

Technote

No. 106

April 1999

Agdex No: 133/92

ISSN No: 0158-2755

Palatability Scoring of Forage Plants in Central Australia

G. Bohning and A. Wilkie, Rangeland Production Officers, Alice Springs

INTRODUCTION

A characteristic of good summer and winter rains in central Australia is the production of many grass and herbage species that become available for grazing cattle. Many pastoralists recognise these species, and through observation and experience, classify them as good, moderate, or useless for cattle. These categories are primarily a reflection of the readiness of stock to eat the feed so that grazing preference is generally synonymous with palatability.

The chemical composition of a plant, including its mineral, protein, and energy content, can be analysed to provide an indicator of its nutritional value. However, this does not describe the overall palatability of each plant species. Palatability is influenced by complex factors including seasonal conditions, stock type and condition, land type, and other plants available to grazing stock at the time. Given this complexity, the palatability of a grass or forb can only be truly verified by direct observation of grazing stock.

Observational studies on plant palatability are tedious. Reference texts often used in Central Australia, such as *The Grasses of Central Australia* (Lazarides 1970) and *The Plants of Western New South Wales* (Cunningham et al. 1992) contain only general information on the palatability and forage value of certain plants. While interpreting seasonal and grazing influences in Central Australia, Campbell (1992) classified several species as palatable or unpalatable based on a local knowledge of plant ecology and the experience of local pastoralists. McColl (1982) compiled a collection of pressed grass specimens for each pastoral station in Central Australia which included information on the palatability and nutritional value of 30 grass species. While it was acknowledged that the palatability ratings applied to each species were "somewhat subjective", no clear description of how these ratings were arrived at was provided. It may be fair to assume that the rankings were arrived at in much the same way as the current survey i.e., "popular opinion" (R. Dance pers. comm).

Although developed for a specific project it is intended that the information presented here could be used wherever a value rating on a particular Central Australian forage plant is required.

METHOD

Members of a survey group individually ranked the palatability of species encountered during the trial. The group consisted of rangeland officers, a stockman/ stock inspector/ botanist and livestock officer, with a combined experience in Central Australia of 75 years. Additionally, four experienced pastoralists provided their estimates on the palatability of all the plants they were familiar with. The palatability of each species was considered in a dry, hayed-off state (low moisture content), and a lush green state (high moisture content). Five classes were offered to the group for their palatability ranking of each species (Table 1).

Table 1. Palatability ranks used in the survey

Palatability Rank	
1	Very low palatability
2	Low palatability
3	Medium palatability
4	High palatability
5	Very high palatability

The results of the survey were tabled and the mean (arithmetic average) and the modal (the value of most frequent occurrence) palatability rank for each species was calculated (Tables 2 and 3).

RESULTS

Table 2. Palatability ranking for common Central Australian grasses in a green and dry state

Common name	Species list	Green			Dry		
		mean	range	mode	mean	range	mode
Mulga grass	<i>Aristida contorta</i>	3	3-4	3	2	1-3	3
Kerosene grass	<i>Aristida holathera</i>	2	1-3	2	2	1-3	1
Wire grass	<i>Aristida inaequiglumis</i>	1	1-2	1	1	1	1
Feathertop wiregrass	<i>Aristida latifolia</i>	1	1-2	1	1	1	1
Barley mitchell grass	<i>Astrebla pectinata</i>	4	3-5	3	3	2-5	2
Green summer grass	<i>Brachiaria piligera</i>	5	5	5	4	3-4	4
Buffel grass	<i>Cenchrus ciliaris</i>	4	2-5	5	3	1-5	3
Golden beard grass	<i>Chrysopogon fallax</i>	4	2-5	4	2	2-3	2
Lemon scented grass	<i>Cymbopogon ambiguus</i>	2	1-4	2	2	1-3	1
Button grass	<i>Dactyloctenium radulans</i>	4	3-5	4	4	2-5	4
Cotton panic grass	<i>Digitaria brownii</i>	4	2-5	5	3	1-5	5
Umbrella grass	<i>Digitaria coenicola</i>	5	4-5	5	4	2-5	5
Oat grass	<i>Enneapogon avenaceus</i>	5	5	5	4	4-5	4
Wolloyoat grass	<i>Enneapogon polyphyllus</i>	5	3-5	5	4	3-5	4
Curly windmill grass	<i>Enteropogon acicularis</i>	4	2-5	5	4	2-5	3
Woollyoat	<i>Enneapogon polyphyllus</i>	2	1-4	2	2	1-3	2
Narrow-leaf neverfail	<i>Eragrostis setifolia</i>	3	1-4	3	3	1-3	3
Knottybutt neverfail	<i>Eragrostis xerophila</i>	2	1-4	2	2	1-3	3
Eight day grass	<i>Fimbristylis dichotoma</i>	4	2-4	4	2	1-3	3
Desert fringe grass	<i>Fimbristylis eremophila</i>	3	2-3	3	2	1-3	1
Bandicoot grass	<i>Monachather paradoxus</i>	4	1-5	5	3	1-5	3
Native millet	<i>Panicum decompositum</i>	4	3-5	5	3	1-4	3
Fairy grass	<i>Sporobolus</i> spp.	3	1-4	4	2	1-3	3
Small-burr grass	<i>Tragus australianus</i>	3	2-5	4	2	1-4	2
Five minute grass	<i>Tripogon loliiformis</i>	4	3-5	5	2	1-4	4
Purple plume grass	<i>Triraphis mollis</i>	2	1-3	3	2	1-2	2

Table 3. Palatability ranking for common central Australian forbs in a green and dry state

Common name	Species list	Green			Dry		
		mean	range	mode	mean	range	mode
Lantern flower	<i>Abutilon</i> sp.	2	1-3	1	1	1-3	1
Creeping saltbush	<i>Atriplex elachophylla</i>	3	1-4	2	2	1-3	1
Saltbush	<i>Atriplex</i> sp.	2	1-4	2	2	1-4	1
Tar vine	<i>Boerhavia</i> spp.	4	3-5	4	2	2-4	2
Bogan flea	<i>Calotis hispidula</i>	2	1-5	1	2	1-2	1
Black crumbweed	<i>Chenopodium melanocarpum</i>	1	1	1	1	1-2	1
Tickweed	<i>Cleome viscosa</i>	1	1-2	1	1	1	1
Ruby saltbush	<i>Enchylaena tomentosa</i>	3	2-4	3	2	1-4	2
Tropical speedwell	<i>Evolvulus alsinoides</i>	3	2-4	2	2	1-4	1
Hairy goodenia	<i>Goodenia lunata</i>	2	1-4	3	1	1-2	1
Little yellow daisy	<i>Rhodanthe charsleyae</i>	1	1-2	2	1	1	1
Yellow daisy	<i>Rhodanthe tietkensis</i>	2	1-3	3	2	1-2	2
Sticky indigo	<i>Indigofera colutea</i>	2	1-3	2	1	1-2	1
Indigo	<i>Indigofera linifolia</i>	3	1-3	3	2	1-2	2
Birdsville indigo	<i>Indigofera linnaei</i>	4	3-5	4	3	2-4	2
Silky cowvine	<i>Ipomoea polymorpha</i>	3	1-5	0a	2	1-4	1
Meuller's peppercrest	<i>Lepidium muelleriferdinandi</i>	3	1-5	4	3	1-4	3
Three wing bluebush	<i>Maireana triptera</i>	3	2-4	3	3	2-3	3
Spiked malvastrum	<i>Malvastrum americanum</i>	2	1-3	1	1	1-2	1
Poached egg daisy	<i>Polycalymma stuartii</i>	1	1-3	1	1	1-2	1
Munyeroo	<i>Portulaca oleracea</i>	4	3-5	4	3	1-5	3
Green pussytail	<i>Ptilotus polystachyus</i>	3	2-4	4	2	1-3	2
Spiny saltbush	<i>Einadia nutans</i>	4	3-4	4	0b	0	0
Buckbush	<i>Salsola kali</i>	3	1-5	3	1	1-2	1
Cartwheel burr	<i>Sclerolaena cornishiana</i>	2	1-3	3	1	1-2	1
Small copperburr	<i>Sclerolaena costata</i>	2	1-3	3	1	1-2	1
Copperburr	<i>Sclerolaena</i> sp.	2	1-4	2	1	1-2	1
Sida	<i>Sida</i> spp.	2	1-3	1	1	1-2	1
Spunk weed	<i>Stenopetalum nutans</i>	3	2-5	2	3	1-4	4
Purple pea (vetch)	<i>Swainsona</i> spp.	3	1-5	4	2	1-3	1
Caltrop	<i>Tribulus terrestris</i>	3	1-5	3	2	1-3	1

^(a) Due to the wide range of palatability scores within this species it was not possible to calculate the mode figure.

^(b) *Einadia nutans* was not ranked by any of the survey participants in a dry state.

DISCUSSION

The survey showed that the palatability of most grasses and forbs decreased as the plant changed from green to dry. As the pasture dries out, the level of nutrients in it drops. What remain are the less digestible complex carbohydrates (cellulose, hemicellulose and pectins) and waste products from metabolism and photosynthesis. (D. Wilson pers. comm).

The survey results indicated that the modal or most common palatability, as against the average palatability rank, was noticeably different in a number of the surveyed species. Within the

grasses in green condition, the modal palatability ranking of eight species was higher than the corresponding average values or mean. The exception was barley mitchell grass, which recorded a higher average palatability ranking compared to the modal value. The same trend was apparent in the dry grasses with twelve species recording different rankings but only seven recording a higher modal than average palatability rank. The results for the forbs showed 14 of the 31 forbs had a different modal than mean palatability ranks when green (eight higher and six lower) and nine (six lower and three higher) when dry.

It must be noted that it was not always the same species that recorded different modal and mean palatability rankings when green and dry. Some species, such as buffel grass (*Cenchrus ciliaris*), with the same modal and mean palatability ranking when dry, had a different "green" modal and mean palatability ranking.

The difference between the mean and the modal palatability ranks could be due to a combination of factors including the different backgrounds of the survey participants and the geographical spread of pastoralists surveyed.

The difficulties in standardising a palatability ranking could reflect the different backgrounds and experiences of the survey participants. Staff of government departments who have research, monitoring, and reporting functions, often view landscapes and individual plants after they have been grazed. They commonly assess the state of the land and available feed by what is left after grazing or in the complete absence of grazing. This potentially gives this group a slightly different view on what plant is palatable than a pastoralist who may often directly observe grazing livestock.

The geographic spread of surveyed pastoralists may also contribute to the range of palatability rankings. The Central Australian pastoral district covers an area of 650 000 km², approximately half of which is used for grazing. With average annual rainfall of 150 mm in the south increasing northwards to 350 mm and different soil and land types throughout the district. The same grass or forb species may have quite different palatabilities depending on the soil type, type and amount of rainfall and other feed available.

Although information is limited on the palatability of individual plants in central Australia and the rangelands of Australia generally, it is a common theme that the palatability of a plant is strongly related to the other feed available (Mitchell 1988). This further demonstrates the effect of different soil types, rainfall patterns and even grazing practices on the perceived palatability of a plant. Examples of species where large ranges in palatability rankings were recorded include buffel grass, cotton panic grass (*Digitaria brownii*) and bandicoot grass (*Monachater paradoxus*).

Although this list is not comprehensive, and exists simply as a guide, the survey should allow government departments and local pastoralists to improve their knowledge on the forage value of selected central Australian plants. This survey documents the accumulated knowledge held by people concerned with palatability of forage plants in Central Australia. It does so using a clearly described method allowing the database to be updated or expanded using this standard format.

REFERENCES

Campbell, G. A. (1992). "Weighted averages ordination for interpreting seasonal and grazing influences upon arid zone pastures". Paper presented at the 7th Australian Rangeland conference, Cobar, N.S.W .

Cunningham, (1992). Plants of Western New South Wales. Soil Conservation Service of N.S.W. Inkata Press, Sydney.

Lazarides, M. (1970). The grasses of central Australia. Australian National University Press, Canberra.

McColl, C. R. and Ulyatt, L. I. (1982). Central Australian range herbarium. Department of Primary Production, Alice Springs.

Mitchell, A. A. (1988). Arid shrublands plants of Western Australia 2nd edn, University of Western Australia Press with the Department of Agriculture Western Australia. Nedlands.

Please visit us on our website at www.primaryindustry.nt.gov.au

While all care has been taken to ensure that information contained in this Technote is true and correct at the time of publication, the Northern Territory of Australia gives no warranty or assurance, and makes no representation as to the accuracy of any information or advice contained in this publication, or that it is suitable for your intended use. No serious, business or investment decisions should be made in reliance on this information without obtaining independent/or professional advice in relation to your particular situation.