

Economics of agriculture

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## THE IMPACT OF SOWING STRUCTURE ON PROFITABILITY OF FAMILY FARMS DIRECTED AT THE FINAL PRODUCTION OF FATTENED BEEF CATTLE<sup>1</sup>

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### Abstract

*Small and inadequately used estates of family farms limit the capacities of cattle production because of limited forage production which is the basis of farm economic sustainability. Insufficient and inadequate use of soil resources leads to the decrease of their competitiveness which also results in the need of finding more rational ways of their organisation.*

*Bearing that in mind, the decision on buying mercantile maize on the market instead of producing it on the farm is taken into consideration. As a consequence of the previous decision, the possibility of the change of sowing structure is raised.*

*Applying partial budget analysis, it was examined whether the decision on buying mercantile maize on the market and changing the sowing structure was economically justified and under what conditions using additional procedure of sensitive analysis. Applying this approach, it was investigated to what extent that decision contributed to improving the profitability of family farm.*

*The results of the conducted research show that buying mercantile maize on the market will enable changes in the sowing structure, that is, buying mercantile maize will make the area free, which according to some conservative estimations, can be used for production of sufficient amounts of alfalfa hay and silage maize for fattening of additional 19 head. In addition, it is shown that more rational way of organising family farms directed at the final production of fattened beef cattle can additionally use available resources and in that way increase profitability and improve competitiveness.*

**Key words:** *economic analysis, profitability, competitiveness, sowing structure, mercantile maize, beef cattle fattening, family farms.*

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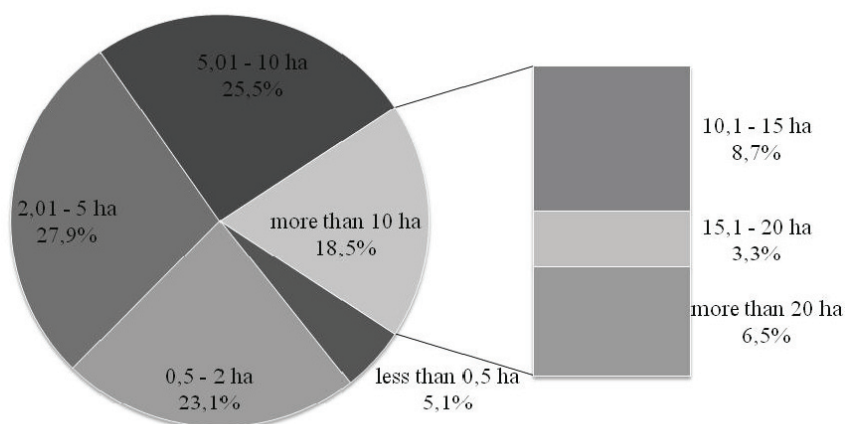
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## Introduction

Animal husbandry as an initiator of the development of the total agricultural production faces a serious crisis. The contribution of animal husbandry to the total agricultural production of the Republic of Serbia is estimated at about 40%, whereas in the 1970s the participation of animal husbandry in the structure of agricultural production was 50%. On the other hand, the participation amounts to 70% in the developed countries (Lučić et al., 2001). Keeping natural conditions, unused facilities and other potentials in mind, it is necessary to systematically increase the number of head (especially those breeds whose products are deficient on the market – beef) and change breed structure and in that way to influence productivity and profitability of total production. Regarding researches which show that average share of livestock in the Republic of Serbia is of low intensity (28 livestock unit per 100 ha), in which process the share of livestock by districts ranges from very weak (15 livestock units per 100 ha in South Bačka District) to low intensity (47 livestock units per 100 ha in Kolubara District), except for Mačva District, which has a medium level of livestock share (58 livestock units per 100 ha) which refers to significant reserves for intensifying agricultural production by establishing favourable relationships between animal husbandry and plant production (Bošnjak and Rodić, 2008). The fact that animal husbandry is slowly renewable should be taken into account, as well as the fact that family farms, weakly organised, participate in the structure of livestock fund with 76% (Bošnjak et al., 2008). Bearing that in mind, the problem of unfavourable ownership structure of family farms is raised (Graph 1).

*Graph 1 - Ownership structure of registered agricultural households on the territory of AP of Vojvodina in year of 2008.*



*Source: Author's calculation based on data from Ministry of Finance of Republic of Serbia - Treasury (06.05.2008.)*

In the structure of registered agricultural households on the territory of AP of Vojvodina in observed period, small farms are predominant – farms with land property below 5 ha make 56% of total number of registered farms, whereas the share of farms with land property of over 10 ha is 18.5%. This is extremely unfavourable ownership structure considering that these are farms located in low land region. Unfavourable ownership structure is general problem present at the level of Republic of Serbia. According to research results obtained by Bogdanov Natalija and Božić Dragica (2005) in ownership structure of farms in the Republic of Serbia, predominant are small farms, since small farms with below 3 ha of land make 60.2%, whereas farms with over 10 ha make only 5.6% of total number of farms<sup>3</sup>. Considering the decisive significance of ownership structure for efficiency of operation in agriculture, it can be concluded that it is very difficult to remain competitive and survive on the market with conditions of increasingly strong competition with such unfavourable ownership structure. Small and inadequately used estates limit capacities of livestock production because of reduced forage, which represents the basis of economic sustainability of the farm. An insufficient use of their production potentials 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. 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). Considering that, the aim of this paper is to examine the impact of sowing structure on their profitability using the model of family farm directed at the final production of fattened beef cattle under the conditions of unchanged estate size.

## Materials and Methods

In accordance with the aim of the research, and on the basis of data collected on the selected family farms during the year of 2009, the model of family farm is constructed, having the following characteristics:

- family farm is placed in lowlands,
- 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, averagely realised one cycle per year, 25 head in fattening),
- the structure of plant production is coordinated with the needs of animal husbandry and agrotechnical limitations of crop rotation,

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<sup>3</sup> According to Census 2002, number of agricultural farms in Republic of Serbia was 778.891.

- the technology of crop production is typical for the area where the family farm is located and
- 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).

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 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 of additional head should be taken into account. 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.

Applying partial budget analysis, it was examined whether the decision on buying mercantile maize and changing the sowing structure was economically justified and under what conditions using additional procedure of sensitive analysis. Applying this approach, it was investigated to what extent that decision contributed to improving the profitability of family farm.

## 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 (ha)	CHANGE (%)	STRUCTURE (%)	
	Before	After			Before	After
Alfalfa (establishing)	0.39	0.69	0.30	78.72	2.57	4.59
Alfalfa (using)	1.44	2.58	1.14	78.72	9.63	17.20
Maize (mercantile)	3.71	0.00	-3.71	-100.00	24.75	0.00
Maize (silage)	2.89	5.16	2.27	78.72	19.25	34.41
Other crops	6.57	6.57	0.00	0.00	43.80	43.80
<b>TOTAL</b>	<b>15.00</b>	<b>15.00</b>			<b>100.00</b>	<b>100.00</b>

*Source: Author's calculation*

Estimated annual change which amounts to -40,270.3 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 (RSD)*

ELEMENTS	Number of Added Calf's	
	0	19
<b>Increased Revenue</b>	<b>0</b>	<b>1,862,000</b>
Adding calf's to herd	0	1,862,000
<b>Reduced Expense</b>	<b>193,617.2</b>	<b>193,617.2</b>
Stop harvesting mercantile maize	193,617.2	193,617.2
<b>Total Increased Revenue and Reduced Expenses</b>	<b>193,617.2</b>	<b>2,055,617.2</b>
<b>Reduced Revenue</b>	<b>0</b>	<b>0</b>
None	0	0
<b>Increased Expense</b>	<b>233,887.5</b>	<b>1,629,132.1</b>
Adding calf's to herd	0	1,217,490.1
Purchasing mercantile maize	233,887.5	411,642
<b>Total Reduced Revenue and Increased Expense</b>	<b>233,887.5</b>	<b>1,629,132.1</b>
<b>Estimated Annual Change</b>	<b>-40,270.3</b>	<b>426,485.1</b>

*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 19 head then the situation seems quite different (Table 2.). In that case it can be expected that average annual change of the results of family farms amounts to 426,485.1 dinars.

In order to examine the sensitivity of that decision, partial budget analysis (Table 2.) is done for the different number of head added to fattening and different amounts of purchasing prices of mercantile maize (Table 3.).

*Table 3. - Estimated Annual Change if Mercantile Maize is Purchased Given Varying Numbers of Calf's Added and Purchased Mercantile Maize Prices*

N° of Added Calf's	Purchased Mercantile Maize Price (RSD/Ton)						
	6,000.0	7,500.0	9,000.0	10,500.0	12,000.0	13,500.0	15,000.0
<b>0</b>	37,692.2	-1,289.1	-40,270.3	-79,251.6	-118,232.8	-157,214.1	-196,195.3
<b>5</b>	176,115.1	129,337.6	82,560.1	35,782.6	-10,994.9	-57,772.4	-104,549.9
<b>10</b>	314,537.9	259,964.2	205,390.4	150,816.7	96,242.9	41,669.2	-12,904.6
<b>19</b>	563,699.1	495,092.1	426,485.1	357,878.1	289,271.1	220,664.1	152,057.1

*Source: Author's calculation*

In case no head is added to fattening, the decision on buying mercantile maize is not economically justified as long as purchasing price of mercantile maize is higher than 7,450.4 dinars per tonne. However, adding of 5 head to fattening positively influences business results provided that purchasing price of mercantile maize is lower than 11,647.4 dinars per tonne. On the other hand, the decision on buying mercantile maize by adding maximum possible 19 head to fattening is economically justified

for analysed range of prices of mercantile maize. Thus, lower purchasing price of mercantile maize and greater number of head added to fattening result in the changes that positively influence business results of family farm.

Although it is determined under what conditions that decision are 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 work employed for production of mercantile maize in any other way? Is it possible to use facilities for storing mercantile maize ear for some other purposes?

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 (e.g. maize picker) 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.

## Conclusion

The results of the conducted research show that it is the consequence of the fact that buying mercantile maize on the market will enable changes in the structure of sowing, that is, buying mercantile maize will make the area free, which according to some conservative estimations, can be used for production of sufficient amounts of alfalfa and silage maize for fattening of additional 19 head. However, the results of conducted research show that the decision on buying mercantile maize is not economically justified as long as its purchasing price is higher than 7,450.4 dinars per tonne. On the other hand, buying mercantile maize along with simultaneous increasing of the number of head fattened positively influence business results. Hence, lower purchasing price of mercantile maize and higher number of head added to fattening result in changes which positively influence business results of family farm.

The results of this research should be considered in the context of aspiration to establish profitable specialised family farms in Republic of Serbia. In addition, it is shown that using modern and more rational way of their organisation the additional resources can be used, and in that way improve their profitability and competitiveness.

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