

# Profitability development of key Czech agricultural commodities in the period 2002–2006

## *Vývoj rentability klíčových zemědělských komodit v ČR v období 2002–2006*

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**Abstract:** The paper examines development of Czech agriculture through profitability of the 10 chosen most important commodities (wheat, barley, rapeseed, sugar beet, potatoes, dairy cows – milk, cattle fattening, suckler cows, pigs fattening, poultry – fattening broilers) in the time horizon 2002–2006. The aim of the paper is to give an objective information about the influence of agrarian policy on the development of agricultural commodities, especially with reference to the comparison of changes in the pre-accession (period I = 2002–2003) and in the after-accession of the CR to the EU (period II = 2004–2006). This deals with the economic position of Czech producers related to the most considerable commodities of Czech agriculture through 2 indicators, profitability without supports (R–S) and profitability with supports (R+S). There was proved that profitability R+S in the period I was positive for most plant commodities while it was negative for most animal commodities. In connection with the membership of the CR in the EU, agricultural supports significantly increased for nearly all commodities as the consequence of applying the Common Agricultural Policy (CAP) on Czech agriculture. Therefore, there were monitored in the period II important positive changes of the indicator R+S for most commodities. For the average of the Czech Republic, there were obtained the following values of R+S in the period I, resp. period II: wheat 2.6%, resp. 24.9%, barley 27.7%, resp. 39.8%, rapeseed –18.0%, resp. 23.4%, sugar beet 9.1%, resp. 41.4%, potatoes 10.5%, resp. 2.5% (the only one case of decrease), milk 2.1%, resp. 8.5%, fattening cattle –14.6%, resp. –3.6%, suckler cows –8.8%, resp. 19.7%, fattening pigs –5.5%, resp. –1.2%, fattening broilers –2.9%, resp. 0.1%.

**Key words:** common agricultural policy, agricultural commodities, economics, costs, producer prices, profitability, supports

**Abstrakt:** Článek zkoumá vývoj českého zemědělství prostřednictvím rentability 10 vybraných nejvýznamnějších komodit (pšenice ozimá, ječmen jarní, řepka ozimá, cukrovka, brambory konzumní, dojnice – mléko, skot – výkrm, krávy bez tržní produkce mléka, prasata – výkrm, drůbež – výkrm brojlerů) v časovém horizontu 2002–2006. Cílem článku je podat objektivní obraz vlivu agrární politiky na vývoj zemědělských komodit zejména s ohledem na porovnání změn v předvstupním období (období I = 2002–2003) a v období po vstupu ČR do EU (období II = 2004–2006). Jde zejména o vystižení pozice českých producentů v oblasti výroby nejvýznamnějších komodit českého zemědělství za pomoci indikátorů rentability bez podpor (R–S) a rentability s podporami (R+S). Rentabilita R+S v období I vykazovala kladné hodnoty u většiny rostlinných komodit a záporné hodnoty u většiny živočišných komodit. V souvislosti s členstvím ČR v EU došlo k výraznému zvýšení podpor českých producentů v rámci Společné zemědělské politiky (CAP). Rentabilita R+S tak vykazovala výrazné zlepšení hodnot u téměř všech sledovaných komodit. Za ČR celkem byly vypočteny následující hodnoty indikátoru R+S v období I, resp. v období II: pšenice 2,6 %, resp. 24,9 %, ječmen 27,7 %, resp. 39,8 %, řepka olejná –18,0 %, resp. 23,4 %, cukrovka 9,1 %, resp. 41,4 %, brambory 10,5 %, resp. 2,5 % (jediný případ poklesu), mléko 2,1 %, resp. 8,5 %, výkrm skotu –14,6 %, resp. –3,6 %, krávy bez tržní produkce mléka –8,8 %, resp. 19,7 %, výkrm prasat –5,5 %, resp. –1,2 %, výkrm brojlerů –2,9 %, resp. 0,1 %.

**Klíčová slova:** společná zemědělská politika, zemědělské komodity, ekonomika, náklady, ceny zemědělských výrobců, rentabilita, podpory

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Supported by the Ministry of Agriculture of the Czech Republic (Research Plan MZE 0002725101 – Analysis and Evaluation of Possibilities of the Sustainable Agriculture and Rural Areas in the Czech Republic in Conditions of the EU and European Model of Agriculture).

Agriculture is an important branch of national economy not only from the point of view the population nutrition, but also from the point of view maintaining of landscape, keeping of environment and rural development, generally called multifunctionality of agriculture.

Multifunctionality is then significant phenomenon that is connected especially with targeting of supports to fulfilling of the mentioned functions.

Doucha, Foltýn (2008) discussed effects of agricultural multifunctionality in the period before and after accession of CR to the EU through a set of indicators for 3 elementary axes, namely economic efficiency, relation to environment and relation to rural development.

In this paper the attention is focused on assessment of the axe 1 – economic efficiency of agricultural production as well in the period before and after accession of CR to the EU.

In this paper, economic development of the Czech agriculture in the period 2002–2006 is analysed through the profitability of 10 most important commodities (wheat, barley, rapeseed, sugar beet, potatoes for consumption, dairy cows – milk, cattle fattening, suckler cows, pigs fattening, poultry – fattening broilers).

For the branch of agriculture, the accession of the CR to the EU has meant an important change of the hitherto agrarian policy, which changed from the purely national (Czech) agrarian policy to the European Common Agricultural policy (CAP). The CAP represents especially the common principles and purposes of agrarian policy, and at the same time, it is superior to national policies and includes common rules and conditions for the administration of supports to farmers of all member states with maintaining some national specificities of the short-term character (e.g. the sequential approximation of direct payments of farmers in the new member states to the conditions of farmers in the EU 15) or the long-term character (e.g. supports of the state-aid type).

From this reason, the time horizon 2002–2006 was divided into the period before the accession of the CR to the EU (period I: years 2002–2003), and the period after the accession (period II: 2004–2006), for searching for the principal changes, which occurred in the period II as compared to the period I in Czech agriculture represented by the above-mentioned commodities.

On the base of these circumstances, the main goal of this paper is to give objective information about the impact of agrarian policy on the development of agricultural commodities and economic position of Czech producers in the period I and II.

For the chosen commodities and both periods, the approach was selected which considers the natural-climatic conditions, the agrarian-political conditions (level of supports before and after the accession to the EU) and the national production-economic conditions (especially intensity of production, production costs, producer prices) and to evaluate impacts of these conditions on the production profitability for individual commodities.

## MATERIAL AND METHODS

The analysis starts from the annual inquiry about costs and production intensity of agricultural products provided by the former Research Institute of Agricultural Economics Prague (VÚZE), renamed as the Institute of Agricultural Economics and Information (Poláčková et al. 2002–2006), which have been processed on the base of the VÚZE methodology (Novák 1996). At the same time, there were used principles and rules of the Czech agrarian policy before and after the accession to the EU described in the “Green Reports” (Ministry of Agriculture of the Czech Republic 2001–2007) and in the internal database of agrarian policy in the CR for the period 1993–2007 (Doucha 2008).

For the economic efficiency evaluation of the key commodity production, the mathematical model AENVI-1 (Foltýn et al. 2008a) was used, which enables to evaluate 2 indicators of profitability, i.e. profitability without supports ( $R-S$ ) and profitability with supports ( $R+S$ ) for 10 above-mentioned commodities, 3 production regions  $K+R$ ,  $B$ ,  $Bo+H$  (described further) and the average results of the CR and for the time horizon 2002–2006 divided into the period I and II.

For illustration of this methodology, there are presented in this paper the detailed analyses of both types of profitability for wheat and milk.

Profitability  $R-S$  represents the share of producer prices per production unit and unit costs of the given commodity, in the given region. Profitability  $R+S$  presents the share of producer prices and unit support related to the unit costs for the given commodity. The term “unit support” means all possible supports (direct and indirect) divided by the production size allocated to the given commodity (Foltýn et al. 2008b).

Unit costs for all commodities are defined as the total costs divided by production intensity.

In the case of plant commodities, production intensity is defined only as the per hectare yield, while in the case of animal commodities, production intensity is defined as the milk yield, daily weight increment, slaughter weight etc.

Unit supports contain all supports allocated to the given commodity. For plant commodities, only direct supports connected with production or land are considered (like SAPS – Single Area Payment System from EU budget, Top-Up – National Adding Special Supports from the national budget, set-aside, certified seeds etc.) related to the total production size of the given commodity in the CR. For animal commodities, there are considered supports on production per head (e.g. milk production, LU for cattle, etc.) and all indirect supports connected with the consumption of own feeding stuffs.

### Methodological approach to computing profitability of commodities

Computation of profitability is based on the cost inquiry of the VÚZE for plant and animal commodities per annum in the period 2002–2006. This inquiry is provided on the set of representative Czech agricultural enterprises and their results are divided into 3 types of production regions, namely

|      |  |
|------|--|
| K+R  | corn and sugar beet production region        |
| B    | potatoes production region                   |
| Bo+H | potatoes-oats and mountain production region |
| CR   | average values for the Czech Republic        |

Assumption (about the relation between agricultural production region and the LFA classification in the CR): For the needs of this paper, production region K+R were associated with regions except of the LFA (non-LFA), production region Bo+H with regions

LFA–H of the mountain type (LFA–HA and LFA–HB) and production region B with regions partly non-LFA and partly with regions LFA–O (type OA, OB and S) of the other LFA types (except of LFA–H).

From the point of view of supports in the LFA which are connected only with the TTP (permanent grassland) area in the Czech Republic, there is considered the share of the TTP in the individual regions. On the basis of the LPIS (the database of the Czech agricultural land monitoring) detailed data, we suppose that

- the production region K+R coincides with 0% of TTP in the LFA
- the production region B coincides with 75% of TTP in the LFA–O and with 25% of the TTP in non-LFA
- the production region Bo+H coincides with 100% of TTP in the LFA–H.

The model assignment of the TTP to the production region starts from data application of the ČÚZK (Czech Office for Surveying, Mapping and Cadastre) on the statistical data system LPIS about accounting agricultural land for the needs of the support assignment system (with the total area 3 469 thousand ha of the UAA, i.e. utilized agricultural land).

### Model AENVI-1 – denoting

For every commodity, there was created by the help of aggregation of individual costs the model structure of 9 main cost items. For plant and animal commodities, there are considered next cost items: (per hectare for plant commodities, resp. per feeding day for animal commodities):

| <i>Symbol</i> | <i>For plant commodities</i>    | <i>For animal commodities</i>       |
|---------------|---------------------------------|-------------------------------------|
| x1            | Seeds (seedlings) – purchased   | Feeds – purchased                   |
| x2            | Seeds (seedlings) – own         | Feeds – own                         |
| x3            | Fertilizers – purchased         | Medicaments and disinfection assets |
| x4            | Fertilizers – own               | Mechanization costs                 |
| x5            | Costs on plant protection       | Other direct costs and services     |
| x6            | Mechanization costs             | Total labour costs                  |
| x7            | Other direct costs and services | Material fixed assets depreciation  |
| x8            | Total labour costs              | Depreciation of animals             |
| x9            | Fixed costs                     | Fixed costs                         |

Let us denote for every commodity<sup>1</sup>

$i$  = PS, JC, RE, CU, BR (plant commodities), D1, MLE, TEL1, VB1, D2, TEL2, PRA, SEL, PVP, VP, BRO (animal commodities) and for every production region  $j$  = K+R, B, Bo+H, CR:

Nha total cost per hectare

<sup>1</sup> PS – winter wheat, JC – spring barley, RE – rapeseed, CU – sugar beet, BR – potatoes for human consumption, D1 – dairy cows, MLE – cow milk, TEL1 – calves up to 6 months of age in the dairy cattle system, VB1 – fattening cattle, D2 – suckler cows, TEL2 – calves up to 7 months of age in the suckler cows system, PRA – sows, piglets, PVP – young fattening cattle, VP – fattening cattle, BRO – fattening broilers.

|         |  |
|---------|--|
| Nt      | unit costs per ton   |
| Nks     | total cost per 1 average head in the given category of animals   |
| Nkd     | total costs per feeding day in the given category  |
| Nkg     | costs per 1 kg of final l.w. of the given category   |
| Nlt     | costs of 1 litre of milk   |
| CN      | total costs per hectare (for plant commodities),<br>resp. total costs per 1 dairy cow and year (D1),<br>resp. total costs per 1 suckler cow and year (D2),<br>resp. total costs per 1 head in fattening (cattle, pigs or broilers)<br>from the birth to the final fattening weight,<br>resp. total costs per 1 litre of milk |
| HAvyn   | per hectare yield  |
| UZI     | animal production efficiency, e.g. annual milk yield, daily weight increment in the category of fattening animals  |
| hmJAT   | live weight of 1 head in fattening in the final category   |
| hmKON   | final weight of 1 head in breeding in the given category   |
| pocKD   | number of feeding days in the category of animals  |
| prirKD  | daily weight increase  |
| nat     | nativity, i.e. the number of born animals per 100 mothers  |
| cenaNAK | price of 1 purchased head for fattening  |
| JN      | unit costs of final production   |
| RC      | producer price of the final production   |
| POD     | total supports – sum of direct (PP) and indirect (NP) supports allocated per 1 hectare for plant commodities, resp. per 1 average head of the appropriate animal commodity   |
| JPOD    | unit support of the final production   |
| R+S     | profitability with supports  |
| R–S     | profitability without supports   |

### ***Calculation of total costs***

For all commodities  $i$  and all production regions  $j$ , the following relations hold:

$$Nha(i, j), \text{ resp. } Nkd(i, j) = x1(i, j) + x2(i, j) + \dots + x9(i, j) \quad \text{for all } i \text{ and } j$$

#### *Plant commodities*

$$CN(i, j) = Nha(i, j) \quad \text{for } i = \text{plant commodities}$$

#### *Dairy – milk<sup>2</sup>*

$$CN(MLE, j) = Nkd(D1, j) \times 365 \times 0.94$$

#### *Fattening cattle*

$$CN(VB1, j) = Nkd(D1, j) \times 365 \times 0.06 + Nkd(TEL1, j) \times pocKD(TEL1, j) + Nkd(VB1, j) \times pocKD(VB1, j)$$

where

$$pocKD(VB1, j) = (hmJAT(VB1, j) - hmKON(TEL1, j)) / prirKD(VB1, j)$$

#### *Suckler cows with the calf to the 7 months*

$$CN(TEL2, j) = Nkd(D2, j) \times 365 / nat(D2, j)$$

#### *Fattening pigs*

$$CN(VP, j) = Nkd(PRA, j) \times 365 / nat(PRA, j) + Nkd(PVP, j) \times pocKD(PVP, j) + Nkd(VP, j) \times pocKD(VP, j)$$

where

$$pocKD(PVP, j) = (hmKON(PVP, j) - hmKON(SEL, j)) / prirKD(PVP, j)$$

$$pocKD(VP, j) = (hmJAT(VP, j) - hmKON(PVP, j)) / prirKD(VP, j)$$

#### *Fattening broilers*

$$CN(BRO, j) = cenaNAK(BRO, j) + Nkd(BRO, j) \times pocKD(BRO, j)$$

<sup>2</sup>Total costs on milk production are calculated as the 94% share from the total costs per 1 cow and year (6% of the total costs per 1 cow and year is assigned to the costs of the born calf).

where

$$\text{pocKD}(\text{BRO}, j) = \text{hmJAT}(\text{BRO}, j) / \text{prirKD}(\text{BRO}, j)$$

### **Calculation of unit costs**

$$\begin{aligned} \text{JN}(i, j) &= \text{Nt}(i, j) = \text{CN}(i, j) / \text{HAvyn}(i, j) && \text{for } i = \text{plant commodities} \\ \text{JN}(i, j) &= \text{Nlt}(\text{MLE}, j) = \text{CN}(\text{MLE}, j) / \text{UZI}(\text{D1}, j) && \text{for } i = \text{MLE} \\ \text{JN}(i, j) &= \text{Nkg}(i, j) = \text{CN}(i, j) / \text{hmJAT}(i, j) && \text{for } i = \text{VB1, VP, BRO} \\ \text{JN}(i, j) &= \text{Nkg}(\text{TEL2}, j) = \text{CN}(\text{TEL2}, j) / \text{hmKON}(\text{TEL2}, j) && \text{for } i = \text{TEL2} \end{aligned}$$

### **Producer prices**

The average producer prices of all commodities in production regions and in the CR were taken from the periodic cost inquiry of the VÚZE.

### **Agrarian policy of the CR and the Common Agricultural Policy of the EU**

The Czech agrarian policy in the pre-accession period was oriented especially on the facilitation of the transition to the EU support system scheme and on stopping the decrease of the numbers of ruminants. After the accession of the CR to the EU, the national support policy was already subordinated to the CAP rules.

The model AENVI-1 starts from the theoretical assumption that into the calculation of R+S, there are included all direct and indirect supports (claimed supports), i.e. only those supports, which are paid off on the basis of agricultural or arable land, numbers of animals and production conditions (LFA payments).

### **Calculation of the total supports**

$$\begin{aligned} \text{SUB}(i, j, r) &= \text{PP}(i, j, r) + \text{NP}(i, j, r) \\ &\quad \text{for } i = \text{all commodities} \\ &\quad \text{for } j = \text{all production regions} \\ &\quad \text{for } r = \text{years 2002–2006} \end{aligned}$$

where PP, resp. NP are the sum of all direct, resp. indirect supports allocated to the given commodity.

For the plant commodities, there are considered only direct supports (e.g. SAPS, Top-Up and similar type of supports), for animal commodities, there are considered both types of supports. Direct supports (PP) contain in animal production mostly the supports per head in relation to the livestock units (LU), while indirect supports (NP) contain all supports which are connected with the own feeds through supports of feeding plant commodities, including the supports of TTP in the LFA.

All allocated supports for the given commodity are divided by the total size of this commodity (the total sum of hectares or numbers of animals).

The supports PP and NP for every commodity can be regionally differentiated (e.g. LFA supports) and it is necessary to allocate them to production regions (K+R, B, Bo+H and CR).

### **Direct supports for plant commodities**

In the period I, supports for certified seeds and compensatory supports on arable land connected with the program set-aside were included to the PP. In the period II, especially SAPS and Top-Up, and supports for certified seeds were included, in accordance with the yearly changes of the support rules.

### **Direct supports for animal commodities**

In the period I, compensatory payments on milk, supports of milking cows and supports of suckler cows breeding are included. In period II, supports for cattle breeding (ruminants) and support of suckler cows breeding are included.

### **Indirect supports for animal commodities**

To the NP, there are counted in both periods the supports of own feeds for of all animal categories, which enter the calculation of total costs for the individual commodities.

For cattle, there are included the following feeding crops:

- maize for silage (KUS) through the consumption of the silage maize,
- perennial fodder crops (VLP) through the consumption of the higher dry matter silage,
- permanent grassland (TTP) through the consumption of green masses or hay,
- feeding cereals (PS, JC) through the consumption of the own cereals in feeding mixtures.

For pigs, there is considered only the variant (d).

For broilers, the consumption of the own feeds is not considered, which is proved by the evidence of almost zero values in the cost inquiry for broilers.

Fodder crops (KUS and VLP) were supported through the compensatory supports on arable land in terms of the program set-aside in the period I. In the period II, the supports of these crops were different in the individual years (the SAPS was paid

always and the Top-Up for KUS every year and the VLP only in the year 2004 and 2006).

TTP in the period I were supported only in the context of the LFA payments, while in the period II, they were supported both by the SAPS and the regionally different LFA payments.

Supports of feeding cereals were included in both periods according to the above-mentioned rules for supports of plant commodities.

### Calculation of unit supports

For all production regions  $j$  and for all years  $r = 2002-2006$ , unit supports are constructed as the share of the total supports and intensity of production:

$$JPOD(i, j, r) = POD(i, j, r) / HAvyn(i, j, r) \\ \text{for } i = \text{plant commodities}$$

$$JPOD(MLE, i, j) = POD(D1, i, j) / UZI(D1, i, j) \\ \text{for } i = MLE$$

$$JPOD(TEL2, j, r) = POD(D2, j, r) / hmKON(TEL2, j, r) \\ \text{for } i = TEL2$$

$$JPOD(i, j, r) = POD(i, j, r) / hmJAT(i, j, r) \\ \text{for } i = VB1, VP, BRO$$

### Calculation of profitability

For all commodities  $i$ , for all production regions  $j$  and years  $r = 2002-2006$ , we can define the indicators of profitability without supports ( $R-S$ ) and profitability with supports ( $R+S$ ) by the following relations:

$$R-S(i, j, r) = RC(i, j, r) / JN(i, j, r)$$

$$R+S(i, j, r) = (RC(i, j, r) + JPOD(i, j, r)) / JN(i, j, r)$$

### Relations between supports and profitability

The original sense and aim of supports in agriculture was to improve the income situation of agricultural producers with reference to common interests (e.g. so that farmers could further provide their agricultural activities and could exist in the countryside and so that they do not abandon agricultural land etc.). State authorities, as the providers of supports, decide about the selection of the considered commodities and about the level of supports in the terms of their agrarian policy, i.e. the national policy (before the accession to the EU), or the above-national (the CAP EU after the accession).

The aim of agrarian policy is then to ensure agricultural producers the possibility to achieve an adequate profit rate in the average conditions, regional conditions, or specific conditions of the given state with the help of the targeted supports (direct or indirect).

For every commodity  $KOM$ , region  $j$  and year  $r$ , the following relations hold:

- $R+S(KOM, j, r) > R-S(KOM, j, r)$   
if  $KOM$  is a supported commodity in the region  $j$  and in the year  $r$  (where  $POD(KOM, j, r) > 0$  is the sum of allocated supports of the commodity  $KOM$ ), or

- $R+S(KOM, j, r) = R-S(KOM, j, r)$   
in other case.

For the supported commodities, the following common expectation holds that the supports will change the negative profitability without supports into the positive profitability with supports, i.e.

- $R-S(KOM, j, r) < 0$  and at the same time  $R+S(KOM, j, r) > 0$   
for the commodity  $KOM$ , definite region  $j$  and definite year  $r$

In the terms of agrarian political measures, the following cases can occur:

- $R-S(KOM, j, r) < 0$  and  $R+S(KOM, j, r) < 0$   
i.e. the support level is insufficient and does not solve the economic situation of producers for the given commodity
- $R-S(KOM, j, r) > 0$  and  $R+S(KOM, j, r) \gg 0$   
i.e. supports still raised the level of profitability of the given commodity.

The frequent cases of the targeted supports of agrarian policy are the regional differentiated supports (e.g. LFA payments). These supports start from the logical expectation that in the regions favourable for agriculture, the profitability  $R-S$  is significantly better than in the areas less favourable for agriculture.

If we associate production regions with the LFA (less favourable areas) regions as we mentioned above, i.e.:

- $K+R = \text{non-LFA}$   
 $Bo+H = \text{LFA-H}$   
 $B = \text{LFA-O}$

then we can formulate the following assumptions:

- $R-S(KOM, K+R, r) > R-S(KOM, Bo+H, r)$
- $R+S(KOM, K+R, r) \approx R+S(KOM, Bo+H, r)$   
where  
 $POD(KOM, Bo+H, r) > POD(KOM, K+R, r)$

Nevertheless in practice there is possible the following case:

- $R+S(KOM, K+R, r) < R+S(KOM, Bo+H, r)$

In this case, we can say that the support of the LFA regions was too high and it could cause production migration of this commodity from the agriculturally convenient conditions ( $K+R$ ) to the less favourable conditions ( $Bo+H$ ).

Through the "decoupled supports", i.e. the supports separated from the production size of the given com-

modity (decoupling), there is solved in the agrarian policy the problem how to support the farmers income and not to stimulate production of the given commodity.

The result of this process is the equal support for every hectare of agricultural or arable land or the equal support for every head number of cattle by the LU. These supports then are paid off to farmers in the same way (i.e. regardless of the conditions in which they produce and regardless of the production region).

The administration of decoupled supports leads to the natural presupposition that if for the profitability without supports  $R-S$ , for the definite commodity KOM the following relation holds

- $R-S(KOM, K+R, r) > R-S(KOM, Bo+H, r)$   
then after the granted support (whatever its height) to farmers (e.g. decoupled payments per hectare) in the region  $K+R$  and  $Bo+H$ , we expect that the same relation holds even for the profitability with supports  $R+S$ , i.e.
- $R+S(KOM, K+R, r) > R+S(KOM, Bo+H, r)$   
providing  
 $POD(KOM, Bo+H, r) = POD(KOM, K+R, r)$

Nevertheless, this logical expectation does not need to hold always. Under the definite assumptions, there can occur a case, when the profitability  $R+S$  achieved

in the region  $Bo+H$  will be higher than in the region  $K+R$  even at the same level of supports.

Then, there exists a case, when the following relations hold:

- $R+S(KOM, K+R, r) < R+S(KOM, Bo+H, r)$   
under the definite level of support  $POD0$
- $POD0(KOM, Bo+H, r) = POD0(KOM, K+R, r)$ .

The detailed proof of this statement can be found in the study Foltýn et al. (2008b).

## RESULTS AND DISCUSSION

The model computations of profitability  $R-S$  and  $R+S$  in the framework of the individual commodities, considering the years and production regions, were done by the arithmetic mean of the period I and II and processed to the summary tables.

On the example of wheat and milk there were analyzed and by factor cost analysis interpreted results of model calculations in periods for the individual production regions  $K+R$ ,  $B$ ,  $Bo+H$  and  $CR$ .

### Profitability of wheat production

Changes of wheat profitability in the periods I and II sorting by production regions are presented in Table 1.

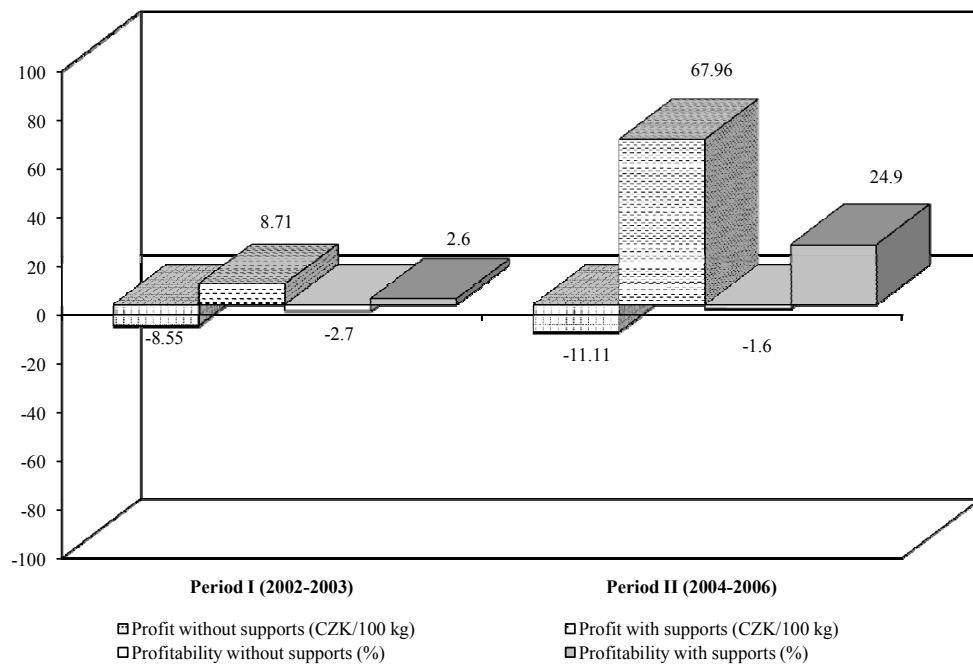


Figure 1. Total profitability development of wheat production

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

Table 1. Wheat – arithmetic mean of the period I (2002–2003) and the period II (2004–2006)

| Indicator                       | Unit   | Period I          |        |        |             | Period II         |        |        |             | Index<br>period II /period I |
|---------------------------------|--------|-------------------|--------|--------|-------------|-------------------|--------|--------|-------------|------------------------------|
|                                 |        | production region |        |        | total<br>CR | production region |        |        | total<br>CR |                              |
|                                 |        | K+R               | B      | Bo+H   |             | K+R               | B      | Bo+H   |             |                              |
| Seeds (seedlings) – purchased   | CZK/ha | 1 537             | 1 444  | 1 265  | 1 444       | 1 290             | 1 312  | 1 185  | 1 274       | 88.2                         |
| Seeds (seedlings) – own         | CZK/ha | 243               | 199    | 193    | 216         | 183               | 223    | 201    | 202         | 93.9                         |
| Fertilizers – purchased         | CZK/ha | 2 430             | 2 239  | 1 953  | 2 258       | 2 823             | 2 391  | 2 157  | 2 534       | 112.2                        |
| Fertilizers – own               | CZK/ha | 237               | 218    | 174    | 217         | 165               | 238    | 164    | 195         | 89.8                         |
| Costs on plant protection       | CZK/ha | 2 032             | 2 266  | 2 032  | 2 120       | 2 283             | 2 290  | 2 020  | 2 245       | 105.9                        |
| Mechanization costs             | CZK/ha | 2 197             | 2 201  | 1 970  | 2 151       | 2 361             | 2 568  | 2 417  | 2 441       | 113.5                        |
| Other direct costs and services | CZK/ha | 1 633             | 1 072  | 1 070  | 1 303       | 1 781             | 1 412  | 1 246  | 1 543       | 118.5                        |
| Total labour costs              | CZK/ha | 2 823             | 2 532  | 2 219  | 2 586       | 3 099             | 2 562  | 2 214  | 2 732       | 105.7                        |
| Fixed costs                     | CZK/ha | 2 626             | 2 578  | 2 166  | 2 512       | 2 555             | 2 527  | 2 322  | 2 503       | 99.6                         |
| Yield of hectare                | t/ha   | 4.87              | 4.51   | 4.29   | 4.61        | 5.69              | 5.36   | 4.76   | 5.39        | 116.8                        |
| Total costs                     | CZK/ha | 15 760            | 14 749 | 13 042 | 14 806      | 16 540            | 15 522 | 13 926 | 15 668      | 105.8                        |
| Unit costs                      | CZK/t  | 3 250             | 3 279  | 3 042  | 3 218       | 2 935             | 2 933  | 2 988  | 2 940       | 91.3                         |
| Average of producer price       | CZK/t  | 3 149             | 3 187  | 2 990  | 3 133       | 2 910             | 2 770  | 2 710  | 2 829       | 90.3                         |
| Direct supports                 | CZK/ha | 776               | 776    | 776    | 776         | 4 174             | 4 174  | 4 174  | 4 174       | 537.8                        |
| Indirect supports               | CZK/ha | 0                 | 0      | 0      | 0           | 0                 | 0      | 0      | 0           | –                            |
| Total supports per unit         | CZK/t  | 164               | 178    | 182    | 173         | 748               | 798    | 903    | 791         | 458.2                        |
| Profit with supports            | CZK/t  | 64                | 85     | 131    | 87          | 723               | 635    | 625    | 680         | –                            |
| Profit without supports         | CZK/t  | –100              | –92    | –52    | –85         | –25               | –163   | –278   | –111        | –                            |
| Profitability with supports     | %      | 1.9               | 2.5    | 4.2    | 2.6         | 25.8              | 23.7   | 24.6   | 24.9        | –                            |
| Profitability without supports  | %      | –3.0              | –2.9   | –1.7   | –2.7        | 0.6               | –3.1   | –5.2   | –1.6        | –                            |

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations



### Results for the CR total

**Yield per hectare:** in the period I there has been achieved level 4.6 t/ha (influence of unfavourable weather on the year 2003), in the period II yield has grown about 0.8 t/ha (influence of favourable weather on the year 2004), i.e. growth by 16.8%.

**Total costs** (in the period II against the period I: increase by 5.8%.

**Unit costs** (period II/I): decrease by 8.6%. The reason of this decrease was the quicker growth of the yield per hectare than the growth of total costs.

**Producer prices** (period II/I): decrease about by 9.7%.

**Total supports:** in the period I and II there were paid off supports which achieved average level of 173 CZK/t, resp. 791 CZK/t.

**Profitability:** Profitability R–S has not changed from the period I to period II and has stayed slightly negative even after the accession of the CR to the EU. The influence of supports has reflected in the profitability R+S in both periods. In the period I, profitability R+S has changed thanks to the supports from the negative value to the positive (2.6%). In the period II this profitability increased till the level nearly 25% in spite of decrease of producer prices (Figure 1).

### Results according to production regions

**Hypothesis 1** (for wheat):

(a)  $H_{Avyn}(K+R) > H_{Avyn}(Bo+H)$

(b)  $Nha(K+R) > Nha(Bo+H)$

(c)  $Nt(K+R) < Nt(Bo+H)$

(d)  $RC(K+R) > RC(Bo+H)$

(e)  $R-S(K+R) > R-S(Bo+H)$

$R+S(K+R) > R+S(Bo+H)$

The assumption d) of the hypothesis 1 about producer prices is based on the expectation that the soil climatic conditions in a better production region positively influence the higher level of producer prices in the consequence of higher quality of wheat production as a foodstuff.

### Findings

For the average results of the period I and II, there were found the following findings:

(a), (b), (d): assumption were confirmed

(c): in the period I, we obtained  $Nt(PS, K+R) > Nt(PS, Bo+H)$ , while in the period II  $Nt(PS, K+R) < Nt(PS, Bo+H)$  – then this assumption was confirmed only for the period II

(e): in the period I, we have computed that the values of R–S and R+S are higher in Bo+H than K+R, while in the period II indicators R–S and R+S have shown the expected relations for K+R and Bo+H – then the assumption was confirmed only for the period II (Figure 2).

Hypothesis 1 about production regions for unit costs and profitability without supports was not

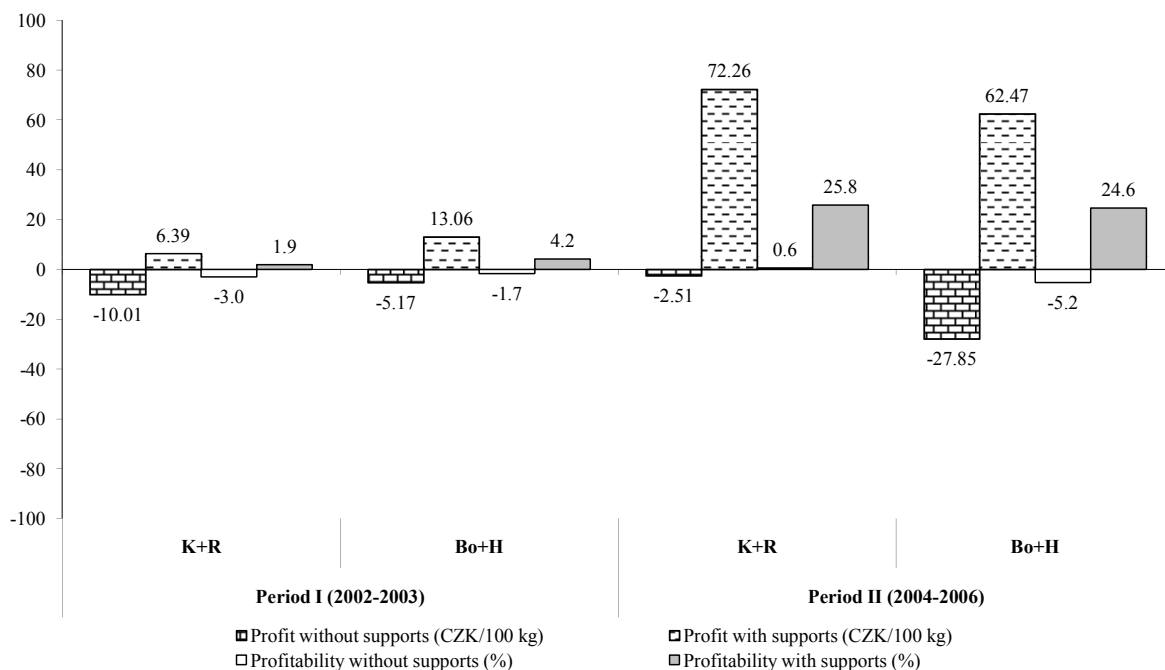


Figure 2. Regional profitability development of wheat production

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

fully confirmed. The achieved yield per hectare in the region K+R was higher than in Bo+H, however, unit costs in the region K+R were also higher than in Bo+H (which is a contradiction to the assumption) as a consequence of the inadequate growth of the total costs spent on the achieved per hectare yield. This fact had a negative impact on the values of profitability R–S in spite of that the condition on producer prices were fulfilled.

On the other hand, for the period II, the hypothesis 1 holds for all assumptions.

In the region K+R, a production intensification trend has shown in the period I against the region Bo+H not only from own resources, but also by the increased values of purchased fertilizers (by 24.5%), purchased seeds and seedlings (by 21.5%) and by the higher other direct costs and services (by 52.6%). This necessarily caused an increase of labour costs (by 27.2%) and consequently also an increase of fixed costs (by 21.3%). The final result was the quicker growth of total costs than the growth of yield per hectare.

In the period II related to the period I in the region K+R, the total costs (by 4.9%) have been increasing much more slowly than the per hectare yield (by 16.8%). This favourable situation was demonstrated by the fall of unit costs (almost by 10%), which contributed to the achievement of the positive profitability R–S in spite of the producer price decrease by about more than 7.5%.

An analogous relation occurred in the period II for the CR total (but only on a smaller scale). Nevertheless, in spite of per hectare yield growth (almost by 17%) and the decrease of unit costs (by 8.7%), the value of profitability R–S stayed negative (–1.6%) as a consequence of the fall of producer price (by 9.7%).

### Profitability of milk production

Development of milk profitability in the period 2002–2006 according to production regions and the CR total is shown in Table 2.

#### Results for the CR total

Milk yield: in the period I reached 5 612 l/cow/year and increased in the period II to 6 087 l/cow/year (increase by 8.5%, i.e. by 475 l/cow/year) in the consequence of the technical-biological progress and the increasing share of the milk productive type of dairy cows in the CR.

Total costs: in the period II they have grown against period I by 11.1%, i.e. about 2.6 percent point (p. p.) faster than milk yield, which was negatively reflected in the level of unit costs.

Unit costs (period II/I): increase by 2.4%.

Producer prices (period II/I): increase only by 1%, thus practically stagnation.

Total supports: in the period I, producers obtained the following supports – milk compensa-

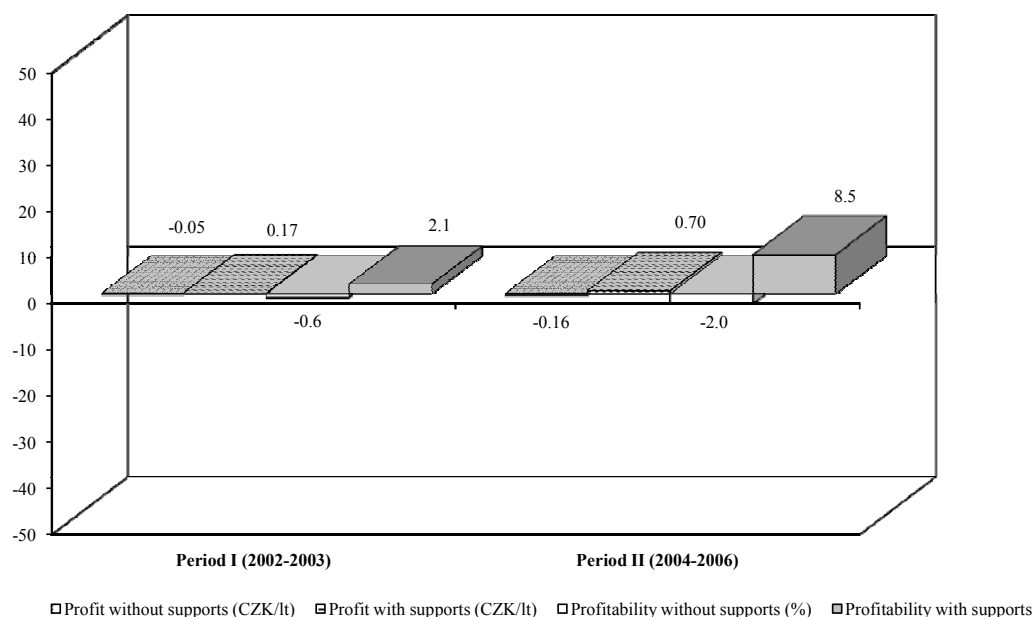


Figure 3. Total profitability development of milk production. Development of milk production profitability in the period I and II according to production regions

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

Table 2. Dairy &amp; milk – arithmetic mean of the period I (2002–2003) and the period II (2004–2006)

| Indicator                           | Unit     | Period I          |        |        |             | Period II         |        |        |             | Index<br>period II/<br>period I |
|-------------------------------------|----------|-------------------|--------|--------|-------------|-------------------|--------|--------|-------------|---------------------------------|
|                                     |          | production region |        |        | total<br>CR | production region |        |        | total<br>CR |                                 |
|                                     |          | K+R               | B      | Bo+H   |             | K+R               | B      | Bo+H   |             |                                 |
| Feeds (litters) – purchased         | CZK/year | 7 003             | 6 695  | 6 908  | 6 840       | 7 895             | 7 932  | 7 193  | 7 687       | 112.4                           |
| Feeds (litters) – own               | CZK/year | 12 086            | 10 300 | 9 299  | 10 476      | 13 515            | 11 232 | 10 200 | 11 432      | 109.1                           |
| Medicaments and disinfection assets | CZK/year | 790               | 547    | 394    | 566         | 866               | 784    | 433    | 691         | 122.1                           |
| Mechanization costs                 | CZK/year | 3 765             | 2 841  | 3 127  | 3 172       | 4 059             | 2 784  | 3 241  | 3 227       | 101.7                           |
| Other direct costs and services     | CZK/year | 4 893             | 4 448  | 4 358  | 4 540       | 5 748             | 5 166  | 5 043  | 5 261       | 115.9                           |
| Total labour costs                  | CZK/year | 9 875             | 9 380  | 10 004 | 9 700       | 10 202            | 10 533 | 10 407 | 10 422      | 107.4                           |
| Material fixed assets depreciations | CZK/year | 1 833             | 1 643  | 1 486  | 1 647       | 2 335             | 2 103  | 2 153  | 2 173       | 131.9                           |
| Depreciation of animals             | CZK/year | 4 873             | 4 685  | 4 625  | 4 717       | 5 728             | 5 565  | 5 374  | 5 543       | 117.5                           |
| Fixed costs                         | CZK/year | 7 194             | 6 224  | 6 006  | 6 417       | 7 011             | 7 486  | 6 194  | 6 974       | 108.7                           |
| Milk yield                          | l/year   | 6 039             | 5 552  | 5 320  | 5 612       | 6 614             | 6 089  | 5 693  | 6 087       | 108.5                           |
| Total costs                         | CZK/year | 52 312            | 46 763 | 46 207 | 48 075      | 57 359            | 53 586 | 50 237 | 53 411      | 111.1                           |
| Unit costs                          | CZK/l    | 8.15              | 7.92   | 8.16   | 8.05        | 8.15              | 8.27   | 8.29   | 8.25        | 102.4                           |
| Average of producer price           | CZK/l    | 7.97              | 8.05   | 7.97   | 8.00        | 7.96              | 8.14   | 8.09   | 8.08        | 101.0                           |
| Direct supports                     | CZK/LU   | 452               | 452    | 452    | 452         | 1 813             | 1 813  | 1 813  | 1 813       | 400.6                           |
| Indirect supports                   | CZK/LU   | 505               | 775    | 870    | 782         | 3 018             | 3 405  | 3 752  | 3 474       | 444.2                           |
| Total supports per unit             | CZK/l    | 0.16              | 0.22   | 0.25   | 0.22        | 0.73              | 0.85   | 0.97   | 0.87        | 395.3                           |
| Profit with supports                | CZK/l    | -0.02             | 0.35   | 0.06   | 0.17        | 0.54              | 0.72   | 0.77   | 0.70        | -                               |
| Profit without supports             | CZK/l    | -0.18             | 0.13   | -0.19  | -0.05       | -0.19             | -0.13  | -0.21  | -0.16       | -                               |
| Profitability with supports         | %        | -0.2              | 4.4    | 0.7    | 2.1         | 6.6               | 8.7    | 9.2    | 8.5         | -                               |
| Profitability without supports      | %        | -2.2              | 1.6    | -2.3   | -0.6        | -2.3              | -1.6   | -2.5   | -2.0        | -                               |

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

tion payments as a consequence of the milk quota in the pre-accession period, the support of dairy cows breeding (program 1.G.), further indirect supports derived from the program set-aside and supports of the certified cereal seeds in the total level 0.22 CZK/l.

In the period II, the supports increased to the level 0.87 CZK/l, as the sum of direct supports on LU of cattle and indirect supports derived from supports on the area of feeding plants for own feedings (green maize and maize silage, perennial fodder crops, permanent grassland-TTP), including supports for TTP in the LFA (regions B and Bo+H).

**Profitability:** in both periods the profitability R-S has been slightly negative. Nevertheless, in the period II, there was reached a lower economic efficiency of milk production (increasing negative profitability) in the consequence of the inadequate growth of costs, especially feeding costs and depreciations of fixed assets. The influence of supports has reflected in the profitability R+S, which in the period I practically only compensated loss (2.1%), while in the period II supports significantly influenced the positive results of profitability (8.5%), in spite of the stagnation of producer prices (Figure 3).

#### Comparisons related to production regions

The mentioned economic indicators in production regions do not copy the results achieved for the CR

regarding the different breeding productive type of cows in the different production regions K+R and Bo+H (Kopeček et al. 2003–2007, Poláčková et al. 2003–2007) and regarding the differentiation of the regionally oriented supports – e.g. LFA supports (Ministry of Agriculture of the Czech Republic 2003–2007).

**Hypothesis 2** (for dairy cow – milk):

- (a)  $UZI(K+R) > UZI(Bo+H)$
- (b)  $Nks(K+R) > Nks(Bo+H)$
- (c)  $Nlt(K+R) < Nlt(Bo+H)$
- (d)  $RC(K+R) \leq RC(Bo+H)$
- (e)  $R-S(K+R) > R-S(Bo+H)$   
 $R+S(K+R) > R+S(Bo+H)$

The assumption d) of the hypothesis 2 about producer prices of milk is based on the expectation that the higher milk yields reached in the favourable production regions are negatively influenced by the height of producer prices in consequence of the lower content of milk components in the milk (negative correlation between milk yield level and producer prices).

The assumption (e) of the hypothesis 2 about profitability R-S issues from thesis that the intensive breeding of dairy cows, resp. the more intensive milk production goes parallel with decreasing of unit costs, i.e. that the intensity growth will overcome the lower (eventually the same) producer price of milk

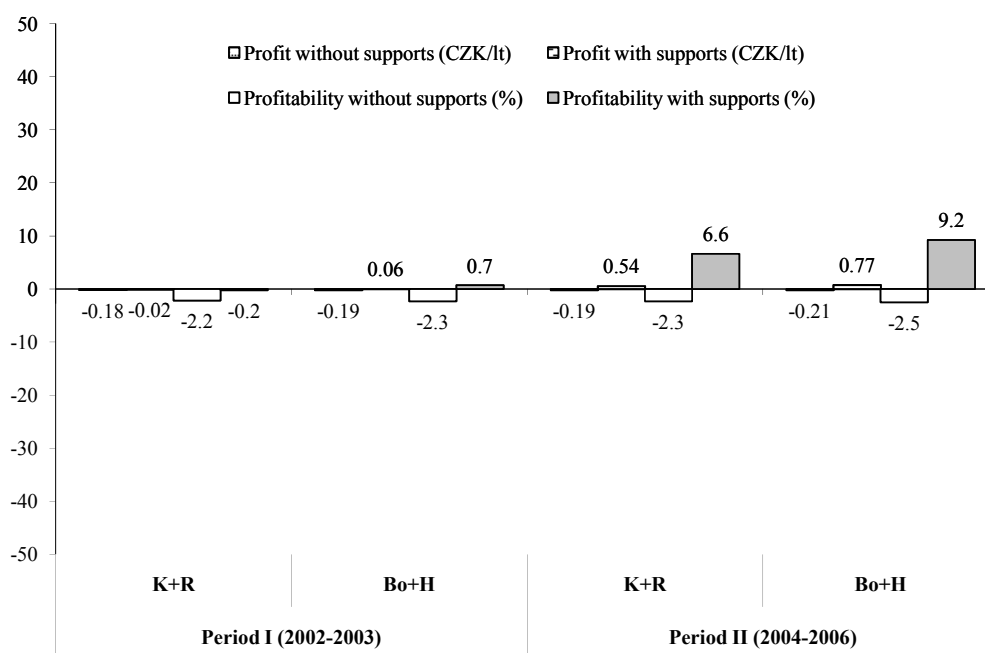


Figure 4. Regional profitability development of milk production

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

(Kopeček 2002; Poděbradský 1992; Poděbradský et al. 1992).

### **Findings**

For the average results of period I and II, there were found the following findings:

(a)–(d): assumptions were confirmed

(e): assumptions of hypothesis 2 were proved with the exception of R+S in the period II (Figure 4).

Profitability R–S reached slightly negative values in both periods, while profitability R+S has shown a change from the unprofitable milk production (in period I) to the profitable one (in the period II).

The negative profitability R–S in the period II has been caused by the quick growth of the total costs (by 11.1%, especially thanks to feeding costs and material fixed assets depreciation) related to the milk yield growth (by only 85%). The result of these facts was the growth of unit costs, whereas the growth of producer prices was only by about 1%.

A big influence on the profitability R–S had also the stagnation of producer prices, with a bigger fluctuation in the some years (e.g. in years 2003 and 2006 below the level of 7.90 CZK/l). Regarding the particularly low producer prices in these years, the profitability R–S reached the lowest values (–1.64%, resp. –4.66%) in the whole analyzed time horizon 2002–2006.

The influence of supports has shown that while the profitability R+S in the period I practically only compensated for the loss of milk production (2.1%), in the period II the profitability R+S significantly increased to the acceptable level 8.5%.

### **Profitability changes for other key agricultural commodities**

The results of the profitability analysis for key commodities of the Czech agriculture (with the exception on wheat and milk) in the time horizon 2002–2006 worked out according to the same methodology like for wheat and milk can be found in Tables 3 and 4.

### **Production economics and profitability of commodities**

The measuring of profitability changes of individual commodities have been based on the comparison of the chosen operational economic indicators in the periods I and II and had to show the factors, which have led to the changes of economic efficiency (positive or negative) and the influence of supports, which in the connection with the transition of Czech

agriculture to the CAP affected the profitability of commodities.

### **Changes of operational economic indicators (index period II/I)**

#### Per hectare yields

– a significant growth of rapeseed (by 60.4%), wheat, barley and potatoes (by 11.2–16.8%) and sugar beet (by 7.1%);

#### Animal production efficiency

– growth of milk yield (by 8.5%), higher weight increase for fattening pigs and broilers (by more than 3%); decrease of natality for suckler cows by 7%) and stagnation of weight increase for the fattening cattle;

#### Seeds and seedlings costs

– purchased seeds and seedlings: cost increase for rapeseed, sugar beet and potatoes (by 51.1%, resp. 31.2%, resp. 10.8%), and decrease for wheat and barley (–11.8%, resp. 9.4%),  
– own seeds and seedlings: cost growth for barley, rapeseed and sugar beet (range 16.8–45.1%), decrease for potatoes and wheat (range –20.6% till –6.1%);

#### Fertilizers costs

– purchased fertilizers: cost increase for all commodities (from 0.8% for rapeseed up to 32.0% for sugar beet),  
– own fertilizers: cost growth on barley and sugar beet (by 13.9%, resp. 16.0%), decrease for wheat, potatoes and rapeseed (by –10.2%, resp. –8.6%, resp. –6.2%);

#### Feeds costs

– purchased feeds: significant cost increase for fattening cattle, milk and suckler cows (range 12.3–15.6%) and decrease for fattening pigs and broilers by 7% in average),  
– own feeds: cost increase to the extent of 4.6% as far as 9.1%, with the exception of fattening broilers, which reached the significant growth of costs from 5 to 13 CZK/year;

#### Total costs

– plant commodities: growth of the total costs for potatoes and wheat about (by 5–6%), for barley and rapeseed (by 8–9%) and for sugar beet by 14.8%),  
– animal commodities: total costs decrease for suckler cows and fattening broilers (1.7%, resp. 3.4%), for fattening pigs (by 1.3%), for milk and fattening cattle (by 11%);

#### Unit costs

– plant commodities: decrease from –33.7% (rapeseed) to the –1.4% (barley) with the exception of sugar beet (growth by 7.1%);

Table 3. Another key commodities of plant production – arithmetic mean of the period I (2002–2003) and the period II (2004–2006)

| Commodity/Indicator            | Unit   | Period I          |        |        |             | Period II         |        |        |             | Index<br>period II/period I |
|--------------------------------|--------|-------------------|--------|--------|-------------|-------------------|--------|--------|-------------|-----------------------------|
|                                |        | production region |        |        | total<br>CR | production region |        |        | total<br>CR |                             |
|                                |        | K+R               | B      | Bo+H   |             | K+R               | B      | Bo+H   |             |                             |
| <b>Barley</b>                  |        |                   |        |        |             |                   |        |        |             |                             |
| Yield of hectare               | t/ha   | 4.44              | 3.79   | 3.61   | 4.05        | 5.01              | 4.21   | 3.89   | 4.50        | 111.2                       |
| Total costs                    | CZK/ha | 12 747            | 11 953 | 11 368 | 12 177      | 14 029            | 12 763 | 11 917 | 13 147      | 108.0                       |
| Unit costs                     | CZK/t  | 2 871             | 3 162  | 3 159  | 3 014       | 2 831             | 3 102  | 3 141  | 2 971       | 98.6                        |
| Average of producer price      | CZK/t  | 3 771             | 3 622  | 3 264  | 3 634       | 3 237             | 2 943  | 2 953  | 3 103       | 85.4                        |
| Direct supports                | CZK/ha | 752               | 752    | 752    | 752         | 4 174             | 4 174  | 4 174  | 4 174       | 555.0                       |
| Total supports per unit        | CZK/t  | 169               | 197    | 206    | 185         | 848               | 1 033  | 1 123  | 955         | 517.3                       |
| Profitability with supports    | %      | 37.9              | 22.4   | 10.7   | 27.7        | 47.5              | 31.5   | 32.7   | 39.8        | –                           |
| Profitability without supports | %      | 31.9              | 15.9   | 4.0    | 21.4        | 17.9              | –1.1   | –2.3   | 8.2         | –                           |
| <b>Rapeseed</b>                |        |                   |        |        |             |                   |        |        |             |                             |
| Yield of hectare               | t/ha   | 1.96              | 2.05   | 1.92   | 1.99        | 3.39              | 3.22   | 2.98   | 3.19        | 160.4                       |
| Total costs                    | CZK/ha | 18 815            | 18 444 | 16 727 | 18 060      | 21 120            | 19 957 | 17 911 | 19 617      | 108.6                       |
| Unit costs                     | CZK/t  | 9 904             | 9 247  | 8 970  | 9 327       | 6 269             | 6 237  | 6 049  | 6 186       | 66.3                        |
| Average of producer price      | CZK/t  | 6 436             | 6 615  | 6 482  | 6 537       | 6 352             | 6 203  | 6 288  | 6 259       | 95.7                        |
| Direct supports                | CZK/ha | 2 018             | 2 018  | 2 018  | 2 018       | 4 174             | 4 174  | 4 174  | 4 174       | 206.8                       |
| Total supports per unit        | CZK/t  | 1 158             | 1 093  | 1 152  | 1 124       | 1 253             | 1 319  | 1 423  | 1 329       | 118.3                       |
| Profitability with supports    | %      | –23.4             | –16.9  | –14.8  | –18.0       | 22.1              | 21.2   | 28.5   | 23.4        | –                           |
| Profitability without supports | %      | –34.4             | –28.1  | –27.0  | –29.4       | 2.3               | 0.3    | 5.2    | 2.1         | –                           |
| <b>Sugar beet</b>              |        |                   |        |        |             |                   |        |        |             |                             |
| Yield of hectare               | t/ha   | 45.87             | 52.60  | n.a.   | 46.24       | 49.75             | 45.74  | n.a.   | 49.50       | 107.1                       |
| Total costs                    | CZK/ha | 39 095            | 40 905 | n.a.   | 39 196      | 45 088            | 43 674 | n.a.   | 44 999      | 114.8                       |
| Unit costs                     | CZK/t  | 853               | 783    | n.a.   | 848         | 908               | 955    | n.a.   | 911         | 107.4                       |
| Average of producer price      | CZK/t  | 916               | 869    | n.a.   | 914         | 1 236             | 1 208  | n.a.   | 1 234       | 135.1                       |

Conclusion Table 3

| Commodity/Indicator            | Unit   | Period I          |        |        |             | Period II         |        |        |             | Index<br>period II/period I |
|--------------------------------|--------|-------------------|--------|--------|-------------|-------------------|--------|--------|-------------|-----------------------------|
|                                |        | production region |        |        | total<br>CR | production region |        |        | total<br>CR |                             |
|                                |        | K+R               | B      | Bo+H   |             | K+R               | B      | Bo+H   |             |                             |
| Direct supports                | CZK/ha | 546               | 546    | n.a.   | 546         | 2 656             | 2 656  | n.a.   | 2 656       | 486.6                       |
| Total supports per unit        | CZK/t  | 12                | 11     | n.a.   | 12          | 54                | 58     | n.a.   | 54          | 449.8                       |
| Profitability with supports    | %      | 8.9               | 12.6   | n.a.   | 9.1         | 41.9              | 32.7   | n.a.   | 41.4        | –                           |
| Profitability without supports | %      | 7.5               | 11.2   | n.a.   | 7.7         | 36.0              | 26.6   | n.a.   | 35.4        | –                           |
| Potatoes                       |        |                   |        |        |             |                   |        |        |             |                             |
| Yield of hectare               | t/ha   | 21.36             | 22.91  | 21.37  | 22.16       | 26.90             | 27.10  | 23.81  | 25.70       | 116.0                       |
| Total costs                    | CZK/ha | 58 012            | 74 728 | 65 026 | 69 740      | 73 979            | 74 820 | 70 958 | 73 042      | 104.7                       |
| Unit costs                     | CZK/t  | 2 746             | 3 270  | 3 067  | 3 164       | 2 846             | 2 801  | 3 002  | 2 874       | 90.8                        |
| Average of producer price      | CZK/t  | 3 095             | 3 666  | 3 156  | 3 430       | 2 899             | 2 860  | 2 780  | 2 835       | 82.6                        |
| Direct supports                | CZK/ha | 1 418             | 1 418  | 1 418  | 1 418       | 3 561             | 3 561  | 3 561  | 3 561       | 251.2                       |
| Total supports per unit        | CZK/t  | 68                | 65     | 69     | 67          | 142               | 134    | 151    | 141         | 211.2                       |
| Profitability with supports    | %      | 16.6              | 14.1   | 5.1    | 10.5        | 7.6               | 5.4    | –2.4   | 2.5         | –                           |
| Profitability without supports | %      | 14.2              | 12.1   | 2.9    | 8.4         | 2.7               | 0.6    | –7.4   | –2.4        | –                           |

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

Table 4. Another key commodities of animal production – arithmetic mean of the period I (2002–2003) and the period II (2004–2006)

| Commodity/Indicator            | Unit               | Period I          |        |        |             | Period II         |        |        |             | Index<br>period II/<br>period I |
|--------------------------------|--------------------|-------------------|--------|--------|-------------|-------------------|--------|--------|-------------|---------------------------------|
|                                |                    | production region |        |        | total<br>CR | production region |        |        | total<br>CR |                                 |
|                                |                    | K+R               | B      | Bo+H   |             | K+R               | B      | Bo+H   |             |                                 |
| Cattle fattening               |                    |                   |        |        |             |                   |        |        |             |                                 |
| Weight increase                | kg/FD              | 0.872             | 0.879  | 0.828  | 0.864       | 0.89              | 0.87   | 0.83   | 0.86        | 99.9                            |
| Total costs                    | CZK/year           | 13 298            | 12 386 | 11 937 | 12 566      | 14 509            | 14 033 | 13 330 | 14 007      | 111.5                           |
| Costs of live weight           | CZK/kg l.w.        | 46.42             | 42.73  | 44.08  | 44.16       | 49.60             | 48.46  | 48.40  | 48.78       | 110.5                           |
| Average of producer price      | CZK/kg l.w.        | 35.62             | 36.02  | 35.39  | 35.74       | 38.66             | 40.29  | 39.25  | 39.60       | 110.8                           |
| Direct supports                | CZK/LU             | 0                 | 0      | 0      | 0           | 1 785             | 1 785  | 1 785  | 1 785       | 0.0                             |
| Indirect supports              | CZK/slaughter head | 997               | 1 209  | 1 254  | 1 186       | 2 363             | 2 588  | 2 793  | 2 627       | 221.5                           |
| Total supports per unit        | CZK/kg l.w.        | 1.69              | 2.05   | 2.13   | 2.01        | 7.03              | 7.41   | 7.76   | 7.48        | 372.0                           |
| Profitability with supports    | %                  | -19.6             | -10.9  | -14.9  | -14.5       | -7.9              | -1.6   | -2.9   | -3.6        | -                               |
| Profitability without supports | %                  | -23.3             | -15.7  | -19.7  | -19.1       | -22.1             | -16.9  | -18.8  | -18.8       | -                               |
| Suckler cows                   |                    |                   |        |        |             |                   |        |        |             |                                 |
| Labour input                   | hours/year         | 55.46             | 40.24  | 27.70  | 34.74       | 37.60             | 39.08  | 21.54  | 29.15       | 83.9                            |
| Total costs                    | CZK/year           | 28 862            | 19 168 | 13 873 | 17 163      | 23 445            | 19 538 | 14 520 | 16 862      | 98.2                            |
| Costs of calf                  | CZK/kg l.w.        | 155.24            | 103.13 | 74.64  | 92.33       | 121.02            | 101.51 | 75.52  | 87.61       | 94.9                            |
| Average of producer price      | CZK/kg l.w.        | 52.87             | 52.87  | 52.87  | 52.87       | 64.59             | 64.59  | 64.59  | 64.59       | 122.2                           |
| Direct supports                | CZK/LU             | 4 532             | 4 532  | 4 532  | 4 532       | 4 178             | 4 178  | 4 178  | 4 178       | 92.2                            |
| Indirect supports              | CZK/slaughter head | 279               | 2 030  | 2 645  | 2 112       | 2 442             | 4 730  | 6 363  | 5 256       | 248.9                           |
| Total supports per unit        | CZK/kg l.w.        | 22.68             | 30.94  | 33.83  | 31.32       | 31.62             | 37.76  | 44.66  | 39.98       | 127.7                           |
| Profitability with supports    | %                  | -51.3             | -18.8  | 16.1   | -8.8        | -21.6             | 1.1    | 45.9   | 19.7        | -                               |
| Profitability without supports | %                  | -65.9             | -48.7  | -29.1  | -42.7       | -47.7             | -36.3  | -14.3  | -26.2       | -                               |
| Pig fattening                  |                    |                   |        |        |             |                   |        |        |             |                                 |
| Weight increase                | kg/FD              | 0.668             | 0.644  | 0.660  | 0.662       | 0.692             | 0.681  | 0.637  | 0.683       | 103.3                           |
| Total costs                    | CZK/year           | 6 031             | 5 586  | 5 871  | 5 877       | 5 704             | 6 311  | 5 970  | 5 954       | 101.3                           |



Conclusion Table 4

| Commodity/Indicator            | Unit               | Period I          |       |       |             | Period II         |        |        |             | Index<br>period II/<br>period I |
|--------------------------------|--------------------|-------------------|-------|-------|-------------|-------------------|--------|--------|-------------|---------------------------------|
|                                |                    | production region |       |       | total<br>CR | production region |        |        | total<br>CR |                                 |
|                                |                    | K+R               | B     | Bo+H  |             | K+R               | B      | Bo+H   |             |                                 |
| Costs of live weight           | CZK/kg l.w.        | 32.70             | 32.83 | 32.86 | 32.63       | 32.02             | 35.23  | 35.45  | 33.34       | 102.2                           |
| Average of producer price      | CZK/kg l.w.        | 30.69             | 30.66 | 30.21 | 30.57       | 31.97             | 31.07  | 31.46  | 31.64       | 103.5                           |
| Direct supports                | CZK/LU             | 0                 | 0     | 0     | 0           | 0                 | 0      | 0      | 0           | –                               |
| Indirect supports              | CZK/slaughter head | 26.93             | 34.35 | 28.19 | 29.35       | 144.81            | 104.41 | 218.26 | 134.00      | 456.5                           |
| Total supports per unit        | CZK/kg l.w.        | 0.25              | 0.31  | 0.26  | 0.27        | 1.33              | 0.97   | 2.01   | 1.24        | 459.4                           |
| Profitability with supports    | %                  | –5.5              | –5.6  | –6.9  | –5.5        | 4.2               | –8.7   | –5.0   | –1.2        | –                               |
| Profitability without supports | %                  | –6.2              | –6.6  | –7.7  | –6.3        | 0.0               | –11.4  | –10.9  | –4.9        | –                               |
| Poultry – broilers fattening   |                    |                   |       |       |             |                   |        |        |             |                                 |
| Weight increase                | kg/FD              | 0.047             | 0.046 | 0.046 | 0.047       | 0.048             | 0.048  | 0.049  | 0.048       | 103.3                           |
| Total costs                    | CZK/year           | 316               | 300   | 290   | 310         | 294               | 313    | 309    | 299         | 96.6                            |
| Costs of live weight           | CZK/kg l.w.        | 21.98             | 21.47 | 21.14 | 21.78       | 20.29             | 21.58  | 21.00  | 20.59       | 94.6                            |
| Average of producer price      | CZK/kg l.w.        | 21.10             | 21.23 | 21.10 | 21.13       | 20.53             | 20.72  | 21.04  | 20.60       | 97.5                            |
| Direct supports                | CZK/LU             | 0                 | 0     | 0     | 0           | 0                 | 0      | 0      | 0           | –                               |
| Indirect supports              | CZK/slaughter head | 0                 | 0     | 0     | 0           | 0                 | 0      | 0      | 0           | –                               |
| Total supports per unit        | CZK/kg l.w.        | 0                 | 0     | 0     | 0           | 0                 | 0      | 0      | 0           | –                               |
| Profitability with supports    | %                  | –3.8              | –1.1  | 0.0   | –2.9        | 1.1               | –3.5   | 0.2    | 0.1         | –                               |
| Profitability without supports | %                  | –3.8              | –1.1  | 0.0   | –2.9        | 1.1               | –3.5   | 0.2    | 0.1         | –                               |

Source: Annual inquiry about costs and intensity of agricultural products of legal enterprises (VÚZE); own calculations

- animal commodities: decrease for suckler cows and fattening broilers (by more than 5%), for fattening pigs, milk and fattening cattle (range 2.2–17.5%);

#### Producer prices

- plant commodities: decrease from –17.4% (potatoes) to the –4.3% (rapeseed) with the exception of sugar beet (growth by 35.1%);
- animal commodities: decrease for fattening broilers (by 2.5%), increase for milk (for 1%), for fattening pigs and fattening cattle (range 3.5–10.8%) and for calves in breeding system of suckler cows (by more than 22%);

#### Profitability without supports

- plant commodities: significant improvement for rapeseed from –29.4% on 2.1% and sugar beet from 7.7% to 35.4% and slight improvement for wheat (by 1.1 p. p.), decrease for barley from 21.4% to 8.2% and potatoes from 8.4% to –2.4%;
- animal commodities: improvement for suckler cows from –42.7% to –26.2% (nevertheless highly unprofitable), and further for fattening cattle, pigs and broilers in range of 0.2–3.0 p. p., with the exception of milk (decrease by 1.4 p. p.)

#### Profitability with supports

- plant commodities – the most significant improvement for rapeseed from the negative profitability –18.0% to the positive value 23.4%, significant improvement for sugar beet from 9.1% to 41.4%, for wheat and barley improvement by 22.3 p. p., resp. 12.1 p. p. The decrease for potatoes, but with the positive profitability (2.5%);
- animal commodities – significant improvement for suckler cows from –8.8% on 19.7% and fattening cattle from –14.5% on –3.6%, less significant improvement for milk from 2.1% on 8.5% and fattening pigs from –5.5% on –1.2%.

## CONCLUSION

In the period I, the profitability without supports (R–S) was positive for all analyzed plant commodities with the exception of wheat and rapeseed, while for all animal commodities the profitability R–S was negative.

There was proved that profitability with supports (R+S) in the period I was positive for most plant commodities with the exception of rapeseed, while it was negative for most animal commodities with the exception of milk, which has changed to positive values.

In the period II, the profitability R–S was positive for all plant commodities with the exception of potatoes, while for animal commodities the profitability

R–S stayed negative with the exception of fattening broilers.

In connection with the membership of the CR in the EU, agricultural supports have considerably grown up as the consequence of applying the CAP to Czech agriculture. Therefore, there were monitored in the period II important changes of the indicator profitability R+S for most commodities. Profitability R+S of plant commodities raised from the positive values in the period I to the significant higher positive values in the period I. The negative profitability R+S in the period I has changed to the positive values in the period II for suckler cows and fattening broilers, it stayed negative for fattening cattle and pigs and it stayed positive for milk.

As a summary of the findings of this paper, we can state that the profitability R+S of nearly all analyzed commodities has been improving in the time horizon 2002–2006 (the only exception is the commodity potatoes). This proves the positive influence of the CR accession to the EU on the economics of Czech agricultural sector characterized by 10 key commodities.

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Arrived on 2<sup>nd</sup> March 2009

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