

Production Costs in the Fattening Period of Pigs and Assessment of the Influence of Selected Factors on the Amount of These Costs

J. Štolcová, J. Homolka

Faculty of Economics and Management, Czech University of Life Science in Prague, Czech Republic

Anotace

Od 90. let minulého století se produkce jatečných prasat a výroba vepřového masa v ČR stala díky se snižující soběstačnosti ČR v této komoditě často diskutovaným tématem. Nízké a kolísavé realizační ceny (CZV), zvýšený dovoz živých zvířat i vepřového masa ze zahraničí a vysoké náklady na výrobu jsou často označovány jako jedny z hlavních důvodů současného kritického stavu v tomto odvětví živočišné výroby. Tento příspěvek se zabývá kalkulací výrobních nákladů ve výkrmu jatečných prasat a posouzením vlivu vybraných faktorů na výši těchto nákladů. Cílem tohoto příspěvku je poskytnout přehled o výrobních nákladech v konečné fázi produkce jatečných prasat a přehled o vlivu vybraných faktorů (cen kalendářního roku a výměry zemědělské půdy podniku) na výši těchto nákladů. K dosažení cíle byla využita data anonymního dotazníkového průzkumu podniků zabývajících se chovem prasat z let 2006 - 2010. K vyčíslení výrobních nákladů bylo využito dvoustupňové kalkulace. Pomocí analýzy rozptylu byla vyhodnocena programem STATISTICA statistická významnost vlivu vybraných faktorů na jednotlivé ukazatele – nákladové položky. Výše vlastních celkových nákladů na výkrm jatečného prasete od roku 2006 do roku 2008 meziročně rostla, v roce 2009 a 2010 byly zjištěny meziroční poklesy, a to v důsledku snižování nákladů na krmiva a mzdových a osobních nákladů. Průměrné celkové vlastní náklady výkrmu jatečných prasat za sledované období let 2006 – 2010 činily 1752,8 Kč/100KD. Náklady na krmiva jsou ve struktuře nákladů nejvýznamnější položkou, ve sledovaném období tvořily v průměru 65,6% celkových vlastních nákladů výkrmu jatečných prasat. U podniků bez výměry zemědělské půdy byl tento podíl o 2,4% vyšší. Poznatky prezentované v článku jsou výsledkem řešení výzkumného záměru MŠM 6046070906 „Ekonomika zdrojů českého zemědělství a jejich efektivní využívání v rámci multifunkčních zemědělskopotravinářských systémů“.

Klíčová slova

Prase, výkrm, náklady, ekonomika, konkurenceschopnost, vliv, cena zemědělských výrobců, výměra, zemědělská půda.

Abstract

From the 90th years of the last century is the production of pigs and pork industry in the Czech Republic thanks to decreasing self-sufficiency CR in this commodity frequently discussed topic. Low and fluctuating producer's price, increased imports of live animals and pig meat abroad and the high costs of production are often referred as one of the critical reasons for the current situation in the livestock sector. This paper deals with the calculation of cost of production in the fattening period of pigs and assessment of the influence of selected factors on the amount of these costs. The aim of this paper is to give an overview of the production costs in the final stage of pig production and overview of the influence of selected factors (the prices per year and the size of agricultural land area of farm) on the amount of costs. To meet the goal was used data of anonymous questionnaire survey of farms from the years 2006 – 2010. To quantify the cost of production was used two-stage calculation. Using analysis of variance and program STATISTICA was evaluated statistical significance of selected factors on indicators – cost items. The amount of total cost in the fattening stage of pigs increased from 2006 to 2008, in 2009 and 2010 were identified annual declines, as a result of reducing the cost of feed and labor costs. The average total cost in the fattening period of pig in the period of 2006 – 2010 amounted to 1 752.8 CZK /100 FD. Feed costs in the cost structure are the most important item in the period represented on average 65.6% of total cost in the fattening period of pigs. For farms without agricultural land, the proportion was 2.4% higher. Pieces of knowledge introduced in this paper resulted from solution of an institutional research intention MSM 6046070906 „Economics of resources of Czech agriculture and their efficient use in frame of multifunctional agri-food systems“.

Key words

Pig, fattening, cost, economics, competitiveness, influence, producer's price, area, agricultural land.

Introduction

Current pig production is often implemented in three stages: breeding, rearing and fattening. Breeding stage involves piglet production and it is more complex to manage than rearing or fattening stage (Rodríguez, 2010). Usual units are for instance rearing stages producing young pigs and fattening stages producing pigs to be slaughter. Fattening stages involves feeding pigs from about 25 kg until they are ready to slaughter, typically at the weight about between 105 and 125 kg.

Pig and pork production is economically important agrarian sector in the Czech Republic and the EU. New trends, such as economic, social and ecological forces are redefining the EU pork industry (Backus and Dijkhuizen, 2002). Czech pig breeding and production and pork industry were affected by many changes during recent years. Unfortunately, not all subjects operating in this livestock sector have succeeded in adapting to the new conditions, which caused a strong competitive environment in the EU and globally. Many farms are diverted from pig production, focused on other sector of crop production or livestock or business in agriculture ended completely. Low and variable realization price together with high costs are for many years the cause of unprofitable production of pigs and result in long-term decline in self-sufficiency of the Czech Republic in the production of this commodity. This development in the Czech Republic mean in stagnant domestic consumption of pork higher dependence on foreign imports. The increasing demands of the legislative requirements in recent years involved in the declining profitability (Šlesinger, 2007). Den Ouden et al. (1997) reported animal welfare preferences have to be related to the cost of production.

To strengthen competitiveness and reduce loss of production of slaughter pigs is currently an important step for breeders effective cost reduction per unit of production. The aim of the paper is to give an overview of costs in the final stage of pig production and overview of the influence of selected factors on the amount of costs. It is possible to provide guidance to producers of pigs, the calculation of the cost in the fattening period of pigs.

Materials and methods

For objective evaluation of cost in the fattening period of pigs was necessary based on data collected on an anonymous questionnaire survey of farms using a closed herd turnover system. The input data for the calculation of costs were data from 85 pig farmers from the Czech Republic. Own costs in the fattening period of pigs were determined for each calendar year in the period 2006 - 2010. The calculations own costs had been treated in terms of costs tracked separately in specified category – fattening period of pigs. To calculate the costs in the fattening period of pigs was used two stage cost calculation. In the first step, calculations were made for costs in the fattening stage of pig. From the total cost of the animal category is subtracted the valuation of secondary product - pig manure. To expression the proportion of cost of the main product is used for calculation unit 100 feeding days (FD) and 1kg live weight gain. Costs of 1 kg live weight gain are calculated as a proportion of the daily costs in the fattening period of pigs and total daily live weight gain. In the second step are calculated the costs per 1 kg live weight of slaughtered pig. In such costs are included the costs of pig transferred from the previous category. Average live weight of slaughtered pig is calculated as a proportion of the total live weight of the animal and number of animals.

Formula for calculation of the total cost (C_{total}) in the fattening period of pigs is made of 9 items:

$$C_{total} = F_{purch} + F_{own} + MD + ODM + ODES + LW_{total} + WO + AA + O$$

where:

F_{purch}	purchased feed and bedding
F_{own}	own feed and bedding
MD	medication and disinfection
ODM	other direct material
$ODES$	other direct expenses and services
LW_{total}	labour and wages total
WO	write-off (direct)
AA	auxiliary activities
O	overheads (administrative and production overheads)

To be able to assess the influence of the size of agricultural land area and the influence of the prices per year on the value of costs is applied analysis of variance (ANOVA). If the factors examined have the appropriate measure and no effect, then the effect will not reflect on their statistical characteristics of this magnitude. If the influence of the factor is significant, this should be reflected in the statistical characteristics of the measured values – especially on the degree of variability (variance) and on the mean value. To search statistical significance influence of factors (the prices per year and the size of agricultural land area of farm) to the individual cost items in the fattening period of pigs, the results were evaluated by statistical program STATISTICA CZ Trail version 10th.

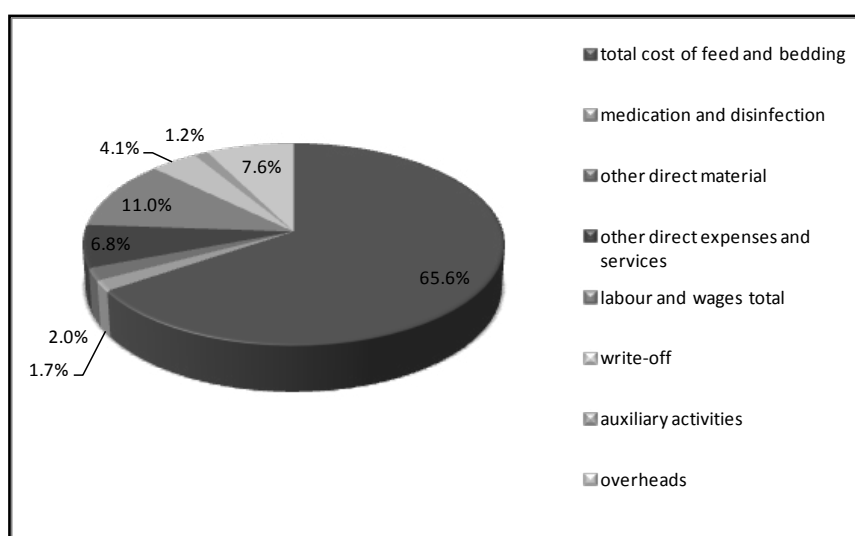
Results and discussion

The most important cost item is in the fattening period of pig, as observed by many authors, (Poděbradský, 1998; Pulkrábek et al., 2005; Poláčková, 2007, 2008, 2009; Weiß, 2007; Bergmans, 2008; Abrahámová, 2009; Foltýn et al., 2009; Haxsen, 2012; Künzler, 2012), the cost of feed. Feed costs in the cost structure are the most important item in the period represented on average 65.6% of total cost in the fattening period of pigs (*Graph 1 Structure of the cost in the fattening stage of pig in the period 2006 - 2010 (CZK/100FD)*). The growth performance of pigs is increasing demands on feed quality, which is reflected in the increasing cost for feeds (Sundrum et al., 2000, Jeroch et al.,

2008; Morel et al., 2012). The average growth rate of the total cost of feed and bedding in the fattening period of pigs in the period amounted to 1.001. The cost of purchased feeds and bedding are the most important item of costs structure, represent in the period 2006 – 2010 average 47.97% of the total cost for fattening pig.

Table 1 The fattening period of pigs - development costs of purchased feed and bedding, annual average of farms examined companies in years 2006 – 2010 (CZK/100FD) provides information on the development costs of purchased feeds and bedding in the period and compares these data with the annual costs of feed for pigs according to CZSO. The average growth rate of the costs of purchased feed and bedding in the fattening stage of pigs in the period in the questionnaire survey is lower by 6.8% compared to the average rate of increase in the price of feed for pigs according to CZSO. The highest feed costs were recorded during the whole period in 2008, when market prices for feed grain and cereal-based compound feedingstuffs for pigs in world increased significantly. Dynamic increase in grain prices and consequently the cost of pig meat production since 2007 significantly dampened pig production in the Czech Republic (Abrahámová, 2009). The unfavorable development costs for feed due to the high prices of basic components of feed mixtures for pigs in 2008 refers Fowler (2009).

The highest average cost items purchased feed and bedding in the questionnaire survey was found in 2008 (975.31 CZK/100FD) and the lowest in 2010



Source: Calculations from Survey Data

Graph 1 Structure of the cost in the fattening stage of pig in the period 2006 - 2010 (CZK/100FD).

Indicator	2006	2007	2008	2009	2010
Purchased feed and bedding	801.01	945.65	975.31	890.92	690.95
Base index (2006=1)	1.000	1.181	1.218	1.112	0.863
Chain index	x	1.181	1.031	0.913	0.776
<i>Average growth rate</i>					<i>0.964</i>
Chain index of feed prices for pigs (CZSO)	x	1.259	1.220	0.775	0.954
<i>Average growth rate</i>					<i>1.032</i>

Source: Calculations from Survey Data, CZSO

Table 1: The fattening period of pigs - development costs of purchased feed and bedding, annual average of farms examined companies in years 2006 – 2010.

Indicator	2006	2007	2008	2009	2010
Medication and disinfection	28.97	28.87	33.01	28.96	29.09
Base index (2006=1)	1.000	0.997	1.139	1.000	1.004
Chain index	x	0.997	1.143	0.877	1.004
<i>Average growth rate</i>					<i>1.001</i>

Source: Calculations from Survey Data

Table 2: The fattening period of pigs – development costs of medication and disinfection, annual average of farms examined companies in years 2006 - 2010 (CZK/100FD).

(690.95 CZK/100 FD). Statistically significant influence of prices of the prices per year and the size of agricultural land area of farm has been demonstrated in cost of feed and bedding purchased. The average growth rate of this cost item in the period was 0.964.

Cost item own feed and bedding are on average in the period 17.66% of the total cost. On own feed and bedding was statistically significant only influence of the prices per year.

Development costs of medication and disinfection in the monitored period shows *Table 2 The fattening period of pigs– development costs of medication and disinfection, annual average of farms examined companies in years 2006 - 2010 (CZK/100FD)*. This cost item occupies the total cost for fattening pig 1.70%. The highest cost of medication and disinfection in the fattening period of pig were incurred in 2008, on average 33.01 CZK/ 100FD. In other years, these costs ranged between 28.87 – 29.09 CZK/100FD. The average rate of growth of costs of medication and disinfection in the fattening stage of pigs in the period 2006 - 2010 in the questionnaire survey was 1.001. Statistically significant influence of the prices per year and a statistically significant influence of the size of agricultural land area of farm have not been in the period 2006 – 2010 established.

Other direct material represents on average about

1.98% of the total cost of fattening period of pigs. The cost of medication and disinfection in the fattening stage of pig the examined farms ranged on average in the period up 19.79 to 44.65 CZK/100FD. Statistically significant influence of the prices per year and a statistically significant influence of the size of agricultural land area of farm have been in the period 2006 – 2010 established.

Direct material costs include from the total cost in the fattening stage the examined farms in the period on average 69.31%, other direct costs and services then 6.76%. Other direct costs and services ranged in the surveyed farms in the period on average up 104.05 to 142.35 CZK/100FD. The average growth rate of other direct costs and services was in the monitored period 1.055. At this cost item has been a statistically significant influence of the prices per year established and statistically significant influence of the size agricultural land area of farm too.

Labour and wages costs together represent 11.05% of total cost in the fattening period examined farms in years 2006 - 2010. Statistically significant influence of the prices per year and a statistically significant influence of the size of agricultural land area of farm have been in the period 2006 – 2010 established. The highest labour and wages costs were identified in 2006 and the lowest in 2010. Development of labour and wages costs shows

Table 3 The fattening period of pigs – development costs of labour and wages, annual average of farms examined companies in the period 2006 – 2010 (CZK/100FD). Park (2010) points to the increase in labour productivity in the sector pig production in many EU countries over the past six years. The average growth rate of labour and wages costs in the period was 0.971, i.e. lower by 9.1% compared with an average growth rate of labour and wages in agriculture, according to CZSO (1.062).

Write-off direct (depreciation of tangible and intangible assets) present about 4.09% of total cost in the fattening stage examined farms in the period 2006 – 2010. Statistically significant influence on this cost item was not in one factor established.

The costs of auxiliary activities presents on average about 1.22% of the total cost in the fattening stage examined farms in the period 2006 – 2010. On this cost items was statistically significant only influence of the size of agricultural land area of farm.

Administrative and production overheads are on average 7.56% of total cost in the fattening stage examined farms in the period 2006 – 2010. At this cost item has been not statistically significant influence of the size of agricultural land area of farm. The lowest average overheads was reached in 2006, namely 113.31 CZK/ 100FD. The highest average overheads then was reached in 2008,

concretely 152.92 CZK/ 100FD.

In the period 2006 – 2010 ranged the total cost in the fattening stage up 16.5 to 19.2 CZK/FD. The lowest total cost in the fattening stage were identified in 2006 (1649.77 CZK/100FD), and the highest in 2008, namely 1920.99 CZK/100FD (*Table 4 The fattening period of pigs– development of total cost, annual average of farms examined companies in years 2006 - 2010 (CZK/100FD)*). The average growth rate of total cost in the fattening stage examined farms in the period (1.010) is lower by 1.5%, compared with an average growth rate of input prices of total, according to CZSO (1.025). Statistically significant influence of the prices per year and a statistically significant influence of the size of agricultural land area on the value of the total cost farm have been in the period 2006 – 2010 established.

Table 5 The fattening period of pigs– development of total cost, according to the size of agricultural land area of farms in years 2006-2010 (CZK/100FD) provides concrete value of total cost in the fattening period divided in groups according to size of agricultural land area of farm. The highest total cost in the fattening period examined farms in years 2006 – 2010 was reached in farms without agricultural, while the lowest in farms with a size of agricultural land area in the range of 501 – 2000 ha.

Only two cost items have during the survey period

Indicator	2006	2007	2008	2009	2010
Labour and wages	202.45	200.98	200.29	184.30	180.09
Base index (2006=1)	1.000	0.993	0.989	0.910	0.890
Chain index	x	0.993	0.997	0.920	0.977
<i>Average growth rate</i>	<i>0.971</i>				
Chain index of labour in agriculture (CZSO)	x	1.100	1.084	1.025	1.039
<i>Average growth rate</i>	<i>1.062</i>				

Source: Calculations from Survey Data, CZSO

Table 3: The fattening period of pigs – development costs of labour and wages, annual average of farms examined companies in the period 2006 – 2010 (CZK/100FD).

Indicator	2006	2007	2008	2009	2010
Total cost	1 649.77	1 683.61	1 920.99	1 791.57	1 716.01
Base index (2006=1)	1.000	1.021	1.164	1.086	1.040
Chain index	x	1.021	1.141	0.933	0.958
<i>Average growth rate</i>	<i>1.010</i>				

Source: Calculations from Survey Data

Table 4: The fattening period of pigs – development of total cost, annual average of farms examined companies in years 2006 - 2010 (CZK/100FD).

Size of agriculture land area	0 ha	1 - 500 ha	501 - 2 000 ha	2 000 and more ha
Number of Data	75	135	105	110
Total cost (CZK/100FD)	1 768.62	1 649.41	1 588.25	1 634.39

Source: Calculations from Survey Data

Table 5: The fattening period of pigs – development of total cost, according to the size of agricultural land area of farms in years 2006-2010 (CZK/100FD).

of declining average growth rate. It is the cost of purchased feed and bedding (0.964) and labour and wages costs (0.971). This development was identical with the development of most European countries, supported by increasing productivity and reducing costs to feed. That is the key to the overall improvement of production costs in the pig production (Park, 2010).

Conclusion

Long-term monitoring and evaluation of the cost of production would by the usual activity farmers, especially at such a commodity that is exposed to strong competitive environment. The prices per year and the size of agricultural land area have a statistically significant effect on the amount of total cost in the fattening period of pigs, which is well supported by the demonstrated statistically significant effect of these two factors on the cost of purchased feed and bedding, which represent on average 47.97% of the total cost in the fattening period of pigs. Farms without agricultural land

recorded in the period on average by 8.90 % highest of total cost, than was an average of farms with area of agricultural land. Amount of total cost in the fattening period of pigs from 2006 to 2008 increased year on year, in 2009 and 2010 were identified annual declines, as a result of reducing the cost of feed and labor costs. The average total cost in the fattening period of pigs in years 2006 – 2010 were 1752.8 CZK/ 100FD. The average growth rate of total cost in the fattening stage of pigs in years 2006 – 2010 amounted to 1.010, which is 1.5% less compared to the average growth rate of prices of total inputs by Czech Statistical Office (CZSO) 1.025.

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Corresponding author:

Ing. Jarmila Štolcová,

Department of Economics, Faculty of Economics and Management,

Czech University of Life Sciences in Prague, Kamýčká 129, 165 21 Prague 6- Suchdol, Czech Republic

E-mail: jarmila.stolcova@seznam.cz

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