FORAGING BEHAVIOUR OF HEIFERS, SHEEP AND GOATS IN GRASS–LEGUME CAFETERIA

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ABSTRACT
The paper reports findings of a grazing trial with heifers, sheep and goats in a grass–legume cafeteria involving 45x10 m alternate strips of 18 grasses and 18 legumes. In the first year heifers were grazed. Sheep were introduced in the second year and goats in the third year. The stocking rate was 1.5 ACU/ha. Foraging behaviour of three kinds of animals differed in many respects with grazing and rest durations, choice of species in the forenoon and afternoon and in different seasons. Heifers, by and large, preferred grasses over legumes and browse. Sheep, on the contrary, preferred legumes over grasses and browse. Goats preferred browse and legumes over grasses. These findings serve as base line information in designing a silvopastoral system for mixed herd grazing which low and medium level farmers practice.

KEYWORDS
Heifer, sheep, goat, grazing, behaviour

INTRODUCTION

Grazing animals have specific dietary preferences for certain categories of plants. This is an important consideration in pasture and livestock management especially for selecting a correct mix of pasture species. Experiments with *ad lib* stall feeding show a spectrum of relative palatability which varies as per plant and animal species. The need was therefore, felt for studying foraging behaviour during *in situ* grazing of a vegetation mix. Following this an experiment was carried out with different herd types i.e. heifer, sheep and goats, which were allowed to graze in a pasture cafeteria involving 18 grasses and 18 leguminous species.

MATERIALS AND METHODS

A grass–legume cafeteria was established in 1991, with 45x10 m alternate stands of 18 perennial grass and 18 herbaceous/shrubby legumes. The grasses were : fulkara grass *(Bothriochloa intermedia)*, palisade grass (*Brachiaria brizantha*), signal grass (*B. decumbens*), buffel grass (*Cenchrus ciliaris*), birdwood grass *(C. setigerus*), *Cenchrus* hybrid *(C. ciliaris* x *C. setigerus*), rhodes grass *(Chloris gayana*), fulva grass (*Chrysopogon fulvus*), bermuda grass (*Cynodon dactylon* – two strains), marvel grass (*Dichanthium annulatum*), spear grass (*Heteropogon contortus*), blue panic (*Panicum antidotale*), guinea grass *(P. maximum*), dinanath grass (*Pennisetum pedicellatum*), thin napier grass (*P. polystachyon*), Trihybrid (*Pennisetum americanum x P. purpureum x P. squamulatum*) and nandi grass (*Setaria sphacelata*) and the legumes : forage groundnut–1 (*Arachis glabrata*), forage groundnut–2 (*A. hagenbeckii*), bankulthi (*Atylosia scabaeoides*), pigeonpea (*Cajanus cajan*), butterfly pea *(Clitoria ternatea*), hedge lucerne (*Desmanthus virgatus*), indigofera (*Indigofera suffruticosa*, lablab bean (*Lablab purpureus* cv. JLP–3, JLP–4), horse gram (*Macrotyloma uniflorum*), siratro (*Macroptelium atropurpureum*), phasybean (*M. lathyroides*), mimosa (*Mimosa invisa)*, tinpatia (*Rhynchosia minima*), brazilean stylo (*Stylosanthes guianensis*), caribbean stylo (*S. hamata)*, shrubby stylo (*S. scabra*) along with a stand of subabul (*Leucaena leucocephala*) with understorey of caribbean stylo.

In the first year four cross–bred heifers were grazed @ 1.5 ACU/ha from September 1992 to February 1993. Sheep grazing was introduced in the second year with 12 sheep of Muzaffarnagri breed from August 1993 to February 1994. In the third year 12 goats of Barberi breed were grazed from August 1994 to February 1995. Pasture measurements included: plant population, plant height, total and effective tillers, branches, basal cover, biomass, leaf–stem ratio and weed population. Data on daily movement of animals along with grazing time spent in each grass/legume stand and fortnightly body weights were recorded. The animals were allowed to move about freely in daily 8 h grazing to graze/browse any of the species.

RESULTS

Grazing time spent was minimum in the monsoon and maximum in late winter and spring months (Fig.1). Rest period was apparently related to the availability of nutritious forage. The number of total visits by cattle, sheep and goats was also lowest in the monsoon period as animals devoted more time grazing only highly preferred species.

In the monsoon grazing heifers devoted maximum percentage of grazing time to grasses followed by legumes and annual weeds. Grazing preference shifted to legumes in winter. Sheep spent more time in grazing legumes. Consumption of grasses increased in late winter (December – January) and spring (Feburary–March). Total number of visits to the grass/legume stands was lowest in October–November, when sheep devoted more time grazing only a few highly preferred legumes. Goats spent more time browsing shrubby legumes in monsoon, postmonsoon and winter months. Seasonal preferences are detailed in Table 1. The guinea grass (*Panicum maximum*) was preferred by heifers in the afternoon only.

DISCUSSION

Grazing animals show a strong seasonality in foraging behaviour. The sheep showed a high preference for legumes over grasses. This study corroborates the fact that sheep prefer diets rich in protein and hence a great liking for legumes over grasses (Fig. 1). All the legumes were not preferred in equal measure. Stylos in general show very high preference ranking as compared to other legumes. The caribbean stylo (*S. hamata*) was much preferred by sheep and cattle. The goats preferred shrubby stylo (*S. scabra)* over caribbean stylo. Among grasses too this tendancy was observed. The bermuda grass was highly preferred by all three kinds of animals. Among the three species of *Cenchrus*, birdwood grass (*C. setigerus*) was much preferred by sheep and goat while *Cenchrus* hybrid was preferred by heifers.

Results of foraging behaviour could form the basis for designing the primary production system for single species or mixed herd grazing as the case may be. The results are also indicative of the lean period feeding strategy as the herd types have shown preferences for certain categories of plants during the lean (dry summer) period.

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Table 1
Seasonal Preferences for grasses and legumes in sown pasture

	Monsoon (Aug–Sept)	Postmonsoon (Oct–Nov)	Winter (Dec.–Jan)	Spring (Feb.–March)
		CATTLE		
Grasses	Bermuda–1&2 Dinanath, Spear grass	Bermuda–2&1, Marvel, Signal, Buffel x Birdwood grass hybrid	Bermuda–2&1, Guinea grass, Pennisetum Trispecific hybrid	Fulkara grass, Bermuda–1, Buffel x Birdwood grass hybrid, Birdwood, Buffel grass
Legumes	Caribbean stylo	Caribbean stylo, Subabul,Shrubby stylo	Pigeonpea, Caribbean stylo, Siratro, Subabul, Shrubby stylo	Pigeonpea, Caribbean stylo, Shrubby stylo, Lablab bean, Subabul
		SHEEP		
Grass	Bermuda–1&2, Spear grass, Dinanath	Bermuda–2&1	Signal grass, Bermuda–1&2, Birdwood grass, Buffel	Guinea, Pennisetum Tri Hybrid, Birdwood grass, *Cenchrus* hybrid, Bermuda–2
Legumes	Caribbean stylo, Shrubby stylo, Siratro, Rhynchosia	Caribbean stylo, Shrubby stylo, Subabul, Siratro	Caribbean stylo, Shrubby stylo, Forage groundnut–2, Subabul	Caribbean stylo, Shrubby stylo, Forage groundnut–2, Subabul
		GOAT		
Grasses	Bermuda–1, Dinanath	Bermuda–1 Thin Napier	Bermuda–2, Signal grass, Bermuda–1, Rhodes grass	Bermuda– 1&2, Birdwood grass, Guinea grass, Dinanath
Legumes	**S**hrubby stylo, Caribbean stylo, Siratro	Shrubby stylo, Caribbean stylo, Subabul	Shrubby stylo, Caribbean stylo, Forage groundnut–2, Subabul, Bankulthi	Shrubby stylo, Caribbean stylo, Forage groundnut–2

Figure 1
(a) The duration of grazing and rest for cattle; (b) Time allocation by cattle for grazing; (c) The duration of grazing and rest for sheep; (d) Time allocation by sheep for grazing; (e) The time duration of grazing and rest for goats; (f) Time allocation by goats for grazing.