

DATA RELATED TO FLORISTIC COMPOSITION AND GRAZING VALUE OF A *FESTUCA RUBRA*-*NARDUS STRICTA* PASTURE, FROM THE “DRAGOȘ-VODĂ”, VÂNĂTORI-NEAMȚ BISON RESERVE

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Abstract

Forage grass resources from the „Dragoș-Vodă”-Neamț bison reserve are represented by the permanent pasture of „*Festuca rubra* – *Nardus stricta*” (4 ha). The researches aimed the mapping of this pasture, in order to establish exactly the floristic composition and its pastoral value, the double meter method being thus used. The pasture comprises mostly plants from Gramineae family (93.2%, 11 taxons), the highest participation being reached by *Festuca rubra* (19.87%) and *Nardus stricta* (19.04%). The latter species became co-dominant, due to the intensive grazing, another grass species being disadvantaged (*Agrostis tenuis* – 12.13%). Leguminosa family included 4 species - *Trifolium pratense*, *Trifolium repens*, *Lotus corniculatus*, *Anthyllis vulneraria* (3.56%). Diverse plants category comprised 12 species. Grazing value was obtained through the combined usage of data related to specific contribution and specific quality index, reaching a level of 49.79 (“AVERAGE” value). The studied pasture could support feeding of 1.24 UVM/ha. The intensive grazing and ground flattening contributed to the floristic composition degradation, compared to the structure of the vegetal layer from the Vânători-Neamț park. Pasture value allows its further usage, with some adjustments: rotation of grazing areas; over seeding with valuable fodder species; supplemental feeding of bison if grazing does not fulfill the nutritional requirements.

Key words: pasture, *Festuca Rubra*, *Nardus stricta*, grazing value, bison

INTRODUCTION

European Bison nutrition and feeding still have unknown areas, mainly due to the special digestion peculiarities of this species, knowing these animals preference for high amounts of crude fiber ingestion. There are certain bison reserves in Romania and the feeding within is done in approximately the same way as for domestic ruminants. However, it was necessary to better know the available feeding resources in such reserves, in order to estimate then their nutritional value. The main goal of our researches was to assess the botanic composition of the pastures from “Dragoș Vodă” natural park and bison reserve, part of the Tg. Neamț – Romania Forestry Authority.

MATERIALS AND METHODS

An identification of pasture botanical composition is needed to calculate the pastoral value. The specific methods are named the double linear metering or the geobotanic methods and were recommended by certain authors [9, 13]. We used the double linear metering method, which comprises the notifying of any vegetal species occurring in 100 points across a double meter. Readings have been done at each 4 cm, during 2 repetitions. The sum of points where any plant could occur represents the *specific frequency*, and could range from 0 to 100 [3, 4]. *Specific contribution* (specific abundance) is given by the percentage ratio between specific frequency and the sum of specific frequencies which characterize the species found in 100 spots, according to the mathematical relation:

$$C.s.(%) = \frac{F.s.}{\sum F.s.} \times 100, \text{ in which:}$$

C.s. = specific contribution; F.s. = specific frequency; \sum F.s. = sum of specific frequencies.

Feeding value of species from pasture is expressed through the *specific quality index* (I.s.), which is granted in accordance with the table 1 details.

Table 1 – Correlation between specific quality index and feeding value of botanic species (Vintu et al., 1995, 2004)

Specific quality index (S.I.)	Feeding value	Representative species
5	Excellent	<i>Phleum pratense</i> , <i>Festuca pratensis</i> , <i>Dactylis glomerata</i> , <i>Lolium multiflorum</i> , <i>Medicago sativa</i> , <i>Lolium perene</i> etc.
4	Very high	<i>Poa pratensis</i> , <i>Medicago lupulina</i> , <i>Trifolium repens</i> , <i>Trifolium pratense</i> etc.
3	Good	<i>Agrostis capillaris</i> , <i>Festuca rubra</i> , <i>Festuca nigrescens</i> , <i>Lotus corniculatus</i> , <i>Poa alpina</i> etc.
2	Average	<i>Alchemilla vulgaris</i> , <i>Phleum montanum</i> , <i>Poa annua</i> , <i>Plantago lanceolata</i> , <i>Plantago major</i> , <i>Plantago media</i> , <i>Trifolium montanum</i> , <i>Taraxacum officinale</i> etc.
1	Mediocre	<i>Briza media</i> , <i>Festuca ovina</i> , <i>Anthoxanthum odoratum</i> , <i>Potentilla erecta</i> etc.
0	Without value	<i>Nardus stricta</i> , <i>Deschampsia caespitosa</i> , <i>Deschampsia flexuosa</i> , <i>Carex leporina</i> , <i>Vaccinium myrtillus</i> , <i>Equisetum arvense</i> etc.

This index (Is) essentially refers to the organic and mineral nutrients from plants, to their nutritional and biological value, to their palatability. It is expressed through grades from 0 la 5. Those species receiving an 1 to 5 quotation could be considered for feeding usage [1, 2]. *Pastoral value* (V.p.) computation, for any studied pasture is done through the data issued from specific contribution and specific quality index calculation, in accordance with the relation below [7].

$$VP = \sum_{i=1}^n (CS_i \times IS_i) / 5'$$

in which CS_i – estimation of specific contribution through the specific volume;
IS_i - specific index;

i – species; n – species amount;
5 – maximum possible grade

Pastoral value (V.p.) calculation is requested in order to asses the *grazing capacity* (C.p), which could be obtained through the relation below [5, 6].

C.p. = V.p. X c (UVM/ha), in which c represents a coefficient which could range from 0.02 to 0.03 for the pastoral value calculated through double linear metering.

Assessment of permanent pasture production potential and quality could be done using the *Specific contribution* (C.s.) and *Grazing capacity* (C.p) values, as presented in table 2.

Table 2 – Assessment of pasture productivity and quality, in accordance with the pastoral value (V.p.) (Iacob et al., 2004)

Pastoral value (V.p.) evaluated through the double metering method	Grazing capacity (C.p) (UVM / ha) for permanent pastures	Pasture classifying
75-100	> 2-3	Very good
50-75	1 – 2	Good
25-50	0.5 – 1	Average
5-25	0.2 – 0.5	Poor
< 5	< 0.2	Degraded

RESULTS AND DISCUSSIONS

The grassy feeding resources are represented by the vegetal species from the permanent pasture, sized 4 hectares and localized within the surrounded perimeter of Vânători Neamț bison reserve. As a consequence of its usage way, the permanent meadow could be considered as pasture – it comprises species of small or average height and soils with low fertility. The European bison permanently graze this pasture, knowing its digestive physiology peculiarities.

Identification of pasture vegetation was done by passing across the entire studied territory. Botanic mapping was done through the double linear metering method, several readings being done for each biocenoses, in order to identify the specific contribution of

each species, reported to the total amount of recordings.

The pasture within the studied reserve could be classified as mountain pasture, of *Festuca rubra* - *Nardus stricta* type. This kind of meadow realizes a passage from *Festuca rubra* to *Nardus stricta* pastures. Certain pedologic features are given by pronounced soil acidity, moisture and compaction due to intensive grazing done by bison.

The pasture from Dragoș Vodă – Vânători Neamț bison reserve is mainly composed of plants belonging to *gramineae* botanic family (93.72% of its floral composition, 11 taxons). Main identified species and their specific contribution are presented in table 3 and fig. 1.

Table 3 – Floral composition, pastoral value and grazing capacity of the *Festuca rubra*-*Nardus stricta* permanent pasture, from Vânători-Neamț natural Park

Species	Specific frequency (n)	Specific contribution (Cs) (%)	Specific quality index (Is)	Pastoral value (Vp)	Grazing capacity (Cp) (UVM/ha)
Gramineae (11 species)	448	93.72		235.15	1.24
<i>Festuca rubra</i>	95	19.87	3	59.62	
<i>Nardus stricta</i>	91	19.04	0	0.00	
<i>Agrostis tenuis</i>	58	12.13	3	36.40	
<i>Festuca pratensis</i>	38	7.95	5	39.75	
<i>Cynosurus cristatus</i>	39	8.16	3	24.48	
<i>Dactylis glomerata</i>	32	6.69	5	33.47	
<i>Agrostis rupestris</i>	31	6.49	3	19.46	
<i>Poa media</i>	25	5.23	3	15.69	
<i>Sieglingia decumbens</i>	21	4.39	0	0.00	
<i>Anthoxanthum odoratum</i>	15	3.14	1	3.14	
<i>Phleum pratense</i>	3	0.63	5	3.14	
Legumes (4)	17	3.56		12.76	
<i>Trifolium pratense</i>	7	1.46	4	5.86	
<i>Trifolium repens</i>	5	1.05	4	4.18	
<i>Lotus corniculatus</i>	4	0.84	3	2.51	
<i>Anthyllis vulneraria</i>	1	0.21	1	0.21	
Diverse plants (12 species)	13	2.72		1.05	
<i>Arnica montana</i>	1	0.21	1	0.21	
<i>Viola declinata</i>	1	0.21	0	0.00	
<i>Hieracium aurantiacum</i>	1	0.21	0	0.00	
<i>Potentilla ternata</i>	1	0.21	1	0.21	
<i>Alchemilla vulgaris</i>	1	0.21	2	0.42	
<i>Geum montanum</i>	1	0.21	0	0.00	
<i>Pedicularis verticillata</i>	1	0.21	0	0.00	
<i>Prunella vulgaris</i>	1	0.21	0	0.00	
<i>Antennaria dioica</i>	1	0.21	0	0.00	
<i>Urtica dioica</i>	1	0.21	0	0.00	
<i>Rumex sp.</i>	2	0.42	0	0.00	
<i>Rubus hirtus</i>	1	0.21	1	0.21	
		100.00		49.79 "AVERAGE" value	

Among gramineae, most important were those species which gave pasture typology: *Festuca rubra* (19.7% among all taxons) and *Nardus stricta* (19.04% from all species). Due to intensive grazing, *Nardus stricta* became co dominant, against a species with high feeding quality (*Agrostis tenuis* – 12.13% of all species). However, the occurrence of certain species presenting excellent feeding value (*Festuca pratensis*, *Dactylis glomerata*) in proportions greater than 7-8% in spontaneous flora, contributed to counter balance the qualitative depreciation of pasture, due to *Nardus stricta* - *Festuca rubra* co-participation.

Legumes family included 4 species - *Trifolium pratense*, *Trifolium repens*, *Lotus*

corniculatus, *Anthyllis vulneraria* summing a specific contribution of 3.56% within the floral composition of the studied pasture.

Twelve species were comprised within the *Diverse plants* category, most of them preferring low or moderate soils fertility and well water provisioning. Most frequent are the species which indicate soil acidity, such as: *Prunella vulgaris*, *Alchemilla vulgaris*, *Antennaria dioica*. Wild blackberry played a relevant role in pasture composition, being thus appreciated by bison, knowing it remains green all across the year, especially under the snow layer. It could serve as completion for dried forages used during the cold season.

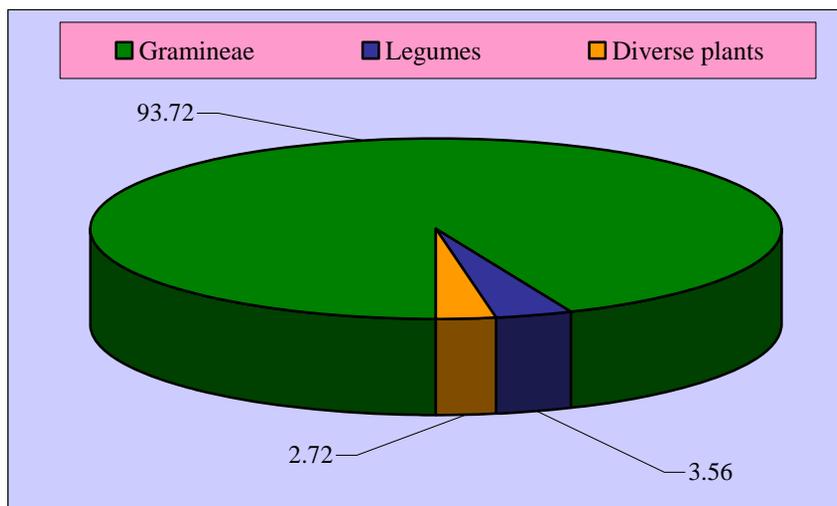


Fig. 1 – Participation of the 3 botanic families in floral composition of *Festuca rubra-Nardus stricta* pasture, studied within the Vânători-Neamț bison reserve

Pastoral value was calculated at the 49.79 level (“AVERAGE” value), situated quite close to the lower limit of the interval requested for other grading - “GOOD” (50-75 values).

Assessment pasture productivity and quality was done using the pastoral value (V.p.) and grazing capacity. Thus, the *Festuca rubra-Nardus stricta* pasture from the “Dragoș-Vodă” reserve (4 ha) could allow the feeding of 1.24 UVM/ha.

It could be concluded that intensive grazing and field compaction contributed to

pasture composition changing, through its degrading, compared to the vegetal cover structure in Vânători-Neamț park. Despite these, the composition of the studied pasture allows its usage, under some circumstances:

1. rotation of grazing areas, using electric fences
2. re-seeding of pasture, in order to increase the proportion of gramineae and legumes with high feeding value, despite the species with poor or without feeding value

3. supplemental feeding of animals, if grazing does not assure the nutritional requirements of bison in the reserve.

CONCLUSIONS

The meadow found in the “Dragoș-Vodă” bison reserve could be classified as mountain pasture, of *Festuca rubra* - *Nardus stricta* type.

Its composition consisted in gramineae (93.72%), legumes (3.56%) and different other species (2.72%).

These proportions and specific quality indexes contributed to pasture classifying in the average grading (pastoral value=49.79).

Intensive grazing induced terrain compaction, moisturizing and also to pasture degradation, through an increase in *Nardus stricta* participation percentage.

It is recommended to recover the pasture through certain zootechnical and agrotechnical methods, prior to its intensive usage as feeding source.

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