

SEASONAL CHANGES IN THE PREFERENCE BY CATTLE FOR *MACROPTILIUM ATROPURPUREUM* CV. SIRATRO

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ABSTRACT

*A series of experiments measured changes in the preference rating by cattle for *Macroptilium atropurpureum* cv. Siratro. In the first experiment the proportion of Siratro in the diet selected by cattle grazing *Setaria anceps* cv. Nandi-Siratro pastures continuously stocked at 1.1 and 3.0 animals ha⁻¹ was determined on four contrasting swards. In three indoor cafeteria experiments herbage consumption and eating time were measured when cattle were offered a free choice of various cut herbages.*

In spring and early summer only small quantities of Siratro (mainly leaf) were selected by grazing animals (2-10 per cent) but in autumn Siratro constituted a major part of the diet (62-73 per cent). The quantity eaten was related to the relative palatability at different times of the year but also to the quantity of Siratro on offer.

*Pen feeding studies with *Digitaria decumbens* (pangola) and Siratro demonstrated a preference for pangola rather than Siratro. Autumn grown Siratro was preferred to summer grown Siratro.*

It was concluded that relative palatability of Siratro changes throughout the year and this can influence the proportion of Siratro in mixed swards and also partly account for the relatively high animal production recorded in autumn and winter.

INTRODUCTION

The trailing legume *Macroptilium atropurpureum* cv. Siratro has been shown to adapt and persist under a wide range of tropical and sub-tropical conditions (Jones and Jones 1977) and Siratro-grass pastures are capable of high beef production (Walker 1977). The legume is able to contribute to animal production by fixing atmospheric nitrogen for the associated grass (Vallis 1972) and also by directly supplying the grazing animal with herbage which is relatively high in protein and digestibility (Milford and Minson 1966). There is however some conjecture as to the relative acceptability of this legume to grazing cattle. Although it is not certain whether palatability affects the intake of any given species when it is fed alone (Minson 1969, Marten and Jordan 1974), it is widely accepted that differences in the palatability of species in mixed pastures lead to selective grazing and can be extremely important to the productivity and persistence of a pasture. Since Siratro is generally grown in combination with grasses it is important to know to what extent Siratro is eaten at different times of the year, whether or not Siratro is less palatable than the associated grass and if relative palatability varies throughout the year. A series of experiments was done to obtain information on these topics.

MATERIALS AND METHODS

The experiments were conducted at the C.S.I.R.O. Samford Pasture Research Station in south-east Queensland. Experiment 1 measured the proportion of Siratro in the diets selected by cattle grazing Siratro-*Setaria anceps* cv. Nandi pastures at high and low grazing intensities on the experiment described by Jones (1974). Experiments 2, 3 and 4 measured herbage consumption and consumption time when cattle were offered free choice of various cut herbages.

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Experiment 1—Selection of Siratro by grazing cattle

The setaria-Siratro pastures were continuously stocked with Hereford heifers at 1.11 and 2.96 beasts ha⁻¹. The diet selected during grazing was measured by an additional four oesophageal-fistulated cattle that grazed each pasture on 3 consecutive days in four periods (spring, summer, autumn and winter). These animals were accustomed to grazing setaria/Siratro pastures and grazed an adjacent area of the same mixture for 4 days prior to sampling. On each occasion herbage yields were estimated using cuts with a forage harvester (Shaw *et al.* 1976) and botanical composition estimated by visual observation of sub samples.

Samples of ingested feed were collected via the oesophageal fistulae, were stored at -10°C, and later three samples from three positions within the frozen mass were manually separated into grass and legume components, with allowance being made for the residual fraction of small fragments, using the technique described by Chacon, Stobbs and Haydock (1977). The percentage Siratro in the diet was expressed on a dry matter basis.

Experiment 2—Relative preference of cattle for Siratro and pangola

Leaf was plucked from 6-week regrowth of disease-free pure stands of Siratro in summer and autumn and *Digitaria decumbens* (pangola) in autumn. These samples were immediately frozen and stored at -10°C. The relative preference of cattle for the three feeds was determined by offering herbage at the same time and measuring consumption and consumption time.

Twelve troughs were placed around the perimeter of an open yard, as a randomised complete block design (3 feeds × 4 replicates). Four kilograms of feed were placed in each trough and successive groups of 3 cows, which prior to the experiment had been grazing Rhodes grass and *Kazungula setaria* pastures, were introduced into the yard for 30-minute feeding intervals. Observers recorded the time (secs) each animal spent eating from each trough and consumption of feed was recorded after each group completed its 30-minute feeding period. Feed was replenished and troughs re-randomised at the completion of each 30 minute feeding period. Fifteen cows (5 blocks of 3 cows) sampled the feeds. The procedure was repeated on a second day using a further 15 cows.

Experiments 3 and 4—Preference of cattle for summer and autumn-grown Siratro

The relative preference of cattle for summer and autumn grown Siratro leaf was determined in Experiment 3 using the same Siratro herbage used in Experiment 2. The repeatability of preferences was determined using Siratro leaf plucked from plants grown at a different site one year later (Experiment 4). In both these experiments the two feeds were provided in 8 troughs (4 replicates × 2 feeds) and the feed consumed and the consumption time of 6 blocks of 3 cows (i.e. 18 cows) used to measure relative palatability.

RESULTS

The highest proportion of Siratro was generally eaten by cattle grazing pastures which had both the highest yield and percentage of Siratro (Table 1) and diets in spring contained a low content of Siratro (2-3 per cent) whereas in autumn Siratro constituted 62-73 per cent of the herbage eaten. In autumn diets contained a higher percentage of Siratro than was in the swards whereas in the other seasons diets contained less Siratro, the only exception being cattle grazing the heavily stocked spring swards which were very low yielding (425 kg ha⁻¹ dry green material) and they selected a diet containing a similar proportion of Siratro to that contained in the sward.

Animals in experiment 2 selected autumn grown pangola in preference to both summer or autumn grown Siratro ($P < 0.01$) (Table 2). Observed mean consumption time was highly correlated ($r = 0.89$) with the actual quantity of herbage con-

TABLE 1

Mean percentage *Siratro* offered and selected by cows grazing *Nandi setaria-Siratro* swards at two intensities of grazing in four seasons.

Season	Grazing Intensity (animals ha ⁻¹)	Percentage <i>Siratro</i> In fistulae samples (% DM)	
		In swards (% DGM)†	(% DM)
Spring	1.11	6 (332)‡	3*
	2.96	2 (8)	2
Summer	1.11	22 (418)	10
	2.96	18 (127)	9
Autumn	1.11	51 (nd)	73
	2.96	41 (nd)	62
Winter	1.11	49 (1216)	22
	2.96	28 (652)	7

* Mean of 36 observations (4 animals × 3 days × 3 sub-samples).

† D.G.M. = dry green material.

‡ Figures in parenthesis yield of green material in kg ha⁻¹ (nd = not determined).

sumed and cows spent longer feeding on the pangola herbage ($P < 0.05$). Cows were recorded feeding for a mean of 68 per cent of the available time. Autumn grown *Siratro* in Experiment 2 was selected in preference to summer grown herbage ($P < 0.05$). The pattern of selection was similar on both sampling days.

TABLE 2

Herbage consumed and consumption time by cattle fed 6-week regrowths of *Siratro* leaf harvested in summer and autumn and pangola in autumn.

	Summer-grown <i>Siratro</i>	Autumn-grown <i>Siratro</i>	Autumn-grown pangola	Significance level
<i>Experiment 2</i>				
Dry matter consumed (g cow ⁻¹ 30 min ⁻¹)	495	651	1251	**
Relative intake	100	131	253	
Feeding time (min cow ⁻¹)	4.3	4.9	11.3	*
Relative feeding time	100	114	265	
<i>Experiment 3</i>				
Dry matter consumed (g cow ⁻¹ 30 min ⁻¹)	730	1980		*
Relative intake	100	271		
Feeding time (min cow ⁻¹)	4.2	12.8		**
Relative feeding time	100	307		
<i>Experiment 4</i>				
Dry matter consumed (g cow ⁻¹ 30 min ⁻¹)	837	1380		*
Relative intake	100	165		
Total feeding time (min cow ⁻¹)	5.4	8.1		†
Relative feeding time	100	152		

† $P < 0.10$, * $P < 0.05$, ** $P < 0.01$.

When cows were offered only the two Siratro feeds they showed a marked preference for autumn feed in both Experiments 3 and 4 (Table 2).

DISCUSSION

Siratro grown in association with grass contributes only a small amount to the diet of grazing cattle in spring and early summer. This is partly due to the relatively low yield of the legume compared with grass but was also probably due to lower overall palatability of the legume compared with the grass during this period of the year. This partial rejection of Siratro early in the growing season assisted the build-up of legume until the autumn when cows were shown to have a preference for Siratro leaf. Although cows showed a preference for autumn-grown setaria, under grazing conditions the more favoured parts of setaria are removed with progressive defoliation (Chacon and Stobbs 1976) and the cows preference for Siratro in autumn was probably due to the reduced palatability of the grazed setaria. Further detailed studies of the distribution of Siratro within the sward canopy are required to fully understand animal preferences.

The changes in palatability of Siratro are of practical significance. They could partially account for the persistency of the legume in a wide range of environments. Under lenient grazing Siratro is less palatable in spring and summer and plants are able to develop strong tap roots and grow into large plants. Since Siratro herbage in autumn is highly palatable and relatively high in both protein and digestibility (Milford and Minson 1966) such high quality feed can account for animals continuing to grow well into the winter dry season ('t Mannetje 1973).

The exact reason for the differences in palatability between summer and autumn grown herbage is not known. Siratro is known to release volatile sulphur compounds and a number of these compounds are thought to influence food preferences (Asher and Grundon 1970). Generally dried feed has been used in indoor feeding studies with Siratro and it is likely that such processing of herbage could eliminate the noxious compounds, with respect to palatability factors. Further research could establish the extent to which palatability may be affected by these compounds.

Feeding frozen herbage to groups of animals provides the only means of measuring seasonal changes in palatability. This technique may be criticised because of possible effects of storage on palatability but changes in chemical composition in this study were most probably small because leaf was hand-plucked, which kept mechanical damage to a minimum, material was stored for a minimum of three months prior to feeding, and observation of frozen herbage indicated that the feed was in a well preserved state when presented to animals. Although there is no information on changes in tropical legumes after rapid freezing, experiments with tropical grasses show that dry matter digestibility and voluntary intake are the same as for fresh feed (Minson 1967).

The cafeteria technique provided a reasonably sensitive measure of relative preferences which provided an understanding of specific differences and seasonal changes in palatability. However in the grazing situation the spatial distribution of plant parts is another factor which influences preferential consumption of herbage and field testing with fistulated animals should complement indoor studies.

It is concluded that the palatability of Siratro varies throughout the year depending upon sward composition as well as changes within the plant and it is suggested that persistence of and animal production from Siratro based pastures are partially related to these changes.

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