Grazing Capacity of Grasslands with Tropical Grasses, Dallisgrass and Bahiagrass

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Being a country stretching from south to north, the southwestern part of Japan has a climate of high temperature and high humidity with heavy rains in the summer season (Fig. 1). Due to such climatic condition, temperate grasses in the areas with low elevations suffer from so-called summer growth depression, after the spring flush occurred, resulting in an insufficient herbage intake of grazing animals, and also suffer from diseases and missing stands, making the management and utilization of the grassland very difficult.

Studies on the use of tropical grasses in such areas, carried out recently, have shown that dallisgrass and bahiagrass are adapted to areas with elevations lower than 400 m in the kyushu region, and these grasses are now in the practical use. Of a series of results obtained from the studies, grazing capacity of dallisgrass and bahiagrass lands will be presented in this paper.

Growth pattern of dallisgrass and bahiagrass in lowlands of Kyushu

Both grasses sprout in late March when the mean temperature exceeds 10°C, and the plants reach 15 cm of height in late May when mean temperature becomes 17°C. Fig. 2 shows herbage production of both grasses in pasture[1]. Because Italian ryegrass was mixed-sown for the reason shown below, the herbage production up to May represents largely that of Italian ryegrass, but the production after June when the Italian ryegrass

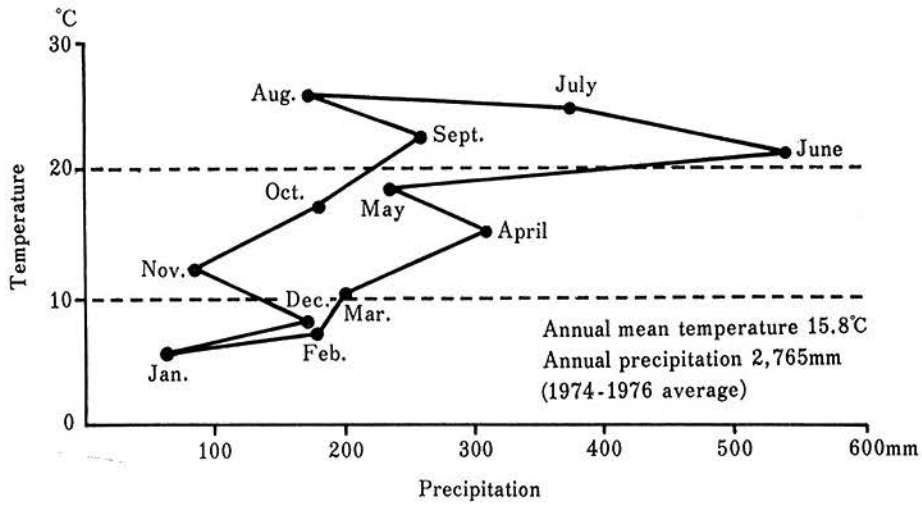

Fig. 1. Monthly mean temperature and precipitation at the Dairy Branch of Miyazaki Agricultural Experiment Station

disappears indicates that of the single grass, dallisgrass or bahiagrass. When fertilizers were applied at the rate (kg/a) of 2.0 of nitrogen, 1.5 of phosphorus and 1.2 of potassium, the herbage production (air-dry weight kg/a) per day of dallisgrass pasture was 0.5 in May–June, 1.0 in June–July, 1.0–0.8 in July–August, 0.4 in September–October, and that of bahiagrass pasture was 0.7–1.0 in June–July, 0.9–1.0 in July–August, 0.8–0.9 in August–September, and 0.5 in September–October. Both grasses produce about 130 kg per year.

Grazing period of dallisgrass and bahiagrass pasture

As it is said that both grasses grow at the temperature above 10°C[2], their growing season falls into a period from about March to November in southern Kyushu, but the actual grazing period is limited from an early May to late October. Such a short grazing period is a disadvantage of tropical grasses. Therefore, it is necessary to increase the grazing period as well as grazing capacity by adopting the combination with temperate grasses or autumn-saved pasture of dallisgrass.

1) Sowing of Italian ryegrass aiming at an early start of grazing

As the start of grazing in the tropical grass pastures is later by about 50 days than that of temperate grass pastures, the over-seeding of Italian ryegrass in autumn to tropical grass pastures was tried in order to hasten it. In a bahiagrass pasture at the 3rd year after its establishment, Italian ryegrass was sown in the mid-October at the rate of 0.15 kg/a and 0.3 kg/a. After the sowing, three different treatments were given: soil compaction by cultipacker or by hoof pressure, and no soil compaction[3]. In all the plots, plant height of Italian ryegrass reached about 25 cm in early April, making the grazing possible. In the control plot without Italian ryegrass, plant height reached about 20 cm only in mid-May. Number of plants and yield of Italian ryegrass were better with the seed-rate of 0.3 kg/a. Of the soil treatments, soil compaction by cultipacker, which was highly effective in stirring soil surface, gave the highest yield, followed by soil compaction by hoof pressure and then no compaction, showing 9–20% higher annual yields than the control plot.

In the use of Italian ryegrass, it should be careful not to suppress the growth of tropical grass by the Italian ryegrass. For that purpose, the use of earliest varieties was found to be desirable[4].

Thus, the over-seeding of Italian ryegrass into tropical pastures is very effective not only in hastening grazing use, but also in increasing seasonal uniformity of herbage production and grazing capacity.

2) Extension of grazing period by autumn-saved pasture of dallisgrass

In the open yard feeding system, it is desirable to maintain the grazing period as long as possible. As stated above, the grazing period ends usually in late October in tropical grass pastures. To defer the end of grazing the following system was tried in which a dallisgrass pasture was used for both cutting and grazing[5]. By the end of August, when the peak growth period of dallisgrass terminated, the pasture was used for cutting to prepare stored feed for winter, but after that it was kept unused until the grazing use began at the time when grazing ended in other grazing pastures.

A 2.3 ha pasture and 15 heifers (14 months of age) of Holstein were used for the experiment. Average yield (air-dry weight/ha) of early half and later half of November was about 2.8 ton. Feed ingredient at the end of November showed almost no change except 40% lower content of crude protein as compared to that at the end of August. An aggregated number of grazing cattle was 460 (when converted into matured cattle with body weight of 500 kg, it becomes 261) with a higher efficiency of pasture use than that of usual grazing time. Average daily body weight gain during the pasture use was fairy good, i.e., about 890 g.

Growth of grazing cattle and grazing capacity

It is said that in general tropical grasses are low in nutrient content and palatability. As raising of dairy cattle and beef cattle is mostly intended in establishing grasslands from unused lands, the growth of these cattle and grazing capacity were examined on tropical grasslands. Firstly, growth of dairy heifer was studied with different kinds of tropical and temperate grasses[6]. Grasslands used are shown in Table 1. Area of each glassland was 1.2 ha, on which 5 Holstein heifers (7 months of age at the beginning of the experiment) were raised by a rotational grazing method for a period of April to October. Production of each grassland is shown in Fig. 2. Frequency of grazing during the grazing period was 9–10 times for habiagrass pasture, and 7–9 times for each of other grasslands. Average grazing duration was 15 days, the shortest duration, for bahiagrass with high frequency of grazing, and was 25 days, the longest duration, for tall-fescue and some temperate grasses mixed-seeded grassland.

An aggregated number of grazed cattle per ha (figures in parentheses indicate that converted to matured cattle with 500 kg of body weight) was 1,124 (588) for bahiagrass, 1,076 (541) for dallisgrass, 903 (443) for dallisgrass-bahiagrass mixed pasture, and 898 (432) for temperate grasses mixed pasture, indicating the high grazing capacity of tropical grass pastures. In bahiagrass pasture, an area required for raising one cattle for a period from April to October was estimated to be about 18 a. It is said that 700 A.U. is appropriate for the maintenance and effective use of bahiagrass[7]. The subsequent studies made clear that it is not difficult to use bahiagrass pasture to that extent.

Usually the growth (body weight) of grazing cattle shows the following pattern: good

Table 1. Daily gain during grazing of Holstein heifer calves (g)

Year	Grasses	Month (month of age) April (7)	May (8)	June (9)	July (10)	Aug. (11)	Sept. (12)	Oct. (13)	Average
1970	Tall-fescue mixed-seeded	893	900	527	290	774	531	—	640
	Bahiagrass	943	683	653	332	390	559	—	583
	Bahiagrass-dallisgrass mixed-seeded	907	877	533	381	540	480	—	605
1971	Tall-fescue mixed-seeded	582	755	730	590	581	213	346	547
	Dallisgrass	841	666	566	616	616	480	592	624
	Bahiagrass-dallisgrass mixed-seeded	633	848	840	467	423	97	83	574
1972	Tall-fescue mixed-seeded	750	893	677	521	181	438	493	553
	Dallisgrass	835	963	761	424	100	544	450	569

Note: Supply of concentrate (DCP 10, TDN 70, per day per head)

Year	At the beginning of grazing		Summer season	
1970	April 15–April 30	1 kg	July 11–Sept. 10	1 kg
1971	April 7–April 30	1 kg	July 3–Sept. 2	0.5 kg
1972	April 6–April 19	1 kg	No supply	

Pasture	Year	Herbage production (air-dry weight kg/a) per day							Annual production (a)
		April	May	June	July	Aug.	Sept.	Oct.	
Bahiagrass	1969*	★ 18.4	0.8	1.1	0.9	1.4	1.1	0.8 0.9 1.0 0.4	152.7kg
	1970**	★ 10.2	0.3	0.6	0.7	0.7	1.1	0.9 0.6 0.5	115.2
Dallisgrass	1971***	★ 13.6	0.6	0.3	0.3	0.5	0.6	0.5	97.9
	1972*	★ 16.1	0.8	0.7	0.6	0.8	0.8	0.5 0.3	142.6

Note * 3rd year after establishment
** 4th year after establishment
***2nd year after establishment
★ Standing crop at the time of initial use
Except 1969, with Italian ryegrass mixed-planted

Fig. 2. Herbage production of bahiagrass and dallisgrass pastures

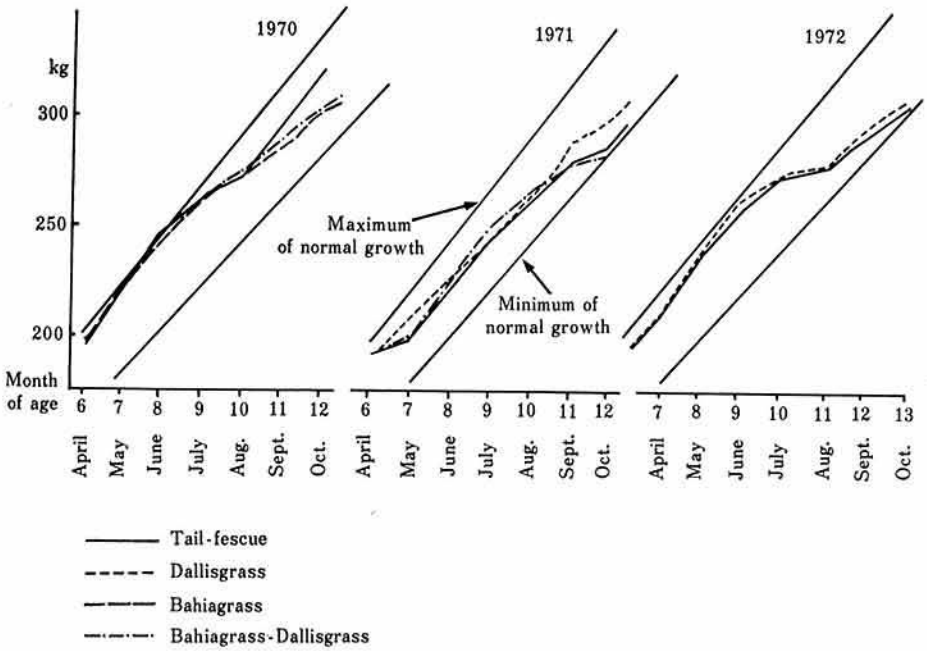

Fig. 3. Growth (body weight) of dairy heifers on pastures of different grasses

initial growth followed by slow or stagnant growth in the summer season and later recovery. In this experiment, the same trend was observed in each year. Fig. 3 shows the growth (body weight) of grazing dairy heifers together with maximum and minimum values of "the Estimated Body Weight of Cows by Month of Age" given in the Appendix Table 3 of "the Normal Growth Values of Holstein Cattle" published by Japan Holstein Registration Association, and Table 1 shows daily gain. No significant difference in daily gain was observed among different grasses.

Yokota[8] reported that beef cows grazed on

bahiagrass pasture from May to August showed an average body weight increase of 14 kg, and that the grazing may possibly be extended to the middle of November. In this case, the grazing capacity is estimated to be about 570 cattle/ha.

All these results indicate that bahiagrass and dallisgrass are well adapted to low elevation areas of southern Kyushu, giving the good growth of grazing cattle. However, further studies will be needed on the management and utilization of pastures of these grasses, particularly on the saving of fertilizers by the mixed seeding of leguminous forage crops, supply of micro-nutrients, and labor-saving, long term stable production and utilization by the mixed-seeding of other perennial grasses.

References

1) Miyazaki Pref. Agr. Exp. Sta.: Studies on the technology of the establishment and management of pasture and of the grazing on the tropical grasses pasture. 137–139 (1975) [In Japanese].
2) Mitsui, K.: Handbook of forage crop and pasture. 5 (1965) [In Japanese].
3) Miyazaki Pref. Agr. Exp. Sta.: Studies on the technology of the establishment and management of pasture and of the grazing on the tropical grasses pasture. 86–88 (1975) [In Japanese].
4) Miyazaki Pref. Agr. Exp. Sta.: Studies on the technology of the establishment and management of pasture and of the grazing on the tropical grasses pasture. 62 (1975) [In Japanese].
5) Owaki, S. & Hisamatsu, T.: The extension of autumn grazing in dallisgrass pasture. *Kyushu Agr. Res.*, 38, 187 (1976) [In Japanese].
6) Miyazaki Pref. Agr. Exp. Sta.: Studies on the technology of the establishment and management of pasture and of the grazing on the tropical grasses pasture. 129–139 (1975) [In Japanese].
7) Kyushu Agricultural Experiment Station: Studies on the management and utilization of pastures in the warm temperate zone. 34–62 (1971) [In Japanese].
8) Yokota, O.: Studies on the establishment of pasture and grazing of beef cattle. Abstract of the meeting to report experimental results (Miyazaki Pref. Agr. Exp. Sta.). 64–68 (1969) [In Japanese].