POSSIBILITIES FOR IMPROVING THE MANAGEMENT OF THE MEADOWS FROM BANAT MOUNTAIN AREA

ARMAȘ ANA GINA[1], SAUER MARIA[1], CSIZMADIA ANDREA ȘTEFANA[2], VĂDUVA LOREDANA[2], PETROMAN IOAN[*2]

[1]Development Research Station for Raising Sheep and Goats, S.C.D.C.O.C. Caransebeș

[2] University of Life Sciences "King Mihai I" from Timisoara, Faculty of Management and Rural Tourism, Timisoara, Romania

*Corresponding author's e-mail: *i_petroman@yahoo.com*

Abstract: *The efficient management of mountain meadows and the sheep production system in conditions of sustainability of the area, requires the use of good exploitation practices on pastures, by implementing integronic management that will include the management of meadows, soil, water and vegetation. Management measures for good water management to express production according to the capacity of the soil to produce vegetative mass, must provide for the provision of a sufficient quantity of quality water, using where possible automatic sprinklers or other watering systems and in sufficient quantities. The implementation of the best vegetation management on the meadows from Banat mountain area depends on the variation of the production factors, the number of sheep grazing on a unit of area, the grazing period on a pasture area, the number of available meadows and the productivity of the meadow. Maintaining or improving the vegetation on the meadows depends on the carrying capacity of the meadow, the number of grazing sheep and the grazing capacity according to the nutritional value of the meadow.*

Key words*: Banat, sheep, management, mountain meadows*

INTRODUCTION

The ecosystem in general and the mountain one in particular is defined as an ensemble consisting of biotope and biocenosis, in which close relationships are established both between organisms and between them and abiotic factors, and can be defined as "the fundamental functional unit of the biosphere, with a determined type of interactions of inorganic and organic components and its own energy configuration, which ensures the development of biogeochemical cycles and energy transformations in the given fragment of the earth's crust." [10,12,18]. In the mountain area, the ecosystem includes:

Meadows, pastures and hayfields, considered natural ecosystems and constituted dominant elements of the rural environment with a greater biological diversity than cultivated areas. At the level of Romania, only in the mountain area there are 3,200,000 ha of agricultural land of which approximately 2,500,000 ha are natural meadows. These national ecosystems are:

- particularly fragile; [2, 13,16,17]
- the soils have a natural acidity;
- floristic and faunal composition is influenced by the quality of the soil;

The management of their sustainable use requires the implementation of the best agricultural practices in terms of optimal grazing of sheep and goats during the summer with the provision of wintering in hill or plain farms [1,11,15]. The best management practices of grasslands in addition to well-managed rotational grazing, for their protection as natural ecosystems must also provide:

- periodic mowing to combat invasive plants and restore the vegetal carpet;
- development of surveillance and conservation programs;
- avoiding plowing, to avoid soil dislocation and its degradation;
- avoiding maintenance work during the flowering period of the plants;
- avoiding sheep grazing on degraded and newly sown pastures;
- alternative use of meadows [5,6];

- prohibition of overgrazing [4,14];
- the use of organic fertilizers for fertilization;
- maintaining spontaneous flora by avoiding repeated mowing;
- preservation of the natural habitat of various forms of life [1,12];
- optimization of sheep loading according to productivity;
- reseeding the meadows to avoid increasing the risk of anthropogenic degradation;
- changing the overnight or milking place.

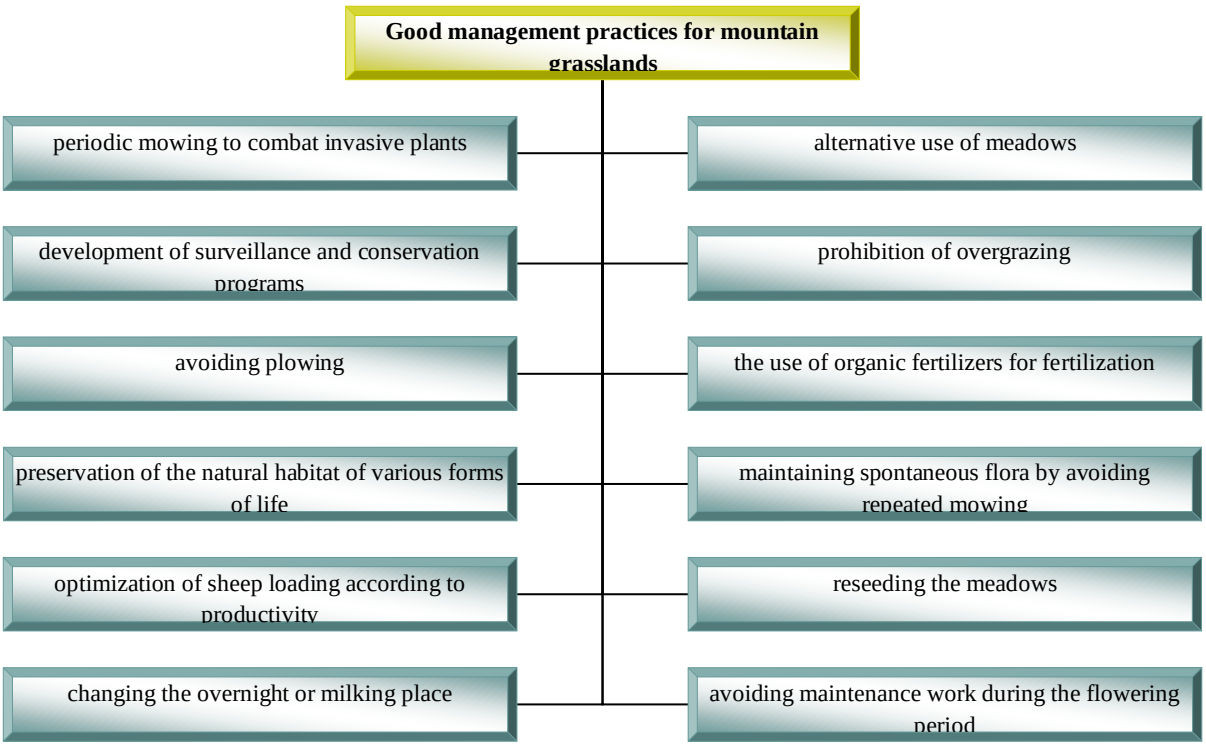

Figure 1. Good management practices for mountain grasslands

Mountain ecosystems provide basic environmental services – water, biodiversity, energy and soil – essential for the development of mountain meadows populations. Like any other ecosystem, the practical mountain ecosystem is made up of: [3,7,8,9]

- abiotic factors:

a. energy resources;

b. environmental trophics: water, climate and soil;

- biotic factors:

a.vegetable biomass;

b. the sheep and the raptors

c. the microorganisms that decompose and mineralize organic remains.

MATERIALS AND METHODS

Because socioeconomic value of mountain meadows ecosystems changes depending on the conditions in which vegetation, sheep and people evolve, within this scientific approach, we taking into account the characteristics of the ecosystems from Banat mountain area, represented by meadows and hayfields, we conducted research with the aim of proposing for the implementation of the best managerial practices of use through grazing, by perfecting the technological management systems regarding the exploitation knowing that, gravity favors the drainage of meadows being essential for the load of sheep in the ecosystem, the orientation of the slopes determines the amount of solar

radiation that directly influences the floristic variety of grasslands, solar radiation in large quantities has negative effects on sheep and flora and the temperature determines the different development of the vegetation, with effects on ensuring the food requirement for the expression of the production to the biological value of the genetic material exploited on the pastures and mountain meadows.

RESEARCH RESULTS

The efficient management of meadows and grazing systems from the area under analysis, in conditions of sustainability, implies the proposal for the implementation of good exploitation practices through integronic management, which will include the following types of management, of meadows, soil, water and vegetation.

1. Management of mountain meadows. Management through the implementation of new improved management principles of pasture exploitation and grazing models for transhumance or semi-transhumance sheep from mountainous rural area of Banat has numerous effects:

a. positive:

• accelerates the sequestration of atmospheric carbon in the soil by introducing forage plant species with high productive value;

• erosion reduction due to environmental factors: water air;

• soil degradation through compaction due to overgrazing is avoided;

• creates more sustainable livelihoods for shepherd;

• increases biomass in meadows;

• the greenhouse effect is avoided.

- b. negative:

• requires high energy consumption;

• stimulates nitrogen oxide emissions by adding nitrogen.

Some researchers believe that the restoration of native grasslands and sensitive sites that have suffered due to the development of energy or industrial capacities is necessary to remove contaminated soil, to restore vegetation and combat erosion. For a good meadows management from Banat mountain area, we believe that the following good practices regarding the negative effects must be implemented:

- combating erosion through best grazing management models:

- fertilizing and maintaining the vegetative mass through the best technological management and manure management, by optimizing the flocks of sheep according to the productive capacity of the meadow;

- choosing natural seeding methods, by rotating the meadows every two years for a good reseeding;

- the use of seed sources of native species adapted to the specific ecosystem of the Banat mountain area;

- choosing the optimal moment of sowing when there is enough water in the soil for good seed germination;

- avoiding artificial fertilization;

- avoiding the appearance of invasive species in floristic composition;

- forecasting and planning of the management stages of restoring the composition of the soil and the vegetative mass, to increase the nutritional value of the meadow and stimulate sheep production.

2. Soil management has positive effects, through the new implemented measures aimed at maintaining its state of health by combating: acidification, compacting, mineral imbalance, erosion, water conservation, loss of biodiversity. Some researchers show that the soil state of health of mountain meadows is also threatened by salinization and

alkalinization, and for their recovery it is considered that the following steps must be taken:

- evaluation of the surface covered with short grass to identify weeds;
- of sunburned, compacted, uneven or exposed soil areas;
- extracting a block of soil to determine the soil structure;
- evaluation of the soil from the point of view of the uniformity;
- awarding a credit rating:

a. good: friable, intact – grade 1 or 2 is given;

b. moderate, firm grade 3-4;

c. weak: compact, very compact, grade 5.

For a better knowledge of meadows soils properties what is to be grazed, samples will be taken with the probe, in order to be analyzed in a specialized laboratory and amendments specific to ecological agriculture will be administered according to the recommendations depending on the composition or mineral and organic fertilizers for improving meadow value and growth:

- increasing the amount of crude protein from plants;
- improving digestibility and consumption of biomass;
- increasing meadow production;
- improving the floristic composition of meadows;
- more uniform distribution of production;
- increasing the harvest.

We believe that for the meadows of Banat mountain area, the management measures must provide the way of use, the intensity of use, because irrational use causes the change of the microbial diversity of the soil. Thus, we conclude that:

- well-managed grazing and mowing once every 2 years to rest the soil can increase the population of animal or vegetable microorganisms of microscopic size;
- intensive grazing has a negative influence on the abundance of vegetative mass and floristic diversity.

3. The management of water provision on mountain meadows must consider the recommendations of good practices which provide:

- placement of waterers for sheep and bars will be mounted above the waterers to prevent contamination;
- avoiding watering sheep from contaminated water sources;
- ensuring free access of sheep to the water source;
- watering front of at least 30 cm/sheep;
- avoiding pooling of water under watering cans;
- mounting the water tank below the water source and protecting the source to avoid countermining with droppings and parasites.

The new managerial measures proposed for implementation in Banat mountain area, for a good management of water on pastures, must provide:

a. ensuring a sufficient amount of quality water, using watering cans where it is possible;

b. providing water at discretion for sheep by capturing springs in reservoirs;

c. water administration with constant level watering cans mounted on towable tanks that will move according to the grazing area.

4. Vegetation management. Sheep must have access to pasture to graze whenever they need, with the condition of maintaining or even improving vegetation.

We believe that the implementation of the best vegetation management on meadows from Banat mountain area depends on several production factors:

a. the number of sheep grazing on a surface unit;

b. the duration of grazing;

c. the number of available meadows;

d. the quality of the vegetative mass or productivity.

For a good management of vegetation over time, the maintenance or improvement should be considered:

- the loading capacity of the meadow – the optimal number of sheep that an ecosystem can sustainably support), the maximum number that allows:

a. maintaining vegetation 3-4 sheep per hectare;

b. vegetation improvement 2-3 sheep.

- the number of sheep, meaning the number of sheep that graze on a unit of land for a certain period of time, which can be expressed as the number of months/days per animal unit that grazes per hectare:

• the density of sheep must not exceed the limit of 170 kg of nitrogen per year/ha of agricultural area;

• manure produced in excess can only be spread on ecological land;

• the number of sheep during periods of drought or rain must be reduced to avoid erosion, pollution due to overgrazing and soil compaction, degradation;

- grazing capacity, or the total number of sheep exploited on a certain area of land depends on the total forage resources available, including fodder and concentrates, and represents the relationship between the number of animals and the area of land at any time, which can be expressed as units of animals per hectare.

We believe that in order to maintain the sustainability of grasslands, the best vegetation management must provide for the following management activities and introduce them into the integronic production management:

- reseeding with plants from the specific flora to increase the nutritional value;

- over-sowing, to increase productions during good periods of plant development;

- parcelling of meadows;

- optimization of sheep herds to avoid overgrazing or soil degradation depending on the amount of vegetative mass and soil quality;

- well-managed rotational grazing.

CONCLUSIONS

The meadows from Banat mountain area can be considered true natural ecosystems because they constitute dominant elements of the rural environment, with great diversity, but some of them are particularly fragile, due to the composition and quality of the soils. The management of their sustainable use requires the implementation of the best management practices for optimal grazing of sheep during the summer. The best management practices of grasslands, in addition to well-managed rotational grazing, for their protection as natural ecosystems must also provide for their management to ensure the necessary amount of vegetative mass for the maintenance and production of sheep for as long as possible. The management measures must provide for the efficient and sustainable use of the meadows, through the intensity of use, the irrational exploitation determines the change of diversity, imposing itself through the measures taken by well-managed grazing and mowing once every 2 years for rest and restoring the soil and through intensive and controlled grazing to maintain the abundance of vegetative mass and floristic diversity. The vegetation management on the meadows and maintaining their sustainability, through the measures undertaken by the management, must take into account the loading capacity of the meadow, the optimum number of sheep per surface unit and the grazing capacity to which measures to restore the floristic composition will be added, all as concrete measures of integronic production management.

REFERENCES

[1]. ANDRICIUC R., 2008, Managementul protecţiei infrastructurii critice, Editura. Psihomedia

[2]. ADZIG P., VÎRTOSU D., BABA F., PETROMAN I., BRAD I., VĂDUVA LOREDANA, DUMITRESCU CARMEN, PETROMAN CORNELIA, 2018, Judicious placement of small professional farms of cattle in order to avoid the environment pollution. Journal of Biotechnology, Volume 280

[3]. GRUIA R., 2006, Integronic management and informational connections, HAICTA – International Conference on Information Systems in Sustainable Agriculture. Agroenvironment and Food Technology, University of Thessaly, Volos, Grecia

[4]. LEXICO. Available at: https://www.lexico.com/

[5]. MARIN DIANA, PETROMAN I., PETROMAN CORNELIA, BĂLAŞA M., CSAHOLCZI A., 2015, Study on specific activities of agrotourism. Research Journal of Agricultural Science 47(4)

[6]. NEAGU IULIANA, CULEA C., PETROMAN I., 2007, Creșterea animalelor, Editura Eurostampa

[7]. NINE THINGS YOU NEVER KNEW ABOUT SHEEP, Available at: https://www.bbc.co.uk/

[8]. NUTHAL P.L., 2010, Farm Business Management: The Human Factor. Wallingford-Cambridge: CABI

[9]. PETROMAN CORNELIA, PALADE S., PETROMAN I., POPA, DANIELA, ORBOI MANUELA DORA, PAICU D., HEBER LOREDANA, 2010, Managerial strategies for the conservation of rurality in rural tourism. Animal Science and Biotechnologies, Volume 43(2)

[10]. PETROMAN I.M., PETROMAN I., 2013, Conservarea autenticității prin activități agroturistice, Editura Eurostampa Timișoara

[11]. PETROMAN I.M., VĂDUVA LOREDANA, 2021, Forms of active tourism, Quaestus, 271-279

[12]. PETROMAN I., PETROMAN CORNELIA, 2010, Agritourism and its forms, Lucrări Științifice Seria Agronomie, 53(2)

[13]. JAMES REBANKS, 2015, The Shepherd's Life: A Tale of the Lake District

[14]. SIASIOU A., KARELAKIS C., GALANOPOULOS K., MITSOPOULOS I., LAGKA V., 2021, Typology of Management of Transhumant Sheep and Goat Farms in Greece: Proposals for the System Continuity, European Journal of Agriculture and Food Sciences, 3(1), 84-89. DOI: 10.24018/ejfood.2021.3.1.228.

[15]. VĂDUVA LOREDANA, PANDURU ELISABETA BIANCA, PETROMAN CORNELIA, ADAMOV TABITA, MARIN DIANA, PETROMAN I., 2020, Tourism forms practicable in protected areas, Lucrări Științifice Management Agricol 22(1)

[16]. VĂDUVA LOREDANA, PETROMAN I.M., 2021, Forme alternative de turism, Editura Eurostampa

[17]. VĂDUVA LOREDANA, MARIN DIANA, PETROMAN CORNELIA, 2021, Alternative forms of tourism, concepts and classification, Lucrări Științifice Management Agricol, 23(3)

[18]. VÎRTOSU D., PANDURU ELISABETA BIANCA, VĂDUVA LOREDANA, MARIN DIANA, PETROMAN CORNELIA, PETROMAN I., 2019, Possibilities to improve the management of the exploitation of cattle meat in extensive system, Lucrări Științifice Management Agricol, 20(3)