

LAMB PERFORMANCE ON RUSSIAN WILDRYE AND RUSSIAN WILDRYE-LEGUME MIXTURES

David W. Koch and Limei Yun

Department of Plant, Soil and Insect Sciences, Larami, Wyoming 82071 USA

ABSTRACT

Alfalfa, sainfoin and cicer milkvetch provided relatively little increase in forage production, however, they improved forage palatability and quality, increasing total forage consumption. Over years 3 through 5 of the stand, lamb production per hectare was more than doubled with alfalfa and sainfoin, compared with Russian wildrye (RWR) alone. Cicer milkvetch was relatively slow to establish and did not contribute significantly to mixture quality until Year 5. Alfalfa was more competitive to RWR than sainfoin.

KEYWORDS

Alfalfa, sainfoin, cicer milkvetch, pasture, forage quality, crude protein, in vitro digestibility, forage production, forage utilization

INTRODUCTION

Suggested advantages of seeding legumes with a perennial grass are: increased production, improved quality and palatability of forage and improved performance of livestock. Legumes differ in seeding vigor and some may compete excessively with grasses such as Russian wildrye. Drilling grass and legume in alternate rows or in opposite directions has been recommended for reducing competition and helping to insure establishment of the grass.

METHODS

A 2.8-ha field at the Archer Research and Extension Center was seeded to replicated blocks of 'Bozoisky' Russian wildrye (*Psathyrostachys juncea* [Fisch.] Nevski) (RWR) alone in 50-cm rows and in mixtures with either 'Spredor II' alfalfa (*Medicago sativa* L.), 'Monarch' cicer milkvetch (*Astragalus cicer* L.), or 'Remont' sainfoin (*Onobrychis viciifolia* Scop.). Legume were seeded in 50-cm rows, but perpendicular to the grass rows. Seeding rates (PLS) were: RWR, 5.6 kg ha⁻²; alfalfa, 1.7 kg⁻²; cicer milkvetch, 4.5 kg⁻²; and sainfoin, 24.6 kg ha⁻². The site is at 1820 m elevation and receives an average 40 cm of precipitation annually. All legumes were inoculated with appropriate inoculum. Cicer milkvetch seed was scarified. All blocks were seeded on December 10, 1990. The experimental design was a randomized complete block with three replications.

Quadrats (1/4 m²) of legumes and grasses were clipped before and after grazing in 1993, 1994 and 1995. Additionally, two exclosures were placed in each grazed block and sampled before and after grazing. Samples were separated into grass and legume components, dry matter yield was determined and samples processed for forage quality analysis.

On each main plot 8 lambs, previously accustomed to grass pasture,

were introduced June 14-21, when alfalfa was in early bloom, sainfoin was at mid-bloom and cicer milkvetch was in late-bud stage. Stocking rate was based on utilization at the 60 to 70% level overall over 7 to 9 days for each grazed block. At the end of grazing, July 5-12, 4 ft² samples within exclosures and adjacent grazed areas were clipped and species separated in order to determine forage quality of ungrazed forage and utilization by species. Samples were processed and lab analyzed for crude protein, in vitro dry matter digestibility, acid-detergent fiber and neutral-detergent fiber.

RESULTS AND DISCUSSION

Sainfoin significantly increased forage availability. It was less competitive toward Russian wildrye than alfalfa. Russian wildrye continued to increase in dry matter during the grazing period, while alfalfa and sainfoin declined (data not shown). Alfalfa-RWR and sainfoin-RWR mixtures improved utilization over pure stands of RWR. Lambs consumed more grass in the sainfoin-RWR, compared to the alfalfa-RWR mixture (Table 1). Legume utilization was greater than that of grass. Order of palatability of legumes was cicer milkvetch, sainfoin and alfalfa, indicated by 96, 91 and 85% utilization, respectively. Average utilization of RWR was 46%. At the initiation of grazing in 1994, alfalfa was 10-20% bloomed, sainfoin as 50-70% bloomed and cicer milkvetch was in the late bud stage of maturity.

Forage quality (1994 data), measured by crude protein and in vitro dry matter digestibility (IVDMD) was higher with legumes than with RWR and therefore, the weighted average quality of mixtures was higher than the grass alone. The decline in forage quality over the duration of grazing was, from greatest to least: RWR > RWR-sainfoin > RWR-alfalfa > RWR-milkvetch. Sainfoin was the fastest and cicer milkvetch the slowest-maturing legume. Legumes declined relatively less over the 26-day grazing period (June 9 to July 5) than Russian wildrye. Average daily gain (ADG) of lambs was greatest with RWR-sainfoin and RWR-alfalfa mixtures in 1992, 1993 and 1994 (Table 3). These results correspond with the relative difference in forage quality and the relative utilization of forages. With each succeeding year, cicer milkvetch contributed greater amounts to the total forage of the RWR-milkvetch mixture. Not until 1995, did cicer milkvetch produce an increase in lamb ADG and in lamb gain per hectare. Over the three-year period, alfalfa and sainfoin more than doubled the amount of lamb produced per hectare.

Table 1

Forage availability (dry matter) in year four (1994) and utilization by lambs of Russian wildrye (RWR) and RWR-legume mixtures. Means are averages of three replications.

Grass or mixture	Forage availability			Forage utilization		
	Grass	Legume	Total	Grass	Legume	Total
	kg ha ⁻² , dry matter					
RWR	1208	-	1208	555	-	555
RWR-Alfalfa	743	659	1402	361	419	780
RWR-Sainfoin	929	590	1518	684	245	929
RWR-Milkvetch	1004	197	1291	421	148	568
LSD _{.05}	193	123	229	202	188	230

Table 2

Forage quality of RWR and RWR-legume mixtures in 1994. (averages of three replications.)

Grass or mixture	Crude protein			In vitro digestibility		
	Grass	Legume	Weighted average	Grass	Legume	Weighted average
	kg kg ⁻² , d.m. basis					
	June 9, 1994					
RWR	98	-	98	629	-	629
RWR-Alfalfa	80	173	126	547	667	606
RWR-Sainfoin	74	136	103	561	609	583
RWR-Milkvetch	60	180	93	567	674	588
	July 5, 1994					
RWR	67	-	67	499	-	499
RWR-Alfalfa	62	148	99	516	604	555
RWR-Sainfoin	57	108	67	472	570	493
RWR-Milkvetch	60	156	71	533	666	548

Table 3

Lamb performance on RWR and RWR-legume mixtures, 1993-95. Means are averages of eight animals per treatment and three replications.

	1993		1994		1995	
	ADG	Gain/ha	ADG	Gain/ha	ADG	Gain/ha
	----- kg -----					
RWR	0.109	94	0.155	86	0.145	119
RWR-Alfalfa	0.305	259	0.250	141	0.264	262
RWR-Sainfoin	0.314	267	0.255	143	0.232	232
RWR-Milkvetch	0.118	96	0.173	108	0.214	212
LSD _{.05}	0.059	62	0.145	49	0.063	66