

# DIET OF ANGORA AND FERAL GOATS IN A EUCALYPTUS POPULNEA SEMI-ARID WOODLAND

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## SUMMARY

The time spent eating different foods by free-ranging angora and feral goats was directly observed on three different pastures and five occasions over 12 months. The diets selected were significantly different except during an autumn flush of forb growth in response to late summer rain. In the absence of fresh herbage angoras ate more low quality grass and feral goats ate more browse and litter. The major resource of these woodlands is the high availability of browse during the dry periods. Angora goats appear to be poorly adapted to exploit this resource.

## INTRODUCTION

Angora goats have been commercially successful in semi-arid areas of Texas, South Africa and Turkey but have not been exploited in similar parts of Australia. Recent interest in goats for control of woody weeds in the semi-arid wooded grasslands of Australia (Wilson *et al.* 1975) led to attempts to run angora goats commercially in western N.S.W. which later proved to be unsuccessful. Diet studies were initiated as part of a study of the management requirements for angora and feral goats in this environment.

## MATERIAL AND METHODS

### The pastures

The trial took place in a Eucalyptus populnea woodland near Cobar, N.S.W. Eucalyptus trees more than 25 m high occurred with a density of 36/ha and their crowns covered 16% of the area. Six thousand small trees and shrubs per ha formed a fairly dense understorey and carried 2.4t leaf DM/ha. The most common species of shrub and their leaf DM (kg/ha) were Acacia aneura (180) Cassia, nemophila (240), Dodonaea viscosa (20), Eremophila mitchellii (730), E. sturtii (260), Geijera parviflora (620) and Myoporum deserti (40). The herbage layer was characterised by the grass Paspalidium constrictum beneath the Eucalyptus canopy whilst Sclerolaena (= Bassia) diacantha (chenopod), dead Stipa variabilis (grass) and Hibiscus spp. (perennial forb) predominated between the trees.

Three contrasting pasture conditions were created by the following treatments which were imposed from March 1975:-

1. "Sheep treatment" grazed at 8 ha/wether (a normal local grazing pressure).
2. "Goat treatment" grazed at 2 ha/doe goat.
3. "Cleared treatment" grazed at 2 ha/doe goat. The clearing involved bulldozing out all shrubs and trees with trunks less than 20 cm diameter.

Figure 1 indicates how herbage and browse DM availability was affected by these treatments. Forage availability declined on the sheep treatment with the low rainfall from October 1974 to September 1975 but increased in response to wetter conditions thereafter; the higher grazing pressure on the goat treatment prevented this recovery. The bulldozing on the cleared treatment destroyed most of the herbage and little recovery occurred until 1976. Acceptable browse

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availability on all the treatments changed principally with its rate of removal by the goats.

Samples of the principal food plants for chemical analysis were hand plucked in order to collect similar parts of plants to those grazed.

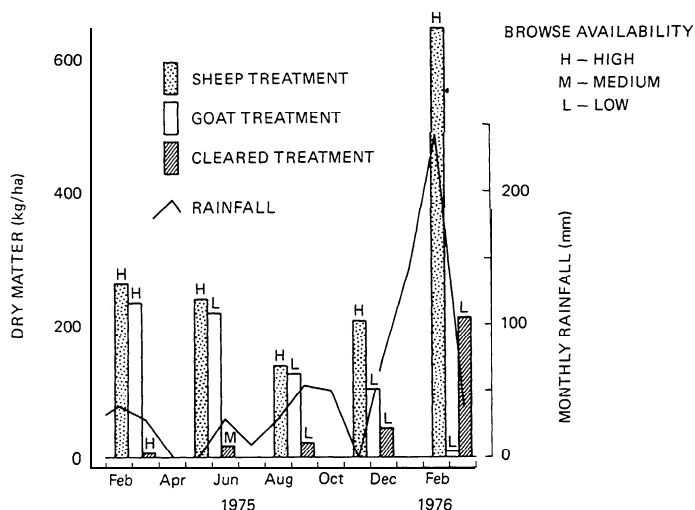


Fig. 1. The availability of herbage and browse DM on each sampling occasion and the monthly rainfall over the experimental period. Browse availability was based on *Acacia aneura*: H, M, L = > 50, 5-50, < 5 kg leaf DM/ha respectively

#### Diet studies

Four feral and four angora goats, which were habituated to the proximity of human beings, were run as separate herds and permanently grazed at the site. Their diet was assessed quarterly from March 1975 to March 1976 (see Table 1). At least three days prior to the sampling day the herd was released into the paddock. On the sampling day the herd was located at dawn and the food eaten at 30 second intervals was recorded. After 10 observations on one animal attention was transferred to the other three in turn. Ten full rotations were completed on each sample day, which usually took until mid-afternoon, i.e. 100 observations were made of each animal on each sampling occasion. The plants which were present at the time of eating in a 2 x 1 m quadrat constructed with its long side centred on the animal's feet were also recorded and these plants are said to be "encountered".

#### RESULTS

On all sampling occasions except those in March 1976 the allocation of grazing time between grass, forbs, browse and litter was significantly different between angoras and ferals (Table 1). However, the differences in March 1975 on the sheep treatment and December 1975 on the goat treatment involved only minor components of the diet.

The Spearman Rank Correlation Coefficient for the species eaten and encountered by the goats is indicated in Table 1. Significant correlation

indicates a similar order of preference or encounter. Only on three out of ten sampling occasions did the angoras and ferals eat the available species in a similar order. On five sampling occasions they failed to encounter the species in a similar order, indicating that their choice of food took them to different strata in the field layer.

Table 1 Percent of total grazing time devoted to eating grass (G), forbs (F), browse (B) and litter (L) by angora and feral goats.  $\chi^2$  tests independence of the data for angoras and ferals. Spearman Rank Correlation Coefficient indicates similarity of the order in which species were eaten and encountered.

	Angoras				Ferals				$\chi^2$	Spearman Rank		
	G	F	B	L	G	F	B	L		Eaten	Encountered	
Sheep treatment												
March 1975	30	31	24	15	31	38	24	7	32.1***	0.1	0	
Sept. 1975	30	10	35	25	13	16	60	11	80.5***	-0.5	0.9***	
Dec. 1975	43	21	23	13	6	26	38	30	155.5***	0	0.3	
March 1976	2	83	5	10	2	81	7	10	1.4 ns	1.0**	0.7**	
Goat treatment												
June 1975	45	28	18	9	23	34	32	11	48.5***	0.6	0.7**	
Sept. 1975	43	3	37	17	27	9	34	30	41.5***	0.3	-0.3	
Dec. 1975	10	9	21	60	17	3	21	59	19.3***	0.6*	0	
March 1976	5	68	17	10	7	64	15	14	5.0 ns	0.4	0.7**	
Cleared treatment												
Dec. 1975	41	11	30	18	6	0	79	15	237.5***	-0.7**	0	
March 1976	2	93	5	0	2	95	3	0	0.1 ns	1.0***	0.7***	

\*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$

A major cause of the differences in species both eaten and encountered was the preference of the angoras for P. constrictum. Consumption of this species took them into the dense shrubberies beneath the Eucalyptus canopy; feral goats tended to avoid this stratum unless they were eating M. deserti. This is illustrated by Table 2 where the seven most commonly eaten plant species are listed with the percent of total grazing time devoted to them from March to December 1975. March 1976 is excluded because on that date both types of goats concentrated on eating the fresh ephemeral forbs, particularly Euphorbia drummondii, which had been induced by the good summer rainfall. Table 1 indicates similar diets for March 1976 on the sheep and cleared treatment but not on the goat treatment, where low herbage availability forced the goats to seek alternative food.

Although the diets of the two types of goats were significantly different, there were also important similarities. All herbaceous species and all but two browse species were eaten to some extent by both types of goat. E. mitchellii and E. sturtii were unacceptable to both angoras and ferals.

Chemical analysis of plant samples indicated that perennial forbs and browse maintained a higher N content than grasses during the dry period up to December 1975. A sample of the analyses is found in Table 2.

## DISCUSSION

Huston *et al.* (1971) showed that angora goats under range conditions in Texas varied seasonally in their use of grass, forbs and browse; nutritional stress in winter resulted in a greater use of browse. Similar nutritional stress in this experiment resulted in an increased intake of low quality grass, although the feral goats concentrated on browse and litter at these times. The high intake of dry grass indicates the surprisingly low acceptability of A. aneura which is an important dry season browse plant in eastern Australia (e.g. McMeniman and Little 1974). It is important to recognise that goats are generalist herbivores not specialist browsers (e.g. Malachek and Leinweber 1972), and that they make their selection at a plant species level. Although angoras have been reported as spending year round more than 50% of their time browsing (Huston *et al.* 1971), they did not do so in this environment.

These data indicate that angora goats are poorly adapted for exploiting the major resource of these woodlands, which is the availability of browse throughout dry seasons. They also confirm a suggestion by Mitchell (1973) derived from South African goat farmers, that angora goats browse less than other breeds.

Table 2 The percent of total grazing time devoted to the seven most commonly eaten plant species between March and December 1975 inclusive (all treatments combined), and their nitrogen content (% DM)

	Angoras	Ferals	% N
Grass: <u>Paspalidium constrictum</u>	12	2	0.7 - 2.3
<u>Stipa variabilis</u>	13	8	0.5 - 0.7
Forbs: <u>Hibiscus spp.</u>	5	4	1.5 - 3.0
<u>Sclerolaena diacantha</u>	4	5	2.0 - 3.5
Browse: <u>Acacia aneura</u>	6	10	2.0 - 2.8
<u>Dodonaea viscosa</u>	6	6	1.9 - 2.4
<u>Myoporum deserti</u>	8	6	1.7 - 2.2

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