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Critical pasture , seasonal grazing and sustainable development of grassland animal husbandry production in China

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Key words : seasonal animal husbandry , critical pasture , theoretic carrying capacity , grassland degradation

Introduction In many part of China , especially in its western part , animals were grazed on different areas in different seasons (Ren Jizhou et al . 1978) due to apparent climatic effect . Based on the principles of seasonal animal husbandry and pastoral-agriculture ecological system , a new idea of critical pasture was developed . The critical pasture is defined as the pasture that had lowest carrying capacity in a particular season . In order to use 3S technology for pratacultural development , the new method of calculating carrying capacity of critical pasture was given . The new idea , target and method were validated in the project of "Change of Grassland Productivity and Counter-measures in Aletai" .

Materials and methods A grazing system can be confined at a township , a county , a prefecture or even a province (region) level . In the grazing system , there are many factors that affect the pasture carrying capacity , such as utilization rate of grassland , herbage yield , pasture type , structure of livestock flock and grazing period . Three coefficients was used to calculate the carrying capacity of critical pasture , a) Useable Grassland Coefficient (UGC) , k_{1m} ; b) Useable Forage Coefficient (UFC) , k_{2m} ; and c) Use factor (UF) , k_{3m} .

Results The results in 2002 (Table 1) indicated that , summer pasture was the critical pasture in the grazing system in Aletai prefecture , which had the lowest carrying capacity . The maximum carrying capacity of Aletai grazing system should be equal or below the carrying capacity of summer pasture , i . e . 5881 ,133 SU although the theoretic carrying capacity of Aletai grazing system was 6 ,578 ,477 SU based on the principle of critical pasture . In fact the actual carrying capacity of Aletai grazing system was 7 ,887 ,390 SU in 2002 (Xinjiang Provincial Statistic Bureau 2001) . Thus the summer pasture carried 1 ,308 ,913 SU more livestock than the theoretic carrying capacity , and 2 ,006 ,257 SU more livestock than the carrying capacity of critical pasture , overgrazed 19 .9% and 34 .1% respectively .

Table 1 The list of parameters in a grazing system of grassland animal husbandry in Aletai prefecture , China (2002) .

Season pasture	hm ² Area	kl _m UGC	kg/hm ² y _m	k2 _m UFC	k3 _m UF	t TFIP	day Grazing days	SU Carrying capacity
Summer	1186664	0 .91	5042 .76	0 .90	0 .60	2940567	100	5881133
Winter	4786609	0 .68	2384 .96	0 .80	0 .50	3105116	90	6900258
Spring-Autumn	3667213	0 .77	4966 .28	0 .85	0 .50	5960039	175	6811473
Aletai system	9646504	0 .74	3973 .18	0 .83	0 .51	12005721	365	6578477

Conclusions The idea of critical pasture is developed based on principles of seasonal animal husbandry and pastoral-agriculture ecological system . The accurate calculation of carrying capacity of critical pasture provides a new visual angle of assessment for control of desertification and grassland deterioration , having important theoretical and practical significance in monitoring grassland .