doi: 10.17221/263/2015-AGRICECON

Economic efficiency of suckler cow herds in the Czech Republic

Jan SYRUCEK[1]*, Jindrich KVAPILIK[1], Ludek BARTON[1], Mojmir VACEK[2], Ludek STADNIK[2]

[1]*Department of Cattle Breeding, Institute of Animal Science, Prague, Czech Republic*
[2]*Department of Animal Husbandry, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czech Republic*

*Corresponding authors: syrucek.jan@vuzv.cz

Syrucek J., Kvapilik J., Barton L., Vacek M., Stadnik L. (2017): **Economic efficiency of suckler cow herds in the Czech Republic**. Agric. Econ. – Czech, 63: 34–42.

Abstract: The objective of the study was to assess the profitability of suckler cow herds located in different regions of the Czech Republic. Data on 2164 suckler cows were collected for 2013 from 20 beef farms using a questionnaire and the covered production, reproduction, and economic traits. Model calculations were used to determine the level of profitability with support payments either included (2.15%) or excluded (–45.5%). Break-even points defined as the points when the operation reaches zero profitability were estimated for the number of calves weaned and sold (81 calves/100 cows) and for the selling price of calves (54.6 CZK/kg). Fixed cost as a proportion of the total costs was reduced with the increasing herd size. Based on the results of a sensitivity analysis, the selling price for calves, the number of calves weaned the calving interval, and the amount of support payments were identified as the factors with the highest impact on the overall herd profitability.

Keywords: break-even point, costs, price, profitability, sensitivity analysis, suckler cows

Over the past decade, cattle has contributed 10% to the overall revenues generated from the animal production in the CR, whereof 42% consisted in milk sales (Czech Statistical Office 2014a). Suckler cows comprise the only cattle category with increasing numbers over the long-term. In 2014, there were in total 191,000 suckler cows in the CR, which corresponds to an increase of 54% compared to 2003 (Czech Statistical Office 2014b). Suckler cows typically are kept on the permanent grasslands with the objective of producing weaned calves and maintaining grazed areas in a natural yet cultivated state (Kvapilík et al. 2006). Permanent grasslands are utilized less intensively in the CR (18 cows/100 ha) compared to the EU average (21 cows/100 ha) (Eurostat 2014; FAOSTAT 2014). In spite of the increased suckler cow numbers, the production and consumption of beef have been decreasing in the recent years. The aim of every breeder is to maximize profit as given by the difference between income and expenses per herd and year, and the suckler cow operations are no exception (Aby et al. 2012a). As the suckler cows are bred mainly to produce calves for the later sale, a high level of their fertility is a major condition for the successful herd management (Kvapilík and Zahrádková 2007). The age of heifers at the first calving and the calving interval are among the most important functional traits (Aby et al. 2012b), as these are closely related to the number of weaned calves and thus the necessary level of profitability. In the CR, the average number of weaned calves per 1 suckler cow is 0.75 to 0.80 and the calf loss until weaning ranges from 8% to 10% (Boudný and Janotová 2012). A farmer cannot usually influence the market price of calves. The fluctuation of this price and the prices of inputs constitute one of the

Supported by the Ministry of Agriculture of the Czech Republic (project MZERO0714) and the National Agency for Agricultural Research of the Czech Republic (project NAZV QJ1510191) and by the Ministry of Education, Youth and Sports of the Czech Republic ("S" grant)".

doi: 10.17221/263/2015-AGRICECON

greatest economic risks for the suckler cow operations (Belasco et al. 2010). Payment support is also an important element inasmuch as the suckler cow herds are mostly unprofitable and unsustainable over the long term without subsidies (Wolfová et al. 2004; Jones 2007; Boudný and Janotová 2012). Support for the suckler cows at the time of the data analysis included mainly the following payments (Doucha et al. 2012; Ministry of Agriculture 2014):

– Single Area Payment Scheme(SAPS) – direct payments;
– Transitional national subsidies (PVP, earlier TOP-UP) – for agricultural land, ruminants, beef cattle;
– Specific support under Article 68 of the Council Regulation (EC) No 73/2009 targeted at specific sectors – beef calves; and
– Payments for the Less Favoured Areas.

The objectives of this study were to assess the profitability of suckler cow herds in the CR based on the data acquired at the farm level and the subsequent model calculations, to determine the break-even points, and to evaluate the impact of various factors, including payment supports, on the overall profitability of the system. In addition, we investigated farmers' views of different factors influencing the economic performance of their operations.

MATERIAL AND METHODS

Data

Input data were collected for 2013 using a questionnaire from a total of 20 suckler cow herds located in the CR. Each questionnaire consisted of 94 questions focused on selected production and economic characteristics. Average data were obtained on the basis of 2164 suckler cows (an average 108 animals per herd). The calving season was predominantly in spring. Grazing began mostly in April/May and ended in October/November. As is normal practice in the CR, suckler cows of those breeds reared under more extensive conditions are kept outdoors during winter whereas those of breeds kept under intensive conditions are housed indoors. Reproduction traits (age at calving, calving interval, number of calves born and weaned, etc.), live weight gains of calves, and herd turnover rates were observed (Table 1). In addition to reproduction and production character-

Table 1. Basic indicators for the suckler cow herds analysed

Item	*n*	Mean	Min	Max	s
Number of cows per ha of permanent grassland	8	0.48	0.21	1.20	0.30
Use of natural service (%)	7	91	60	100	15
Age at first insemination (months)	7	27	24	34	4
Age at first calving (days)	7	944	700	1290	215
Calving interval (days)	7	388	365	400	16
Number of calves born per 100 cows and year (calves)	8	88	67	108	13
Twinning rate (%)	8	0.6	0.0	3.0	1.1
Number of calves weaned per 100 cows and year (calves)	8	84	67	103	14
Age of calves at weaning (months)	7	7.5	4.0	11.0	2.3
Herd turnover rate (%)	7	14.9	14.6	15.0	0.2
Birth weight of calves – bulls (kg)	7	38	20	50	10
Birth weight of calves – heifers (kg)	7	33	20	45	8
Live weight of calves at age 120 days – bulls (kg)	7	168	120	190	28
Live weight of calves at age 120 days – heifers (kg)	7	148	120	160	16
Live weight of calves at age 210 days – bulls (kg)	7	289	230	320	36
Live weight of calves at age 210 days – heifers (kg)	7	233	205	280	28
Live weight gain of calves from birth to weaning – bulls (g/day)	7	1177	900	1400	146
Live weight gain of calves from birth to weaning – heifers (g/day)	7	925	700	1150	157

Source: own calculation

doi: 10.17221/263/2015-AGRICECON

istics, also recorded were the various cost items and support payments received. Clearly outlying values were excluded from further analyses.

Methods

Herd revenues included those from calf sales and support payments. In order to achieve comparable results, operating costs were structured following the study of Poláčková et al. (2010) and included the costs of feed (self-produced and purchased), labour, veterinary services, energy and fuels, depreciation of fixed assets, depreciation of animals, intracompany costs, and overheads. Other costs included purchased material and services. The value of manure as a secondary output of animal production was deducted from total costs.

As it was impossible to acquire the information about the depreciation rate for cows used in different herds, this was calculated as a fixed value for all operations on the basis of the weighted average of herd replacement rate and replacement heifer price, and using Czech national average data for 2013 on cow carcass weight and carcass price (State Agricultural Intervention Fund 2015a). The following model was used:

$$D_c = (R_c \times P_h) - (R_c \times CW \times P_{cwc}) \quad (1)$$

where:
D_c = depreciation of cows per year
R_c = herd replacement rate
P_h = purchase price for a replacement heifer
CW = carcass weight
P_{cwc} = price per kg of carcass weight (cows)

To analyse the relationship between production volume (number of cows) and costs, it was necessary to break out the total costs into variable and fixed costs. Variable costs usually vary with output (Kvapilík and Syrůček 2012) and in the current analysis they included self-produced and purchased feeds, veterinary services, depreciation of cows, and other costs (materials used). Fixed costs are independent of output and these included wages, depreciation of fixed assets, energy costs, overheads, and intracompany costs.

The profitability of suckler cow herds under the conditions of the CR was assessed using the following models calculating the profit per cow, calf, and 1 kg of calf live weight:

$$PR_{sc} = (WC_n \times WC_w \times WC_{sp}) + S_{sc} - (\Sigma TC_{sc} - FM_{sc}) \quad (2)$$

where:
PR_{sc} = the profit per suckler cow and year
WC_n = the number of weaned calves per cow and year
WC_w = the live weight of a calf sold
WC_{sp} = the selling price per kg of calf live weight
S_{sc} = the subsidies per suckler cow and year
TC_{sc} = the total cost per suckler cow and year
FM_{sc} = the price of manure per suckler cow and year

$$PR_{wc} = \frac{PR_{sc}}{WC_n} \quad (3)$$

where:
PR_{wc} = the profit per calf weaned and sold
PR_{sc} = the profit per suckler cow and year
WC_n = the number of weaned calves per cow and year

$$PR_{kg} = \frac{PR_{wc}}{WC_w} \quad (4)$$

where:
PR_{kg} = the profit per kg of calf live weight sold
PR_{wc} = the profit per calf weaned and sold
WC_w = the live weight per calf sold

The profitability expressed as a percentage was determined as follows:

$$P = \left(\frac{PR}{(\sum TC - FM)}\right) \times 100 \quad (5)$$

where:
P = the level of profitability as a percentage
PR = the profit per year
TC = total costs per year
FM = the price of manure per year.

The level of profitability was assessed using two different scenarios. The first scenario was based on the data obtained from the questionnaires whereas national average data (except for yearly costs) from the Czech Beef Cattle Performance Recording System were used in the second scenario (Kvapilík et al. 2014). The prices of weaned calves were obtained as the average prices for the various months of 2013 (Czech Statistical Office, 2014c). The subsidies used to calculate the profitability in Scenario 2 were based on the assumption of 1 cow per 1.5 ha of agricultural land in Less Favoured Areas (Ministry of Agriculture 2013; State Agricultural Intervention Fund 2015b; Czech Beef Breeders Association 2015). The subsidy rates used were 6069 CZK/ha (SAPS), 248 CZK/ha agricultural land (PVP), 191 CZK/LU (PVP; beef cows), 11,650 CZK/LU (article 68 payment; beef calves), and 2976 CZK/ha (Less Favoured Areas).

To assess the efficiency of the operation, a break-even point defined as the point at which costs and

doi: 10.17221/263/2015-AGRICECON

revenues are equal and the operation reaches zero profitability was determined (Střeleček and Kollar 2002). The break-even point was estimated for the number of calves weaned, selling price for 1 kg of calf's live weight, yearly costs after deducting the value of manure, and the level of yearly support payments.

Correlation and regression analyses were performed to determine the relationships among production and economic variables and to assess the change of the total costs when the input parameters were altered. This created the basis for a sensitivity analysis investigating the potential parameter and assumption changes in the model and their impacts on different target variables (Pannell 1997). It answers the question as to which of the input parameters has the greatest impact on the overall economic result. The impact of a 20% change of input parameters on the overall profitability, as described by Wolfová et al. (2004), was examined in this study using the graphic analysis.

In addition, the farmers' views of the various factors influencing the economic performance of their operations were investigated. Such an analysis contributes to identifying the possible obstacles to change and the potential difficulties encountered in the livestock management (Magne et al. 2012). Eleven dimensions were selected (breed, management strategy, natural and climatic conditions, nutrition, pasture, winter housing, reproductive performance, labour management, revenue from sales, subsidies, and input prices) in total and their importance was assessed using a 5-point scale (1 = little importance; 5 = considerable importance).

All calculations were made using the Microsoft Excel 2010.

RESULTS AND DISCUSSION

Total costs and their variability

The total costs in suckler cow herds were calculated as the unit costs per 1 cow, feeding day, and weaned calf (Table 2). In accordance with a number of studies (e.g. Skunmun et al. 2002; Crosson et al. 2006; Boudný and Janotová 2012), feed costs constituted the major component of variable costs and accounted for 27% of the yearly costs. The average feed cost per day was 21.8 CZK, with the self-produced feed (e.g. pasture) coming to 92% of that. The average feed cost per day determined for suckler cow herds in the CR reported in a previous study (Boudný and Janotová 2012) was 21.3 CZK and accounted for 31% of the total costs. An important cost item was also the depreciation of cows, consisting in the difference between the costs of heifers entering the herd and the price of the culled cows, which in this study amounted to 1332 CZK per cow/year. It had previously been calculated that increasing the productive period from 5 to 7 calvings would result in reducing the depreciation of cows by 685 CZK (Kvapilík and Zahrádková 2007). Major cost

Table 2. Variability of costs in the suckler cow herds analysed

Item	*n*	CZK/cow/year				CZK/feeding day				Percentage of total costs
		mean	median	s	v	mean	median	s	v	
Own feeds	20	7 323	7 895	1 633	0.54	20.06	21.63	4.47	0.54	24.82
Purchased feeds	20	626	496	547	4.61	1.71	1.36	1.50	4.61	2.12
Total feed costs	x	7 949	8 182	2 332	4.08	21.78	22.42	6.39	4.08	26.94
Labour costs	20	5 638	5 402	1 962	1.09	15.45	14.80	5.38	1.09	19.11
Veterinary services	20	467	433	195	2.52	1.28	1.19	0.54	2.52	1.58
Depreciation of fixed assets	20	1 369	772	1 755	16.83	3.75	2.12	4.81	16.83	4.64
Depreciation of animals	x	1 332	x	x	x	3.65	x	x	X	4.52
Energy and fuels	20	1 285	584	1 865	78.11	3.52	1.60	5.11	78.11	4.36
Overheads	20	3 410	2 407	3 126	7.45	9.34	6.59	8.56	7.45	11.56
Intra-company costs	20	4 136	4 328	2 695	10.20	11.33	11.86	7.38	10.20	14.02
Other costs	20	3 917	3 739	2 059	2.17	10.73	10.24	5.64	2.17	13.28
Total costs	x	29 502	26 637	6 579	0.44	80.83	72.98	18.02	0.44	100
Manure	20	2 814	2 021	2 359	3.86	7.71	5.54	6.46	3.86	x
Total costs reduced by manure value	x	26 689	24 615	7 995	1.04	73.12	67.44	21.90	1.04	x

Source: own calculation

doi: 10.17221/263/2015-AGRICECON

Table 3. Cost per 1 feeding day depending on the herd size (CZK)

Cost item	Costs in CZK per feeding day		
Number of cows in herd	< 50	50 to 100	> 100
Number of herds	6	6	8
Own feed	17.07	21.09	20.92
Purchased feed	1.50	1.07	2.09
Labour costs	18.17	17.77	13.32
Veterinary services	1.33	1.22	1.30
Depreciation of fixed assets	9.96	2.07	2.93
Depreciation of animals	3.65	3.65	3.65
Energy and fuels	9.45	2.75	1.04
Overheads	19.70	6.11	7.47
Intra-company costs	0.00	10.30	11.85
Other costs	16.43	9.34	9.28
Total variable costs	39.98	36.36	37.24
Total fixed costs	57.28	39.00	36.61
Total costs	97.26	75.37	73.85

Source: own calculation

items may differ among herds due to different natural and production conditions, breeds, nutrition, and production systems (Kvapilík and Zahrádková 2007). Considerably increased costs can result from the reduced pasture production, e.g. due to the climatic changes (Nääs et al. 2010). The total costs per 1 feeding day as determined in this study were by 11 CZK higher than those reported by Boudný and Janotová (2012) for 2010. The high variability of costs observed among suckler herds (Table 2) represents an opportunity for optimizing and reducing those costs. Measures leading to reduced costs should nevertheless be carried out with the aim to improve the overall efficiency of the operation, as the cost reduction alone is not always associated with the increased profitability.

The total costs were reduced with the increasing number of cows (Table 3), mainly due to the decreased fixed costs (wages, depreciation of fixed assets, energy costs, etc.). If a herd comprised less than 50 cows, fixed costs per cow and feeding day were 57.28 CZK and represented 59% of the total costs. In comparison, operations with more than 100 cows reported fixed costs 21 CZK lower, but variable costs were similar. That of course resulted in considerably reduced total costs. Larger operations usually have a higher proportion of variable costs in their total costs. The relationship between the fixed cost proportion and the production volume has been reported previously (Střeleček and Kollar 2002). To achieve a satisfactory income from a suckler cow herd, it is necessary to keep a sufficient number of cows (Gajos and Dymnicki 2012).

Model calculation of profitability (break-even analysis)

The 2013 results of the operations analysed revealed an average profit per cow of 573 CZK and the profitability of 2.15% (Table 4). The average overall yearly support payments obtained per 1 cow were 12 720 CZK. The major influence of support payments is evidenced by the fact that the regime without subsidies resulted in a loss of 12 147 CZK per cow and a negative profitability of –45.5%. In agreement with our findings, no beef production system analysed previously under the conditions of the CR, regardless of the marketing strategy pursued, was profitable without subsidies (Wolfová et al. 2004, 2006). Depending on the production system and the breed used, the profitability without subsidies has been shown to range between –20% and –40% (Wolfová et al. 2004). In the study by Gajos and Dymnicki (2012), direct payments contributed between 42% and 48% to the total revenue of the beef production systems in the population of Polish Red cows. Similarly, based on the results of a relevant cost analysis carried out in England, suckler cow systems were able to make a profit exceeding 100 GBP/head only with subsidy payments. The level of profitability was influenced by the intensity of the beef systems and the production area (lowland vs. Less Favoured Area) (Jones 2007).

When comparing the results with model calculations (Scenario 2 based on the Czech national average data), a higher level of profitability was shown due to the increased support payments, even though the revenues

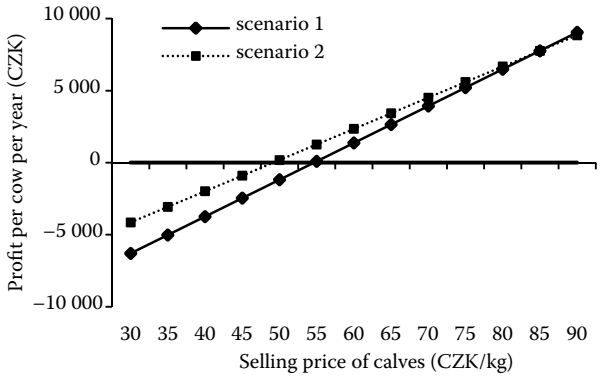

Figure 1. Profit or loss depending on the sale price of calves

Source:: own calculation

doi: 10.17221/263/2015-AGRICECON

Table 4. Model calculation of the suckler herd profitability

Items	Scenario 1 (monitoring data)	Scenario 2 (national data)
Number of calves born per 100 cows and year	87.58	80.00
Number of calves weaned per 100 cows and year	83.83	76.53
Average weight of calves sold (kg/head)	305	283
Average price for calf sold (CZK/kg live weight)	56.88	54.85
Revenues from sale of calves per suckler cow (CZK)	14 542	11 879
Revenues from sale of calves per weaned calf (CZK)	17 347	15 522
Revenues from sale of calves per kg of calf live weight (CZK)	56.88	54.85
Annual amount of subsidies per suckler cow (CZK)	12 720	16 042
Annual amount of subsidies per weaned calf (CZK)	15 174	20 962
Annual amount of subsidies per kg of calf live weight (CZK)	49.75	74.07
Total annual costs after reduction on suckler cow (CZK)	26 689	26 689
Profit including subsidies per suckler cow (CZK)	573	1 232
Profit including subsidies per weaned calf (CZK)	684	1 610
Profit including subsidies per kg of calf live weight (CZK)	2.24	5.69
Profitability including subsidies (%)	2.15	4.62
Profit without subsidies per suckler cow (CZK)	–12 147	–14 810
Profit without subsidies per weaned calf (CZK)	–14 490	–19 352
Profit without subsidies per kg of calf live weight (CZK)	–47.51	–68.38
Profitability without subsidies (%)	–45.51	–55.49
Break-even number of calves weaned per 100 cows and year (calves)	80.52	68.59
Break-even price for calf sold (CZK/live weight)	54.63	49.16
Break-even total costs after reduction per cow and year (CZK)	27 262	27 921
Break-even total costs after reduction per weaned calf (CZK)	32 521	36 484
Break-even total costs after reduction per kg of calf live weight (CZK)	106.63	128.92
Break-even amount of subsidies per cow and year (CZK)	12 147	14 810

Source: own calculation

Table 5. Model-based profit per 1 suckler cow and year depending on the price and number of calves weaned

Scenario	Calves sold per 100 cows	Selling price (CZK/kg live weight)					
		40	45	50	55	60	65
1 (monitoring data)	70	–5 428	–4 361	–3 293	–2 226	–1 158	–91
	75	–4 818	–3 675	–2 531	–1 387	–243	900
	80	–4 208	–2 988	–1 768	–548	672	1 892
	85	–3 598	–2 302	–1 006	290	1 587	2 883
	90	–2 988	–1 616	–243	1 129	2 502	3 874
	95	–2 378	–930	519	1 968	3 417	4 865
	100	–1 768	–243	1 282	2 807	4 332	5 857
2 (national data)	70	–2 723	–1 732	–742	249	1 239	2 230
	75	–2 157	–1 096	–34	1 027	2 088	3 149
	80	–1 591	–459	673	1 805	2 937	4 069
	85	–1 025	178	1 381	2 583	3 786	4 989
	90	–459	815	2 088	3 362	4 635	5 909
	95	107	1 451	2 796	4 140	5 484	6 828
	100	673	2 088	3 503	4 918	6 333	7 748

Source: own calculation

doi: 10.17221/263/2015-AGRICECON

from calves sold were lower. A comparison of the two scenarios at different prices for calves is shown in Figure 1. A higher profitability due to higher support payments in spite of lower revenues is evident for the Scenario 2 up to the price of 84.9 CZK/kg for calves sold. When this price is higher, the revenues from calf sales are increased and the Scenario 1 becomes more profitable due to a larger number of heavier calves sold at a higher price. Zero profitability would be reached even in the case of deteriorating production indicators, a lower selling price for calves, increased costs, or reduced support payments (Table 4). Under the model conditions, the profitability of a suckler cow herd is achieved when at least 81 calves per 100 cows are sold yearly or when the average selling price for calves is higher than 54.6 CZK/kg live weight. Based on the results of the break-even analysis, the margin for increased costs to reach zero profitability is rather limited (2%). The calculated parameters for the break-even point can be considered as minimum requirements for farmers. To reach the break-even point without subsidies, the revenues (prices of calves sold) would need to increase by 31% (Wolfová et al. 2006). Model situations (Table 5) show that the increased price and number of weaned calves result in the increased profitability per 1 cow. Especially in the Scenario 2, due to higher prices, profit is generated even though the number of weaned calves is lower.

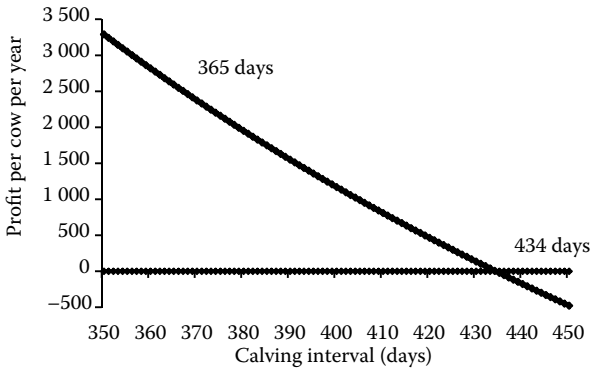

Figure 2. Calving interval and profitability

Source: own calculation

Relationships between production and economic indicators

Based on the correlation and regression analyses, a more intensive use of pasture through an increased number of cows per hectare of grassland resulted in

Table 6. Sensitivity analysis of the suckler cows herds

Indicator	Change (%)	CZK per cow and year				
		revenues	subsidies	costs	total profit	
					value	change
Price of calves	+20	17 450	12 720	26 689	3 482	+2 908
	–20	11 633	12 720	26 689	–2 335	–2 908
Number of calves weaned	+20	17 450	12 720	26 754	3 417	+2843
	–20	11 633	12 720	26 624	–2 270	–2 843
Loss of calves	+20	14 412	12 720	26 686	446	–127
	–20	14 672	12 720	26 692	701	+127
Calving interval	+20	12 118	12 720	26 638	–1 799	–2 373
	–20	18 177	12 720	26 765	4 132	+3 559
Herd turnover	+20	14 542	12 720	26 955	307	–266
	–20	14 542	12 720	26 422	840	+266
Subsidies	+20	14 542	15 264	26 689	3 118	+2 544
	–20	14 542	10 176	26 689	–1 971	–2 544
Feed costs (prices)	+20	14 542	12 720	28 278	–1 016	–1 590
	–20	14 542	12 720	25 099	2 163	+1 590
Labour costs	+20	14 542	12 720	27 816	–554	–1 128
	–20	14 542	12 720	25 561	1 701	+1 128
Overheads	+20	14 542	12 720	27 371	–108	–682
	–20	14 542	12 720	26 007	1 255	+682

Source: own calculation

doi: 10.17221/263/2015-AGRICECON

reducing costs by as much as 3000 CZK per 1 cow and year and in an increased profit per year. Depending on the production conditions, the optimal animal load per hectare of agricultural land as reported by to their low absolute values.

Subjective evaluation of factors by farmers

Based on the farmers' opinions, the prosperity of their farms mostly depends on the breed kept (4.5 points on the 1–5 scale), which is in agreement with the findings of Šafus et al. (2006). The nutrition (including pasture quality) and management strategy (4.0 points) as well the reproduction indicators (3.6 points) also were seen to be quite important factors. As demonstrated by Louda and Stádník (2000), these factors are in fact correlated with one another and significantly affect the overall efficiency of the herd management. By contrast, the herd efficiency is less influenced by the natural and climatic conditions (3.0 points). A breed is usually chosen by the farmer with respect to the specific conditions of the farm location, and, therefore, as corroborated by the findings of Ježková et al. (1999), such conditions may be considered as less significant. Similarly, the technical management of the herd (with regard to feeding, reproduction, and animal health) was identified by the French beef cattle farmers as a priority to ensure the survival of their farms. The mastery of such management is fundamental for farmers, as it influences the progress of the production process (Magne et al. 2012).

CONCLUSIONS

The results of the analysis of production and economic data obtained from the suckler cow herds in the CR indicate a low profitability (2.15%) and underscore the importance of support payments. Revenues from the sales of weaned calves as well as culled cows alone are insufficient to achieve the long-term profitability. The total costs per 1 feeding day and cow came to 80.83 CZK, with feed costs (both self-produced and purchased) accounting for 27%. The total costs were reduced with the increasing cow numbers due to the decreased fixed costs. The break-even points were reached at 81 calves weaned and sold per 100 cows and at the selling price of 54.6 CZK per kg of the calf's live weight. Higher values will result in a profit of the cow-calf operation. Relationships were confirmed between the production and economic indicators. Based on the results of the sensitivity analysis, the selling price for calves was identified as the factor with the greatest impact on profitability. A 20% increase in price will result in a by 2908 CZK higher profit. It is difficult for farmers to influence selling prices, however, and they should, therefore, focus on improving the reproduction characteristics because the calving interval is also closely related to the overall economic efficiency. A higher number of weaned and sold calves increases revenues in order to cover the total costs and generate profit for the operation.

REFERENCES

Åby B.A., Aass L., Sehested E., Vangen O. (2012a): A bio-economic model for calculating economic values of traits for intensive and extensive beef cattle breeds. Livestock Science, 143: 259–269.

Åby B.A., Aass L., Sehested E., Vangen O. (2012b): Effects of changes in external production conditions on economic values of traits in Continental and British beef cattle breeds. Livestock Science, 150: 80–93.

Belasco E.J., Schroeder T.C., Goodwin B.K. (2010): Quality risk and profitability in cattle production: A multivariate approach. Journal of Agricultural and Resource Economics, 35: 385–405.

Boudný J., Janotová B. (2012): Ekonomika chovu masného skotu v letech 2008–2010. Náš chov, 72: 36–39.

Crosson P., O'Kiely P., O'Mara F.P., Wallace M. (2006): The development of a mathematical model to investigate Irish beef production systems. Agricultural Systems, 89: 349–370.

Czech Beef Breeders Association (2015): Porovnání sazeb LFA v minulém a novém programovacím období. Available at http://www.cschms.cz/DOC_HOMEPAGE/242_Sazby_LFA.pdf (accessed Jan, 2015).

Czech Statistical Office (2014a): Souhrnný zemědělský účet. Available at https://www.czso.cz/csu/czso/zem_ts (accessed Dec, 2014).

Czech Statistical Office (2014b): Livestock Survey. Available at https://www.czso.cz/csu/czso/livestock-survey-142014-6b429pw4mq (accessed Dec, 2014).

Czech Statistical Office (2014c): Indexy cen zemědělských výrobců. Available at https://www.czso.cz/csu/czso/indexy-cen-zemedelskych-vyrobcu-prosinec-2013-ntsq3b-cr5o (accessed Dec,2014).

Doucha T., Foltýn I., Humpál J. (2012): Profitability of dairy and suckler cows breeding on Czech farms. Agricultural Economics – Czech, 58: 397–408.

doi: 10.17221/263/2015-AGRICECON

Eurostat (2014): Number of cattle. Available at http://ec.europa.eu/eurostat/web/products-datasets/-/tag00016 (accessed Dec, 2014).

FAOSTAT (2014): Agricultural area. Available at http://faostat3.fao.org/browse/E/EL/E (accessed Dec, 2014).

Gajos E., Dymnicki E. (2012): Beef production based on a suckling system as an alternative to milk production at the example of Polish Red cattle. Animal Science Papers and Reports, 30: 353–361.

Ježková A., Louda F., Dvořák P., Stádník, L. (1999): Chov krav bez tržní produkce mléka v rozdílných výrobních podmínkách. Agricultural Economics – Czech, 45: 555–562.

Jones J.V.H. (2007): The use of relevant cost analysis to assess production viability following the decoupling of support payments in England. International Farm Management Association. Available at http://ifmaonline.org/wp-content/uploads/2014/07/07Jones.pdf (accessed Jan, 2015).

Kvapilík J., Pytloun J., Zahrádková R., Malát K. (2006): Chov krav bez tržní produkce mléka. Institute of Animal Science, Prague.

Kvapilík J., Růžička Z., Bucek P. (2014): Ročenka 2013, Chov skotu v České republice. Available at http://www.cmsch.cz/store/skot-rocenka-2013-na-web.pdf (accessed Sept, 2015).

Kvapilík J., Syrůček J. (2012): Kalkulace příspěvku na úhradu a úplných nákladů. Náš chov, 72: 22–26.

Kvapilík J., Zahrádková R. (2007): Vybrané ukazatele chovu krav bez tržní produkce mléka. Náš chov, 67 (Masný skot speciál): 23–27.

Louda F., Stádník L. (2000): Vliv rozdílné úrovně výživy na hormonální a ovulační aktivitu u přežvýkavců. Czech Journal of Animal Science, 45: 553–556.

Magne M.A., Cerf M., Ingrand S. (2012): Understanding beef-cattle farming management strategies by identifying motivations behind farmers' priorities. Animal, 6: 971–979.

Ministry of Agriculture (2013): Ministr Miroslav Toman podepsal sazby přímých plateb pro rok 2013. Available at http://eagri.cz/public/web/mze/tiskovy-servis/tiskove-zpravy/x2013_ministr-miroslav-toman-podepsal-sazby.html (accessed Jan, 2015).

Ministry of Agriculture (2014): Struktura dotačních zdrojů. Available at http://eagri.cz/public/web/mze/dotace/ (accessed Jan, 2015).

Nääs I.D., Romanini C.E.B., Salgado D.D., Lima K.A.O., do Vale M.M, Labigalini M.R., de Souza S.R.L., Menezes A.G., de Moura D.J. (2010): Impact of global warming on beef cattle production cost in Brazil. Scientia Agricola, 67: 1–8.

Pannell D.J. (1997): Sensitivity analysis of normative economic models: Theoretical framework and practical strategies. Agricultural Economics, 16: 139–152.

Poláčková J., Boudný J., Janotová B., Novák J. (2010): Metodika kalkulací nákladů a výnosů v zemědělství. Institute of Agricultural Economics and Information, Prague.

Šafus P., Přibyl J., Veselá Z., Vostrý L., Štípková M., Stádník L. (2006): Selection indexes for bulls of beef cattle. Czech Journal of Animal Science, 51: 285–298.

Skunmun P., Chantalakhana C., Pungchai R., Poondusit T., Pruesasri P. (2002): Comparative feeding of male dairy, beef cattle and swamp buffalo I. Economics of beef production. Asian-Australasian Journal of Animal Sciences, 15: 878–883.

State Agricultural Intervention Fund (2015a): Zpráva o trhu s hovězího a vepřového masa. Available at http://www.szif.cz/cs/zpravy-o-trhu?year=2014&cdr=03&ino=0 (accessed Jan, 2015).

State Agricultural Intervention Fund (2015b): Sazby přechodných vnitrostátních podpor 2013. Available at http://www.szif.cz/cs/CmDocument?rid=%2Fapa_anon%2Fcs%2Fzpravy%2Fsaps%2Fjz%2F1398339769987.pdf (accessed Jan, 2015).

Střeleček F., Kollar P. (2002): Searching the proportional level of operating costs – specification of the minimum volume of production. Agricultural Economics – Czech, 48: 106–116.

Topcu Y., Uzundumlu A. S. (2009): Analysis of factors affecting on live weight gain cost in cattle fattening farms: The case of Erzurum Province. Journal of Animal and Veterinary Advances, 8: 1169–1172.

Wolfová M., Přibyl J., Wolf J., Zahrádková R. (2006): Effect of subsidy regimes on economic values of functional traits in beef cattle breeding. Journal of Animal Breeding and Genetics, 123: 97–104.

Wolfová M., Wolf J., Zahrádková R., Přibyl J., Dano J., Kica J. (2004): Main sources of the economic efficiency of beef cattle production systems. Czech Journal of Animal Science, 49: 357–372.

Wolfová M., Wolf J., Zahrádková R., Přibyl J., Dano J., Krupa E., Kica J. (2005): Breeding objectives for beef cattle used in different production systems: 2. Model application to production systems with the Charolais breed. Livestock Production Science, 95: 217–230.

Zhao H. A., Du X. D., Hennessy D. A. (2011): Pass-through in United States beef cattle prices: A test of Ricardian rent theory. Empirical Economics, 40: 497–508.

Received on September 21, 2015
Accepted on April 15, 2016
Published online on December 5, 2016