Bulletin of the *Transilvania* University of Braşov
Series II: Forestry • Wood Industry • Agricultural Food Engineering • Vol. 10 (59) No.1 - 2017

RESEEDED GRASSLANDS – AN ALTERNATIVE FOR HIGH OUTPUT DAIRY FARMING SYSTEM

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Abstract: *Improvement of permanent grasslands by complete reseeding is an important action for providing high yields of grass with high feeding value. The experiments were carried out on a permanent grassland and considering the following factors: adequate machinery suitable for total sward destruction, the season of seedbed preparation and sowing, basic fertilization, choice of seed mixtures, choice of sowing equipment and post-sowing management In the year following reseeding, grassland management consisted of two silage cuts and a grazing cycle with dairy cows.Total herbage production was 4 - 6 times greater than control plot and herbage crude protein content (CP %) was 1.6 - 2.1 times greater than control plot.*

Key words: *grassland, reseeding, high production, feeding value.*

1. Introduction

The establishment of grasslands with high forage production and quality is an important way to promote sustainable livestock production systems, especially for dairy farming.

Sward renovation by total reseeding should provide optimum conditions for seed germination, plant emergence and growth and development of the root system, with the final aim being to develop a dense vegetative cover. To ensure successful sward renovation, it is necessary to understand the reasons why the pasture production and quality decline over time. To understand these reasons, previous research were performed on stationary area conditions, soil characteristics, vegetation, and botanical composition and climate conditions.

Previous analyses and research results suggest that the best solution to improve degraded grasslands must be decided based on the following factors: adequate processing for the destruction of the old vegetation, optimal period for seedbed preparation and seeding, basic fertilization, choice of seed mixtures, agricultural machinery for sowing and post-sowing

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management [2].

The aim of this study was to determine the most appropriate methods to improve the grasslands in Romania in accordance with the stationary area conditions and a reduced environmental impact.

Investigation was focused on establishing a favourable interaction between soil cultivation systems and animal husbandry, particularly proving the development of intensive grasslands located nearly the farms, used by dairy cow grazing, hay making or mixed system is very profitable [3].

2. Materials and Methods

The experiment was undertaken at one site in Depression Fagaras, Brasov County. The site was representative of the region in terms of limiting factors.

The experimental area was located on a permanent grassland with a Podzols soil type, the principal limiting factor being the soil acidity.

The soil in the 0 - 10 cm profile is strongly acidic, low in P and moderate in K and in the 10 - 20 cm profile is strongly acidic and low supplied in the P and K (Table 1).

The experimental area was in an advanced stage of degradation caused by a bad management (absence of annual clearing and nursing works, invasion of worthless species, irrational grazing, no fertilization and correction of soil acidity) and the effect of different restrictive factors.

The methods applied to improve these degraded grasslands were as follows:

- liming 4 – 5 Mg ha^{-1} agricultural limestone (Figure 1);
- total destruction of the old sward by shallow ploughing in spring 2014;
- seedbed preparing (Figure 2) by rotary harrow, in spring 2014;
- seeding with perennial grass and legume mixtures (Figure 3), and simultaneously rolling before and after sowing, using a special grass sowing machine [2];
- application of a compound fertiliser (N15P15K15) at rate of 300 kg ha^{-1} at the start of the growing period in spring of 2014;
- application of a compound fertiliser (N15P15K15) at rate of, 350 kg ha^{-1} in 2015.

Method was chosen due to the fertile topsoil. The seed mixtures were selected in accordance with local area conditions, operating under a mixed utilization system, grazing and cutting, and consisted of: *Festuca pratensis* (L.) - 9 kg; *Festuca arundinacea* (L.) - 13 kg; *Dactylis glomerata* (L.) - 7 kg; *Trifolium pratense* (L.) - 5 kg; *Trifolium repens* (L.) - 2.5 kg; *Lotus corniculatus* (L.) - 3.5 kg, summing 40 kg ha^{-1}.

The reseeded grassland had an area of 26 ha. Average land coverage of sown species ranged from 85 % to 94 %.

Principal agrochemical properties of the soil from experimental fields Table 1

Location	Profile [cm]	pH [H_20]	P-status [ppm]	K-status [ppm]
Depression Fagaras	0-10	4.8	10.8	90.0
	10-20	4.9	7.4	36.0

Fig. 1. *Aspect of liming.*

a.

b.

Fig. 2. *Seedbed preparing:*
a. - tractor and rotary harrow aggregate; b. - aspect of cultivated soil

a.

b.

Fig. 3. *Seeding with perennial grasses and forage legumes mixture: a. - tractor and a special grass sowing machine aggregate; b. - aspect of sown area*

Some assessments of the main nutritional parameters (Table 2 and Figure 4): crude protein, crude fibre, cell wall constituents (NDF, ADF, and ADL), crude ash and dry matter digestibility (DMD) and organic matter (OMD), by infrared spectroscopy technique (NIRS), have been determined, both for reseeded grassland and control plot.

Table 2

The annual average of main forage nutritional parameters obtained on plots, % DM

Variant	CP [%]	CA [%]	CF [%]	NDF [%]	ADF [%]	ADL [%]	DMD [%]	OMD [%]
Control plot	7.90	6.20	43.90	78.10	47.60	5.90	41.60	36.30
Establishment year, 2014	13.20	7.50	38.80	68.30	45.80	5.80	49.10	45.80
Second year, 2015	16.10	9.60	25.40	50.00	29.30	3.30	70.00	65.40

CP – crude protein; CA – crude ash; CF – crude fibre; NDF – neutral detergent fibre; ADF – acid detergent fibre; ADL – acid detergent lignin; DMD – dry matter digestibility; OMD – organic matter digestibility

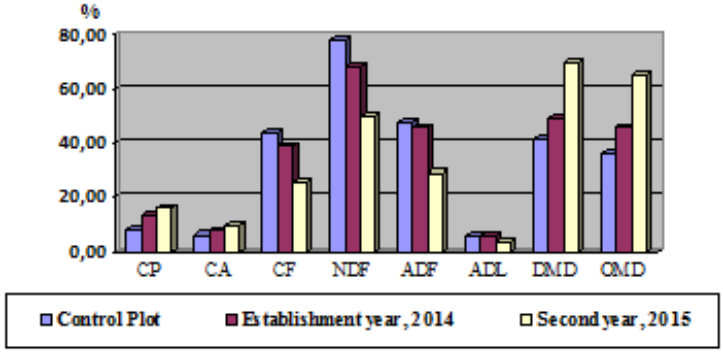

Fig. 4. *The annual average of main forage nutritional parameters, % DM*

3. Results and Discussion

The average of yield of the reseeded sward ranged from 2.50 to 2.80 Mg DM ha^{-1} in the reseeding year. In the first full year post reseeding, total herbage production of the reseeded pasture was between 9.70 and 11.73 Mg DM ha^{-1}. The second year consisted of 2 cuttings and one cow grazing. The output of the control plot was 1.5 - 1.8 Mg DM ha^{-1} in first year and 2.2 - 2.4 Mg DM ha^{-1} in second year.

Values represent average of the herbage production by taking samples.

Herbage CP content ranged between 13.20 and 16.10 g kg^{-1} DM, while the control plot had CP content of 0.08 g kg^{-1} DM.

The content of cell wall constituents: NDF, ADF, ADL had values characterizing a forage with medium to high feeding value.

Reseeding old permanent pasture resulted in an improvement in production and feed quality, which can result in increased forage based protein that can be grown 'on-farm' and greater efficiency of livestock production.

The digestibility coefficients of the analysed forage samples have presented also values for a good quality of forages provided by reseeded pastures.

For a comparative study it assessed the grass feeding value by nutritive unit method [1] (1 NU = Net Energy content of 1 kg of barley). At a medium consumption of 0.50 NU $liter^{-1}$ of milk [4], except the maintenance intake for animal vital functions, it can appreciate that in control plot with 0.31 NU kg^{-1} DM resulted an average of 1400 milk liters ha^{-1}, in comparison with reseeded grassland, with 0.51 NU kg^{-1} DM, and 10700 milk liters ha^{-1} (7.6 times higher).

4. Conclusion

The best solution for improving the degraded grassland will be decided after a thorough analysis on stationary area conditions, soil characteristics, botanical composition of the old vegetation, climatic conditions etc.

Reseeding grasslands, using suitable seed mixtures, have increased herbage production and quality compared to old permanent pasture and confer significant advantages in terms of animal performance, especially for dairy farming.

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