ASSESSMENT OF PROFITABILITY AND BREAK-EVEN POINTS IN SUCKLER COW HERDS

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Abstract

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Suckler cow enterprises comprise an important segment of Czech agriculture, and the number of suckler cows has been steadily increasing in recent years. The objective of this study was to assess the profitability of suckler cow herds in the Czech Republic based upon data collected for 2014, 2015, and 2016 using a questionnaire covering production, reproduction, and economic traits. The average yearly costs reached 30,583 CZK per cow. When subsidies in the average amount of 14,347 CZK per cow were included, profitability of 8.3, 8.7, and 6.3 % was observed in 2014, 2015, and 2016, respectively. Feed, labour, depreciation, and overheads were the largest cost items and together comprised 66 % of total yearly costs. The data obtained proved the economy of scale. Average break-even points were determined for the number of weaned calves, calving interval, and selling price of calves (75 calves, 465 days, and 56 CZK/kg live weight, respectively). A sensitivity analysis identified the number of weaned calves, price of calves, calving interval, and amount of subsidies as the most influential parameters.

Keywords: break-even point, costs, economies of scale, profitability, sensitivity analysis, subsidies, suckler cows

INTRODUCTION

As in most other European Union (EU) countries, cattle production is one of the most important segments of livestock production in the Czech Republic (CR). As reported in the Economic Accounts for Agriculture, the contribution of cattle and milk to the total revenues from animal production at current prices amounts to 63 % (Czech Statistical Office, 2017a). Suckler cows represent an important percentage of Czech cattle herds, comprising 37 % of the total cow population in 2016 (Czech Statistical Office, 2017a). In 2016, there were in total 12.1 million suckler cows in EU-28 countries, and this number has not changed markedly in the last 10 years (Eurostat, 2017). In the CR, however, the suckler cow population has recently been increasing considerably despite declining bovine meat production and low per capita beef consumption. Over the past decade (2007 to 2017), suckler cow numbers have increased by 62,000 head (40 %), and the population as of 1 April 2017 was 216,095 head (Czech Statistical Office, 2017a).

Sustainability and future development of suckler cow herds are dependent upon, among other factors, achieving a reasonable level of profitability. Cow-calf production systems are influenced by a number of extrinsic and intrinsic factors that are reflected to various extents in their overall economic success. The effects of these factors are not isolated but interact with each other. It has been shown that a negative impact of a single such factor cannot necessarily be offset fully by above-average results achieved as measured by the others (Kvapilík *et al.*, 2006). As reported

in many studies, the production of weaned calves on permanent grasslands is the main objective of suckler cow operations; therefore, economically successful herd management is closely associated with fertility of the cows (e.g., Wolfová *et al.*, 2005; Kvapilík and Zahrádková, 2007). It is reported that a prerequisite for herd profitability is to have average number of weaned calves per 100 cows in excess of 90 (Sacher and Diener, 2004; Kvapilík *et al.*, 2006). Relatively low labour and investment costs are typical for this type of operation (Michaličková *et al.*, 2016), and it is noteworthy that suckler cows play a role in providing employment opportunities in some less favoured areas (Boudný and Janotová, 2012).

Various payment supports are an important source of income for suckler cow operations. Most studies on the subject agree that suckler cow herds are unprofitable and unsustainable over the long term without subsidies (Wolfová *et al.*, 2004; Jones, 2007). Subsidies are paid to farmers with the intention of meeting in part the costs ensuing from the non-productive functions provided by cattle herds and which are not adequately covered by the market sale of products (Kvapilík and Zahrádková, 2007). In addition to direct payments, beef cattle breeders farming in least favoured areas are entitled to the payments that compensate for significantly higher production costs and prevent farmers from leaving the areas of natural restrictions (Lososová *et al.*, 2016).

A number of other factors also influence the profitability of suckler cow herds, including breed (Davies *et al.*, 2009), nutrition (Nayigihugu *et al.*, 2007), herd replacement rate (Berger, 2014), price of weaned calves (Wolfová *et al.*, 2004), and health problems (Taylor *et al.*, 2012).

The objectives of this study were to evaluate the profitability of suckler cow herds in the CR during the period 2014–2016, assess the impact of subsidies, and determine the economic efficiency using break-even points and sensitivity analyses.

MATERIALS AND METHODS

Data

Input data were collected from cow–calf farms located in every regions of the CR. The data were obtained for 2014, 2015, and 2016 using a questionnaire containing 95 questions structured in seven parts: basic information, reproduction characteristics, weights and weight gains, herd turnover, revenue and subsidies, yearly costs, and farmers' views on various factors influencing the economic performance of their suckler cow herds. Totals of 20, 22, and 19 farms of different size responded to the questionnaire in 2014, 2015, and 2016, respectively. Fifteen of these provided data in all three years. In 2014, 2015, and 2016, average data were obtained in relation to 2,527, 2,734, and 2,517 suckler cows, respectively. Different production

I: *Basic indicators for suckler cow herds analysed.*

Item	Unit	2014 Mean ± SD	2015 Mean ± SD	2016 Mean ± SD
Average number of cows in herd	n	126 ± 92	124 ± 92	132 ± 97
Number of cows per ha of permanent grassland	n	0.3 ± 0.1	0.4 ± 0.1	0.5 ± 0.2
Number of cows per worker	n	35 ± 19	40 ± 16	46 ± 11
Use of natural service	%	87 ± 13	79 ± 18	80 ± 8
Age at first calving	days	936 ± 135	924 ± 134	915 ± 126
Calving interval	days	412 ± 37	401 ± 27	399 ± 48
Number of calves born per 100 cows and year	n	89 ± 11.3	92 ± 6.2	93 ± 9.4
Twinning rate	%	0.26 ± 0.43	0.77 ± 2.25	1.50 ± 1.89
Loss of calves	%	5.5 ± 5.1	4.9 ± 5.2	2.4 ± 0.7
Number of calves weaned per 100 cows and year	n	84 ± 13.5	87 ± 7.1	91 ± 11.1
Age of calves at weaning	months	7.6 ± 1.0	8.3 ± 1.2	8.0 ± 1.1
Herd turnover rate	%	15.1 ± 5.2	13.5 ± 5.2	13.2 ± 5.5
Birth weight of calves – bulls	kg	42 ± 3	42 ± 3	41 ± 4
Birth weight of calves – heifers	kg	36 ± 3	38 ± 4	37 ± 3
Live weight of calves at age 120 days – bulls	kg	179 ± 14	190 ± 26	184 ± 22
Live weight of calves at age 120 days – heifers	kg	150 ± 21	167 ± 31	170 ± 13
Live weight of calves at age 210 days – bulls	kg	294 ± 15	311 ± 37	304 ± 27
Live weight of calves at age 210 days – heifers	kg	234 ± 28	267 ± 43	268 ± 30

SD = standard deviation.

and reproduction traits were observed and their average values in respective years are given in Tab. I. In addition, also recorded were various cost items, revenues, and support payments received. Clear outlying values were excluded from further analyses.

Methods

Herd revenues included those from calf sales and support payments. The income realized on calf sales was based on the live weight of a calf sold and the selling price per kilogram of calf live weight. Support for suckler cows at the time of data analysis included mainly the following payments (Ministry of Agriculture, 2017):

- Single area payment scheme (SAPS) and greening – direct payments;
- Voluntary coupled support (VCS) targeted to specific sectors – beef calves (earlier specific support under Article 68 of Council Regulation (EC) No 73/2009);
- Transitional national subsidies (PVP) – for agricultural land and beef cattle;
- Payments for less favoured areas; and
- Payments from rural development programmes relating to agri-environment, climate, and organic farming.

In 2015 and 2016, due to changes in the EU Common Agricultural Policy, the payment for greening was added whereas the SAPS rate per hectare was reduced (SAPS rates were 5,997, 3,544, and 3,515 CZK/ha in 2014, 215, and 2016, respectively).

In order to achieve comparable results, total costs were structured following the study of Poláčková *et al.* (2010) and broken out into variable and fixed costs in accordance with Kvapilík and Syrůček (2012). In the present study, variable costs included the costs of feed (self-produced and purchased), veterinary services, depreciation of cows, and intracompany costs. Fixed costs included wages, depreciation of fixed assets, energy costs, overheads, and other costs. Other costs involved purchased material and services, including insurance. The value of manure as a secondary output of animal production was deducted from total costs.

In addition, the participating farms were allocated into three groups according to the size of the herd ($<$ 50, 50 to 100, $>$ 100 cows) in order to evaluate economies of scale.

As it was impossible to acquire 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 averages of the herd replacement rate, replacement heifer price, cow carcass weight, and price. The following model from Syrůček and Kvapilík (2015) was used:

$$DC = (Rc \times Ph) - Rc \times CW \times Pcwc, \qquad (1)$$

where Dc is depreciation of cows per year, Rc is herd replacement rate, Ph is purchase price for a replacement heifer, CW is carcass weight, and Pcwc is price per kg of carcass weight (cows).

The profitability of suckler cow herds under the conditions of the CR was assessed using the following model calculating the profit per cow:

$$PRsc = (WCn \times WCw \times WCsp) + Ssc - (\Sigma TCsc - FMsc) \qquad (2)$$

where PRsc is the profit per suckler cow and year, WCn is the number of calves weaned and sold per cow and year, WCw is the live weight of a calf sold, WCsp is the selling price per kg of calf live weight, Ssc is the subsidies per suckler cow and year, TCsc is the total cost per suckler cow and year, and FMsc is the value of manure per suckler cow and year.

The costs and profit were also determined per day on feed and per calf weaned.

Profitability is generally defined as the ratio of revenue to resources consumed. In this study, return on costs (ROC) was calculated as the quotient of the total profit divided by total costs:

$$ROC = \frac{PRsc}{\Sigma TCsc - FMsc)} \times 100 \qquad (3)$$

To assess the efficiency of the operation, a break-even point was defined and determined as the point at which costs and revenues are equal and the operation reaches zero profitability (Střeleček and Kollar, 2002). Following the methodology by Syrůček *et al.* (2017a), break-even points were estimated for the number of calves weaned, calving interval, selling price for 1 kg of calf's live weight, yearly feed costs, yearly total costs, and the level of yearly support payments. The break-even point indicates a minimum requirement for maintaining sustainability of the operation. Therefore, this also was calculated for the levels of annual profitability (ROC) at 5 and 10%, which can be considered as optimum.

Also investigated was the question as to which of the input parameters had the greatest impact on the overall economic result. For this purpose, a sensitivity analysis as described by Syrůček *et al.* (2017a) was undertaken to examine potential changes in the model and their impacts on the different target variables. The impact of a 20% change in input parameters was examined, similarly as reported by Wolfová *et al.* (2004). The analysed parameters included price of calves, number of calves weaned, loss of calves, calving interval, herd turnover, subsidies, feed costs, labour costs, and overheads.

Where appropriate, the following currency exchange rates were used: 1 EUR = 27 CZK, 1 USD = 25 CZK. All calculations were made using Microsoft Excel 2016.

RESULTS AND DISCUSSION

Total costs and their variability

Compared to other cattle operations, such as feedlot or dairy operations, suckler herds are characterized by less use of conserved forage and lower concentrates requirements, lower labour consumption, and less-demanding housing facility requirements (Kvapilík *et al.*, 2006). Total yearly costs per cow have been estimated to be 40% lower in suckler herds compared to dairy operations (Kvapilík, 2016). In this study, total yearly costs per cow were 30,200, 30,525 and 31,024 CZK in 2014, 2015, and 2016, respectively (Tab. II), and were similar to those reported by Syrůček *et al.* (2017b). The total costs were on average 19% higher than in Slovakia, for which data had been collected from 29 operations for the years 2008–2012 (Michaličková *et al.*, 2015). The difference is mainly due to lower labour costs in Slovakia. In contrast, total yearly costs in Bavaria were markedly higher due to higher inputs and amounted to 48,000 CZK per cow in 2013 (Jahresbericht 2013, 2014).

Total yearly costs determined per weaned calf ranged between 34,000 and 36,000 CZK in the present study. Due to a higher number of weaned calves in that year, they were lowest in 2016 in spite of the fact that the costs per cow were highest in that year. Total costs per feeding day ranged between 82.3 and 84.8 CZK. They were similar to those based on the results of 39 suckler herds from the CR in 2014 and 2015 (82.9 and 82.4 CZK per feeding day) (Peterková *et al.*, 2017) and to those reported by the Institute of Agricultural Economics and Information (IAEI) in the CR, which came to 86.0 CZK per feeding day in 2015 (ÚZEI, 2017). Total costs per feeding day lower by 12 CZK had

been determined earlier for the period 2008–2010 (Boudný a Janotová, 2012). That difference probably is due to annual inflation of 2% in the period 2008–2016 (Czech Statistical Office, 2017b). The total costs observed in this study were reduced by 8% to reflect the value of manure produced and averaged 28,088 CZK per cow and year.

In terms of cost structure, feed costs constituted the major cost item in every year. That is in agreement with multiple previous studies (e.g., Skunmun *et al.*, 2002; Crosson *et al.*, 2006). In this study, the feed costs accounted for 24% of the total costs, which proportion is similar to that reported by IAEI using data from the CR (ÚZEI, 2017) but lower than the 32% calculated by Michaličková *et al.* (2016) for suckler herds in Slovakia. The average depreciation of animals was determined in this study to be 2,262 CZK per year, which is approximately 200 CZK higher than the result obtained on the basis of a model calculation using the herd turnover rate of 15% (Syrůček and Kvapilík, 2015). The sum of feed costs, wages, depreciation, and overheads accounted for 63–69% of total costs in the present study, which is somewhat lower than the 77% calculated in the report by IAEI (ÚZEI, 2017). Whereas a relatively low fluctuation of different cost items was observed among years, different suckler operations did vary considerably in the rate of fixed assets depreciation, overheads, and other costs, possibly due to the different methods of cost accounting used.

Economies of scale

The results given in Tab. III indicate that increasing herd size is associated with reduced costs per feeding day. A more detailed analysis indicated that total costs were reduced mainly

II: *Variability of costs in suckler cow herds.*

Cost item	in CZK per cow and year			in CZK per feeding day		
	2014	2015	2016	2014	2015	2016
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Own feeds	6,584 ± 1,622	6,868 ± 3,579	7,048 ± 1,174	18.0 ± 4.4	18.8 ± 9.9	19.3 ± 3.2
Purchased feeds	587 ± 600	641 ± 664	585 ± 547	1.6 ± 1.7	1.8 ± 1.8	1.6 ± 1.5
Total feed costs	7,171 ± 2,408	7,510 ± 4,085	7,633 ± 4,291	19.6 ± 6.6	20.6 ± 11.2	20.9 ± 3.2
Labour costs	4,664 ± 2,553	5,111 ± 2,739	5,327 ± 2,839	12.8 ± 7.0	14 ± 7.1	14.6 ± 7.8
Veterinary services	526 ± 397	455 ± 370	477 ± 442	1.4 ± 1.1	1.2 ± 1.0	1.3 ± 1.2
Depreciation of fixed assets	1,551 ± 2,229	1,981 ± 2,607	2,611 ± 3,686	4.2 ± 5.0	5.4 ± 7.2	7.1 ± 10.3
Depreciation of animals	2,311	2,382	2,092	6.3	6.5	5.7
Energy and fuels	1,447 ± 2,461	1,219 ± 1,586	1,280 ± 1,894	4.0 ± 6.7	3.3 ± 3.9	3.5 ± 5.2
Overheads	3,311 ± 4,445	3,967 ± 2,008	2,840 ± 3,056	9.1 ± 12.2	10.9 ± 5.4	7.8 ± 8.4
Intra-company costs	3,921 ± 2,688	3,888 ± 4,075	4,151 ± 3,864	10.7 ± 7.4	10.7 ± 11.2	11.3 ± 9.4
Other costs	5,299 ± 3,730	4,013 ± 3,650	4,614 ± 3,481	14.5 ± 7.5	11 ± 10.2	12.6 ± 9.5
Total costs	30,200	30,525	31,024	82.7	83.6	84.8
Manure value	2,813 ± 2,212	2,216 ± 396	2,458 ± 469	7.7 ± 6.1	6.1 ± 1.1	6.7 ± 1.3
Total costs reduced by manure	27,388	28,309	28,567	75.0	77.6	78.1

SD = standard deviation.

due to decreasing fixed costs, and especially labour costs, overheads, and depreciation of fixed assets. In agreement with the study by Střeleček and Kollar (2002), it was determined that especially labour costs as the main item of fixed costs were reduced with increasing herd size. Similarly, the highest labour productivity was identified in large-sized farms in a study based on the accounting data of 926 Czech farms (Novotná and Volek, 2016). Increasing suckler herd size might therefore be of importance for achieving sufficient income and profitability (Gajos and Dymnicki, 2012). Productivity can be improved by greater scale. Moreover, an increase in farm size may also be associated with new opportunities to capitalize on new techniques, technologies, and practises that can also improve productivity (Veysset *et al.*, 2015).

Calculation of profitability

Although the highest average price per 1 kg live weight of calf sold was recorded in 2015, the revenues from calf sales per cow were highest in 2016 (Tab. IV). That was due mainly to higher numbers of calves born, weaned, and sold per 100 cows in that year. When subsidies were excluded from the calculation, profitability was negative in the range of −42 to −46 %. Negative profitability

III: *Average costs per feeding day during 2014–2016, by herd size.*

Cost item	Costs in CZK per feeding day		
Number of cows in herd	< 50	50 to 100	> 100
Number of herds	17	16	28
Own feed	18.24	17.74	19.47
Purchased feed	1.56	1.84	1.66
Total feed costs	19.80	19.58	21.13
Labour costs	15.51	13.78	12.94
Veterinary services	1.51	1.69	0.93
Depreciation of fixed assets	7.79	5.98	3.81
Depreciation of animals	6.21	6.21	6.21
Energy and fuels	5.58	4.33	1.93
Overheads	10.15	9.50	8.79
Intra-company costs	11.57	10.91	10.40
Other costs	14.95	13.06	11.11
Total variable costs	39.10	38.39	38.67
Total fixed costs	54.00	46.66	38.57
Total costs	93.10	85.05	77.24

IV: *Calculation of suckler herd profitability*

Items	Unit	2014	2015	2016
Average weight of calf sold	kg	273	280	282
Average price for calf sold per kg of live weight	CZK	64.78	66.51	64.96
Revenue from sale of calf	CZK	17,664	18,651	18,332
Revenues from sale of calves per suckler cow	CZK	14,829	16,279	16,627
Total annual costs after reduction	CZK	27,388	28,309	28,567
Profit without subsidies per suckler cow	CZK	−12,558	−12,030	−11,940
Profit without subsidies per feeding day	CZK	−34.41	−32.96	−32.62
Profit without subsidies per weaned calf	CZK	−14,958	−13,783	−13,164
Profitability (ROC) without subsidies	%	−45.85	−42.49	−41.80
Annual amount of subsidies per suckler cow	CZK	14,826	14,483	13,732
Profit including subsidies per suckler cow	CZK	2,268	2,453	1,792
Profit including subsidies per feeding day	CZK	6.21	6.72	4.90
Profit including subsidies per weaned calf	CZK	2,702	2,811	1,976
Profitability (ROC) including subsidies	%	8.28	8.67	6.27

ROC = return on costs.

values determined in suckler cow herds without subsidies under the conditions of the CR had been reported in previous studies as –29% (Wolfová *et al.*, 2004), –23% (Wolfová *et al.*, 2006), –54% (Boudný and Janotová, 2012), and –46% (Syrůček *et al.*, 2017b). Similarly, a loss of –42% had been determined for cow–calf operations in Slovakia (Michaličková *et al.*, 2015).

In the present study, subsidies contributed 47% to the total revenue of suckler herds, whereas a higher proportion of 62% had been reported by Boudný and Janotová (2012) in a model calculation with all

eligible subsidies included. In agreement with our results, Gajos and Dymnicki (2012) had estimated the proportion of support payments in the total revenue of beef production systems in Poland to be between 44 and 48%, whereas a somewhat lower contribution of subsidies (32%) was determined in Slovakia (Michaličková *et al.*, 2015).

Profit of 6,210 CZK per cow per year while including yearly subsidies of 12,447 CZK per suckler cow was achieved in Germany in 2012 (Münchhausen, 2014). In the present study, the average profits including subsidies were 2,702, 2,811, and 1,976 CZK per

V: *Break-even analysis.*

Item	Unit	2014		2015		2016	
		Break-even point	Difference [1]	Break-even point	Difference [1]	Break-even point	Difference [1]
Weaned calves	**n/100 cows**	71	–13	74	–13	81	–10
Calving interval	**days**	485	+73	468	+68	440	+42
Price for calf sold	**CZK/ kg live weight**	54.88	–9.9	56.49	–10.02	57.96	–7.00
Feed costs	**CZK/cow/year**	9,439	+2,268	9,963	+2,453	9,425	+1,792
Total annual costs	**CZK/cow/year**	32,469	+2,268	32,978	+2,453	32,816	+1,792
Subsidies	**CZK/cow/year**	12,558	–2,268	12,030	–2,453	11,940	–1,792

1) Difference from the value obtained in a given year

VI: *Break-even point* at 5% and 10% profitability (ROC).

Item	Unit	2014		2015		2016	
		5%	10%	5%	10%	5%	10%
Weaned calves	**n/100 cows**	79	87	82	89	89	97
Calving interval	**days**	437	398	425	389	402	369
Price for calf sold	**CZK/ kg live weight**	60.86	66.84	62.27	68.05	63,54	69.12
Feed costs	**CZK/cow/year**	8,027	6,743	8,498	7,166	7,979	6,665
Total annual costs	**CZK/cow/year**	31,056	29,773	31,513	30,182	31,371	30,056
Subsidies	**CZK/cow/year**	13,928	15,297	13,445	14,861	13,368	14,796

ROC = return on costs.

VII: *Sensitivity analysis of production and economic parameters.*

Item	Profit including subsidies per cow and year (CZK)						Average change in annual profit (CZK)	
	2014		2015		2016			
	+ 20%	–20%	+ 20%	–20%	+ 20%	– 20%	+ 20%	–20%
Price of calves	+5,234	–698	+5,709	–802	+5,117	–1,533	+3,114	–3,114
No. of calves weaned	+5,174	–638	+5,612	–705	+5,028	–1,443	+3,036	–3,036
Loss of calves	+2,095	+2,442	+2,286	+2,620	+1,711	+1,873	–137	+137
Calving interval	–203	+5,976	–260	+6,523	–979	+5,949	–2,582	+3,873
Herd turnover	+1,806	+2,731	+1,977	+2,930	+1,374	+2,210	–406	+406
Subsidies	+5,234	–697	+5,350	–443	+4,538	–954	+2,788	–2,788
Feed costs	+834	+3,702	+952	+3,955	+265	+3,319	–1,513	+1,513
Labour costs	+1,335	+3,201	+1,431	+3,476	+727	+2,857	–1,037	+1,037
Overheads	+1,606	+2,931	+1,660	+3,247	+1,224	+2,360	–676	+676

cow in 2014, 2015, and 2016, respectively, with the profitability ranging from 6.3 to 8.7 %. A lower profitability reached in 2016 can be explained by a lower rate of subsidies, and particularly by a lower VCS targeted to beef calves. Syrůček *et al.* (2017b) had reported a lower profitability of suckler herds in the CR based on data from 2013 (2.2 %) as result of lower support payments. Conversely, higher profitability of 13.1 % had been determined in the model calculation by Boudný and Janotová (2012). Profit and profitability in suckler cow herds had been determined for Mecklenburg-West Pomerania (Germany) in 2014 and 2015 to be 2,375 CZK/cow and 5.7 %, respectively (Weber and Kvapilík, 2016). Compared to the present study, lower costs and higher revenues from sale of calves resulted in a yearly profit of 8,135 CZK/cow in a cow-calf operation in Northern Utah in the USA (Holmgren and Feuz, 2015).

Break-even analysis

The operations included in this study were on average profitable, and therefore the break-even points at 0 % profitability for various parameters are lower than those actually achieved (Tab. V). The break-even points for the number of weaned calves were 71, 74, and 81 calves per 100 cows in 2014, 2015, and 2016, respectively, and were slightly lower than those reported by Syrůček *et al.* (2017b). This means that under model conditions in a particular year zero profitability of the suckler herd is reached when at least such a number of calves per 100 cows is weaned and sold. The break-even point for the calving interval was calculated as 464 days, 64 days longer than the actual average calving interval observed. In order to achieve 5 or 10 % levels of profitability, the parameters would have to be improved over the calculated break-even points as shown in Tab. VI.

Sensitivity analysis

Tab. VII shows how a ± 20 % change in production and economic parameters altered profitability per cow. Model calculations indicated that profitability was mainly influenced by the number of calves weaned and sold, price of calves, calving interval, and support payments. A 20 % reduction in the selling price for calves or a 20 % decrease in the number of calves weaned would put an operation in economic loss. Conversely, a 20 % selling price increase would improve the overall profitability by 11.3 %. The price of calves has been reported previously as the major factor influencing suckler cow herd profitability (Wolfová *et al.*, 2004). In that study, a 20 % price increase had improved profitability by 8.2 %. Reproduction is another important factor with a significant effect on beef herd profitability (Wolfová *et al.*, 2005). The sensitivity analysis in this study identified the number of weaned calves per cow as the second most important parameter for herd profitability. Feed costs and price were the most sensitive cost items in this study. Wolfová *et al.* (2004) had determined that 20 % higher feed costs resulted in 4.4 % lower profitability, which finding was similar to that of our study. Calf losses, presumably due to their low absolute values, and culling rates were identified by the sensitivity analysis as less important. Culling rates are associated with cow depreciation and their lower importance can be explained by the fact that higher culling rates would increase the cost of heifers but would at the same time increase the revenues from sale of cows.

CONCLUSIONS

Suckler cow enterprises comprise an important segment of Czech agriculture. As the net production of beef in the EU is lower than its consumption, the global consumption of beef is forecast to rise substantially, and permanent grassland areas are still underutilized in the CR, further increase of suckler cow numbers can be expected in the CR. Suckler cow herds are also important for the non-production functions they serve, such as maintaining grazed areas or providing employment in rural areas. Achieving a reasonable level of profitability is nevertheless essential to maintaining and further developing suckler cow enterprises.

The results of the present study indicate that suckler cow enterprises are profitable only when subsidies are included. Average profitability of 8.3, 8.7 and 6.3 % was determined for 2014, 2015, and 2016. When subsidies were excluded, negative profitability ranging from –42 to –46 % was observed. It is evident, therefore, that in addition to improving production characteristics, it is a necessity to utilize all types of payment supports available to secure sufficient farm income. Detailed cost analysis demonstrated a possibility to take advantage of economies of scale, and the high proportion of fixed costs amounts to an average 54 % of total costs. The factors most sensitive to change are the selling price of calves, number of calves weaned, subsidies, and calving interval.

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