PERFORMANCE OF SHEEP GRAZING *Brachiaria decumbens, Panicum maximum and Pennisetum purpureum* IN COMBINATION WITH *Gliricidia sepium*

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ABSTRACT

The introduction of forage legumes into grass pastures has generally improved grazing animal production by increasing total edible biomass and nutrient profiles. An experiment was designed to study the performance of sheep grazing Brachiaria decumbens, Panicum maximum and Pennisetum purpureum in combination with Gliricidia sepium. Eighteen paddocks of approximately 0.03 ha were used in the trial. Nine of the paddocks had Gliricidia sepium alley planted in rows 4 m apart and interplanted with 4 rows of either Brachiaria decumbens, Panicum maximum, or Pennisetum purpureum. The other nine paddocks had only the grass species without the Gliricidia sepium. The paddocks were each grazed by 3 sheep. The pure grass stands without the Gliricidia sepium served as controls for the grass species in combination with Gliricidia sepium. The three grasses and their combinations within the alley plots were replicated three times.The animals were grazed continuously for 28 days in the sub plots. Sheep grazing the Gliricidia/Panicum plot had a higher (P < 0.01) growth rate (38 g d-1) than those animals grazing both the Gliricidia/Bracharia (23 g d-1) and Gliricidia/Pennisetum (21 g d-1) plots respectively. There was no significant difference (P > 0.05) between sheep grazing the Gliricidia/Bracharia and Gliricidia/Pennisetum plots. The total dry matter intake of sheep on the Gliricidia/Panicum plot was higher (P < 0.05) (1.33 kg DM d-1) than that of sheep on Gliricidia/Bracharia (0.86 kg DM d-1) and Gliricidia/Pennisetum (0.43 kg DM d-1) plots respectively. The total biomass from the Gliricidia/Bracharia (23 t ha -1)and Gliricidia/Panicum (21 t ha -1) plots respectively were higher (P < 0.01) than the total biomass from the Gliricidia/Pennisetum (13 t ha -1) plot. These results demonstrate that grazing West African dwarf sheep in a Gliricidia sepium/Panicum maximum plot improved their growth rate during dry season when feed supplies are limited. It also underscores the poor performance of animals grazing Pennisetum purpureum in Gliricidia sepium alley plot.

Keywords: Grazing, *Brachairia, Panicum, Pennisetum, Gliricidia*, Sheep

INTRODUCTION

A major problem facing livestock farmers worldwide is how to economically maximize animal production with limited land availability. The situation is even worsened by desertification, leaching and urbanization. The potential to increase ruminant production on these land areas can be realized if innovations in managing rangeland are adopted. Tropical pastures have long been recognized as capable of producing large quantities of forage dry matter; however, individual animal performance is normally less per animal than for similar animals grazing temperate zone forages (Minson and Wilson, 1981; Moore and Mott, 1973). Ellis et al. (1976) reported that grazing behaviour of animals is based on availability and preference for plant species and/or portions of plants. Small ruminant production system in Nigeria is based on indoor feeding, grazing of natural or sown pasture or a combination of these. Grazing of sown pastures however, is limited to universities, research institutions and a few private farms where animal performance can be better evaluated. There have been few grazing trials in the country to determine productivity of pasture, and small ruminant performance. Sumberg (1985) reported an improvement in the nutritional quality of natural fallow regrowth in a Gliricidia sepium alley plot. The planting of browse species such as Gliricidia sepium and Leucaena leucocephala as hedgerows of alleys in native or productive permanent grass plots may overcome the constraint to animal production caused by lack of fodder in the dry season. The presence of legume forages and tree forages in pasture have been generally accepted to improve ruminant productivity in both tropical (Milford, 1967) and temperate (Ulyatt, 1980) pastures. In addition, the extensive root systems of leguminous trees bind soil and so control soil erosion. Trees also reduce the direct effects of wind erosion. This study was therefore undertaken to determine the performance of sheep grazing Brachiaria decumbens, Panicum maximum and Pennisetum purpureum in Gliricidia sepium alley plots.

MATERIALS AND METHODS

Study Area: The study was carried out at the International Livestock Centre for Africa (ILCA), now International Livestock Research Institute (ILRI),

Ibadan, Nigeria. The station is located between latitudes 6°101 and 9° 101 North of the equator and longitudes 3° and 6° East of the Greenwich, at an altitude of 200 m above sea level with annual rainfall averaging 1500 mm. The vegetation in this area is made up of derived guinea savanna and humid forest zone (Ezenwa, 1995). Mixed farming had been practised in the area for several decades.

Experimental Design: For this study, randomised complete block design was used consisting of 18 paddocks of approximately 0.03 ha. Nine of the paddocks had *Gliricidia sepium* alley planted in rows 4 m apart and interplanted with 4 rows of either *Brachiaria decumbens*, *Panicum maximum*, or *Pennisetum purpureum.* The other nine paddocks had only the grass species without the Gliricidia sepium. The pure grass stands without the *Gliricidia sepium* served as controls for the grass species in combination with *Gliricidia sepium*. Each plot was grazed by 3 sheep. The three grass combinations within the alley plots were replicated three times.The animals were grazed continuously for 28 days in the sub plots. Sampling of the grasses and *Gliricidia* was done at the start of grazing (i.e. before grazing), then weekly, and at the end of the grazing period. The weekly sampling was to estimate forage quantity and utilization rates. Grazing was discontinued anytime dry-matter (DM) on offer falls below 2.5 % of total body weight of the grazing animals.

Sheep: 9 - 12 months old sheep were assigned to the various subplots on the basis of initial forage on offer allowing 20 kg DM for 15 kg sheep. Animals were weighed weekly. The animals were able to harvest the upper foliage of the *Gliricidia* tree by leaning on the tender stem. The matured stem were bent down and tied so that the upper foliage became available for grazing. The animals were treated with an anthelminthic before grazing began. They were provided with shade and mineral salt block in each paddock. Dry matter yield on offer was estimated by cutting from three random 0.5 x 0.5 m quadrats for the grass and 1m x 1m quadrats for *Gliricidia* in each paddock. The cutting was done at 10 cm above ground level with a hand shear for grasses and 25 cm above ground level for the trees. Data were analysed using Analysis of Variance

RESULTS

Growth Rate: The growth data of sheep grazing *Brachiaria, Panicum* and *Pennisetum* in *Gliricidia sepium* alley are shown in Figure 1. Sheep grazing the *Gliricidia/Panicum* plot had a higher (P<0.01) growth rate (38 g d-1) than those sheep grazing both *Gliricidia/Brachiaria* (23 g d^{-1}) and *Gliricidia/Pennisetum* (21 g d^{-1}) plots respectively. The mean body weight of sheep grazing *Gliricidia/Brachiaria* plot was not significantly different (P > 0.01) from those grazing the *Gliricidia/Pennisetum* plot.

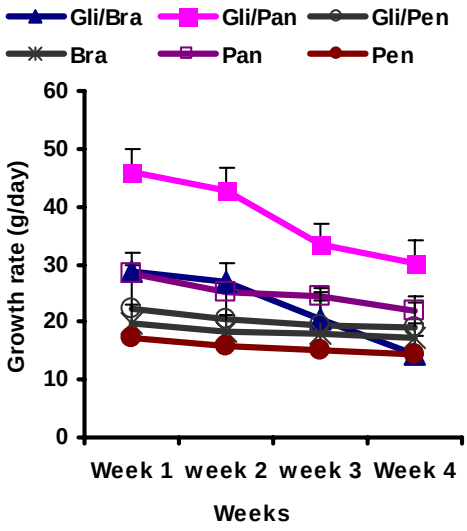

Figure 1: Growth rate of sheep grazing *Brachiaria*, *Panicum* and *Pennisetum* in *Gliricidia* alley.

Total Dry Matter Intake: Total dry matter intake (TDMI) of sheep grazing *Brachiaria, Panicum* and *Pennisetum* in *Gliricidia sepium* alley are summarised in Figure 2. Sheep grazing *Gliricidia/Panicum* plot had a higher (P < 0.05) TDMI (1.33 kg DM d^{-1}) than those grazing *Gliricidia/Pennisetum* (0.43 kg DM d^{-1}) plot but not significantly different (P > 0.05) from sheep grazing *Gliricidia/Brachiaria* (0.86 kg DM d^{-1}) plots. The intake of dry matter of sheep on *Pennisetum/Gliricidia* alley plots was not different (P > 0.05) from those on *Brachiaria/Gliricidia* plots.

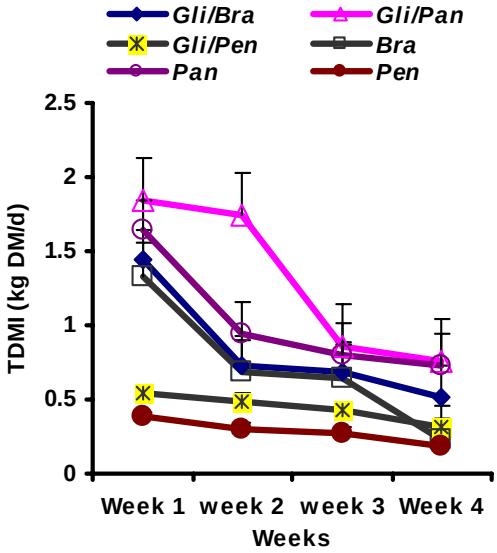

Figure 2: Total dry matter intake of sheep grazing *Brachiaria*, *Panicum* and *Pennisetum* in *Gliricidia* alley

Total Biomass: Total biomass yields of the three grasses in *Gliricidia sepium* plots are shown in Figure 3. The total biomass (TBM) yields from the *Gliricidia/Brachiaria* (23 t ha-1) and Gliricidia/Panicum (22 t ha -1) plots were higher ($P < 0.01$) than the TBM (13 t ha-1) from the *Gliricidia/Pennisetum* plot. There was however, no significant difference ($P > 0.01$) between the TBM yields of *Gliricidia/Brachiaria* and *Gliricidia/Panicum* plots.

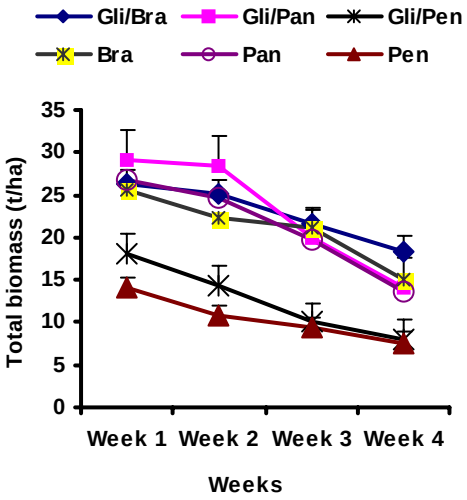

Figure 3: Total biomass yields of *Brachiaria, Panicum* and *Pennisetum* in *Gliricidia* alley plots

DISCUSSION

The effects of supplementing *Gliricidia sepium* to basal grass diets on growth and survival rates of WAD sheep and goats have been reported (ILCA, 1988). In that study, sheep response was twice that of the goats. ILCA (1988) reported a growth rate of 30.3 to 48.9 g/d for male and 25.5 to 37.7 g/d for females sheep fed *Panicum* grass at different levels of *Gliricidia* supplementation. The sheep used in this study were not sexed. The growth rate of 38 g/d observed in *Gliricidia/Panicum* plot is consistent with the report of ILCA (1988).

The introduction of browse trees such as *Gliricidia* and *Leucaena* into planted pasture has contributed substantially to the dietary nutrient profiles of livestock under grazing condition.

The higher TDMI in the *Gliricidia/Panicum* plot could be attributed to preference of *Panicum* grass to the other grass species, which resulted in higher growth rate of sheep. It was observed that yields of total biomass declined as the grazing days increased. This is in agreement with the findings of Mears and Humphreys (1974) who reported reductions in green matter of Kikuyu grass (*Pennisetum clandestinum)* as stocking rate and grazing days increased.

Similarly, Watson and Whiteman (1981) reported a drop in green yields of mixed pastures of *Panicum maximun* and *B. decumbens*. The general decline in live-weight gain as grazing progressed was attributed to reduced nutritive value due to advanced plant maturity (Blunt, 1978), and thus reduction in herbage, especially leaf, on offer (Laredo and Minson, 1973).

Conclusion: Data from this study showed that there is a great potential for improvement in growth rate of sheep grazing planted pasture with *Gliricidia sepium* as hedgerows or alleys. The availability of the browse plants during dry season would have improved the quality of the declining nutritive value of the grass species, and hence reduced the characteristic weight loss during this period. In addition, to weight loss reduction, the use of leguminous browse plant improves soil fertility and structure, provides firewood to the household and acts as a windbreak when planted in the farm. The nutrient recycling from the grazing animals would also improve the nutrient status of the rangland.

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