

# EFFECTIVITY OF CHOSEN AGRICULTURAL ENTERPRISES MEASURED BY MEANS OF INDICATOR SYSTEMS IN DEPENDENCE ON THE SUBSIDY POLICY\*

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This contribution deals with the effectivity measurement in the chosen sample of agricultural enterprises in the relation to the financial subsidies during the time period 1999–2005. There were about 50 agricultural enterprises in the chosen sample. To find out detailed differences among them, they were classified according to the sea level of their farmlands. Financial analysis indicator systems (Altman Index, IN 99, Financial Health based on the methodology of the MA of the CR and the Du Pont Model) were used as the methods of the research work. These systems analyse the impact of the financial subsidies.

agriculture; subsidy policy; financial analysis; indicator systém; agricultural enterprises

## INTRODUCTION

The measurement of enterprise effectivity means to quantify a contribution of the enterprise activity for its goals achievement. The so-called theory of the firm derives the primary target empirically from the economic experience. There was a historical development of the enterprises targets conception (S y n e k , 1999). Maximizing profit used to be the primary target from the point of view of the original version of the theory of the firm and yet in the short time aspect, that means without time dimension and without risk influence. Aggregate gains were used as a basic indicator to measure this target, later there were profitability indicators, e. g. ROI indicator (Return on Investment) developed in 1919 by Du Pont company, ROE indicator (Return on Equity), ROA indicator (Return on Assets), etc. From the point of economic experience the enterprise primary target – maximizing profit – was transformed into the above-mentioned ROE indicator (Return on Equity), into the profit per share (EPS – Earnings Per Share) and stock quotation rise. In the 80ies more complicated models for enterprise management were formed. They include risk into making decisions and a certain kind of dynamics appeared. According to new models, the shareholder's value maximizing is considered as the enterprise production target. Most theorists and experts currently agree on determination of this target as the MVA indicator (Market Value Added) and EVA indicator (Economic Value Added).

For the common management, profit and profit based indicators (ROA, ROI, EPS and mainly ROE ) are still used for the assessment, nevertheless they do not distinguish various risks at the single companies. These indicators perform as a part of the indicator systems and they also serve as a tool for company efficiency measurement.

Their advantages are: to enable time development analysis, to perform as a tool of the cross-sectional analysis (comparison of a firm financial situation with the financial situation of other companies) and to enable creation of financial models.

The packet of profitability indicators should always be combined with the so-called Du Pont analysis, which is used especially to detect basic factors of effectiveness (K i s l i n g e r o v á et al., 2004).

## MATERIAL AND METHODS

The goal of this contribution is to assess effectivity development of an average agriculture enterprise and to evaluate the influence of the supported subsidies on the economic results of these enterprises. To state the indicators for financial analysis, we used a database of agricultural enterprises created in the research framework No. MSM 6007665806 in the years 1999–2005. From an unstable number of agricultural enterprises, such enterprises were chosen, which appeared in the database every year. This sample of the agricultural enterprises was further classified according to the sea level (to assess the differences among them properly) into groups of enterprises farming:

- up to 450 m (border chosen by a committee for mountain and submountain areas of the Agrarian Chamber of the CR as a margin limit). This area was called in the research work as the first group and there were about 13–16 enterprises.
- 450 (included) – 550 m above the sea level. This area was called the second group and there were about 14–19 enterprises.
- above 550 (included) m above the sea level. This area was called the third group and there were 12–16 enterprises.

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Database consisted of the balance sheet in short form, the gains and loss statement in short form and a questionnaire. To set the final figures from the database, average value indicators were used according to the above-mentioned classifying of the agricultural enterprises and these indicators were counted as a simple average. Thereby “average enterprise” has arisen as representative of each group. The effectivity was evaluated by the main profitability indicators – ROA, ROE and ROS. The indicator systems consisted of these values and bankrupt indicators: Altman Financial Health Index of 1983 specified for limited companies or for companies, which are not dealt with in the capital market; IN99, which is used to find out whether the enterprise is able to create an economic profit, that means it is able to create a shareholder’s value; financial health index used within the Operational Programme “Rural Development and Multifunctional Agriculture” of the Ministry of Agriculture of the CR. At the end the pyramidal analysis of the indicator, system Du Pont was performed. This system describes linking between ratio indicators and shows, which components affect the ratio indicator for return on equity, using analysis of links by the method of sequential changes (method of index value logarithm could not be used because an analysed indicator in many cases resulted in opposite direction operation). All the calculated indicators were divided into subsidy including indicators and subsidy non-including indicators. Indicators without subsidy mean that the subsidy was subtracted from the revenue because it forms the revenue component.

## RESULTS AND DISCUSSION

### The development of the subsidy amount

Before processing of the financial analysis of the indicator systems it is necessary to state the subsidy amount

for each year of the observation according to the chosen classification of the agricultural enterprises. The explicit rise of subsidies after the Czech Republic accession to the European Union in 2004 is obvious from Fig. 1.

It is necessary to describe briefly a structure of these subsidies. Permanent subsidies – **subsidy titles** – provided according to the so-called “Regulations” were of great importance before the accession to the EU and they formed a great percentage of the aggregate subsidies. From the second half of the 90ies till the accession to the EU, there were about 20–30 titles every year. The most supported commodities were: cattle, sheep, goats, and horses breeding on permanent grasslands (title 1.L), milking cows breeding (title 1.G) and support of keeping and improvement of genetical potential of farm animals and plants (title 2.). Exceptional subsidies were of great importance because they compensated for example drought losses (in 2002) and flood damage.

Another form of financial subsidies are the programmes based on legislative adaptations of the government regulations:

- **government regulations**, which support nonproductional functions of agriculture and less favoured areas (LFA). These regulations are currently financed by means of the Horizontal Rural Development Programmes (HRDP), which is a subsidy of an outstanding rise after the accession to the EU – almost twice as much and the volume of utilization is on the highest level in the enterprises with higher altitude. Subsidy rise was caused (except of new charges and programmes) by a change in the production performed by the farmers themselves because of higher subsidy utilization.
- **other government regulations**, which react on actual needs of the Czech agriculture (e. g. support of milk production quotas, etc.).

**SAPS** support (Single Area Payment Scheme), newly implemented after the accession to the EU, performs a new

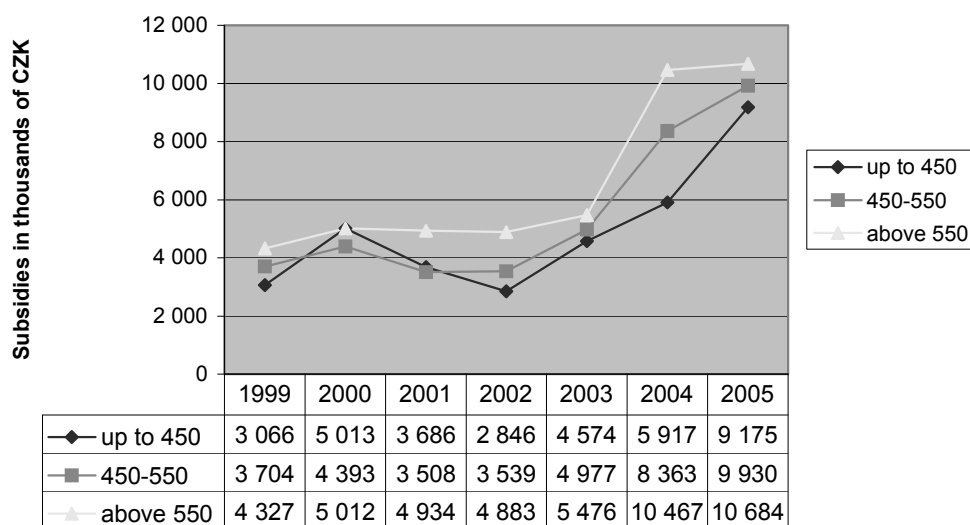


Fig. 1. Subsidies development in the years 1999–2005

Source: personal calculation

source of gains within the so-called „direct payments“, which levelled in 2004 at the amount of 1830 CZK/ha and in 2005 at 2110,70 CZK/ha (there was a 5% negotiated debit). In the scheme of the direct payments there also appeared **supplementary payments (TOP–UP)**, which within the sample of enterprises subsidized exceptionally threatened commodities in 2004: arable soil, cows without market production of milk, cattle, and forage crops and flex seed corn and in 2005: ruminants and crops on arable soil.

### Profitability and indicator systems analysis

Profitability indicators are considered to be the main indicators of the enterprise effectivity. While assessing these indicators, it is necessary to take into account that the production rentability often proves loss. It is usually caused by the influence of climate and land conditions, which meant to be a decisive factor. They influence mainly plant production and subsequently animal production. The next important factor are prices (input and output). Long term underestimation in this sector results in financial activities loss, which is caused by high costs. Negative economic profit of an agricultural enterprise results in negative profitability indicators for many years. It is necessary to point out that in the case of ROE indicator both the economic profit and the enterprise net worth can be negative. The enterprise performs as a profitable one, but

loss is realized. This situation has not happened because an average enterprise was considered in this contribution so that the negative net worth was eliminated. Next, it is necessary to mention that within the OP Agriculture, enterprises wanting to utilize subvention on fixed assets, they have to finance the project from their own sources, which are not available and they have to draw new credits. After financing of the project is ensured, subvention is allocated.

Agricultural enterprise effectivity is also influenced by the possibility of utilization of higher subsidy volume, which is twice as high in 2004 and 2005 than before. That is why more enterprises were profitable in these years. After subvention subtraction the negative profitability value is obvious (Table 1) and it becomes deeper.

Table 1 displays the development of the most important profitable indicators, whose positive maximum was in 2004, when, including subventions, the profitable indicators for all enterprises were higher than 5%. It can also be seen that the positive return on equity of the enterprises including subvention, was achieved in 2000, 2001 and then after the accession of the Czech Republic to the EU in 2004 and 2005. Only the level in 2000 and 2001 varies when the least value of the ROE indicator was achieved by enterprises above 550m above sea level. After the accession to EU the ROE indicators (including subventions) of the single enterprise get stable. Years 2002 and 2003 under the influence of climate conditions achieve negative values of ROE indicators even with all subven-

Table 1. Total return indicator in 1999–2005

Enterprise (altitude)	Item	1999	2000	2001	2002	2003	2004	2005
Return on equity (= EAT/Equity, in %)								
Up 450	with subvention	-0.10	5.91	3.52	-0.31	-1.76	7.61	4.36
	without subvention	-5.96	-3.01	-2.82	-5.49	-10.21	-2.20	-9.01
450–550	with subvention	-0.22	3.80	2.57	-0.94	-2.96	6.12	4.09
	without subvention	-8.16	-6.59	-4.37	-7.95	-13.15	-12.77	-16.79
Above 550	with subvention	0.59	3.13	0.84	-0.22	-2.63	7.24	4.66
	without subvention	-11.45	-10.15	-11.69	-12.69	-17.36	-18.41	-21.81
Basic earning power (= EBIT/Assets, in %)								
Up 450	with subvention	3.06	5.48	4.02	2.59	0.12	5.28	3.73
	without subvention	0.11	0.73	0.60	-0.12	-4.46	-0.51	-4.24
450–550	with subvention	2.14	4.44	3.72	1.44	-0.30	5.51	4.30
	without subvention	-2.22	-1.06	-0.32	-2.74	-6.30	-5.61	-8.25
Above 550	with subvention	2.53	3.32	2.18	1.28	-0.13	5.42	3.78
	without subvention	-3.28	-3.32	-4.40	-5.35	-7.76	-7.86	-11.39
Return on profit (= EAT/Revenues, in %)								
Up 450	with subvention	-0.07	4.17	2.37	-0.20	-1.34	7.53	3.39
	without subvention	-4.42	-2.26	-1.99	-3.74	-8.35	-2.41	-7.80
450–550	with subvention	-0.20	3.05	2.22	-0.85	-2.82	5.23	3.79
	without subvention	-7.99	-5.77	-4.02	-7.73	-13.83	-13.02	-19.25
Above 550	with subvention	0.49	2.71	0.73	-0.19	-2.29	5.77	4.49
	without subvention	-10.69	-9.91	-11.32	-12.11	-17.34	-18.44	-28.20

Source: personal calculation

tions. After the subvention deduction all kinds of enterprises would be non profitable, whereas the highest negative profitability is performed by enterprises above 500m above sea level (during the whole monitored period it is higher than -10% and in 2005 even -21.81%). These enterprises also appeared as the achievers of the highest volume of the absolute amount of the subvention. Generally, it can be said that the indicator was not of such a level in any year to bring an important return.

Earning power of an enterprise developed in the same way as the return on equity (ROE). Enterprises above 550 m above sea level perform again the least figures. The conclusion is that the profitability decline and the rise of the subvention importance lead to negative figures of the profitability, nevertheless, it is expressed by means of ROA, ROE, ROS either.

Based on the Altman index of the financial health (Table 2), it can be said that any average agricultural enterprise, regardless the sea level, including all subventions, appeared during the whole monitored period in the grey zone, which means that the financial health of these enterprises is not restricted and we cannot accept any statistically based prognosis about their future development. Any of the agriculture enterprises did not prove Z ratio higher than 2.9, which means an excellent financial health.

An average agricultural enterprise above 550m above sea level, threatened by bankruptcy (Z ratio lower than 1.2), proves the worst Altman index calculated for an average agriculture enterprise exclusive subvention. Even an average agricultural enterprise with altitude from 450–550 m appears in this period at the edge of the bankrupt except the years 2001 and 2002. In these years it performs figures of 1.21–2.90, which means the so-called grey zone. The

best results are achieved by enterprises with the altitude up to 450 m. They appeared in the grey zone for the whole time (the only exception was the year 2003, possibly influenced by climate conditions). But even these enterprises prove dependence of the financial results on the volume of subventions (enterprises with the highest subventions perform the worst results if these are not included).

Table 3 displays a calculation of the IN99 index, which is used to find out whether the enterprise creates the economic profit, i.e. the return on equity. Index IN99 is suitable in cases when a firm reviewer is not able to estimate the firm's opportunity costs on equity, what is necessary to know for the firm's economic profit calculation. The IN99 index is able to assess the situation of the firm with higher than 85% success (Neumaierová, Neumaier, 2002). Creating a return on equity (IN99 higher than 2.07), does not mean the availability of the enterprise to fulfil its liabilities. Its way of financing can be so aggressive that the existence of the firm is threatened. And on the opposite the enterprise need not create a return on equity and it fulfils the liability properly.

It can be seen from Table 3 that in all years, regardless the kind of enterprise and regardless the subvention, agricultural enterprises realize negative value of the economic profit (value of IN lower than 0.684). That means that there is no higher return for the owners to receive compared to the alternative investment. In 2004 average agriculture enterprises with subvention included got mostly close to the boarder of the grey zone interval (grey zone interval  $2.07 > IN99 < 0.684$ ).

Another example of the financial health index is the index used by the Operational Programme "Rural Development and Multifunctional Agriculture" of MA of the

Table 2. Evaluation of the results by means of Altman model in 1999–2005

Enterprise (altitude)	Item	1999	2000	2001	2002	2003	2004	2005
Up 450	with subvention	1.3772	1.5957	1.6227	1.5209	1.3539	1.5538	1.7150
	without subvention	1.2563	1.4005	1.4824	1.4098	1.1662	1.3159	1.3877
450–550	with subvention	1.3332	1.4172	1.5426	1.4850	1.3532	1.6483	1.6293
	without subvention	1.1542	1.1911	1.3768	1.3134	1.1072	1.1919	1.1138
Above 550	with subvention	1.1974	1.2622	1.3115	1.3104	1.1732	1.4194	1.4323
	without subvention	0.9589	0.9895	1.0416	1.0381	0.8603	0.8740	0.8094

Source: personal calculation

Table 3. Evaluation of the results by means of IN99 in 1999–2005

Enterprise (altitude)	Item	1999	2000	2001	2002	2003	2004	2005
Up 450	with subvention	0.4841	0.6246	0.5759	0.5064	0.3431	0.5239	0.5383
	without subvention	0.3352	0.3843	0.4031	0.3696	0.1120	0.2311	0.1354
450–550	with subvention	0.3980	0.5286	0.5025	0.3881	0.2835	0.5953	0.5238
	without subvention	0.1776	0.2503	0.2983	0.1768	-0.0195	0.0334	-0.1109
Above 550	with subvention	0.4065	0.4463	0.4013	0.3653	0.2793	0.5596	0.4582
	without subvention	0.1129	0.1106	0.0690	0.0301	-0.1059	-0.1119	-0.3086

Source: personal calculation

Table 4. Evaluation of the results by means of Financial Health according to MA in 1999–2005

Enterprise (altitude)	Item	1999	2000	2001	2002	2003	2004	2005
Up 450	with subvention – marks	20	31	30	23	20	31	29
	– category	B	A	A	B	B	A	A
	without subvention – marks	20	22	22	21	19	22	21
	– category	B	B	B	B	B	B	B
450–550	with subvention – marks	24	28	29	24	22	31	31
	– category	B	A	A	B	B	A	A
	without subvention – marks	21	22	22	21	19	21	21
	– category	B	B	B	B	B	B	B
Above 550	with subvention – marks	23	27	24	24	20	31	31
	– category	B	A	B	B	B	A	A
	without subvention – marks	21	21	21	21	19	21	21
	– category	B	B	B	B	B	B	B

Source: personal calculation

CR. Results of the analysed enterprises are shown in Table 4.

To evaluate the financial health we use 4 economic indicators (profitability, stability, activity and liquidity). According to the achieved results, marks are granted. The total amount is 31 marks. Calculation is undertaken every year and the final amount of marks for the assessment is an arithmetic average during the last three years. Enterprises are divided according to the amount of marks into categories A, B, C, D, E (enterprises in the category D, E – less than 15 marks are disqualified). From the analysis we can see a very good situation of the chosen agricultural enterprises because they fluctuate in categories A and B (the calculated indicators are without subsidies). Average evaluation of the enterprises with subsidies levels at 26 and without subsidies at 21 marks. Based on positive results in contrast to other indicator systems, this index is possible to consider as a “softer” one. We may assume that this is an intention of MA to enable the most of enterprises to reach the EU sources.

Analyzing return ratios in terms of profit margin and turnover ratios, referred to as the Du Pont System, is credited to the E.I. Du Pont Corporation, whose management developed a system of breaking down return ratios into their components (P e t e r s o n , 1994). From the analysis it is obvious that the improvement of ROE is possible to reach by a rise of assets profitability (by improvement of the profit but also by accelerating of the assets turnover). It is also necessary to consider other influences, e.g. credit conditions, the structure of the assets in the relationship with the liquidity, etc. For analysis and then for comparison we chose year 1999, which is the first year of monitoring and it was not influenced by any exceptional nature conditions; and the year 2005. This is the year with the last accessible items and also it is the year of the EU subsidy system implementation and its relative stability. This year was not influenced by any of the exceptional climatic conditions, too.

The effects of particular ratios were defined in case of an average enterprise including subsidies, up to 450 m

above sea level only absolutely (the same in case of an enterprise from 450–550 m above sea level). It was pointless to use relative comparison (the index was negative because of the effect of the negative indicator ROE in 1999). Because of this negative value, the value index logarithm was not applicable. For analysis of an average enterprise without subsidies up to 450 m above sea level (the same in case of an enterprise from 450–550 m above sea level and an enterprise above 550 m above sea level) is the interpretation of a relative change (index) complicated. It is necessary to take into consideration that the index was calculated as a ratio of two negative numbers. Due to mathematical bonds for the interpretation we must come from the reverse index value.

The ROE indicator increased in 2005 compared with 1999 in case of all compared enterprises with subsidies by the same part of profit per 1 CZK of owner's equity (e.g. enterprise up to 450m above sea level increase in an absolute expression by 0.0446 CZK per 1 CZK owner's equity), whereas in case of an enterprise up to 450 m above sea level and from 450–550 m above sea level ROE values increased from negative figures to positive figures (Table 5). The main reason for that is a change of the subsidy policy after the accession of the CR to the EU. Positive effect was influenced by return on assets, respectively return on earnings affected by the above-mentioned including subsidies. The other effects were of little importance.

From the comparison after deduction of subsidies in both years decrease of economical situation of agricultural enterprises is obvious for all altitudes. Return on asset decreased by more than 50%, which is an alert result (enterprise 450–550 m altitude – decrease by 51.5%, i.e. by 0.0864 CZK profit per 1 CZK of owner's equity). It is caused by decrease of return on earnings (decrease of profit per 1 CZK on yield), which was the most outstanding in case of enterprises above 550 m altitude and it was expressed in decrease of the return on equity by 62.2%, i.e. by 0.1878 CZK per 1 CZK on owner's equity.

Table 5. Evaluation of the results by means of Du Pont method comparison of 2005 and 1999 – with subvention

Item	Change of ROE	Effect of analytical indicators on the analysed indicator (ROE):			
		ROA = EAT/Revenues	Leverage = Assets/Equity	Rate of return = EAT/Revenues	Total assets turnover = Revenues/Assets
Enterprise up to 450 m altitude					
Absolute change	0.0446	0.0527	-0.0080	0.0486	0.0041
Enterprise 450–550 m altitude					
Absolute change	0.0431	0.0470	-0.0038	0.0439	0.0031
Enterprise above 550 m altitude					
Index	7.9569	9.4535	0.8417	9.1411	1.0342
Absolute change	0.0407	0.0495	-0.0088	0.0476	0.0018

Source: personal calculation

Table 6. Evaluation of the results by means of Du Pont method – comparison of 2005 and 1999 – without subvention

Item	Change of ROE	Effect of analytical indicators on the analysed indicator (ROE):			
		ROA = EAT/Revenues	Leverage = Assets/Equity	Rate of return = EAT/Revenues	Total assets turnover = Revenues/Assets
Enterprise up to 450 m altitude					
Index	0.6607	0.5579	1.1841	0.5669	0.9843
Absolute change	-0.0306	-0.0472	0.0166	-0.0455	-0.0017
Enterprise 450–550 m altitude					
Index	0.4856	0.4439	1.0939	0.4151	1.0694
Absolute change	-0.0864	-0.1022	0.0158	-0.1149	0.0127
Enterprise above 550 m altitude					
Index	0.5252	0.4421	1.1881	0.3789	1.1669
Absolute change	-0.1035	-0.1445	0.0410	-0.1878	0.0432

Source: personal calculation

## CONCLUSION

Set on basic indicators of the enterprise effectivity, simply profitability indicators, we can assess an average agricultural enterprise according to altitude categories quite positive. Of course, it is necessary to take into consideration specific agricultural sector where the fluctuation of economic results of agricultural enterprises is caused by the influence of nature conditions. The situation has changed after subsidies were deducted. Our analysis proved assumption of unfavourable and worsening development of these indicators. Using indicator systems (Altman index, IN99), we found out that average agricultural enterprises classified according to the altitude, including all subsidies are not in good condition. We have to take into account that both indexes assessment is only rough and each of them characterize different financial situation. According to IN99, all kinds of agricultural enterprises reach a negative economic value added and according to Altman index an average agricultural enterprise above 550m altitude without including subsidy is close to bankrupt. On the other side positive results were performed by financial health index of MA of the CR, when all enterprises were evaluated by categories A or B, which means a positive assessment for granting subventions. This contribution also proved that the effectivity of an agricultural

enterprise with the highest amount of subsidies is the weakest after the subsidies deduction. In other words, enterprises become dependant on subsidies and their existence without subsidy system is practically impossible. An absence of subsidy policy would mean to shut down or to restrict production of non profitable commodities.

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**Výkonnost vybraných zemědělských podniků měřená prostřednictvím ukazatelových soustav v závislosti na dotační politice.**

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Cílem předložené práce je posoudit vývoj výkonnosti průměrného zemědělského podniku a zhodnotit vliv poskytovaných dotací na výsledky hospodaření. Výkonnost byla hodnocena prostřednictvím ukazatelů rentability (ROA, ROE, ROS), Altmanovým indexem, IN99, indexem finančního zdraví podle metodiky MZe ČR a systémem Du Pont. Vypočtené ukazatele byly rozděleny na ukazatele zahrnující a nezahrnující dotaci. Na podkladě ukazatelů rentability lze hodnotit průměrný zemědělský podnik relativně pozitivně, a to zejména vzhledem ke specifickým a funkcím agrárního sektoru. Situace je zcela jiná po očištění ukazatelů o dotace, které byly v letech 2004 a 2005 více než dvojnásobné oproti předchozím rokům. Analýza potvrdila předpoklad nepříznivého a stále se zhoršujícího vývoje těchto ukazatelů. S využitím ukazatelových soustav (Altmanův index, IN99) bylo zjištěno, že průměrné zemědělské podniky se nenacházejí v příliš dobré finanční kondici. Pouze podle metodiky MZe ČR bylo postavení podniků hodnoceno dobře (kategorie A a B). Z rozboru také vyplynulo, že výkonnost zemědělského podniku s největším objemem dotací je po jejich odpočtu nejslabší – podniky se tak stávají na dotacích zcela závislými a jejich existence bez systému dotací je prakticky nemožná.

zemědělství; dotační politika; finanční analýza; soustavy ukazatelů; zemědělské podniky

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