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REGIONAL ISSUES OF AGRICULTURAL ECONOMY EFFECTIVENESS IN LATVIA

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ABSTRACT

The paper is devoted to the assessment of agricultural production effectiveness in Latvian regions, based on the differences between input use coefficients, prices and productivity levels. For the analysis data from Latvian Farm Accountancy Data Network database, Economic Accounts for Agriculture, as well as statistical data from Rural Support Service and Central Statistical Bureau of Latvia were used. Input use coefficients are performed with a help of multiple linear regression method. Study results shows that agriculture production effectiveness differs significantly between regions, that indicates that in order to research and model possible effects of Common agricultural policy reform in Latvia it is essentially to take into account regional aspect.

Keywords: effectiveness, profitability, regional issues, input use coefficients, Latvia.

1 INTRODUCTION

With the accession to the European Union (EU), Latvia is adopting *aquis communautaire* and European Common agricultural policy (CAP). The main element of the last CAP reform agreement in 2003 was the introduction of a single payment scheme (SPS), which implies a shift from agricultural production to producer support. The implementation time of the SPS depends on the decision of the Latvian government, however new payment scheme should be introduced in the new Member States not later than 2008. Besides the extended implementation time of SPS, new Member States can also decide on the regionalisation level of the amount of premiums available as well as on maintaining the certain part of direct payments coupled to production.

The research of agricultural economy effectiveness could be used as a basis in decision-making process concerning regionalisation options of SPS.

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The objective of the present study is to perform the assessment of agricultural production effectiveness in Latvian regions, based on the differences between input use coefficients, prices and productivity levels.

The object of the study is a certain crop hectare or animal in an average farm of a region. In order to make effectiveness analysis it is necessary to examine the following data:

- input use coefficients;
- agricultural crop yield, productivity of livestock;
- purchasing prices, subsidies;

The analysis of Latvian agricultural production effectiveness is performed using the regional division made on the base of the previous studies of Latvian State Institute of Agrarian Economics (LSIAE) related to agricultural land unhomogeneity researches. Seven regions were established in order to calculate income (purchasing prices, productivity/yield, subsidies) and costs (input use coefficients) parts for the analysis.

Input use coefficients are calculated on the basis of Latvian Farm Accountancy Data Network (FADN) database for year 2001 with a help of multiple linear regression method.

Economic Accounts for Agriculture (EAA) and Central Statistical Bureau of Latvia (CSB) are used as the main data sources for obtaining the purchasing prices used in the calculations. Crop and animal productivity is calculated on the basis of CSB data about crop/livestock production in all types of farms in 2001.

An average amount of subsidy paid for a specific crop hectare or animal is calculated by dividing total amount of assigned “direct nature” subsidies with an appropriate crop area or number of animals.

The paper consists of the three parts representing methods used in the study, main assumptions and the results.

2 CALCULATION OF EFFECTIVENESS

According to the specificity of the present study (the effectiveness of agricultural activity is calculated per hectare or animal) it is relevant to use commercial profitability indicators (describe the profit amount obtained from sales of a certain amount of production) for assessment of effectiveness.

Profitability (%) = Profit before tax / Total revenues x 100

Table 2.1 shows an algorithm of calculation of financial indicators.

Table 2.1 Calculation of financial indicators

x	The amount of sales of production / Production Price
=	**Value of production (net turnover)**
+	Subsidies
=	**Total revenues**
-	Specific costs in crop and animal production (seeds, plants, fertilizers, pesticides, feed, veterinary costs)
-	Overheads (maintenance costs, fuels, lubricants, electricity, heating)
-	Depreciation
-	External factor costs (hired labour force costs, interest)
=	**Profit before tax**

Source: M. Rurāne (1997) Uzņēmuma finansu vadība [Financial Management of Enterprise], Riga, Turības mācību centrs, 254 pp.

More detailed overview on the calculation of indicators included in the income and expenditure items is presented in the subchapters below.

2.1 Expenditure Part

In order to estimate regional differences of effectiveness of agricultural activity it is necessary to know the detailed use of inputs in each particular region. Unfortunately, the Central Statistical Bureau of Latvia provides information only about the amounts of *main inputs* used in production process on the *sector level*.

In 2003 the recurrent[1] calculation of input use coefficients was performed using the data of Farm Accountancy Data Network (FADN) database. The description of the data source used in the study, methods, main assumptions and results is presented below.

Data Source

The calculation of input use coefficients in 2003 was performed using the FADN database for the year 2001, which according to the FADN methodology aggregated statistical information about 349 farms of selection. Database in-

[1] The previous calculation of input use coefficients was performed in 1999. L. Dambiņa, V. Bratka, A. Miglavs, O. Rasnacs, R. Filmanoviča, S. Zvirbule, Multi Country Statistical Cooperation Pilot Projects on Statistics: Component: Agricultural Sector Modelling Use of FADN data as a basis for the generation of data on intermediate consumption in Latvia. Latvian State Institute of Agrarian Economics.

cludes information about farms' structural and productivity indicators, revenues, costs, results of economic activity.

Using the weight of farms, authors created an artificial farm sampling, where the number of farms increased to 19605.

Method

For calculation of input use coefficients authors chose a multiple linear regression method. In the present study the number of animals and hectares under field crops at farms' disposal is used as an independent variables and the amount of used inputs is treated as a dependent variable.

The calculated regression coefficients a_{11}, a_{12},…, a_{mn} show the amount of use of a particular resource per one hectare or animal of a farm. For a problem solving it is assumed that $a_0=0$, which means that the observed input was used only for agricultural needs.

For calculation of linear regression coefficients in this research authors used SPSS software tool "Non-linear regression analysis", which allows defining feasible constraints for the values of regression coefficients. Constraints for coefficients were set for those field crops and animals, where the number of farms with correspondent crops or animals is very small, that arouse difficulties in defining the coefficients.

According to the use and registration inputs can be divided into three groups:

1. inputs, which are used only in crop or in animal production;
2. inputs, which are used in crop and animal production;
3. inputs, which are also used in other connected branches, for example, forestry.

Depending on the affiliation of resources to one of these groups, input use coefficients were calculated using one of the following regression methods:

- one-stage regression analysis, when the amount of inputs used is directly distributed between the objects of agricultural production – hectares of field crops, animals (1st and 2nd group of inputs);
- two-stage regression analysis, when at first the regression coefficients are defined for different economic activities and after that the amount of inputs related to agricultural activities is distributed between the objects of agricultural production.

The usage of methods for calculation of input use coefficients is reflected in Table 2.2

Table 2.2 Usage of regression methods depending on the kind of input

Method	Kind of input
One-stage regression analysis	Seeds, plants, fertilizers, pesticides, feed, veterinary costs, depreciation
Two-stage regression analysis	Repair, fuels, lubricants, electricity, hired labour force costs, interest

The next step after defining the input use coefficients is the correction of the calculated coefficients. The objective of this activity is to adjust the values of coefficients to ensure that the sum of multiplications of those with the number of hectares and animals correspond to the actual total amount of input use in all farms but at the same time retaining the same input use structure as it was defined with the help of multiple linear regression model.

The correction of coefficient is performed according to the following formula:

$$a_{ij}^{*} = a_{ij} * I_i; \quad I_i = \frac{y_i}{\sum_{j=1}^{n} a_{ij} x_j},$$

where

a_{ij}^{*} and a_{ij} - corrected and non-corrected coefficient of i-kind input use exploited for j-kind of agricultural production object;

y_i - actual amount of use of i-kind input;

x_j - actual number of j-kind objects of agricultural production;

I_i - correction coefficient for input of i-kind.

Similar approach is used in the correction of input use coefficients on region level.

As a result of these corrections, the precise coefficients were obtained, which fully correspond to the actual amount of input use in a particular region or country as a whole.

2.2 Revenue Part

In this research the average value of production and revenues including subsidies are calculated per one hectare of field crops or one animal at farm's disposal. For the calculation of these indicators it is necessary to use the average purchase prices for a certain products, the average amount of subsidies paid and the average productivity indicators. In case of data availability the regional as-

pect is introduced in the calculations as well. The motivation of a choice of Latvian territorial division used in the research is presented in chapter 2.3.

Prices

The main source for obtaining purchase prices of certain products was Latvian EAA tables for year 2001. The regional price differences were calculated for wheat, rye, barley and milk on the basis of CSB data about the purchase of cereals and milk in all types of farms (Annex 1).

Productivity

The productivity of field crops is calculated by dividing the amount of production produced in all types of farms with the number of hectares under the correspondent crops (Annex 2).

Productivity indicators for animal production – milk yield, wool fleece, egg production, honey production are obtained by dividing the amount of production produced in a particular region with the number of correspondent animals (dairy cows, sheep, laying hen, beehives)

Meat productivity is calculated for the *whole sector* by dividing the amount of produced meat in 2001 (live weight) with the number of correspondent slaughtered animals and after that correcting obtained indicators with the slaughter weight recalculation coefficient (Annex 3).

Subsidies

All state support measures for agriculture can be divided into three groups:

1. direct production support measures, which includes payments granted to farmer for producing a particular product;
2. indirect production support measures, which are oriented towards the development of agriculture and its branches, but not linked to the amounts of agricultural production or the involvement of production factors in the production process;
3. general agriculture support measures, which mainly affect the development of agriculture by building the infrastructure of sector's activity.

In the present study the average amount of subsidies per one hectare or animal is calculated by dividing the direct subsidies paid for a particular kind of crop or animal with the correspondent crop field or number of animals. Subsidies for beef and pork production per animal are calculated dividing the total amount of subsidies with the amount of produced meat (slaughter weight) and multiplying with the average meat productivity (Annex 4).

2.3 Regional Division

The division of districts of the Republic of Latvia is made following the objective to obtain specific regions, taking into account differences in social, economic and nature conditions of Latvian territory as well as administrative-territorial division of a state, in order to precisely estimate the effectiveness of agricultural activity in different regions.

The basis for regional division of the present study is the researches made by the LSIAE about the territorial differences, which resulted in a definition of a purpose territory – Less favoured areas – in the first draft of Latvian Rural Development Plan 2004-2006. On the basis of the analysis of 22 indicators (5 demographic indicators, 6 economic indicators, 11 indicators describing the land suitability for agriculture) Latvian territory was divided into 5 regions.

Taking into consideration that the financial support for agriculture, which is the main mechanism of policy implementation is administered on the basis of regional division (9 regions) of the Rural Support Service (RSS), the above mentioned territorial division of Latvia is supplemented with the RSS regional division.

As a result the 7 regions were elaborated for the assessment of the effectiveness of agricultural activity:

Region 1 – Liepaja, Ventspils, Talsi districts; *Region 2* – Kuldiga, Saldus, Tukums districts; *Region 3* – Dobele, Jelgava, Bauska districts; *Region 4* – Riga district; *Region 5* – Limbazi, Valmiera, Valka, Cesis districts; *Region 6* – Ogre, Aizkraukle, Madona districts; *Region 7* – Aluksne, Jekabpils, Gulbene, Balvi, Rezekne, Ludza, Preili, Kraslava, Daugavpils districts.

3 RESULTS AND DISCUSSION

According to the structure of the research, the analysis of the results includes input use coefficients on sector level, regional difference indices of input use coefficients, and profitability indicators of agricultural activity on region level.

3.1 Input Use Coefficients on Sector Level

Input use coefficients are calculated with the help of multiple linear regression model on the basis of FADN data base for 2001. The coefficients are expressed in monetary terms and are calculated per one average Latvian hectare of field crops or one animal (Table 3.1). The values of the coefficients are adjusted according to the total amount of used inputs in farms.

Table 3.1 Input use coefficients, LVL per hectare, LVL per animal

Products	Seeds, plants	Fertil-izers	Pesticides	Feed	Veterinary costs	Repair	Fuel, lubricants	Electricity	Heating	Depreciation	Hired labour input (h)	Total labour input (h).	Hired labour costs (Ls)	Total labour costs (Ls)	Interest
Wheat	16,7	36,9	29,9			9,1	26,7			36,2	12,7	44,7	11,6	41,1	6,7
Rye	16,7	10,4	3,6			9,1	26,7			36,2	12,7	44,7	11,6	41,1	6,7
Barley	16,7	13,2	3,6			9,1	26,7			36,2	12,7	44,7	11,6	41,1	6,7
Oats	16,7	14,6	3,6			9,1	26,7			28,7	12,7	44,7	11,6	41,1	6,7
Mixed cereals	16,7	12,1	3,6			9,1	26,7			28,7	12,7	44,7	11,6	41,1	6,7
Triticale	16,7	12,1	3,6			9,1	26,7			28,7	12,7	44,7	11,6	41,1	6,7
Other cereals	16,7	12,1	3,6			9,1	26,7			28,7	12,7	44,7	11,6	41,1	6,7
Pulses	35,2	21,6	14,4			9,1	26,7			28,7	12,7	44,7	11,6	41,1	6,7
Potaotes	351,1	35,3	69,6			71,8	87,4			43,1	49,3	193,7	109,7	431,2	6,7
Sugarbeets	61,9	183,2	35,0			126,0	83,4			43,1	55,1	138,9	68,9	173,7	6,7
Rape	16,7	36,9	29,9			9,1	26,7			84,7	12,7	44,7	11,6	41,1	6,7
Oil and fibre crops	11,6	13,4	3,6			47,6	104,8			84,7	49,3	193,7	49,2	193,4	6,7
Field vegetables	42,1	86,1	25,3			25,1	160,2			43,1	49,3	193,7	49,2	193,4	6,7
Vegetables in covered areas	172,9	199,2	150,1			798,7	404,7	127,2	160,8	588,4	873,9	3249,8	2146,6	7982,5	6,7
Dairy cows				177,6	18,9	14,5	34,4	16,1	1,8	3,3	57,5	200,8	43,8	152,9	1,6
Young cattle before 1 year of age				100,1	3,8	14,5	34,4	6,3	1,8	3,3	57,5	200,8	21,8	76,0	1,6
Young cattle over 1 year of age				100,1	3,8	14,5	34,4	6,3	1,8	3,3	57,5	200,8	21,8	76,0	1,6
Other cattle				100,1	3,8	14,5	34,4	6,3	1,8	3,3	57,5	200,8	21,8	76,0	1,6
Fattening pigs				64,4	1,4	1,3	2,0	1,7	1,7	4,4	1,3	5,7	0,6	2,6	1,6
Piglets				64,4	1,4	1,3	1,5	1,7	1,7	4,4	1,3	5,7	0,6	2,6	1,6
Sows				204,0	6,8	1,3	2,4	4,8	1,7	4,4	21,2	58,1	17,2	47,0	1,6
Sheep				15,2	1,7	0,4	2,1	1,5	0,6	1,1	25,9	76,1	13,2	38,6	1,6
Goats				15,2	1,7	0,4	2,1	1,5	0,6	1,1	25,9	76,1	13,2	1863,2	1,6
Poultry				4,7	0,2	0,1	0,1	0,2	0,4	0,7	0,5	1,6	0,7	0,4	0,2
Horses				102,6	1,7	0,4	2,1	6,3	0,6	1,1	25,9	76,1	13,2	38,6	1,6
Rabbits				5,1	0,8	0,1	0,5	0,0	0,0	0,1	2,6	7,6	2,2	6,4	0,07
Bees				5,1	1,1	0,1	0,5	0,0	0,0	0,5	2,6	7,6	2,2	6,4	0,07

Source: LSIAE calculations

On farm level labour costs are shown only for a hired labour force. Total labour costs (hired and unpaid labour force) are calculated on the basis of the assumption, that the hourly rates for hired and unpaid worker are the same. Therefore total labour costs are calculated by multiplying total labour input expressed in hours with the hourly rate of a hired worker, which in its turn is calculated dividing hired labour costs with the hired labour input expressed in hours.

Total costs per hectare or animal are calculated by summing correspondent items of costs horizontally. For each type of field crop hectare or animal the two sums of total costs can be calculated, which will be used in the analysis of profitability presented in the following chapters.

3.2 Input Use Coefficients on Region Level

In order to calculate input use coefficients on region level, the actual amounts of used inputs in a particular region were compared with the theoretical amounts, i.e. calculated using the coefficients. After that input use coefficients in a particular region were adjusted with the help of the above-mentioned indices reflected in Table 3.

Table 3.2 Regional correction indices of input use coefficients

Inputs	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Seeds, plants	0,95	1,18	1,05	1,02	0,89	1,16	0,81
Fertilizers	0,94	0,97	1,14	1,22	0,98	0,88	0,81
Pesticides	1,27	0,95	1,23	0,98	1,14	0,73	0,71
Feed	1,26	1,03	1,02	0,86	1,03	0,86	1,02
Veterinary costs	0,77	1,28	1,09	1,45	0,88	1,14	0,74
Repair	0,97	0,72	1,37	1,12	1,19	0,80	0,75
Fuel, lubricants	0,84	1,15	1,05	1,05	1,15	0,97	0,90
Electricity	0,75	1,11	1,42	0,87	1,46	0,81	0,95
Heating	0,56	0,56	1,16	2,60	0,81	0,26	0,63
Depreciation	1,04	0,91	1,16	0,77	0,81	0,93	0,99
Hired labour input (hours)	0,31	1,22	1,81	1,48	1,02	0,49	0,67
Total labour input (hours)	0,94	0,99	1,09	0,89	0,59	0,88	1,19
Hired labour costs (LVL)	0,21	0,95	1,61	0,94	1,19	0,59	0,64
Interest	1,31	1,02	1,22	0,83	1,55	0,57	0,72

Source: LSIAE calculations

The use of a particular input per one hectare or animal in a region (in monetary terms) can vary depending on

- specialization of agricultural production and therefore intensity of use of certain resources;

- input producers'/purchase prices;
- total intensity level of agricultural production in a region.

3.3 Effectiveness Indicators of Agricultural Production on Region Level

In the present study profitability indicators were used for the analysis of effectiveness of agricultural production. The object of profitability analysis is field crop hectare or animal in average farm in each of the seven regions. Depending on the calculation of labour costs

1. labour costs are estimated only for hired workers (I);
2. labour costs are estimated according to the total labour input, e.i. unpaid workers were evaluated as well (II),

two levels of profitability were calculated (Table 3.).

Profitability is influenced by

- *amounts of used inputs* (in terms of value): volume, t; input prices, LVL per tonne;
- *total amount of revenues*: productivity, tonne per hectare, tonne per animal; purchase price of products, LVL per tonne; amount of paid subsidies, LVL per tonne, LVL per animal.

Profitability is computed per field crop hectare or animal of an average farm, assuming that all production per hectare or animal is sold at average purchase price in a particular region, the calculated average amount of resources in a certain region was used in production process and the amount of subsidies paid corresponds to that of an average level in the country.

Evaluating production profitability in a certain region it is crucial to take into consideration factors, which have affected its value in comparison with the same indicators in other regions. Production profitability of wheat, rye, barley and milk are affected by regional differences in the levels of purchase prices, productivity and the amounts of input use. At the same time the main factor affecting meat production profitability (due to the lack of information) is the amount of input use. The levels of profitability of some products could be the same, while economic evaluation according to the factors affecting profitability are different. Therefore it is desirable to study profitability indicators in dynamics, which will be an objective for the further research.

The economic interpretation of value of profitability in this research is the following – profitability shows the average amount of profit before tax, ensured by 1 LVL of revenues, which is obtained from sales of average amounts of production from one hectare or animal and granted subsidies for tonne of production or animal.

Table 3.3 Profitability of agricultural production in regions, LVL/ha, LVL/animal

	Region 1		Region 2		Region 3		Region 4		Region 5		Region 6		Region 7	
Products	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Wheat	-0,14	-0,29	-0,15	-0,29	-0,04	-0,15	-0,01	-0,09	-0,51	-0,64	-0,05	-0,30	-0,16	-0,47
Rye	-0,01	-0,23	-0,15	-0,35	-0,32	-0,51	-0,16	-0,28	-0,01	-0,13	-0,03	-0,37	0,10	-0,24
Barley	-0,22	-0,47	-0,21	-0,41	-0,40	-0,60	-0,10	-0,22	-0,30	-0,45	-0,12	-0,49	-0,09	-0,50
Oats	-0,18	-0,44	-0,23	-0,44	-1,10	-1,42	-0,58	-0,75	-0,60	-0,79	-0,18	-0,59	-0,08	-0,51
Mixed cereals	-0,07	-0,31	-0,48	-0,75	-1,11	-1,44	-0,11	-0,23	-0,46	-0,64	0,03	-0,32	-0,18	-0,65
Triticale	0,02	-0,20	0,23	0,10	0,21	0,09	0,31	0,24	-0,16	-0,30	-0,08	-0,46	0,27	-0,03
Other cereals (buckwheat etc.)	-0,44	-0,77	0,04	-0,13	-0,39	-0,60	0,13	0,03	-0,21	-0,35	-0,19	-0,61	0,07	-0,30
Pulses	0,06	-0,10	0,05	-0,08	-0,31	-0,46	0,55	0,52	-0,22	-0,34	0,62	0,52	0,15	-0,11
Potatoes	0,30	0,04	-0,11	-0,42	-0,63	-1,05	0,31	0,18	0,14	-0,05	0,01	-0,50	0,09	-0,53
Sugarbeets	-0,42	-0,67	0,05	-0,06	-0,07	-0,16	-0,18	-0,24	-0,12	-0,19			0,20	-0,06
Rape	-0,24	-0,38	-0,29	-0,41	-0,17	-0,26	-0,72	-0,82	-0,24	-0,32	-0,12	-0,33	-0,50	-0,81
Oil and fibre crops	-0,11	-0,57	-0,14	-0,50			-0,39	-0,67	-0,18	-0,44	-0,06	-0,72	0,00	-0,70
Field vegetables	0,44	0,28	0,29	0,13	0,22	0,06	0,50	0,43	0,14	0,01	0,30	-0,01	0,30	-0,06
Vegetables in covered areas	0,82	0,53	0,69	0,41	0,75	0,60	0,90	0,85	0,76	0,62	0,76	0,27	0,87	0,60
Dairy cows	0,27	0,07	0,24	0,06	0,15	-0,04	0,36	0,26	0,16	0,03	0,29	-0,08	0,25	-0,14
Cattle	-0,16	-0,43	-0,18	-0,41	-0,32	-0,55	-0,10	-0,24	-0,26	-0,43	0,03	-0,39	-0,06	-0,51
Pigs	-0,29	-0,31	-0,09	-0,11	-0,13	-0,16	0,02	0,01	-0,12	-0,13	0,08	0,05	-0,06	-0,10
Sheep	-0,14	-0,96	-0,46	-1,13	-0,79	-1,40	-0,42	-0,80	-0,57	-0,98	-0,02	-1,20	-0,19	-1,54
Goats	0,82	0,69	0,74	0,62	0,60	0,47	-0,38	-0,74	0,78	0,72	0,82	0,61	0,75	0,47
Poultry	-0,51	-0,74	-0,74	-0,97	-0,20	-0,32	-3,43	-3,75	-0,54	-0,66	-0,07	-0,39	-0,18	-0,51
Horses	-0,18	-0,35	-0,08	-0,22	-0,17	-0,30	0,07	-0,01	-0,13	-0,22	0,12	-0,15	-0,02	-0,31
Rabbits	-1,37	-2,40	-1,64	-2,46	-2,00	-2,77	-1,40	-1,85	-1,72	-2,24	-1,10	-2,67	-1,26	-2,96
Bees	0,65	0,51	0,65	0,55	0,64	0,55	0,66	0,61	0,52	0,44	0,76	0,59	0,67	0,45

Source: LSIAE calculations

Profitability indicators calculated on the basis of a second labour cost computation variant seems to be more logical, since they include the evaluation of total labour input and therefore reflect the total contribution of resources.

The negative values of the obtained profitability indicators are prevailing in this research. That means that agriculture in Latvia, as a whole is unprofitable and cannot be the only sufficient source of income for an average farm. As the main reasons for such unprofitability low productivity indicators, inefficient use of inputs can be named. It is important to analyse not only the values of profitability indicators, but also the differences in values of factors forming these indicators.

More detailed review on the productivity indicators of certain products on region level, calculated on the basis of the total labour input variant (II) is given below.

Wheat

The profitability of wheat production in regions is determined by different levels of purchase prices, yield indicators as well as different amount of inputs used per one hectare expressed in value terms (Annex 5). In the third region the revenues from one hectare of wheat are the highest, which can be explained with the higher yield indicators and relatively high average purchase prices comparing with those of average in the country. Due to high land quality in the third region, farms are specializing in production of field crops, therefore the amount of inputs used for such production is larger than in other regions. The advantage of a fourth region is high average purchase price of wheat, which in line with the relatively low indicators of input use, result in higher profitability indicators of wheat production.

As it was mentioned before it is important to study profitability in dynamics, because the greater input use in a particular region today can result in the more rapid increase of yield indicators in future.

Potatoes

The effectiveness of potatoes productions on region level in contrast with wheat productions depends on two factors: the value of input use and yield of potatoes (Annex 6). In the present study the assumption was made that purchase price of potatoes is the same in all regions. Due to high land quality in the third region there are almost no production of potatoes and therefore in this region on average production of potatoes is relatively inefficient and values of profitability indicators are negative.

Due to the large amount of total labour input in the sixth and seventh region total costs per one hectare are high. Yield of potatoes corresponds to country's average level, which is not sufficient to ensure the positive profitability indicators of production.

Milk

Profitability indicator of milk production is highest in the fourth region, which could be explained by higher milk yield indicator, high purchase price of milk and relatively small amount of input use, determined by lower total costs of feed (Annex 7). In the first, second, third and fifth regions the average revenues from sales of milk are nearly the same. The levels of profitability were determined by the average input use for one dairy cow in a region.

Milk yield indicators in the sixth and seventh region are the lowest in Latvia, while the amounts of used inputs are relatively large, which can be determined by assessment of unpaid labour input in monetary terms.

Beef and Pork

In this research the only factor, which affected profitability indicators of beef and pork production was different level of input use among the analysed regions. One of the reasons for such low average revenues from sales of meat products could be the assumption about the average amount of subsidies per one animal, which was calculated per all slaughtered animals.

Compared to the production of pork, production of beef can be evaluated as unprofitable: revenues from sales are far behind the amounts of input used expressed in monetary terms. It is known that production of beef is a by-product of milk production. Therefore analysing information reflected in Annex 8 it is important to keep in mind, that the above-mentioned beef is mainly the meat obtained from slaughtering dairy cows.

For the analysis of profitability of pork production in the expenditure part the amount of resources needed for a fattening pig was taken into consideration.

As it was mentioned before, regional differences of profitability indicators are directly linked to the total amount of resources, needed for one animal in a particular region. The structure of input use on region level varies: for example in the fifth and sixth region a total labour input (hired and unpaid) expressed in monetary terms comprises a relatively large share in the total input use structure. In the third region the larger share corresponds to costs of maintenance of equipment, while in the first region the animal feed costs are prevailing.

In the calculations of profitability indicators for animals like sheep, goats and poultry, revenues from sales of both groups of products were estimated (sheep – meat and wool, goats – meat and milk, birds – meat and eggs).

CONCLUSIONS

1. Study of agricultural production effectiveness in Latvia, based on the input use coefficients, prices and productivity levels, shows that agriculture production effectiveness differs significantly between regions.
2. In order to reflect a total input use the "total labour costs" were estimated, i.e. hired and unpaid (family labour resources) labour force are calculated on the basis of the assumption, that the hourly rates for hired and unpaid worker are the same.
3. Evaluating production profitability in a certain region it is crucial to take into consideration factors, which have affected its value in comparison with the same indicators in other regions. The same levels of profitability might have radically different economic interpretation.
4. Unequal agricultural resource and input use division among regions and as a result – significant differences in agricultural production effectiveness indicate that in order to research and model possible effects of European Common agricultural policy reform in Latvia it is essentially to take into account regional aspect.

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Annex 1 Average purchase prices of certain products used in calculation of revenues in Latvian regions in 2001, LVL/tonne

Products	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Wheat *	54,37	55,98	59,70	61,92	58,98	59,27	55,32
Rye *	54,45	47,27	52,74	52,96	54,74	53,70	56,66
Barley *	50,90	50,63	52,71	53,03	53,28	54,14	50,91
Oats				53,69			
Mixed cereals				52,87			
Triticale				52,52			
Other cereals (buckwheat etc.)				96,55			
Pulses				127,22			
Potatoes				68,54			
Sugarbeets				19,47			
Rape				121,10			
Oil and fibre crops				78,85			
Field vegetables				56,48			
Vegetables in covered areas				349,98			
Milk **	102,15	95,60	94,98	98,60	96,95	91,25	92,40
Beef (slaughter weight)***				856,74			
Pork (slaughter weight) ***				983,10			
Sheep meat (slaughter weight) ***				1200,24			
Sheep wool ****				653,48			
Goat meat (slaughter weight) ***				1200,24			
Goat milk				357,70			
Poultry (slaughter weight) ***				1037,35			
Eggs (thousand pieces)*****				36,70			
Horse meat (slaughter weight) ***				550,79			
Rabbit meat (slaughter weight) ***				1359,86			
Honey*****				2362,30			

Source: LSIAE calculations using CSB and EAA data

*- CSB; Purchase of cereals in all types of farms, 2001;
**- CSB; Purchase of milk in all types of farms, 2001;
***- CSB; Purchase N 11; 2001;
****- CSB; Form 24, Report on animal production, 2002;
*****CSB; Report 21, 2001.

Annex 2 Productivity indicators of field crops and animals used for calculation of revenues in Latvian regions in 2001, tonne per ha, tonne per animal

Productivity indicators	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Wheat	2,53	2,47	3,13	2,60	1,84	2,25	2,05
Rye	1,82	2,02	1,87	1,71	2,05	1,78	1,86
Barley	1,66	1,87	1,84	1,89	1,68	1,68	1,74
Oats	1,55	1,66	1,10	1,22	1,29	1,52	1,57
Mixed cereals	1,70	1,34	1,08	1,76	1,41	1,86	1,42
Triticale	1,87	2,74	3,15	2,95*	1,82	1,67	2,38
Other cereals (buckwheat etc.)	0,67	1,17	0,94	1,26	0,95	0,82	1,01
Pulses	1,14	1,23	1,02	2,61	0,95	2,85	1,11
Potatoes	14,00	10,68	8,21	16,44	13,25	10,91	9,83
Sugarbeets	19,38	31,54	35,63	28,43*	29,53	n.d.	30,99
Rape	1,34*	1,27	1,73	0,90	1,35	1,33	0,94
Oil and fibre crops	0,22*	0,68*	n.d.	n.d.	0,82	0,50	0,60
Field vegetables	11,85	11,31	11,68	15,90	9,64	9,91	9,15
Vegetables in covered areas	40,57*	36,19*	72,13*	137,65*	57,56*	36,55*	75,82*
Dairy cows (milk)	4,02	4,26	4,27	4,51	3,99	3,86	3,95
Goats (milk)	0,39	0,34	0,26	0,67	0,46	0,36	0,28
Honey (tonne per hive)	0,011	0,012	0,013	0,012	0,009	0,014	0,011
Wool (kg per animal)	2,07*	1,10*	2,26*	2,49*	2,42*	4,41*	2,18*
Eggs (thousand pcs per laying hen)	0,173	0,124	0,255	0,243	0,163	0,191	0,204

Source: LSIAE calculations using CSB data

*- data for year 2002

Annex 3 Meat productivity indicators used for calculation of revenues in Latvia in 2001, tonne per animal (slaughter weight)

Productivity indicators	Beef	Pork	Sheep meat	Goat meat	Poultry	Horse meat	Rabbit meat
	0,181	0,073	0,02	0,02	0,0015	0,213	0,0026

Source: LSIAE calculations using CSB data for 2001

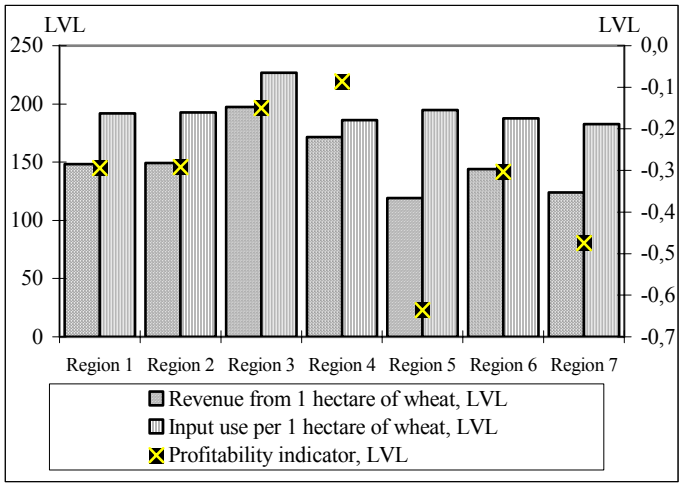
Annex 4 Average amount of subsidies per hectare or animal used in calculation of revenues in Latvia in 2001, LVL per hectare, LVL per animal

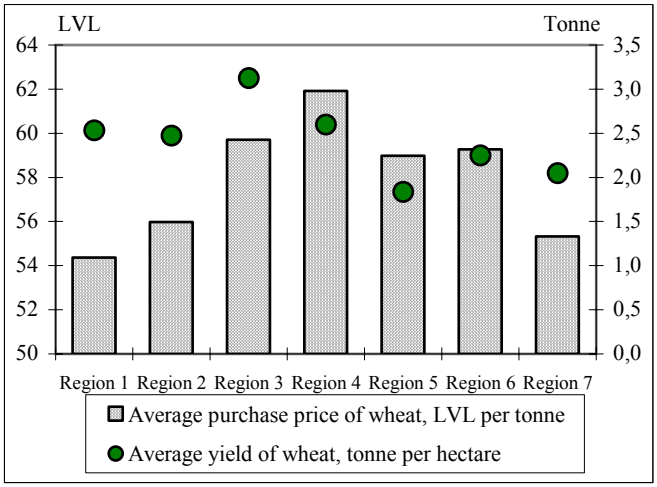
Products

Wheat	10,68
Rye	9,99
Barley	8,06
Oats	7,3
Mixed cereals	7,44
Triticale	8,02
Other cereals	7,44
Pulses	8,36
Potatoes	2,33
Sugarbeets	0
Rape	13,96
Oil and fibre crops	224,6
Field vegetables	2,73
Vegetables in covered areas	1680
Dairy cows	15,17
Cattle	7,06
Pigs	1,34
Sheep	1,36
Goats	1,36
Poultry	0,0032
Horses	5

Source: LSIAE calculations using Rural Support Service data for 2001

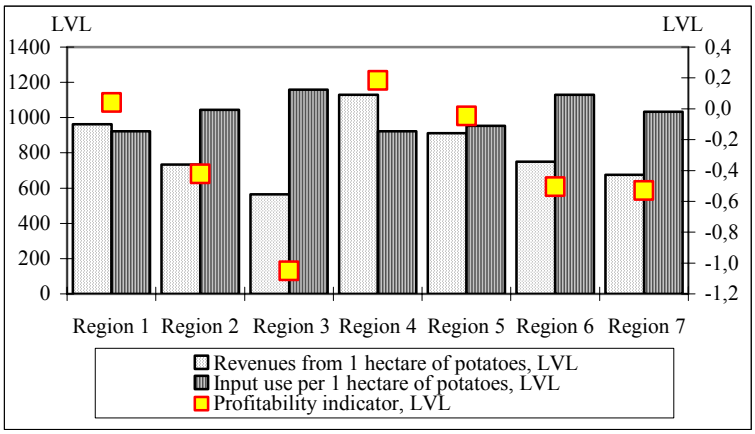
Annex 5 Indicators describing profitability of wheat production in Latvia in 2001





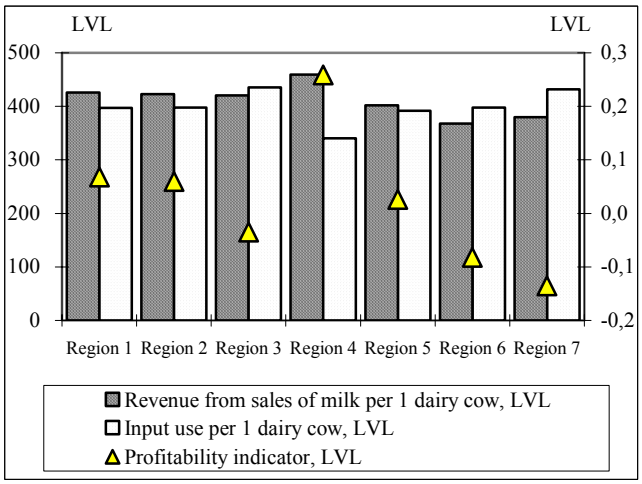
Source: LSIAE calculations using RSS and CSB data

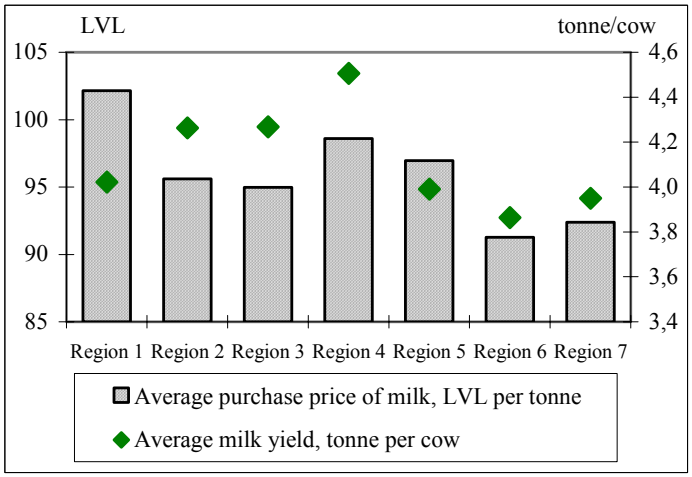
Annex 6 Indicators describing profitability of potatoes production in Latvia in 2001



Source: LSIAE calculations using RSS and CSB data

Annex 7 Indicators describing profitability of milk production in Latvia in 2001





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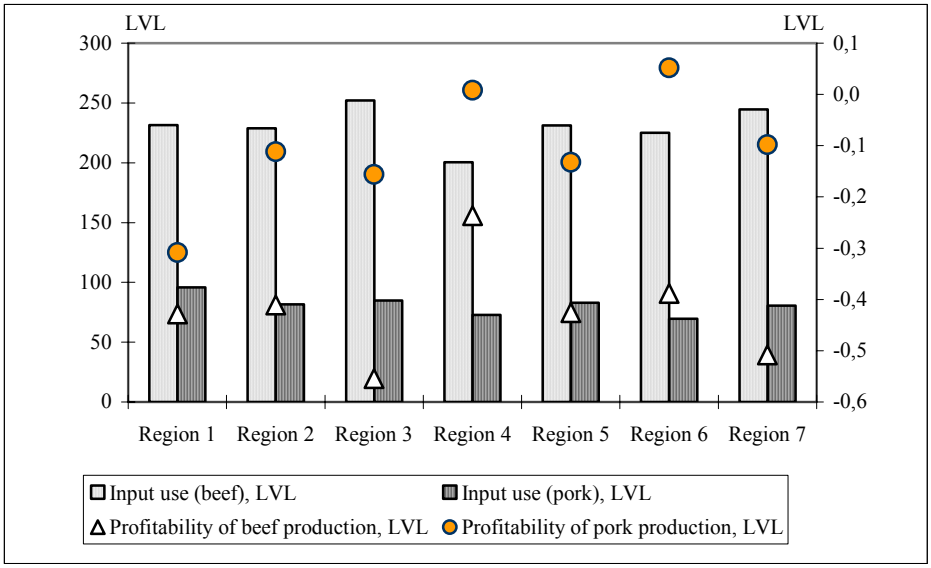
Annex 8 Profitability of beef and pork production in Latvia in 2001