

学 位 論 文 要 旨	
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題 目	Study on fertilizer management for year-round grazing of tropical grasses in South-western island Okinawa, Japan (南西諸島における暖地型イネ科牧草の周年放牧草地での施肥管理技術に関する実証的研究)
<p>Present study was carried out to establish the fertilizer management of tropical grasses utilized intensive year-round grazing pasture in south-western islands Okinawa, Japan.</p> <p>Field experiment of sudangrass (<i>Sorghum sudanense</i> [Piper] Stapf cv. Rich sudan, Sg), signalgrass (<i>Brachiaria decumbens</i> Stapf cv. Basilisk, Bd) and digitgrass (<i>Digitaria eriantha</i> Steud. cv. Transvala, Tr) was carried out to examine the effects of phosphorous fertilizer on the growth in red-yellow acid soil (pH4.9-5.6). Results of the experiment showed that tropical grasses of Bd and Tr could be cultivated on red-yellow acid soil in Okinawa with the reducing phosphorus fertilizer.</p> <p>As the soil management in grazing pasture, the pot experiment of Sg, Bd and Tr was conducted to determine the optimum application rate of lime (calcium carbonate) and phosphorous fertilizer in red-yellow acid soil. The concentration of exchangeable aluminum significantly decreased in the soil with increased rate of calcium carbonate application. Lime application was highly effective for Sg, but not for Bd or Tr. The critical level of phosphoric acid application required in the soil was more than 2.3 and 2.1 mg ($P_2O_5/100g$ dry soil) for Bd and Tr, respectively.</p> <p>The experiment was carried out to clarify the efficiency of applied nitrogen fertilizer using ^{15}N-labelled fertilizer (^{15}N) on year-round-rotational grazing pastures of giant stargrass (<i>Cynodon nlemfuensis</i> Vanderyst, Gs) and Tr.</p> <p>Dry matter yield, total nitrogen content and ^{15}N recovery rate of the available herbage were not significantly different between Gs and Tr. The efficiency of nitrogen fertilizer on the available herbage was 33.8 and 31.8% in Gs and Tr, respectively. Recovery of ^{15}N in the stubbles and roots, rhizosphere soils and available herbage averaged across the two grasses was 5.1, 10.7 and 32.8%, respectively. Total ^{15}N recover rate in the plant and soil averaged across both Gs and Tr was 48.6%, which means that 51.4% of applied nitrogen fertilizer was lost.</p> <p>To evaluate carrying capacity in year-round grazing pasture cultivated with proper fertilizer management, rotational grazing experiment was conducted for two years by using Breeding Japanese Black Cattle to compare pasture utilization and herbage accumulation responses of Tr and Gs. Mean value of pasture allowance before grazing of Tr was lower than that of Gs, because crop growth rate (CGR) in non-grazing period of Tr was lower than that of Gs in both summer and winter season. The annual mean herbage intake and TDN intake of Gs were adequate in both years. Carrying capacity on the Tr and Gs were 1,942 CD/ha and 2,227 CD/ha, respectively. More than 6.9 head/ha in summer and 4.2 head/ha in winter were desirable stocking rates for Gs as grazing cycle (7 days grazing followed by NPK fertilization, about 30 days non-grazing). On the other hand, for the Tr, it was 6.5 head/ha in summer and less than 3.4 head/ha in winter because of lower herbage mass in winter with below 20°C.</p>	