

INFLUENCE OF GRASSLAND MANAGEMENT AND GRAZING BY DIFFERENT FARM ANIMALS ON ANIMAL PERFORMANCE AND FLORA ALTERATIONS

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Abstract

The objectives of this study were to test the possibilities of using different farm animals for landscape care on extensive pasture, taking into account their particular performance, and to analyse alterations of the flora in consequence of grazing by different animals and various pasture management. Salers had the highest (836g/d) and Galloways (584g/d) the lowest live weight gain as compared with the other breeds (771g/d). Lambs had higher live weight when grazing together with cattle and horses (mixed grazing) than under one species grazing. The number of legume increased and that of grass decreased. Following 3 years the grazing animals effected an increase of plant numbers in order of: Horses 86%, Cattle 15%, Mixed grazing 14% and sheep no effect. The most success of increasing plant numbers was registered when combined grazing and mowing of pasture was used.

Keywords: Cattle, sheep, horses, grazing, pasture management, animal performance, plant population

Introduction

Extensification of grassland management and animal production are reactions to diverse ecological and sociological problems (Briemle, 1990). Intensity of amelioration and fertilization as well as use of plant-protective agents affected reduction of species variety and destruction of landscape (Werner, 1989; Hohenheim, 1995). Increased extensive agriculture leads to a raised species diversity of the plant population (Müller, 1990). Pasture management may influence plant population. Landscape care, especially in natural reserves is an essential field of activity, which should be coordinated by agriculturists with adequate compensation (Matthes, 1991). Several grassland management systems with different animal species have been studied, as for instance mixed grazing (Nolan, 1986; Buttenschön and Buttenschön, 1988). Another aspect is the quality of products; beef and mutton or lamb is more conducive to health - regarding unsaturated fatty acids - if produced extensively on grassland compared to intensively produced ones (Matthes et al., 2000; Pastushenko und Matthes, 2000). Aim of the present paper was to study the management of extensively used grassland and the grazing by different farm animals affecting live weight gain of the animals and the alterations of plant diversity.

Material and Methods

A 32 ha area of extensively and ecologically used grassland in the green landscape near the river Elbe in the north of Germany was split up into 7 sections for grazing by 7 groups. The grazing groups I-IV were 8 animals of different breeds of cattle per group. In group V 4 horses were used. Group VI consisted of 25 Merino-landrace ewes with twin lambs. Group VII, the mixed group, was composed of 5 cattle, 3 horses and 18 Merino-landrace ewes with twin lambs. The pasture was divided on base of one standard animal unit per ha corresponding to 500 kg LW. The live weights of the cattle and lambs are shown in table 1. Animals were turned

into pasture in early May and removed from pasture early November in each of two experimental years.

For the studies of flora alterations the different animal groups (I-VII) and the following types of management were used

A = Combined continuous grazing and mowing, in June

B = Only continuous grazing

C = Cut once in June and grazed in winter time, since November

Further the effect of horse and cattle grazing on the pasture vegetation was studied.

The studies started in 1993 and finished in 1995. The analyses and mapping out of the plant population was carried out before turning the animals out to pasture, during grazing and after their return from pasture.

The ecological numbers and ecological groups of plants were estimated according to the methods of Braun-Blanquet (1964) and Ellenberg et al. (1992).

Results and Discussion

On the average of the two grazing years Salers (Sa) had the highest and Galloways (Ga) the lowest live weight gain during the days on pasture (Table 1).

Mixed grazing resulted in better lamb performances compared with one species grazing, on the average of 167 (VII) versus 115 (VI) g live weight gain per day. Lambs mean live weights were 13.6 kg (VI) and 12.9 kg (VII) at the beginning of the experiments. One month later the lambs' live weights were equal and at the end the lambs of the mixed grazing group were on an average 8.9 kg heavier than the lambs of the mono-grazing group. The live weight gain was highest in spring time, decreased to a minimum in August and increased slightly later on (not shown in Table 1).

The proportion of legumes increased slightly from 7 to 11 %, while the grasses tended to decrease from 42 to 39 %, and the herbs changed less (51 versus 50%) in the second year.

During the study 25 plant species were new arrivals most of them herbs and 18 plant species disappeared. In the last year of the study, the plants were represented by 17.9% fresh water and moor vegetation, 34.9% herb vegetation, and 40.5% anthropo-zoogene heather and grass areas. The alterations of the numbers of plant species differed, depending on grazing animals species and the management (Table 2.1). The total number of plant species increased with all animal groups; one exception was observed with group I. From the different managements, combined grazing and mowing as well as grazing only resulted in a higher increase of plant species than winter pasture. Horses differ from cattle and sheep in cultivation. Number of plant species increased more following horse grazing than following cattle grazing (Table 2.2). Plants react differently to animals eating behaviours. The number of the grazing animals must conform to the growth of pasture plants.

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Table 1 - Live weight at the end of the studies and live weight gain on pasture, mean of 2 years

Group	Animal species	Breed	Live weight at the beginning kg	Live weight at the end kg	Live weight gain g/animal · d
I	Cattle	Galloway (Ga)	264.9±6.5	370.3±9.7 ^a	584±6.5 ^a
II	Cattle	Saler (Sa)	333.8±6.5	482.8±9.7 ^c	836±6.5 ^c
III	Cattle	Ga x Black Pied (F1)	263.1±5.7	400.1±8.4 ^b	771±6.5 ^b
IV	Cattle	Black Pied (BP)	274.3±6.2	413.1±9.2 ^b	771±6.1 ^b
VI	Sheep	Merino-landrace with twin lambs	13.6±0.3	34.3±0.7 ^a	115±3.4 ^{a1)}
VII	Mixed group (Cattle, horses,sheep)	Merino-landrace with twin lambs	13.2±0.3	43.2±0.8 ^b	167±3.9 ^{b 1)}

¹⁾ All data from lambs

Numbers with different letters within the animal species differ ($\alpha < 0.01$)

Table 2 – Vegetation changes

2.1 - Alterations of the number of plant species following farming management and animal grazing groups

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Animals grazing group	1993				1995			
	Management				Management			
	A	B	C	TNS	A	B	C	TNS
I Cattle, Ga	36	37	74	78	56	42	55	70
II Cattle, Sa	35	43	47	63	43	55	51	69
III Cattle, F1	35	30	39	53	45	43	59	66
IV Cattle, BP	44	34	52	64	67	48	56	86
V Horses	33	31	-	37	67	42	-	69
VI Sheep, ML	49	37	58	78	51	54	54	75
VII Mixed group	71	35	-	80	74	68	-	91

2.2 - Alterations of vegetation following two years horse or cattle grazing

Number of plant species	Horse grazing		Cattle grazing	
	1993	1995	1993	1995
Total	38	69	61	70
Herbs	29	48	41	50
Grass	27	21	19	19

Abbreviations

2.1: A = Combined grazing and mowing, in June, B = Only grazed, C = Winter pasture, cut once, TNS = Total number of species