

Participatory Silage Making and Hay and Silage Mixed Feeding Technology for Winter Feeding to Goats in Jumla, Nepal

R. R. Gyawali^{1*}, S. Yadav² and D. Yadav³

¹District Livestock Service Office, Jumla

²Regional Directorate of Livestock Services, Surkhet

³National Sheep and Goat Research Programme, Jumla

*Corresponding author: reshamg91@gmail.com

ABSTRACT

*This action research was carried out to demonstrate the method of silage making and its feeding, mixed with chopped hay to goats during feed scarcity periods as coping strategy for winter days in Jumla. Nine farmers took part in on-farm silage production and feeding trial. A total of 29 kids and 16 does as treatment group and 12 kids and 19 does of the similar age group and status as control were selected to compare the body weight gain. The normal practice of feeding was 3-4 hours of grazing daily, occasionally combined with tree fodder (*Quercus* sp.) in communal pastureland and offering hay for snowfall days in pens. In addition to this, treatment groups were supplemented with mixed silage and chopped hay at the rate of 2% of body weight on dry matter basis, half each from the silage and hay. The mixture was given daily early in the morning for 45 days from 25th of December to 10th of February, when the average minimum temperature dropped from -2.4 to -5.4^o C. Goats consumed about 95% of the offered amount of silage whereas chopped hay was rejected by about 90%. The result showed that kids gained 0.49 kg with average daily gain of 10.88 g and does gained 2.44 kg with an average daily gain of 54.22 g for the treatment group. The difference between the initial and final body weight was positive for treatment group whereas it was negative for the control. Male kids grew faster by 8.6%, female kids by 6.7% and does by 12.6% for silage supplemented group compared to control. It indicated that proper fermented maize fodder silage can be obtained from pits prepared before winter and loss in body weight can be prevented by the supplementation of silage during cold days in high mountains when there is scarce of green forages.*

Keywords: action research, coping strategy, maize fodder, body weight

INTRODUCTION

Mountain region of Nepal has about 13% of the total goat population. Sinhal and Chyangra are the major breeds and mostly reared under migratory system. High mountain region is highly acknowledged for the communal rangeland pasture resources to meet the forage demands of seasonal migratory animals. But the feed supply is adequate only in the months of June-September; rest of the year animals are forced to face feed scarcity (Pandey and Tiwari, 2002). A substantial shortage of winter fodder as being an important constraint within the transhumant system (Farman and Tetlay, 1991; Dost, 1995). The crisis of animal feed during winter season not only causes nutritional stress but also reduces the capacity to resist the cold stress. In this season, farmers either sell their flocks in lower price or bring their flocks to mid hill districts in search of feed where they should pay more money as levy against grazing. So, the silage technology may be taken as one of the best options. Silage, which is anaerobically fermented green fodder, is valued throughout the world as a source of animal feed during lean months (Ragothaman, *et a.,l* 2010). The practice of making and feeding silage is limited only in government owned farms in Nepal, mostly focused to large ruminants. The reluctance in the adoption among the farmers may be due to the lack of on farm application of the technology. Furthermore, in high mountain region the temperature factor for proper fermentation of silage and goats' preferences for its consumption was also not assessed at community level. So, aiming for green roughage supplement through silage to local goats during winter period by utilizing maize fodder, this action-oriented study was carried out.

MATERIALS AND METHODS

An Organized farmers' group (OFG), Jolimungrah Pasu Sewa Samuha, in Dhapa VDC-7 in Jumla district was selected for on farm silage making and feeding practices. As per the decision made from the group meeting, 9 members voluntarily carried out the study on their farms. Irrespective of the variety, farmers sowed the maize seed estimating at double of the rate as for grain production between 3rd and 4th week of June. They took care themselves for the fodder in the field. After two to two and half months of sowing, maize crop was harvested, in 3rd week of September, before coming out the cobs. It was wilted on sunlight for about 3 hours and chopped properly with the help of chaff cutter machine at about the size of 2-3 inches long. Silo pits were dug as per the size required to the owner ranged from 1-3 cubic meters. A polythene sheet was laid down on the pits. Chopped fodder maize was filled with continuous trampling by participants to remove the oxygen as soon as possible from the pits. The pits were sealed with the same polythene sheet at first then with the soil and stones tightly. Sixty-two farmers from KalikaKhetu and Kanakasundari Village

Development Committees were visited the site and participated actively in the process of chopping and ensiling the maize fodder. After 3 months (3rd week of December) silo pits were opened one by one from a corner and evaluated using the sense of smell, taste and color. Hay prepared traditionally from local grasses (non-legume type) was collected from hay store owned by farmers. Hay was chopped with chaff cutter machine and mixed with silage properly before offering to goats. A total of 29 kids (3-12 months) and 16 non pregnant does of local breed Sinhal were selected to feed the calculated amount of silage and chopped hay. Likewise, 12 kids of the similar age group and 19 does were taken as control group i.e. without silage and hay. Body weight was recorded at each fifteen days' interval, using spring weighing balance. The refusal of feeds if any was weighed once at fortnight. The health status was also observed during the trial period. Daily 3-4 hours grazing occasionally combined with tree fodder (*Quercus* sp.) in communal pastureland near by the village and offering hay for snowfall days in the pens was the normal practice of feeding. In addition to this, treatment group was supplemented with mixed silage and chopped hay at the rate of 2% of body weight on dry matter basis, half each from the silage and hay. The mixture was given in common feeder to the goats of individual farmers daily early in the morning from December 25 to February 10 (45 days). The period of one week was considered as an adaptation period. Weather data were collected from climatic field office, Jumla. The quantitative data were analyzed using simple statistical tools and qualitative data as description.

RESULTS

The weather situation

The average maximum and minimum temperatures in Jumla from January 2013 to February 2014 were collected and found that the months from November to February were the coldest months of the year when the average minimum temperature fell to -5.4°C in December (Figure-1). During the feeding trial period snowfall was recorded three times in the months of January and February. The rainfall was not recorded for the trial period. In the month of October when fodder was ensiled average maximum and minimum temperature was 25.8°C and 8.0°C which gradually decreased to 16.8°C and -5.4°C respectively by December when it was opened.

Quality of silage

Silage with pleasant aroma, nearly odorless, light sour taste and slightly golden with light green color was found within the pits. There was no mould growth appeared in all pits at opening.

Preferences of feeds

The mixture of chopped hay and silage was the new feed to goats. For the first day of offering the mixed, goats of two farmers did not like to eat it. When farmers added a little amount of common salt on the mixed, goats used to consume almost all the amount of silage offered. After few days, no salt was needed to accustom the feed. It was found that almost 95% of the offered amount of silage was consumed by goats whereas only 10% of chopped hay was consumed. The intake of chopped hay was nominal and the practically about 1% of the body weight of animals was consumed only from the silage on dry matter (DM) basis (assuming 35% DM content).

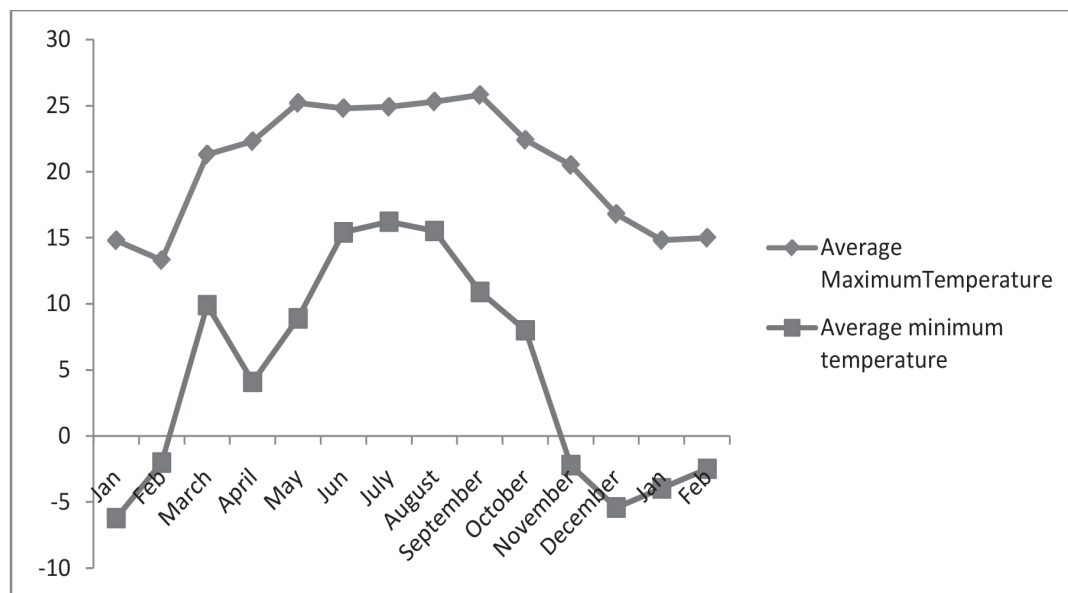


Fig. 1: Average maximum and minimum temperature (°C) in Jumla during January 2013 to February 2014 (Source: Climatic field office, Jumla)

Body weight gain in goats

The initial and final average body weight is presented in Table 1. It reveals that the average initial body weight of the kids was lower in treatment group than in the control group, whereas the average body weight of doe was lower in control group than that of treatment. The same trend was observed for the final body weight.

The total weight gain in kids was 0.49 kg/kid, with average daily gain of 10.88 grams and in does it was 2.44 kg with an average daily gain of 54.22 gm for the treatment group during the trial period, whereas kids and does lost their body weight by 0.03 and 0.84 kg/ animal respectively for the group without silage supplement.

Table 1: Initial and final body weight of goats (Kg) supplemented silage and hay mixed feed as treatment and without the mixture as control in Jumla, 2014

Animals	Control		Treatment	
	Initial BW	Final BW	Initial BW	Final BW
Kids	11.83(12)	11.75	9.44(29)	9.93
Does	25.31(19)	24.47	26.15(16)	28.59

Note: Figures in parenthesis indicate the number of animals

While considering the sex of kids, the difference (weight gain or loss) between the initial and final body weight was positive for both the males and females in treatment group whereas it was positive only for male kids in control group (Fig. 2). Male kids grew faster by 8.6% and female kids by 6.7% and does by 12.6% for silage supplemented group than the animals without the supplementation (Table 2).

Goat health status

Health condition of the goats was also observed during the period of feeding trial. No clinical signs of contagious diseases were noticed during the 45 days of feeding trial. Two kids with lower body scores were infested with external parasites (lice).

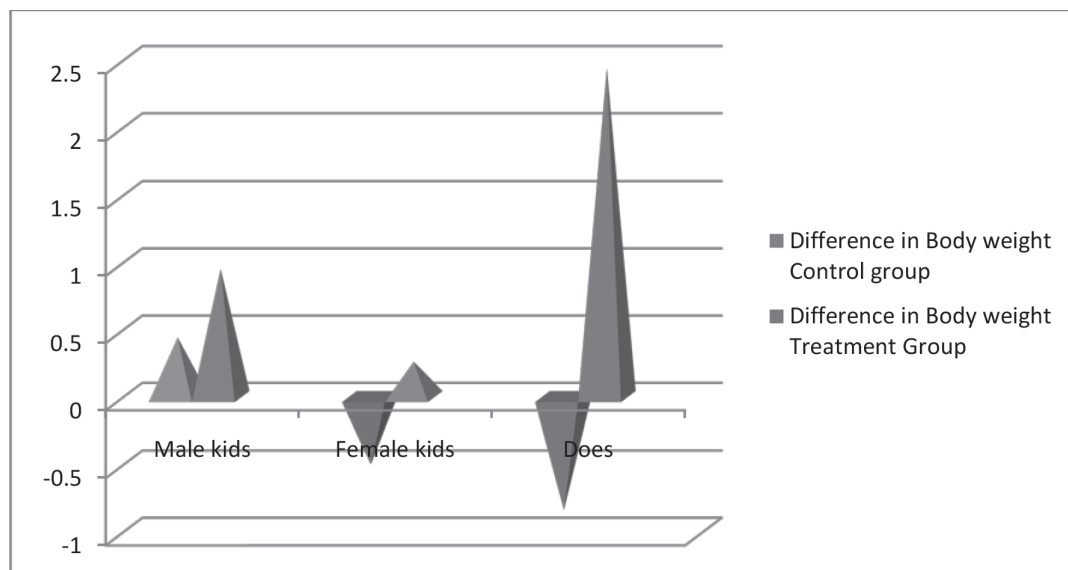


Fig. 2: Positive and negative body weight gain in goats supplemented silage and hay mixed feed as treatment and without the mixture as control in Jumla, 2014.

Table 2: Body weight gain of goats and differences (%) between supplemented silage and hay mixed feed as treatment and without the mixture as control in Jumla, 2014

Body weight gain in percentage			
Animals	Control group (C)	Treatment Group (T)	Difference between C&T
Male kids	4.67	13.27	8.59
Female kids	-4.10	2.61	6.70
Does	-3.32	9.33	12.65

DISCUSSION

The temperature record over the period of one year in Jumla shows that the environmental temperature fell down abruptly from 8 to -2 °C from October to November, December to February were the coldest months. The quality of silage in silo pit was found good may be due to well fermentation and formation of lactic acid due to the proper ambient temperature and anaerobic condition within the sealed pit . Regarding the aroma/odor, it was mentioned that nearly odorless is the characteristic of well fermented silage (Charley B and Schmidt, 2014). More preferences in consuming the silage may be due to its green nature as compared to the chopped dry hay. The normal practice among the farmers was offering hay without chopping. The findings matches, while compared to dry roughages (wheat and rice straw) between whole and chopped forms but in contrast to the findings goats' preferred chopped hay of clover and other high quality forages over the un chopped material (Abdel and Alla ,1999). The findings of Abi *et al.*, (2008) matches the present finding, which revealed that in transhumant system male kids, female kids and does gained lower body weight in winter period than the summer period and they also found that male kids gained more live weight than female in winter period. In the same study, does lose the body weight during the period.

In this experiment too low gain in body weight of the goats may be due to the low availability of forage in pastureland combined with cold stress and the result obtained positive weights was practically the supplement of silage only. The lowest average daily weight gain/goat was observed on transhumance system was also supported by Khanal (2012) and Osman *et al.*, (2009). Malisetty *et al.*, (2013), revealed that Nellore ram lambs gained average daily body weight of 32.33 g with sole silage-based feed ration. The lost in body weight during winter season in migratory ewes was also found in a study of Dhaubadel (2000).

CONCLUSION

Goats in high mountains areas are either confined around the farmers' settlement or brought down to the mid hills pasture during colder days of the year. While around the villages, it is crucial to meet the feed demand of animals. The practice of making silage from the maize fodder from pit silo was successful at the community level. Similarly, body weight loss due to deficit of feed combined with cold stress in goats could be prevented by the supplement of a little amount of maize silage (approximately 1% of body weight on DM basis) during winter season.

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