Productivity of Permanent Pastures Located at Different Altitudes

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Abstract
This work studies the yielding and grazing capacity of some permanent pastures located in Banat's Mountains, at 236 – 1300 m altitude. The mean results achieved showed that the yield difference between the minimal altitude level (236 m) and the maximal one (1300 m) is 0.93 t/ha DM. This difference leads to the conclusion that the yield of the permanent pastures located in the studied area decreases with 0.87 kg/ha DM (about 0.5 t/ha fresh mass) for each 100 m of altitude.

Keywords: altitude, grazing capacity, yield

1. Introduction

The variation of climate and soil conditions influences directly the productivity of permanent pastures locate at different altitude levels. The periodical determination of permanent pastures' yielding capacity represents a must in the elaboration and application of a differentiated technological program for efficiency and quality improvement [1-4].
The objective of this work is represented by the study of the natural yielding potential of some permanent pastures locate at different altitude levels.

2. Materials and methods

The researches were performed during 2005 – 2009, on the permanent pastures located between 236 – 1300 m altitudes in Banat's Mountains, the County of Caraş-Severin. At this altitude interval, we set 13 observation points in 13 different locations, with different natural conditions (climate, soil), within the perimeters of the grazing grounds afferent to these localities.
The determination of forage biomass yield was performed every year of study, by mowing the areas surrounded by pastures, at the beginning of earing of the dominant gramineae species. The yields achieved were analyzed and interpreted with the method of variance analysis (ANOVA).
The grazing capacity, determined „in situ", was annually calculated according to pasture yield and the quantity of fresh mass daily consumed by 1 cow-unit.

3. Results and discussion

In the presentation of dry matter yields, we considered the determinations performed in the 13 observation points, for each altitude interval, according to the available natural conditions. We did not apply organic or mineral fertilizers on the closed pasture areas, because the major objective of these studies was to determine „in situ" the yielding capacity of the pastures situated on these

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altitudes. The yield differences between altitudes were then compared with the mean yield of the 13 locations.

The yields achieved in 2006 ranged between 1.59 – 3.73 t/ha dry matter, with an amplitude of 2.14 t/ha (Figure 1). If we speak about the interval between 236 – 470 m, we may notice that yield amplitude between the smallest level (2.33 t/ha) and the biggest one (3.73 t/ha) is only 1.37 t/ha, compared with the altitudes between 630 m – 1300 m, where the yield amplitude is 2.12 t/ha. The yield difference between the two altitude limits, namely 2.14 t/ha DM, proves that for each 100 m-increase altitude, the dry matter yield decreases with a mean value of 0.218 t/ha, or about 1 t/ha fresh mass.

The analysis of the yields obtained leads to the conclusion that the biggest DM yield, 3.73 t/ha, was obtained at 320 m altitude, with a difference to the mean of 1.43 t/ha (62.57%), being very significant statistically. Also, at the close altitudes of 462 m and 470 m, the yields were 2.64 t/ha, respectively 2.55 t/ha, with statistically assured differences to the mean.

In the superior half of the altitude interval studied, respectively at 930 m, we achieved a 2.54 t/ha DM yield, almost identical with the yield achieved at 470 m. This yield may be due to the influence exerted by the sheep-based organic fertilization, performed by animal breeders in this region.

The determinations performed in 2007 proved that the yields produced in this year ranged between 1.46 – 2.90 t/ha (Figure 2). The amplitude between two yield limits is 1.44 t/ha DM, meaning a pasture yield decrease of about 0.311 t/ha per 100 m altitude, respectively about 1.5 t/ha fresh mass. Between the altitudes of 236 and 470 m, the amplitude between the variation limits is 0.96 t/ha DM, and between 630 – 1300 m, the difference is 0.83 t/ha DM.

In the third year (2008), the mean yield obtained in the 13 points is only 1.76 t/ha smaller than the mean yield obtained in 2006 (2.29 t/ha) and 2007 (2.09 t/ha). In 2008, the yields achieved were influenced by the altitude level and also by the local stationary conditions of vegetation. This largely explains the bigger-level yields obtained from the pastures situated at big altitudes (Figure 3). Actually, in this year, the rainfall quantity recorded was 30 – 40 %-fold bigger in the altitude interval of 650 – 1300 m than in the interval between 236 – 470 m. In these terms, the biggest DM yield, 2.67 t/ha, was obtained at 1300 m altitude.

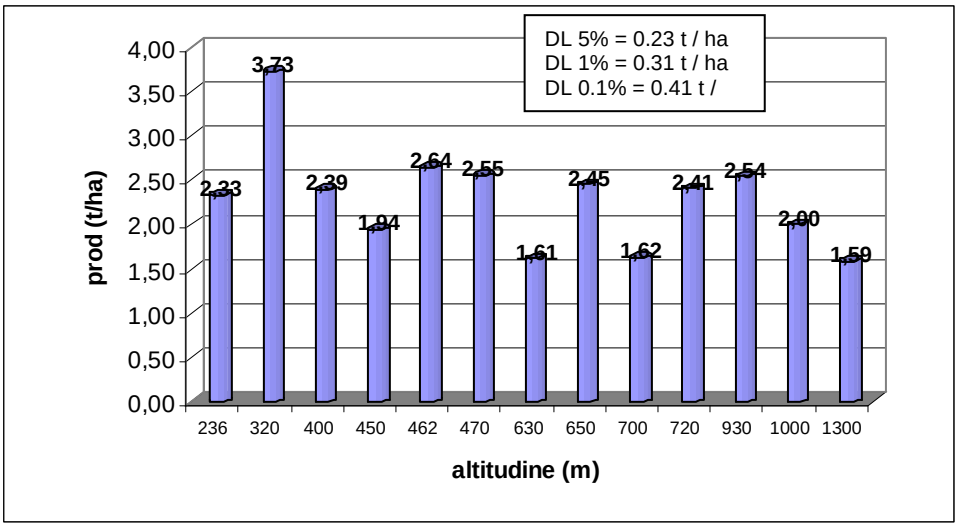

Figure 1. Graphic presentation, according to altitude levels, of dry matter yield (2006)

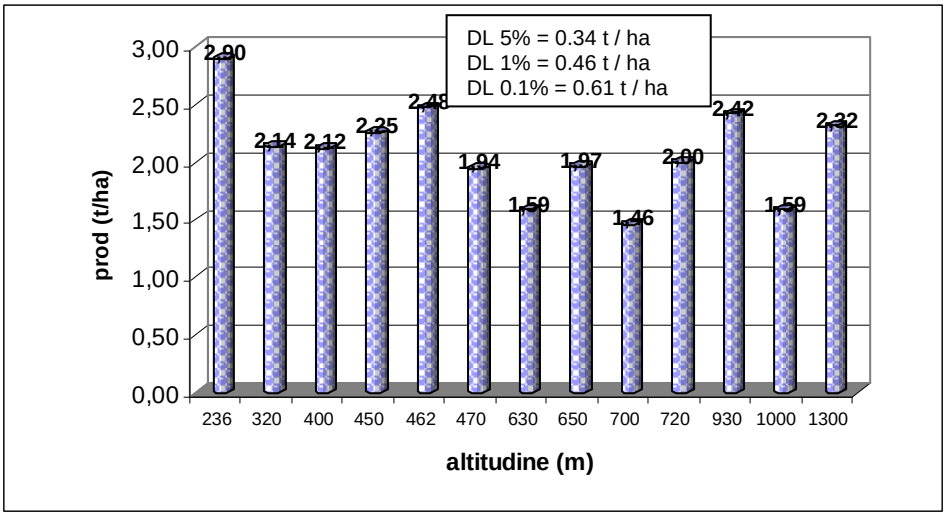

Figure 2. Graphic presentation, according to altitude, of dry matter yield (2007)

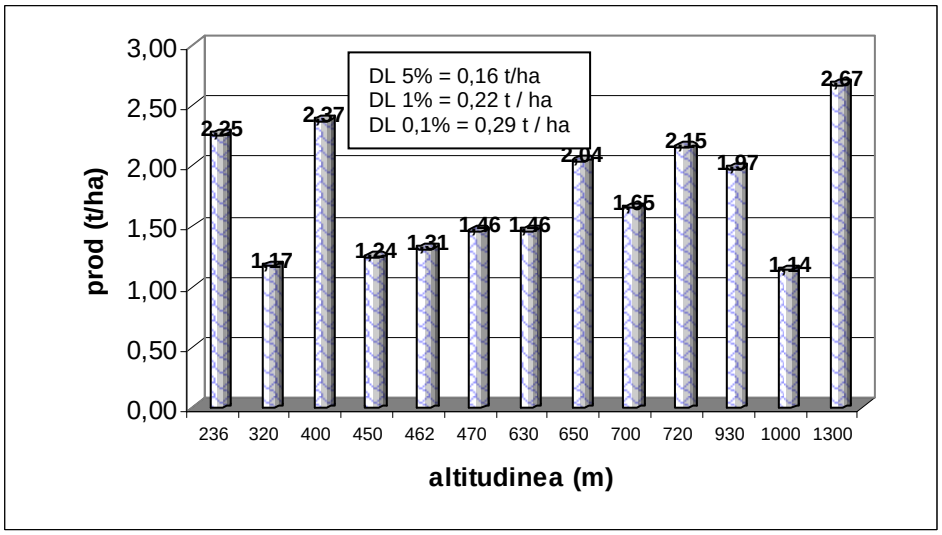

Figure 3. Graphic presentation, according to altitudes, of dry matter yield (2008)

4. Conclusions

The mean yield difference (2.14 t/ha dry matter) between altitudes (236-1300 m) proves that, on the average, for each 100-m altitude increase, the dry matter yield decreases with 87 kg/ha, or about 0.5 t/ha fresh mass.

The highest, significant mean yields were achieved in the locations situated at inferior altitudes.

The grazing capacity ranges little from one altitude level to another.

References

1. Bărbulescu C., Motcă Gh., Păşunile munţilor înalţi, Ed. Ceres, 1983, Bucureşti.

2. Maruşca T., Elemente de gradientică şi ecologie montană, Ed. Universităţii Transilvania, 2001, Braşov.

3. Potsch M. E. et al., Floristic diversity and forage quality of mountain pastures in Austria. Quality production and quality of the environment in the mountain pastures of an enlargeed Europe. September 15-17, Udine, Italy, 2005, 231-238.

4. Uhliarova E., Michalec M., Zimkova M., Extensive utilisation of grassland in the Kremnicke vrchy Mountains and its impact on biodiversity. Quality production and quality of the environment in the mountainpastures of an enlarged Europe. September 15-17, Udine, Italy, 2005, 101-105.