Superiour Revaluation of the Pastures in the Cindrel Mountains by Environment Friendly Technologies in Order to Obtain High Quality Products

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Abstract
The experiments placed in the year 2011 for a superiour valuing of pastures, by their results, lead to the elaboration of some ecological systems of mountain agriculture. The production levels record growths of 13% on the organically fertilised variants and a growth in the weight which can reach 153g/head/day at the young sheep. The selectivity of pasture is reflected in the preference of animals for a more intense grazing on the organically fertilized pastures as compared to the unfertilized ones. The experimental variants (gradual organic fertilization, fertilization + oversowing) support a long-lasting pratological system which can lead to an evolution of the floristic composition favourable to the fixation of perennial fodder leguminous plants, obtaining significant growth in weight and improving the quality of the carcasses. The suggested system does not pollute the environment and it is conceived to be achieved besides the protection of prato-ecosystems and acceptable economical results by integrating natural resources and the natural mechanisms of adjustment in agricultural practice so as to replace at maximum the inputs from outside the system, ensures a long-lasting protection of food and high quality products by ecologically preferable technologies, ensures the income of the farmers and supports the multiple functions of agriculture.

Keywords: ecological agriculture, agro tourism, pratological system, friendly technologies, mountain area

1. Introduction
Revaluating the mountain pastures in the Cindrel Mountains with the Turcana sheep represents a millennial occupation, on its side having been developed a pastoral area of national interest, known under the name of Sibiu Neighbouring.

The work of the group of researchers concerning the improvement of these pastures in order to obtain high quality mountain products is an old preoccupation having in view on one hand the increase of the crop of green mass, and on the other hand the revaluation of the traditional products (milk, meat) in the context of complementary activities (agro tourism).

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2. Materials and methods

Station conditions. Geographical position.
The experimental field of ICDM lies on the NE of the Cindrel Mountains at an altitude of 1348 m, an area surrounded by large spruce fir forests and by large surfaces of natural pastures, (Festuca ruba type), pastures with a general coverage of 78%, out of which: graminaceae 55%, vegetables 8%, other botanical species 15%. The seeds used belong to a family of perennial graminaceae and vegetables with characteristics according to the analysis bulletins.
The organic fertilizer is the dung coming from the tanks of the research biobase.
The revaluation of the pasture was achieved by grazing with young sheep of Turcana breed, a group selected from the sheep belonging to I.C.D.M.-Cristian. The experiment took place in random blocks and its purpose was the study of
the cumulated effect of the technological input and the effect on the quantity and quality of the products obtained.

**Experimental variants:**
- V1 - witness natural pasture;
- V2 - soil liming with Ca- 5t/ha CaCO3
- V3 - soil liming with Ca- 5t/ha CaCO3 + organic fertilizers (dung, 20t/ha, applied at the beginning of the experiment)
- V4 - soil liming with Ca 5t/ha + organic fertilizer, dung, 30t/ha.
- V5 - soil liming with Ca 5t/ha + organic fertilizer (dung, 40t/ha).
- V6 - soil liming with Ca 5t/ha + organic fertilizer (dung 40t/ha) + over sowing with *Trifolium repens* 6kg/ha useful seed).
- V7 - soil liming with Ca 5t/ha + dung released while grazing + a mixture of perennial vegetables and graminaceae (*T. repens* + *Lolium perene*)

After determining the grass production, in the areas established beforehand, the areas were grazed with young sheep. In order to test the animals’ preference for an experimental variant or another one, a free grazing was chosen, ensuring free access of the animals from one variant to the other. Therefore there was made a biological test of the palatability appreciating this characteristic on the basis of the selectivity of the pasture.

The selectivity of the pasture was in its turn determined according to the number of animals on the lots and the time of stopping to graze.

The average increase of the animals’ weight during the whole period was determined on some animals in six repetitions (an animal being considered a repetition) by making repetitive weighing.

### 3. Results and discussion

The results obtained reflects the influence of the experimental factors on the floristic composition, the crop dry substance (DS), the chemical composition of fodder, the quality of carcass, the farmer’s benefit.

The gradual progress of the experimental factors starts with the amendment (V2) which influences to a certain degree the floristic composition. We noticed the reduction to a certain extent of the participation percentage of the *F. ruba* species and the increase of the percentage of *Agrostis tenuis* species with values oscillating between 58% in 2011 and 66% in 2012.

When besides the amendments organic fertilizer was added, the reaction of the vegetal carpet was very strong i.e. the participation percentage of *Agrostis tenuis* species increased, which starts to become dominant with values between 31% and 36%. The favourable influence of organic fertilizers on the pastures is already known. Even on the pastures of *Nardus stricta*, as a consequence of applying dung, the quantity of this species decreases considerably, thus a larger number of more valuable species of graminaceae and vegetables being able to grow.

Referring to the fertilization of the mountain pastures with dung, Barbulescu and Motca (1983) [1] show the the application of dung (30t/ha) on the mountain pastures determines the increase of the quantity of *Agrostis tenuis* species which can become dominant. The results that we have obtained confirm these data. The application of dung is recommended to be done in autumn, at the end of the grazing period. Thus, the dominant and co dominant species will be strongly stimulated to grow the next year, therefore obtaining an earlier spring crop which is well consumed by the animals. The crop of DS is influenced by the experimental factors. As a general appreciation, the lowest results have been obtained on the witness lot and the highest ones on the lots fertilized with dung and dung obtained while grazing + over sowing with a mixture of vegetables and perennial graminaceae.

<table>
<thead>
<tr>
<th>Variant</th>
<th>Crop of DS (t/ha) (2011)</th>
<th>Interaction of factors</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>1.92</td>
<td>100</td>
<td>0.00</td>
</tr>
<tr>
<td>V2</td>
<td>3.14</td>
<td>163.3</td>
<td>1.22</td>
</tr>
<tr>
<td>V3</td>
<td>4.13</td>
<td>214.7</td>
<td>2.21</td>
</tr>
<tr>
<td>V4</td>
<td>3.99</td>
<td>158.4</td>
<td>3.06</td>
</tr>
<tr>
<td>V5</td>
<td>5.00</td>
<td>200.1</td>
<td>3.37</td>
</tr>
<tr>
<td>V6</td>
<td>5.12</td>
<td>205.9</td>
<td>2.04</td>
</tr>
<tr>
<td>V7</td>
<td>5.18</td>
<td>269.5</td>
<td>3.26</td>
</tr>
</tbody>
</table>
The gradual increase of the crop during the first years from the application moment, confirm the data obtained by Lapusan and co. (1980) [2] i.e. the positive effect of the dung increases gradually during the first years getting increased of the crops of 3.26t/ha/DS.

As to the chemical composition of fodder it was found out that this is sensibly influenced by the experimental factors.

So, the gross protein has the highest values at the variants (V6 and V7) [3].

The content of gross cellulose is within common limits during the first two experimental years, being within about 27 and 31 %. We think that this happened due to a late spring coming and to a late evolution in the vegetation of plants, which led to a lower accumulation of cellulose.

The non nitrogenous extracts are on average round 44.25.

The gross fat and the ashes have common values at the pasture plants and a little influenced by the experimental factors.

<table>
<thead>
<tr>
<th>Variant</th>
<th>PB</th>
<th>CB</th>
<th>Gross ashes</th>
<th>Gross fat</th>
<th>Non nitrogenous extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>10.47</td>
<td>27.36</td>
<td>5.22</td>
<td>3.91</td>
<td>53.04</td>
</tr>
<tr>
<td>V2</td>
<td>8.90</td>
<td>28.85</td>
<td>7.96</td>
<td>3.52</td>
<td>50.77</td>
</tr>
<tr>
<td>V3</td>
<td>9.65</td>
<td>28.54</td>
<td>6.81</td>
<td>3.45</td>
<td>51.55</td>
</tr>
<tr>
<td>V4</td>
<td>14.76</td>
<td>29.75</td>
<td>7.81</td>
<td>3.43</td>
<td>44.25</td>
</tr>
<tr>
<td>V5</td>
<td>10.43</td>
<td>31.27</td>
<td>8.80</td>
<td>3.06</td>
<td>46.44</td>
</tr>
<tr>
<td>V6</td>
<td>14.80</td>
<td>29.58</td>
<td>5.85</td>
<td>3.40</td>
<td>52.30</td>
</tr>
<tr>
<td>V7</td>
<td>14.93</td>
<td>28.75</td>
<td>5.41</td>
<td>3.45</td>
<td>50.25</td>
</tr>
</tbody>
</table>

**Table 2. Chemical composition (%) - 2011**

**Figure 1. Chemical composition (%) - 2011**

<table>
<thead>
<tr>
<th>No.</th>
<th>Weight at the beginning of the experiment</th>
<th>Weight at the end of the experiment</th>
<th>Total period (kg)</th>
<th>Increase/head/day (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>35.3</td>
<td>1.3</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>33.5</td>
<td>1.5</td>
<td>71</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>37.7</td>
<td>1.7</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>39.2</td>
<td>1.2</td>
<td>57</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>36.4</td>
<td>1.4</td>
<td>66</td>
</tr>
<tr>
<td>6</td>
<td>37</td>
<td>38.8</td>
<td>1.8</td>
<td>85</td>
</tr>
<tr>
<td>average</td>
<td>35.3</td>
<td>36.8</td>
<td>1.48</td>
<td>69</td>
</tr>
</tbody>
</table>

**Table 3. The extent of putting weight at the young sheep - Paltinis, 2011**
The over sowing, made according to the experimental procedure, is successful to a very small extent, the over sown species being established to a very small extent, between 1 and 5%.

Next we will make reference to the effect of the amendments and of the organic fertilizers, on the palatability of fodder at the grazing with young sheep.

The animals selected for the experiment have been repeatedly weighed and the average daily increase in weight, as well as the increase in weight for the whole period was determined.

The selectivity of pasture appreciated by the free spread of the animals on different lots (differently fertilized) points out the fact that the animals prefer to stay more, to graze more intensely on amended and fertilized lots with quantities of 40t/ha of dung, where the percentage of vegetables is higher on the vegetal carpet (trifolium repens) as compared to the witness variant, (V2,V3,V4,V5). We clearly noticed the favourable influence of amendments and organic fertilization on the palatability of the fodder obtained on the mountain pastures [4].

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4. Conclusions

The experiments placed in the year 2011 for a superior valuing of pastures, by their results, lead to the elaboration of some ecological systems of mountain agriculture.

The production levels record growths of 13% on the organically fertilised variants and a growth in the weight which can reach 153g/head/day at the young sheep.

The selectivity of pasture is reflected in the preference of animals for a more intense grazing on the organically fertilized pastures as compared to the unfertilized ones.

The experimental variants (gradual organic fertilization, fertilization + oversowing) support a long-lasting pratological system which can lead to an evolution of the floristic composition favourable to the fixation of perennial fodder leguminous plants, obtaining significant growth in weight and improving the quality of the carcasses. The results of the experiment lead us to the conclusion that a long lasting pratological system can be represented by variants in which amendments with Ca are applied (in order to correct the acidity of the soil) and organic fertilizers (dung and dung obtained while grazing).

The application of this system can lead to an evolution of the floristic composition favourable to the establishment of perennial fodder vegetables. By biological fixation they can bring the necessary nitrogen necessary in order to obtain a satisfactory and good quality production.

The system suggested above, is non polluting and produces acceptable economic results.

The direct consequence is the reduction of the pollution of the environment in agriculture, the decrease of the pressure on some resources, at the same time ensuring the income of the farmers by the reduction of the costs.

The positive experience (which remains an advantage already acquired) acquired by practicing traditional agriculture completed by the results of the scientific research in the field, stands out an ecological agriculture integrated in the future of mankind.

References

4. Puia I., V. Soran, Agricultural ecology and the ecologic agriculture, 1982