EVALUATION OF COW MILK PRODUCTION DURING THE GRAZING PERIOD OF NATURA 2000 GRASSLAND HABITATS

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Abstract. *In livestock development strategy, a country's permanent grasslands playan important role. After the pastoral value, green mass production and animal load of the Natura 2000 grassland habitats were broadly established, it was possible to assess milk production per hectare as the final productivityoutcome. Normal vegetation habitats 1530*, 2340*, 6150, 6210, 6240*, 62CO* and 6520 averaged 5.58 t/ha green matter (GM) with a loading of 0.57 cattle units (LU) per hectare in 150 days of grazing, a pastoral value (PV) of 38.1 and finally 3,250 liters of milk/hectare. Through the degradation of the grassy carpet, a part of Habitats 6150, 6240 and 6520 achieves approx. three times less namely 1.65 t/ha GM in 140 days of grazing with 0.18 LU/ha and 14.6 PV providing 1,160 l/ha cow's milk. The most valuable habitat is 6520, Mountain grasslands that produce almost 6,000 l/ha of cow's milk at 65 PV and 11.75 t/ha GMandtheleast productive is Habitat 2340* Pontic continental dunesthat produce 870 l/ha of cow'smilk. These data are used to draw up the arrangements and development strategy of the pastoral heritage.*

Keywords: grasslands habitats, pastoral value, green mass production, milk production

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1. Introduction

Expressing grassland productivity through grass production (green mass, hay, etc.) and fodder quality (pastoral value, protein content, useful minerals, digestibility, etc.) is important but not sufficient for livestock grazing use [10].

Duringgrazingseason, in additiontothespeciesandcategory of animals, climatic factorsintervene, especiallytheairtemperature at altitude, withdaysreaching over 10 degrees Celsius, whichisequaltothe optimal grazingtime [4].

Green mass productionanddailyandseasonalrequirementdirectlyinfluencesthe optimal loadwithanimalsexpressed in livestockunits per hectare. [11].

Finallyexpressingtheproductivitythrough animal productssuch as live weightgain (meat), milk, wool, etc., includesproductionwithfeed quality, climatic andgrowingconditions [10].

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2. Materials and Methods

For the assessment of animal production in the first phase, the pastoral value of the habitats was established based on floristic surveys [6, 8, 9].

Using the same method, the production of green mass was determined by which the optimal load with animals and the duration of the grazing season were determined according to the evolution of the temperature on the altitude.

Finally, the evaluation of milk production coefficients, based on pastoral value per altitude established in long-term experiences with dairy cows, were used [5, 7].

A total of 54 locations from the Danube Delta to the Carpathians were studied: **Plains:** Muntenia, Oltenia, Banat, Crişana**; River basins:** Suceava, Chinejii-Prut, Siret-Tecuci, Crişul Negru, Valea Ierului, Danube Delta**; Hills, Plateaus, Gorges:** North Dobrogean, Babadag, Casimcea, Lăzăreni, Transylvania, Mureş**; Lowmountains:** Macin**;**

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EasternCarpathians

Mountains: *Rodna, Rarău, Stânişoarei, Baraolt, Perşani, Ciucaş*

Areas - Bazin Râmnicu Sărat: *Vrancei*

- BraşovCounty: *Perşani, Ciucaş, Piatra Craiului, Bârsei*

SouthernCarpathians

Mountains: *Bucegi, Ţarcu, Godeanu, Cerna*

Areas– BraşovCounty: *Bucegi, Făgăraş*

- Sadului Valley Gorge: *Cibin, Lotru*
- Sebeşului Valley: *Cibin, Sebeş, Şureanu*
- Oltenia Subcarpathians: *Parâng, Vâlcan*
- Northern Oltenia: *Căpăţânii, Lotrului, Parâng, Vâlcan, Godeanu*
- Timiş River Gorge: *Ţarcu, Godeanu*

Western Carpathians

Mountains:*Poiana Ruscă,Codru Moma,Vlădeasa,Pădurea Craiului, Plopiş*

Areas- Timiş River Gorge: *Semenic, Poiana Ruscă*

- Apuseni Natural Park: *Bihor, Gilău, Vlădeasa*

The cenotaxons (associations, alliances, etc.) established in general accordingtothephytosociologicalprinciplesandcriteria of BRAUN - BLANQUET

andfollowers, wereincluded in the Natura 2000 Habitatsquitedifficult, althoughwehad an explicit guideavailable [1, 2, 3, 12].

The main cause of cenotaxons inclusion in the habitats was the improper management of these grasslands which were invaded by worthless plants, especially *Nardus stricta* in the mountain area, *Botriochloa ischaemum* and *Pteridium aquilinum*in the hillarea, *Deschampsia caespitosa*, *Juncus* sp., *Carex*sp., on lands with excess moisture and many others.

The most economically important Natura 2000 habitats were the following:

1530* - Pannonic salt-steppes and marshes;
2340* - Pannonic inland dunes;
6150 - Siliceous alpine and boreal grasslands;
6210 - Semi-natural dry grasslands and scrub land facies on calcareous substrates;
6240* - Sub-pannonic steppie grasslands;
62CO* - Ponto-sarmatice steppes;
6410 - Molinia meadows on calcareous, peaty or clayey-silt-laden soils;
6440 - Aluvial meadows of river valleys of the Cnidium *dubii*;
6510 - Lowland hay meadows (*Alopecuruspratensis, Sanquisorba off.*)
6520 - Mountain grasslands

The transformation coefficients established for altitude were applied to the average indices of pastoral value (Table 1)

Table 1. Conversion coefficient of pastoral value in milk production depending on altitude and growing conditions

Altitude (m)		Grazing season duration (days)	Transformation coefficients	
			Not irrigated	Meadows*) Irrigated*)
2,000 - 2,200		55	35	-
1,800 - 2,000		70	44	-
1,600 - 1,800		85	53	-
1,400 - 1,600		100	62	-
1,200 - 1,400		115	71	-
1,000 - 1,200		130	80	-
800 - 1,000		145	89	-
600 - 800		160	98	98
400 - 600		175*	98	107
200 - 400		190*	98	116
0 - 200		205*	98	125
Gradients / 100 m	**600 - 2,200**	**- 7,5**	**- 4,5**	**0**
	0 - 600	**- 7,5**	**0**	**- 4,5**

*) In conditions of irrigated land, river meadows or years with rainy summers.

The duration of the optimal grazing season at altitude decreases by 7.5 days/100 m, being equal to the duration of average daily air temperatures of 10 degrees Celsius [4].

For lower altitudes, in plains and hills this duration is shorter due to less precipitations and periods of drought, being longer in river meadows, rainy years or under irrigated land conditions.

The conversion coefficients in milk production by multiplying with the pastoral value depending on the altitude decrease by 4.5/100 m in the conditions of our country, respectively from 125 on the 0-200 m gap in areas with guaranteed humidity, upto 35 on the floor higher mountain (2,000-2,200 m) to where they graze with the animals.

3. Results and Discussions

Grassland habitats in Romania are spread from the Black Seashore (10-20 m) to the highest peaks of the Romanian Carpathians (2,450 m alt.) (Table 2).

Table 2. Spreading, duration of grazing, green mass production (GMP) and animal loading of grasslandhabitats

Habitat	Altitudinal gap (m)	Grazing Season duration (days)	Green mass production GMP		Animal loading (LU/ha)
			t/ha	%	
A. Normal vegetation habitat					
1530*	20 - 100	160	4.17	75	0.40
2340*	10 - 100	160	1.32	24	0.13
6150	1,550 - 2,450	70	2.66	48	0.58
6210	200 - 1,200	170	8.24	148	0.70
6240*	20 - 400	175	7.34	132	0.65
62CO*	20 - 400	160	3.55	64	0.31
6520	200 - 1,850	150	11.75	211	1.21
AVERAGE		**150**	**5,58**	**100**	**0.57**
B. Degradedvegetation habitat					
6150	1,450 - 2,210	75	1.70	103	0.35
6210	200 - 980	175	1.21	73	0.11
6240	100 - 800	175	1.54	93	0.14
6520	480 - 1,900	130	2.16	131	0.26
AVERAGE		**140**	**1,65**	**100**	**0.18**
Dif. A - B	+ ; -	+ 10	+ 3.93	x	+ 0.39
	%	107	338	x	317

The optimal length of thegrazingseasonis 70 days in Habitat (H) 6150 to 175 days in Habitats 6210 and 6240 with an average length of 140-150 days.

The average green mass production (GMP) in habitats with appropriate floristic composition was assessed at 5.58 t/ha GMP with a minimum of 1.32 t/ha GMP at H 2340 and a maximum of 11.75 t/ha GMP at H 6520.

Habitats with degraded grass (6150, 6210, 6240 and 6520) have an average of 1.65 t/ha GMP, respectively 3.4 times less compared to habitats with normal floristic composition.

Animal loading is similarly presented, which was assessed at 0.57 LU/ha in normal grasslands and barely 0.18 LU/ha in degraded grassland habitats.

The pastoral value on the basis of which the milk production was calculated also shows very different values depending on the grass condition and the type of habitat (Table 3).

Table 3. Evaluation of cow milk production of grassland habitats

Habitat		Pastoral value		Milkcoefficient	Milkproduction	
		ind.	%	(ind.)	L/ha	%
A. Normal vegetation habitat						
1530*		33.6	88	62	2,080	64
2340*		14.0	36	62	870	26
6150		36.9	97	44	1,620	50
6210		43.6	114	104	4,530	139
6240*		46.1	121	107	4,930	152
62CO*		27.8	73	98	2,720	84
6520		65.0	171	92	5,990	184
AVERAGE		**38.1**	**100**	**92**	**3,250**	**100**
B. Degraded vegetation habitat						
6150		18.9	129	47	890	76
6210		9.2	63	107	980	84
6240		12.8	88	107	1,370	118
6520		17.6	121	80	1,410	122
AVERAGE		**14.6**	**100**	**86**	**1,160**	**100**
Dif.	+ ; -	+ 23.5	x	+ 6	+ 2,090	x
A - B	%	268	x	107	280	x

On average, normal habitats have 38.1 PV with large differences from 14 PV (H 2340) to 65 PV (H 6520).

In degraded habitats, 14.6 PV was evaluated from 9.2 (H 6210) to 18.9 PV (H 6150), considered as very weak.

Obviously, milk production is also directly proportional to the pastoral value, being on average 3,250 L/ha in normal habitats and 1,160 L/ha in degraded ones, respectively 2.8 times lower.

The highest production of almost 6,000 L/ha of cow's milk was assessed at H 6520 (Mountain grasslands) and the lowest of 870 L/ha at H 2340 (Pannonic inland dunes).

Assessments of GMP, PV indices and milkyield of grassland habitats mainly served for their general characterization.

Concretely, on the territory in the area under study for the pastoral development projects, the inventory and mapping of the surfaces of the existing habitats to which the values evaluated in this paper will be applied.

Conclusions

(1) Permanent grassland habitats in Romania, with a normal grass carpet can provide on average 3,250 litres of cow's milk per hectare;
(2) Degraded habitats due to improper management produce on average 1160 litres per hectare, more than 3 times less than normal ones;
(3)After the inventory and mapping of grassland habitats with the assessment of their productivity, pastoral arrangements can be drawn up with their management on scientific bases.

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