

学位論文の要旨

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専 攻 入学年度	宮崎大学大学院農学工学総合研究科博士後期課程資源環境科学専攻 (西暦) 2015年度 (4月) 入学
学位論文 題 目	GENOTYPIC DIFFERENCES IN CANOPY STRUCTURE AND FEASIBILITY OF GRAZING ON WINTER AND SUMMER PASTURES OF NAPIERGRASS (ネピアグラスの草冠構造と夏季および冬季草地の放牧可能性にお ける品種間差異)
<p>【論文の要旨】 (和文の場合1,200字程度、英文の場合800語程度)</p> <p>Napiergrass (<i>Pennisetum purpureum</i> Schumach), a C₄ tropical grass that produces plentiful, nutritious green forage, is considered an excellent feed source for livestock raised under grazing systems and green chopping in tropical regions and temperate Kyushu, Japan. Napiergrass phenotypes include normal, semi-dwarf (DL), and dwarf Taiwan line (7734). The dwarf and DL genotype canopy structures contrast with that of normal Napiergrass, cv. Merkeron (ME), and the dwarf types are better suited for grazing than the normal type, as they have a higher tiller number and leaf blade percentage and exhibit high persistence in southern Kyushu. In the first part of this study, yield and quality attributes of the canopy structure were characterized over a range of Napiergrass genotypes (7734, DL, and ME) to assess their grazing suitability.</p> <p>Leaves of tropical grasses, including Napiergrass, are susceptible to frost damage, and plant growth ceases when subjected to frost. However, frost-damaged leaves form foggage, which is expected to be suitable for use as stored herbage over winter in the same way as hay and silage are processed during the summer. However, no research findings are available for grazing of beef cows on Napiergrass foggage as autumn-saved pasture. Rotational grazing is an intensive grazing management strategy that provides livestock with a continuous opportunity to consume fresh grass in an active growth stage. DL Napiergrass can adapt to intensive rotational grazing by beef cows, thus enabling expansion of cultivation areas in southern Kyushu. However, grazing management on 7734 Napiergrass pastures has not been examined in this region. The tropical legume lablab bean (<i>Dolichos lablab</i> L.) was found suitable for mixed cropping with tropical grass to increase crude protein content in herbage and milk produced by grazing dairy cows in Thailand. The second part of this study, therefore, was conducted to examine grazing potential on foggage and fresh grass of semi-dwarf and true dwarf Napiergrass genotypes, intercropping with lablab bean in southern Kyushu.</p>	

In the first part of the study, 7734, DL, and ME plant densities were 4, 2, and 1 plant m⁻², respectively. The relative light intensity (RLI) and dry weight of plant fractions were obtained by stratified clipping at the first and second cuttings in early September and late November, respectively. Plant height was in the order ME (199 cm), DL (128 cm), and 7734 (88 cm) at the first cutting, and 7734 tended to have higher tiller density, dry matter yield, and leaf area index than DL and ME at both cuttings. The canopy RLI of 7734 tended to decrease more with the decline in strata compared with DL and ME, which corresponded with the lowest 7734, followed by DL and ME at both cuttings. Genotype 7734 exhibited the greatest digestibility, highest crude protein concentration, and lowest structural carbohydrate concentration, which would be favorable for grazing breeding beef cows.

In one-day intermittent grazing by Japanese Black (JB) beef cows on foggage pasture from December to March, 2017, 1-4 months after the first frost, grazing time on Napiergrass increased until late February, and pasture height and herbage mass decreased consistently with grazing. In rotational grazing on pastures of the two Napiergrass genotypes, the pre- and post-grazing plant height was higher for DL than 7734 in mixed cropping with lablab bean by three JB breeding beef cows during pregnancy over two cycles, from mid-July to early September 2017. Herbage mass was roughly comparable between the two genotypes in the first cycle, whereas it decreased considerably for 7734 in the second cycle. However, the genotypes exhibited similar herbage consumption. Moreover, dry matter intake (DMI) tended to be higher for 7734 than for DL in the first cycle. Live-weight (LW) gain increased with grazing, averaging 0.79 kg/head/day, with 19 g DM/kg LW/day of DMI. Therefore, the LW of breeding beef cows was at least maintained under rotational grazing without additional feed supply for 56 days in summer in southern Kyushu.

In order to maximize livestock production and pasture sustainability and longevity, the impact of grazing animals on community structure and strategies to maintain a functional ecosystem in the pasture must be considered in rotational grazing management. The grazing system described here thus represents a management tool that allows pasture managers to control the frequency and duration of grazing and rest periods to optimize both livestock and plant performance. The optimal, and therefore most sustainable, combination of year-round grazing management on dwarf-type pastures of Napiergrass in the Kyushu region remains to be determined.

- (注1) 論文博士の場合は、「専攻、入学年度」の欄には審査を受ける専攻のみを記入し、入学年度の記入は不要とする。
- (注2) フォントは和文の場合、10.5ポイントの明朝系、英文の場合12ポイントのtimes系とする。
- (注3) 学位論文題目が外国語の場合は日本語を併記すること。
- (注4) 和文又は英文とする。