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ECONOMIC EFFECTS OF THE USE OF MOUNTAIN PASTURES FOR BREEDING OF HEIFERS¹

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Summary

In the Republic of Serbia, pastures cover more than 800,000 ha, while pastures and meadows together cover 1,428,000 ha, i.e. 27.97% of the total exploited agricultural land. However, economic effects of their utilization so far have not been sufficiently explored. The above mentioned areas can be successfully utilized for growing of heifers. Therefore, this paper lists the advantages and economic effects of the use of pastures for breeding of heifers.

Using the example of a family farm that utilizes modern technical and technological solutions in accommodating and feeding the cattle, it was determined that the costs of breeding reduce by 19.07% when exploiting pastures, compared to stable breeding. Different types of cooperation among the cattle farms are proposed particularly focusing on formation of farms specialized in breeding of heifers. Also, the paper lists the problems linked to the utilization of pastures, as well as measures that could contribute to their more effective use.

Keywords: *cattle production, feeding, competitiveness, territorial specifics, comparative advantages, costs*

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Introduction

A significant part of the Republic of Serbia, primarily its central and southern area, is dominated by hills and mountains, primarily used as cattle pastures in agricultural production. Over the last decade, according to the available statistical data (period 1999 to 2008), around 5,104,000 ha of land is used for agricultural production, with pastures making 828,000 ha or 16.21% of the total agricultural land.

The use of pastures greatly improves the cost effectiveness of the cattle and sheep production, and therefore the biggest number of cattle and sheep in Serbia is concentrated in the territory of central Serbia. The growing of cattle and sheep in pastures is closely linked to the production of bulky cattle food in meadows, covering the area of 600,000 hectares in Serbia, thus making, together with pastures, total of 1,428,000 ha, i.e. as much as 27.97% of the total utilized agricultural land. However, regardless of the good natural potentials for utilization of pastures, they are increasingly less utilized, due to the fact that the number of cattle and sheep is continuously dropping. This drop is the result of the negative price ratio between the agricultural and industrial products. The other significant reason for the reduction of cattle number is the unregulated agricultural market in Serbia and the inability to export to the countries of EU (**Ivanović, 2008**).

So far, a small number of researches have been conducted in Serbia, dealing with the economic effect of the utilization of pastures. This problem was dealt with by **Gogić (2004)**, who applied the method of calculation of the so-called processing price of the pasture grass in order to evaluate whether pastures are better utilized for growing of steers or sheep. Using the example of the family farm from Stara Planina area, **Gogić (2005)** tested the economic effectiveness and financial feasibility of investments in growing of sheep and steers utilizing pastures. Using family farms as an example, **Ivanović (2005)** studied how the use of pastures influences the milk production by milking cows. Certain researches on the economic effects of agricultural production in hilly and mountainous areas were also conducted by **Sorajić (1995)** in the region of east Herzegovina and **Bulatović (1999)** in the northern part of Montenegro. Pastures are mostly characterized by poor quality of grass cover, and yield is also at a low level. In the period 1999 - 2008, the average yield from pastures was 0.51 t/ha, with moderate yearly oscillations (variation coefficient 11.78%) and an insignificant growth rate (2.05%) (Source: www.stat.gov.rs).

In order to achieve highest possible financial gain from pastures (which are the main comparative advantage in the area of cattle production), breeding of the type of livestock that best utilizes bulky food (even that of poor quality) would be required, such as sheep and cattle. Comparing the production of milk and meat with these two types of animals in the period 1999 – 2008, significant differences can be noted. The average production of cow milk made for 99% of the total milk production in Serbia, while sheep milk made for just 0.99%. The differences are not as evident when it comes to the production of meat. Beef makes for the total of 19.80% of total meat production in Serbia, compared to merely 3.99% for mutton (source: www.stat.gov.rs). Having in mind the domination of cattle over sheep breeding (with respect to the volume of production of meat and milk), this paper will be dealing with the issues of utilization of pastures in cattle production.

Material and Method

Taking into consideration the natural potentials of Serbia, as well as the above mentioned previously conducted analyses and problems, the research subject in this paper will be the analysis of the potentials for utilization of pastures for cattle breeding, primarily breeding of heifers.

The paper will also point to the advantages and shortcomings to cattle breeding (breeding of heifers) in pastures and the measures required for optimum utilization of pastures. Apart from the comparative analysis, through the use of methods of analytical calculation will be calculated the economic effects of breeding of heifers in pastures. The analysis will be done on the family farms example, as they utilize over 90% of production capacities of the overall agriculture production in Serbia.

Results and Discussion

Cattle production includes three main breeding systems – pasture, stable and combined. Family farms in the biggest number of cases utilize the stable system, rarely the combined system, while the utilization of strictly pasture system in the Serbian conditions is almost negligible. The presence of specific breeding systems depends on numerous factors, such as the farm location (i.e. availability of pastures in the area), pasture quality, availability of labor for looking after the cattle in pastures, agrarian policy measures, etc. While in Serbia subsidies are used to stimulate classic milk production and cattle breeding, there are still no state subsidies that would influence the promotion of those types of cattle production that are fully based on utilization of pastures. As an example, we can mention the growing of specialized breeds of cattle, as well as the production of beef based on the principle cow – calf, first calf cow – calf, etc.

Stable system, the dominant system in Serbia, has numerous shortcomings – costs of fodder and costs of bedding significantly exceed the same costs of the combined system, the invested labor is higher, cows are more susceptible to diseases and have more problems with reproduction, etc. All these factors influence the poor economic effects of stable system compared to the stable-pasture system.

In order for the aforementioned shortcomings to be alleviated, in the period of summer feeding it would be desirable to use animal feeding plants produced in plowed land instead of conserved food. In this case, fresh cattle fodder is mowed and cows are fed in stables, and this continuous exploitation of green mass is called green conveyer (sequence). However, this form of provision of green fodder requires big organizational efforts in farms applying this system, because it requires high level of mobility of labor and mechanization. Apart from that, this form of feeding is dependent on weather conditions, since in the rainy period it is impossible to feed cattle with green mass due to inability to use mechanization in the plowed land. Another problem could also be the balancing of meals for cattle, having in mind that during the vegetation period different plants are grown with variable nutrition values.

The effect of all these difficulties is that increasing number of farms has began replacing green fodder with conserved fodder when feeding specific categories of cattle (cows and steers), although aware of all the advantages of green fodder (such as high level of digestion, minimum losses of nutritive substances, cattle likes consuming this food, it is beneficial to animal health and production). As an alternative source of

green food, green hydroponics cattle food can be used. This source of cattle food is represented in growing plants without using land, i.e. cereal in the initial growing stage. As it requires significant investments in facilities and equipment, this type of feeding has not gained momentum in our practice.

In order to demonstrate the effects of the use of pastures in breeding of heifers, i.e. the benefit of breeding them in pastures for at least one part of the year instead in stables, a relevant calculation of expenses was conducted per one heifer. The assumption was that heifers use pastures 150 days a year and that in that period there are no costs of silage and alfalfa, while the costs of concentrated food are the same as with stable breeding (because the quality of pasture is difficult to predict).

The paper makes the assumption that the heifers are insured from disease induced death or accidental death (as the basic risk), and also from the loss of breeding capability (as additional risk). Depreciation, maintenance and insurance of facilities and equipment were calculated under the assumption of using modern opened free type facilities. In that way the costs of facilities construction are reduced (compared to classic stables), the labor productivity is increased, and better effects to the health of the animals are achieved. Other parameters of the calculation were harmonized with the actual situation in the production practice. It was assumed that the heifers are taken care of during pasture season by the members of the household, and therefore these costs were not included in the calculation, but compensated from the farm profit. This kind of calculation can serve as the orientation when estimating the costs of heifer breeding service (for specialized breeders), because it doesn't include the cost of female calves involved into the breeding (table 1).

Table 1 Cost of breeding one heifer with and without pasture usage (RSD)

Calculation elements	In stable	In pasture
Fodder	71,494.50	55,267.00
Insemination	1,000.00	1,000.00
Veterinary services	1,000.00	800.00
Registration	3,000.00	3,000.00
Straw	7,300.00	6,570.00
Water	851.00	766.00
Depreciation of buildings	735.00	735.00
Depreciation of equipment	1,102.50	1,102.50
Maintenance of buildings	367.50	367.50
Maintenance of equipment	882.00	882.00
Insurance of heifers	2,500.00	2,500.00
Insurance of buildings	73.50	73.50
Insurance of equipment	110.25	110.25
Total for one heifer	90,416.25	73,173.75

Based on the data from the calculation, it can be concluded that by transferring from stable to the combined breeding system (stable-pasture) the cost would be reduced by 19.07%. The planned expenses pertain to the period of two years which is the length of grow of one heifer, from a week old calf to two years, when the first birth is expected. According to some estimates (**Milojić Miroslava (1989)**), around 40% of young cattle originating from milk production breeds will actually be used for milk production. These are mostly early maturing species that are made barren 14-16 months old, thus achieving higher production of milk during life period. This early insemination has become a standard in milk production.

However, since the breeding of heifers lasts approximately two years, the return of invested funds is delayed, thus burdening the finished products during cow exploitation period. One of important methods for rationalization of breeding, apart from the reduction of growing period, is the inclusion of quality yet cheap cattle food. According to **Krstić et al. (2000)**, in the structure of costs of growing heifers in large farms the cost of food takes 57.2% (the costs relating to calves are not included). In the analyzed example of family farms, the food contribution is even higher, because the costs do not reflect the labor costs of household members.

In Serbia, milk producers most commonly breed heifers in pastures, in order to reduce the costs. At the same time with breeding heifers for own needs, they can breed heifers for the market.

The other possibility is to form specialized farms that would do service of breeding heifers for a wider number of producers, similar to service of fattening steers that was very popular among producers for a very long time. This form of cooperation could especially work well between lowland and mountain farms (lowland farms providing good quality calves, mountain growing them and returning back at a specific gravidity period) thus bringing to the maximum territorial specifics and comparative advantages in securing all types of cattle fodders.

The cooperation can also be in following way – large farms transferring cows that are not in production phase or transferring young cattle to the mounting farms during the vegetation season and thus significantly reducing the costs of feeding. That would be a good solution when there is a disparity between the number of cattle in a farm and the capacity for production of bulky food. Having in mind that we are talking about sensitive production, all production and market conditions must be precisely defined among the relevant parties.

It is obvious that in breeding of heifers the use of pastures is extremely important because it greatly reduces the costs of production, both directly and indirectly. Direct reduction of costs pertains to the costs of cattle fodder, while indirectly costs of cattle production are reduced through the increase of labor productivity and improvement of health of cattle.

However, regardless of all the advantages of the use of pastures, there are certain problems linked to their utilization. As the use of pastures is generally free of charge, there are no financial funds available for their maintenance and nourishment. Therefore, the grass cover can be of poor quality, the grass mass yield is low and

extremely dependant on weather conditions during the year. In Serbia, most pastures are of natural origin, while artificial ones can be scarcely found.

Natural pastures in our country, according to **Pavličević (2001)**, are not satisfactory, neither by quality nor yield. He doesn't just see the reasons in the lack of agro-technical measures, but also in lack of their preparation and improper use. For the purpose of improving the effects of utilization of pastures, increase of yield and quality of grass cover is required, which can be achieved through division of pastures (through construction of appropriate permanent or mobile fences). The rotational grazing would contribute to better and more steadfast utilization of grass cover with the reduction of percentage of weed, it would enable higher exploitation of produced green fodder by 30% compared to free pasture feeding.

The pastures could be significantly improved by irrigation and fertilization with mineral fertilizers and manure (which would increase the yield), as well as the introduction of pasture-mowing system (improving the yield and quality of green mass). The improvement of quality of grass cover can be achieved by sowing quality grass species (this measure would contribute to yield increase and nutritive value of grass).

Regular spring or autumn preparation of pastures should include a wide range of measures, the most important ones being stubbing up of wattle, collection of stones and other waste material, removing of weed and molehills and regulation of watering places. All of the above listed measures would produce better results in artificial than in natural pastures. One should also bear in mind that, when it comes to artificial pastures, they should not be used for free but strictly for rotational grazing.

Conclusion

Having in mind the large areas under pastures (primarily in the mountain territory of central Serbia), the paper examines the potentials of their utilization in breeding of heifers. Therefore, an analytical calculation of breeding of heifers in a family farm was made, that demonstrated that the costs of heifers breeding reduce by 19.07% when using pastures, compared to their breeding in stables. Therefore, formation of specialized farms for breeding of heifers would increase the cost effectiveness of milk production even in those farms that are not in the position to use pastures for feeding of milking cows.

In order to improve the economic effects of the use of pastures, implementation of measures for improvement of yield and the quality of grass cover will be required, while special attention should be paid to the enlargement of areas under artificial pastures.

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