Diversity and variation in nutritive value of plants growing on 2 saline sites in south-western Australia

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Introduction In south-western Australia 10% or 1.8 million ha of the farmed area is affected by dryland salinity and a further 6 million ha are at risk of salinity (NLWRA, 2001). Animal production from saltbush (*Atriplex* spp.)-based pasture systems represents the most likely large-scale opportunity for productive use of saline land in the short to medium term. Feeding saltbush-based pastures as a maintenance feed during the prolonged autumn feed gap typical in Mediterranean-type climates maximises their economic value. The aim of this study was to explore the diversity and nutritive value of plants that typically persist in saltbush-based saltland pastures.

Materials and methods Two highly saline pastures were chosen at Meckering and Tammin in Western Australia. The Meckering site (19 ha) was situated 130 km east of Perth in the 400 mm annual rainfall zone. The Tammin site (12 ha) was situated 180 km east of Perth in the 325 mm annual rainfall zone. Saltbush was established at both sites more than 10 years before this study and no other plants species had been deliberately introduced. Plant diversity and quality were determined along 3 transects within each plot in autumn 2001. Diversity was measured through the Botanal technique (Mannetje & Haydock, 1963), ranking only the herbaceous component. All species were sampled for laboratory analysis of digestibility (pepsin-cellulase digestibility of the organic matter in the dry matter (P-CDOMD, Norman *et al.,* 2004), pepsin-cellulase organic matter digestibility (P-COMD), ash, acid-detergent fibre (ADF %OM) and crude protein (CP) concentrations.

Results The Meckering site contained 31 herbaceous plant species, of which 26 were volunteers and 7 were native to Australia. The Tammin site contained 24 plant species of which 19 were volunteers and 8 were native to Australia. Both sites contained greater botanical diversity than is found in adjacent non-saline areas. Of the feed on offer at the Tammin site, 60% was derived from halophytic shrubs, 38% grasses and 2% from forbs and legumes. Feed on offer at the Meckering site consisted of 43% halophytes, 52% grasses, 4% forbs and 1% legumes. The legumes provided the best quality biomass with both high high digestibility and CP content. There was considerable variation in P-CDOMD within the grasses. Many had sufficient energy for maintenance of an adult sheep however CP content was low. Some forbs and all halophytes accumulated excess salts. Although many of these plants have high P-COMD values, intake is likely to be restricted by salt and, therefore, sheep are unlikely to maintain themselves on these species alone. The halophytes provided a good source of CP.

Table 1 Mean nutritive values of plants collected from 2 saline sites in autumn

	#	P-CDOMD %	OMD %	CP %	ADF %OM	Ash %
Legumes	4	61.8 (0.6)	66.8 (1.7)	14.9 (1.2)	27.3 (2.9)	8.9 (2.0)
Grasses	16	56.8 (1.1)	62.2 (1.1)	4.4 (0.3)	27.8 (1.4)	9.1 (1.1)
Halophytes	16	48.0 (0.9)	64.2 (1.2)	9.2 (0.6)	14.4 (0.9)	25.5 (1.0)
Forbs	5	58.2 (2.1)	72.9 (7.1)	6.1 (0.5)	22.5 (4.4)	17.8 (6.2)

Numbers in parentheses are the s.e. of the means

Conclusions Mature saltbush pastures in Western Australia are rich in diversity. The variation in nutritive value within and between these species is significant. Legumes have the highest feeding value but are least salt-tolerant with a low biomass contribution. Halophytes and grasses were the largest contributors to biomass but the nutritive values of grasses (low digestibility and CP content) and halophytes (high ash content) suggest that sheep need a combination of both to maintain live weight. Given the opportunity to select, mature sheep should maintain live weight during autumn while grazing. The variation in nutritive value implies opportunities to improve the feeding value of saltbush-based pastures through manipulation of species composition and agronomic selection of high value species. A mixed sward of shrubs, grasses, legumes and forbs appears to be the most productive option, since species of different salt tolerance can occupy niches in these very heterogeneous areas. This mix in turn provides the best opportunity for sheep to select for energy, CP and salt.

References

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