

## THE INFLUENCE OF THE APPLICATION OF DIFFERENT FERTILIZATION METHODS ON THE PRODUCTIVITY OF THE MEADOWS IN THE MIERSIGULUI PLAIN

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### **Abstract**

*By increasing the production of grasslands will also increase animal production and thus the welfare of their owners, the rural community in general being closely linked to agro-zootechnical production which is the main source of income. The crawling of the meadow in the Miersigului Plain with the help of sheep brings improvement, but it is statistically inferior to the use of fertilizers.*

**Key words:** meadow, sheep, sheepfolding, fertilization, production

### **INTRODUCTION**

From an ecological point of view, a rational and controlled exploitation of the meadows, leads to an increase of the biodiversity of the vegetal carpet and to the protection of the soil degradation, and the organization of a rational grazing creates a pleasant image of neat appearance of the meadows (Moisuc A et al, 2001, Vîntu V et al, 2004. White T.A. et al, 2004). These results must be obtained following international standards. The Romanian agricultural policy cannot ignore the targets assumed in order to comply with the standards and regulations set by the Paris Agreement on June 1, 2017 (Chereji A.I et al., 2019).

The quality of the pastures is reflected in the livestock sector and, above all, in the breeding of sheep. Sheep may use feed from permanent meadows, sometimes inaccessible to other farm animal species, agricultural by-products and other occasional sources less than 9.2% being concentrated fodder (Maerescu C.M. et al., 2018).

The welfare of pastures is also a factor influencing the welfare of animals. Animal welfare situation in Romania is on a slowly improving path (Maerescu C.M. et al, 2019). A well-developed animal breeding gradually gives a clear background for the idea of agro-tourism in the villages from Miersigului Plain (Moșoia A, 2011).

Sheepfolding is a way of fertilizing meadows that is done directly by animals. Thus, the animals, which are kept closed during the day's rest period, but especially during the night, leave significant amounts of liquid

and solid manure on the ground. Such lands are often found around saivans or sheepfolds. There is therefore the problem of using this manure in order to increase the value of the meadows, the productivity, all the more so as the quantity of these manure is considerable. In order to carry out the fertilization by sheepfolding, the animals are kept for several nights on the same area, in some fenced places, called sheepfolds.

The area of the sheepfold is calculated in relation to the species or number of animals:

$$S = N \times s$$

Where: - s is the area reserved for an animal;

- N is the number of animals in the herd.

Sheepfolding is carried out throughout the grazing season with an intensity of maximum 2 - 3 nights a sheep / 1m<sup>2</sup> on meadows with valuable vegetal carpet, or 4 - 6 nights a sheep / 1m<sup>2</sup> on degraded meadows. The sheepfolding is performed with all animal species, returning as equivalent 2-3 nights 1 UVM / 6m<sup>2</sup> on valuable meadows or 4-6 nights on degraded meadows. Exceeding the threshold of 6-8 nights a sheep / 1m<sup>2</sup> or 1UVM / 6m<sup>2</sup> leads to the accentuated degradation of the vegetal carpet by the appearance of the species of trophic weeds (stevia, nettle, etc.) as well as to the pollution of waters, soil, landscape, animal diseases and other disadvantages. During the nights when the sheepfolding is carried out, sufficient quantities of nutrients accumulate, which determine the increase of the percentage of participation in the grass carpet of some very valuable species such as: *Lolium perenne*, *Trifolium repens*, *Trifolium pratense*. (Rotar I., Carlier L., 2005).

## MATERIAL AND METHODS

The study took place in the Miersig Plain, Miersig locality. Miersigului Plain is located between Crișul Repede and Crișul Negru, it has altitudes between 100 m to the west and 170 m at the contact with Dealurile Lăzărenilor.



Fig.1. Miersigului Plain

The Miersigului Plain comprises two subunits: western, called Câmpia Veljurilor (Pop G, 2005, Mahara Gh, 2003) located towards the Crișurilor canal, with faeoziomuri and a higher and eastern agricultural potential, in which luvisols and cambisols predominate (Gavra C. 2015).

The experiment was performed over 4 years (2018-2021), being organized according to the method of randomized blocks, in four repetitions, with four variants. The surface of the experimental plot was 20 m<sup>2</sup>. Experimental factors performed on unamended agrofund:

N1 - natural meadow;

N2 - fertilization with N<sub>50</sub>P<sub>25</sub>K<sub>25</sub> kg/ha;

N3 - one sheep / m<sup>2</sup> sheepfolding for five nights;

N4 - fertilization with N<sub>100</sub>P<sub>50</sub>K<sub>50</sub> kg/ha;

N5 - fertilization with P<sub>150</sub>P<sub>75</sub>K<sub>75</sub> kg/ha;

The objectives pursued through this research are the following:

- Study of the effect of the application of chemical fertilizers on meadows on the SU (dry matter) crop;
- Study of the effect of sheepfolding on the DS (dry substance) crop and phytodiversity of grasslands;
- Increasing the production (qualitative and quantitative) and implicitly the animal load per ha.

## **RESULTS AND DISCUSSIONS**

The hierarchy established during the four experimental years ranks on the basis of the productions on the first place the variant fertilized with N<sub>100</sub>P<sub>50</sub>K<sub>50</sub> kg / ha, followed by the variant fertilized with N<sub>50</sub>P<sub>25</sub>K<sub>25</sub> kg/ ha, then the variant fertilized by sheepfolding - a sheep /m<sup>2</sup> grazing for five nights. Smaller yields were obtained by the sheepfolding method, the difference of 0.95 t/ha DS being ensured as statistically significant. The reaction of the crop to the application of nitrogen fertilizers in moderate doses is ensured statistically as very significant, compared to the increase in yield obtained in the variant with sheepfolding which is statistically assured as distinctly significant. The average crop increase brought by N during the whole experiment is 12.71 kg DS/kg N, a value that falls within the characteristic range of this type of meadow and shows a good response of the vegetal carpet to the mineral fertilization.

The lowest yields were obtained for the variant fertilized by sheepfolding, respectively a difference of 0.95 t/ha ensured from a statistical point of view as distinctly significant.

Table 1

Production of DS t/ha, unamended, 2018 – 2019

Types	Production of SU t/ha		Production of SU t/ha 2018-2019	Relative yield %	Diference t/ha	Significance
	2018	2019				
N1	3,03	3,53	3,28	100	-	-
N2	3,73	5,13	4,43	135,06	1,15	xxx
N3	3,54	4,54	4,04	123,17	0,76	xx
N4	4,45	5,35	4,90	149,39	1,62	xxx
N5	3,87	4,87	4,37	133,23	1,09	xxx

DL (P 5%) = 0,41

DL (P 1%) = 0,60

DL (P 0,1%) = 0,88

The productivity of a meadow is measured directly by the harvest obtained, expressed either by the production of green mass/ha, or by the production of dry matter / ha, the second method being used in this paper.

The inputs consist in the administration of chemical fertilizers with moderate content and doses of N, P and K, but also in more environmentally friendly alternatives with soil enrichment with nutrients, namely sheepfolding, their effects being analyzed both on unamended terrain and amended.

Table 2

Production of DS t/ha, unamended, 2020 - 2021

Types	Production of SU t/ha		Production of DS t/ha 2020-2021	Relative yield %	Diference t/ha	Significance
	2020	2021				
N1	4,31	3,03	3,67	100	-	-
N2	6,03	4,15	5,09	138,69	1,42	xxx
N3	5,53	4,10	4,81	131,06	1,14	xxx
N4	6,63	4,25	5,44	148,22	1,77	xxx
N5	4,65	3,57	4,11	111,98	0,44	x

DL (P 5%) = 0,44

DL (P 1%) = 0,66

DL (P 0,1%) = 0,9

Table 3

Production of DS t/ha, unamended, 2018 - 2021

Types	Yield of SU t/ha				Yield of DS t/ha	Relative yield %	Diference t/ha	Signific.
	2018	2019	2020	2021				
N1	3,03	3,53	4,31	3,03	3,47	100	-	-
N2	3,73	5,13	6,03	4,15	4,76	137,17	1,29	xxx
N3	3,54	4,54	5,53	4,10	4,42	127,37	0,95	xx
N4	4,45	5,35	6,63	4,25	5,17	148,99	1,70	xxx
N5	3,87	4,87	4,65	3,57	4,24	122,19	0,77	xx

DL (P 5%) = + 0,48

DL (P 1%) = + 0,68

DL (P 0,1%) = + 0,96

Compared to the production of the control variant, the differences obtained are very significant for the N2 and N4 variants, distinctly significant for the N3 and N5.

## CONCLUSIONS

As a result of the applied treatments, the following effects are found regarding the modification of the productivity of the experimental variants:

The studied meadow has a natural productivity of about 3.5 - 4 t/ha SU, which can be significantly improved by various energy inputs;

Sheepfolding results in crop increases, which is statistically significant. However, it is found that:

- does not bring increases in the degree of occupation of grass vegetation, and may even have a repressive effect;

- does not change the weight and the ratio of the present species, similar to the control variant, being registered however a slight decrease of the dominant species;

Fertilization with N<sub>100</sub>P<sub>50</sub>K<sub>50</sub> kg/ha brings the greatest benefits in terms of harvest.

## REFERENCES

1. Chereji A.I., I.A. Chiurciu, C.M. Maurescu, D. Țuțui, I. Chereji Jr., 2019, A (Sustainable) CAP after Brexit and the Paris Agreement. Views from Romania, *Lucrări Științifice Management Agricol*, Vol 21, No 2.
2. Gavra C., 2015, Study regarding the halophilous vegetation of the Crișurilor plain (North Western Romania), *Analele Univ. din Oradea, Fascicula: Ecotoxicologie, Zootehnie și Tehnologii de Ind. Alimentară*, vol. XIV/A, anul 14, Editura Univ. din Oradea, ISSN 1583-4301, pp. 339-349, 8 pg.
3. Gavra C., 2015, Study regarding the paludal vegetation from the middle basin of Crișul Negru River, *Analele Universității din Oradea, Fascicula: Ecotoxicologie, Zootehnie și Tehnologii de Industrie Alimentară*, vol. XIV/B, anul 14, Editura Universității din Oradea, ISSN 1583-4301, pp. 165-175, 8 pg.
4. Maurescu C.M., D. Țuțui, A.I. Chereji, 2018, Evolutions and Perspectives Concerning the Production and Consumption of Sheep Meat in Romania. From a Declining Industry to a Rising Star. *Annals of the University of Oradea, Fascicle: Ecotoxicology, Animal Husbandry and Food Science and Technology*, Vol. XVII/A
5. Maurescu C.M., D. Țuțui, A.I. Chereji, 2019, Leading by Example: The Animal Welfare in the EU. Past Evolutions, Current Trends. Case Study: Romania, *Annals of the University of Oradea, Fascicle: Ecotoxicology, Animal Husbandry and Food Science and Technology*, Vol. XVIII/A
6. Mahara Gh., 2003, Unitățile și subunitățile geografice ale Dealurilor Banatului și Crișanei, *Analele Universității din Oradea, Seria Geografie*, tom. VI, Oradea.
7. Moisuc A., I. Samfira, P. Carrere. 2001. *Pajiști naturale și exploatații ecologice*, Ed. Agroprint, Timișoara.

8. Moșoiu A, 2011, Swot Analysis of Rural Development in the Village Sânmartin, Natural Resources and Sustainable Development, Vol.1 pp.211-216 <https://ssrn.com/abstract=2701929>
9. Pop G., 2005, Definirea, limitele si regionarea Dealurilor de Vest si a Campiei de Vest, Studia UBB, Geographia, L, 1, Cluj-Napoca.
10. Rotar I., Carlier L., 2005, Cultura Pajiștilor, Ed. Risoprint, Cluj-Napoca, ISBN 973-656-8112-1
11. Vîntu V., Al. Moisuc, Gh. Motcă, I. Rotar. 2004. Cultura pașiștilor și a plantelor urajere, Editura „Ion Ionescu de la Brad”, Iași
12. WHITE T. A., 2004, Vegetation diversity, growth, quality and decomposition in managed grasslands. Agriculture, Ecosystem and Environment 10, 73-84