



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

21st International Grassland Congress / 8th
International Rangeland Congress

Effects of Herbage Species on the Spatial Heterogeneity of Biomass in Grazed Pasture: Kentucky Bluegrass vs. White Clover

M. Tsutsumi

National Institute of Livestock and Grassland Science, Japan

M. Fukasawa

National Institute of Livestock and Grassland Science, Japan

N. Tachi

Tohoku University, Japan

S. Itano

National Institute of Livestock and Grassland Science, Japan

T. Kosako

National Institute of Livestock and Grassland Science, Japan

See next page for additional authors

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/3-2/38>

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

Presenter Information

M. Tsutsumi, M. Fukasawa, N. Tachi, S. Itano, T. Kosako, and H. Tsukada

Effects of herbage species on the spatial heterogeneity of biomass in grazed pasture : Kentucky bluegrass vs . White clover

M . Tsutsumi^{1,2} , M . Fukasawa¹ , N . Tachi³ , S . Itano¹ , T . Kosako¹ and H . Tsukada¹

¹National Institute of Livestock and Grassland Science , Nasushiobara , Tochigi 329 – 2793 , Japan ; ²Present Address : National Agricultural Research Center for Western Region , Ohda , Shimane 694 – 0013 , Japan ; ³Tohoku University , Osaki , Miyagi 989 – 6711 , Japan . E-mail : mcof@affrc.go.jp

Key words : calf , grazing pressure , *Poa pratensis* , rising plate meter , *Trifolium repens*

Introduction Recently , the spatial heterogeneity of plant biomass in grassland has been investigated from various approaches . However , those previous studies did not address the following aspect : if different plant species are grown in grassland , will the dynamics of spatial heterogeneity of the biomass differ ? . This problem is important in evaluating the universality of the results of previous researches concerning the spatial heterogeneity of plant biomass . We investigated whether the different herbage species , for example Kentucky bluegrass (*Poa pratensis* L . , KB) and white clover (*Trifolium repens* L . , WC) , influence the spatial heterogeneity of the biomass in grazed pasture .

Materials and methods Three pastures (each 10 a in area) were established as follows : the first consisted of 30% KB-dominated pasture and 70% WC-dominated pasture , the second consisted of 50% KB and 50% WC , and the third contained 70% KB and 30% WC by ground area . The grazing experiments were carried out in 7 successive days for periods I (from 8th to 15th May) , II (from 29th May to 5th June) and III (from 19th to 26th June) in 2006 . Three groups of two Holstein castrated calves (mean age 186±55 days and mean liveweight 154.2±30.7 kg) were the subjects for the study . Aboveground biomass was measured at 50 points in each area (KB or WC dominated) of the three pastures with a Filip's Folding Sward Meter (Jenquip , New Zealand) every morning (grazing period and the next day) . Behavioural observations were carried out in each test period (Fukasawa et al . , 2007) . The observers recorded which calf ate KB or WC during the morning meal and the evening meal on each observation day . In the results of the behavioural observations , the selectivity for each species area of the calf groups during each experiment period was stable . Therefore , we considered the following unit as grazing pressure : head · min · 8 h⁻¹ · a⁻¹ (liveweight 500 kg = 1 head) . The spatial heterogeneity of biomass was evaluated using SD (standard deviation) and CV (coefficient of variation) of the biomass (g DM 0.25 m⁻²) . We applied GLM (general linear model) to the SD and CV using the herbage species , average biomass , grazing pressure , paddocks , and experimental periods as autonomous variables .

Results and discussion Though the effects of herbage species on SD and CV were not significant , the effects of the interactions between herbage species , and paddocks and experimental periods were significant (GLM , P < 0.05) . In both KB and WC areas , positive correlations were found between the average and the SD of biomass , between the CV of biomass and grazing pressure , and no significant correlations between the SD and grazing pressure (Table 1) . No significant correlations were found between the average and the CV in KB areas , while negative correlations were found in the WC areas . The results suggest that the spatial heterogeneity dynamics were apparently different between the KB and WC areas even in such a short term .

Table 1 Correlation matrix between average , SD and CV of biomass (g DM 0.25 m⁻²) , and grazing pressure (head · min · 8 h⁻¹ · a⁻¹) on each of KB and WC areas .

	KB			WC		
	Average	SD	CV	Average	SD	CV
SD	0.82***			0.52***		
CV	-0.06	0.51***		-0.59***	0.35**	
Grazing pressure	-0.46***	-0.18	0.41***	-0.52***	0.07	0.64***

** P < 0.01 , *** P < 0.001 .

Conclusion We should understand that the dynamics of the spatial heterogeneity of grasslands can be modified by the differences of herbage species .

Reference

Fukasawa , M . , Tachi , N . , Tsutsumi , M . , Kosako , T . , Tsukada , H . , (2007) . The effect of area proportion of Kentucky bluegrass and white clover swards on diet selection of calf . *Japanese Journal of Grassland Science* , 53(Ext .) , 280 – 281 (in Japanese only) .