

Summer dormant temperate grasses are productive and persistent in the medium - low rainfall cropping region of New South Wales

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Abstract

Kasbah cocksfoot (*Dactylis glomerata* L.) and Atlas PG phalaris (*Phalaris aquatica* L.) have emerged as promising temperate grasses for the medium-low rainfall wheat-belt area of southern NSW following evaluation at Barmedman. Kasbah in particular showed superior production and persistence in the three year evaluation, two years of which were significantly drier than average. Winter production of Kasbah was superior in all three years, a trait of high value in areas where winter feed gaps frequently occur. Atlas PG exhibited production and persistence similar to Kasbah in two of the three years, but productivity declined sharply in the final year. The productivity and persistence of Kasbah and Atlas PG was superior to intermediate and summer active varieties of the same species sown at this site. Summer dormancy appears to be a mechanism that enables plants to avoid the yearly summer drought experienced in the medium-low rainfall wheat-belt areas of NSW.

Keywords

Summer dormant, Kasbah, Atlas PG, persistence

Introduction

In the past decade, cereal cropping has been the dominant enterprise in the medium-low rainfall (350-500mm) zone of NSW. However in recent years, declining returns from cropping, erratic rainfall and the increased return from beef and sheep meat products has resulted in many producers reducing the area of their cropping operations and re-entering the beef and sheep industry. Due to the past heavy emphasis on cropping, pastures in these areas consist predominately of volunteer annual species which provide feed of variable quality for 4-6 months of the year (autumn – spring). Consequently there is a considerable period of the year where livestock are grazing residues of low quality and production is less than what could potentially be achieved. Lucerne (*Medicago sativa* L.) has been used as part of the cropping rotation by many producers. There are however, some inherent problems with wide scale use of lucerne in this region. Lucerne requires careful grazing management for persistence, it produces very little herbage through winter and it is not well adapted to low pH soils which are widespread in many areas of NSW (McDonald *et al.* 2003). Perennial grasses have the potential to increase year-round pasture production and enhance animal productivity as well as offer significant environmental benefits. Producers have been reluctant sow perennial grasses due to poor persistence of previously used varieties. Until relatively recently, the main varieties of perennial grasses available exhibited low to moderate levels of summer dormancy. Perennial grasses have been developed which are very strongly summer dormant and are potentially better suited to the medium-low rainfall area as they are better able to withstand frequent droughts common in this region. An experiment was designed to evaluate the production and persistence of a range of perennial grasses in the medium-low rainfall region of NSW.

Materials and methods

The summer dormant perennial grasses Kasbah cocksfoot (6 kg/ha), Atlas PG phalaris (6 kg/ha) and Resolute MaxP (16 kg/ha) tall fescue (*Festuca arundinacea* L.) were sown in a randomised block design replicated four times (plots 2m x 4m) at Barmedman (147°26'E, 34°09'S), NSW in May 2003. Less summer dormant varieties, Currie cocksfoot, Sirolan phalaris and AU Triumph tall fescue were included

as comparative controls. Herbage production of sown and other species was assessed seasonally using calibrated visual assessment with persistence measured via basal and frequency counts on an annual basis using a 1m² fixed quadrat.

Average annual rainfall at the site is 480 mm. Historical data indicates that summer rainfall accounts for approximately 30% of annual total, but this can vary widely as it is usually a result of summer storms. Soil was a red sandy loam with pH_{CaCl2} of 4.8.

Results

Annual rainfall in two of three years at the site was well below average. Only 280 mm and 300 mm were recorded in 2003 and 2004 respectively with less than 30 mm recorded in either summer. Overall the summer dormant cultivars evaluated were more productive and persistent than the less summer dormant controls (Figure 1a and 1b). Kasbah cocksfoot was the most productive and persistent of the grasses evaluated. The performance of Atlas PG was similar to Kasbah over the first two years of the experiment but declined in the third year as a result of lower plant numbers. Resolute MaxP tall fescue was more persistent than the summer active AU Triumph, but its production and persistence was inferior to both Kasbah and Atlas PG. As perennial density declined the gaps were colonised by annual species, predominately subterranean clover (*Trifolium subterraneum* L.), capeweed (*Arctotheca calendula* L.) and silver grass (*Vulpia* spp.)

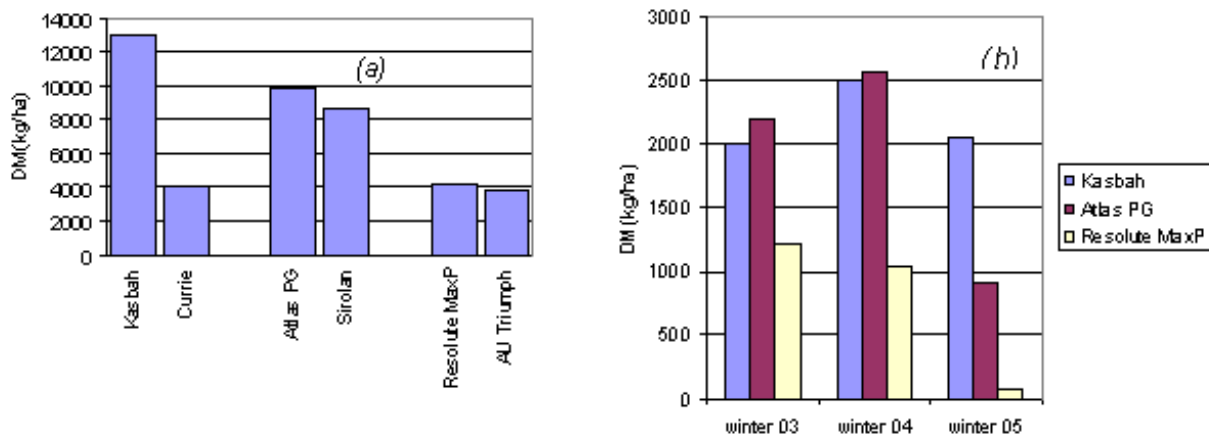


Figure 1. Cumulative herbage production (kgDM/ha) (a) and plant frequency (b) of six sown perennial grasses over three years at Barmedman, NSW (LSD (5%) for DM = 1499, LSD(5%) for frequency = 13.4, 20.6 and 11.8 for 2003, 2004 and 2005 respectively).

Winter production of Kasbah in particular was superior over the three years (>2t/ha) (Table 1). Atlas PG exhibited similar winter production in the first two years, but produced less than 1t/ha in the third year due to declining plant density. Resolute MaxP winter production was significantly less than both Kasbah and Atlas PG in all years.

Table 1. Winter herbage production (kg DM/ha) of several perennial grasses over three years at Barmedman NSW (numbers within columns followed by the same letter are not significantly different)

	2003	2004	2005
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Kasbah	1991 ^{bc}	2496 ^c	2032 ^c
Currie	2026 ^{bc}	571 ^{ab}	0 ^a
Atlas PG	2156 ^{bc}	2574 ^c	930 ^b
Sirolan	2473 ^c	2253 ^c	723 ^b
Resolute MaxP	1218 ^a	1064 ^b	130 ^a
AU Triumph	1650 ^{ab}	209 ^a	80 ^a
LSD (5%)	686	776	442

Conclusion

Summer dormant perennial grasses have considerable potential in the medium-low rainfall area of NSW. Compared to the more summer active cultivars, the summer dormant cultivars were more productive and more persistent over time. Summer dormancy is a mechanism that assists plants in surviving the frequent droughts encountered in the area. Kasbah cocksfoot in particular exhibited high annual and winter production. Feed deficits are common in the autumn-winter period in southern Australia. The ability of Kasbah to provide high quality feed at this time of year could potentially increase animal productivity and reduce reliance on supplementary feeding.

References

McDonald W, Nikandrow A, Bishop A, Lattimore M, Gardner P, Williams R and Hyson L (2003). Lucerne for pasture and fodder. Agfact P2.2.5, NSW Agriculture.