

THE INFLUENCE OF ORGANIC FERTILIZATION ON THE QUALITY OF *AGROSTIS CAPILLARIS* + *FESTUCA RUBRA* NATURAL GRASSLANDS IN THE UPPER BASIN OF THE SUCEAVA RIVER

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The objective of this study is to reveal the qualitative changes caused by organic fertilization in *Agrostis capillaris* L. and *Festuca rubra* L. grasslands in the upper basin of the Suceava River. The study will be used, as a starting point, to identify the necessary measures for the sustainable management of these grasslands. The study was conducted during several field trips between 2009 and 2011, in Poiana Cerbul, Putna village, where we set up a fertilization experiment comprising five variants and three repetitions. Based on ADF and NDF content of feed, quality values were calculated: RFV, NEL and TDN. Using organic fertilization we have achieved an increase of the forage quality, with significant differences, distinct significant or very significant compared to the control variant.

Key words: organic fertilizer, feed quality, ADF, NDF

INTRODUCTION

The *Festuca rubra* and *Agrostis capillaris* meadows are a valuable source of animal feed in the mountains.

Proper management of these grasslands involves a series of actions aiming to improve soil fertility. Among these, organic fertilization contributes, on the one hand, to increased production and, on the other hand, to improve its quality [1] [4] [5] [9].

In conducting the research on the flora and vegetation of natural pastures in the upper basin of the Suceava River, we assumed that, in order to effectively capitalize on natural pastures, without disturbing equilibrium established in the structural and functional grassland ecosystems, it is mandatory to establish/evaluate the influence of organic fertilization the feed produced [3] [6] [10].

Therefore, during our research, we aimed to achieve the following objectives:

- the influence of organic fertilization on forage quality: ADF content (acid detergent

- fibre) and NDF (neutral detergent fibre), RFV (relative feed value), NFC extractive (non-fibrous carbohydrates), NEL (net energy lactation), TDN (total digestible nutrients);

- identifying the optimum amount of manure that can be used to fertilize *Agrostis tenuis* L. + *Festuca rubra* L. meadows.

MATERIAL AND METHOD

In order to achieve our goals, the study has undergone the following stages:

In order to achieve our objectives, we have organized a single factor experience comprising five variants and three repetitions on a *Agrostis capillaris* and *Festuca rubra* meadow of the village Putna, Suceava County, situated at 47°04'41.25" North latitude, 25°03'29.73" East longitude and 611 metres altitude.

We have studied the influence of organic fertilization on forage quality, through the study of four doses of manure, in the following fertilization variants: V1 – control (unfertilized), V2 – 20t/ha annually, well fermented manure, V3 – 30t/ha annually, well fermented manure, V4 – 40t/ha annually, partially fermented manure (slightly fermented), V5 – 50t/ha annually, partially fermented manure (slightly fermented);

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The manure fertilization took place in early spring, in keeping with the local practice;

The laboratory measurements were performed on feed samples from the first vegetation cycle.

The NDF content (% of DM) and ADF (% of DM) was determined using the Van Soest method.

RFV has been calculated using the following formula [8]:

NEL and TDN content were calculated using the following formulas [2]:

$$NEL = 1,085 - 0,0124 \cdot ADF \text{ (Mcal/kg)}$$

$$TDN = 4,898 + 89,796 \cdot NEL \text{ (\%)}$$

$$NFC = 100 - (PB + GB + CenB + NDF) \text{ (\%)}$$

RESULTS AND DISCUSSIONS

The use of manure positively influenced the NDF content of feed. The aggregated data (Table 1) on NDF content of the forage outlines the following aspects:

- Organic fertilization resulted in reductions of the NDF content compared to the control;

- The lowest NDF value was registered in the V4 variant: 51.91% in 2010 and 50.48% in 2011.

- The highest NDF content was determined in the V1 control variant, in both years of the study;

- Very significant reductions of the NDF content were recorded in the V5 variant: a 52.29% value in 2010, and in the V3 variant, amounting to 53.11% in 2011.

ADF values of the production content reveal the following characteristics:

- Organic fertilization decreased the ADF content compared to the control variant (Table 1);

- The lowest ADF content was recorded in the V5 variant: 48.36% in 2010, and the V2 variant: 38.74% in 2011;

- The highest ADF content was determined in the V1 unfertilized variant: 55.53% in 2010 and 48.09% in 2011;

- Very significant reductions of the ADF contents were also recorded in the other variants.

Manure also positively influenced the relative feed value of green mass, all fertilized variants recording very significant increases in relation to the control variant (Table 1). The highest RFV value was recorded in the V4 variant: 106.38 in 2011. Lower values were registered in the V2 and V3 fertilized variants, in 2010, and V2 and V5, in 2011. Statistically increases of the RFV value were registered in all fertilized variants in both years of study (Table 1).

In both years of study, regressions of the applied manure doses and of the NDF and ADF contents were negative and regressions of the applied manure doses and RFV values were positive (Figure 1).

The experimental data highlights the fact that manure fertilization results in a higher non-fibrous carbohydrates (NFC) content of the produced feed.

Table 1 The influence of organic fertilization on the NDF and ADF content and the RFV

Variants	2010			2011		
	NDF (%DM)	ADF (%DM)	RFV	NDF (%DM)	ADF (%DM)	RFV
V ₁ (Mt)	60.05 ^{Mt}	55.53 ^{Mt}	70.78 ^{Mt}	59.68 ^{Mt}	48.09 ^{Mt}	80.17 ^{Mt}
V ₂	55.68	50.22 ^{ooo}	83.18*	56.45 ^{ooo}	38.74 ^{ooo}	96.79***
V ₃	54.53	51.59 ^{ooo}	83.10*	53.11 ^{ooo}	39.70 ^{ooo}	101.58***
V ₄	51.91 ^o	50.76 ^{ooo}	88.97**	50.48 ^{ooo}	40.02 ^{ooo}	106.38***
V ₅	52.29 ^o	48.36 ^{ooo}	92.43**	58.12 ^{oo}	40.30 ^{ooo}	92.04***
DL	5%	5.94	1.57	10.92	1.07	1.91
	1%	8.64	2.29	15.89	1.55	2.78
	0,1%	12.96	3.43	23.84	2.33	4.17

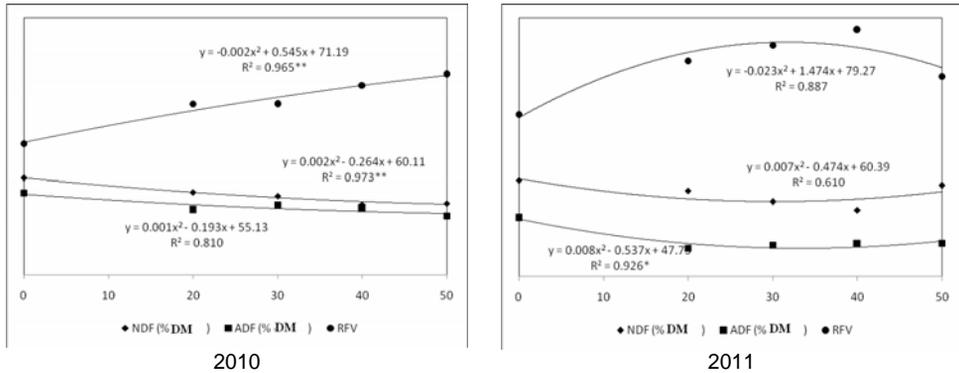


Figure 1 Correlations between the applied manure doses and quality parameters NDF, ADF and RFV

Thus, the V2, V3 and V4 fertilized variants recorded higher NFC values compared to the control variant (Table 2). The highest NFC value was observed in the V4 version: 28.13% DM, in 2010, and 27.80% DM, in 2011. Among the fertilized variants, the lowest NFC content was registered in the V5 version: 24.72% DM, in 2010, and 18.36% DM, in 2011.

The experimental results (Table 2) confirm the beneficial influence of organic fertilization on forage quality, as all fertilized variants recorded very significant increases of the net energy lactation (NEL), compared to the control variant. The highest NEL value

was found in the V5 version: 0.49 Mcal/kg DM, in 2010, and 0.59 Mcal/kg DM, in 2011. Very significant increases of the NEL value were recorded in V2, V3 and V4 fertilized variants, in 2011.

Micro and macro elements contained in organic fertilizers have a very significant influence on the content of total digestible nutrients (TDN) of the produced feed.

This effect was observed in the study, all fertilized variants registered higher TDN parameter values than the control variant (Table 2).

Table 2 The influence of organic fertilization on the NFC, NEL and TDN content

Variants	2010			2011		
	NFC (% DM)	NEL (Mcal/kg DM)	TDN (% DM)	NFC (% DM)	NEL (Mcal/kg DM)	TDN (% DM)
V ₁ (Mt)	23.74 ^{Mt}	0.40 ^{Mt}	40.50 ^{Mt}	22.51 ^{Mt}	0.49 ^{Mt}	48.78 ^{Mt}
V ₂	25.06 ^{***}	0.46 ^{**}	46.41 ^{***}	23.66 ^{***}	0.60 ^{***}	59.19 ^{***}
V ₃	25.68 ^{***}	0.45 [*]	44.89 ^{***}	26.50 ^{***}	0.59 ^{***}	58.12 ^{***}
V ₄	28.13 ^{***}	0.46 [*]	45.81 ^{***}	27.80 ^{***}	0.59 ^{***}	57.77 ^{***}
V ₅	24.72 ^{***}	0.49 ^{**}	48.48 ^{***}	18.36 ⁰⁰⁰	0.59 ^{***}	57.45 ^{***}
DL	5%	5.93	1.75	1.19	0.05	0.15
	1%	8.62	2.55	1.74	0.07	0.22
	0,1%	12.94	3.82	2.60	0.10	0.33

The highest TDN value was obtained in the V5 version: 48.48% DM, in 2010, and in the V2 variant: 59.19% DM, in 2011. The smallest raise of the TDN value was obtained from version control.

The general trend has been: growing NFC values, NEL and TDN, with the increase of the applied manure dose (Figure 2).

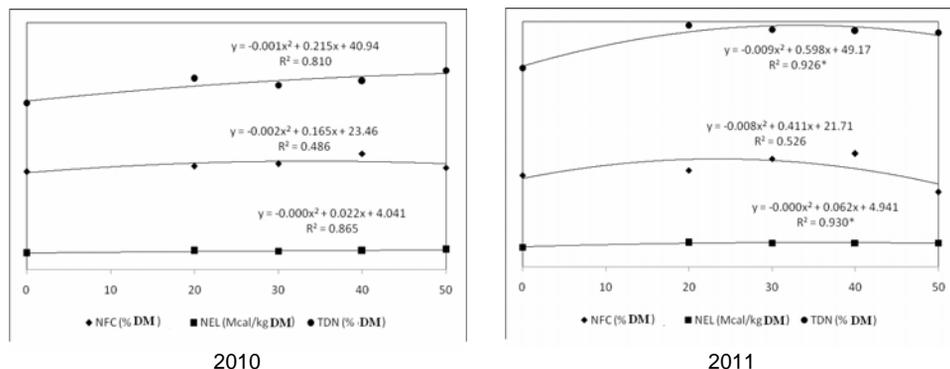


Figure 2 Correlations between the applied manure doses and quality parameters NFC, NEL and TDN

CONCLUSIONS

Study results revealed that through the use of the organic fertilizer high quality feed is obtained, regardless of the degree of decomposition of the manure or the administration dosage.

The use of manure determined lower NDF and ADF values, which resulted in obtaining a higher relative feed value (RFV) of the obtained yields and, therefore, a greater palatability and digestibility of the feed.

All these results recommend the use of manure as fertilizer on *Agrostis capillaris* and *Festuca rubra* grasslands.

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