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Performance of sheep integrated in Bajra- Neem + *Gliricidia* agri-silvi system

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Abstract
Sixteen Madras Red breed ram lambs were divided into 4 groups and fed respectively with *ad libitum* bajra (*Pennisetum glaucum*) straw (T_1), bajra hay (T_2), bajra straw supplemented with leaves of neem (*Azadirachta indica*) and *Gliricidia sepium* in equal proportions (T_3) and bajra hay supplemented with leaves of neem and *G. sepium* in equal proportions (T_4) along with concentrate mixture. The growth rate of lambs in T_3 was significantly ($P<0.01$) higher (59.99 *vs*. 36.00 g per day) as compared to T_1. The dry matter intakes, digestibility of nutrients were significantly higher when straw was supplemented with tree leaves mixture (T_3). The results inferred that bajra straw when supplemented with tree leaves mixture could support equal performance to that of sheep fed with bajra hay or bajra hay supplemented with tree leaves mixture.

Key words: Agroforestry, Agrisilviculture, Animal nutrition, Small ruminants, Top feed

Agroforestry is a sustainable land use system that combines tree crops and agricultural crops. This system enhances production and economic return per unit area besides enhancing the soil quality. Thus integrating fodder trees in dry land farming additionally generate nutritious feed to the livestock. The crop residues obtained from the dry land farming are poor in palatability and nutrient makeup and require supplementation when fed to livestock. Hence, a study was conducted to assess the performance of lambs fed bajra straw supplemented with neem and gliricidia leaves from agrisilviculture system.

Two acre of dry land was divided into four plots *viz.,* A, B, C, and D of 0.5 acre each. These four plots were ploughed and uniformly fertilized with NPK at the ratio of 40:20:20. In plots A and B, bajra (*Pennisetum glaucum*) was raised for grain production at the seed rate of 8 kg / ha. In plots C and D, bajra was raised for fodder at the seed rate of 10 kg / ha. The bajra crop in experimental plots B and D were raised as understorey with 10 years old neem (*Azadirachta indica*) plantations with 5x5m space. At boundary of the field, *Gliricidia sepium* were planted as fence and leaves were harvested and fed. The grain production after the harvest from the experimental plots A and B was recorded. The straw yield was also recorded from the plots A and B. The bajra for fodder production (plots C and D) was harvested at 55th day and converted into hay and the dry fodder was stored for animal experimentation.

To study the growth rate of lambs, 16 weaned Madras Red breed ram lambs were divided into 4 groups and fed respectively with *ad libitum* bajra straw (T_1), bajra hay (T_2), bajra straw supplemented with tree leaves mixture (TLM) containing neem and *Gliricidia* in equal proportions (T_3) and bajra hay supplemented with TLM (T_4). All the experimental lambs were uniformly fed 150 g of standard concentrate mixture containing 12.31% digestible crude protein (DCP) and 70.16% total digestible nutrients (TDN). The leaf fodder constituted about 30% of the total roughage consumed. Daily feed intake was measured and the body weights of the lambs were recorded at fortnightly intervals. At the end of growth trial, digestion trial was conducted to assess the per cent digestibility of the rations. The digestion trial lasted for 15 days, which included 10 days of preliminary and 5 days of collection period. The experimental feed samples (concentrate mixture, bajra straw, bajra hay, leaves of *Gliricidia* and neem) and faeces were analysed as per AOAC (1985) for estimating apparent digestibility of nutrients. The data were statistically analysed.

The yields of grain in plot A and plot B were 1.700 and 1.686 ton / ha respectively. Bajra - Neem + *Gliricidia* agrisilviculture system reduced the grain production only by 0.82 %. The yields of straw in the respective plots were 4.250 and 4.215 ton / ha. Kaushick *et al*. (2000) also reported that the average grain and straw yields of pearl millet was statistically the same as when the crops were grown without trees. In plot C and plot D, bajra cultivated for fodder, yielded 6.894 and 5.580

ton hay per hectare, respectively. The fodder biomass yield of bajra raised in neem plantations were non-significantly reduced to the extent of 19%. However, superior protein content of *Gliricidia* and neem leaves (Table. 1) harvested from plot D were used as supplement for animals fed with straw. Bijalwan (2011) also reported that the reduction in the agricultural produce under agri hortisilviculture system is supplemented by multifarious benefits of woody perennials. The proximate compositions of the ingredients used in the study were presented in the table 1.

The performance of lambs integrated in the agrisilviculture system with or without tree leaves supplementation is presented in the table 2. The weight gain was the least when the lambs were fed with bajra straw and concentrate mixture (T_1). The body weight gain of lambs in T_3 was comparable with T_2 and T_4 which indicated that supplementation of TLM to low protein straw supports equal performance to that of hay as roughage source.

The dry matter intakes, digestibility of nutrients were significantly higher when straw was supplemented with tree leaves mixture (T_3). Similarly, Khandaker *et al.* (1998) reported higher dry matter intake, digestibility and growth rate of sheep, when wheat straw was supplemented with *Sesbania aculata* leaves on dry matter basis by 10 or 20%. Sharma *et al.* (1998) also inferred that nutrient deficiencies of rice straw left over by goats were alleviated through *Leucaena* hay supplementation.

The results of the study indicated that Bajra- Neem+ *Gliricidia* agrisilviculture system could support equal performance in sheep to that of sheep fed with conventional ration containing concentrate mixture and bajra hay.

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Table 1. Proximate compositions of the feed ingredients (% DM basis)

Parameter	Concentrate mixture	Bajra straw	Bajra hay	Neem leaves	Gliricidia leaves
Crude protein	16.34	3.07	8.84	14.24	19.62
Crude fibre	9.36	37.76	27.88	12.83	16.98
Ether extract	2.12	1.13	1.63	2.18	2.23
Nitrogen free extract	62.4	48.27	51.09	61.43	50.61
Total ash	9.78	9.77	10.56	9.32	10.56

Table 2. Performance of sheep integrated in Agrisilviculture system with top feed supplementation for 90 days

Details	T_1	T_2	T_3	T_4
Initial body weight (kg)	8.65±0.55	8.87±0.96	8.65±1.05	8.90±1.04
Final body weight (kg)	12.80±0.45	14.40±0.78	14.05±1.25	14.90±0.86
Total weight gain (kg)	$3.25±0.12^a$	$5.50±0.28^b$	$5.40±0.27^b$	$6.15±0.28^b$
Average daily gain (g)	$36.00±1.53^a$	$61.10±3.20^b$	$59.99±3.00^b$	$66.66±2.72^b$
Dry matter Intake (g/day)	397±17	520±39	527±51	525 ±47
DMI as % of body weight.	$3.70±0.05^a$	$4.46±0.06^b$	$4.66±0.11^b$	$4.41±0.10^b$
Feed conversion ratio	$11.13±0.82^e$	$8.62±1.00^d$	$8.74±0.47^d$	$7.99±1.05^d$
Dry matter digestibility (%)	$49.71±0.99^f$	$60.87±1.55^d$	$55.34±1.02^e$	$60.44±1.35^d$
Crude protein digestibility (%)	$45.24±1.42^c$	$60.41±2.60^b$	$59.83±1.03^b$	$64.68±1.12^a$
Digestible crude protein (%)	$3.04±0.10^c$	$6.41±0.28^b$	$6.07±0.10^b$	$8.26±0.14^a$
Total digestible nutrient (%)	$47.69±0.94^e$	$55.45±1.09^d$	$49.98±0.97^e$	$53.06±1.05^d$

a, b, c values bearing différent superscript in a row differ significantly (P<0.01)
d, e, f values bearing différent superscript in a row differ significantly (P<0.05)

T_1 - *ad libitum* bajra straw, **T_2-** bajra hay, **T_3 -** bajra straw supplemented with leaves of neem and *Gliricidia sepium* in equal proportions, **T_4 -** bajra hay supplemented with leaves of neem and *Gliricidia sepium* in equal proportions along with concentrate mixture.

References

AOAC. 1985. *Official Methods of Analysis*, 11th ed. Association of Agricultural Chemists, Washington, DC, USA.

Bijalwan Arvind 2011. Productivity assessment of agricultural crops in existing agri hortisilvicultural system of mid hills of central western Himalaya, India. *African J. Agric. Res.* 6 (10): 2139-2145.

Kaushick, N., Jagdev Singh and R. A. Kaushick. 2000. Performance of arable crops in the initial years under rainfed agri-silvi horticultural systems in Haryana. *Range Mgmt. & Agroforestry* 21 (2): 170-174.

Khandaker, Z. H., H. Steingars and W. Drochner. 1998. Supplementation of wheat straw with Sesbania on voluntary intake, digestibility and ruminal fermentation in sheep. *Small Rumin. Res.,* 28 (1): 23-29.

Sharma, K., N. Dutta, Q. Z. Hasan and B. Biswal. 1998. Effect of supplementing rice straw left over with *Leucaena leucocephala* hay or concentrate on intake and nutrient utilization in goats. *Indian J. Anim. Nutr.* 15: 222-224.