THE VALUE OF NATIVE AND NATURALISED PLANTS TO EXTENSIVE GRAZING SYSTEMS – WHOLE ECONOMICS

The Australian rangelands are a complex mosaic of plant species that make up the diet of grazing cattle. As well as being important for livestock nutrition and health, some grazed plants have been found to contain compounds with the ability to change fermentation in the rumen, improving the efficiency of digestion and in some cases reducing methane formation and emission.

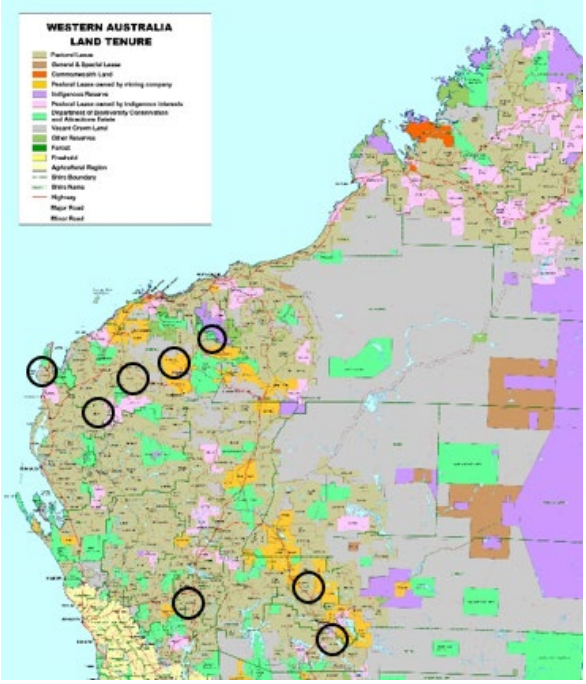
There are existing regional guides available for producers covering plant identification, grazing value and management information. This guide is intended as a supplement to these guides, providing additional information on plant species with the potential to improve animal production, efficiency as well as reduce methane emissions.

Relevant resources include:

Pasture Identification: A field guide for the Pilbara, available via Rangelands NRM

Common plants in the Pilbara of WA, available via DPIRD

Common pasture plants of the Kimberley rangelands of WA, available via DPIRD



NUTRITIONAL VALUE OF PLANTS

Animal performance is largely driven by diet. The value of feed for animal performance is a function of intake – the amount an animal eats – and the nutritive value of the feed.

Energy intake is often low in rangeland diets and so it makes sense that we improve our knowledge of energy available for cattle in different rangeland plant species.

Gas and volatile fatty acid (VFA) production from fermentation are good indicators of the nutritive value of rangeland plant species. VFAs are like fuel for the animal and, in general, the more that are produced from feed the more fuel the animal has at its disposal. These are the main source of energy for the ruminant animal. High levels of VFAs from fermented plants are an indication that the feed is of high value.

TABLE 7. Top performers for fermentability (digestibility) and total production of total volatile fatty acids by rumen microbes

Scientific name	Common name	Life form	Fermentability (Gas mL/g of dry matter)	Volatile fatty acids (mM)
	Average all species		320	79
	Oaten chaff (control)		320	73
1 *Swainsona formosa*	Sturt desert pea	Short-lived herb	380	113
2 **Psydrax latifolia*	Wild Lemon, bush plum	Small tree	380	100
3 *Ipomoea muelleri*	Poison morning Glory	Climbing perennial herb	370	111
4 *Dodonaea lobulata*	Bead Hopbush	Spreading shrub	370	98
5 *Portulaca oleracea*	Purslane	Succulent	370	99
6 *Eremophila maculata subsp. Brevifola*	Fuschia bush	Shrub	340	106
7 *Ptilotus auriculifolius*	Ear-leaved Mulla Mulla	Annual herb	360	100
8 *Cenchrus setiger*	Birdwood Grass	Grass	340	70
9 *Eragrotis eriopoda*	Wollybutt grass	Grass	340	77
10 *Astrebla elemoides*	Hoop Mitchell Grass	Grass	310	86
11 *Acacia xiphophylla*	Snakewood	Tree	300	92

*Previously called *Canthium latifolium*

REDUCING METHANE THROUGH PLANT SELECTION

Many Australian plants contain compounds that can modify rumen fermentation by preventing the growth of specific rumen microbes. Some of these compounds can improve the feed conversion, and others harm it. Some compounds prevent methane formation, and this is a desirable trait. Not only does this result in less greenhouse gas emissions but less feed energy is lost during the break down of feed.

When methane formation is reduced, often the level of propionic acid (a type of volatile fatty acid) is increased and can lead to better animal production. A lower acetate to propionate ratio (A:P) is a good trait and indicates methane suppression may be occurring.

Low ammonia production can be beneficial for animal production and result in less nitrogen is excreted into the environment.

TABLE 8. Top performers for bioactivity on rumen microbes

Scientific name	Common name	Life form	Methane (% of total gas fermented)	A:P	Ammonia (mg/g crude protein)
	Average for all species		19.6	3.2	81
	Oaten chaff (control)		15.0	2.9	43
1 *Eremophila fraseri*	Turpentine bush, Burra	Viscid shrub	2.6	1.9	9
2 *Eremophila glabra*	Emu Bush	Spreading shrub	4.3	1.7	61
3 *Senna artemisioides subsp. oligophylla*	Senna	Spreading shrub	5.6	2.3	-
4 *Eremophila maculata subsp. Brevifola*	Fuschia bush	Diffuse shrub	7.1	2.0	59
5 *Eremophila cuneifolia*	Compact eremophila	Spreading viscid shrub	8.5	2.2	8
6 *Ptilotus exaltatus*	Pink/Tall Mulla Mulla	Erect Annual Herb	10.8	4.0	114
7 *Solanum lasiophyllum*	Flannel Bush	Erect shrub	11.1	3.2	122
8 *Scaevola spinescens*	Currant Bush	Shrub	11.1	2.8	5
9 *Acacia colei*	Acacia	Tree	11.1	3.0	31
10 *Themeda sp. Hamersley*	Kangaroo grass	Grass	16.1	3.5	77

CRUDE PROTEIN

Protein is essential for livestock maintenance and production. The optimal level of crude protein required for growing weaners is around 15 to 18% of the feed.

TABLE 9. Top species for crude protein content

Scientific name	Common name	Life form	Crude protein %
	Average for all species		11
	Oaten chaff (control)		5
1 *Swainsona formosa*	Sturt's Desert Pea	Prostrate herb	22
2 *Maireana sedifolia*	Blue bush	Compact, divaricately branched shrub	22
3 *Ptilotus exaltatus*	Pink/Tall Mulla Mulla Mulla Mulla	Erect Annual Herb	17
4 *Vachellia farnesiana*	False Mimosa	Thicket forming tree	17
5 *Ptilotus auriculifolius*	Ear-leaved mulla mulla	Annual herb	15
6 *Eremophila forrestii*	Wilcox Shrub	Much-branched shrub	15
7 *Rhagodia eremaea*	Rhagodia	Shrub	15
8 *Acacia craspedocarpa*	Hop mulga	Broad-leaved shrub or tree	15
9 *Portulaca oleracea*	Purslane	Succulent	14
10 *Acacia acuminata*	Jam	Tree	14

POTENTIAL OF RANGELAND PASTURES

Pasture improvement is particularly challenging in extensive rangeland environments. Similarly there are limited management options available to encourage selective grazing for beneficial species.

This information is intended to help rangeland producers identify the proportion of nutritive and anti-methanogenic plants occurring on property. Further work may determine geographically specific emissions factors for grazing animals based on regional make-up of the feedbase.