STUDIES ON RATIONAL ROTATION MOWING SYSTEMS OF TYPICAL STEPPE REGION IN INNER MONGOLIA

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ABSTRACT
Through the synthetic analysis of 14 years study on the above-ground biomass and N reserves in unit area, the author concluded that rational rotation mowing systems of typical steppe region should be mowing one year at a year interval or mowing two years at a year interval.

KEYWORDS
Typical steppe, rational rotation mowing system, biomass, N-element reserves in unit area

INTRODUCTION
There are 80 million hectares of natural grassland in the Inner Mongolia Autonomous Region of China, among them 7.8 million hectares are mowing pasture which can produce 2.5-3.0 billion kilograms of hay annually, which is used mainly as compensation forages in winter and spring.

Leymus chinensis steppe is the best mowing pasture in a typical steppe region. But irrational utilization in the steppe caused different degrees of degradation and decline of primary production. In order to solve the problem, the author had studied the rational rotation mowing system of *L. chinensis* mowing pasture in this area from 1982 to 1994.

OBJECT AND METHODS
A research area was designed at *L. chinensis* site of Inner Mongolia Grassland Ecosystem Research Station, Academic Sinica. (43°38'N, 116°42'E), and belonged to temperate semiarid typical steppe and chestnut soil zone. Annual average temperature over 14 years was 0.31°C. Annual precipitation was 343.6mm, and 73.92% of it fell in May to August. The vegetation type was *L. chinenses + Stipa grandis* + Arid herbs steppe.

In accordance with the existing problems in mowing pasture of the typical steppe, we designed mowing twice a year (on 23 June and 12 September), mowing one year at a year interval, mowing two years at a year interval and the contrast (all on 16 August). The area of plot is $4m^2$ (2x2m), arranged as contrasted, 6 replications and 6 cm stubble height were adopted through all the experiments.

RESULTS AND DISCUSSION
The changes of above-ground biomass of the communities: Figure 1 demonstrates that the above-ground biomass of the communities under different rational rotation mowing treatments were decreased with fluctuation. Originating from the actual average value of year, supposing that the above-ground biomass of contrast community was 100%, we can learn that above-ground bimass of mowing twice a year was 64.13%, mowing once a year 76.74%, mowing one year at a year interval 82.38%, mowing two years at a year interval 76.50%. The disposal of the last two were better, and the mowing two years at a year interval indicated that the relationship of pressure of mowing and elasticity of returning was much more clear. The reason for the above-mentioned result was related to the biomass of mowed pasture that the more the grasses are mowed, the more the nutrients are taken away. At last, nutrient cycling loses equilibrium and inevitably brings about productivity decrease.

Nutrient reserves of mowed forages in unit area: When we determine the rational system of rotation mowing, we must not only consider the above-ground biomass of the communities, but also consider the content of nutrient. We evaluated the nutrient reserves of mowed forage in unit area. By means of product of biomass in unit area and proportion of nutrient elements. It seems more rational to compare the differences by this index. Comparing N-element reserves in unit area, we found that mowing one year at a year interval or mowing two years at a year interval are much better than three treatments (Table 1).

CONCLUSIONS
As above-mentioned, through the synthetic analysis of above-ground biomass and N-element reserves in unit area of respective treatments within 14 years, the results indicated that both of mowing one year at a year interval and mowing two years at a year interval have many advantages. Therefore, a rational system of rotation mowing of typical steppe in Inner Mongolia should be mowing one year at a year interval or mowing two years at a year interval. The contrast treatment also has many advantages, but it is impossible and unrealistic to maintain no-mowing for a long time in a mowing pasture.

REFERENCES
Yankai Zhong and Qinghai Bao. 1991. A study on reasonable mowing of natural mowing steppe in Baiyinsile Farm. Acta Ecologica Sinica. **11(3)**:242-249 (in Chinense).

Yankai Zhong and Qinghai Bao. 1992. By mowing and mowing interval time in the defferent periods, to the influence of grass biomass on the *Leymus chinensis* steppe. Research Grassland Ecosystem. (**4**):213-230 (in Chinense).

Table 1
Nutrient reserves of mowed forages in unit area

Name of plants	Items	Mowing twice a year June 23	Mowing once a year interval Sep. 12	Mowing one year at a year interval Aug. 16	Mowing two years at a year Aug. 16	Contrast
Leymus chinensis	1	35.950	36.210	72.780	52.270	61.350
	2	2.068	1.773	1.584	1.642	1.339
	3	0.743	0.642	1.153	0.858	0.821
Stipa grandis	1	15.000	15.580	16.280	15.300	27.690
	2	1.804	1.616	1.410	1.687	1.194
	3	0.271	0.252	0.230	0.258	0.331
Herbs	1	62.850	66.700	60.660	67.110	71.410
	2	2.109	1.818	1.769	1.881	1.543
	3	1.326	1.213	1.089	1.262	1.102
N-reserves of the community($g.m^{-2}$)		2.340	2.107	2.472	2.378	2.254

1=biomass($g.m^{-2}$)
2=N-content(DW.%)
3=N-reserves($g.m^{-2}$)

Figure 1
The changes of above-ground biomass of the communities ($g.m^{-2}$)