

The interaction of management with botanical composition of irrigated grass-legume pasture mixtures in the Intermountain West USA

J.W. MacAdam, T.C. Griggs and G.J. Mileski

Utah State University, Logan, Utah 84322-4820 U.S.A, Email: jenmac@cc.usu.edu

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Introduction Beef produced on semi-arid range and milk produced in confinement are the main agricultural commodities in the semi-arid western USA. The studies reported here were undertaken to determine the suitability of irrigated pasture as an alternative to traditional beef and dairy production systems. The clipping and grazing studies were not run concurrently or within the same field, but were successive steps in selecting mixtures best-suited for rotational stocking of irrigated pastures in the Intermountain West. Summaries of productivity data have been reported elsewhere (MacAdam, 2002; MacAdam et al., 2004).

Materials and methods Treatments consisted of binary mixtures of introduced grasses (*Bromus riparius*, *Dactylis glomerata*, *Festuca arundinacea*, or *Lolium perenne*) and legumes (*Lotus corniculatus* or *Trifolium repens*) under clipping or grazing. Clipped plots were 1.5 x 6 m, and were fertilised with 15-5-10 NPK at each harvest. Grazed paddocks were 15 x 22 m and were fertilised with 56 kg/ha N in spring. Treatments were either managed as for season-long grazing, or a hay crop was taken followed by clipping or grazing. Paddocks were grazed or harvested according to regrowth rate of each mixture, so harvest number per year varied among treatments. *L. perenne* plots were harvested at 15 cm down to 4 cm. *B. riparius*, *D. glomerata*, and *F. arundinacea* plots were harvested at 25 cm down to 8 cm. Treatments in the clipping study were replicated five times, and treatments in the grazing study were replicated four times.

Results Percentage *T. repens* was always higher than that of *L. corniculatus* in the clipping study. In the grazing study, percentage *L. corniculatus* was always higher than that of *T. repens*, regardless of management, and highest when a hay crop was taken prior to grazing. Management had no effect on percentage *T. repens* under grazing. *L. perenne* mixtures always had the highest legume percentage, and under grazing, *D. glomerata* always had the lowest. Under grazing, *F. arundinacea* and *B. riparius* had similar percentages of legumes.

Table 1 Percentage legume of clipped (1997-1999) or grazed (2001-2003) mixtures determined by NIRS

Season-long clipping					Hay crop followed by clipping				
Clipped	<i>L.c.</i>	s.e.m.	<i>T.r.</i>	s.e.m.	Clipped	<i>L.c.</i>	s.e.m.	<i>T.r.</i>	s.e.m.
<i>B. r.</i>	12.8	3.05	18.8	3.29	<i>B. r.</i>	16.8	2.60	25.0	7.88
<i>D. g.</i>	8.2	3.03	14.1	1.99	<i>D. g.</i>	9.5	2.15	12.6	2.11
<i>F. a.</i>	6.7	1.91	17.6	3.27	<i>F. a.</i>	9.3	1.57	19.0	3.86
<i>L. p.</i>	35.5	3.99	55.2	6.03	<i>L. p.</i>	43.7	4.00	57.1	4.56

Season-long rotational stocking					Hay crop followed by rotational stocking				
Grazed	<i>L.c.</i>	s.e.m.	<i>T.r.</i>	s.e.m.	Grazed	<i>L.c.</i>	s.e.m.	<i>T.r.</i>	s.e.m.
<i>B. r.</i>	17.3	2.77	8.2	2.20	<i>B. r.</i>	36.8	4.04	7.5	1.52
<i>D. g.</i>	4.1	1.20	0.8	0.56	<i>D. g.</i>	12.7	2.06	0.0	0.31
<i>F. a.</i>	17.3	1.48	8.2	1.67	<i>F. a.</i>	37.4	2.35	5.4	1.39
<i>L. p.</i>	44.3	2.33	32.3	5.27	<i>L. p.</i>	59.9	1.68	28.6	5.34

Conclusions In the western U.S.A., mixtures of *L. perenne* and *T. repens* are short-lived and have resulted in pasture bloat even when bloat preventatives were used. *L. corniculatus* is non-bloating, established readily in our high pH soils, and was retained well under rotational stocking management. Utilisation was comparable to mixtures containing *T. repens*. *L. corniculatus* is tolerant of the periodically dry soils of irrigated pastures, and is recommended as the legume component of irrigated pasture mixtures for the semi-arid western USA.

References

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