ON FARM SHEEP PRODUCTION FROM SALTBUSH PASTURES

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SUMMARY

On a farm at Tambellup, WA, *Atriplex Zentiformis* (Quail brush) pasture was grazed by adult Merino wethers in a grazing system which involved gradual access to larger areas of saltland forage in conjunction with access to pasture paddocks and supplementation with hay and some grain. Sheep maintained liveweight while losing condition. Wool growth rates were also at levels expected for poor quality dry pasture. Saltbush was not a major component of the total feed on offer and did not form a large component of the diet of grazing sheep. However, water intakes were 2 to 4 times higher than expected for sheep grazing dry annual pasture whenever saltbush was available. These results are directly comparable to those found experimentally, where water intake and tissue water accretion masked changes in sheep liveweight.
Keywords: saltbush, on-farm, grazing, management, sheep

INTRODUCTION

Leaf from saltbush species grown in Western Australia (WA) can have a total ash content of up to 38% of dry weight, a large proportion of which is made up of sodium and potassium salts (Warren *et al.* 1990). Intake and animal performance are reduced when sheep are offered a diet of pure saltbush due to this high level of salt, although provision of low salt roughage may allow sheep to maximise intake and maintain weight (Warren *et al.* 1990; Warren and Casson 1992).

Development of management strategies for saltland has been inhibited by the lack of knowledge on how grazing sheep utilise the forage grown on saline land. Nevertheless, many producers consider that saline land revegetated with saltbush is valuable as an autumn feed reserve.

Further development of the n-alkane technique (Dove and Mayes 1991) for estimating pasture intake and diet composition in the field has made the study of forage utilization from saline land more practical. Saltbush are commonly the only green feed available to sheep grazing salt land pasture over the summer/autumn period. This, combined with the fact that the majority of pasture on unimproved saline soils in the agricultural region of WA is comprised of *Hordeum geniculatum* (barley grass), provided the opportunity to utilize the n-alkane technique to obtain a "snap shot" of diet composition over a short period in a relatively simple system.

From discussions with farmers utilizing revegetated saline land, it appears that there are 2 main grazing management strategies for this land, either set stocking over the summer/autumn period or opportunistic grazing throughout the year. Pasture or stubble paddocks are often grazed in conjunction with revegetated saltland pastures and supplements in the form of grain or hay may also be provided.

In this study the use of saltbush pastures was monitored from January to March 1995 at 3 sites on farms in the wheat belt of WA, chosen due to their differing management strategies. Only the results for the site at which sheep were managed most intensively are presented here.

MATERIALS AND METHODS

Sites were selected on 3 farms where low lying land was affected by salinity and on which saltbush had previously been established. Properties were located at Tambellup (s-w) and Wickepin (s-e) in WA. Saltland pastures at the 2 Wickepin sites were set stocked for a 3 to 4 month period over summer; results from these sites will be presented elsewhere. Management of the feed resource at Tambellup involved movement of sheep at the farmer's discretion through various paddocks (Table 1).

Average stocking rates over the whole grazed area were 3.0 to 3.5 sheep/ha during the grazing period. The area of saltbush grazed consisted of a 39 ha paddock which had been fenced into 4 smaller paddocks (4 to 13 ha/paddock) and sown with *Atriplex lentiformis* (Quail brush). These paddocks (saltbush l-4) were then grazed sequentially in conjunction with 1 of 2 larger (65 ha) pasture paddocks. Stock were also given sequential access to each of 4 small paddocks sown to Tagasaste. Supplementary cereal hay, given *ad libitum*, and small amounts of oat grain (< 50 g/sheep.day) was also provided throughout the grazing period.

Water containing low levels of total soluble salts (TSS) was freely available either from a trough (2600 mg/L TSS) or a natural soak (810 mg/L TSS).

The site sown to Quail brush consisted mainly of sandy loam over clay, surrounded by areas of deeper sand into which tagasaste had been sown. Quail brush was sown into the site at 2 different times (saltbush 3 & 4: 1990, saltbush 1 & 2: 1993), with the last sowing being the most successful in terms of saltbush establishment. Average annual rainfall at the site was 410 mm.

Feed on offer (kg dry matter (DM)/ha) and composition of the understorey was estimated prior to grazing by visual scoring (t'Mannetje and Haydock 1963). The amount of dry leaf and fine stem material from shrubs was determined using a modified visual scoring reference bush technique (Andrew *et al.* 1979). Pasture samples were collected prior to grazing for quality analysis by hand harvesting individual species and collecting random sub-samples of supplements. Samples were then freeze dried and analysed for alkane content (Dove and Mayes 199 1) as well as nitrogen, ash, DM digestibility and minerals using standard techniques.

A total of 256 four-year-old Merino wethers were weighed (69.2 ± 0.4 kg) and condition scored (CS) (3.4 ± 0.3) prior to introduction to the study area. Thirty sheep from within this group were selected at random for wool growth measurements. Every 6 weeks during grazing the same 10 cm^2 mid side patch was clipped from these 30 sheep at the skin surface and the wool collected, washed and weighed in order to determine wool growth (Langlands and Wheeler 1968). Fibre diameter was estimated on bulked mid side patch samples for each 6-week period.

Sheep were given access to the first saltbush paddock on 30 January 1995. Once sheep were introduced to saltbush, liveweights and CS from 50 sheep selected at random from within the mob were recorded weekly. Faecal grab samples were also collected on a weekly basis from another 30 randomly selected sheep. These samples were bulked for each collection date and stored frozen until they could be freeze dried. Faeces from weeks 4, 6 and 8 were ground and analysed for n-alkanes.

Water intake was measured weekly for the first 7 weeks of grazing only, using a small, inline water meter installed at the trough. After week 7, sheep also had access to the natural soak.

RESULTS

Feed on offer

Table 1. Components of feed on offer from 10 paddocks and the weeks of grazing by sheep at Tambellup

Paddock	Area (ha)	Weeks grazed	Pasture (kg DM/ha)	Saltbush (kg DM/ha)	Tagasaste (kg DM/ha)	Total feed on offer (kg DM/ha)
Pasture 1	63	1 - 7	1140	0	0	1140
Pasture 2	68	8 - 12	721	0	0	721
Saltbush 1	4	1 - 12	727	253	0	980
Saltbush 2	12	4 - 12	673	95	0	768
Saltbush 3	13	7 - 12	730	47	0	777
Saltbush 4	10	7 - 12	867	9	0	876
Tagasaste 1	5	1 - 7	820	0	120	940
Tagasaste 2	3	4 - 12	820	0	120	940
Tagasaste 3	3	7 - 12	820	0	106	926
Tagasaste 4	3	7 - 12	820	0	120	940

Although saltbush density was between 500 and 2500 plants per hectare, this species did not form a large proportion of the total feed on offer. Less than 26% of the DM available to sheep consisted of saltbush on the 39 ha sown to this species (Table 1). The majority of feed in pasture paddocks was comprised of Barley grass (80%), while in saltbush paddocks, Barley grass (10-35%), Puccinellia (2-40%), Tall wheat grass (0-25%) and Silver grass (5-20%) were the dominant understorey species. In the 4 small paddocks sown to tagasaste, DM production from the bushes was 120 kg/ha. Feed on offer in these small paddocks was therefore also dominated by understorey species (820 kgDM/ha) of similar composition to that in the pasture paddocks.

Liveweight and wool growth

Sheep liveweight did not change significantly ($P< 0.05$), remaining at 70.4 kg (± 0.4) throughout the 12 week grazing period (Figure 1. (a)). However, CS declined from 3.2 (± 0.3 SEM) to 2.0 (± 0.4 se) by the end of the same period (Figure l(b)).

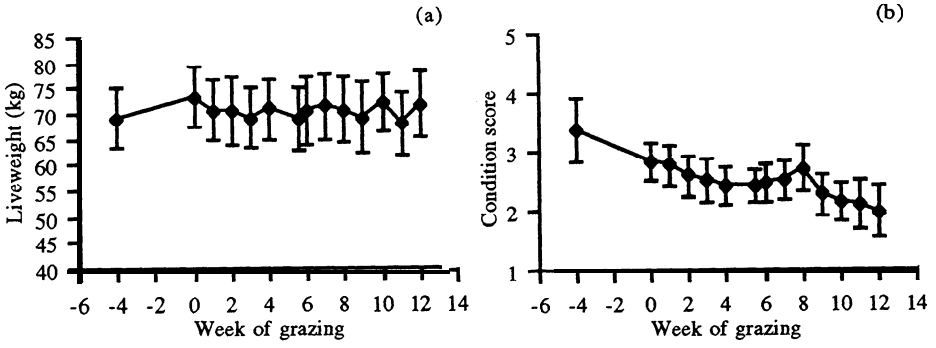

Figure 1. Liveweight (a) and condition score (b) of adult Merino wethers grazing saltland pasture at Wambellup, WA, from January to March 1995

Fibre diameter decreased from 20.3 µm in the first 6 weeks of grazing to 18.9µm in the second 6-week period. There was no significant difference in wool growth ($P>0.05$), with 6.9 (±0.3) g clean wool/m^2.day grown in the first 6 weeks and 6.8 (±0.3) g clean wool/m^2.day grown in the second.

From alkane analysis of diet components and faeces, the maximum proportion of saltbush in the diet was only about 12% (Figure 2). During week 4 of grazing, hay and grain were major components of the diet. Hay became the major dietary component in week 6. Clover was also an important diet component during week 6. Tall wheat grass was a major component of the diet in week 8 when sheep were given access to paddocks containing this feed. Tagasaste was present only in the diet during the first period examined, comprising about 15% of the diet.

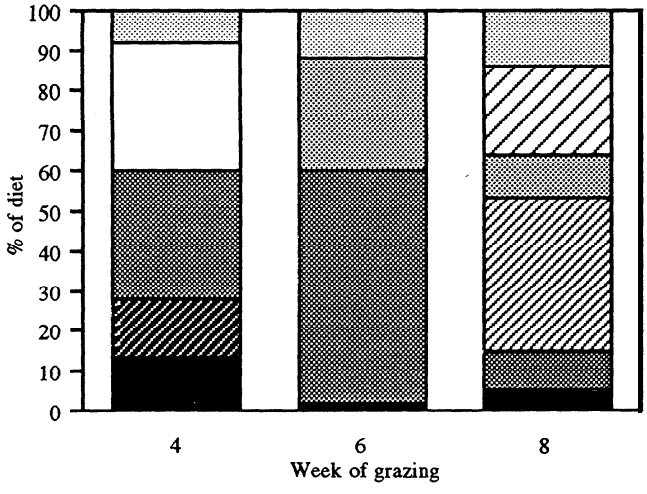

Figure 2. Proportions of pasture species in the diet of sheep during weeks 4, 6 and 8 of grazing
❑ Minor sp ❑]Barley grass ▨ Clover ▨ Tall wheat grass ☐ Grain ▩ Hay ▨ Tagasaste ■ Quail brush

Water intake was highest at times when sheep had access to saltbush and gradually decreased as saltbush was removed from the pasture (Figure 3). Intake levels were above 4l/sheep.day at these times, with sheep drinking up to 8 litres per day when grazing the first saltbush paddock.

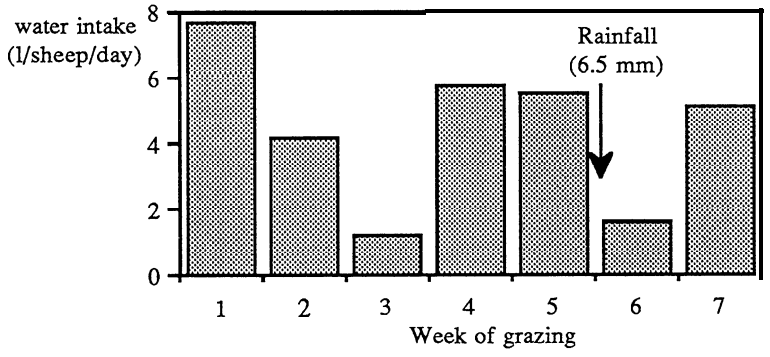

Figure 3. Water intake (L/sheep.day) by adult Merino wethers grazing revegetated saline land

DISCUSSION

Although establishment was reasonable at the Tambellup site, the amount of DM available from saltbush was much less than 0.5 t/ha. This low level of productivity is in line with earlier studies (Warren *et al.* 1995; Morcombe *et al.* 1994) and that observed on farms (S. Vlahos pers corn.).

Concern has been expressed by farmers using saltbush pastures over summer/autumn, both in WA and other states of Australia, at the poor sheep performance measured under experimental conditions at Katanning (Warren and Casson 1994; Warren *et al.* 1995). However, the maintenance of liveweight but loss of condition and low wool growth rates observed at the Tambellup site were consistent with that found at experimental sites.

Although saltbush is eaten by sheep, it appears to provide little value in terms of animal production over dry unimproved pasture. At this site the alkane technique showed that even though there was a relatively small amount of saltbush available, equating to less than 2 % of the total feed on offer, it was a component of the diet. Even 12% of saltbush in the diet appears to have led to increased water intake and possible tissue water retention which masked liveweight losses. Thus farmers observing sheep grazing saltland pastures containing saltbush may see "well rounded" stock, even though they are declining in condition.

This information has implications for the management of revegetated saline land and it is recommended that farmers should either regularly weigh and condition score stock grazing these pastures or assume that pasture based on saltbush is of equivalent value to unimproved pasture and supplement accordingly.

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REFERENCES

ANDREW, M.H., NOBLE, I.R. and LANGE, R.T. (1979). *Aust. Rangel. J.* **1:** 225-31.

DOVE, H. and MAYES, R.W. (1991). *Aust. J. Agric. Res. 42:* 913-52.

LANGLANDS, J.P. and WHEELER, J.L. (1968). *Aust. J. Exp. Agric. and Anim. Husb. 8:* 265-70.

t'MANNETJE, L.T. amd HAYDOCK, K.P. (1963). *J. Br. Grass. Soc.* **18: 268-75.**

MORCOMBE, P.W., YOUNG, G.E. and BOASE, K.A. (1994). *Proc. Aust. Soc. Anim. Prod.* **20:** *3* 13-*16.*

WARREN, B.E., BUNNY, C.J. and BRYANT, E.R. (1990). *Proc. Aust. Soc. Anim. Prod.* **18: 424-27.**

WARREN, B. and CASSON, T. (1992). *Proc. Aust. Soc. Anim. Prod.* **19: 237.**

WARREN, B.E. and CASSON, T. (1994). Proceedings of the 3rd National Workshop on Productive Use of Saline Land, Echuca, Vic., pp. 125-9.

WARREN, B., CASSON, T. and BARRETT-LENNARD, E. (1995). *J. of Agric., W.A. 36: 24-7.*