ECONOMIC COMPETITIVENESS OF DIFFERENT WAYS OF PASTURE UTILIZATION

P. Gogić¹

Abstract: A family farm model was used in order to study the economic importance of pasture utilization in sheep breeding and cattle fattening during the summer period. The model was based on real technological, organizational and economic conditions of a farm in the hill and mountain regions of eastern Serbia.

The economic competitiveness of different ways of pasture utilization was studied based on the processing price of green feed obtained from pastures. Under the given economic conditions, a higher processing price of feed may be expected in cattle fattening. Thus, from the economic standpoint farms involved in cattle fattening would have a justifiable production. However, due to the changing market conditions it was necessary to determine the processing prices at different price levels of fattened cattle, animals for fattening and the production value per breeding ewe. A special diagram was constructed enabling a rapid and easy determination of the processing price of feed in practice taking into account different market conditions of sheep breeding and cattle fattening.

In addition, using the same diagram it was possible to determine the relationship between the production value per breeding ewe and the price of fattened cattle at different price levels of animals for fattening inducing the same processing price of pasture feed.

Key words: pastures, competitiveness, processing price, cattle fattening, sheep breeding.

Introduction

During the summer period nutrient properties of green feed play the key role in the diet of some kinds of livestock, especially cattle and sheep. Pastures are the major source of green feed although characterized by low yields, situated on land

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deficient in nutrient elements, in uneven and unaccessible mountain regions distant from inhabited places. In Serbia and Montenegro the share of pastures accounts for approx. 21% of agricultural land or about 1.3 million hectares. The average annual yield of grass i.e. hay ranges from 450 to 500 kg per ha. Therefore, pastures are the most extensive way of utilization of agricultural land, having the least economic importance for agricultural production. Over the past years there has been a decrease in the number of cattle and sheep in Serbia and Montenegro, contributing to the decline of the economic importance of pasture utilization.

In 1998 the number of cattle in Serbia and Montenegro amounted to 1.9 million. This is by 27% less than in 1981 when there were 2.6 million cattle. Over the analyzed years the total number of sheep has decreased even more, from 3.1 million in 1981 to 2.4 million in 1998 i.e. by about 23%. The conclusion which tends to emerge is the declining economic importance of pastures.

Therefore, the economic importance of pastures may only be raised by intensifying their utilization i.e. by increasing the number of grazing cattle and sheep. However, the economic importance of pastures is known to be effected by the kind of livestock grazing. Therefore, from the economic standpoint the objective of the study was to determine the most justifiable way of pasture utilization by comparing cattle fattening and sheep breeding.

**Material and Methods**

A farm model was developed based on a questionnaire in the region of Stara Planina (Eastern Serbia). The farm comprised 9 ha of wheat-growing area, 33 ha of natural and artificial meadows. Taking into account the additional 100 ha state-owned pastures, livestock production focused on pasture utilization was initiated. Regardless of the three household members 2 seasonal workers were hired, taking into account the stock production requirements on the farm during the summer period. Considering the available pastures, 60 cattle were expected to be fattened or 200 sheep to be bred.

The organization of cattle fattening included the purchase of animals weighing 270 kg per animal on average which have already been prepared for fattening using forage from state enterprises or private farmers from the same region. Cattle fattening took place during the summer period, May to October. Grazing 35 kg of green feed along with an additional 30 g of salt on average per cattle daily was sufficient enough for the animals’ needs with regard to nutrients and energy. At the end of the grazing period along with a 1000 g of liveweight gain daily, cattle weighed 450 kg. Depending on the market conditions, it was possible to fatten cattle or heifers or both in a certain proportion. It was necessary to construct barns, sheds in case of bad weather, to water cattle or feed them with
mineral and vitamin mixtures, erect an electrical fence for rotation pastures. In addition, it was necessary to construct accommodation for hired workers and a watering place for animals.

Sheep breeding required the construction of barns for the winter period along with the neighbouring dairy store, silos for the preservation of animal feed, hay, ensilage, an accompanying infrastructure and implements. An electrical fence for rotation pasture was an advantage. In addition to everything, a watering place in the pasture was also necessary.

The economic effects achieved in these productions had an influence on the decision with regard to either cattle fattening or sheep breeding. Taking into account that the cattle fattening and sheep breeding model was focused on pasture utilization, the economic effect of these productions was presented using the utilization or processing value (price) of the pasture feed. From the economic standpoint the price showed what livestock production induced the most justifiable use of feed from pastures i.e. from the economic standpoint what production induced more significant pasture utilization.

The utilization value of pasture feed represented the difference between the market value of the livestock products obtained and the production costs excluding feed costs. The feed processing price was obtained by dividing the processing value by the amount of feed obtained from the pasture (Kristof, 1977), i.e.

\[
pc = \sum_{i=1}^{n} \frac{b_i \cdot c_i - bt}{a},
\]

where:
- \(pc\) – processing price of feed from pastures
- \(b_i\) – quantity of particular livestock products
- \(c_i\) – market price of particular livestock products
- \(bt\) – total production costs excluding feed costs from pastures, and
- \(a\) – amount of feed from pastures.

The pasture feed processing price at unaltered production output was noted to be effected by the price of livestock products as well as the price of inputs, whereas with regard to cattle fattening it is particularly the price of the animal for fattening. Therefore, when making the decision with regard to livestock production it was necessary to determine the processing price for different relationships between input and output prices.

In addition, it was necessary to know parity relationships between the prices of competitive livestock products, in our case, parity relationships between the prices of fattened cattle at different prices of animals for fattening and production
value per breeding ewe. Due to the variety of commodities obtained in sheep breeding, it was necessary to show the value per breeding ewe.

There was a parity relationship between cattle fattening and sheep breeding in cases of equal processing prices of pasture feed in the two productions. With regard to this relationship, an equal financial result was expected in the two productions.

The following formula was used to determine the parity production value per breeding ewe at a certain price level of fattened cattle, animal for fattening along with constant production costs, whereby the processing prices of pasture feed for both productions were mutually identical:

\[
\text{pv} = \frac{b_j \cdot c_j - (b_t \cdot c_t + b_{tj}) + b_{to}}{Q},
\]

(2)

where:

- \( \text{pv} \) – parity production value per breeding ewe
- \( b_j \) – total weight of fattened cattle (kg)
- \( c_j \) – liveweight price of fattened cattle per kg
- \( b_t \) – total weight of animal for fattening (kg)
- \( c_t \) – market price of animal for fattening (d/kg)
- \( b_{tj} \) – other production costs of fattened cattle excluding costs of feed from pastures
- \( b_{to} \) – total costs of sheep breeding excluding costs of feed from pastures, and
- \( Q \) – number of breeding ewes which may graze from a certain pasture area or be fed a certain amount of feed.

**Results and Discussion**

The value of stock-breeding products and production costs excluding costs of pasture feed (Table 1) was determined in order to establish the mutual competitiveness between cattle fattening and sheep breeding on pastures, taking into account the hypotheses the model was based on (Table 1). The processing price of feed obtained from both ways of pasture utilization was computed based on these indices.

Taking into account the prevailing conditions in the analyzed model of pasture utilization, a higher processing price of green feed was obtained in cattle fattening than sheep breeding (12.17 d/t > 11.21 d/t). Therefore, it can be concluded that from the economic standpoint it was more justifiable to fatten cattle than to breed sheep i.e. taking into account the given conditions a greater competitiveness with regard to pasture utilization was obtained in cattle fattening.
### Table 1. Calculation of cattle fattening (60 animals) (Dinars)

<table>
<thead>
<tr>
<th></th>
<th>PRODUCTION VALUE</th>
<th>PROCESSING COSTS</th>
<th>PROCESSING VALUE (A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>33,750.00</td>
<td></td>
<td></td>
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<tr>
<td>B.</td>
<td></td>
<td>1. Animals for fattening 24,300.00</td>
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<tr>
<td></td>
<td></td>
<td>2. Animal transport 300.00</td>
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<td></td>
<td></td>
<td>3. Electricity 54.00</td>
<td></td>
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<td></td>
<td>4. Depreciation 543.00</td>
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<td></td>
<td></td>
<td>5. Labor costs 288.00</td>
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<td></td>
<td></td>
<td>6. Insurance 1,732.75</td>
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<td></td>
<td></td>
<td>7. Other costs 123.25</td>
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<td></td>
<td></td>
<td>8. Interest 1,541.00</td>
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<tr>
<td></td>
<td>Total (1 to 8): 28,882.00</td>
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<td>4,868.00</td>
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</tbody>
</table>

**Fattened cattles price** (c_f) 1.25 d/kg

**Fattening animals’ price** (c_t) 1.50 d/kg

**Pasture green feed amount** (a) 400 tona

**Processing price of green feed** (p_c) 12.17 d/t

### Table 2. Calculation of sheep breeding (200 animals) (Dinars)

<table>
<thead>
<tr>
<th></th>
<th>PRODUCTION VALUE</th>
<th>PROCESSING COSTS</th>
<th>PROCESSING VALUE (A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>27,900.00</td>
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<tr>
<td>B.</td>
<td></td>
<td>1. Fodder excluding pasture feed 12,556.00</td>
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<tr>
<td></td>
<td></td>
<td>2. Electricity 67.50</td>
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<td></td>
<td></td>
<td>3. Depreciation 5,143.00</td>
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<td></td>
<td></td>
<td>4. Labor costs 2,000.00</td>
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<td>5. Insurance 1,302.50</td>
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<td></td>
<td></td>
<td>6. Other costs 140.00</td>
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<td></td>
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<td>7. Interest 2,207.00</td>
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<td></td>
<td>Total (1 to 7): 23,416.00</td>
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<td>4,484.00</td>
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</tbody>
</table>

**Production value per breeding ewe** 139.0 d

**Pasture green feed amount** (a) 400 tona

**Processing price of green feed** (p_c) 11.21 d/t

Market constraints are known to impact the processing prices of feed and therefore it was necessary to determine parity prices under various market conditions in order to establish competitiveness between livestock productions involving pasture utilization. In addition, trends in the processing prices of pasture feed, depending on the sales prices of fattened cattle, purchase prices of animals for fattening and different amounts of production values per breeding ewe under unaltered conditions (Table 3) were analyzed.
Increasing the market prices of liveweight of fattened cattle and production values per breeding ewe tended to raise the processing prices of pasture feed, and, on the other hand increasing the prices of fattening animals, these were found to decline.

In addition to the trends of the pasture feed processing prices, it was possible to establish the parity production values per breeding ewe (Table 3) for the corresponding processing prices of pasture feed in relation to the prices of fattened cattle and fattening animals.

<table>
<thead>
<tr>
<th>Price of animals for fattening (d/kg)</th>
<th>1.00</th>
<th>1.20</th>
<th>1.40</th>
<th>1.60</th>
<th>1.80</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.90 (Production value per sheep)</td>
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<tr>
<td>1.00 (Production value per sheep)</td>
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<tr>
<td>1.10 (Production value per sheep)</td>
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<tr>
<td>1.20 (Production value per sheep)</td>
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<tr>
<td>1.30 (Production value per sheep)</td>
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</tr>
<tr>
<td>1.40 (Production value per sheep)</td>
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</table>

Parity production values per breeding ewe were found to take an identical course as did the processing prices of pasture feed i.e. increasing the processing value per breeding ewe tended to raise the processing price of feed.

The use of a specially constructed diagram (Fig. 1) was the most precise and simple way of determining the processing price of pasture feed for different prices of fattened cattle and animals for fattening and production values per breeding ewe.
It was possible to establish the processing prices of pasture feed on the abscissa by plotting the prices of fattened cattle on the line parallel to ordinate, production values per breeding ewe on the line parallel to abscissa and the prices of animals for fattening on the ordinate. It was hypothesized that other production costs were constant.

Fig. 1. - Graphic determination of the processing price of pasture feed and parity prices between fattened cattle and production value per breeding ewe

The processing price of pasture feed was obtained by dropping the vertical line from the points where the lines representing the prices of fattened cattle and prices of animals for fattening intersect on the abscissa. At the same time, the parity production value per breeding ewe for the corresponding processing price of pasture feed was recorded from the parallel horizontal line to abscissa. For example, the processing price of pasture feed amounting to 12.17 d/t was determined by dropping the vertical line on the abscissa from the point where the line representing the price of fattened cattle 1.25 d/kg and the line representing the price of the animal for fattening 1.50 d/kg intersect. In addition, the production value per breeding ewe which was in parity relationship with the price of fattened cattle along with the corresponding price of animal for fattening was established by dropping the vertical line from the point representing the processing price of pasture feed on the parallel horizontal line. Thus, the processing price of pasture feed was 1.46 d/t for the production value of breeding ewe amounting to 120 d/animal, whereas its corresponding parity price of fattened cattle was about 0.85 d/kg when the price of the animal for fattening amounted to 1.1 d/kg, etc.
Pastures represent the most extensive way of utilization of agricultural land because it was green feed only used by grazing animals (cattle, sheep, etc.) during the summer period. Therefore, the economic importance of pastures was effected by the number of animals grazing. In our country over the past years the total number of animals both cattle and sheep has been noted to decrease especially those grazing. The conclusion which tends to emerge is the declining economic importance of pastures for agricultural production. Therefore, the economic importance of pastures may be raised by intensifying utilization i.e. increasing the number of animals grazing.

However, investigations have shown that the kind of animals grazing had an impact on the economic importance of pastures. The economic effects of pasture utilization were determined taking into account the processing prices of pasture feed for sheep breeding and cattle fattening. Under the given economic conditions in the family farm model a higher pasture feed processing price was obtained in cattle fattening than sheep breeding. Also, investigations have shown that increasing the price of fattened cattle and production values per breeding ewe tended to raise the processing price. On the other hand, increasing the price of animal for fattening, the processing price tended to decline.

In addition to the processing prices of feed, it was of major importance to know the parity relationships between the commodity prices of competitive stock productions achieving the same processing prices in order to determine the economic competitiveness of pasture utilization.

REFERENCES
EKONOMSKA KONKURENTNOST RAZLIČITIH NAČINA KORIŠĆENJA PAŠNJAKA

P. Gogić

Rezime

Na sastavljenom modelu porodičnog poljoprivrednog gazdinstva ispitivan je ekonomski značaj korišćenja pašnjaka pri gajenju ovaca i tovu junadi u ljetnjem periodu. Model je zasnovan na realnim tehnološkim, organizacionim i ekonomskim uslovima gazdinstva i okruženja iz brdsko-planinskog područja Istočne Srbije.

Ekonomska konkurentnost različitih načina korišćenja pašnjaka je ispitivana na osnovu iznosa preradne cijene zelene stočne hrane sa pašnjaka. Pri postojećim uslovima privređivanja, postizala bi se veća preradna cijena stočne hrane pri tovu junadi, pa bi za gazdinstvo ova proizvodnja bila ekonomski cjelovita. Zbog mogućnosti promjene tržišnih uslova, preradne cijene su utvrđene i za različite nivoe cijena utovljene junadi, grla za tov i vrijednosti proizvodnje po priplodnoj ovci. Za tu svrhu konstruisan je i poseban dijagram pomoću kog se brzo i lako u praksi mogu utvrđivati preradne cijene stočne hrane pri različitim tržišnim uslovima gajenja ovaca i tova junadi.

Takođe, pomoću dijagrama se može utvrditi i pri kojem odnosu vrijednosti proizvodnje po priplodnoj ovci i cijena utovljene junadi za različite cijene grla za tov se ostvaruje isti iznos preradnih cijena stočne hrane sa pašnjaka.


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