Comparison of enriched silvipasture and *Cenchrus ciliaris* pasture with natural pasture in ravenous soils for goat production under rainfed conditions

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Introduction

Goat is a future animal and plays a crucial role in providing livelihood and supplementary income to resource poor farmers and landless labourers of rural India. Goat rearing also ensures self-employment and act as a cushion in present climate change phenomena like drought and famine. Goats are found more in ecologically fragile arid and semiarid areas. Hence, it is imperative to address goat production under present scenario of climate change and food scarcity. The diverse challenges and constraints as growing population, increasing food, feed and fodder needs, natural resources degradation, climate change demands a reorientation of our strategies for goat production and development of feed and fodder resources in the country by utilizing waste lands/ poor lands, because in our country goats are mainly depend on natural feed resources available on waste and degraded lands. The poor production potential of these lands and poor values of qualitative parameters of available vegetation on such lands hamper expression of production potential of Indian goats, side by side economic progress of goat keepers. Therefore, an attempt was made to develop feed resources under three models *i.e.,* Silvipasture, sown pasture and natural vegetation stand (natural pasture) in Yamuna ravines of Mathura district of Uttar Pradesh.

Materials and Methods

Three rain-fed pastures were evaluated through grazing studies. These pastures were *Zizyphus* sp. based silvipasture, *Cenchrus ciliaris* pasture and natural pasture. The inter row space of *Zizyphus* sp. old plantation was ploughed and sown with *C. ciliaris+ Cyamopsis tetragonoloba* seeds in rainy season, so that pasture enriched in legumes as well as in quality fodder for goats. The soils of these pastures were ravenous with loamy sand texture. These pastures were allowed for about 5hour daily grazing by introducing six Barbari male having age 10-11month with a grazing area one hectare in each from September month. The intake study was carried out with the help of double indicator method by using chromic oxide as indicator. Not any supplementation was offered to animals after grazing. The experimental animals were observed regularly for their body weight and other nutritional parameters. *Zizyphus sp*. trees were not lopped for their leaves. Samples of rumen fluid (50 ml) were withdrawn from all intact kids at 4 h post-feeding using a stomach tube at the end of experiment. Each sample was placed in a 100 ml glass jar and the pH determined using a portable pH meter within 4 to 5 min of sampling. After pH measurement rumen fluid was strained with four layer of muslin cloth and stored –20ºC. The N was determined using Kjeldahl technique (AOAC, 1990), total volatile fatty acids (TVFA) as per Barnett and Reid (1957) procedure, ammonia nitrogen by Conway (1962) method, while TCA-N estimated by following the procedure of Tagari *et al.* (1964).

Results and Discussion

The grazing kids attained maximum average daily gain (g) under *Zizyphus sp*. based enriched silvipasture model followed by sole pasture of *C. ciliaris* (Table1). However, these two were found superior over natural pasture of this area. This weight gain pattern also reported by Tripathi and Dutta (2010) under improved pasture over natural pasture. Natural pasture mainly comprised of *Saccharum munja, Saccharum spontenum, Dychostachys bipinnata, C. ciliaris, C. setigerus* and other seasonal forbs. Grazing kids also drawn maximum dry matter as their feed in terms of dry matter intake (% live body weight basis) and dry matter intake (on metabolic weight basis) were also recorded higher in Silvipasture and sole pasture of *C. ciliaris.* Dry matter digestibility was significantly higher in silvipasture model over rest two models. As far as rumen fermentation pattern is concerned, contents of TVFA (mmol/dl), Ammonia- N (mg/dl) and TCA-N (mg/dl) were recorded higher side in enriched silvipasture system. pH value of rumen fluid was found with non-significant difference among all the pastures models. Total–N (mg/dl) and NPN (mg/dl) contents in rumen fluid were significantly higher with natural pasture, however total –N was statistically at par with enriched silvipasture System.

Table1: Various parameters of goats as influenced by various models of pastures

Parameters	*Zizyphus sp*. based silvipasture	*C. ciliaris* pasture	Natural pasture
Dry matter intake(kg)/100kg BW	4.66±0.64	4.46±0.53	3.46±0.28
Dry matter intake (g)/ $W^{0.75}$	102.55±13.75	93.18±10.58	72.17±6.28
Crude Protein intake (kg)/100 kg BW	450.85±61.97	468.17±59.69	348.14±26.04
Crude protein intake(g)/ $W^{0.75}$	9.91±3.25	9.77±2.92	7.25±0.56
Average daily gain (g)	65.13±5.71	29.60±2.60	9.21±4.70
Digestibility (%)			
Dry matter	65.61±2.95	58.09±2.97	52.71±1.71
Crude protein	57.08±5.10	58.71±4.88	50.87±2.49
Rumen parameters			
pH	6.28 ± 0.07	6.77 ± 0.02	6.65 ± 0.05
TVFA (mmol/dl)	14.99 ± 0.53	11.72 ± 0.40	10.01± 0.41
Ammonia-N (mg/dl)	33.71 ± 1.62	30.1 ± 2.41	29.54 ± 1.04
Total-N (mg/dl)	92.4 ± 1.61	82.6 ± 3.59	92.4 ± 1.97
NPN (mg/dl)	53.2 ± 1.91	45.73 ± 1.56	59.92 ± 2.59
TCA-N (mg/dl)	39.2 ± 2.16	36.86 ± 2.44	32.48 ± 1.89

Conclusion

Silvipasture (*Zizyphus sp.*+ *C. ciliaris*) enriched with *Cyamopsis tetragonoloba* improves grazing materials and animal production parameters *i.e.* dry matter intake and its digestibility as well as average daily gain without any adverse effect on rumen fermentation pattern.

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