

BEHAVIOUR OF CATTLE ON TWO DIFFERENT TYPES OF UPLAND PASTURES

D. Macesic and M. Knezevic

Faculty of Agriculture, University of Zagreb
Department for Forage & Grassland Production

ABSTRACT

The purpose of this research was to study the influence of the quality of pastures on the behaviour of cows in a 'cow-calf' system. The behaviour was measured by the four principal activities of the herd: grazing, lying, 'roaming' and insect repelling, and it is presented with relative indicators. The trial was conducted on pasture areas of the Faculty of Agriculture, University of Zagreb, at the altitude of 650-850 m. The influence of the pasture quality on the behaviour of cattle on pasture was studied on two different types of pastures: a natural unreclaimed pasture belonging to the *Arrhenatheretum medioeuropaeum* association and a reclaimed pasture by manuring and reseeding belonging to the *Lolium-Cynosuretum* association. Grazing behaviour was studied on 26 cows (Charolais x Istrian cattle) kept in a 'cow-calf' system. During spring and autumn period the cows spent more time, expressed in percentage, in grazing on the pasture belonging to the *Arrhenatheretum medioeuropaeum* association than on the pasture belonging to the *Lolium-Cynosuretum* association (53.00% and 44.43% during spring period, and 43.89% and 27.97% during autumn period, respectively). The established differences were significant ($P < 0.05$). The time spent on lying was significantly longer for all the three grazing periods on the pasture belonging to the *Lolium-Cynosuretum* association. The cows spent significantly more time ($P < 0.05$) on 'roaming' on the pasture belonging to the *Lolium-Cynosuretum* vegetal association. The pasture did not have significant influence on the time spent on insect repelling.

KEYWORDS

Arrhenatheretum medioeuropaeum, *Lolium-Cynosuretum*, cow behaviour, pasture intensity, grazing, 'cow-calf'

INTRODUCTION

It is possible to express the quality of pasture through its botanical composition or natural indicators: production of biomass of grassland, or through cattle production - meat production in kg/ha, milk in l/ha, etc.

If animal behaviour represents the expression of adjustment of an individual to the effect of different internal and also external factors (Hafez, 1970), then the quality of pasture could have significant influence on grazing animals. Animals on pasture are subject to the influence of the most different external factors, some of which affect the overall activity less, and some of them more, affecting at the same time animal behaviour (Castle et al., 1950; Halley, 1951; Knezevic, 1983).

The purpose of this research was to try to establish if and to what extent the quality of pasture influenced the behaviour of cows.

MATERIALS AND METHODS

The research was conducted on grassland area of the 'Research station for upland agriculture', of the Faculty of Agriculture, University of Zagreb, at the altitude of 650-850 m. The grassland areas where the research was conducted were obtained by deforestation of beech and fir forests. The trial was conducted on two types of pasture:

Pasture A = natural unreclaimed pasture belonging to the *Arrhenatheretum medioeuropaeum* vegetal association

Pasture B = intensive pasture by manuring and reseeding belonging to the *Lolium-Cynosuretum* association

A natural unreclaimed pasture belonging to the *Arrhenatheretum medioeuropaeum* vegetal association is characterised by two most wide-spread plant species, and those are: *Arrhenatherum elatius* and *Trisetum flavescens*. Out of other plant species we find very often the following: *Dactylis glomerata*, *Holcus lanatus*, *Festuca rubra*, *Festuca pratensis*, *Trifolium repens*, *Vicia cracca*, *Centaurea jacea*, etc.

An intensive pasture by manuring and reseeding belonging to the *Lolium-Cynosuretum* association is characterised by the following plant species: *Lolium perenne*, *Trifolium repens* and *Cynosurus cristatus*, that can be spread with abundant manuring and intensive pasture utilisation, as well as the *Dactylis Glomerata* grass (Bürkle, 1980; Hulina, 1983). An important place, according to its representation, have also species of weed associations of *Chenopodietea* genus (*Convolvulus arvensis*, *Capsella bursa pastoris*, *Rumex crispus* and others), which reflects a strong anthropogenic influence and indicates it is a pasture of higher efficiency (Ellenberg, 1952).

During the grazing season the behaviour of 26 cows (cross-breed between Charolais and Istrian cattle) kept in the 'cow-calf' system was observed. The behaviour was defined through four essential herd activities (Hancock, 1953):

1. grazing - this activity includes all the animals that in the moment of recording are grazing, as well as short periods of time when animals are walking while choosing the grass where to graze
2. lying - this activity includes all the animals that in the moment of recording are lying or sleeping
3. 'roaming' - this activity includes all the animals that in the moment of recording are standing or walking, and that are not grazing or insect repelling
4. insect repelling - this activity includes all the animals grouped in order to repel insects easily in the moment of recording

Observations of the above activities were carried out in three shifts of nine days each, through three characteristic vegetation periods: spring, summer and autumn. The cow behaviour was observed daily in the time period of 4-21 hours, and every 15 minutes the number of animals performing one of the four already mentioned activities was recorded, supposing that the registered activity in the moment of registering denoted this activity for the next 15 minutes.

Each activity is expressed in percentages, and the relative duration period of each activity is calculated from the total observation time (1035 minutes) as per the following formula:

$$T_a = \frac{\sum (a_i \times n)}{A} \quad (\text{Petit, 1972})$$

T_a = duration time of certain activity

a_i = number of animals with registered particular activity within limited period of time

A = number of animals in a group (the whole herd was treated as one group)

n = duration of time interval between two successive observations

RESULTS AND DISCUSSION

The production of biomass during the whole grazing season through

all the three periods: spring, summer and autumn was higher on the intensive pasture by manuring and reseeding belonging to the *Lolium-Cynosuretum* association (Pasture B), than on the natural unreclaimed pasture belonging to the *Arrhenatheretum medioeuropaeum* vegetal association (Pasture A), as seen in the Table 1. The smallest difference between pastures in the production of dry matter was in summer time, because drought caused the biomass reduction on both pasture types (Pasture A - 15.2 dt/ha, Pasture B - 15.7 dt/ha). The total biomass production amounted to 36.5 dt/ha of DM for the Pasture A, and to 42.1 dt/ha for the Pasture B.

The botanical composition of pasture belonging to the *Arrhenatheretum medioeuropaeum* vegetal association and the pasture belonging to the *Lolium-Cynosuretum* association is expressed in percentage of DM of grass, legumes and other plants (herbaceous plants, weeds, etc.) shown in the Table 2. The Pasture B contains higher percentage of grass (66.40%) and legumes (13.49%) from the Pasture A (grass: 61.26%; legumes: 7.97%), while the percentage of other plants made of herbaceous plants and weeds is higher at the Pasture A than at the Pasture B (30.77% and 20.11% respectively).

The results obtained by observation of cow behaviour during the grazing season of the three principal periods: spring, summer and autumn are shown in the Table 3. During the whole grazing season the cows spent more time in percentage on grazing on the natural, unreclaimed Pasture A, belonging to the *Arrhenatheretum medioeuropaeum* vegetal association, than on the intensive pasture B by manuring and reseeding belonging to the *Lolium-Cynosuretum* association. The differences were significant ($P < 0.05$) in spring and in autumn period. That can be explained by lower biomass production of the Pasture A in relation to the Pasture B during the whole grazing period, but also by its worse botanical composition (Table 2). Cows would sooner satisfy their feeding needs on a more productive and a better-quality pasture that is reflected in a significantly lower percentage of time spent on grazing activity on the Pasture B ($P < 0.05$). These results are in concordance with the previously obtained results from the other authors (Hancock, 1954; Hodgson, 1981; Knezevic, 1983), who also established a linear increase of time needed for grazing, as a result of decrease in quantity and quality of available pasture. Drought in summer period conditioned the

biomass reduction on both types of pastures, therefore differences in the time spent on grazing were not significant. The time spent on lying was significantly higher ($P < 0.05$) for all the three grazing periods on the Pasture B belonging to the *Lolium-Cynosuretum* vegetal association. The cows spent significantly more time ($P < 0.05$) on 'roaming' on the Pasture A belonging to the *Arrhenatheretum medioeuropaeum* vegetal association, than on the Pasture B belonging to the *Lolium-Cynosuretum* vegetal association. The pasture did not have any significant influence on the time spent on insect repelling.

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Table 1

Biomass production on two types of upland pastures (DM) during grazing season

	Spring dt/ha	Summer dt/ha	Autumn dt/ha
Pasture A	15.9	15.2	5.5
Pasture B	19.9	15.7	6.5

Pasture A = natural unreclaimed pasture belonging to the *Arrhenatheretum medioeuropaeum* vegetal association

Pasture B = intensive pasture by manuring and reseeding belonging to the *Lolium-Cynosuretum* vegetal association

Table 3

Behaviour of cows during grazing season on two types of upland pastures given in % of four activities.

Activity	Spring		Summer		Autmun	
	Pasture A	B	Pasture A	B	Pasture A	B
Grazing	53.00	44.43	37.67	35.56	43.89	27.97
Lying	12.36	41.57	20.51	41.09	14.40	46.45
Roaming	3.40	13.20	39.11	21.63	40.56	23.33
Ins. rep.	1.24	0.80	2.71	1.72	1.15	2.25

Table 2

Botanical composition of Pasture A and Pasture B given in % of DM of grass, legumes and other plants (herbaceous plants, weeds, etc.)

	Grass %	Legum. %	Other %	%
Pasture A	61.26	7.97	30.77	100
Pasture B	66.40	13.49	20.11	100