Effect of Four Fertiliser Regimes on the Persistence of Perennial Native Grasses

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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 1m^2 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 fertilisen whichis not detrimental euen at higt rates , provided an appropriabe enterprise and graxing srrategy B used to controb and utrlise 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