Modelování rentability výkrmu skotu

Modeling of slaughter cattle profitability

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Abstract: The paper analy the economics of cattle fattening. With the help of the model AGRO-ŽV, there were simulated the perspectives of this livestock production branch using 2 agricultural policy scenarios in the Czech Republic for the years 2007 and 2008. With the help of the model AGRO-ŽV, there were computed 5 model variants: economics without supports, economics with coupled supports (scenario 1) and economics with decoupled supports (scenario 2). All the model results (both without supports and with supports) with the actual intensity of the cattle fattening show negative profitability of this branch. For reachig positive results of this branch,it was necessary to increase the intensity. In the Table 1, there is presented the so-called "break-even point" of profitability, which was found through the level of the daily weight gain about 0.90 kg (scenario 1) and nearly 1.00 kg (scenario 2) per 1 feeding day.

Key words: slaughter cattle economics, model AGRO-ŽV, CAP, coupled supports, decoupled supports, break-even point

Abstrakt: Článek je zaměřen na analýzu ekonomiky výkrmu skotu. Za pomoci modelu AGRO-ŽV byly simulovány perspektivy odvětví živočišné výroby podle 2 scénářů agrární politiky v České republice pro roky 2007 a 2008. Pomocí modelu AGRO-ŽV bylo vypočteno 5 modelových variant, které jsou zahrnuty v tabulce 1: ekonomika bez podpor, ekonomika spojená s přímými platbami vázanými na produkci (scénář 1, tzv. coupling) a ekonomika spojená s přímými platbami odpojenými od produkce (scénář 2, tzv. decoupling). Všechny modelové výsledky (jak bez podpor, tak s oběma typy podpor) s aktuální intenzitou výkrmu skotu ukazují na zápornou rentabilitu tohoto odvětví. Předpokladem pro dosažení pozitivních výsledků tohoto odvětví bylo nezbytné zvýšit intenzitu výkrmu (denní přírůstky). V tabulce 1 je uveden tzv. „bod zvratu" rentability, která byla nalezena při úrovni přírůstku 0.90 kg (scénář 1) a téměř 1.00 kg (scénář 2) na krmný den.

Klíčová slova: ekonomika výkrmu skotu, model AGRO-ŽV, SZP, přímé podpory, nepřímé podpory, bod zvratu

The membership of the Czech Republic in the European Union brought about changes in the area of agricultural policy. One of the important branches, which is supported in the framework of the CAP, is cattle breeding. The importance of this branch may be expressed by the share of cattle breeding (milk and slaughter cattle production in current prices) in the overall value of production of the agricultural branch in the CR within the Total Agricultural Account for the year 2006, which represents cca 27%, of which slaughter cattle represents 7.2%. Cattle production economics has been at present considerably influenced by the amount of supports (direct payments), which enter this area both directly – the national complementary payments (Top-Up) per 1 livestock unit (LU), and indirectly – the support of feeds through varea support per 1 hectare of agricultural land (SAPS) and the Top-Up per 1 hectare for the selected commodities (e.g. cereals). Considering the fact that the total volume of these "claim supports" still grows (from the accession to the EU in 2004 to the year 2013, when the amount of direct payments will be the same all over the EU), there also grows their influence on the total results of the cattle production economics. This paper focuses on the analysis of the slaughter cattle economics. The influence of the CAP (Common

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Agricultural Policy) has been simulated in the paper through the model AGRO-ŽV for the year 2005 (basic year) and for the years 2007 and 2008 (ex-post prediction). Considering the continuous transition of the CAP EU from commodity supports (so-called coupled support connected with production) to area supports per 1 hectare of agricultural land or per an agricultural plant culture (so- called decoupling, i.e supports not connected with production), the paper simulated the influence of both the policies on the slaughter cattle economics. The economics of this branch was, as results from the cost research of the RIAE, unprofitable in average in the CR within the last years (Poláčková et al. 2003–2007). Therefore, the paper simulates searching for the "break-even point", i.e. of such intensity of cattle fattening, when the unprofitable economics of this branch is transformed into profitable and a zero profitability level is reached by the model AGRO-ŽV.

Principles of the model AGRO-ŽV come out from the methodological approach to evaluating cattle breeding economics which were originally presented by Poděbradský (1992) and Poděbradský et al. (1992). This methodological knowledge was used also by Kopeček (2002), for searching of the break-even point for dairy cattle. Problems of cattle breeding economics and break-even point were researched also by other authors.

Střeleček et al. (2004) have monitored the cattle head number development with relation to the animal efficiency. Since the year 1990 to 2002, beef and dairy cattle numbers have dropped by more than 50% in the Czech Republic. This decrease has been partly compensated by an increase in efficiency, yet milk production has dropped to 55% in this period and beef production to 60% compared with 1989. Střeleček and Kollar (2002) were concern by the topic of various types of costs and referred to the relations between them. The authors describe two possibilities how to find the break-even point: One way is to compare the dynamics of revenues and costs, the second way is to compare the actual and expected variable costs.

Kvapilík et al. (2008) present that by the low weight gains and the low purchase prices of the slaughter cattle, it is possible to reach positive economic results only exceptionally. The most important conditions for reaching the positive profitability are the daily weight gain over 1 kg per head, further, the measures for cost decreasing related to market prices in the CR and the EU. Kvapilík et al. (2006) found that the main possibilities for costs saving can be found in feeding costs which represent 50% from the total costs. The point is mainly the increase of the quality and production effect of fodder and the economic use of feeding mixtures.

The searching for the break-even point was solved by Perry (1980). The 1100-lb steer (499 kg) must have been sold for $57.83 per 100 pounds (45.359 kg). This is for the owner the "break even" on investment. The average daily weight gain of 650 (295 kg) to 1100-lb steer is 2.80 pounds (1.27 kg).

The author also examined feeding cost calculations on the base of the daily intake in dependence on the daily weight gain and the weight of steer. The author has used a mathematical model which was created by Brent et al. (1978) to compare the rate of gain, the daily feed intake, and the efficiency of feed conversion of the finishing steers starting at the weight of 650 lb and fed by one of 10 diet types; the diet types range from all-corn silage to all concentrates. From the structure of slaughter cattle costs, the most considerable are feeding costs (82.6%), fixed costs (stabling costs and costs of interest) represent only 17.4%.

Later, Perry (1995) defined the break-even point with respect to price development. At market time, then, the 1200-lb (544 kg) steer must gain net $70.32 (28.786 CZK/USD ČNB 1994, i.e. 2 024 CZK) per 100 pounds, resp. 44.63 CZK/kg ($843.78 cost divided by 1200-lb finish weight) for the owner to "break even" on the investment. The average daily weight gain of 650 to 1200-lb steer is 2.66 pounds (1.21 kg).

For economic effectiveness evaluation of cattle production, there was used also the mathematical model AENVI-1 (Foltýn et al. 2008b), which enables to evaluate 2 indicators of profitability, i.e. profitability without supports (R–S) and profitability with supports (R+S). Profitability R–S represents the share of producer prices per the unit of production and unit costs of the given commodity in the given region. Profitability R+S represents the share of producer prices and unit support related the the unit costs for the given commodity. The term "unit support" means all possible supports (direct and indirect) divided by the production size allocable to the given commodity (Foltýn et al. 2008a).

OBJECTIVE

The objective of this paper is the analysis of slaughter cattle profitability with the help of the AGRO-ŽV model, which is based on the data of the year 2005 for the simulation ex-post predictions for years 2007 and 2008, while taking into consideration the influence of the CAP EU represented by two most probable scenarios of the agricultural development for the CR, i.e. coupling and decoupling.

MATERIAL AND METHODOLOGY

The analysis starts from the annual inquiry about costs and production intensity of agricultural products provided by the Research Institute of Agricultural Economics Prague (RIAE) for the year 2005 and on the estimate of cost development for the year 2006 (Boudný, Mládek 2007) in compliance with the RIAE methodology (Novák 1996) and prices of agricultural producers for slaughter cattle for the year 2005 and 2006 according to the Czech Statistical Office (CZSO 2005–2006). The solution also results from the current rate of the SAPS and Top-Up for the years 2007 and 2008 (Scenario 1 – coupling, where the continuation of the current variant of agricultural policy for the CR is expected) and the estimates of single payment per 1 hectare of agricultural land for the years 2007 and 2008 (Scenario 2 – decoupling, where, except for the SAPS payment, also the "payments dissolving" Top-Up per 1 hectare of agricultural land is expected). Cattle fattening economics includes supports, depending on the given agricultural policy scenarios, both in income (LU support), and in costs through feed (fodder supports and concentrate supports as well as fodder milk). The principles and rules of the Czech agrarian policy and the CAP there were described in "Green Reports" (Ministry of Agriculture of the Czech Republic, 2005–2008).

For analysis of d the ependence of cattle fattening economics on breeding intensity, prices of inputs (especially of the concentrates and roughage feed) as well as the supports of agricultural commodities (in the framework of the rules of the considered agricultural policy variants) the model of AGRO–ZV has been used (Foltýn et al. 2004).

Model AGRO-ŽV: This model enables simulation of functional dependencies of the cost level of the particular categories of animals on the intensity level (production of dairy and meat cattle, pig breeding, layer and meat poultry breeding) in the framework of the closed herd turnover. Based on input parameters of the given category (input and output weight, daily weight gain, mortality percentage and slaughter selection, final slaughter weight etc.), the numbers of feeding days in the category and the average annual levels are calculated based on the model. In addition, fattening technologies of the individual animal categories are entered in the model in dependence on the intensity of breeding (average consumption of the particular kinds of feed – both fodder and concentrates – per 1 feeding day) as well as prices of feeding crops and components resulting from feed composition, based on which the model calculates the costs for own and purchased feed. Finally, based on the entered labour costs, dpreciation costs and other (especially overhead) costs per 1 feeding day, the model calculates the total costs for raising within the given category (reflecting the number of feeding days within the given category). With the help of dynamic transfers from one category to anothercategory and the costs starting of the fattening, the model AGRO-ŽV will count the total costs per 1 kg of live weight (of slaughter animals), per 1 liter of milk (at milking cows) etc. The total economics of the individual breeding including the supports of agricultural policy will be counted by the model based on entering the agricultural producer price for the product (e.g. of the slaughter cattle), supports related to the unit of the final product (e.g. support per 1 livestock unit converted to 1 kg of live weight) and supports of feed costs (for 1 ton of hay, corn silage, hay silage and various kinds of feed mixtures according to efficiency) derived from the supports of agricultural commodities entering model calculations as feeding crops (silage corn, perennial fodder crops, meadows and pasture, feed cereals – wheat, barley etc.).

Prices and costs: In the model simulations, we expect that the enterprise consumes only its own feed fodder and concentrates, while concentrates include external price for processing to the appropriate feed mixtures. Input prices of feed have been derived from the RIAE cost research for the year 2005 and from the estimate for the year 2006. The year 2005 has been used as the comparison base, while for the ex-post prediction for the year 2007 and 2008, agricultural producers' prices have been used. For labour costs and other costs, the average trends of growth of wages in agriculture and the average national economy inflation rate have been used.

Agricultural policy implementation: The influence of the considered scenarios of agricultural policy reflects both in the income of the agricultural enterprise for slaughter cattle in conversion to live weight (Top-Up for LU – direct support), and in the support of feed – the decrease of cost prices of feed cost prices by the appropriate part of the commodity support converted to the product intensity unit (indirect support). Feed support also reflects the relevant support of milking cows converted per 1 liter of milk.

Break-even point: The main indicator of efficiency in the fattening has been taken over from the CZSO data for the year 2005 for all considered time periods. Economic efficiency in the cattle fattening is simulated by the AGRO-ŽV model in order to find the break point, i.e. such fattening intensity (daily increase), where zero profitability rate is reached. This process has been implemented in the paper by finding of the closest efficiency value, at which the lowest positive profitability rate is reached. The simulation of the influence and importance of the policy on economics of the cattle fattening has been illustrated by model calculations without supports and with the inclusion of supports. For the years 2007 and 2008, the model situations result from 2 scenarios (scenario 1 – coupling, scenario 2 – decoupling, see the part "Material").

Mathematical description of the model AGRO-ŽV

The model AGRO-ŽV evaluates animal commodity economics in the further described steps. The model computations come out from the closed cattle turnover in division into the following categories:
D1 – dairy cows, TJ1, resp. TB1 – calf-heifers, resp. calf-bulls from the birth till 6 months age, J11 – heifers from the 6 months age to admission (the given value = 380 kg l.w.), J12 – heifers from the fertility to calving, VB1 – fattening of bulls from 6 months age till the final slaughter weight (the given value = 590 kg l.w.).

Step 1 (calculation of the average head numbers): The algorithm for calculation of the average head numbers is contained in the Table 1.

As final indicators of the turnover, there are used the average head numbers of the individual categories for a dairy cow, i.e.

prum.st(D1), prum.st(TB1), prum.st(TJ1), prum.st(J11), prum.st(J12), prum.st(VB1)

Where: prum.st = average head number of a category

Assumption (for the cattle turnover): The whole closed turnover is proposed as calculations which are related to 1 average head of the basic herd (dairy cows), i. e. prum.st(D1) = 1.

From the Table 2, it is evident that the average head numbers are functions of the input parameters of the dairy cattle turnover, like the cow natality, born weight of calves, daily weight gain of animals in categories, final slaughter weight, percentage of mortality and slaughter elimination etc.

Step 2 (calculation of feeding costs per a day): For every category i = D1, ...,VB1 and for all types of feeds j = hey, silage, dry matter silage, cereals, feeding milk, feeding mixture JKS1, ..., JKSn we define:

$$\text{Nakl.krm}(i) = \text{sum}\ (j = \text{feeds},\ \text{prum.st}(i) \times \text{sp.krm}(i, j)) \times \text{cena.krm}(j)) \qquad \text{for } i = \text{D1},\ldots,\text{VB1}$$

Where: Nakl.krm(i) = feeding costs per a day, sp.krm(i, j) = daily feed consumption for an average head of the category i, cena.krm(j) = market price of the feed j

Note that the norm of sp.krm(i, j) is a non-linear function of the daily weight gain of the category i and therefore the total feeding costs Nakl.krm(i) have the function dependence on the daily weight gain of the category i.

Step 3 (total costs per an average head in a category): On the base of the given norms per 1 feeding day, i.e. labour costs, depreciation of long-term assets and the other direct costs and overheads, we define the total costs for an average head in the category i

$$\text{Nakl.cel}(i) = (\text{Nakl.krm}(i) + \text{Nakl.prac}(i) + \text{Odp}(i) + \text{Nakl.ost}(i)) \times \text{poc.KD}(i)$$

Where: Nakl.cel = total costs, Nakl.prac = labour costs, Odp = depreciation of long-term assets and Nakl.ost = other direct costs and overheads, poc.KD = number of feeding days in the category i (final weight minus starting weight divided by the daily increase, see Table 2)

Step 4 (total costs for a final slaughter head): Total costs for a final fattening head contain the sum of costs for a born calf-bull, costs for breeding a calf-bull till 6 months age and costs for fattening of a bull from 6 months age to the final slaughter weight.

$$\text{Nakl.jat.ks.VS} = (\ (\text{poc.hm(TB1)} \times \text{cena.nar(TB1)} + \text{Nakl.kd..odch(TB1)} \times \text{poc.KD(TB1)}\ ) \times (1+\text{uhyn(TB1)} + \text{brak(TB1)}\ ) + \text{Nakl.kd.odch(VB1)} \times \text{poc.KD(VB1)}\ ) \times (1+\text{uhyn(VB1)}+\text{brak(VB1)}\ )$$

$$\text{Nakl.kg.z.h.VS} = \text{Nakl.jat.ks.VS}/\text{jat.hm.VS}$$

Where: jat.hm.VS = kon.hm(VB1), Nakl.jat.ks.VS = total costs for a final slaughter head, poc.hm = starting weight, cena.nar = price of the born calf, Nakl.kd.odch = costs for breeding per 1 feeding day, poc.KD = number of feeding days, uhyn = mortality (%), brak = slaughter elimination (%), Nakl.kg.z.h. = total costs for kg l.w. of a final slaughter head, jat.hm = final slaughter weight, kon.hm = final weight in a category

Step 5 (support calculation for an average weight in a category): The total sum of supports POD(i) for an average head in the category i = D1,...,VB1 is the sum of direct supports PP(i) and a indirect supports NP(i) allocable for this category:

$$\text{POD}(i) = \text{PP(I)} + \text{NP}(i)$$

$$\text{PP}(i) = \text{POD.VDJ} \times \text{koef.VDJ}(i)$$

$$\text{NP}(i) = \text{suma}(j = \text{krmiva},\ \text{PLO(Kj)} \times \text{POD(Kj)}) \times \text{poc.KD}(i)$$

$$\text{sp.krm}(i, j) = \text{PLO(Kj)} \times \text{VYN(Kj)} \times \text{koef.krm}(\text{Kj}, j)$$

$$\text{PLO(Kj)} = \text{sp.krm}(i, j)/(\text{VYN(Kj)} \times \text{koef.krm}(\text{Kj}, j))$$

Where: POD.VDJ = support for a livestock unit (LU), koef. VDJ = transfer coefficient for a head in a category to LU, krmiva = feeds, PLO = area of a plant commodity, Kj = source plant commodity for the feed *j*, sp.krm = feed consumption, VYN = per hectare yield, koef.krm = transfer coefficient of raw material of a plant Kj on the feed *j*

Step 6 (calculation of total supports per 1 final slaughter head of cattle):

$$\text{POD.jat.ks.VS} = \text{PP(TB1)} + \text{NP(TB1)} + \text{PP(VB1)} + \text{NP(VB1)}$$

$$= \text{POD.VDJ} \times 0.80 + \text{NP(TB1)} \times \text{poc.KD(TB1)} + \text{NP(VB1)} \times \text{poc.KD(VB1)}$$

Where: POD.jat.ks.VS = total supports per 1 slaughter head

Step 7 (calculation of total profit per 1 final slaughter head of cattle):

$$\text{ZIS.jat.ks.VS} = \text{cena.kg.z.h.VS} \times \text{jat.hm.VS} + \text{POD.jat.ks.VS} - \text{Nakl.jat,ks.VS}$$

$$\text{ZIS.kg.z.h.VS} = \text{cena.kg.z.h.VS} + \text{POD.kg.z.h.VS} - \text{Nakl.kg.z.h.VS}$$

$$\text{POD.kg.z.h.VS} = \text{POD.jat.ks.VS/jat.hm.VS}$$

$$\text{Nakl.kg.z.h.VS} = \text{Nakl.jat.ks.VS/jat.hm.VS}$$

Where: ZIS.jat.ks.VS = profit of a final slaughter head, cena.kg.z.h.VS = price of a kg l.w. of a final slaughter head, POD.kg.z.h.VS = total support per 1 kg l.w. of a final slaughter head, Nakl.kg.z.h.VS = total costs per 1 kg l.w. of a final slaughter head

Step 8 (calculation of the break-even point): The break-even point is defined as the intensity level of a category where the profit per 1 kg l.w. of a final slaughter head is zero, or the price and unit support is equal to unit costs per a final slaughter head.

$$\text{ZIS.kg.z.h.VS} = 0$$

$$\text{cena.kg.z.h.VS} + \text{POD.kg.z.h.VS} = \text{Nakl.kg.z.h.VS}$$

Remark: Indicators POD.kg.z.h.VS and Nakl.kg.z.h.VS are functions of the daily weight gain of prir(TB1) and prir(VB1), further of the born weight poc.hm(TB1) and of the final slaughter weight kon.hm(VB1), it is possible to compute from the above presented equations the daily increase prir(VB1), under the conditions that the other parameters are constant.

RESULTS

The most important expectations and results of model simulations of the cattle fattening economics based on the model AGRO-ŽV are given in the Table 2.

Expectations of model simulations: The model simulations come out from agricultural producer prices of the years 2005 and 2006. Considering the fact that the agricultural producers' prices of agricultural commodities stagnate in a long term horizon, predictions for the years 2007 and 2008 used the average prices of the year 2006. Also for the cost of feed, we have used the expectation of stagnation of these costs for the prediction of 2007 and 2008, which are based on the assumption that the costs per 1 hectare of agricultural commodities grow approximately with the inflation level, however, the per hectare yield, which causes the unit stagnation, grows as well. On the other hand, the growth of milk yield by ca 2.0% per year (according to the CZSO data for the years 2004–2006) results from the implementation of the milk quota system, which influences the fodder milk costs for calves and, at the same time, the growth of labour costs (6.4%) and other costs (2.0%).

Results of model simulations: All variants of model simulations without supports have been calculated by the AGRO-ŽV model as unprofitable, and therefore economically ineffective, whereas it is based on the assumption of the average daily weight gain 2005 and 2006 (0.867 kg l.w. per a head and a feeding day). The loss fluctuates from 7.50 to 9.50 CZK/kg of live weight (Figure 1).

The losses have been considerable, but not fully eliminated by applying the supports in all variants from 0.50 to 1.50 CZK/kg of live weight in case of the same intensity level (Figure 2).

Model simulations in the case of the scenario 1 (coupling supports) show better results than the simulations in case of the scenario 2 (decoupling supports), i.e. the difference is approximately 1 CZK. This means that the expected transfer from the current CAP (which uses the coupled policy system) to the future CAP (assumed the decoupled policy system) will aggravate economics of this branch, and consequently, it will strengthen the pressure on the economic effectiveness and competitiveness in this area. This conclusion has been also confirmed by the calculation of the break-even point (profitability limit). While for the scenario 1, the break-even point has been reached for the daily gain closely above 0.90 kg per a feeding day, in case of the variants with the scenario 2, this limit approaches more the value 1.00 kg per 1 feeding day (Figure 3).

Model simulations searching for the slaughter cattle profitability in dependence on the daily weight gain in the case of the scenario 1 (coupling) and scenario 2 (decoupling) are displayed for the visual demonstration in the Figure 4 and Figure 5.

Table 1. Model AGRO – ŽV: Dairy cattle turnover

Indicator/Category		D1	TJ1	TB1	J11	J12	VB1
Production intensity		milk yield	přír	přír	přír	–	
Dairy cattle turnover	Unit	litr/head,year	kg/day	kg/day	kg/day	–	kg/day
		Z	Z	Z	Z	–	Z
Initial head number (poc.st)	head	Z	V nat.D1/2*poc.st.D1	V nat.D1/2*poc.st.D1	V kon.st.TJ1	V kon.st.J11	V kon.st.TB1
Natality (natal)	100 head/ head	Z					
Initial live weight (poc.hm)	kg	Z	Z	Z	V kon.hm.TJ1	V kon.hm.J11	V kon.hm.TB1
Daily weight gain (prir)	kg/day	–	P	P	P	V (kon.hm–poc. hm)/poc.KD	P
Final slaughter weight (kon.hm)	kg	V poc.hm	V poc.hm.TJ1+poc. KD. TJ1*prir.TJ1	V poc.hm.TB1 +poc.KD.TB1*prir. TB1	Z	Z	Z
Mortality (uh.proc)	koef.	Z	Z	Z	Z	Z	Z
Mortality (uh.ks)	head	V poc.st*uh.proc					
Mortality (uh.KD)	days	V poc.KD/2	V poc.KD/3	V poc.KD/3	V poc.KD/2	V poc.KD/2	V poc.KD/2
Cattle removing (brak.proc)	koef.	Z	Z	Z	Z	Z	Z
Cattle removing (brak.ks)	head	V poc.st*brak.proc					
Cattle removing (brak.hm)	kg	V poc.hm	Z	Z	Z	Z	Z
Cattle removing (brak.KD)	days		V (brak.hm–poc.hm)/prir				
Slaughter production (jat.ks)	head	–	–	–	V[1]	–	V poc.st* (1–uh.proc– brak.proc)
Slaughter production (jat.hm)	kg	–	–	–	Z	–	V kon.hm
Slaughter production (jat.KD)	days	–	–	–	V (jat.hm–poc. hm)/prir	–	V (jat.hm–poc. hm)/prir
Number of feeding days (poc.KD)	days	Z	Z	Z	V (kon.hm–poc. hm)/prir+21* (ind.insem–1)	Z poč.dnů březosti	V (kon. hm–poc. hm)/prir
Sanitation (vym.KD)	days	Z	Z	Z	Z	Z	Z
Number of feeding days for breeding (odch.KD)	days	V poc.KD+vym.KD					
Final head number (kon.st)	head	V poc.st*(1–uh.proc–brak.proc)–jat.ks					
Index of insemination (ind.insem)	index				Z		
Average head numbers (prum.st)	head	V poc.st	V (kon.st*poc.KD+uh.ks*uh.KD+brak.ks*brak.KD+jat.ks*jat.KD)/365				

[1]poc.st.J11*(1-uh.proc.J11-brak.proc.J11)-potreba.J11(=(uh.ks.D1+brak.ks.D1)*(1+uh.procJ11+brak.proc.J11)*(1+uh.proc.J12+brak.proc.J12)

[2]Z = data input (required value), P = daily weight gain (required value), V = data output (computed value)

DISCUSSION

In spite of the increase of the beef production efficiency from 1989 (Střeleček et al. 2004), the slaughter cattle production is unprofitable. This result agrees with publications of many other authors, e.g. Boudný, Mládek (2007), Foltýn et al. (2008a), Foltýn et al. (2008b), Kvapilík et al. (2008), Poláčková et al. (2003–2007).

For finding of the break-even point, there was used way to compare the dynamics of revenues and costs corresponding with the methodology of Střeleček and

Table 2. Model AGRO-ŽV – Slaughter cattle production profitability – ex-post prediction to 2008

Indicator	Unit	2005	2007–sc1	2007–sc2	2008–sc1	2008–sc2
Expectations of model simulations						
Average producer price of slaughter cattle	CZK/kg l.w.	40.62	41.95	41.95	41.95	41.95
Feed costs – hay	CZK/t	1 051	1 122	1 122	1 122	1 122
– hay silage	CZK/t	525	561	561	561	561
– corn silage	CZK/t	494	527	527	527	527
– wheat	CZK/t	2 956	3 157	3 157	3 157	3 157
– barley	CZK/t	2 946	3 147	3 147	3 147	3 147
– milk for calves	CZK/l	8.10	8.26	8.26	8.26	8.26
Milk yield of cows	l/head,year	6 254	6 497	6 497	6 625	6 625
Index of labour costs growth for slaughter cattle (6.4 % per year)	2005=100	100.0	113.2	113.2	120.5	120.5
Index of other costs growth for slaughter cattle (2.0 % per year)	2005=100	100.1	104.0	104.0	106.1	106.1
Results of model simulations						
Profitability of slaughter cattle breeding in the CR without supports						
Daily weight gain of slaughter cattle	kg/day	0.867	0.867	0.867	0.867	0.867
Support of slaughter cattle per 1 LU	CZK/kg l.w.	0.00	0.00	0.00	0.00	0.00
Support of own feed	CZK/kg l.w.	0.00	0.00	0.00	0.00	0.00
Costs for slaughter cattle	CZK/kg l.w.	48.10	50.75	50.75	51.59	51.59
Profit/loss of slaughter cattle breeding	CZK/kg l.w.	–7.48	–8.80	–8.80	–9.64	–9.64
Profitability of slaughter cattle breeding in the CR including supports in the framework of the CAP						
Daily weight gain of slaughter cattle	kg/day	0.867	0.867	0.867	0.867	0.867
Support of slaughter cattle per 1 LU	CZK/kg l.w.	2.72	3.14	0.00	2.70	0.00
Support of own feed	CZK/kg l.w.	3.67	5.19	7.36	6.28	8.29
Costs for slaughter cattle[1]	CZK/kg l.w.	44.43	45.56	43.39	45.32	43.31
Profit/loss of slaughter cattle breeding	CZK/kg l.w.	–1.09	–0.47	–1.44	–0.66	–1.36
Break-even point (limit of profitability)						
Daily weight gain of slaughter cattle	kg/day	0.967	0.904	0.989	0.916	0.974
Support of slaughter cattle per 1 LU	CZK/kg l.w.	2.72	3.14	0.00	2.70	0.00
Support of own feed	CZK/kg l.w.	4.76	5.66	8.80	6.94	9.64
Costs for slaughter cattle[1]	CZK/kg l.w.	43.34	45.09	41.95	44.66	41.95
Profit/loss of slaughter cattle breeding	CZK/kg l.w.	0.00	0.01	0.00	0.00	0.00

[1]Costs for slaughter cattle include indirect support of own feed (= total costs minus support of own feed)

Source: author's calculation

Kollar (2002). The analysis of searching the break-even point for the slaughter cattle breeding shows that unit costs decrease with a higher production intensity and, therefore, the daily weight gain approaches the break-even point. This principle is in agreement with the conclusions of Poděbradský (1992), Poděbradský et al. (1992) and Kopeček (2002).

Kvapilík et al. (2008) present that one of the most important conditions for reaching the positive profitability is the daily weight gain level over 1 kg per 1 feeding day and further a cost decrease related to market prices in the CR and the EU.

Perry (1980), under the different conditions of the US market, mentioned that the break-even point can be reached for the 1100-lb (499 kg) steer by the 2.80 pounds (1.27 kg) of the average daily weight gain, measured from 650 lb (295 kg) to 1 100 lb l.w. Later, Perry (1995) on the base of the same methodology recalculated these results by 2.66 pounds (1.21 kg) of the average daily weight gain (measured from 650 lb to 1200 lb l.w., i.e. 544 kg).

The above mentioned findings correspond with the results of the analysis in this article. While for calculations with the scenario 1, the break-even point

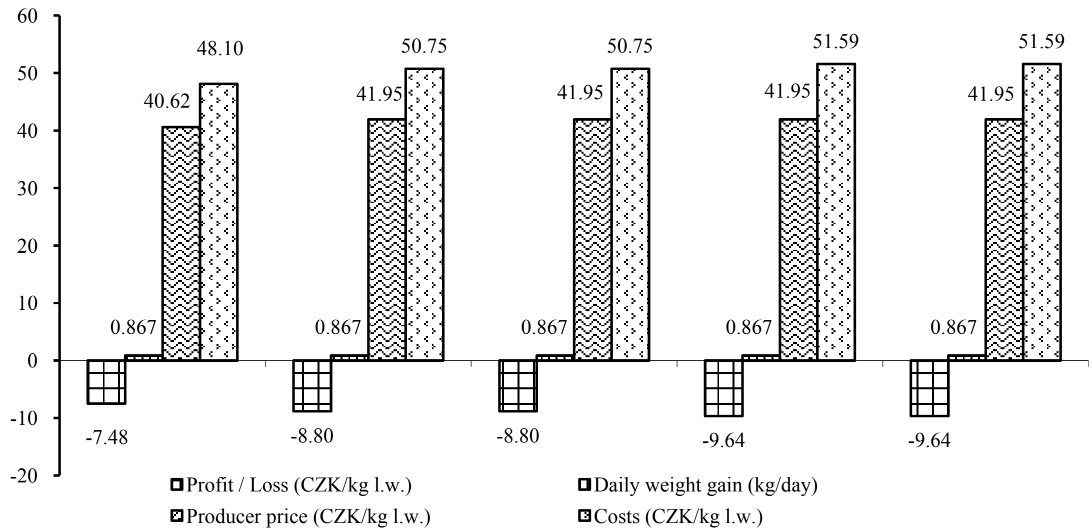

Figure 1. Profitability of slaughter cattle production without supports

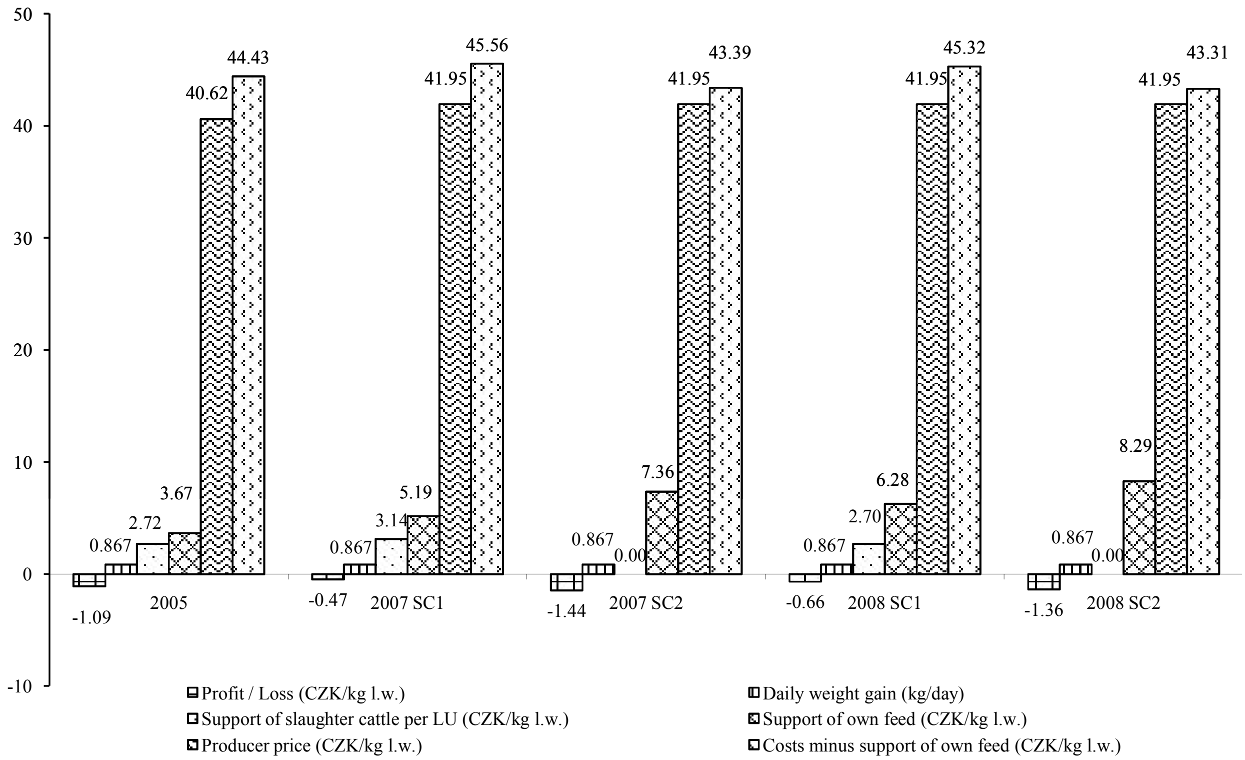

Figure 2. Profitability of slaughter cattle production with supports

has been reached on the level of the efficiency about 0.90 kg per feeding day, in case of the scenario 2, this limit approaches 1.00 kg.

From the model structure analysis, it is evident that feeding costs represent approximately 50% from the total costs and they are the most important cost item. Further, with regard to the low daily weight gain 0.867 kg in 2005 and 2006, it was necessary to focus attention regarding the slaughter cattle economics to the level of feeding rations and to the increasing

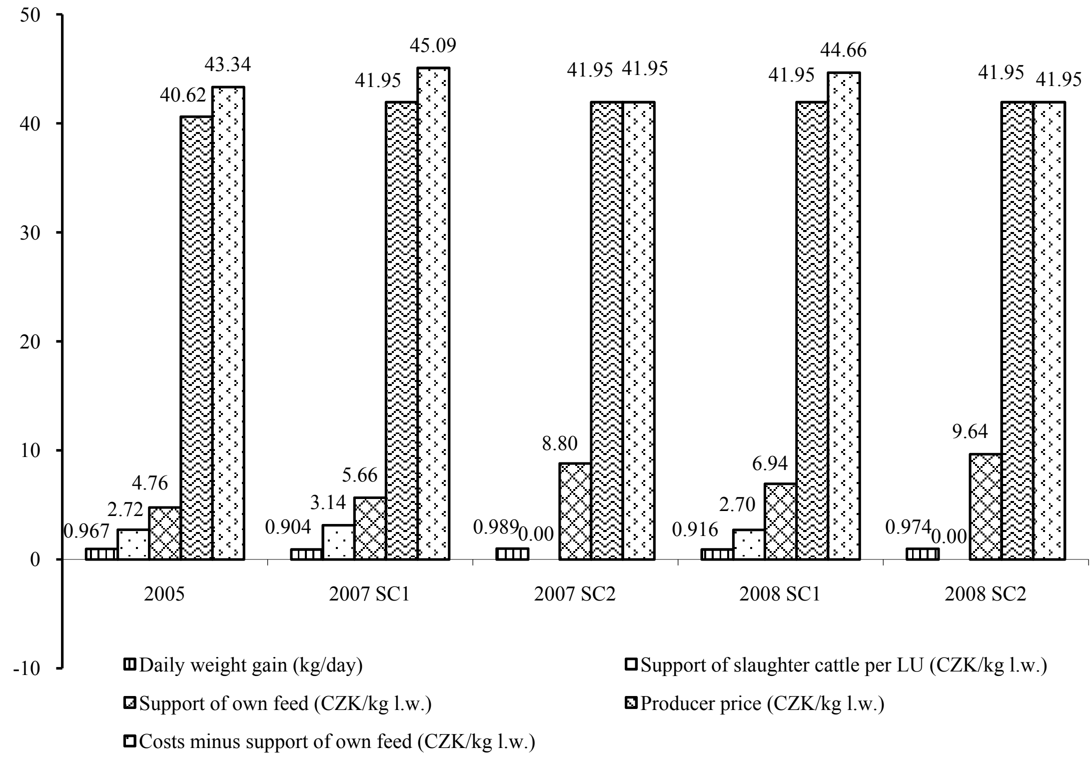

Figure 3. Break-even point (limit of profitability) of slaughter cattle breeding

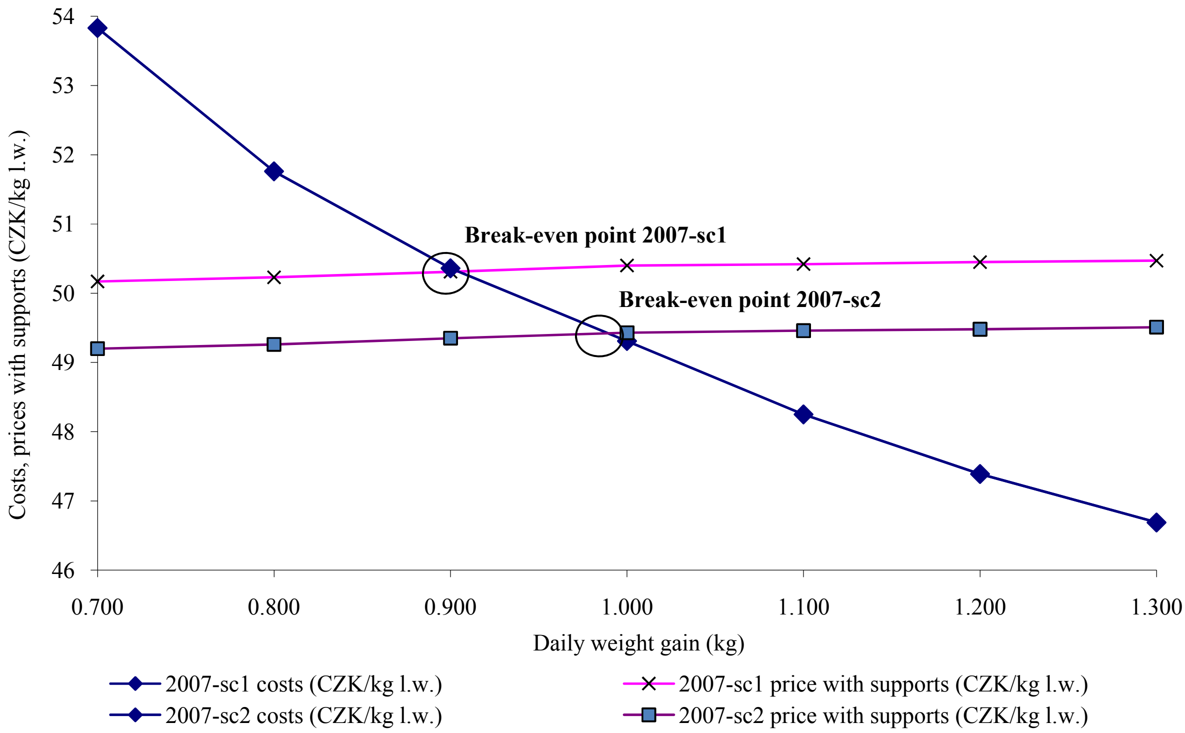

Figure 4. Searching of break-even point of slaughter cattle breeding in the year 2007

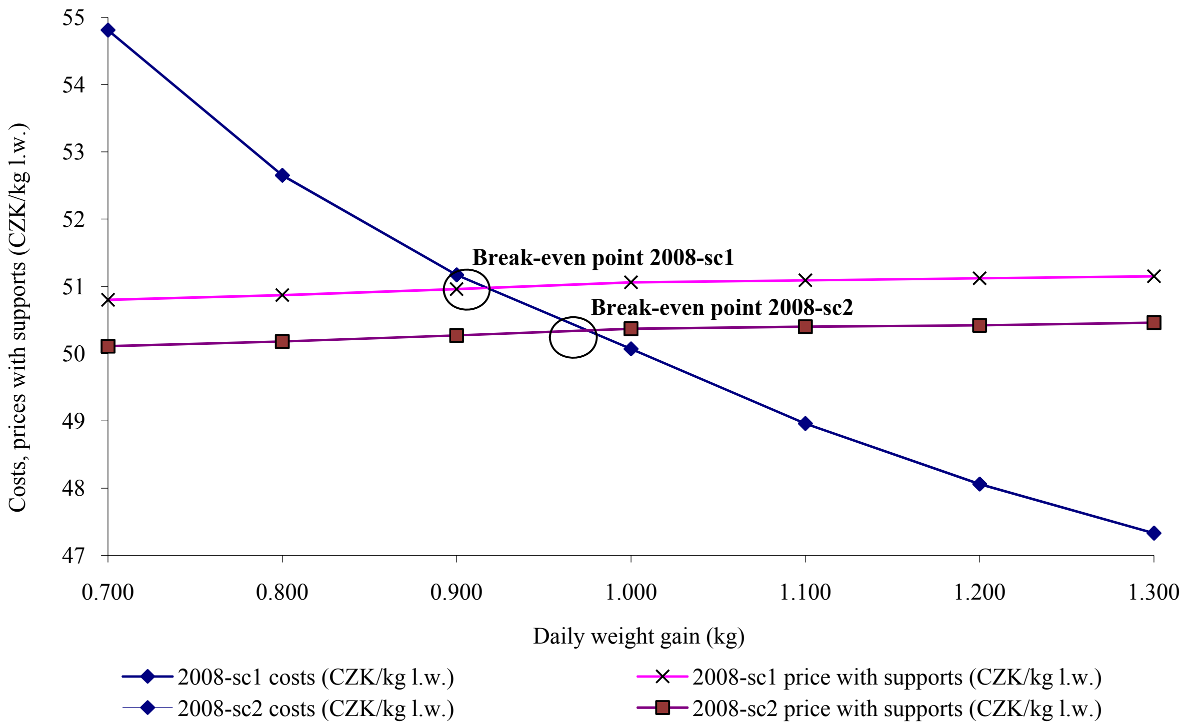

Figure 5. Searching of break-even point of slaughter cattle breeding in the year 2008

of their quantity and quality characterized by the content of the netto energy adequate to the daily weight gain 1 kg. Also Kvapilík et al. (2006) found that the main possibilities for cost savings can be found in feeding costs which represent 50% from the total costs. Perry (1980), with the help of the model of feed conversion effectiveness, which was created by Brent et al. (1978), calculated that feeding costs represent over 80% from the total structure costs without labour costs and therefore he analyzed feeding costs as main possibilities for cost savings connected with the decision of farmers how long the slaughter cattle should be kept in breeding.

CONCLUSION

From the results of model simulations, it issues that the intensity of the slaughter cattle breeding, which was reached in the CR, even with inclusion of direct and indirect supports, is not sufficient for reaching the positive profitability. The profitability is reached only at the higher efficiency level above 0.90 kg per feeding day. The variants of agricultural policy for the scenario 2 request a higher level of profitability than variants for the scenario 1, which has been probably caused by the transfer of the Top-Up payment LU on the cattle to the whole agricultural land, which decreases the total cattle support. However, the future focus of the CAP on decoupling of supports from production increases the competitive pressures and decreases the influence of direct payments on the individual commodities. This is a trend, which should be taken into account for the future. Payment per farm (SPS) fully supports the trends of variants calculated in the scenario 2 and the necessity to modify production of the slaughter cattle while considering the competitiveness of slaughter cattle production in the Czech Republic in the conditions of the EU single market.

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