

Methodological Approaches to Costs Evaluation of Canned Feed

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Anotace

Příspěvek se zabývá metodickými přístupy hodnocení nákladovosti výroby konzervovaných krmiv zejména kukuřičné siláže a siláž ze zavadlých víceletých píceňin na orné půdě. Hlavně se jedná o úpravu doposud používaného způsobu kalkulace vlastních nákladů vybraných krmných plodin ve dvou fázích. V první fázi jde o kalkulaci nákladů vybraných krmných plodin při pěstování a sklizni a ve druhé fázi se kalkulují náklady na zpracování vybraných krmných plodin tj. na proces jejich silážování.

Výsledkem provedené metodické úpravy hodnocení nákladovosti výroby konzervovaných krmiv je souhrnná kalkulace vlastních nákladů spočívající ve spojení obou fází kalkulace tj. ve spojení počáteční fáze pěstování, sklizně krmných plodin a následně fáze zpracování a dopravy konzervovaných krmiv.

Příspěvek uvádí dílčí výsledky výzkumu řešeného v rámci výzkumného záměru č. MSM 6215648904.

Klíčová slova

Metodika kalkulací vlastních nákladů, náklady siláže, základní struktura nákladů, souhrnná struktura nákladů.

Abstract

The paper deals with methodological approaches of cost evaluation of canned feed production, especially cost evaluation of corn silage or silage from melted multiannual fodder on arable land. Mainly there is modification of the cost calculation method in two steps used for chosen fodder crops up to now. The first step is cost calculation of chosen fodder crops during cultivation and harvesting. The second step is cost calculation of chosen fodder crops processing, it means process of crops ensilage.

The result of methodological modification of cost evaluation of canned feed production is an aggregate of own cost calculation by combining both phases of calculation, i.e. connection in the initial phase of cultivation and harvesting of fodder crops and the subsequent phase of processing and transport of canned feed.

The paper is a partial output of a Research project of FBE MUAFF Brno, (MSM No 6215648904).

Key words

Methodology of total costs calculation, costs of silage, basic cost structure, summary cost structure.

JEL: Q020, Q140

Introduction

Costs of canned feed significantly influence costs of milk production, beef production and production of other commodities and products. In the field of fodder crops cultivation on arable land there is highly quality production by expending appropriate costs and by corresponding prices

of products as well. The quality of production and direct costs, that cultivator can influence the most, are connected especially with using of right cultivate technology (e.g. Jánský (2005), Jánský, Pospíšil (2010)). That goes also for fodder plants grown on arable land. Their economic connections are analyzed in this paper. The capacity of the machine and level of cultivate technology can

influence, better said reduce, the costs, especially timeliness costs. They are usually similar to labour costs and therefore need to be considered when looking at the total revenue of silage production (Gunnarsson, Spörndly, Hansson (2005)). Further with management in consumption of inputs such as fertilizers and seed, the benefit-cost ratio in corn silage production will increase (Pishgar Komleh, Keyhani, Rafiee, Sefeedpari (2011)). The goal of the paper is to suggest methodological approach to costs evaluation of canned feed. It includes calculation for chosen canned feed such as corn silage and silage from melted multiannual fodder on arable land. Corn silage is a widely used crop and popular forage for ruminant animals due to high yield, digestibility, palatability, storage ability and etc (Pishgar Komleh, Keyhani, Rafiee, Sefeedpari (2011)).

Material and methods

The basic condition of plants cultivation is corresponding production with high quality by acceptable costs and by appropriate prices as well. (e. g. Jánský, Létalová, Živělová (2009), Jánský, Živělová, Křen, Valtýníonvá (2007)). The quality of production and direct costs, that cultivator can influence the most, are connected with using of right growing technology. The great importance of technology and its influence on productivity of arable crops are mentioned by many authors (e.g. Bojnec, Latruffe (2009), Drozd, Hanusz (2009), Konno, Iwate-Ken (2009), Žák, Macák, Hašana (2012)). What is also important it is influence of silage corn on crops cultivated consequently (e.g. Žembery (2008)).

There are many economic indicators of performance evaluation (Hřebíček, Popelka, Štenc, Trenz (2012), Sedláček (2010)). Evaluation of fodder crops cultivation economy by using cost calculation, which is used in this paper, goes from evaluation of direct and overhead costs, i.e. full own costs. This cost structure follows in general calculation formula that is divided into following cost items (e.g. Poláčková (2010), Homolka, Mydlář (2011)).

Items of calculation formula

- | | |
|-----------------------------|--|
| 1. Purchased material | seeds, seedlings, fertilizers, agents of plants protection and other direct material |
| 2. Inputs of own production | seeds, seedlings, fertilizers and other own products |

- | | |
|------------------------------------|--|
| 3. Other direct costs and services | external services, energy, insurance, rent and tenancy, estate tax and others |
| 4. Labour costs in total | wage costs and other personnel costs, including health and social insurance allowance |
| 5. Costs of auxiliary activities | costs of own machinery operation, repairs and maintaining (fuel consumption, depreciation of long-term tangible and intangible assets, tractors, combines, machines for crop farming, road tax and other costs |
| 6. Production overhead | common costs of all around crop farming, e.g. depreciation (silage holes, mows), rent, spare parts and material for production objects repairs, other costs |
| 7. Administration overhead | costs common for the whole company, e.g. electric energy, communication, depreciation (administrative building), rent, interests and other common costs |

Although this formula isn't obligatory most of Czech companies use it (e. g. Synek, Kislingerová (2010)). The items 1, 2, 3 are calculated as direct costs to particular outputs. In the item 4 of total labour costs there methodology prescribes to include direct costs calculated to particular outputs as well as relevant part of wages from costs of auxiliary activities and from overheads. The item 5 includes especially costs of own machinery operation. These costs are classified to particular outputs in accordance with incompany principles. The items 6 and 7 are dissolved overhead (indirect) costs.

Cost calculation has two problems. The first one is question of cost allocation to outputs. The second one is choice of suitable content and extent of calculation and structure of calculated items. Classification of cost as unit and overhead costs follows classification costs as technological costs (unit and overhead too) and costs of operation and control (always overhead) (e.g. Král (2010)).

There are cost calculation that are not to usable in agriculture, especially calculation of incomplete costs and moder methods of cost management, e.g. Activity Based Costing (ABC). Or it is possible to use them only in limited measure Létalová (2008). For example Nekvapil (2007) shows

that importance of break even poing is generally overestimated because of limited applicability. This approach is possible to use only in fast estimates. For example Petřík (2007) further states that increasing indirect costs are typical currently, especially in field of auxiliary and overhead costs. That's why he considers cost method ABC as an instrument of process and value management that is able to provide practical answer to very topical and important problems of these costs, their control and planning.

Data base for evaluation of canned feed product economy

Data of sample survey about costs and revenues of farm products (data from Institute of Agricultural Economics and Information (IAEI)) in years 2007 - 2009 are adapted to information about costs of canned feed (corn silage, silage from melted multiannual fodder on arable land). In the case of corn silage there selection respondents' assemblage included 146-164 businesses and in the case of silage from melted multiannual fodder it was 144-154 businesses. Costs of canned feed are made from this assemblage.

Indicators acreage of harvested areas, included in processing of survey results, and their share on total acreage of harvested areas of relevant crops in the Czech Republic are important for review of representativeness of selection assemblage. From the point of mentioned share of harvested areas on total acreage of harvested areas of relevant crops the results of sample survey are representative. As the table 1 shows the share of silage crops in survey is in excess of 10 %, which uses to be usually considered as sufficient for ensuring of representativeness.

Results and discussion

In interior company accounting there are costs of canned feed monitored in special outputs – so called

auxiliary activities silage (corn silage) and haylage (silage from melted multiannual fodder on arable land). To these outputs there are concentrated costs connected with canning of green fodder and storing of canned feed. Costs of green fodder cultivation are monitored on relevant outputs of crop farming (corn for silage, multiannual fodder on arable land). Green fodder enters into costs of canned feed as own intermediate product and constitutes essential part of these costs.

Costs of corn silage production

Own costs of corn silage in monitored period are shown in the table 2.

Own costs per 1 hectare of harvested area of corn for silage increases in particular production areas as well as in average of total costs of survey. Increase in hectare yield influenced decreasing of cost per 1t of corn for silage; decrease was 11.2 %. Situation in particular production areas progressed similarly. Own costs of silage as canned feed for cattle farming and fattening are on average 102 % higher (average costs are 628 CZK per t) than green fodder of corn for silage.

The basic structure of cost items connected with ensilage of green fodder of corn is shown in the figure 1. The greatest share on the total costs of corn silage have costs of own products consumption (green fodder), it is 83.9 %. Share of other cost items is from 2 to 4 %.

So called summary structure of costs mentioned in the figure 2 enables to better analyze and after that influence height of particular cost items. On the average own costs of corn silage production (628 CZK per t) there is in monitored period share of seed 13.3 %, fertilizer 14.1 % and chemical protective agents 7.4 %. Labour costs (18.0 %), costs of own machinery operation (16.8 %) and overhead (15.1 %) reached the highest share on total costs.

Crop	Acreage of harvested areas in survey (hectare)			Share of survey areas on total acreage of harvested areas in the Czech Republic (%)		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Corn for silage	35 576	30 543	32 539	17.2	14.3	16.9
Multiannual fodder crops on arable land	25 060	23 936	25 303	10.3	10.8	11.5

Source: Sample survey of costs and revenues of farming products IAEI

Table 1: Acreage of harvested areas of fodder crops in the sample survey and their share on the total acreage of fodder crops harvested areas in the Czech Republic.

Indicator	Year of survey	Production area			Average of survey
		C and B	P	PO and M	
Own costs of corn for silage (CZK per hectare)	Year 1	15 853	14 201	13 806	14 621
	Year 2	18 057	15 797	15 383	16 233
	Year 3	18 379	17 023	17 725	17 536
	Average	17 430	15 674	15 638	16 130
Hectare yield (ton per hectare)	Year 1	27.05	24.62	28.26	26.30
	Year 2	31.64	31.05	29.10	30.65
	Year 3	34.56	36.25	35.06	35.53
	Average	31.08	30.64	30.81	30.83
Own costs of corn for silage (CZK per ton)	Year 1	586	577	489	556
	Year 2	571	509	529	530
	Year 3	532	470	506	494
	Average	563	518	508	526
Own costs of silage (CZK per ton)	Year 1	695	686	586	663
	Year 2	664	605	615	623
	Year 3	660	571	586	597
	Average	673	621	596	628

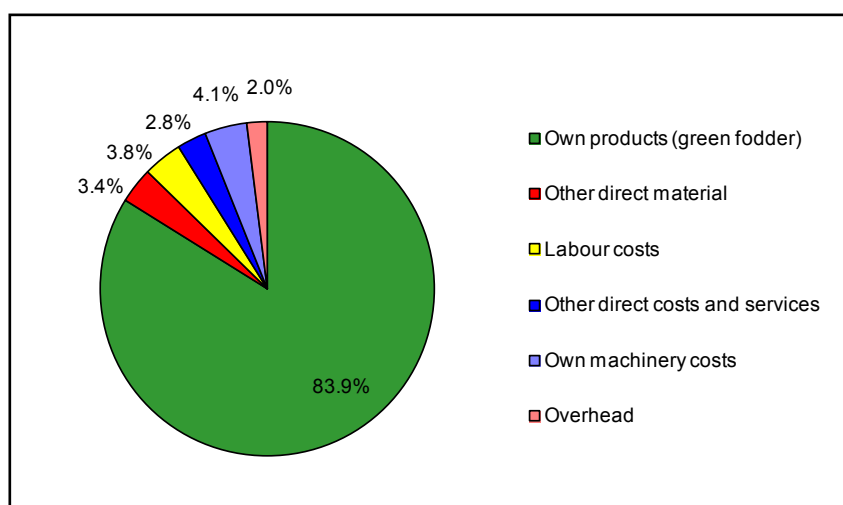
C and B ... corn and beet production area

P ... potato production area

PO and M ... potato-oat and mountain production area

Source: Sample survey of costs and revenues of farming products IAEI

Table 2: Costs of corn for silage and corn silage.



Source: Sample survey of costs and revenues of farming products IAEI

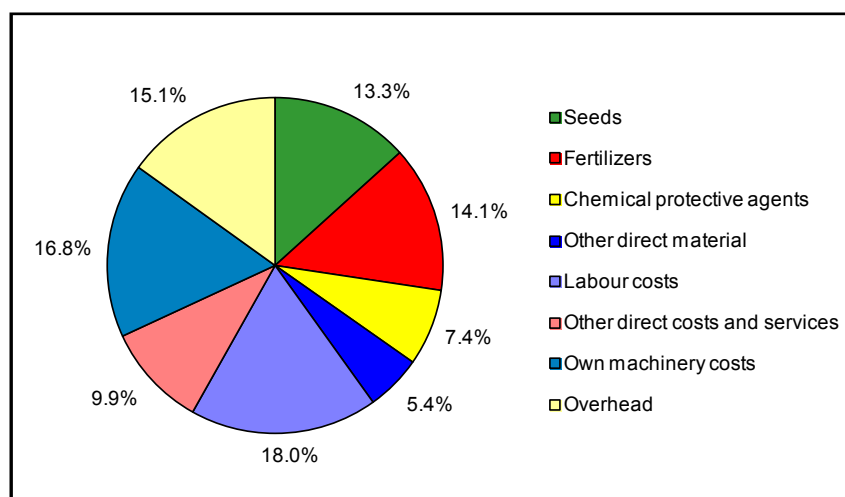
Figure 1: Basic structure of corn silage costs .

Costs of silage from melted multiannual fodder production

Own costs of silage from melted multiannual fodder on arable land in monitored period, their dividing according to types of production area and average of whole search assemblage are mentioned in the table 3.

Own costs per 1 hectare of harvested area of

multiannual fodder on arable land increased all the time, 19.6 % on average, 14.1 % in potato-oat and mountain production area, 21 % in corn and beet production area and the most 23.5 % in potato production area. Hectare yield of multiannual fodder permanently increased as in the case of corn for silage. Increasing of hectare yield influenced decreasing of costs per 1t of green fodder of multiannual fodder. Coefficient 1:3 was used for



Source: Sample survey of costs and revenues of farming products IAEI

Figure 2: Summary structure of corn silage costs.

Indicator	Year of survey	Production area			Average of survey
		C and B	P	PO and M	
Own costs of corn for silage (CZK per hectare)	Year 1	6 570	5 693	5 789	6 052
	Year 2	6 788	6 448	6 322	6 526
	Year 3	7 941	7 031	6 606	7 239
	Average	7 100	6 391	6 239	6 605
Hectare yield (ton per hectare)	Year 1	26.75	19.99	24.14	23.52
	Year 2	28.21	32.14	28.75	29.98
	Year 3	30.08	32.30	28.36	30.54
	Average	28.35	28.14	27.08	28.01
Own costs of green fodder of multiannual fodder on arable land (CZK per ton)	Year 1	246	285	240	257
	Year 2	241	201	220	218
	Year 3	264	218	233	237
	Average	250	234	231	237
Own costs of haylage ¹⁾ (CZK per ton)	Year 1	1 162	1 110	910	1 025
	Year 2	1 113	821	812	875
	Year 3	1 173	936	922	992
	Average	1 149	956	881	964

¹⁾ Coefficient for recalculation of green fodder into haylage

C and B ... corn and beet production area

P ... potato production area

PO and M ... potato-oat and mountain production area

Source: Sample survey of costs and revenues of farming products IAEI

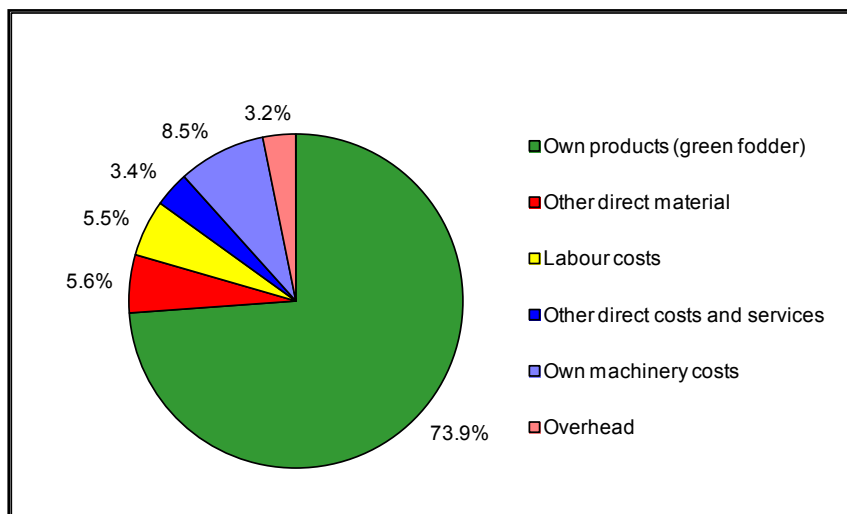
Table 3: Costs of multiannual fodder on arable land and costs of silage from melted multiannual fodder.

recalculation of costs of this green fodder into costs of silage. Costs per 1 t of silage from melted multiannual fodder are on average 252 CZK higher (average costs are 964 CZK) than triple costs of 1t of green fodder used for silage production.

Basic structure of cost items that are connected with production of silage from melted multiannual fodder cultivated on arable land is shown in figure

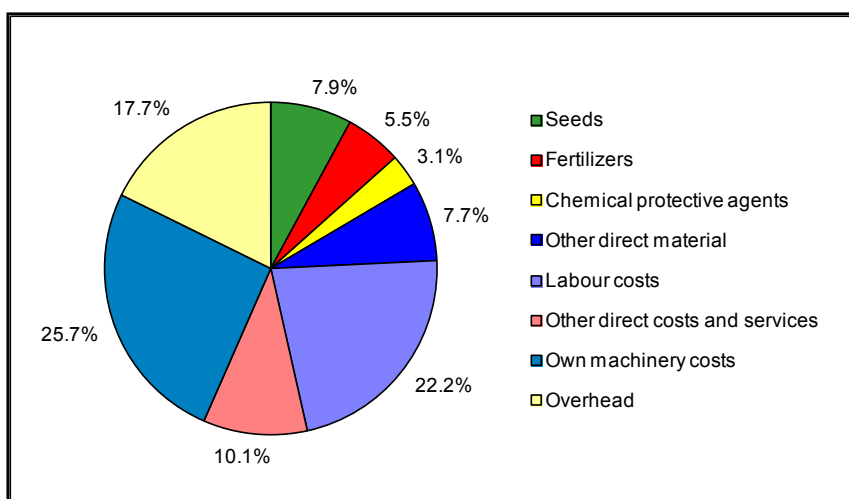
3. The greatest share on total costs of silage from melted multiannual fodder has consumption of own products, it is 73.9 %. The second greatest item is costs of own machinery operation with share 8.5 % on total costs. Share of other cost items ranges from 3.2 to 5.6 % on total costs.

The figure 4 shows summary structure of particular cost items that are connected with silage from melted



Source: Sample survey of costs and revenues of farming products IAEI

Figure 3: Basic costs structure of silage from melted multiannual fodder.



Source: Sample survey of costs and revenues of farming products IAEI

Figure 4: Summary structure of costs of silage from melted multiannual fodder.

multiannual fodder production. On the average own costs of this silage production (964 CZK per 1t) in monitored period there is relatively low percentage share of seed (7.9 %), fertilizer (5.5 %), chemical protective agents (3.1 %) and other direct material (7.7 %). The highest share on production of silage from melted multiannual fodder accounts costs of own machinery operation (25.7 %), labour costs (22.2 %), overhead (17.7 %) and other direct costs and services (10.1 %).

Conclusion

The result of methodological modification of cost evaluation of canned feed production is an aggregate of own cost calculation by combining both phases of calculation, i.e. connection in the

initial phase of cultivation and harvesting of fodder crops and the subsequent phase of processing and transport of canned feed.

Summary structure of costs enables to better analyze and after that influence level of particular cost items. On the average own costs of corn silage production (628 CZK per 1t) in monitored period there is share of seed 13.3 %, fertilizer 14.1 % and chemical protective agents 7.4 %. Labour costs (18.0 %), costs of own machinery operation (16.8 %) and overhead (15.1 %) accounted the highest share on total costs.

On the average own product costs of silage from melted multiannual fodder (964 CZK per 1t) in monitored period there is relatively low percentage share of seed (7.9 %), fertilizer (5.5 %), chemical

protective agents (3.1 %) and other direct material (7.7 %). The highest share on production of this silage accounts costs of own machinery operation (25.7 %), labour costs (22.2 %), overhead (17.7 %) and other direct costs and services (10.1 %).

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