Sward Characteristics of Dairy Cows Grazed at Two Stocking Rates in Agro-pastoral Transitional Zone of Northern China

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Key words : dairy cow , grazing , stocking rate , sward characteristics , northern China

Introduction Studies on grazing pastures are limited and the mechanisms through which the dairy cows affect the sward characteristics associated with different stocking rates are poorly understood in North China .

Materials and methods The experimental site was located at the Guyuan Grassland Research Station of China Agriculture University , Hebei , northern China (41°46′N , 115°40′E , 1400 m a .s .l .) . The pasture was established in 2003 with a seed mixture of smooth bromegrass (SB) , western wheatgrass (WW) and Russian wild ryegrass (RW) and alfalfa (AL) . The stocking rate for lax grazing (LG) and moderate grazing (MG) was 2 .6 and 3 .8 cows ha^{-1} respectively . A simplified rotational grazing system was applied , with 3d grazing periods followed by 18d resting periods . Three quadrats were chosen at random in each plot at the end of each grazing cycle to investigate changes in vegetation cover , plant density , above-ground and root biomass , and botanical composition . Leaf and stem masses were measured on an individual plant basis .

Results and discussion Annual mean forage standing yield under LG was 7 .28% higher than that under MG . The proportion of AL and SB was consistently higher under LG than that under MG , while the percentage of WW and RW was slightly higher under MG . Mean canopy cover of all species in LG was slightly higher ($p > 0.05$) than that of MG . The change of leaf/stem ratio differed among stocking rates and growth stages . Mean leaf/stem ratio of all species was slightly higher ($p > 0.05$) in MG than those in LG . Leaf/stem ratio of all component species except alfalfa increased . The root biomass significantly decreased with the increased stocking rate (Table 1) . The total root biomass (0-30 cm) increased 2 .43and 2 .35 times for LG and MG from the initial to the end of the grazing period , but the difference between them was not significant ($p > 0.05$) . For both treatments , we found a strong vertical distribution of root biomass towards the upper 20 cm of the soil profile . This finding is in accordance with the observations of McNaughton et al . (1998) .

Table 1 *Sward characteristics by component and year for the two stocking rates .*

Year	Sward characteristics	AL		SB		WW		RW	
		MG	LG	MG	LG	MG	LG	MG	LG
2004	Botanical composition (%)	0 .13	0 .17	0 .60	0 .62	0 .07	0 .07	0 .15	0 .11
	Population density(point/m^2)	379	394	1750	1721	394	378	740	678
	Canopy cover (%)	13 .44	12 .32	49 .99	44 .96	5 .06	4 .80	11 .05	8 .09
	Leaf/stem ratio	1 .52	1 .36	2 .44	2 .62	1 .30	1 .29	2 .34	2 .59
2005	Botanical composition (%)	0 .26	0 .39	0 .55	0 .48	0 .03	0 .03	0 .14	0 .08
	Population density(point/m^2)	559	653	833	903	156	142	533	447
	Canopy cover (%)	40 .14	54 .21	51 .91	53 .68	3 .83	3 .39	12 .31	9 .85
	Leaf/stem ratio	1 .36	1 .23	4 .21	3 .71	1 .59	1 .50	5 .73	5 .58

Conclusions Obtaining and maintaining pasture productivity is a measure to sustain cow grazing systems . From a management perspective , adopting a rotational grazing system with lax stocking rate may improve the sward quality and indirectly increase the productivity of pasture in agro-pastoral transitional zone of northern China .

Reference

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