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**FACULTY OF AGRICULTURE**

# Book of Proceedings

## The Seminar

# AGRICULTURE AND RURAL DEVELOPMENT - CHALLENGES OF TRANSITION AND INTEGRATION PROCESSES

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# Book of Proceedings

## The Seminar
## Agriculture and Rural Development - Challenges of Transition and Integration Processes

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# THE IMPACT OF SOWING STRUCTURE ON EMPLOYMENT OF LABOUR FORCE ON FAMILY FARMS DIRECTED AT FATTENING OF BEEF CATTLE[1]

*Saša Todorović*[2]

***Summary***

*This paper is aimed at examining the impact of change of sowing structure on the employment of labour force and on the economic effects of business operations of farms directed at final production of fattened beef cattle in the conditions of unchanged estate size. Thereby, appropriate models of family farms directed at fattening of beef cattle are formed and they serve for considering organisational and economic effects of changes in sowing structure. Applying partial budget analysis, it was examined whether the decision on changing the sowing structure was economically justified and under what conditions by using an additional procedure of analysis. Applying this approach, it was determined to what extent that decision contributed to economic effects of the family farm business.*

*A detailed analysis of natural, organisational and economic conditions in which these farms operate was previously carried out so as to successfully accomplish the given aim, and then the analysis of all available resources was conducted as well as the analysis of production results. The data for this survey were collected during the year of 2012 by interviewing holders of the chosen family farms directed at the final production of fattened beef cattle. For the purpose of considering the effects of change in sowing structure, the results of previous research related to employment of labour force in crop and livestock production were used.*

*In this regard, the results of the conducted research show that more rational way of organization (change in sowing structure) provides an opportunity for family farms directed at the final production of fattened beef cattle to use available resources (especially labour force) in a better way, and thus to improve economic effects of the family farm business.*

**Key words:** *sowing structure, labour force, fattening beef cattle, family farms.*

**JEL classification:** *Q12, J21, J22*

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## 1. Introduction

Livestock production takes place during the whole year and therefore the level of employment of labour force at livestock farms is almost balanced per month. However, this statement is valid only in the case of farms that are highly specialized and deal exclusively with livestock production, not with the production of animal feed. This type of farms can include highly intensive production, such as fattening of broilers, production of eggs and etc. Thus, it should be taken into account that such farms are less common in our practice, and that the majority of livestock farms are engaged in the production of fodder for their own needs. As regards this type of livestock farms, a greater variation occurs in the employment of labour force during certain months, and these variations mainly come from crop production. Traditionally, crop production requires a considerable employment of labour force in the season, especially in the sowing and harvesting period. Therefore, the farms directed at crop production in certain parts of the year have unused reserves of available labour force. In this matter, the time available for engaging in other activities at small farms directed at crop production is very considerable. The issue of the amount of the available working time which is given to the family farms aimed at crop production for performing additional activities is related to the size and nature of the existing production (Todorović i Ivanović, 2011a; Todorović i Ivanović, 2011b).This means that there is a problem of hidden unemployment at such small farms. Such situation could cause the formation and growth of rural poverty.

Small and inadequately used estates limit capacities of livestock production because of reduced forage production, which represents the basis of economic sustainability of the farm. An insufficient and inadequate use of land resources leads to the decrease of their economic efficiency and rationality of business operations, which makes them less competitive. All that refers to the need for finding modern and more rational ways of their organisation so that available resources can be additionally used. More rational way of organization (change of production direction – introduction of beef production) provides an opportunity for family farms directed at crop production to use available resources (especially labour) better, and thus to improve business results (Todorović et al., 2012). In addition to this, it is necessary to coordinate production structure with available possibilities in order to achieve good economic results (Bastajić and Živković, 2002). In the time of increasingly profitable production, the special attention should be called to the choice of optimal sowing structure, regarding the great impact it has on functioning and success of family farms business operations (Todorović and Munćan, 2009; Todorović et al., 2010a; Todorović et al., 2010b). Bearing that in mind, this paper is aimed at examining the impact of change of sowing structure on the employment of labour force and on the economic effects of

business operations of farms directed at final production of fattened beef cattle in the conditions of unchanged estate size.

## 2. Material and method

A detailed analysis of natural, organisational and economic conditions in which these farms operate was previously carried out so as to successfully accomplish the given aim, and then the analysis of all available resources was conducted as well as the analysis of production results. The data for this survey were collected during the year of 2012 by interviewing holders of the chosen family farms directed at the final production of fattened beef cattle. For the purpose of considering the effects of change in sowing structure, the results of previous research related to employment of labour force in crop and livestock production were used.

In accordance with the aim of the research, the model of family farm directed at the final production of fattened beef cattle is constructed, having the following characteristics:

- family farm is placed in lowlands and has 17.72 ha of arable land,
- it is directed at the final production of fattened beef cattle of Simmental breed (intensive fattening of calves weighing 150 kg at the beginning, achieving total mass of 550 kg, 35 head in fattening),
- thereby the average daily weight gain (average weight gain per feeding day) is 1.25 kg, the duration of fattening is 320 days, and one cycle per year is averagely realised on the farm (the rest of time is spent on cleaning the facilities which are used for fattening beef cattle and their preparation for inclusion of new head for fattening),
- the structure of plant production is coordinated with the needs of animal husbandry and agrotechnical limitations of crop rotation,
- the technology of crop production is typical for the area where the family farm is located and
- the required area for the production of animal feed, aimed at providing stable supply, was increased by 3% to 7%, which is in accordance with practical recommendations (Krstić et al., 2000).

The designed model served for considering organisational and economic effects of the change in the structure of sowing.

For the purpose of finding modern and more rational ways of their organising as well as for the purpose of additional using of available resources, the decision on buying mercantile maize on the market instead of producing it on the farm is taken

into consideration. In addition, the fact that should be taken into account is that buying mercantile maize on the market instead of its producing on the farm makes the area free for potential production of additional amounts of alfalfa hay and silage maize for fattening additional head. In that sense, the decision on buying of mercantile maize on the market instead of producing it on the farm influences the change of sowing structure.

The initial assumption concerning the increase in the number of head for fattening is the fact that most family farms of this type have already had necessary basic means for fattening beef cattle (which corresponds to s real situation in our practice), therefore the additional investments will not be required, but there will be only change in the levels of production value and variable costs on the farm. Increasing the number of head for fattening on the farm will not result in the change in the level of fixed costs. According to Gogić (2005), the fixed costs are not changed when changing the degree of using capacities, that is, their total amount remains the same regardless of the amount of products produced or services rendered. Avoiding additional investments in facilities and equipment, that is better use of existing capacities, the risk of increasing the number of head for fattening is largely reduced.

Applying partial budget analysis, it was examined whether the decision on changing the sowing structure was economically justified and under what conditions by using an additional procedure of analysis. Applying this approach, it was determined to what extent that decision contributed to economic effects of the family farm business.

## 3. **Results and discussion**

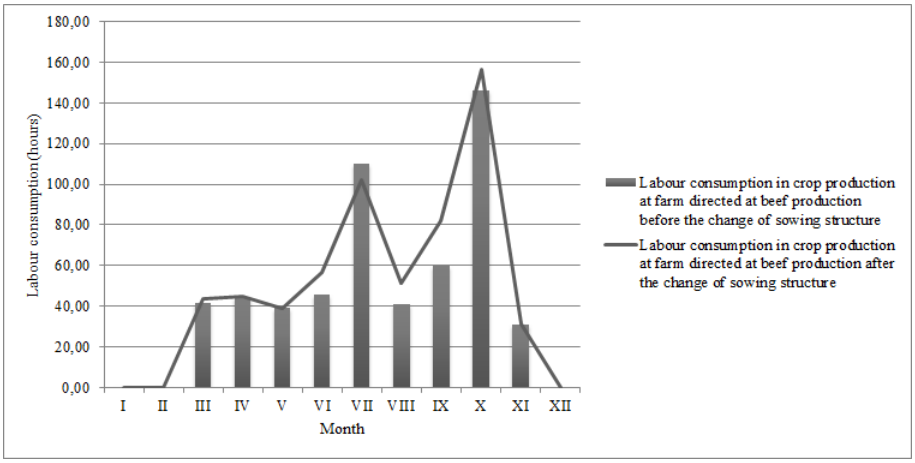
Buying mercantile maize on the market instead of producing it on the farm makes changes in sowing structure which result in the increasing the areas occupied by alfalfa and silage maize (Table 1).

**Table 1:** The area of crops and sowing structure before and after taking a decision on buying mercantile maize on the market instead of producing it on the farm

| **CROP** | **AREA (ha)** | | **CHANGE** | **CHANGE** | **STRUCTURE (%)** | |
|---|---|---|---|---|---|---|
| | **Before** | **After** | **(ha)** | **(%)** | **Before** | **After** |
| Winter wheat | 7.84 | 7.84 | 0.00 | 0.00 | 44.25 | 44.25 |
| Maize (silage) | 3.36 | 6.07 | 2.71 | 80.67 | 18.96 | 34.26 |
| Maize (mercantile) | 4.41 | 0.00 | -4.41 | -100.00 | 24.89 | 0.00 |
| Alfalfa (using) | 1.32 | 2.39 | 1.07 | 80.67 | 7.47 | 13.49 |
| Alfalfa (establishing) | 0.78 | 1.42 | 0.63 | 80.67 | 4.43 | 7.99 |
| **TOTAL** | 17.72 | 17.72 | | | 100.00 | 100.00 |

*Source: Author's calculation*

Thus, the crop production of the modelised farm is aligned with the needs of animal feed for fattening beef cattle and the requirements of crop rotation with regard to the restrictions related to the use of its own labour force. Increasing the participation of silage maize and alfalfa (which require a greater engagement of labour force compared to mercantile maize which was previously present in crop production) in sowing structure contributes to the increase in employment of labour force on the farm (Graph 1).




*Source: Author's calculation*

**Graph 1** Labour consumption in crop production at farm directed at beef production (by months)

This Graph shows that the working time spent in crop production on the farms directed at beef cattle production is longer after the decision to buy mercantile maize on the market (as a consequence of this decision a change in sowing structure occurred), primarily during some months (June, August, September and October). This is, as it was previously mentioned, a consequence of the increase in the participation in sowing structure of silage maize and alfalfa.

While the working time spent in crop production before the change in sowing structure was 559.09 hours, after the change it amounted to 607.34 hours, the change in spent working hours, as a result of the change in sowing structure caused by the decision on buying mercantile maize on the market, only on this basis amounts to 48.25 hours, that is 8.63% at an annual level.

However, estimated annual change which amounts to -278,418.54 dinars shows that, according to previously mentioned assumptions, buying mercantile maize is

not economically justified, for it unfavourably influences the business operations of family farms (Table 2).

**Table 2:** Partial budget analysis of buying mercantile maize instead of producing mercantile maize

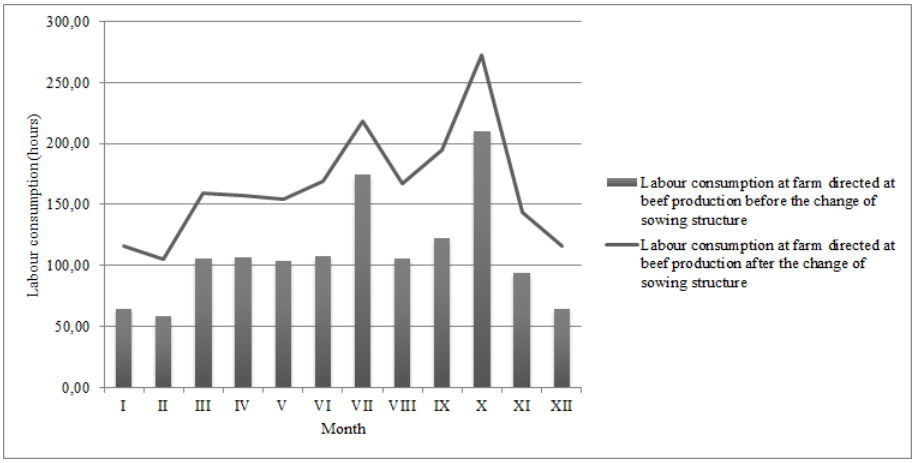
| ELEMENTS | Number of added calf's | |
|---|---|---|
| | 0 | 28 |
| **Increased revenue (RSD)** | **0** | **3,542,000** |
| Adding calf's to herd | 0 | 3,542,000 |
| **Reduced expense (RSD)** | **456,111.06** | **456,111.06** |
| Stop harvesting mercantile maize | 456,111.06 | 456,111.06 |
| **Total increased revenue and reduced expenses (RSD)** | **456,111.06** | **3,998,111.06** |
| **Reduced revenue (RSD)** | **0** | 0.00 |
| None | 0 | 0.00 |
| **Increased expense (RSD)** | **734,529.6** | **3,346,878.2** |
| Adding calf's to herd | 0 | 2,024,724.9 |
| Purchasing mercantile maize | 734,529.6 | 1,322,153.3 |
| **Total reduced revenue and increased expense (RSD)** | **734,529.6** | **3,346,878.23** |
| **Estimated annual change (RSD)** | **-278,418.54** | **651,232.83** |

*Source: Author's calculation*

However, if we take into account the fact that buying mercantile maize in the actual example will make the area free, which according to some conservative estimations, can be used for production of sufficient amount of alfalfa and silage maize for fattening of additional 28 head then the situation seems quite different (Table 2). In that case the average annual change of the results of family farms amounts to 651,232.83 dinars, as well as higher employment of labour force on the family farm can be expected (Graph 2).

This Graph demonstrates that the working time spent on the farms directed at beef cattle production is considerably longer after the decision to buy mercantile maize on the market, and use the free area for the production of alfalfa hay and silage maize for fattening of additional 28 head during all months.

While the working time spent on the farm before the change in sowing structure amounted to 1,317.61 hours, after the change it amounted to 1,972.67 hours, so the change of the spent working hours, as a consequence of the change in sowing structure caused by the decision on buying mercantile maize on the market and using the free area for the production of alfalfa hay and silage maize for fattening of additional 28 head annually amounts to 655.06 hours that is 49.72%.




*Source: Author's calculation*

**Graph 2** Labour consumption at farm directed at beef production (by months)

Although it is determined under what conditions that decision is economically justified, the final conclusion cannot be reached without an additional analysis. Apart from previously described factors, there is a range of others, which producers should consider when making decisions on shifting to buying mercantile maize.

Are sufficient amounts available on the market every year? What is the quality? Are there possibilities for storing mercantile grain maize which will be purchased on the market? Is soil used for production of mercantile maize suitable for growing of other crops? Is it possible to use the labour employed for production of mercantile maize in other way?

There are other questions concerning investments which should be considered. What is the degree of using available capacities for fattening and whether adding of envisaged number of head requires new investments? Is there any available capital for buying additional head? Will the equipment which is used only in the production of mercantile maize be sold? The question whether the equipment will be sold or not greatly influences economic justification of previously analysed decisions, because in case the equipment is not sold, its fixed costs remain, which encumbers the business operations of family farm. However, it is not true in the case when the same equipment is used for doing a service to others (Todorović i Ivanović, 2012).

## 4. Conclusion

The results of the conducted research show that more rational way of organization (change in sowing structure) provides an opportunity for family farms directed at the final production of fattened beef cattle to increase production and use available resources (especially labour force) in a better way, and thus to improve economic effects of the family farm business.

A significant employment of labour force in crop and livestock production on the farms directed at fattening beef cattle ensures higher employment of members of the family farm, who are engaged only on the farm (which increases incomes of the family farm and allows reducing rural poverty). Thus, it reduces the need for engaging most of working-age members of the family farm to work off the farm.

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