, which were lacking in the basal diet. The technology thus identified was use of Urea molasses mineral block lick (Mahesh et al., 2014).

Addressing the nutritional problem, molasses in the form of Urea Molasses Multi-Nutrient Blocks (UMMB) were used as a livestock feed supplement in a number of countries and several studies showed positive effects on productive and reproductive performance plus an attractive benefit cost ratio for both local and crossbred dairy cows.Urea Molasses Multi-Nutrient Blocks (UMMB) are lick blocks containing urea, molasses, vitamins, minerals and other multi-nutrients (Bohra et al.,2012). Supplementation with Urea Molasses Multi-Nutrient Blocks (UMMB) can increase digestibility of fibrous feeds by up to 20%, increase the nutrients the animal receives and can increase feed intake by 25 to 30% (yami, 2007). UMMB production and use is practiced in a number of countries and the result indicated that it improvesthe productive and reproductive performance of dairy cows and sheep (Aye and Adegun, 2010).Several solutions have been suggested by researchers to improve the nutritional quality and palatability of low quality roughages. In this regards, combined feeding of low quality roughages with UMMB is considered to be one of the easiest and effective practices (Jayawickrama et al., 2013). Therefore, this paper aims to review and illustrate up to date information on multi-nutrient bock supplementary feeding to ruminant animals for improving productivity and to suggest the way forward.

LITERATURE REVIEW

The Basic Feed Ingredients of the Blocks and the Characteristics of the Block Components

The urea molasses multi-nutrient block (UMMB) an excellent blend of energy, protein and minerals improved the efficiency of nutrients utilization in poor quality crop residues based diets which constitute the bulk of DM consumed by ruminants under field conditions (Mubi et al. 2011).Formulation of Multi-nutrient blocks based on low cost and locally available feed resources that do not compete with human food has been described as very promising (Makkar, 2007).The ingredients used in the formulation of multi-nutrient blocks and their proportions determine their physico-chemical characteristics, and hence affect acceptability and intake by ruminants (Herrera et al., 2007). Many ingredients can be used for making urea molasses blocks. The choice will depend on their availability, nutritive value, price, easy of handling and the effect on quality of block. Some of the ingredients that may be used are: Molasses, Urea, Bran (Rice, Wheat or Maize), Oilseed Meals and Cakes (Soybean, Coconut, Groundnut, Cottonseed, and Olive), Agro-industrial by-products and Miscellaneous non-conventional feeds (sugar beet pulp, Citrus pulp, tomato pulp, cassava waste, milled groundnut shells, brewers grain, bagasse, poultry manure and waste, slaughter house offal's), cement or lime, salt and, or, minerals (Herrera et al., 2007

Effect of UMMB Supplementation on rumen Micro organism

Singh et al. (2013) reported that supplementation Buffaloes calves with UMMBviable bacterial count was increased significantly on supplemented group as compared to control groups. Similarly, protozoal count increased significantly ($p<0.05$) on supplemented group of buffalo calves as compared to control group(Lair-Full ringer et al., 2016).As cited by Suharyono et al. (2016) microbial protein synthesis in the rumen liquid (mg/l/hour) increased by 205.67 % in Buffaloes .in the same way the microbial protein synthesis in the rumen liquid (mg/l/hour) increased by 67.56 % in Etawa dairy goat and microbial protein synthesis beef cattle increased by 37.99 %.

Effect of UMMB feeding on dry matter intake and digestibility in dairy cattle

When considering the dry matter intake (DMI) of fibrous feed, the primary limiting factors are its digestibility and the rate at which it is broken down to particle sizes that can pass through the reticulo-omasal orifice. One of the most efficient ways of increasing utilization of crop residues is supplementation of nitrogen (N) and energy in the form of urea molasses mineral blocks (Bakshi and Wadhwa,2011).If the fibrous feeds are fermented in the rumen and broken down to particle sizes that can facilitate the flow and also facilitate it digestibility.With UMMB supplementation, straw DMI increased by 30 to 50 percent in different experiments.

Digestibility increased due to increased rates of rumen fermentation, mediated through a larger population of microflora and increased cellulolytic activity. Straw OM digestibility was around 40 to 45 percent under unmanipulated conditions. With UMMB supplementation, Digestibility increased to 50 percent (Bresciani, and Valdés, 2007).DM and OM digestibility increased from 44.0 and 45.22 percent to 50.0 and 53.0 percent, respectively, by UMMB licks supplementation (Herrera et al., 2007). Similarly research done in Nepal, supplementation with UMMB had a significant effect on total dry matter and hay intake. According to Report Bohra et al (2012) With UMMB supplementation in Rathi cattle the dry matter and crude protein intake in control and supplement group were 2.93 and 3.96 kg and 97 &274g per animal per day.The availability of molasses, urea and minerals as source of energy, protein and minerals, respectively through UMMB optimize rumen fermentation and consequently increases utilization of crop residues (Meel et al.,2016).Digestibility of ADF was enhanced from 37.4 percent to 41.3 percent with UMMB licks supplementation with wheat straw, while NDF digestibility increased much more than ADF, i.e. from 42.6 to 51.8 percent.Based on very recent report done by Tekeba et al. (2014*)* the experiment conducted on station to evaluate the effects of a Urea Molasses Multi-Nutrient Block (UMMB) supplementation of typical dry season, roughage based diets on the performance of second and third lactation local Fogera(Zenga) and their F1 Holstein Friesian crossbred cows in Ethiopia, Dry matter intake was a significant ($P \leq 0.05$) increment in crude protein and energy intake of cows was observed.

From the (Table 1), Dry matter intake was a significant ($P \leq 0.05$) increment in crude protein and energy intake of cows was observed as a result of UMMB supplementation for both breeds. The marked increase in hay intake of Fogera cows due to UMMB supplementation resulted in a greater difference in NDF intake in Fogera as compared to crossbred cows. Based on these report it can be safely concluded that supplementation with UMMB licks boosted the digestibility of basal diets based on low quality forages.

Effect of UMMB Supplementation on Reproduction and fertility

An efficient reproductive process is a prerequisite for profitable dairy farming. However, delayed onset of postpartum ovarian activity and high incidence of deep anestrous, especially during dry seasons lead to prolonged inter-calving intervals in cross breed dairy cows. When buffalo's cows were supplemented with urea molasses multi-nutrient block, 40 % buffaloes showed behavioral estrus as compared to 10 % in the control group in India (Salman, 2007). Urea molasses multi nutrient block supplementation showed 38 % and 75 % behavioral estrus of the supplemented Fogera cows and the cross bred cows, respectively. Conversely, only 25 % of the Fogera not supplemented cows and 13 % of their crosses cows came into heat. Apparently UMMB supplementation had a greater effect in crossbred as compared to Fogera cows. (Tekeba et al., 2014). Addressing the nutritional problem, molasses in the form of Urea Molasses Multi-Nutrient Blocks (UMMB) were used as a livestock feed supplement in a number of countries and several studies showed positive effects on productive and reproductive performance plus an attractive benefit-cost ratio for both local and crossbred dairy cows (Misra et al., 2006).Supplementation of crossbred dairy cows with UMMB during the dry season improved the body condition of the cows from score 3.5 to 4 in Nepal (Upreti et al., 2010).

The significant decline in services per conception reduced ($P < 0.01$) the mean calving to conception interval (days open) from 127.2 to 92.4 days (Table 2). Use of UMMB also reduced the calving to first service interval and the calving interval from 77.5 days to65.9 and 405.4 to 365.1 days, respectively. Mial et al. (2000) reported that the effect of supplementation of UMMB on the prepartum and post-partum of claves, the birth weight of calves in supplemented in UMMB group (14.61kg) was significantly ($P<0.05$) higher than the control group (12kg).similarly live weight gain of supplemented calves was significantly effected by the cows supplemented with UMMB (117g/d) than the cow without (56g/d).The mortality was 9% in control group whereas no calf did not died during experimental period.

Table 1. Feed intake of cows of different breeds fed different diets

Traits	Treatments			
	Fogera cows		cross bred cows	
	Control	supplement	Control	Supplement
TDMI (kg/day)	4.90^{a}	6.62^{b}	7.32^{c}	8.52^{d}
HIDM (kg/day)	4.16^{a}	5.35^{b}	5.68^{bc}	6.18^{c}
UMMBI (g/day)		528^{a}		704^{b}
OMI (kg/day)	4.47^{a}	6.03^{b}	6.66^{c}	7.76^{d}
CPI (g/day)	306^{a}	520^{b}	598^{c}	820^{d}
MEI (MJ/day)	32.95^{a}	45.38^{b}	52.93^{c}	62.78^{d}
NDFI (kg/day)	3.36^{a}	4.31^{b}	4.63^{b}	5.17^{c}
ADFI (kg/day)	2.08^{a}	2.67^{b}	2.84^{b}	3.16^{c}

Source: *Tekeba et al. (2014)*
abcd Different superscripts indicate significant (P≤0.05) differences between means in the same row; TDMI = total dry matter intake; HIDM = hay intake on dry matter basis; UMMBI = UMMB intake; OMI = organic matter intake; CPI = crude protein intake; MEI = metabolizable energy intake; NDFI = neutral detergent fibre intake; ADFI = acid detergent fibre intake.

Table 2. Effect of UMMB on fertility of crossbred dairy cattle

Fertility measurements	Before UMMB		After UMMB	
	N	Mean ± SEM.	N	Mean ± SEM.
Calving to first service interval (days)	64	77.54^{a}± 5.20	60	65.91^{b}± 3.53
Calving to conception interval (days open)	64	127.21^{c}± 11.30	60	92.35^{d}± 6.65
Calving interval (days)	64	405.40^{e}± 11.34	60	365.06^{f}± 5.33

Means with different letters within a row differ significantly (P<0.01)
Source: Hermosillo (2014)

Effect of UMMB feeding on milk production and composition

Uptake of the block technology has been easier and faster for dairy cattle compared with beef cattle because of an immediate increase in milk yield from the third or fourth day of feeding the blocks, giving additional profit to the farmers. Misra et al. (2006) reported that supplementation of UMMB licks increased milk yield in crossbred cows during dry season feeding in rain-fed agro-ecosystem in India. Higher milk fat content of treatment group compared with that of control group may be associated with the higher cellulolytic fibre utilization by the microbes in the presence of the optimum urea ammonia provided by UMMB.Nutritionally stressed lactating animals resumed milk production following urea molasses multi nutrient block feeding. For instance, lactating Afar cow spending the day on meager pasture and licking 300-500 gm in the evening managed to produce 1 to 2-kg litter milk a day (Lemma, 2009). Effects of dietary protein content on milk fat and protein percentage were also analyzed by Sinclair et al. (2009).In their report, multiparous Holstein dairy cows fed low protein diets had a significantly higher milk fat content, while milk protein percentage was not affected by level of dietary protein. Based on the research conducted by Upreti et al. (2010) the average daily milk increment was 1.11 liter of milk was obtained in UMMB supplemented group the two research site and had higher fat increment level of 0.68 % compared to the control group. Tekeba et al. (2014) reported that the milk production performance of dairy cows was significantly improved by UMMB supplementation by 0.6 (43 %) and 1.65 (52 %) liter per cow per day for Fogera and crossbred dairy cows, respectively. Both the Fogera and crossbred dairy cows responded positively to UMMB supplementation by a 50 % and 54 % increase in milk offtake, respectively. Besides an increase in daily milk offtake, all the UMMB supplemented cows had a significantly improved butter fat content as compared to the control.

Table 2. Feed production performance of cows of different breeds fed different diets

Traits	Treatments			
	Fogera cows		cross bred cows	
	Control	supplement	Control	Supplement
Milk yield (L/day)	1.40[a]	2.00[b]	3.19[c]	4.84[d]
Milk fat (g/l milk)	45.4[c]	49.6[d]	41.5[a]	42.7[b]
Milk P (g/l milk)	32.5[b]	32.5[b]	30.4[a]	30.5[a]
Milk TS (g/l milk)	134.2[b]	139.9[c]	125.0[a]	126.1[a]
Milk fat (g/day)	63[a]	99[b]	132[c]	206d

[abcd] Different superscripts indicate significant (P≤0.05) differences between means in the same row

Source: *Tekeba et al. (2014)*

Similarly Supplementation of UMMB had significant effects (p<0.05) on daily milk yield, contents and yields of milk constituents such as milk fat, protein, total solid and solids-non-fat (Misra et al., 2006). Likewise, Meel et al. (2015) reported that the significant increase in the milk yield by 15.94% in the treatment group suggested that the supplementation of UMMB improved the milk yield. Supplementing Lactating buffalo with urea molasses multi nutrient blockIncreased in milk yield by 11%, increased in lactation length and overall 18% higher milk production (Bresciani, and Valdés, 2007).In general supplementing of UMMB has positive effect on the milk production performance of cows. Table 3

Effect of UMMB supplementation on body weight gain and growth of beef cattle

Urea Mineral Molasses Block is very important for beef cattle, because it can increase beef production .Urea molasses multi nutrient block can provide energy for ruminants, non-protein nitrogen, minerals, vitamins and other nutrients (Lestari et al., 2016). Luiet al. (2001) reported in China that the average daily gain was 486.7±73.2 g in the experiment group and 346.8 g in the control group during the period feeding of UMMB Twenty-four months bull four months free lick UMMB showed that the experiment group gain weight was higher than in control group (P<0.05) on grazing conditions.

Based on the research done by Haili et al. (2014) in china showed that the weight gain fattening cross bred cattle was significantly higher in experiment group than in control group during the period of experiment. Experimental group average daily gained 280 g more than control group during the period all fattening, average weight increased by 30.4% than control group. A lot of research reports showed that UMMB can improve the body weight. The molasses lick block group and the control group weighed 512±112 g and 346±61 gm, respectively, after feeding UMMB, which were significantly different (P<0.05). In the same way the result showed that, the body height was increased by 7.11 cm and 3.78 cm, the height at hip cross was increased by 6.55 cm and 3.11 cm, the height at sacrum was increased by 6.33 cm and 2.77 cm, the body length was increased by 8.77 cm and 3.66 cm, the heart girth was increased by 13.44 cm and 7.33 cm, the circumference of cannon bone was increased by 1.78 cm and 0.55 cm, the hip width was increased by 7.22 cm and 5.89 cm, the rump length was increased by 4.44 cm and 2.56 cm, the hipbone width was increased by 4.57 cm and 2.12 cm, respectively, in experiment group and control group. The body height, height at hip cross, height at sacrum, body length, heart girth, circumference of cannon bone, hip width, rump length and hipbone width were all higher in experiment group than in control group.

Daily live-weight gain of supplemented Bali cattle was 0.28 kg/head/d, whereas the group that received UMMB was 0.62 kg/head/d. A similar response to supplementation also occurred on the increase of DLWG of Ongole, Simmental and FH CB. The increase of DLWG was higher with than without supplement. The values were 0.65, 1.06 and 0.99 kg/head/d compared to without supplement 0.35, 0.68 and 0.63 kg/head/d respectively. (Table 4)

Haili et al. (2014) also reported that UMMB effect on cattle mineral content in the blood that the concentration of calcium was significantly different (P<0.05),different at the beginning of the Experiment but at the end of the trial, experiment group and control group were all (phosphorus, Zink ,cupper, iodine cobalt and selenium) significantly different (P<0.05).

It can be concluded that UMMB plays an important role on the fattening cattle. It can provide energy for ruminants, non-protein nitrogen, minerals and other nutrients. Supply of UMMB in experiment increased the intake, weight and the performance of cattle. The results showed that UMMB supplementation is an effective strategy to increase the production, while maintaining animal performance and feed efficiency.

Table 3 . Average of increase DLWG Bali cattle, Ongole and Simmental and HF CB (kg/head/d).

Experimental animals	Control	UMMB (B)	(B-A)
Bali cattle	0.28[a]	0.62[b]	0.34
Ongole CB	0.35[a]	0.65[b]	0.30
Simmental CB	0.68[a]	1.06[b]	0.33
HF CB	0.63[a]	0.99[b]	0.36

***Source**: suharyonno et al. (2014)*

Effects of UMMB block on daily intake and live weight gain of sheep

According to findings of Saskatchewan (2008) an intake of 220-230 g/day in sheep grazingnatural pastures supplemented with multi-nutrient blocks. In China productive performance of grazing sheep was significant with much higher weight gain in the Urea molasses multi-nutrient block supplemented animals than in the control group (Jian-Xin et al., 2007). Salman (2007) who reported in Iraq that, feeding Awassi ewe multi-nutrient blocks during grazing improved their weight gain compared to the control and observed no weight loss. Similar trends were also observed on the on-farm experiment; ewes gained higher live weight as a result of multi-nutrient blocks supplementation compared to non-supplemented group after grazing pastures during the wet season. Rohila et al (2011) recorded that higher live weight gain in block supplemented in Marwari lamps (26.7+2.6 kg) than controls (25.8+1.6 kg). The positive live weight of the supplemented groups may also be as a result of improved supply of energy and amino acids at the tissue level which brings the necessary changes in the hormones for better growth. The effects of supplementing multi- nutrient blocks on live weight change of Yankasa sheep in the Wet Season of Guinea Savanna Region of Nigeria, the live weight changes obtained were 0.11 kg/day for control, 0.19 kg/day for multi nutrient block without molasses and 0.21 kg/day for multi -nutrient block with molasses and all the groups significantly ($P<0.01$) differed. No weight loss was observed as a result of non-supplementation (Mubi et al., 2011). This may be attributed to the appreciable amount of nutrients in the grazed pasture during the rainy season. The higher live weight gains of the supplemented groups with multi-nutrient blocks might be due to the supply of degradable nitrogen derived from multi -nutrient blocks, which contributed to the improved growth of rumen microorganisms and invariably increased the supply of microbial protein to the animal. Another probable reason may be as a result of optimum nutrient supplied by the Multi-nutrient blocks supplementation.Muralidharan et al (2014) reported that Supplementation of UMMB had positive influence on the blood biochemical parameters (Total protein levels, Serum albumin levels , Calcium values and Serum phosphorus levels) increased significantly ($p<0.05$) in the off season Mecheri lambs and it was recommended to provide some form of protein and mineral supplementation to the lambs in summer.

Effects of UMMB on nutrient intake, digestibility and live weight gain of goat

In developing countries, the potential for goat meat production is limited by many environmental and nutritional factors. Free-ranging goats can select their diet from a complex variety of available native plant species. Forage quality and availability are reduced during winter and dry seasons of the year, affecting nutrient intake. Mineral and protein supplementation of goats consuming high fibre-low protein forages, generally improve intake and performance. Hand-crafted multi-nutrient blocks based on molasses and urea, can stimulate rumen fermentation and supply nutrients needed to complement deficiencies of goats consuming low quality forages (kawas et al. 2010).

Dry Matter Intake (DMI) was recorded on daily basis in goats allocated to different treatments group. The daily mean DMI (kg) of goats in control, UMB and MUMB was 1.395±0.129, 1.499±0.128 and 1.502±0.121 kg, respectively. Mean daily DMI was higher ($P>0.05$) in MUMB and UMB supplemented groups as compared to control group (Abid et al., 2016).Study done by Faftine and Zanetti (2010) on goat performance in Mozambique, Multi-nutrient block increased significantly in Mozambique ($p<0.05$) the consumption of maize Stover and due to extra nutrients provided by the multi-nutrient block. (Table 5)

The increasing consumption of maize Stover in the diet with multi-nutrient block probably occurred due to increased degradation of dry Stover and rate of passage of digesta by the rumen as a result of increased activity of cellulolytic rumen microflora.

The values of apparent digestibility coefficients (%) of nutrients in the diet with multi-nutrient block was superior in all parameters Faftine and Zanetti (2010).The high apparent digestibility of CP in the supplemented animal which has supplied 78% of the total CP consumed can be related with the high content of nitrogen supplied by urea an almost complete hydrolysis in the rumen, turning into ammonia which is used by microorganisms for the synthesis of microbial protein.

Table 4. Effect of multi-nutrient block on total nutrients intake (g/animal/day) of goats fed maize Stover with and without multi-nutrient block

Parameter	Maize Stover	Maize Stover with multi-nutrient Block
Total dry matter intake	279^{a}	520^{b}
Maize Stover	279^{a}	340^{b}
Multi-nutrient block	-	180^{b}
OM	220^{a}	369^{b}
CP	12.5^{a}	67.8^{b}
NDF	184^{a}	293^{b}
ADF	126^{a}	208^{b}
Hemicelluloses	57.5^{a}	83.1^{b}

^{ab}means in the same row with different superscripts are significantly different (p<0.05)
Source:*Faftine and Zanetti (2010)*

Table 5. Effect of multi-nutrient block on live weight variation of goats fed maize Stover with and without multi-nutrient block

Parameter	Maize Stover	Maize Stover with multi nutrient block
Initial live-weight, kg	11.2^{a}	11.1^{b}
Final live-weight, kg	9.55^{a}	12.6^{b}
Total live-weight change during the experiment, kg	-1.44^{a}	1.65^{b}
Average daily gain, g/d	-7.99^{a}	9.17^{b}

^{ab} means in the same row with different superscripts are significantly different (p<0.05)
Source:*Faftine and Zanetti (2010)*

Effect of multi-nutrient block on live-weight variation

Weight gain of goats was recorded on weekly intervals throughout the trial period. Mean daily weight gained (MDWG) in control, UMB, MUMB were 64±23, 71±22 and 85±21g, respectively. Average weight gained during the experiment were higher (P<0.05) in MUMB treatment group followed by UMB group (P>0.05) when compared to control group (Abid et al., 2016).Mean total and daily weight gain observed in diets with and without multi-nutrient block are shown in Table 6. Average daily weight gain (9.17 g) of the diet with multi-nutrient block was significantly higher (p <0.05) than the diet consisting solely of maize Stover (-7.99 g) Faftine and Zanetti (2010). Live-weight loss in the non-supplemented group, indicate that the nutrients supplied by maize Stover are below the requirements for goats maintenance. Effect of maternal nutrition at different stage of pregnancy in goats Observed that birth weight on the parent group given feed supplements during pregnancy UMMB stem from age 1 to 3 months (early) and 3 to 5 months (late pregnancy) as well as during pregnancy 1 to 5 months, higher birth weight children compared pregnant mother who had not fed the supplement. Based on the results of studies in which the parent who fed supplements during pregnancy UMMB 1 to 5 months of pregnancy and the end of the highest birth weight (2.293 kg) and then early pregnancy (2.286 kg) while pregnant mother feeding without supplements just 2,017 kg in the two types of goats (Muralidharan et al .,2014).

Cost benefit analysis of UMMB supplementation reportedbyTekeba et al. (2014) supplementation of UMMB seems economically meaningful for cross breed cows than Fogera cows. Based on their reports from cross bred cow there was significant (P≤0.05) a net return observed for income from milk sales 0.29 (USD/L) of the supplemented group as compared to a net return of 0.25 (USD/L) of the control group. The feed cost was reported that it was significantly (P≤0.05) reduced for supplemented group 0.15 (USD/L of milk) for cross bred cows group than the feed cost incurred for control group 0.19 (USD/L) at Andasssa Research Center. Mubi et al. (2013) in Nigeria argued that the cost gain (kg) was obtained in blocks without molasses as against multi-nutrient blocks with molasses increased in supplementing of Yankasa.

CONCLUSION AND WAY FOR WARD

Urea Molasses Multi-nutrient blocks have proven to be an excellent tool for the improvement of ruminant feeding. The ingredients required are usually available locally at a reasonable price. Their nature and proportion may vary according to the process used for the solidification and the purpose for which these blocks are to be used. Formulation of blocks based on low cost and locally available feed resources that do not compete with human food should be one of the thrust areas for future work. Urea Molasses Multi-nutrient block supplementation to ruminant animals creates an efficient rumen ecosystem which favors the growth of young animals, milk production, conception rates and the size of a newborn animal.It can provide energy for ruminants, non-protein nitrogen, minerals, vitamins and other nutrients. Supply of UMMB in experiment increased the intake, weight and the performance of cattle.Based on these observations, supplementation with UMMB licks boosted the digestibility of basal diets based on low quality forages. It can be safely concluded that UMMB supplementation plays an important roles to increase the production, while maintaining animal performance and feed efficiency.

The following suggestions were importantly for the way forwarded

- The development of molasses-urea multi-nutrient blocks should be encouraged in all developing countries like Ethiopia, which have a sugar industry and where small farmers feed their livestock on crop residues, communal pastures as a means to make better use of available feed resources at the small farmer level.
- Urea molasses multi-nutrient blocks should be encouraged during the hot and dry seasons , the available feed resources are not enough in energy and digestion proteins, which are insufficient to maintenance requirements and reducing productivity throughout the year.
- The production and dissemination of UMMB should be considered in drought manifest areas along with roughage feed provision.
- In our country, Ethiopia, commercializing (UMMB) in livestock feed industry technology as business and job opportunities for the producers and feed benefits for the farmers through proper strategic direction to make it a reality.
- Considerable additional research is still needed in order to fully exploit the benefits of incorporating various nutrients, minerals, additives and drugs in the blocks.

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