Heavy Grazing of Beef Cattle Combined with Supplementary Sowing to Improve Deteriorated Pastures

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Introduction There are more than 500,000 hm^2 of improved pasture in Yunnan but about 2/3 have significant deterioration. Trials were carried out on these deteriorated pastures after the beginning of the rainy season by a combination of heavy grazing with beef cattle, controlled by electric fences, combined with supplementary sowing. The purpose of the trial was to determine the efficacy of these techniques for renewing these improved but deteriorated pastures.

Materials and methods The trial was conducted on the pasture at Xiaoshao, Kunming (East longitude 103°00′, north latitude 25°13′; elevation 1960 meters; annual rainfall 889mm; annual temperatures 13.4℃; latosolic soil). At the beginning of the trial, the average vegetation coverage was 86.1% with vegetation mainly native grasses with only 3% improved pasture species. The trial paddock area was 260m^2; 52 beef cattle of three-way crossbreeding were used for the trail. The cattle were divided into two groups (26 herds per group); daily rotational grazing with 7 grazing-intensity treatments (head.hrs./m^2) of: 0, 1.16, 2.32, 3.48, 4.64, 5.80 and 6.96. Each treatment was designed with three replications and a random statistical design. Supplementary sowing of pasture species was conducted on each pasture after grazing treatment. The species and sowing rate for supplementary planting was: *Lolium perenne*.cv.grasland nui 9kg/hm^2 + *Triflium repense*.*cv*.Haifa 9kg/hm^2. The trial started in the rainy season. The output and the proportion of improved pasture species were recorded each year.

Results The output of two-year pasture was increased by increased grazing intensity and reached the highest with the sixth treatment (See Table 1). The pasture output of each grazing treatment was significantly higher than the control group ($P<0.01$). Heavy grazing caused the formation of small hillocks of 20-30cm diameter, in what was otherwise usually hard immature soil. Pasture seeds had difficulty growing in the untreated soil which affected percent cover and biomass output.

Table 1 *The Pasture Output of Difference Treatments (kg.DM/hm^2).*

Treatment (head.hr/m^2)	1(ck)	2	3	4	5	6	7
First year	84eD	164eD	604dC	1036cB	1328bA	1458aA	1428aA
Second year	918eC	2303dC	2686dC	4182cB	5179bcB	6698aA	5440bAB
mean	501eE	1233dD	1646dD	2609cC	3254bBC	4078aA	3434bAB

Note: Different small letters in the same row were significantly different at the $P<0.05$ level and capital letters in the same row were significantly different at the $P<0.01$ level.

The proportion of improved pasture species was increased by the different grazing intensities (See Table 2). The original vegetation was reduced under the trampling of beef cattle and growth of the seeded species was increased.

Table 2 *The Pasture Proportion of the Total Biomass of the Land for Different Treatments (%).*

Treatment(head.hr/m^2)	0(ck)	1.16	2.32	3.48	4.64	5.80	6.96
First year	7.2	13.6	45.1	74.5	83.2	80.4	94.1
Second year	19.8	47.0	54.3	73.3	80.0	83.2	86.5
mean	13.5	30.3	49.7	73.9	81.6	81.8	90.3

Conclusions The most effective methodology to restore deteriorated-improved pasture was by use of electric fences, heavy grazing and supplementary sowing. In 0-6.96 head.hr/m^2 of grazing intensity, the proportion of supplementary sowing pasture increased with increasing grazing intensity. On degenerated pasture, the most beneficial grazing intensity was 5.80 head.hr/m^2.

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