Analysis of a long-term development of some selected parameters of Czech agriculture

Analýza dlouhodobého vývoje vybraných ukazetelů rozvoje zemědělství v České republice

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Abstract: The paper presents some partial data obtained in studies on basic indicators of the development of Czech agriculture within the time interval of 1980–2001. The statistical analysis, carried out within a spatially defined territory, enabled to compare the average level and variability of gross plant production, gross animal production and gross agricultural production (in fixed prices of the year 1989) during the period of transformation of the centrally planned economy to free market economy on the one hand, and to quantify their dynamics and structure on the other. Using the method of time series, the authors analyse absolute and relative changes in production and sale of the selected plant and animal commodities in the period of 1990–2001.

Keywords: agriculture; transformation of centrally planned economy; analysis of overall parameters development

Abstrakt: Příspěvek prezentuje dílčí poznatky získané při studiu stěžejních indikátorů rozvoje zemědělství v časovém intervalu let 1980–2001. V prostorově definované zájmové oblasti realizovaná statistická analýza zkoumaného národohospodářského odvětví umožňuje vedle komparace průměrné úrovně a variability objemu hrubé rostlinné a živočišné produkce, jakož i objemu celkové hrubé zemědělské produkce (ve stálých cenách roku 1989) dosažené v období centrálně plánovitě řízené ekonomiky a její transformace na tržní systém kvantifikovat i dynamiku a trend struktury obou odvětví. Na podkladě aplikovaných časových řad jsou v předložené stati vyhodnoceny i absolutní a relativní změny produkce a prodeje vybraných produktů rostlinné a živočišné produkce v časovém intervalu let 1990 až 2001.

Klíčová slova: zemědělství, období centrálně řízené ekonomiky a její transformace, analýza vývoje souhrnných ukazatelů

INTRODUCTION

Agriculture, as one of the basic branches of material production, plays an important role in the national economy of the Czech Republic and has a strong and irreplaceable position in production of foodstuffs. As far as the structure of employment in the civil sector of the Czech national economy was concerned, altogether 4.8% of people worked in agriculture in 2001 and it can be said that, as compared with other post-communistic European countries, this percentage was markedly different. In the global scale, agriculture produces approximately one fifth of the total material production.

From the retrospective point of view, it is necessary to remember that in the centrally planned national economy, agricultural policy was oriented on subsidies and that the government wanted to assure a progressive development of this branch of national economy and to reach the maximum possible level of self-sufficiency in production of staple foodstuffs. Within the period of 1976–1980, collective and state farms in the territory of the former Czechoslovakia were able to produce approximately 84% and 101% of the required plant and animal products, respectively. According to data published by the Czech Statistical Office (ČSÚ), the percentages of specific self-sufficiency in the Czech Republic and in Slovakia were as follows: cereals 108.6%; oil plants 89.1%; fruit 73.9% and vegetables 97.1%. As far as animal products were concerned, the overall self-sufficiency was equal to 105.2% (with 103.1% for meat of big farm animals; 106.1% for meat of small farm animals; 108.0% for poultry meat; 106.4% for eggs and 107.1% for milk and dairy products).

However, these relatively high levels of production could be reached only on the base of an exceptionally high extent of investments and material resources. One of the main causes of these high costs and progressively increasing governmental subsidies was the fact that no (or only little) attention was paid to the efficiency of the expended financial means and to ROI. This can be documented by different financial values of the volume of gross agricultural production (expressed in fixed pric-

es of 1989) per 100 CZK invested in both material and non-material costs in the main branches of Czech agriculture: in 1990, the financial volume of gross agricultural production in sugar-beet-growing region was 156.90 CZK while in the mountain production region with the worst conditions, the corresponding result was only 103.60 CZK (index = 66.0%). In state farms, the difference between the best and the worst (i.e. maize-growing and mountain) production regions was 29.5%.

The main objective of this paper is to present data obtained in studies on the average level, variability, dynamics and developmental trends of some overall indicators of Czech agriculture within the period of its transition to market economy.

SURVEY OF LITERATURE

Until now, only small attention was paid to the problem of an exact evaluation of the long-term developmental trend of Czech agriculture. From the analytical point of view, a study published by Papay (1987) can be considered as important because it described the development of gross and market production of agricultural commodities in the territory of the Czech Republic and Slovakia within the period of 1970–1985.

Maca and Bodečková (1993) described long-term trends in the volume of gross plant production in the Czech Republic with regard to the consumption of fertilisers within the period of 1948–1990.

Maca and Králík (1994) presented results of their study on developmental trends in gross and market (both plant and animal) production in the last years of centrally planned national economy in the Czech Republic and in the first stage of its transformation.

Maca and Klíma (1996) tried to quantify the average level, variability and long-term development of basic plant commodities (i. e. cereals, oil plants, potatoes, sugar beet, fruit, grapes and vegetables) as well as animal products (slaughter animals, slaughter cattle and pigs, milk and eggs) within the period of 1980–1994. This analysis demonstrated that within the five-year period of 1980–1984, the average annual changes in the volume of the basic plant and animal products showed plus signs (from +10.73% in case of oil plants to +1.22% in case of sugar beet and from +3.68% in case of slaughter pigs to +0.54% in case of slaughter cattle) while in the transformation period of 1990–1994, there was a steep decrease and all the figures had minus signs (milk –13.68%; slaughter cattle –12.69%; cereals –8.99%; eggs –6.78%; slaughter animals –5.98%; vegetables –4.62%; fruit and grapes –4.01%; sugar beet –3.56% and slaughter pigs –1.20%). All these relative decreases were significant and a positive value was found only in case of production of oil plants (+7.56%).

Maca and Klíma (1997) also studied problems associated with the entry of Czech agricultural production into world markets and analysed the impact of changes in the subsidy policy on the formation of the volume of selected commodities and their consumption. This macroeconomic analysis was focused on the developmental tendencies in the volume of gross and market agricultural production and its basic components as well as on correlations of time series of these indicators in 1990–1994.

Bodečková and Křivková (2002) evaluated dynamics and developmental trends of the plant, animal and total agricultural production indexes in the Czech Republic within the time interval of 1993–1999 and compared their results with data from Germany, Austria, Slovakia and Poland. They also used this methodology for a point and interval extrapolation of indicators in the time horizon 2001–2003.

Stávková and Maca (2002) published a statistical analysis of harvests, harvested area and per hectare yields of selected crops in the transition period of Czech national economy to the market system in years 1990–1998. Using models of linear and quadratic type, these authors demonstrated an average annual decrease in the harvest volume by –23.71% for other cereals, –13.90% for potatoes, –13.14% for rye, –9.56% for fodder crops on arable land, –7.59% for total pulses, –4.87% for barley, –3.82% for pea, –3.77% for triticale, –3.05% for total cereals and –2.38% for wheat. An average annual increase in the harvest volume was recorded in case of winter rape (+7.29%), maize for grain (+7.07%), poppy seeds (+6.51%) and early potatoes (+5.66%).

MATERIAL AND METHODS

Data obtained from the D-base of the Czech Statistical Office were used for an exact analysis and evaluation of phenomena under study. In accordance with the objectives of this analysis, the obtained indicators of extensity and intensity of production were at first described from one-dimensional point of view by means of numeric characteristics of general level ($\bar{y}$) and relative variability (v_y in %). Basic and chain indexes

$$i_{\frac{n}{0}} = \frac{y_n}{y_0} \times 100, \qquad \text{resp. } i_{\frac{n}{(n-1)}} = \frac{y_n}{Y \times (n-1)} \times 100$$

were used for description of the dynamics of index series.

The trends of indicators under study were analysed using models of developmental tendencies of the type:

$$y' = a_{yt} + b_{yt} \times t_i \ .$$

Suitability of their application was thereafter tested by means of correlation coefficients derived according to the equation

$$r_{yt} = \frac{\sum yt_i - n \times \bar{y} \times \bar{t}}{n \times s_y \times s_t}$$

where

$$s_y = \sqrt{\frac{\sum_{i=1}^{n} y_i^2}{n} - \bar{y}^2} \quad \text{and} \quad s_t = \sqrt{\frac{\sum_{i=1}^{n} t_i^2}{n} - \bar{t}^2}$$

Significance of correlation coefficients of parameters under study was tested using tables of minimum values of significant correlation coefficients at significance levels $P = 0.05$ and $P = 0.01$.

The average annual changes (increases and/or decreases) of the phenomena under study were thereafter quantified using the formula

$$b'_{yt} = \frac{b_{yt} \times 100}{a_{yt} + b_{yt} \times t_i}$$

Parameters of trend functions, describing developmental tendencies of time series under study, enabled also a point prediction.

RESULTS AND DISCUSSION

Results of the analysis can be expressed as values of their average rate of increase and/or decrease (Table 1).

Table 1. Characteristics of the rate of growth of overall indicators of the development of Czech agriculture within the period of 1980–2001

Parameter	Statistics	Period		
		1980–1989	1990–1999	1990–2001
Gross agricultural	average growth rate (%)	1.63	–3.40	–2.98
production – total	indexes 1989/1980	115.68	x	x
	1999/1990	x	73.29	x
	2001/1990	x	x	71.73
Plant production	average growth rate (%)	1.91	–2.20	–2.04
	indexes 1989/1980	118.57	x	x
	1999/1990	x	81.61	x
	2001/1990	x	x	79.80
Animal production	average growth rate (%)	1.43	–4.30	–3.72
	indexes 1989/1980	113.70	x	x
	1999/1990	x	67.31	x
	2001/1990	x	x	65.92

Table 2. Dynamics of overall indicators of the development of Czech agriculture within the period of 1989–2001

Year	Total gross agricultural production		Of this			
			plant production		animal production	
	indexes		indexes		indexes	
	basic	chain	basic	chain	basic	chain
1989	100	–	100	–	100	–
1990	130.7		131.2		130.3	
1991	119.0	90.1	127.3	97.0	113.1	86.9
1992	104.7	87.9	105.6	83.0	104.0	91.9
1993	102.3	97.7	110.5	104.6	96.4	92.7
1994	96.1	94.0	102.5	92.7	91.6	95.0
1995	101.0	105.0	105.5	102.9	97.8	106.7
1996	99.6	98.6	107.7	102.1	93.9	96.0
1997	94.6	94.9	103.8	96.4	87.9	93.7
1998	95.2	100.7	102.0	98.3	90.4	102.8
1999	95.2	100.0	107.1	105.0	87.7	97.0
2000	91.4	95.5	99.6	93.0	85.6	97.6
2001	93.7	102.5	104.7	105.2	85.9	100.3

When interpreting characteristics presented in this table both from factual and temporal points of view, it can be concluded that in 2001, the volume of gross agricultural production was by –28.3% lower than in 1990. In plant and animal production, the corresponding decrease was –20.2% and –34.1%, respectively.

Data characterising levels of basic and chain indexes are presented in Tables 2, 3 and 4. When using indexes with a fixed base, we can see that, as compared with 1989, in the year 2001, the most marked decrease occurred in gross production of fodder crops and feed root crops, viz. by 47.5%. As far as the other crops were concerned, the gross production of hops decreased by 38.7%, followed by fruit and grapes, vegetables and cereals (by 35.4%; 33.1% and 8.1%, respectively). On the other hand, a marked increase was recorded in gross production of technical crops (59.0%). An enormous decrease was demonstrated in animal production, namely by 61.0%; 44.8%; 42.0%; 23.5% and 17.3% in production of slaughter cattle, milk, slaughter animals, slaughter pigs and eggs, respectively.

When evaluating series of indexes with floating bases, the greatest decrease occurred in 1992 in production of cereals (–15.3%), followed by technical crops (–12.6%)

Table 3. Dynamics of individual components of plant production in the Czech Republic within the period of 1989–2001

Year	Cereals		Plant production		Animal production		Vegetables		Fruit and grapes		Hops	
	indexes		indexes		indexes		indexes		indexes		indexes	
	basic	chain	basic	chain	basic	chain	basic	chain	basic	chain	basic	chain
1989	100	–	100	–	100	–	100	–	100	–	100	–
1990	114.7	97.3	91.2				96.7	83.8	84.5			
1991	101.7	88.6	98.0	100.7	93.3	102.3	102.8	106.3	90.8	108.3	90.6	107.2
1992	86.1	84.7	86.2	86.2	68.0	72.9	76.8	74.7	78.3	86.2	77.4	85.4
1993	86.0	99.9	94.4	109.6	71.9	105.7	91.9	118.6	80.1	102.2	87.6	113.1
1994	87.5	101.6	98.8	104.7	64.9	90.3	83.5	91.6	74.0	92.4	87.9	100.4
1995	84.7	96.8	129.9	131.4	66.8	102.8	87.1	104.3	64.4	87.0	91.6	104.2
1996	85.0	100.4	117.6	90.6	66.1	99.0	97.4	111.9	75.7	117.4	93.8	102.4
1997	89.0	104.6	110.3	93.8	63.6	96.1	86.0	88.3	69.9	92.4	68.7	73.2
1998	85.4	96.0	130.5	118.3	55.5	87.4	87.9	102.1	72.7	104.0	45.3	66.0
1999	88.0	103.0	154.3	118.2	55.4	99.8	91.0	103.5	74.2	102.1	59.6	131.4
2000	81.0	91.9	135.7	87.9	51.4	92.7	76.6	84.2	83.8	112.9	45.1	75.6
2001	91.9	113.6	159.0	117.2	52.5	102.0	66.9	87.4	64.6	77.1	61.3	136.1

Table 4. Dynamics of individual components of animal production in the Czech Republic within the period of 1989–2001

Year	Slaughter animals total		Slaughter cattle		Slaughter pigs		Milk		Eggs	
	indexes		indexes		indexes		indexes		indexes	
	basic	chain	basic	chain	basic	chain	basic	chain	basic	chain
1989	100	–	100	–	100	–	100	–	100	–
1990	97.6		98.3		97.0		98.2		101.1	
1991	86.7	88.8	83.7	85.1	89.7	92.5	84.3	85.9	96.3	95.3
1992	86.9	100.2	81.1	97.0	93.1	103.8	75.7	89.8	93.0	96.6
1993	85.2	98.0	76.5	94.3	94.2	101.2	68.5	90.5	83.0	89.3
1994	75.3	88.4	61.3	80.1	89.3	94.8	64.1	93.6	80.5	97.0
1995	78.2	103.9	61.6	100.4	95.0	106.4	61.9	96.7	79.0	98.1
1996	77.1	98.6	59.2	96.2	95.2	100.2	62.1	100.3	76.4	96.7
1997	72.3	93.8	54.6	92.4	89.0	93.5	55.2	88.9	86.1	83.0
1998	67.2	93.0	45.6	83.2	87.7	98.5	55.5	100.5	93.7	108.8
1999	64.3	95.7	44.3	97.1	83.6	95.3	55.9	100.7	85.7	91.5
2000	58.0	90.1	38.6	87.3	76.5	91.4	55.3	99.0	79.4	92.6
2001	58.0	100.1	39.0	100.8	76.5	100.0	55.2	99.7	82.7	104.1

and vegetables (–25.3%). The most marked decrease in gross production of hops was recorded in 1998, viz. by –34.0%. Gross production of fruit and grapes decreased at most in 2001 (–22.9%). On the other hand, the highest increase in gross production was recorded in cereals in 1990 (by 14.7%), in vegetables and feed root crops in 1993 (by 18.6% and 5.7%, resp.) and in technical crops in1995 (by 31.4%). As far as fruit and grapes and hops were concerned, the maximum increase was recorded in 2000 (by 12.9%) and in 2001 (by 36.1%), respectively.

In 1991, the most marked decrease in the volume of gross animal production was recorded in case of milk (by –14.1%) while in 1994 it was in production of slaughter cattle and slaughter animals (by –19.9% and –11.6%, respectively). Production of eggs decreased at most in 1997 (by –17.0%). The maximum decrease in production of slaughter pigs occurred in 2000 (by –8.6%). On the other hand, gross production of milk and slaughter cattle slightly increased in 1999 and 2001, resp., (by 0.7% and 0.8%, resp.). In 1995, the highest increase was recorded in production of slaughter animals and slaughter pigs (by 3.9% and 6.4%, resp.). The highest increase in production of eggs was recorded in 1998 (by 8.8%).

The average annual changes in overall indexes of gross agricultural production and of individual commodities are presented in Table 5. These data illustrate changes in the volume of production and enable to estimate their future development. Regarding the length of time series under study, it was decided not to calculate confidence intervals of the estimated values because their prolon-

Table 5. Characteristics of changes in parameters of the development of Czech agriculture within the period of 1980–2001

Parameter	Absolute growth	Relative growth	r_{yt}	Extrapolation for the year 2005
	Mil. CZK	%		
Total gross agricultural production	–2 153 163	–3.03	-0.8239^{++}	64 091 237
Plant production	–415 887	–1.23	–0.4023	32 196 514
Cereals	–252 345	–1.80	-0.5845^{+}	12 967 905
Technical crops	270 712	3.95	0.8852^{++}	7 932 868
Fodder and root crops	–343 005	–7.13	-0.9055^{++}	3 440 804
Vegetables	–33 544	–2.07	-0.5886^{+}	1 487 611
Fruit and grapes	–53 338	–3.05	–0.3105	1 532 829
Hops	–39 862	–6.82	-0.7434^{++}	425 075
Animal production	–1 482 263	–3.92	-0.8536^{++}	31 894 722
Slaughter animals	–795 854	–4.74	-0.4164^{++}	13 614 007
– cattle	–758 581	–15.69	-0.9764^{++}	1 799 646
– pigs	–237 062	–1.93	-0.8085^{++}	11 326 886
Milk	–740 716	–7.08	-0.8863^{++}	7 494 890
Eggs	–51 240	–1.78	-0.6289^{+}	2 667 452

Correlation coefficient r_{yt} significant at the significance levels $P = 0.05$ (+), $P = 0.01$ (++)

Table 6. Long-term developments of some components of gross agricultural production in the Czech Republic (%)

Parameter	Year				Estimate for the year 2005
	1936	1980	1989	2001	
Cereals	11.8	16.3	16.1	20.6	20.2
Technical crops	2.9	3.9	4.4	9.5	12.4
Fodder and root crops	12.3	10.0	10.0	6.9	5.4
Vegetables	3.2	2.0	1.9	1.8	2.3
Fruit and grapes	2.5	2.4	2.7	2.4	2.4
Hops	1.3	0.7	0.8	0.9	0.7
Slaughter animals	17.4	28.5	27.7	23.0	21.2
– cattle	10.3	13.8	12.8	7.4	2.8
– pigs	5.4	14.3	14.1	15.3	17.7
Milk	21.8	18.4	19.3	16.0	11.7
Eggs	2.2	4.2	3.9	4.0	4.2

gation could influence final results due to changes in conditions existing within the study period as well as in the period of extrapolation.

The importance of these statistical data lies in the fact that they enable to compare the average annual changes in the volume of production within the whole study period. When evaluating trends in the development of these indexes of development, it can be concluded that the average relative annual decrease in the volume of gross agricultural production was –3.03% and that the corresponding figures for gross plant production and gross animal production were –1.23% and –3.92%, respectively. When specifying these average annual changes, it was demonstrated that in the branch of plant production, there was an decrease in the volume of gross production of fodder crops and feed root crops (–7.13%), followed by hops, fruit and grapes, vegetables and cereals (by –6.82%; –3.05%; –2.07% and –1.80%, resp.). An average annual increase was recorded only in gross production of technical crops (3.95%). In animal production, the highest relative average decrease was recorded in the volume of gross production of slaughter cattle (–15.69%), followed by gross production of milk, slaughter animals, slaughter pigs and eggs (by –7.08%; –4.74%; –1.93% and –1.78%, resp.).

This means that in the year 2005, the estimated decrease in the volume of gross agricultural production could be –17.7% or –15.8%, as compared with the period of 1995–2001 or with the year 2001, respectively. The corresponding decreases in volumes of gross plant and gross animal production could be –8.8% or –9.2% and –25.1% or –21.6%, respectively. As far as individual crops are concerned, the corresponding decreases gross production of cereals, fodder and root crops would

Table 7. Numeric characteristics of some parameters of the development of Czech agriculture within the period 1990–2001

Parameter	Period	Characteristics		Indexes	
		Average level (thous. CZK, fixed prices 1989) y	Variability v_y (%)	y	v_y
Gross agricultural production – total	I	97 572 863	4.26	100	
	II	105 605 607	1.64	108.2	38.5
	III	89 796 693	10.91	92.0	256.1
	IV	77 900 358	3.47	79.8	81.4
Plant production	I	40 944 982	7.19	100	
	II	43 558 982	2.30	106.4	32.0
	III	39 061 103	10.09	95.4	140.3
	IV	35 313 923	2.72	86.2	37.8
– Cereals	I	15 350 936	8.84	100	
	II	16 632 465	3.71	100.3	42.0
	III	16 240 068	13.36	105.8	151.1
	IV	14 740 268	4.11	96.0	46.5
Animal production	I	56 627 881	2.84	100	
	II	62 046 625	2.35	109.6	82.7
	III	50 735 592	12.79	89.6	450.3
	IV	42 586 436	5.00	75.2	176.0
– Slaughter animals	I	27 260 169	5.91	100	
	II	29 330 804	2.67	95.3	44.5
	III	26 094 947	9.18	94.8	209.5
	IV	20 517 424	12.30	75.3	208.1
– Cattle	I	13 648 438	3.60	100	
	II	14 417 542	0.53	105.6	14.7
	III	11 650 419	16.64	85.4	462.2
	IV	7 117 424	19.33	52.1	536.9
– Pigs	I	13 168 064	4.86	100	
	II	14 417 542	0.57	109.5	10.9
	III	14 152 308	3.45	107.5	71.0
	IV	13 169 460	9.05	100.0	186.2
– Milk	I	19 118 891	6.94	100	
	II	21 515 389	1.51	112.5	21.7
	III	17 203 400	17.36	90.0	251.1
	IV	11 051 905	39.92	57.8	575.2

Periods: I = 1980–1984; II = 1985–1989; III = 1990–1994; IV = 1995–2001

be –12.7% or –17.3%; –41.3% or –34.7%, respectively. As compared with the period 1995–2001, gross production of vegetables would be lower by –2.7% (but higher by 7.0% as compared with the year 2001). Gross production of fruit and grapes would decrease by –26.3% or –17.7% and that of hops by –40.8% or –35.6%, respectively. The only increase in gross production of plant products can be expected in case of technical crops (by 30.1% or 9.5% as compared with the period 1995–2001 or with the year 2001 only).

In animal production, the decrease in the volume of gross production of slaughter animals in 2005 would be –33.7% (as compared with the average of years 1995–2001) and –22.3% (as compared with the year 2001). The predicted volumes of gross production of slaughter cattle and slaughter pigs would be lower by –88.5% or 67.9% and by –3.5% or 3.0%, respectively. Finally, the volumes of gross production of milk and eggs would be lower by –40.6% or 38.5% and by –8.3% or –8.4%, respectively.

Marked changes were recorded in the long-term development and in the dynamics of the main crops and animal products percentages in the total volume of gross agricultural production (including predictions for the year 2005). These data are presented in Table 6.

When interpreting data presented in this table, it can be concluded that the most marked was the increase in the share of gross production of slaughter pigs in the total volume of gross agricultural production (146.8%) in 1980 as compared with 1936. As far as other commodities were concerned, their shares in gross agricultural production were as follows: eggs (91.0%), slaughter animals (63.8%), cereals (38.1%), technical crops (34.5 %) and slaughter cattle (34%). On the other hand, there was also a decrease in the share of some commodities in gross agricultural production; these decreases are as follows: hops (by –46.2%), vegetables (by –37.5%), fodder and root crops (by –18.7%), milk (by–15.6%),and fruit and grapes (by –4.0%).

When evaluating dynamics of the share of individual commodities in the total volume of gross agricultural production in 2001 as compared with 1980, it was demonstrated that gross production of technical crops, hops, cereals and slaughter pigs increased by 143.6%, 28.6% 26.4% and 7.0%, respectively, while those of slaughter cattle, slaughter animals, milk, and eggs decreased by –46.4%; –9.3%; –13.0% and –4.8%, respectively. In plant production, the shares of fodder and root crops, and of vegetables decreased by –31.0% and –10.0%, respectively.

When predicting percentages of individual commodities in the total volume of gross agricultural production in 2005, it was concluded that as compared with 2001, their shares would be higher as follows: in case of technical crops by 32.6%; vegetables by 27.8%; slaughter pigs by 15.7% and eggs by 5.0%. Marked decreases would be expected in shares of slaughter cattle (–62.2%); milk (–26.9%); hops (–22.2%) fodder and root crops (–21.7%); slaughter animals (–7.8%) and cereals (–2.0%).

The data about changes in parameters of the average level and relative variability of the volume of gross agricultural production and its components within the period of centrally planned economy and its transition to market economy are presented in Table 7. When analysing these data, it can be concluded that there was a marked decrease in the overall indexes of the development of agricultural production and that the shares of plant and animal production were rather different. In plant production, these changes were influenced undoubtedly by prices of fertilisers, pesticides, agricultural machinery, fuels and also other sources of energy, while in animal production the volume of production was influenced above all by an enormous decrease in numbers of cattle. This reduction of cattle population resulted also in a decrease in the volume of manure, which is an important factor that influences soil structure and fertility.

CONCLUSION

These data, as well as results of plant and animal production in 2001, did not demonstrate the stability of this branch of Czech national economy and/or its starting growth. It is therefore necessary to conclude that in the system of centrally planned economy, Czech agriculture was one of the most preferred industries. In the period of its transformation, however, the process of the restitution of property and of the destruction of collective farming resulted in a continuous decrease in production and in extensification. Unfortunately, we were not able to find such a variant that would result in reduction of the total volume of gross agricultural production through selective intensification and improvement of the production factors and resources distribution.

REFERENCES

Bodečková B., Křivková M. (2002): Development of agricultural output indices in the Czech Republic and neighbour countries and their prediction. In: Zborník príspevkov 11. Slovenskej štatistickej konferencie Štatistické metódy v praxi, Nitra: 24–28; ISBN 80-88946-19-0.

Maca E., Králík O. (1994): Trends of development of the Czech agriculture in the period of economic transformation. In: Collection of papers of the Faculty of Farm Economics and Management, Agricultural university in Prague. Agrarian prospect III: 341–345; ISBN 80-213-194-5.

Maca E., Klíma J. (1996): Trends of the basical gross production components in the Czech Republic. Zemědělská ekonomika, *42*: 539–548; ISSN 01-39-570X.

Maca E., Klíma J. (1997): Development tendencies of the Agriculture in Czech Republic basic indicators. Zemědělská ekonomika, *43*: 169–191; ISSN 01-39-570X.

Maca E., Bodečková B. (1993): Analysis of the long-term development of production effeciency of mineral fertilizers in the Czech Republic. Acta univ. agric. (Brno), fac. agroecon., XXVI, (1–4): 37–49; ISSN 0524-7446.

Stávková J., Maca E. (2002): Changes in indicators of the development of plant production in the Czech Republic

within the period of 1990–1998. Scientia Agriculturae Bohemica, *33*, (1): 10–17.
Papay M. (1987): Vývoj hrubej a trhovej plnohospodárskej produkcie v ČSSR v období 1970–1985. Zemědělská ekonomika, *33*, (12): 931–946; CS ISSN 0139-570X.
Statistická ročenka České a Slovenské Federativní republiky (1990). SNTL, Praha; ISBN 80-03-00517-7.
Statistické ročenky České republiky 1994–2002. ČSÚ, Scientia Praha; ISBN 80-202-0524-1, 80-203-0568-3, 80-7183-061-5, 80-7183-105-0, 80-7223-079-2, 07223-182-0, 80-7123-343-2, 807183-250-2, 80-7223-760-8.

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