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THE CHANGE OF SOWING STRUCTURE AS A STRATEGY FOR IMPROVING COMPETITIVENESS OF FAMILY FARMS DIRECTED AT THE FINAL PRODUCTION OF FATTENED BEEF CATTLE

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Abstract: The aim of this paper is to examine the impact of sowing structure on family farm competiveness using the model of family farm directed at the final production of fattened beef cattle in the conditions of unchanged estate size. Applying a partial budget analysis, it was examined whether the decision on buying alfalfa hay or 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 family farm profitability. The results of the conducted research show that the decision on buying mercantile maize mainly contributes to improving competitiveness of family farms directed at the final production of fattened beef cattle compared with the decision on buying alfalfa hay. It is the consequence of the fact that buying mercantile maize on the market will enable sowing structure changes, that is, buying mercantile maize will make the area free, which according to some conservative estimations, can be used for the production of sufficient amounts of alfalfa and silage maize for fattening of additional 19 head, whereas buying alfalfa hay will make the area free, which can be used for production of sufficient amounts of mercantile and silage maize for fattening of additional 6 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 land resources and in that way increase profitability and improve competitiveness.

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

Introduction

Agriculture of the Republic of Serbia faces a great number of challenges which significantly influence its development. Animal husbandry as an initiator of

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the development of the total agricultural production tackles a serious crisis. The animal husbandry contribution 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). The number of all domestic animals for the last twelve years has been constantly decreasing. The most significant decrease was identified during 2000, 2001 and 2002. During this period the number of animals decreased by 18.6% (Aleksić et al., 2009). The decrease of the number of certain breeds in the Republic of Serbia is the result of numerous factors such as: the absence of incentive measures, low loan capability, price disparity, depressive meat prices, decrease of rural population, problems concerning purchase and other aggravating circumstances (Bošnjak et al., 2008).

Keeping natural conditions, unused facilities and other potentials in mind, it is necessary to systematically increase the number of heads (especially of those breeds whose products are deficient on the market, e.g. beef) and change breed structure. Thus, it will influence productivity and profitability of total production. It can be said that in the existing socio-economic conditions, better results are achieved by family farms characterised by specialised production in comparison with family farms of the same size, characterised by various production (Bastajić, 2003). Also, the economic efficiency of investments on family farms having greater number of animals is higher as well as their financial feasibility, whilst the risk level in uncertain business operation conditions is lower (Ivanović, 2008). Regarding researches which show that average share of livestock in the Republic of Serbia is of low intensity (28 livestock units per 100 ha), and that 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 livestock fund structure with 76% (Bošnjak et al., 2008). Bearing that in mind, the problem of unfavourable ownership structure of family farms is raised (Figure 1).

Regarding the structure of registered agricultural households on the territory of AP of Vojvodina in the observed period, small farms are predominant – farms with land property below 5 ha make 56% of a 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 farms are located in low land region.

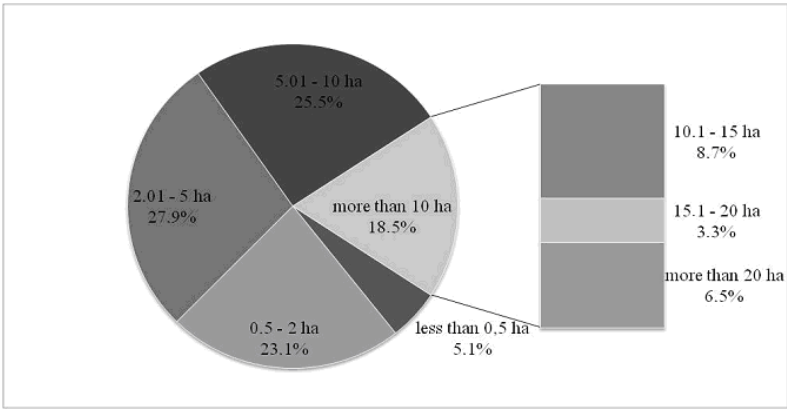

Figure 1. Ownership structure of registered agricultural households on the territory of AP of Vojvodina in the year of 2008 (author's calculation based on data from the Ministry of Finance of the Republic of Serbia – Treasury (6 May 2008).

Unfavourable ownership structure is a general problem present at the level of the Republic of Serbia. According to research results obtained by Bogdanov and Božić (2005) small farms are predominant in ownership structure of farms in the Republic of Serbia, since small farms with below 3 ha of land make 60.2%, whereas farms with over 10 ha make only 5.6% of the total number of farms (according to Census 2002, the number of agricultural farms in the Republic of Serbia was 778,891). 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. Family farms where most of production is developed, deal with different types of beef cattle production. In addition, each production type requires different investment structure. The research results obtained by Ivanović et al. (2008) show that some family farms invest more in facilities for cattle housing, and the other ones invest more in modern equipment, but as a whole, family farms which invest more in modern technical-technological systems of production achieve better business operations results. Modernisation of cattle production greatly depends on this fact. Taking into account Serbian cattle breeding (a small number of animals on family farm and small estate), the need for finding a more rational way of organising arises so that available resources can be additionally used. Small and inadequately used estates limit capacities of livestock production because of reduced forage, which represents the basis of economic farm sustainability. 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. 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). Whilst seeking to achieve a more profitable production, a special attention should be called to the optimal sowing structure choice regarding the extraordinary influence it has on functioning and success of family farm business operations (Todorović and Munćan, 2009). Bearing that in mind, the aim of this paper is to examine the impact of sowing structure on their competiveness using the model of family farm directed at the final production of fattened beef cattle in 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, 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 and Lučić, 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 land resources, the decisions on buying alfalfa hay or mercantile maize on the market instead of producing it on the farm is taken into consideration. This decision makes sowing structure change possible, bearing in mind that buying them on the market instead of producing them on family farm makes the area free for potential production of additional amounts of mercantile maize and silage maize or alfalfa hay and silage maize, and on the other hand, it makes additional head fattening possible. In that sense, the decision on buying alfalfa hay or mercantile maize on the market instead of producing them on the farm influences competitiveness of family farm directed at final production of fattened beef cattle.

Applying partial budget analysis, it was examined whether the decision on buying alfalfa or 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 each of these two decisions contributed to improving the competitiveness of family farm.

Results and Discussion

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

Table 1. The area of crops and sowing structure before and after taking a decision on buying alfalfa hay 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	0.00	-0.39	-100.00	2.57	0.00
Alfalfa (using)	1.44	0.00	-1.44	-100.00	9.63	0.00
Maize (mercantile)	3.71	4.74	1.03	27.71	24.75	31.61
Maize (silage)	2.89	3.69	0.08	27.71	19.25	24.59
Other crops	6.57	6.57	0.00	0.00	43.80	43.80
Total	15.00	15.00			100.00	100.00

On the other hand, buying mercantile maize on the market instead of producing it on the farm makes changes in sowing structure, which result in increasing the areas occupied by alfalfa and silage maize (Table 2).

Table 2. 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
Total	15.00	15.00			100.00	100.00

Estimated annual change which amounts to -31,285.9 RSD shows that, according to previously given assumptions, the purchase of alfalfa hay is not economically justified, taking into account that it has the unfavourable influence on the business operations of family farm (Table 3).

Table 3. Partial budget analysis of purchasing alfalfa hay instead of producing alfalfa hay.

Elements	Number of added calves	
	0	6
Increased revenue	0	588,000.0
Adding calves to herd	0	588,000.0
Reduced expense	62,269.1	62,269.1
Stop harvesting alfalfa hay	62,269.1	62,269.1
Total increased revenue and reduced expenses	62,269.1	650,269.1
Reduced revenue	0	0
None	0	0
Increased expense	93,555.0	540,949.8
Adding calves to herd	0	424,941.6
Purchasing alfalfa hay	93,555.0	116,008.2
Total reduced revenue and increased expense	93,555.0	540,949.8
Estimated annual change	-31,285.9	109,319.3

However, if we consider the fact that buying alfalfa hay in the actual example will make the area free, which according to some conservative estimations, can be used for producing sufficient amounts of mercantile and silage maize for fattening of additional 6 head, then the situation seems quite different. In that case, it can be expected that average annual change of the results of family farm amounts to 109,319.3 RSD.

On the other hand, the estimated annual change which amounts to -40,270.3 RSD shows that, according to the previously mentioned assumptions, buying mercantile maize is not economically justified, for it unfavourably influences the business operations of family farms.

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 the production of sufficient amount of alfalfa and silage maize for fattening of additional 19 head then the situation seems quite different (Table 4). In that case, it can be expected that the average annual change of the results of family farms amounts to 426,485.10 RSD.

Table 4. Partial budget analysis of purchasing mercantile maize instead of producing mercantile maize.

Elements	Number of added calves	
	0	19
Increased revenue	0	1,862,000.0
Adding calves to herd	0	1,862,000.0
Reduced expense	193,617.2	193,617.2
Stop harvesting mercantile maize	193,617.2	193,617.2
Total increased revenue and reduced expenses	193,617.2	2,055,617.2
Reduced revenue	0	0
None	0	0
Increased expense	233,887.5	1,629,132.1
Adding calves to herd	0	1,217,490.1
Purchasing mercantile maize	233,887.5	411,642.0
Total reduced revenue and increased expense	233,887.5	1,629,132.1
Estimated annual change	-40,270.3	426,485.1

In order to examine the sensitivity of these decisions, partial budget analyses (Tables 3 and 4) are done for a different number of heads added to fattening and different amounts of purchasing prices of alfalfa hay (Table 5), as well as different purchasing prices of mercantile maize (Table 6).

Table 5. Estimated annual change if alfalfa hay is purchased given varying numbers of calves added and alfalfa hay purchasing prices.

N° of added calves	Alfalfa hay purchasing price (RSD/ton)						
	6,000.0	7,000.0	8,000.0	9,000.0	10,000.0	11,000.0	12,000.0
0	-100.8	-10,495.8	-20,890.8	-31,285.8	-41,680.8	-52,075.8	-62,470.8
2	49,262.4	38,035.8	26,809.2	15,582.6	4,356.0	-6,870.6	-18,097.2
4	98,625.6	86,567.4	74,509.2	62,451.0	50,392.8	38,334.6	26,276.4
6	147,988.8	135,099.0	122,209.2	109,319.4	96,429.6	83,539.8	70,650.0

In case no head is added to fattening, the decision on buying alfalfa hay is not economically justified as long as purchasing price of alfalfa hay is higher than 5,990.3 RSD per tonne. However, adding of 2 head to fattening positively

influences business results as long as purchasing price of alfalfa hay is lower than 10,388.0 RSD per tonne. On the other hand, the decision on buying alfalfa hay by adding of 4 or 6 head to fattening is economically justified for analysed range of the prices of alfalfa hay. Therefore, lower purchasing price of alfalfa hay and greater number of heads added to fattening result in the changes which positively influence business results of family farm.

Table 6. Estimated annual change if mercantile maize is purchased given varying numbers of calves added and mercantile maize purchasing prices.

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

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 RSD 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 RSD 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 a 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 these decisions are economically justified, the final conclusion cannot be reached without an additional analysis. Apart from the previously described factors, there is a range of others, which producers should consider when making decisions on shifting to buying alfalfa hay or mercantile maize.

Are sufficient amounts available on the market every year? What is the quality? Are facilities and equipment for bales manipulation on family farms suitable for bales available on the market? Are there possibilities for storing mercantile grain maize which will be purchased on the market? Is land used for production of alfalfa hay, that is, for production of mercantile maize suitable for growing of other crops? Is it possible to use the work employed for preparing hay, that is, 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 for preparing alfalfa hay be sold? Will the equipment 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 the 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 the decision on buying mercantile maize mainly contributes to the improving efficiency of utilisation of available land resources and competitiveness of family farms directed at the final production of fattened beef cattle compared with the decision on buying alfalfa hay.

The results of the conducted research show that the decision on buying mercantile maize mainly contributes to improving competitiveness of family farms directed at the final production of fattened beef cattle compared with the decision on buying alfalfa hay. 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 the production of sufficient amounts of alfalfa and silage maize for fattening of additional 19 head, whereas buying alfalfa hay in the actual example will make the area free, which according to some conservative estimations, can be used for production of sufficient amounts of mercantile and silage maize for fattening of additional 6 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 7,450.40 RSD per tonne. Furthermore, buying mercantile maize along with simultaneous increasing of the number of heads fattened positively influence business results. Hence, lower purchasing price of mercantile maize and higher number of heads 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 Serbia. Bearing this in mind, it is shown that using modern and more rational way of their organisation, the additional land resources can be used, and in that way their profitability and competitiveness will be increased.

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PROMENA STRUKTURE SETVE U FUNKCIJI UNAPREĐENJA KONKURENTNOSTI PORODIČNIH GAZDINSTAVA USMERENIH NA FINALNU PROIZVODNJU UTOVLJENE JUNADI

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R e z i m e

Cilj ovog rada je da se u uslovima nepromenjene veličine poseda na modelu porodičnog gazdinstva usmerenog na finalnu proizvodnju utovljene junadi ispita uticaj promene strukture setve na konkurentnost porodičnog gazdinstva. Primenom diferencijalne kalkulacije ispitano je da li je odluka o kupovini sena lucerke ili merkantilnog kukuruza i promeni strukture setve ekonomski opravdana, a dodatnim postupkom senzitivne analize i pod kojim uslovima. Primenjujući ovakav pristup utvrđeno je u kojoj meri ova odluka utiče na konkurentnost gazdinstva. Rezultati sprovedenog istraživanja pokazuju da odluka o kupovini merkantilnog kukuruza u većoj meri doprinosi unapređenju konkurentnosti porodičnih gazdinstava usmerenih na finalnu proizvodnju utovljenih junadi u odnosu na odluku o kupovini sena lucerke. To je posledica činjenice da kupovina merkantilnog kukuruza na tržištu omogućava promene u strukturi setve tj. da se kupovinom merkantilnog kukuruza oslobađa površina na kojoj je prema nekim konzervativnim procenama moguće proizvesti dovoljno lucerke i silažnog kukuruza za tov dodatnih 19 grla, dok se kupovinom sena lucerke oslobođa površina na kojoj je moguće proizvesti dovoljno merkantilnog i silažnog kukuruza za tov dodatnih 6 grla. S tim u vezi, pokazano je da uz racionalniji način organizovanja porodična gazdinstva usmerena na finalnu proizvodnju utovljene junadi mogu dodatno iskoristiti raspoložive zemljišne resurse i na taj način poboljšati profitabilnost i unaprediti konkurentnost.

Ključne reči: ekonomska analiza, profitabilnost, konkurentnost, struktura setve, seno lucerke, merkantilni kukuruz, tov junadi, porodična gazdinstva.

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