

Effect of four fertiliser regimes on the persistence of perennial native grasses

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Introduction It is often said that too much fertiliser will cause native grasses to die out but is it the fertiliser that causes such losses? Perennial native grass pastures will generally respond to fertiliser, provided they contain a responsive legume. This is particularly true of those with a significant component of wallaby grass (*Austrodanthonia* spp), microlaena (*Microlaena stipoides*) or redgrass (*Bothriochloa macra*). Garden *et al.* (2001), using wether sheep, suggests annual grasses reduce wallaby grass when higher rates of fertiliser are used. This paper provides data on the persistence of several native grasses following 12 years of fertiliser application at several different rates with a different livestock enterprise.

Materials and methods The work was carried out on a 66 ha site in the central tablelands of NSW (altitude 900m and mean annual rainfall 795mm) from 1995 to 2006. The soils are shallow, acidic (pH ca 4.2) and shale derived. Soil phosphorus and sulphur levels were initially very low. The pastures are dominated by wallaby grass, with microlaena, wheat grass (*Elymus scaber*), some perennial ryegrass, subterranean clover, *Vulpia* spp and soft brome (*Bromus mollis*). The paddocks were set stocked to enable economic data to be collected from the spring lambing, 2nd cross, prime lamb enterprise. Stocking rates were raised on all annually fertilised paddocks to utilise the extra feed grown, yet maintain high lamb growth rates.

The "control" paddock received 125 kg/ha single superphosphate (8.6% P & 11% S) every third year in line with common practice and carried 5 ewes/ha. Two other paddocks received high fertiliser inputs of either water-soluble, single superphosphate (SSP) or reactive phosphate rock (RPR)-420 kg/ha SSP or 300 kg/ha RPR & gypsum, which provided equal amounts of S & P in 1995 and 250 kg/ha/year SSP or RPR/sulphur blend in 1996 and 1997. For the last nine years, 180 kg/ha of the relevant products (based on 2 kg P/ewe carried) was applied. Two other paddocks received either 140 kg/ha SSP or 100 kg/ha RPR annually and one other paddock only received this rate of RPR only for the first three years. This paddock has been "cell grazed" with no fertiliser for the last 10 years.

Before the trial commenced, permanent transect lines were established in each paddock to monitor species presence and persistence at ten 1m² fixed quadrats using a 10 cm square mesh grid (1000 points/paddock). This has been repeated annually. In addition, pasture composition is recorded every spring and autumn using the "end-point stick" method.

Results and discussion Species composition changed with the seasons and climatic conditions and end point data showed legumes in spring increased from 5% in 1995 to 25% with all high fertiliser rates, while the 1 year in 3 and cell grazed paddocks only rose to 13% legume. Annual grasses in spring remained relatively stable at 10% vulpia was more prevalent in the 1 year in 3 and cell grazed paddocks, whereas soft brome dominated in the high and annual input paddocks.

The % basal presence data in Table 1 shows sown perennials and microlaena generally declined in all paddocks due to very dry conditions in 2006. Wallaby grass increased in all paddocks except the annual input ones where a sheep camp effects and excess competition from ryegrass adversely affected the persistence. Total native perennial counts rose 65% in the high input paddocks but only 23% and 13% respectively in the 1 in 3 and Cell paddocks

Table 1 Perennial Grass Persistence (% basal presence) over 12 years—Comparison of Four Fertiliser Regimes.

Fertiliser Regime	High Input		Annual Input		1 in 3 Input		Cell (nil for 10 yrs)	
Species / Year	1995	2006	1995	2006	1995	2006	1995	2006
Austrodanthonia	321	620	486	470	427	508	318	410
Microlaena	75	22	2	2	11	23	148	133
Elymus	10	5	15	4	3	12	18	6
Sown/Naturalised	118	54	80	55	130	39	25	18

Conclusions These results show that wallaby grass responds positively to fertiliser which is not detrimental even at high rates, provided an appropriate enterprise and grazing strategy is used to control and utilise the growth of annuals.

References

- Langford *et al* (2004). Managing native pastures for agriculture and conservation. NSW DPI ISBN: 0 7347 1620 6.
Garden, D. *et al* (2001). Influence of soils and management on composition of native pastures. Aust J Ag Res 52, 925-36