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Pre Scaling Up of Urea Molasses Block Technology to Fatten Arsi Oxen in West Arsi and East Shewa Zone of Oromia Regional State, Ethiopia

Nabi Husein Dawit Abate Lalisa Diriba Masarat.Xilahun
Adami Tulu Agricultural Research Center, P. O. Box 35, Batu, Ethiopia

Abstract
Pre scaling up of urea molasses block fattening technology was undertaken in two kebeles of Adami Tulu Jido kombolcha and one kebele of Arsi Negele districts, Anano shisho,Desta Abjeta and Gembelto ,respective with the objectives to convince the merits and increase confidence on the technologies, thereby to facilitate dissemination and adoption of the technology, to collect farmers' opinion on the performance of the technology,to improve farmers' knowledge and skill of application of the improved technology through training and to increase local capacity for future scaling-up or out of the technology. It was conducted on farm condition by using Urea molasses block as a supplement to Arsi oxen during the dry period (December-May).The block were made up of different ingredients such as Urea, wheat bran, Molasses, Cement, Mineral (*boji*), salt and noug cake .Those ingredients were purchased from local market. A total of forty two farmers and development agents (DAS) were getting practical training about the block manufacturing and method of feeding. Farmer training center (FTC) was used as sites of training and demonstration during technology was conducted. Thirty one oxen were used for this study from all selected kebeles. Biological and economic data were analyzed by using descriptive statistics. The end result of the study revealed that daily weight gain of animal was 0.45 kilo gram per day with net return of 1173 Ethiopian birr per animal in ninety days. The result of the study shows that Urea molasses block improves body condition of animals, increase body weight gain and makes farmer profitable. Therefore, this technology should be further scaled up by stakeholder in area where at molasses and crop residues are available.
Keywords -Arsi oxen, crop residues, peasant association, pre scaling up and urea molasses block

Introduction

The main feed resources for livestock in Ethiopia are natural pasture and crop residues, which are low in quantity and quality for sustainable animal production Alemayehu (2004), Tessema and Baars (2004) and Tessema *et al*. (2002a) noted that these poor feeds result in low growth rates, poor fertility and high mortality rates of livestock. This types of feed contains low level of nitrogen (Solomon *et al*., 2008) so that rumen microorganisms unable to show their activity due to lack of necessary amount of ammonia and Amino acids. UMB may be used for supplementation of straw based diet in dairy and meat production of smallholder farmers.

Supplementation with straw based diet could increase feed intake daily live weight gain, daily milk yield and longer lactation period (Banerjee G.C, 1982). Urea molasses block (UMB) is rich in protein, minerals and vitamins. It supplies Non protein Nitrogen (NPN) to the rumen microbes without any risk. It contains sufficient nitrogen and energy for rumen micro- organisms. Urea is a non-protein nitrogen (NPN) product which can be used as a N source while molasses used as supplementary energy source. The nitrogen from urea is used by the rumen microbes to make microbial protein. Urea Multi Nutrient block (MUB) contains important ingredients i.e. Urea, noug cake, molasses, mineral mix, wheat bran and salt. It was proved to be complete balanced diet for the animals. It enhances the intake of the animal's especially roughage feeds.

According to the fattening experiment conducted at Adami Tulu Agricultural Research center(ATARC) (Dawit *et al*., 2008), higher total and average daily gain was observed with Urea molasses block and maize silage based ration on Arsi oxen. Therefore, this work was conducted to pre scaling up of UMB feeding technologies to the farmers of the selected kebeles with the objectives; to convince the merits and increase confidence on the technologies, thereby to facilitate dissemination and adoption of the technology, collect feedback/farmers' opinion on the performance of the technology (farmers' feedback assessment**)** and improve farmers' knowledge and skill of application of the improved technology through training.

MATERIAL AND METHODS

The study was conducted in Adami Tulu Jido-Kombolcha (ATJK) district of East Showa and West Arsi Zone of Oromia Regional State, respectively from July to September 2017. ATJK district is located in the middle rift valley of Ethiopia, at 160 kilometers from the capital city of the country, in southeastern part of Oromia. The district is located between 38°20' and 38.5°5' E and 7°35'and 8°05' N. It lies at altitudinal range from 1500 to 2000 masl. The total land area of the district is 1403.3 kilometers square which is inhabited by 177,492 people, of which more than 79% are living in the rural area (Assefa *et al*., 2013). The agro-ecology of ATJK district is

semi-arid and sub-humid in which 90% of the area is lowland while the remaining 10% is intermediate with altitude ranges from 1500 –2000 masl. The minimum and maximum temperatures are 22 to 28C^{o}, respectively. It has an average annual rainfall of 760 mm. It has a bimodal rainfall from March to April (short rain season) and July to September (long rain season) with a dry period in May to June, which separates short rains from long rain (Teshome *et al.,* 2012). The study was undertaken in two kebeles of Adami Tulu Jido kombolcha and one kebele of Arsi Negele district, Anano shisho, Desta Abjeta and Gembelto, respectively.

Farmer's selection

Farmers were purposely selected based on; Amount of crop residue owned, Availability of drinking water around home stead, Proximity to road, Willingness to accept and disseminate the technology and relatively more number of farmers practicing in cattle fattening activity. A total of forty two farmers and three development agents (3DAS) were selected in these three kebeles.

Ingredients and Materials Used

The choice of ingredients were depend on their availability, nutritive value, price, easy of handling and the effect on quality of block. Some Ingredients used were obtained from agricultural and industrial byproducts Molasses, water, wheat bran, noug cage, cement, urea, salt and local mineral (*boji*) were among the ingredients used in these technologies. Materials used were molder, weighing balance, bucket and wood poles

Procedures Followed

1. Preparation of components
2. Mixing
3. Weighting all ingredients in standard volume or weight based on the formula of block.
4. Molding(for 24 hrs) this made block in acceptable shape and
5. Drying (for 5 day based on weather condition) blocks were not directly exposed to sunlight, but placed under a shade with good ventilation.

The amount of different ingredients used were depends on the size of block to be manufactured. According and the formula to be used were indicated below in the following table.

Table 1: Composition of the block

No.	Ingredients	1 kg	5 kg	15 kg	25 kg
1	Molasses	400gm	2kg	6kg	10kg
2	Urea	100gm	0.5kg	1.5kg	2.5kg
3	Wheat bran	250gm	1.25kg	3.7kg	6.25kg
4	Cement	100gm	0.5kg	1.5kg	2.5kg
5	Noug cake	80gm	0.5kg	1.5kg	2.5kg
6	Mineral/boji/	10gm	50gm	150gm	250gm
7	Salt	20gm	100gm	500gm	0.5kg
8	Water	40gm	200.gm	600gm	1kg

Mixing Procedure

A. 1+2(stirred for about 20 minutes)
B. 4+6+7+8
C. A+B
D. C+3+5

Fig 1. Training provided on UMB preparation



Training UMB UMB preparation

Urea molasses block distribution to farmers

For all sites, UMB were manufactured at Adami Tulu Agricultural Research Center (ATARC), and then distributed to the selected kebeles. Urea molasses block was demonstrated at the time of training and distributed for farmers at interval of 15 days and monitoring was conducted on monthly basis.

Animal selection and feeding

Animals selection was made from their herds they have, based on body frame of animals by the use of heart girth and age of animals were estimated by their teeth. Selected animals were dewormed and sprayed from internal and external parasites. One kilogram of UMB was divided into two equal parts and provided for 15 days before starting an actual period of fatting. After two weeks 1kg supplied per day. 1kg of concentrate (noug cake +wheat bran) ½ kg in the morning and ½ kg in the evening was given to each animal. Crop residue was offered as ad-libtum daily or used as basal diets. The animals were get water at list twice in a day. The owner of the animals mixed the Urea molasses block with straw to train the animals, when the animal refused to lick the UMB. The work of fatting was performed by the households especially by women in feeding and frequent watering

Data collected

Initial body weight, finally body weight, initial price, final price, feed cost and opinion of the farmers toward the importance of the technology were collected.

Statistical analysis

Data on initial and final body weight, initial and final price and feed cost were analyzed by using descriptive statistics. Initial body weight and final body weight data were taken by heart girth. Total live weight gain (TLWG) = FWG-IW, DWG= TWG/TFD were; FW=Final weight gain of animals, IW= Initial weight of animals, DWG= Daily weight gain and TFD= total fattening days. Body weight of animals was estimated from heart girth measurement using the regression equation developed by ILRI as cited by Yoseph (1999).

Y= -423.405235+4.833697x (R2 = 0.86; CV= 10%).Where, Y= Estimated body weight, Kg (weight range for prediction was 200-500 kg) and x= Heart girth, cm

Result and Discussion

Farmers training

Training was provided to the farmers on**;** Awareness creation on the importance of the urea molasses block, Selection criteria of animals to be fattened (based on body frame of the animals), Ingredients to be used for preparation, procedures to be followed in preparation, Feeding method (lick) and Precautions to be taken during feeding.

Table.1. Numbers of farmers trained (involved both husband and wife in some households)

Districts	kebeles	Participants		Total
		Male	Female	
ATJK	Desta Abjeta	10	7	17
	Anano shisho	11	4	15
Arsi Negele	Gambelto	6	4	10
Overall		27	15	42

ATJK- Adami Tulu Jido Kombolcha

Around 77% of farmers were trained in Adami Tulu Jido Kombolcha district. Farmers training centers (FTCs) were used as sites of training and demonstration.

Farmers participated in the activity

Twenty three farmers were participated in the study from both East Shoa and West Arsi Zones during the technology performed. Overall 31 oxen were used for the study. A total of 2790kg UMB was prepared and distributed to farmers.

Table 2: Number of Farmers participated and fattened animals

Kebeles	No. of farmers		No. of fattened animals
	Male	Female	
Anano shishoo	6	3	14
Desta Abjeta	8	2	10
Gambelto	4	0	7
Overall	18	5	31

Body weight change

After feeding of Urea molasses block and concentrate for ninety days animals were attained 40.74 kg of average

body weight gain. The average daily body gain of the animal was 0.45kg per day.

Table. 3. Weight gain during cattle fattening

Kebeles	MIBW/kg	MFBW/kg	MTWG/kg	MDWG/kg	
Anano shishoo	242.21		283.86	41.65	0.46
Desta Abjeta	211.8		259.8	48	0.53
Gambelto	233.14		265.71	32.57	0.36
Overall mean	229.05		269.79	40.74	0.45

MIBW= mean of initial body weight *MFBW= mean of final body weight*
MTWG= Mean of total weight gain *MDWG= mean of daily weight gain*

Partial budget analysis

Simple calculation was done to know gross profit using feed cost and animal purchasing price. Estimation of labor cost was difficulty since farmer using his family as labor and gives little time for feeding, watering and other management. The cost of feed per animal was 521.6 Ethiopian birr and average price of animal purchased was 2164 Ethiopian birr. The total cost of production per animal was 2685.06 birr. The farmers were sold the fattened animal at local market with gross margin 1173 Ethiopian birr per animal.

Table. 4 Partial budget analysis of Urea molasses block for Arsi cattle fattening

Items	Cost and revenue
Animal purchased price per head	2163.46birr
Crop residues cost per head	140birr
UMB cost per head	180birr
Concentrate cost per head	201.6birr
Total cost per head	2685.06birr
Gross return/revenue per head	3857.69
Gross margin per head	1172.63birr
Total gross margin (26)	30488.38

Highest profit was obtained in Anano shisho when compared with other kebele. This profit was obtained due to the farmers attend the practical training provided in a good approach.

Feedback assessment

Almost all the participants reported that, the consumption Urea molasses block by animals was achieved after a week from when this type of feed has been introduced to the animals. Urea molasses block increase intake and improve body condition of fattened animals. Participants noticed that the benefits of feeding the intervention diet were visible immediately. It was depending upon the adaptation of the new diet by the oxen. This types of technology was accessible to us, because of all used ingredients are available in our farm level except molasses

Challenge encountered

Some animals were refused to consume the treated straw for first time of feeding. This challenge was solved by mixing atela and other feeds which were previously fed by animal, for the sake of adaption. Scarcity or insufficiency of molasses also the challenge occurred in the time of study.

Discussion

UMB feeding package technology was conducted in three kebeles Anano Shishoo, Desta Abjeta and Gembeto to fatten Arsi Oxen. UMB was made from wheat bran, cement, salt, water, molasses, local mineral and nouge cake. Forty two farmers (27 males and 15 females) were skilled on importance of the technology, way of preparation, feeding method, selection criteria of fattened animal, precaution taken during feeding and preparation .Twenty three farmers were fattened thirty one Arsi oxen by 2790kg of UMB for ninety days with other locally available feed resources. Fattened animals were conquered 0.45kg mean daily weight gain (Mean of total weight gain 40.74) similar to the work of (Dawit *et al*., 2008) and the farmers were got 1173 ETB birr gross margin per head in ninety days of feeding.

Conclusions

The use of a Urea molasses block in supplementation as a catalytic agent of straw based diet in cattle fattening is very much essential for achieving appropriate body weight gain. The fattened animals were attained 0.45kg daily weight gain.The farmers were got 1173 ETB birr gross margin per head in ninety days of feeding. The results showed that it has economic benefits for farmers in a short time fattening (three months). UMB supplementation increase daily live-weight gain; improve performance of animals and makes farmer profitable.

Recommendation

The importance of supplementary feed using urea molasses multi-nutrient block is increasing palatability and this enhances intake of feed and body weight gain is essential to fattening oxen in a short period feeding is very clear to the understanding economic benefit obtained. If UMB is properly disseminated and extended in the study area and other districts of the zones, it will play a vital role in poverty alleviation of poor livestock farmers. Farmers show an enormous interest to exercise further this technology. Therefore, livestock development sectors, local farmer groups, young graduates and farmer cooperatives should be further scale up this feeding package technology were at molasses and crop residues are available.

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