Analysis of the development of the economic account for agriculture of the Czech Republic

Analýza vývoje souhrnného zemědělského účtu České republiky

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Abstract: The paper is focused on assessing the development of the economic account for agriculture of the Czech Republic in the selected reference period 1998–2003. There were evaluated effects of the particular types of the economic accounts. Methods of regression and correlation analysis and development trends were used for the mathematical-statistical analysis. The plant production output similarly as the output of agricultural industry show an increasing tendency since the period under investigation reaching a peak about 2001 and in next years decreasing in difference to the gross value added at basic prices and the net value added at basic prices which shows an increasing trend throughout the period. Both animal output and the agricultural services output show a decreasing trend reaching a minimum about 2002.

Key words: agriculture, economic accounts for agriculture, analysis of development, Czech Republic, mathematical and statistical methods

Abstrakt: Příspěvek je zaměřen na posouzení vývoje souhrnného zemědělského účtu České republiky ve vybraném referenčním období let 1998–2003. Byl posouzen vliv jednotlivých částí souhrnného zemědělského účtu. Pro matematicko-statistickou analýzu byly použity metody regresní a korelační analýzy a trendy vývoje. Rostlinná produkce podobně jako produkce zemědělského odvětví má zpočátku rostoucí tendenci, dosahuje vrcholu kolem roku 2001 a v dalších letech klesá, na rozdíl od hrubé přidané hodnoty a čisté přidané hodnoty v základních cenách, které mají rostoucí tendenci po celé sledované období. Živočišná produkce a produkce zemědělských služeb mají zpočátku klesající tendenci a po dosažení minima kolem roku 2002 mírný vzestup.

Klíčová slova: zemědělství, souhrnný zemědělský účet, analýza vývoje, Česká republika, matematické a statistické metody

Agriculture has been always the important sector of national economy which as a part of the agri-food complex using the international agrarian market ensures necessary demands not only in the CR but also abroad through its offer of food raw-material products and foodstuffs. Results of agricultural production, particularly plant production, are heavily affected by changes in weather conditions which markedly influenced results of our agriculture particularly in the recent years. In 2000 to 2003, a relatively unfavourable development was noticed in the sector of agriculture caused particularly by rainy weather and two waves of floods in 2002 and subsequent long-term drought for most of the growing season in 2003. Unfavourable conditions affecting particularly plant production, the continuing decrease in prices of agricultural products and the decrease in the stock of farm animals also negatively influenced animal production and thus also the total production of agricultural products and the sector of agriculture as a whole.

The aim of the paper is to study the economic extent and efficiency of the sector of agriculture or agricultural primary production within national economy by the means of a basic methodological tool, i.e. economic accounts for agriculture in the reference period 1998 to 2003.

MATERIAL AND METHODS

"Economic Accounts for Agriculture" consist of several basic aggregates. It refers to *production of the sector of agriculture* representing the sum of agricultural products and agricultural services produced by

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the respective units of the sector including secondary inseparable activities. Moreover, part of the account consists of the *total intermediate consumption* which measures the value of own products, goods and services consumed in the production process (except the use of fixed assets). This aggregate serves as one of the main indicators of the production intensity of agriculture. The following aggregate is *gross value added* representing the resultant effect of the sector of agriculture measured by the difference between the agricultural sector production and total intermediate consumption. This indicator serves for evaluating the efficiency of the sector of agriculture as part of the national economy. The last aggregate of economic accounts for agriculture is *net value added* which is produced by all agricultural units after the deduction of the fixed capital consumption.

In the economic accounts for agriculture, units producing for own consumption in gardens and units breeding farm animals in households are not included. However, agricultural production for own consumption is not excluded if the husbandry of farmers exceeds the lower threshold value being included in the economic accounts for agriculture. According to the new methodology, production is valued in basic prices, i.e. in amounts a producer obtains from a buyer for the unit of produced goods and services after the deduction of the tax for production and after adding subsidies for products.

The total intermediate consumption is valued in purchase prices for similar goods or services actual in the period when they enter the production process. The price includes all taxes for products after the deduction of subsidies for the products, however, deductible taxes such as VAT (value added tax) are not included.

The initial data to implement the analysis were obtained from the Czech Statistical Office database. The data are adequate to the reference period 1998 to 2003 when it was possible to use economic accounts for agriculture and their basic aggregates in fixed prices of 2000.

Mathematical-statistical processing of the data comes from the methodology given in papers of Minařík (2000), Klíma, Maca (2002), Klíma, Palát (2003a, 2003b, 2004) and Seger et al. (1998).

RESULTS AND DISCUSSION

Economic account for agriculture of the CR as a whole and in its structure during the period 1998–2003 is given in Table 1. Parameters of models of development trends of plant output, animal output, agricultural services output, output of agricultural industry, total intermediate consumption, gross value added at basic prices and net value added at basic prices are given in Table 2.

The equation for the linear model is: $y_t = a_{yt} + b_{yt}\, t$. The equation for the quadratic model is: $y_t = a_{yt} + b_{yt}\, t + c_{yt}\, t^2$. Only some of correlation indices I_{yt} are significant on the level of $\alpha = 0.01$ or $\alpha = 0.05$.

Linear trends are increasing for variables gross value added at basic prices (y_6) and net value added at basic prices (y_7). Linear trends are decreasing for variables crop output (y_1), animal output (y_2), agricultural services output (y_3), output of agricultural industry (y_4) and total intermediate consumption (y_5) – see positive or negative regression coefficients b_{yt} in Table 2. These developmental trends in the period 1998–2003 are given in graphical form in Figures 1–7.

Table 1. Economic accounts for agriculture (CZK million, constant prices of 2000) of the Czech Republic during the period 1998–2003

Indicator	1998	1999	2000	2001	2002	2003
	CZK million, constant prices of 2000					
Plant output	47 433	51 470	49 765	53 640	49 913	44 032
Animal output	53 585	52 549	50 551	49 896	49 697	49 830
Agricultural services output	1 919	1 194	872	924	783	1 184
Non-agricultural secondary activities (inseparable)	0	0	–	–	2 223	2 173
Output of agricultural industry	102 937	105 213	101 188	104 460	102 616	97 219
Total intermediate consumption	72 124	70 628	70 292	70 448	68 873	64 217
Gross value added at basic prices	30 814	34 585	30 896	34 012	33 743	33 002
Net value added at basic prices	19 085	22 016	19 067	23 273	22 781	22 564

Table 2. Models of development trends of economic accounts for agriculture (CZK million, constant prices of 2000) of the Czech Republic in the period 1998–2003

Indicator	Model type	Model parameters			I_{yt}
		a_{yt}	b_{yt}	c_{ytt}	
Plant output (y_1)	1	1 066 829.8	–508.6	–	0.2860
	2	–4 120 847 495.0	4 120 378.507	–1 029.96428	0.8930*
Animal output (y_2)	1	1 650 617.8	–799.6	–	0.9081**
	2	933 615 746.8	–932 532.475	232.875	0.9869**
Agricultural services output (y_3)	1	278 701.08571	–138.742857	–	0.6268
	2	454 362 469.948	–454 109.35	113.4642857	0.9765**
Output of agricultural industry (y_4)	1	1 994 688.0095	–945.971428	–	0.6203
	2	–2 116 276 793.3	2 116 797.617	–529.303571	0.8010
Total intermediate consumption (y_5)	1	2 621 153.81904	–1 275.54285	–	0.8661*
	2	–1 480 690 572.1	1 481 666.528	–370.642857	0.9409*
Gross value added at basic prices (y_6)	1	–626 179.85714	329.4285714	–	0.3801
	2	–635 228 614.13	634 773.7142	–158.571428	0.4647
Net value added at basic prices (y_7)	1	–1 344 362.7523	682.7428571	–	0.6746
	2	–423 840 938.35	423 074.0285	–105.571428	0.6916

Type of the function: (1) – linear, (2) – quadratic
Correlation index I_{yt} significant on the level: * α = 0.05; ** α = 0.01

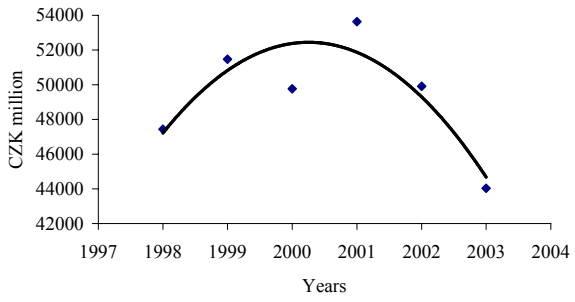

Figure 1. Plant output in constant prices of 2000 in the period 1998–2003

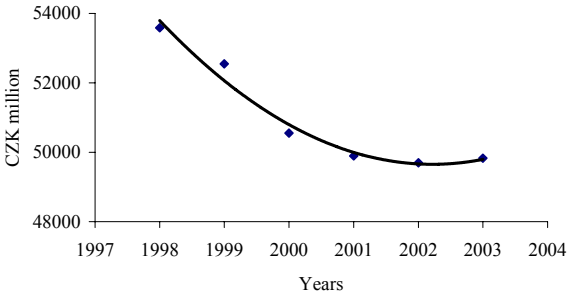

Figure 2. Animal output in constant prices of 2000 in the period 1998–2003

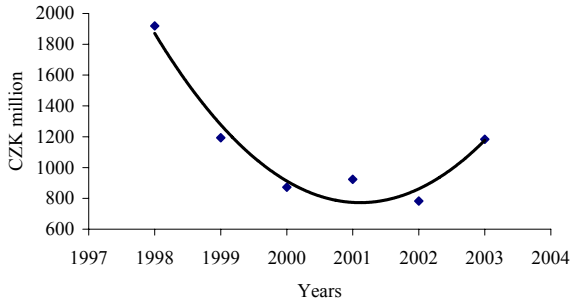

Figure 3. Agricultural services output in constant prices of 2000 in the period 1998–2003

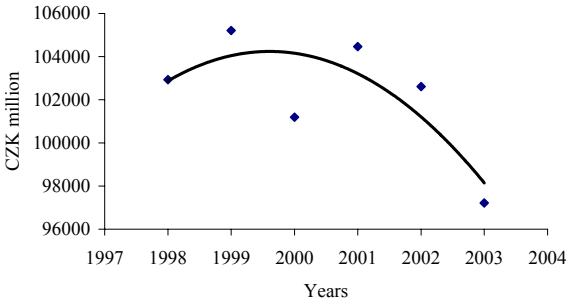

Figure 4. Output of agricultural industry in constant prices of 2000 in the period 1998–2003

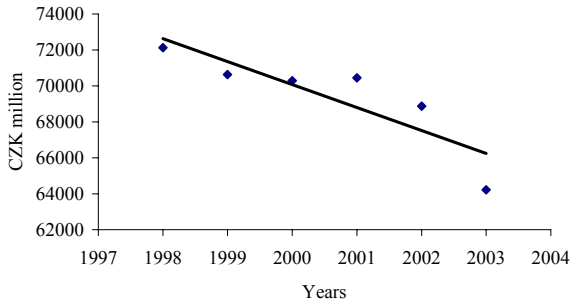

Figure 5. Total intermediate consumption in constant prices of 2000 in the period 1998–2003

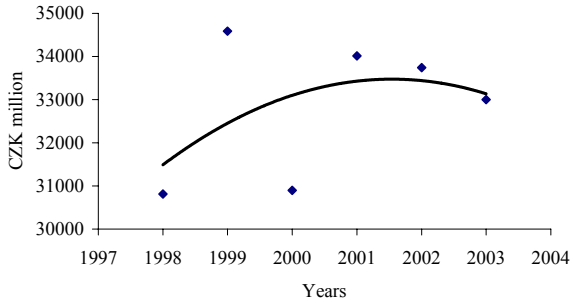

Figure 6. Gross value added at basic prices in the period 1998–2003

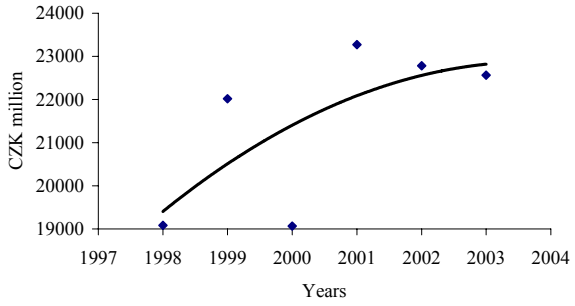

Figure 7. Net value added at basic prices in the period 1998–2003

The plant output similarly as the output of agricultural industry show an increasing tendency since the period under investigation was reaching a peak about 2001 and in the next years decreasing unlike the gross value added at basic prices and the net value added at basic prices which shows an increasing trend throughout the period. For the animal output, there is a decreasing trend and for the agricultural services output a decreasing reaching a minimum about 2002.

CONCLUSION

The paper is focused on assessing the development of economic accounts for agriculture of the Czech Republic in the selected reference period 1998–2003. There were evaluated effects of the particular types of the economic accounts. Methods of regression and correlation analysis and development trends were used for the mathematical-statistical analysis. The plant output similarly as the output of agricultural industry show an increasing tendency since the period under investigation reaching a peak about 2001 and in next years decreasing in difference to the gross value added at basic prices and the net value added at basic prices which shows an increasing trend throughout the period. Both the animal output and the agricultural services output there is a decreasing trend reaching a minimum about 2002.

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