

OPERATING COSTS OF AGRICULTURAL HOLDINGS WITH EQUAL PRODUCTION POSSIBILITIES

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Abstract

Research subject is the analysis of state and basic problems in farm production of pork, as well as economic analysis of fattening pigs. Research included specific case studies on a family farm, pig farm in Gračanica, found in central Kosovo and Metohija and a cooperative farm, a pig farm in Žitorađa located in Toplica district. During a time period in 2012, the volume and applied technology of producing fattened pigs was monitored on both farms and given economic results were analyzed. In the observed period it was determined that the number of fattened livestock on the private farm was 40, while on the cooperative farm it was 30,000. Produced fattened pig on the private farm costs 87 € and pork meat side is 1.16 €/kg. The price of a fattened pig on a cooperative farm is 142 € and pork meat side is 1.94 €/kg. Average weight of a fattened pig on both farms is 100 kg, while the share of pork meat sides varies from 78% -79%.

Key words: *Production of fattened pigs, pork meat – pork sides, price, quality, economic results.*

JEL: *Q12, Q13*

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Introduction

Production of pork meat is one of the activities in agriculture which secures a source of income to all participants in the production chain, conducted in several technological, mutually organization-dependent phases (from care, breeding and feeding of sows and gilts, farrowing, upbringing of piglets and fattening, through feeding, etc.). Regardless of what the natural indicators in intensive, market oriented production of pigs are, it is very difficult to provide a detailed insight into the production cost of fattened pigs, which represents the research basis of the paper and proof that the pig production process is cost effective. Tešanović (1969) determines that with an increase in the number of piglets per sow from 10 to 20, the production cost per piglet reduced by 79.09%, while cost per sow increased by 11.67% per annum. Increase in the genetic basis of pigs represents a necessary precondition for the achievement of greater intensity in this branch of livestock production. So Vidović et al. (2012) report that the annual genetic progress for average daily growth was 8-11 gr, food conversion from 0.03 – 0.05 kg as well as 0.35 – 1.00% for the content of meat in sides. Based on previous research and results in practice there is opinion that better results can be expected in due time as follows: 30 fattened pigs per sow per year, conversion of food below 2 kg, less than 120 days of life to reach 100 kg of body weight, daily gain of live weight of about 2 kg. Rahelić (1984) states that the characteristic of breeds of pigs as well as individual characteristics of livestock to achieve greater daily weight gain, greater amount of meat and better carcass yield in same growing conditions are of great significance to successful and cost-effective pork meat production. By better use of these properties the fattening period is reduced and at the same time total production is increased. Živković, Perunović, (2012) state that pork meat production in Serbia is characterized by the increasing participation of large farms (10,000 to 30,000, and more fattened pigs per year), and quality of pigs has significantly increased, especially on farms, and it can be said it is approaching the European average. Pork meat production is carried out by determining production cost of 1 kg, produced pork meat sides in first and second phase. Research of the economic parameters of producing fattened pigs deals with costs in the first phase of the production process and determining total cost of producing pork meat sides in the second phase, by the division calculation method. Tomović et al. (2005) state that there is a possibility of using the two point method for grading pork meat sides in slaughterhouses whose weekly capacity is less than 200 pigs. Orović et al. (2015) analyze in their paper the business of three groups of 20 individual farms with different primary production, crop, fruit growing and livestock production. Necessary data for production of a basic model was collected by a survey on 60 agricultural holdings on the territory of Toplica. Research in the paper has the goal to provide with application with the given results in relation to both farms. This allows for the given results to have common, rather than only local significance (Andrić, 1998; Jovanović et al., 1998).

Research goal

This paper represents data given by research results, both during research and procedure analysis. During research and proving, primarily a scientific method is used, whose basic application enables explanation and prediction of relations between individual relevant inputs, and results of achieved effects in production of pork meat. In accordance with the development strategy of producing pork meat, the research goal is to improve the quality of pork meat production which originate from noble pure breed, raised on farms A and B, by a large number of analyzed and realized economic parameters. The representation of the given results of plant production on farm A and pig production on both farms will be given. During preparation of this work, data from multiple sources was used. The data used were the production quantity, analysis of pig production and pork meat in long time period. The analysis of this data wouldn't be possible if it weren't approved by both farms and the data was processed by mathematical-statistical methods. This data source was especially important when determining average values, loss, food conversion etc.

Materials and methods

The research conducted included family agricultural holding on farm A in Gračanica whose owner is Bojan Jovanović, address Kosovske Devojke 417 and a cooperative farm B, "1 Decembar" in Žitorada. Both farms have a closed production cycle that includes pig production fattening. Farm A produces 40 fattened pigs and farm B around 30,000 a year. Within farm A 2 persons and 4 minors are employed and in farm B 80 people with corresponding qualifications are employed. Costs of producing fattened pigs on both farms are based on natural indicators determined based on research done in 2012 and all variable categories of costs in accordance with the production process. Material costs relate to consumption of nutrients and medicine used in the production process. Amortization costs are covering 2012 based on norms of necessary space and equipment, we approach the investment estimate, estimate of amortization costs based on which the fixed costs categories are calculated (Šegrt, Kolarski, 2015). When determining costs of producing costs we start from the price of a pig, weight of a pork meat side obtained by slaughter, variable costs of slaughter service and freezing. Results of plant production of farm A and fattened pig production on both farms relates to one year period (2012). In order to make a conclusion, the production parameters were monitored: grain on farm A and food consumption of farms A and B per 1 kg of growth, total growth and cost of food on both farms:

$$\text{food consumption per kilogram of growth} = \frac{\text{Total food consumption}}{\text{Total growth}}$$

$$\text{Total growth} = \text{number of feeding days} \times \text{growth per feeding day}$$

$$\text{production efficiency} = \frac{\text{Total revenue}}{\text{Total expenses}}$$

$$\text{production profitability} = \frac{\text{Gain}}{\text{Investment}} \cdot 100$$

$$\text{Profit rate (profitability)} = \frac{\text{Gain}}{\text{Total revenue}} \cdot 100$$

Significance of results in production of fattened pigs and pork meat in 2012 was followed independently on farms A and B during one research year.

Research results and discussion

Starting from the previously pointed facts and characteristics of pork meat side production strategy, we analyzed on both farms:

- Plant production on 10 ha on farm A,
- Pork meat side production on farms A and B,
- Characteristics of pork meat side quality on both farms.

We analyzed in the paper:

1. Production of meat with special emphasis on pork meat production on the province Kosovo and Metohija in Gračanica on a pig farm A of the owner Bojan Jovanović, Kosovke Devojke street no. 417 and a cooperative farm B “1 Decembar” in Žitorađa in Toplica county in Serbia.

2. Production efficiency of pork meat on farms A and B by using achieved economic indicators of production.

Next to theoretical explanation and application on general examples, we showed efficiency of optimal feeding on an example of feeding mixture for fattened pigs on farm A. Production costs of fattened pigs on both farms are based on naturally determined indicators. Calculation of fixed and variable costs was calculated on both farms in accordance with the production process. Also costs are related to consumption of nutrients and medicine which are used in the production process, as well as amortization of the livestock, existing space and equipment which is done based on norms.

Natural and financial indicators of agricultural production on the farm shown in 2012 were: corn (*Table1*), triticale (*Table2*), wheat (*Table3*) and barley (*Table4*).

Table 1. Achieved economic indicators of corn production on 2 ha

No.	Production year: 2012	Amount	Unit of measure	Price	Unit of measure	Amount of EUR on 2 ha
I	Revenue					
1.	Corn from 2 ha	6.5	t/ha	130.00	EUR/t	1,690.00 EUR
2.	Cornstalks from 2 ha	9	t/ha	17.98	EUR/t	323.70 EUR
A)	Total revenue (1 to 2) for 2 ha					2,013.70 EUR
3	Expenses					
4.	Seed for 2 ha	50	kg	1.50	EUR/kg	75.00 EUR
5.	Fertilizer					
6.	Manure for 2 ha	10	t	4.00	EUR/t	40.00 EUR
7.	KAN (29%N)	400	kg	0.30	EUR/kg	120.00 EUR
8.	Pesticides					
9.	Guardian	6	L	3.00	EUR/L	18.00 EUR
10.	Tezis	6	L	2.50	EUR/L	15.00 EUR
11.	Irrigation					
12.	Energy source for 2 ha	15	L	1.40	EUR/L	42.00 EUR
13.	Diesel fuel	60	L	1.40	EUR/L	84.00 EUR
14.	Maintaining mechanics	2	ha	15.00	EUR/ha	30.00 EUR
15.	Paid services					
16.	Plowing	2	ha		EUR/ha	0 EUR
17.	Land preparation	2	ha		EUR/ha	0 EUR
18.	Sowing	2	ha	35.00	EUR/ha	70.00 EUR
19.	Harvest	2	ha	65.00	EUR/ha	130.00 EUR
20.	Paid seasonal work force	40	working hours	1.50	EUR/working hour	60.00 EUR
21.	Other variable costs					
B)	Total costs (3 to 21)					684.00 EUR
II	GAIN/LOSS					
22.	Total without incentive (A – B)					1,329.70 EUR
23.	Per ha without incentive (22 : 17)					664.85 EUR
24.	Costs of grain in kg (22 : 1)					0.10 EUR
25.	Production efficiency (A : B)					2.94
26.	Revenue profitability (22:A)h100					66.03%

Source: Authors' calculation based on data from Mičić, 2012

From Table 1 we can see that the average corn yield on the farm in 2012 was 6.5 t/ha and in the observed period in 2012 moved in the span from 6.0 t/ha to 7.0 t/ha. Total realized profit on 2 ha is 1,329.70 €, production efficiency is 2.94 and revenue profitability is 66.03 %.

Table 2. Achieved economic indicators of triticale production on 3 ha

No.	Production year: 2012.	Amount	Unit of measure	Price	Unit of measure	Amount of EUR for 3 ha
I	Revenue					
1.	Triticale for 3 ha	5.0	t/ha	150.00	EUR/t	2,250.00 EUR
2.	Straw from 3 ha	5	t/ha	19.50	EUR/t	292.50 EUR
A)	Total revenue (1 to 2) for 3 ha					2,542.50 EUR
3.	Expenses					
4.	Seed for 3 ha	750	kg	0.20	EUR/kg	150 EUR
5.	Fertilizer					
6.	Manure for 3 ha	15.0	t	4.00	EUR/t	60.00 EUR
7.	Urea	600	kg	0.30	EUR/kg	180.00 EUR
8.	Foliar fertilization	6	kg	3.00	EUR/kg	18.00 EUR
9.	Pesticides					
10.	Meteor	30	g	0.15	EUR/L	4.50 EUR
11.	Irrigation					
12.	Energy source for 3 ha	15	L	1.40	EUR/L	63.00 EUR
13.	Diesel fuel	90	L	1.40	EUR/L	126.00 EUR
14.	Maintenance of mechanization	3	ha	19.00	EUR/ha	57.00 EUR
15.	Paid Services					
16.	Sowing	3	ha	30.50	EUR/ha	91.50 EUR
17.	Harvest	3	ha	52.00	EUR/ha	156.00 EUR
18.	Paid season work force	50	working hour	1.50	EUR/working hour	75.00 EUR
19.	Other variable costs					
B)	Total costs(3 to 19)					981.00 EUR
II	GAIN/LOSS					
20.	Total without incentive (A – B)					1,561.50 EUR
21.	Per ha without incentive (20 : 17)					520.50 EUR
22.	Cost of grain in kg (20 : 1)					0.10 EUR
23.	Production efficiency (A : B)					2.59
24.	Revenue profitability (20 : A) h 100					61.42%

Source: Authors' calculation based on data from Mičić, 2012

From Table 2 we can see that the average yield from triticale is 5.0 t/ha on the examined farm A and that it ranged from 4.5 t/ha to 5.5 t/ha. Total realized gain on 3 ha is 1,561.50 EUR, profitability of revenue is 61.42 %.

Table 3. Achieved economic indicators of wheat production on 2 ha

No.	Production year: 2012	Amount	Unit of measure	Price	Unit of measure	Amount of EUR for 2 ha
I	Revenue					
1.	Wheat from 2 ha	5	t/ha	170.00	EUR/t	1,700.00 EUR
2.	Straw from 2 ha	5	t/ha	16.90	EUR/t	169.00 EUR
A)	Total revenue(1 to 2)for 2 ha					1,869.00 EUR
3	Expenses					
4.	Seed for 2 ha	500	kg	0.20	EUR/kg	100.00 EUR
5.	Fertilizer					
6.	Manure for 2 ha	10	t	4.00	EUR/ t	40.00 EUR
7.	Urea	400	kg	0.30	EUR/kg	120.00 EUR
8.	Foliar fertilization	4	kg	3.00	EUR/kg	12.00 EUR
9.	Pesticides					
10.	Meteor	20	g	0.15	EUR/L	3.00 EUR
11.	Irrigation					
12.	Energy source for 2 ha	15	L	1.40	EUR/L	42.00 EUR
13.	Diesel fuel	60	L	1.40	EUR/L	84.00 EUR
14.	Maintenance of mechanization	2	ha	19.00	EUR/ha	38.00 EUR
15.	Paid services		ha			
16.	Plowing	2	ha		EUR/ha	0 EUR
17.	Preparing the ground	2	ha		EUR/ha	0 EUR
18.	Sowing	2	ha	30.00	EUR/ha	60.00 EUR
19.	Harvest	2	ha	55.00	EUR/ha	110.00 EUR
20.	Paid season work force	30	working hours	1.50	EUR/ working hour	45.00 EUR
21.	Other variable costs					
B)	Total costs(3 to 21)					654.00 EUR
II	GAIN/LOSS					
22.	Total without incentive (A – B)					1,215.00 EUR
23.	Per ha without incentive(22 : 17)					607.50 EUR
24.	Cost of grain kg (22: 1)					0.12 EUR
25.	Production efficiency (A : B)					2.86
26.	Revenue profitability (22 : A) h 100					65.00 %

Source: Authors' calculation based on data from Mičić, 2012

From Table 3 we can see that the average yield of wheat is 5.0 t/ha on the examined farm and that it ranged from 4.5 t/ha to 5.5 t/ha. Total profit on 2 ha is 1,215.00 EUR and revenue profitability is 65.00 %.

Table 4. Achieved economic indicators of barley production on 3 ha

No.	Production year: 2012	Amount	Unit of measure	Price	Unit of Measure	Amount of EUR for 3 ha
I	Revenue					
1.	Barley from 3 ha	4	t/ha	170.00	EUR/t	2,040.00 EUR
2.	Straw from 3 ha	5	t/ha	17.04	EUR/t	255.60 EUR
A)	Total revenue(1 to 2) for 3 ha					2,295.60 EUR
3.	Expenses					
4.	Seed for 3 ha	750	kg	0.20	EUR/kg	150.00 EUR
5.	Fertilizer					
6.	Manure for 3 ha	15.0	t	4.00	EUR/t	60.00 EUR
7.	Urea	600	kg	0.30	EUR/kg	180.00 EUR
8.	Foliar fertilization	6	kg	3.00	EUR/kg	18.00 EUR
9.	Pesticides					
10.	Meteor	30	g	0.15	EUR/L	4.50 EUR
11.	Irrigation					
12.	Energy source for 3 ha	15	L	1.40	EUR/L	63.00 EUR
13.	Diesel fuel	90	L	1.40	EUR/L	126.00 EUR
14.	Maintenance of mechanization	3	ha	19.00	EUR/ha	57.00 EUR
15.	Paid services					
16.	Plowing		ha		EUR/ha	0 EUR
17.	Preparation of ground	3	ha		EUR/ha	0 EUR
18.	Sowing	3	ha	30.50	EUR/ha	91.50 EUR
19.	Harvest	3	ha	55.00	EUR/ha	165.00 EUR
20.	Paid season work force	44	r. hours	1.50	EUR/r.s.	66.00 EUR
21.	Other variable costs					
B)	Total costs(3 to 21)					981.00 EUR
II	GAIN/LOSS					
22.	Total without incentive (A – B)					1,314.60 EUR
23.	Per ha without incentive (22 : 17)					438.20 EUR
24.	Cost of grain kg (22: 1)					0.11 EUR
25.	Production efficiency (A : B)					2.34
26.	Revenue profitability (22 : A) h 100					57.26%

Source: Authors' calculation based on data from Mičić, 2012

From Table 4 we can see that the average yield of barley on the farm was 4.0 t/ha and that it ranged from 3.5 t/ha to 4.5 t/ha. Total gain on 3 ha is 1,314.60 EUR, production efficiency is 2.34 and revenue profitability is 57.26 %. It can also be seen that revenue from grain on farm A is 50 t, it moved from 3.5 t/ha to 7.5 t/ha and from total amounts of plant production farm A used 1/3 to feed the herd while 2/3 was sold on the market.

Pricelist of mixture for feeding pigs on farm A

During price calculation of the mixture from own produced grain for breeding pigs on farm, price of all products was taken into consideration, calculated in tons (t). More data about it is shown in Table 5.

Table 5. Prices of concentrate mixtures on farm A

PRICELIST OF FEED MIXTURE FOR PIGS ON A FARM IN KOSOVO AND METOHIJA IN GRAČANICA IN 2012	Price EUR/kg
Pre-starter mixture for feeding pigs up to 10kg (PS)	0.27
Grover mixture for feeding pigs from 15 to 25 kg (SS)	0.22
Starter mixture for feeding pigs up to 15 kg (SG)	0.24
Mixture for feeding fattened pigs from 25 to 60 kg (TS-1)	0.20
Mixture for feeding fattened pigs from 60 to 100 kg (TS-2)	0.19
Mixture for feeding pregnant gilts and sows (SK)	0.17
Mixture feeding lactating sows and boars (SKD)	0.16

Source: Authors' calculation based on data from Mičić, 2012

From Table 5 we can see that the feeding mixture for all categories of pigs farm A produces by itself in powder form in their blenders at producers prices.

Price of the concentrate mixture on the farm was calculated by average exchange rate of the National Bank of Serbia in EUR/kg/116 RSD in 2012.

Productivity of sows and raising piglets on farm A

Farm had ten sows of landrace breed which had two farrowing a year with an average of ten piglets per brood, i.e. 20 piglets per sow a year and one boar of the Yorkshire breed.

Piglets were weaned after 21 days with an average body weight of 5.24 kg. Their breeding lasted 38 days after that until they reached 25 kg, with the achieved daily growth of 0.52 kg/day (Table 6).

Table 6. Productivity of sows and raising piglets up to 25 kg in 2012 on farm A

Livestock number on farm 10	<i>Lowland region</i>
Racial composition Landrace + Yorkshire	Input weight
Time for fattening in years (two rounds)	Exiting weight 25 kg
Average 20 piglets/sow a year	Weight of a piglet after weaning 5.24 kg
Age of piglets when weaning 21 day	Raising piglets 38 days x 0.52 kg/day

I	Revenue	Amount			Price per unit EUR	Total EUR
		Number of pigs	kg/livestock	Total kg		
1	Raising piglets	200	25	5.000	2.80	14,000.00
2	Incentive RS	200	-	-	-	-
3	Incentive RS (sow)	10	-	-	-	-
4	Insurance reimbursement					-
A)	Total(1 to 4)					14,000.00
II	EXPENSES					
5	Feeding piglets					
6	-pre-starter (0.2 kg/day x10days x200 livestock)	200	2	400	0.2695	107.80
7	-SS (to 15 kg) (0.5 kg/day x 13days x200 livestock)	200	6.5	1.300	0.2415	313.95
8	-SG (15-25 kg) (1.56 kg/day x15days x200 livestock)	200	23.4	4.680	0.2190	1,024.92
9	Feeding sows (2.5 kg/day x365days x10 livestock)	10	912.5	9.125	0.1666	1,520.23
10	Feeding boars (2.2 kg/day x 365days x 1livestock)	1	803	803	0.1616	129.76
B)	Total feed(5 to 10)					3,096.66
11	Losses in feeding 1%		50		2.40	120.00
12	Water and medicine – sow	10	-	-	10.00	100.00
13	Human labor (personal or someone else's)	working day		40	10.00	400.00
14	Amortization of the heard (400-100=300x20%)	10	-	-	60.00	600.00
15	Amortization of the facility and equipment			8.000	2.5%	200.00
16	Total direct costs(5 to 15)					4,906.66
17	Indirect costs of the farm					490.00
C)	Total costs(5 to 17)					5,006.66
III	GAIN/LOSS					
18	On a farm without r incentive (A – C)					8,993.34
19	Per pig without incentive (18 : 3)					899.33
20	Price of a kg (C : 1)					1.00
21	Production efficiency (A : C)					2.79
22	Revenue profitability (18 : A) h 100					64.24%

Source: Authors' calculation based on data from Mičić, 2012

From Table 6 we can see that the average weight of piglets on the farm in Gračanica is 25 kg/livestock and that it ranged from 24 to 26 kg/ livestock, with the achieved average price of 1 €/kg and the value of 1 pig was 25.00 €. Total achieved gain for 200

piglets was 8,993.34 €, production efficiency 2.79 and revenue profitability 64.24 %.

In Table 7 there are 40 fattened livestock in 2012 on a family farm A.

Fattened pigs on farm A

Farm A fattens 40 pigs a year in 4 turns and sells them ex-loaded on the farm as well as excess piglets. Farm A breeds around 200 piglets a year of average weight of 25 kg and raises gilts for themselves. Farm A sells 80% of piglets free loaded after they have achieved 25 kg of mass at the price of 2.8 euros, in 2012 (Table 7), as well as total achieved economic indicators (Table 8).

Table 7. Achieved economic indicators in fattened pigs on farm A for 2012

No.	Production year: 2012.	Amount	Stopa konverzije kg hrane:			2.68	kg growth
1.	Fattening period: Jan-Dec	-	Unit of Measure	Mortality rate in feeding:	2.43%		
2.	Number of pigs placed in fattening:	41	livestock				
3.	Average weight of fattened:	100	kg/ livestock				
4.	Fattening time:	87	days				
I	Revenue	-	-	Price	Unit of Measure	Amount/€	Amount (€/livestock)
5.	Fattened pigs (3 x 5)	40.00	livestock	1.58	EUR/kg	6.320.00	158.00 EUR
6.	Manure	20.00	t	4.00	EUR/t	80.00	2.00 EUR
7.	Subventions per pig	40.00	livestock	8.70	EUR/ livestock	348.00	8.70 EUR
A)	Total revenue (1 to 7)	-				6.748.00	168.70 EUR
II	Expenses	-	Unit of measure	Price	Unit of measure	Amount/€	(EUR/ livestock)
8.	Piglets (average livestock)	25.00	kg / livestock				
9.	Piglets (2 x 8)	1,025.00	kg / livestock	1.00	EUR/kg	1,025.00	25.00 EUR
10.	Own mixture of concentrate						
11.	TS1 (from 25-60 kg) (2.15kg/day x 41days x40 g.) 3.526			0.20	EUR/kg	705.00	17.63 EUR
12.	TS2 (from 60-100 kg) (2.45kg/day x46days x40 g.) 4.508			0.19	EUR/kg	856.50	21.41 EUR
13.	Average daily per pig	2.31	kg/EUR				
14.	Mechanical work (7 h14)		kg/EUR	2.00	EUR/kg	80.00	2.00 EUR
15.	Water per pig(15x4) x 8:1.000	10	L/day	1.25	EUR/m ³	43.50	1.08 EUR
16.	Veterinary services and medicine(7x16)			1.00	EUR/ livestock	40.00	1.00 EUR

No.	Production year: 2012.	Amount	Stopa konverzije kg hrane:		2.68	kg growth
17.	Human labor(3 x 5) x 17		0.15	EUR/ livestock	600.00	15.00 EUR
18.	Indirect costs(7 x 18)		1.40	EUR/ livestock	56.00	1.40 EUR
19.	Amortization of facilities and equipment (7 x 19)		2.00	EUR/ livestock	80.00	2.00 EUR
B)	Total costs(9 to 30)				3,486.00	86.52EUR
III	GAIN/LOSS					
20.	On farm with incentive(A – B)				3.262.00	81.55EUR
21.	Price in kg B : (3 x 5)				0.87	
22.	Production efficiency (A : B)				1.94	
23.	Revenue profitability (20 : A) x 100				48.34%	

Source: Authors' calculation based on data from Mičić, 2012

From Table 7 we can see that the value of one fattened pig was 87.00 EUR/pig. Total achieved gain for 40 fattened pigs is 3,262.00 EUR, production efficiency 1.94 and revenue profitability 48.34 %.

Table 8. Total achieved economic results in agricultural and livestock production on farm A

No.	Farm in Gračanica Production year: 2012	Revenue	Amount	Unit of measure	Price	Unit of measure	Amount in EUR for 2 ha	
I	REVENUES	For		e				
1.	Corn from 2 ha	2	6.5	7.1844	t/ha	130.00	EUR/t	933.97 EUR
2.	Cornstalks from 2ha	2	9	18	t/ha	17.98	EUR/t	323.70 EUR
3.	Triticale from 3 ha	3	5	11.618	t/ha	150.00	EUR/t	1,742.70 EUR
4.	Straw from 3 ha	3	5	15	t/ha	19.50	EUR/t	292.50 EUR
5.	Wheat from 2 ha	2	5	8.6036	t/ha	170.00	EUR/t	1,462.61 EUR
6.	Straw from 2 ha	2	5	10	t/ha	16.90	EUR/t	169.00 EUR
7.	Barley from 3 ha	3	4	6.141	t/ha	170.00	EUR/t	1,043.97 EUR
8.	Straw from 3 ha	3	5	15	t/ha	17.04	EUR/t	255.60 EUR
9.	Piglets livestock	159	25	3.975	kg	2.80	EUR/kg	11,130.00 EUR
10.	Fattened pigs	40	100	4.000	kg	1.58	EUR/kg	6,320.00 EUR

11.	Manure per livestock	0.5	40	20	t	4.00	EUR/t	80.00 EUR
12.	Subventions livestock		40		livestock	8.70	EUR/ livestock	348.00 EUR
A)	Total revenue (1 to 12)							24,102.05 EUR
II	Expenses							
13.	Corn from 2 ha							684.00 EUR
14.	Triticale for 3 ha							981.00 EUR
15.	Wheat for 2 ha							654.00 EUR
16.	Barley for 3 ha							981.00 EUR
17.	Upbringing piglets							3,300.72 EUR
18.	Fattening pigs ⁴⁰ livestock							900.00 EUR
B)	Total expenses (13 to 18)							7,500.72 EUR
II	GAIN/LOSS							
19.	Total with incentive (A – B)							16,601.33 EUR
20.	Production efficiency (A:B)							3.21
21.	Revenue profitability (19 : A)h100							68.88%

Source: Authors' calculation based on data from Mičić, 2012

From Table 8 we can see that in 2012 the farm achieved total revenue of 24,102.05 EUR; expenses in the amount of 7,500.72 EUR; gain in the amount of 16,601.33 EUR; in agriculture and livestock production and sale production efficiency 3.21; a d revenue profitability 68.88 %.

Pricelist of concentrate mixtures on farm B for feeding pigs of all categories is shown in Table 9.

Table 9. Price of concentrate mixture on farm B

PRICELEST OF MIXTURE FOR FEEDING PIGS ON A FARM ON KOSOVO AND METOHIJA IN GRAČANICA IN 2012	PRICE EUR/kg
Pre-starter mixture for feeding piglets to 10 kg (PS)	0.48
Grover mixture for feeding piglets from 15 to 25 kg (SS)	0.34
Starter mixture for feeding piglets to 15 kg (SG)	0.33
Mixture for feeding fattened pigs from 25 to 60 kg (TS-1)	0.28
Mixture for feeding fattened pigs from 60 to 100 kg (TS-2)	0.26
Mixture for feeding pregnant gilts and sows (SK)	0.25
Mixture for feeding lactating sows and boars (SKD)	0.29

Source: Authors' calculation based on data from Mičić, 2012

The Farm has its own blenders that operates independently and is located by the entrance gate and by the above mentioned pricelist of mixture entrusts farm B.

Productivity of sows and upbringing of piglets on farm B

Farm B has 1,500 sows Landrace + Yorkshire which had two farrowing a year in the average of 10.3 raised piglets per breed, i.e. 20.6 piglets a year. Piglets are weaning after 28 days with the average body weight of 6.6 kg. Their upbringing lasted 34 days after that up to body weight of 25 kg, with the achieved daily growth of 0.54 kg a day.

More data on productivity of sows and raising piglets on farm B is given in Table 10.

Table 10. Productivity of sows and raising piglets up to 25 kg on farm B in 2012

Livestock Number on farm 1,500	<i>Lowland region</i>
Racial composition Landrace +Yorkshire	Entrance weight
Fattening weight in years (two cycles)	Exiting weight 25 kg
Average 20.6 piglets/pig a year	Weight of a piglet after weaning 6.6 kg
Age of piglets after weaning 28 days	Raising piglets 34 days x 0.54 kg/day

I	REVENUE	Number of livestock	kg/ livestock	Total kg	Price unit	Total €
1	Raising piglets put for fattening:	30,600				
2	Average end weight of piglets:	30,000	25	750,000	2.39	1,792,500.00
3	Manure (sows)total	1,500	500	750,000	0.01	7,500.00
A	T o t a l (1 t o 3)					1,800,000.00
II	EXPENSES					
5	Feeding piglets/ mixture according to pricelist Table 8.					
6	-pre-starter (0.2 kg /day x10days x30,000 pigs)	30,000	2	60,000	0.48	28,800.00
7	-SP1 (to 15 kg) (0.6kg /day x11days x30,000 pigs)	30,000	6.6	198,000	0.34	67,320.00
8	-SP2 (15-25kg) (1.8 kg /day x13days x30,000 pigs)	30,000	23.4	702,000	0.32	224,640.00
9	Feed to sow (4.5kg/day x46days x1,500 pigs)	1,500	207	310,500	0.28	86,940.00
10	Feeding a sow (4.5 kg/day x365days x1,500 pigs)	1,500	1,642.5	2,463,750	0.26	640,575.00
11	Feeding a boar (4 kg/day x365days x25 pigs)	25	1,460	36,500	0.26	9,490.00
B)	Total feed (5 to 11)		3,341.5	3,770,750		1,057,765.00
12	Loss in fattening piglets 2%		-	-		36,000.00
13	Under vacuum	30,000			1.00	30,000.00
14	Water and medicine – sow and boars	1,525	-	-	20.00	30,500.00

OPERATING COSTS OF AGRICULTURAL HOLDINGS WITH EQUAL PRODUCTION POSSIBILITIES

15	Human labor (personal someone else's)	working day		365	400.00	146,000.00
16	Amortization of pigs (450 -150=300x20%)	1,525	-	-	60.00	91,500.00
17	Amortization of facilities and equipment			1,449,275	3%	43,478.00
18	Total direct costs(5 to 18)					1,494,718.00
19	Indirect costs of the farm					93,559.00
C)	Total costs(18 + 19)					1,528,802.00
III	GAIN/LOSS					
20	On a farm without incentive(A – C)					271,198.00
21	Per pig without incentive (20 : 3)					180.79
22	Price for kg (C : 2)					2.04
23	Production efficiency (A : C)					1.18
24.	Revenue profitability (20 : A) x 100					15.07%

Source: Authors' calculation based on data from Mičić, 2012

From Table 10 it is visible that breeding sows-piglets on farm B has the gain from 271,198 EUR, efficiency is 1.18 and revenue profitability is 15.07 %.

Table 11 shows achieved economic indicators in fattened pigs on farm B in 2012.

Table 11. Achieved economic indicators in fattened pigs on farm B

1.	Production year: 2012	Amount	Conversion rate of feed in kg:			3.21	kg/growth
2.	Fattening period: Jan-Dec	Unit of Measure	Mortality rate of fattened:			2.0%	
3.	Number of pigs put for fattening:	30,600	livestock				
4.	Average weight of a fattened pig:	100	kg / livestock				
5.	Length of fattening:	98	Days				
I	Revenue	-	Unit of measure	Price	Unit of measure	Amount total	Amount €/livestock
6.	Fattened pigs(4 x 6)	30,000	livestock	1,58	EUR/kg	4,740,000.00	1,158.00 EUR
7.	Manure	15,000	t	4,00	EUR/t	60,000.00	2.00 EUR
8.	Subventions per pig	30,000	livestock	8,70	EUR/livestock	261,000.00	8,70 EUR
A)	Total revenue (I do 8)	-				5,061,000.00	168.70 EUR
II	Expenses	-					

9.	Piglets (average/ pig)	25.0	kg / livestock				
10.	Piglets(3 x 9)	765,000	kg/ livestock	2,04	EUR/kg	1,560,600.00	52.02 EUR
11.	Farm is has the mixture according to pricelist						
12.	TS1 (from 25- 60 kg) 2.35kg/ dayx46days x30,000 pigs			0,28	EUR/kg	908,040.00	30.27 EUR
13.	TS2 (from 60-100 kg) 2.55kg/ dayx52days x30,000 pigs			0,26	EUR/kg	1,034,280.00	34.48 EUR
14.	Average daily per livestock	2.46	kg/EUR				
15.	Mechanical work (6 x 15)	-	kg/EUR	1,4967	EUR/kg	44,901.00	1.50 EUR
16.	Water per livestock (16 x 5) x 6:1.000	10	L /day	1,15	EUR/m ³	33,810.00	1.12 EUR
17.	Veterinary services and medicine(6 x 17)			0,80	EUR/ livestock	24,000.00	0.80 EUR
18.	Human labor(4x6) x 18		kg/EUR	0,18	EUR/ livestock	540,000.00	18.00 EUR
19.	Indirect costs (6 x 19)		kg/EUR	1,00	EUR/ livestock	30,000.00	1.00 EUR
20.	Amortization of facilities and equipment (6 x 20)			3,53	EUR/ livestock	105,900.00	3.53 EUR
B)	Total costs(9 to 20)					4,281,531.00	142.72 EUR
III	GAIN/LOSS						
21.	On farm with incentive (A – B)					779,469.00	25.98 EUR
22.	Cost per kg B :(4 x 6)					1.42	
23.	Production efficiency(A : B)					1.18	
24.	Revenue profitability (21 : A) x 100				%	15.40	

Source: Authors' calculation based on data from Mičić, 2012

From Table 11 we can see that total achieved gain for 30,000 fattened pigs is 779,469.00 EUR, production efficiency 1.18 and revenue profitability is 15.40 %.

Table 12 shows total achieved economic indicators in pig fattening on farm B in 2012.

Table 12. Total achieved economic indicators in pig fattening on farm B

No.	Production year:	2012	Amount	Amount	Unit of measure	Price	Unit of measure	Amount EUR
I	REVENUE	Livestock						
2.	Manure(sow)	1,500	500	750,000	kg	0.01	€ /kg	7,500.00EUR
3.	Fattened pigs	30,000	100	3,000,000	kg	1.58	€ /kg	4,740,000.00EUR
4.	Manure (fattened pig)	30,000	0.5	15,000	t	4.00	€ /t	60,000.00EUR

5.	Subventions	30,000	livestock	8.70	€/livestock	261,000,00EUR
A)	Total revenue (1 to 5)					5,068,500,00EUR
II	EXPENSES					
6.	Fattened pigs	30,000	livestock		€	4,281,531,00EUR
B)	Total expenses					4,281,531,00EUR
III	GAIN/LOSS					
8.	Total with incentive (A – B)					786,969.00EUR
9.	Production efficiency (A : B)					1.18
10.	Revenue profitability (8 : A) x 100				%	15.53

Source: Authors' calculation based on data from Mičić, 2012

From Table 12 we can see that total realized gain on farm B was 786,969.00 €, production efficiency 1.18 and revenue profitability 15.53 %.

Production efficiency of fattened pigs on both farms in 2012

In order to research production efficiency in fattening pigs, two farms from Serbia and Kosovo and Metohija were taken into consideration since they have the necessary conditions for such production. We researched farm A which has 40 fattened pigs and farm B which has 30,000 livestock. Average entrance weight of piglets for fattening was 25 kg and achieved exit weight was 100 kg. On farm B average fattening period of pigs was 98 days with the daily gain of 0.76 kg/livestock/day, while on farm A it lasted 87 days, with an average daily growth of 0.86 kg/livestock/day. Our results are in accordance with the results stated (Vidović et al., 2012) in the performance test of pure breeds of pigs, landrace and Yorkshire. Calculation of income includes only the revenue from selling pigs while potential revenue from pig meat wasn't taken into consideration (Table 13).

Table 13. Economic indicators of pork meat production – pork meat side on farm A and B in 2012

I	Indicator	Unit of measure	FarmA/	FarmB/
A.	Fresh pork meat sides	livestock	40.00	30,000.00
B.	Livestock weight of live pig weight	kg	100.00	100.00
1.	Total weight, pig (A x B)	kg	4,000.00	3,000,000.00
2.	Pork sides/livestock	%	79.00	78.00
3.	Total pork/side kg (1 x 2) : 100	kg	3,160.00	2,340,000.00
4.	Price of pork sides	€/kg	2.82	2.82
V.	Total revenue (3 x 4)	€	8,911.20	6,598,800.00
II	EXPENSES			
5.	Price of the slaughter service	€/livestock	8.70	8.70

6.	Direct costs of live pig weight	€	3,480.00	4,281,531.00
7.	Total pig slaughter service (Ax 5)	€	348.00	261,000.00
G.	Total expenses(6 + 7)	€	3,828.00	4,542,531.00
III	GAIN/LOSS	€		
8.	Pork sides from farms (V - G)	€	5,083.20	2,056,269.00
9.	Pork side livestock/EUR (8 : A)	€	127.08	68.54
10.	Pork side price kg (G : 3)	€	1.21	1.94
11.	Meat production efficiency (V : G)		2.33	1.45
12.	Revenue profitability (8 : V) x 100	%	57.04	31.16

Source: Authors' calculation based on data from Mičić, 2012

From the shown data it can be seen that pork meat side price on farm A is 1.21 EUR/kg and that this production has the efficiency of 2.33 and revenue profitability of 57.04 %, while on farm B pork meat side price is 1.94 EUR/kg and that this production has the efficiency of 1.45 and revenue profitability of 31.16 %. It can further be seen that on both farms the calculation of slaughter expenses, cooling and processing of sides amounts to 8.70 EUR per fattened pig.

Calculation was conducted in accordance with the achieved yield of slaughtered pigs, value of fattened pig with the mass of 100 kg with the price of 87.00 EUR + 8.70 EUR slaughter expenses, which amounts to 85.70 EUR on farm A.

Slaughtered pigs have amounted to 79 kg of cooled side x 2.82 EUR price of a side, giving the value of 222.78 EUR, and when we take the price of pork meat (side) 95.70 EUR, we get the gain per livestock of 127.08 EUR/kg. It can be easily concluded that the price of a cooled side is 132.79 % bigger than the price of a fattened pig, which doesn't represent an usual relation on the market. Farm A achieved gain in the amount of 5,083.20 EUR.

A calculation was also conducted of farm B in accordance with the yield of slaughtered pigs and the value of a fattened pig with the weight of 100 kg is 142 EUR + slaughter costs 8.7 EUR which amounts to 150.70 EUR, and since cooled pork meat side weighing 78 kg with the price of 2.82 EUR per kg, the value of the livestock (side) is 219.96 EUR.

Slaughtering pigs they obtained pork meat sides with uniform mass, an average of 78 kg per livestock. Farm B realized a profit in the amount of 2,056,047 EUR.

It can easily be concluded that the price of a cooled side is 45.96% bigger than the price of a fattened pig.

We came to new scientific findings in the paper on the practical application of quality feeding in fattening pigs. Advantages of such a method of raising pigs was examined and the scientific contribution to promoting development of producing quality pork

meat, for which Serbia with its pig raising tradition has great geographic-ecological potentials, especially in its agricultural and livestock production. As a final conclusion of the research it can be recommended to pig breeding farms to organize production groups, cooperatives, clusters and franchises so they could more easily open pig raising-repro-center and perfect their products so they could be placed on the market faster.

Conclusion

Based on the analysis of the state in agricultural-food production, specifically pork meat, we came to a conclusion when the approach in this type of production is in question. Another argument in the request for determining fattened pig price on the slaughter line is the given quality according to the share of meat, which is shown in the research on farm A, that it's best to close the entire production cycle from a field to fork. We primarily think on the market of fattened pigs, piglets and pork meat in Serbia in 2012. After the research, we answered a few very important questions in the paper, which are: the price level is not such that it stimulates pig breeders and the price influences production level. One of the reasons there is a reduction and stoppage of slaughtering of big industries in the Republic of Serbia (facilities in Sombor, Subotica and Čoka). There is an expansion of big private slaughterhouses at the same time, which are far more flexible than the industries, therefore their production is far more efficient. Pork meat consumption cyclically reduces due to relatively high prices and a decline in life standard. An increase in price of these products leads to lower demand and meat consumption. The abovementioned indicator shows very significant economic effects of the stated technology in feeding pigs, high strategic efficiency in production development. Pork meat production on both farms is economically justified and development of intensive production of goods can be expected in farm conditions in Serbia.

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TROŠKOVI POLJOPRIVREDNIH GAZDINSTAVA (FARMA, POLJ. PREDUZEĆA, SELJAČKO GAZDINSTVO) SA JEDNAKIM MOGUĆNOSTIMA PROIZVODNJE

Ivan Mičić⁷, Dragana Urošević⁸, Radosav Vujić⁹, Ivana Mičić¹⁰, Marko Mičić¹¹, Marija Mičić¹²

Rezime

Predmet istraživanja u radu je analiza stanja i osnovnih problema u farmskoj proizvodnji svinjskog mesa, kao i ekonomska analiza tova svinja. Istraživanja su obuhvatila konkretne studije slučaja na porodičnom poljoprivrednom gazdinstvu, svinjogojskoj farmi u Gračanici, u centralnom delu Kosova i Metohije i na zadružnom poljoprivrednom gazdinstvu, svinjogojsku farmu u Žitorađi u Topličkom okrugu. U periodu u 2012. godini praćen je obim i primenjena tehnologija proizvodnje tovnih svinja na obe farme i analizirani su dobijeni ekonomski rezultati. U posmatranom periodu utvrđeno je da na privatnoj farmi ukupan broj tovljenika iznosi 40 grla, dok na zadružnoj farmi, broj tovljenika iznosi 30.000 grla. Proizvedeni tovljenik na privatno jfarmikošta 87 €, i svinjsko meso u polutki 1,16 €/kg. Na zadružnoj farmi cena tovljenika iznosi 142 €, i svinjsko meso u polutki 1,94 €/kg. Prosečna masa tovljenika na obe farme je 100 kg, dok je udeo svinjskih polutki varirao od 78%-79%.

Ključne reči: *Proizvodnja tovljenika, svinjskog mesa - polutki, cena, kvalitet, ekonomski rezultati.*

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