

PARTICIPATORY EVALUATION OF IMPROVED FEED TECHNOLOGIES TO ENHANCE SMALL RUMINANT FATTENING ON PASTORALIST RESEARCH GROUP (PRG) MEMBERS IN CHIFRA DISTRICT OF AFAR NATIONAL REGIONAL STATE

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➤ Supporting Information

ABSTRACT: The causes for low productivity of sheep and goat include poor veterinary services, inadequate quantity and quality of feed. Among these limiting factors, poor feed supply and feeding system is the most important. The objectives of this project were to demonstrate and evaluate Urea Molasses Multi-Nutrient Blocks (UMMNB) and concentrates mix feed technologies in participatory manner through Pastoralist Research Group (PRG) approach and look in to the perception and opinions of agro-pastoralist to the new feed and feeding techniques. The PRG has 25 members and was established a year ago. Among the PRG members, 6 trial agro-pastoralists were selected by the PRG members purposefully to implement the experiment. A total of 36 small ruminants (sheep and goat) were used for the trial. Training on UMMNB preparation, formulation of concentrate feed, animal management and data collection were given for PRG members and Development Agents (DAs). The demonstration and evaluation trial were lasts for 4 months data collection period. Data were collected by the trial PRG agro-pastoralist throughout the trial period with close follow up of DAs and woreda experts. For data analysis purpose the researchers used descriptive statistics. The results showed that the final body weight and daily body weight gain was higher in grazing when supplemented with concentrates mix (Treatment 3) in compared to grazing + urea molasses block supplementation (T2) and control one/free grazing (T1). The partial budget analysis also indicated that small ruminant daily weight gain for 4 months with supplementation of concentrate mix supplemented groups (T3) was found to give on average economic return of 250 Ethiopian Birr (ETB) or 6.70 Euro per head. From this study, it can be concluded that the supplementation concentrate mix for small ruminants (sheep and goat) has better weight gain and economically feasible for the chifera district PRG established in 2017. It was also economical at PRG level, with average gross profit of 250 ETB per head in chifera area. Because of this, so money agro-pastoralists has been attracted by the business and engaged in small ruminant fattening practices by purchasing animals from market place without external advice and support.

Key words: Small ruminant, Urea molasses block, Feed technology, Pastoralist research group

INTRODUCTION

Sheep and goats, with their small body size, high reproductive capacity and rapid growth rates are ideally suited to production by resource-poor smallholders. They can be integrated into the overall production system, absorbing surplus labor and consuming small amounts of otherwise unused feed. Despite a large population and the contribution of the national and regional sheep and goat flock to the export earnings of the country Ethiopia in general and Afar region in particular as well as the livelihoods of households in rural and semi urban areas, their productivity is very limited. The causes for low productivity of sheep and goat are multifaceted and include poor veterinary services, inadequate quantity and quality of feed. Among these limiting factors, poor feed supply and feeding system is the most important (Alemayehu, 2002).

Extensive sheep and goat production under the traditional communal grazing/ browsing system is widely practiced in Afar region. Pasture, crop residues and browses are the main feed supply to sheep and goat in the region and such types of feeds rarely satisfy the maintenance requirements of animals. Most of the available feeds are noted for their poor feeding value in terms of protein and energy contents besides their low digestibility.) Some studies, reported that in semi-arid and tropical ecosystems, the quality of forages decreases greatly during the dry season, leading to substantial weight loss of animals (Pinkerton, 2005; Njidda, 2010; Njidda and Nasiru, 2010; Amiri and Mohamed Shariff, 2012; Njidda et al, 2012). This phenomenon requires the alleviation of nutrients deficiency in animals through implementing different feed utilization strategies. Even though many studies were taken place on small ruminants in Ethiopia most of the technologies were not transferred to end users and farmers. As a result, the small ruminant development in smallholder farms remains unchanged. Hence there is a need to search for alternative technologies, which could improve the nutritive value of the poor-quality feeds to enhance the production of small ruminant. There are different techniques that could improve the

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feeding value of basal diet among which urea treatment legume supplementation and concentrates supplementation are well known for their technical and economic feasibility under smallholder Agro-pastoralist especially in developing countries. Moreover, semi-intensified market-oriented fattening of small ruminant has the potential to make smallholder Agro-pastoralist/ pastoralist more profitable.

Objectives of the Study

General objective: The general objectives of this study were to demonstrate and evaluate Urea Molasses Multi-Nutrient Block/UMMNB/ and concentrates mix feed technology in participatory manner through PRG approach and look in to the perception and opinions of Agro-pastoralist to the new feed and feeding techniques.

Specific objectives: A) To evaluate the response of small ruminants (goat & sheep) to the new alternative feed source-based feeding under smallholder Agro-pastoralist during drought season; B) To see the perception of Agro-pastoralist to the new feed and feeding techniques.

METHODS AND MATERIALS

Description of the study area

The study was undertaken in Chifra district of zone one (Awsi Rasu) of the Afar Regional State. It is located south west of Semera on the main road of Mile to Woldiya, which is about 162 km from the regional capital city (Semera) and bordered on the south by Mille, on the west by Amhara Region, on the north by the Administrative Zone four (Fantena Rasu), and on the East by Dubti (Zone one). The total land area of the district is about 173,374 ha of which the largest area is rangeland (APARDB, 2006). The average temperature of the area is about 29oC, and the rainfall is bimodal with erratic distribution, with the long rainy season (Kerma) is between Mid-June to Mid-September and the short rainy season (Sugum) that occurs between March and April. The average annual rainfall is recorded to be between 400 and 600 mm (APARDB, 2006). The altitude range of the area is between >550-1,100 m above sea level and most of the rangelands of the study district falls below 850 m.a.s.l. The dominant soil types in these areas are black, sandy, vertosols and deposits of silt and fine sand particles occur in the plain flat areas where cultivation is practiced (APARDB, 2006). The study area consists of 19 pastoral associations of these 13 of the associations are pastoralists, which entirely depend on livestock production. The remaining 6 associations are agro-pastoralists. The district has an estimated total population of 91,078, of which 50,859 are males and 40,219 are females; 9,132 or 10.02% of its population are urban dwellers and the household numbers are 17,744 (CSA, 2007).

Sampling methods of the study

The PRG having 25 members were established in 2017. Among the PRG members, six trial agro-pastoralists were selected by the PRG members purposefully to implement the experiment. Each treatment was tested by each trial pastoralist. From all trial agro-pastoralists, 36 animals were contributed for the trial (fattening). A total of 36 small ruminants (sheep and goat) were used for the trial, thus each of the six pastoralists had six small ruminants. Training was a crucial component in introducing any new technology. Training on UMMNB preparation, formulation of concentrate feed, animal management and data collection were given for PRG members and DAs. The demonstration and evaluation trial were lasts for 4 months data collection period. Data's were collected by the trial PRG Agro-pastoralist throughout the trial period with close follow up of DA's and woreda experts. Finally, data were analyzed using descriptive statistics such as (percentage, ranges, etc.).

Treatments

- ❖ Grazing (Traditional) (T1)
- ❖ Grazing (improved pasture) + Urea molasses block supplementation (T2)
- ❖ Grazing (improved pasture) + Concentrates mix supplementation (T3)

Table 1 - Ration Formulation

Concentrate mix		Urea Molasses Multi Nutrient Block/UMMNB/		Remarks
Items	Percentage (%)	Items	Percentage (%)	
Cottonseed cake	49	Molasses	40	N.B:2.5% of their body weight level of supplement given to the animal.
Wheat bran	50	Urea	10	
Salt	1	Cement	10	
Total	100	Salt	5	
		Wheat bran	25	
		Cotton seed cake	10	
		Total	100	

RESULT AND DISCUSSION

In this section the findings/ results of the study are presented and discussed. Accordingly, the body weight gain of the experimental sheep & goat fed with grazing + Urea molasses block supplementation (T2) and grazing with supplemented with Concentrates mix (T3) and control one/ free grazing (T1) are presented in Table 1. The initial weight of each sheep and goat was 18.5kg and 15.5kg respectively. Number of animals was 12 in each of the three treatments (i.e., T1, T2, and T3). The final body weight and daily body weight gain was higher 26.5kg final weight in grazing with supplemented with Concentrates mix (T3) than grazing + Urea molasses block supplementation (T2) & control one/ free grazing (T1). In other words, the result shows, that concentrate feed supplementation (T3) results the highest body weight increment on the animals followed by UMMNB feed (T2). On the other hand, free grazing of small ruminants taken as control (T1), gives the lowest effect on animals to increase their body weight. The average daily weight gain range in sheep & goat concentrate mix supplemented group (T3) are 0.066kg/day & 0.066kg/day respectively. The higher live weight gains of concentrate mix supplemented groups(T3) may be due to adequate amount of nutrients in concentrate mixture the CP and energy are comparable than Urea molasses block supplementation (T2) & natural grass grazing without supplementation in (T1).

As table 2 below shows, economic return from goats is slightly higher than sheep under study. This could happen because of the community's food habits. In Afar region, goat is preferred than sheep in their diets. Likewise, goat population is higher than sheep in the region. In every households of the pastoral community of the region; goats are the dominant animals. This could be resulted from feed availability/browses, environmental, agro-climatic condition of the region, genetic make-up of the animals /goats/ adaptability to harsh climate, productivity as well as cultural practices of pastoral community in the region.

The result clearly shows that Urea molasses block supplementation (T2) and concentrate mix supplemented groups (T3) has a great influence on body weight gain of small ruminates relative to control one. Fattening of Afar sheep and goat with supplementation of concentrate feed for three months is highly profitable and brings better average daily weight gain as compare to animals feed on Urea molasses block supplementation (T2). The partial budget analysis indicated that small ruminant daily weight gain for 4 months with supplementation of concentrate mix supplemented groups (T3) was found to give on average economic return of 250 birr per head. For instant six agro-pastoralists in Chifra district has tried to fatten six goat & sheep at a time while after four months they sold all goats and they got net earnings of 9000birr. The remaining group members have been castrated their male goats for further fattening purpose. Because of this, so money agro-pastoralists has been attracted by the business and engaged in small ruminant fattening practices by purchasing some animals from market without external advice/support.

Table 2 - Body weight change and Economic Benefits of Afar Shoat fattening (Sheep & Goat) by feeding UMMNB and Concentrate Supplementation in Chifra district

Items		Grazing +UMMB	Grazing+ Concentrate feed(300gm/DM)
Initial weight(kg)	Shee	18.5	18.5
	Goat	15.5	15.5
Final weight(kg)	Shee	25	26.5
	Goat	22	23.5
Weight change with four months (kg)	Shee	6.5	8
	Goat	6.5	8
Daily weight gain (kg)	Shee	0.054	0.066
	Goat	0.054	0.066
Total cost per trial PRG		1600	1700
Gross return per trial PRG		3000	3200
Gross margin per trial PRG		1400	1500
Total gross output		18000	19200
Total costs		9600	10200
Total gross margin		8400	9000
Economic return		233 per animal	250 per animal

CONCLUSION

This study aims to evaluate different feed technologies on small ruminants in participatory manner on pastoralist context through pastoralist research group. Three-hundred-gram concentrate mix /head/day supplementation (49% Cottonseed cake mixed with 33% wheat bran and 1% salt) of small ruminants (sheep & goat) has better weight gain and economically feasible for the chifera woreda established PRG. It was also economical at PRG level, with average gross profit of 250 ETB per head in chifera area. Because of this, so money agro-pastoralists has been attracted by the business and engaged in small ruminant fattening practices by purchasing some animals from market place without external advice/support. In

the future animal fattening will be played imperative role to improve the livelihood of the poor pastoralists and agro-pastoralists through enhancing the daily income. Besides, agro-pastoralists and extension workers had appreciated fattening practice with concentrate mix feed supplementation than conventional fattening practice.

Recommendations

Even though promising practices had been observed during the study; there are some critical activities has to be done in order to increase benefit and support pastoral livelihoods in this endeavor. The following are recommended to be done in the future.

- Extending on-farm research and increasing numbers of PRG and numbers of agro-pastoralists in each PRG
- Continuous awareness raising to the communities on how to fatten small ruminates
- Working closely with Agro-pastoralists
- Scale up of on-farm research result

DECLARATION

Authors' contribution

Mohammed Nuru contributed in all stages of implementation including review and developing the content. Mohammed Yasin contributed mainly on data gathering and actual implementation of the trial.

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Conflict of interest

The authors declare they have no competing of interests.

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