

CHANGES AND TRENDS IN GRAIN PRODUCTION IN LITHUANIA AFTER ACCESSION TO THE EU

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Abstract

The aim of this paper is to disclose the main changes and trends of Lithuanian grain production. Using quantitative statistical methods, the paper proposes an economic analysis of grain production changes in the period 2004-2015. This analysis revealed that the importance of grain sector in terms of the share of gross agricultural output has increased in Lithuania. Over the analysed period the yielding capacity of grain and the area under crops went on increasing. These in turn lead to an increase of the usable production by 2.2 times, the beginning stocks by 54% and self-sufficiency level reached 318%. In 2015 just 31% of the usable production has been used for domestic needs, as compare to 2004, decreased by more than 50 percentage points. Over the period exports of grain increased significantly by 6.2 times. This confirmed the improved competitiveness of the grain sector. The Common Agricultural Policy direct payment scheme was favourable to grain farms, as the farm net income per family work unit gained by family farms specialist in cereals, oilseeds and protein crops was even by 2.0 times higher than the average in all farms. In order to ensure the income these farms need to use internal or/and external risk management measures.

Key words: balance, grain crops, prices, production

INTRODUCTION

The world is experiencing rising demands for crop production, stemming from three key forces: increasing human population, meat and dairy consumption from growing affluence, and biofuel consumption [5]. Global cereal production has doubled in the past 40 years, mainly from the increased yields resulting from greater inputs of fertilizer, water and pesticides, new crop strains, and other technologies of the Green Revolution. The supply of agricultural products and ecosystem services are both essential to human existence and quality of life. However, recent agricultural practices that have greatly increased global food supply have had inadvertent, detrimental impacts on the environment and on ecosystem services. Though the crop production will become more difficult with climate change, resource scarcity (e.g. land, water, energy, and nutrients) and environmental degradation (e.g. declining soil quality, increased greenhouse gas emissions, and surface water eutrophication) [3, 6, 8].

Lithuanian grain sector after the accession to the EU faced with changes and challenges in the new market. In Lithuania the grain sector became one of the main branches of agricultural production as the highest share (38.5%) of the gross agricultural output consisted of cereals in 2015. In 2015, as compared to 2004, this share increased significantly, by 16.5 percentage points. Lithuania by wheat export ranks fifth among the EU countries. The production of grains constitutes source of income to 13.8% of all farms. The importance of the grain sector in Lithuania has prompted the researchers' attention in this area.

Jedik, Namiotko [4] focussed on family farmers' behaviour of specialist cereals, oilseeds and protein crops farms when alternative objectives are presented. The authors found that not all Lithuanian specialist cereals, oilseeds and protein crops' farms consider gross margin as its primary objective. Maximization of gross margin is the most important attribute of medium and large farms, though small-scale farmers are more concerned on the risk minimization. The

researches also conclude that this study area is still not fully investigated.

Volkov, Droždž [10] suggest that Common Agricultural Policy direct payment scheme has contributed to structural change in Lithuanian agriculture. Authors' findings revealed that economic support system prompted attractiveness of specialist cereals, oilseeds and protein crops farming and alongside stimulated farmer reorientation towards this most economically attractive type of farming. Authors emphasize that without the production support, cereals/rape sector would have been less economically attractive. Baležentis [1] identified the prospective paths for development of Lithuanian cereal farms. According to the author an important direction for maintaining efficiency and productivity of cereal farms is the proper balance between investment support for smaller and larger farms.

Biekša [2] evaluated cereals farms sustainability using sustainable process index and found out that the most significant environmental impacts arise from the use of fertilizers and agricultural machinery.

The above mentioned studies highlight the importance of the grain sector in Lithuania and imply further scientific discourse towards its sustainability.

MATERIALS AND METHODS

The purpose of this research is to identify the main trends and changes of grain production

in 2004–2015. In order to realize this scientific research the main attention was paid to the relevant data, such as crop area and yield of grain crops, production of grain crops and other supply and demand indicators, average purchase prices of grain, retail prices of rye bread and of white bread made from wheat flour, farm net income family farms were taken in consideration. At the national level the data was taken from Eurostat, European Commission, Central Statistical Office of Lithuania and AIRBC. At the farm level the data of Lithuanian Farm Accountancy Data Network (FADN) was employed.

RESULTS AND DISCUSSIONS

According to data provided by European Commission (EC), in 2015, in terms of total grain crops area, Lithuania took the twelfth place at the EU-28 level. The area under grain crops in Lithuania in 2015, as compared to 2004, increased by 64% (Fig. 1). Areas under winter wheat increased most of all: within the last year by 60% and during the reference period 87%. Over the period of 2004–2015, most of all increased the areas under wheat (2.4 times), rape (64%), buckwheat (67%) and triticale (46%), whereas the areas under barley (31%) and rye (30%) decreased. In 2015, in the structure of crops, the areas under winter cereals comprised 53%.

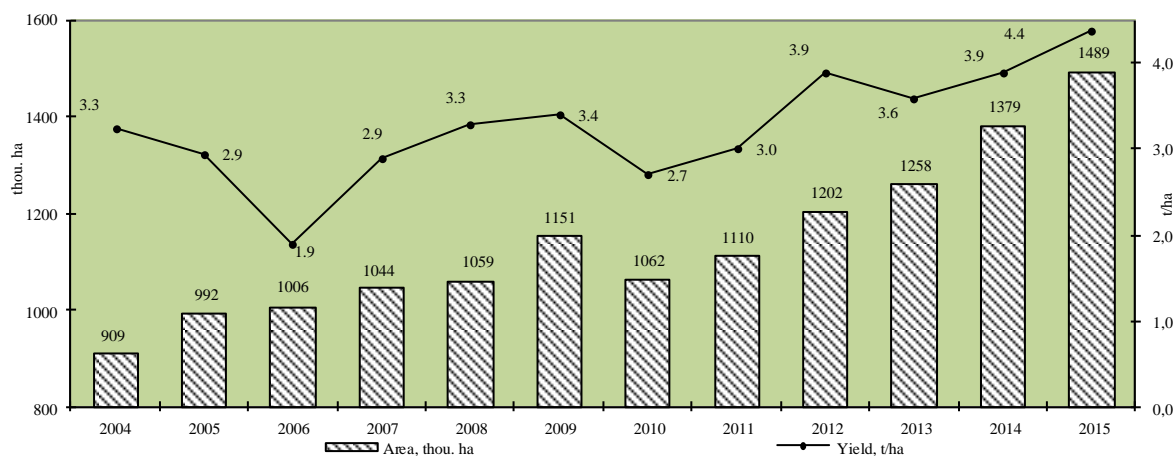


Fig. 1. Crop area and yield of grain crops in 2004–2015

Source: Central Statistical Office of Lithuania (<http://osp.stat.gov.lt/en/temines-lenteles57>)

The yielding capacity of grain crops has been increasing each year. The favourable climatic conditions and investments contribute to the increase of the yielding capacity, even though the potential has not been used fully, i.e. the yielding capacity of cereals as well as productivity of cereals (output of cereals per hectare) has not reached the EU-28 average.

The yielding capacity of cereals in Lithuania in 2014 was lower than the EU-28 average: barley by 21%, wheat by 12%, and rape by 8%. Over the period of 2004–2015, the highest yielding capacity was reached in 2015. Thus, in the past year, as compared to 2004, the yielding capacity increased by 37% (Table 1).

Table 1. Yield of grain crops in 2004–2015, tonnes per hectare

Kind of grain crops	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change 2015 compared to 2004,%
<i>Grain crops</i>	3.21	2.89	1.88	2.94	3.29	3.38	2.70	2.98	3.94	3.62	3.89	4.39	36.8
<i>cereals</i>	3.25	2.94	1.99	3.01	3.35	3.45	2.76	3.03	4.02	3.68	3.98	4.56	40.3
<i>winter cereals</i>	3.76	3.46	2.25	3.65	4.14	3.89	3.06	3.03	4.73	4.09	4.35	5.33	41.8
<i>wheat</i>	4.12	3.85	2.42	4.16	4.76	4.40	3.40	3.32	5.17	4.56	4.81	5.71	38.6
<i>triticale</i>	3.18	2.73	1.88	2.82	3.27	3.16	2.43	2.54	3.82	3.18	3.36	4.08	28.3
<i>rye</i>	2.54	2.12	1.81	2.37	2.76	2.53	1.76	2.02	2.81	1.96	2.26	2.79	9.8
<i>barley</i>	3.78	3.24	2.17	3.15	3.94	3.83	2.52	2.95	4.42	3.60	4.11	4.40	16.4
<i>spring cereals</i>	2.75	2.53	1.74	2.53	2.69	2.87	2.45	3.03	3.27	3.22	3.75	3.69	34.2
<i>wheat</i>	3.45	3.24	2.13	3.08	3.01	3.41	3.06	3.47	3.89	3.71	4.31	4.21	22.0
<i>barley</i>	2.93	2.70	2.06	2.64	2.88	3.03	2.36	3.01	3.38	3.27	3.80	4.00	36.5
<i>triticale</i>	2.72	2.33	1.47	2.82	2.33	2.73	2.11	2.40	2.91	2.88	3.12	3.08	13.2
<i>oat</i>	2.23	1.92	1.30	1.94	2.07	2.23	1.62	2.04	2.31	2.24	2.42	2.55	14.3
<i>buckwheat</i>	0.59	0.55	0.20	0.90	0.76	0.67	0.73	0.96	0.90	0.93	0.95	1.00	69.5
<i>grain maize</i>	2.20	3.08	1.57	4.82	4.24	4.33	6.68	7.48	6.10	7.37	6.06	4.81	118.6
<i>dried pulses</i>													
<i>grain</i>	1.18	1.64	0.81	1.39	1.70	1.80	1.41	1.72	1.89	2.02	2.20	2.29	94.1
<i>Rapeseed</i>	2.03	1.84	1.12	1.79	2.04	2.17	1.65	1.94	2.43	2.13	2.33	3.13	54.2

Source: Central Statistical Office of Lithuania (<http://osp.stat.gov.lt/en/temines-lenteles57>)

In 2015, the production of grain crops amounted to 6521.4 thou. t or by 2.2 times more than in 2004 (Table 2). According to data provided by EC, in 2015, in terms of total cereal production, Lithuania took the thirteenth place at EU-28 level. In the year 2015 the production of winter crops was higher even by 80% than in 2014, and spring crops by 24% lower. Wheat comprised the major share in the structure of harvested cereals 72%, of which 75% winter crops. The

production of grain crops in Lithuania in 2015, as compared to 2014, was higher by 22.5%. The production was reached due to 8% larger grain crop area and 12.9% higher yielding capacity. In USDA Gain report stated that the good export opportunities to countries outside the EU were the main driver for increased wheat plantings in 2015. Also good purchase wheat prices induced some farmers to switch production from less profitable rapeseed to wheat [9].

Table 2. Production of grain crops in 2004–2015, thousand tonnes

Kind of grain crops	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change 2015 compared to 2004,%
<i>Grain crops</i>	2,917	2,870	1,893	3,073	3,484	3,892	2,867	3,304	4,737	4,550	5,324	6,521	2.2
<i>cereals</i>	2,859	2,811	1,858	3,017	3,422	3,806	2,797	3,226	4,657	4,459	5,123	6,067	2.1
<i>winter cereals</i>	1,663	1,458	822	1,553	1,921	2,440	1,592	1,192	2,810	2,623	2,120	3,773	2.3
<i>wheat</i>	1,263	1,149	620	1,151	1,381	1,749	1,250	912	2,257	2,119	1,708	3,272	2.6
<i>triticale</i>	242	176	98	199	286	394	218	187	370	385	292	379	56.8
<i>rye</i>	141	108	90	165	205	208	87	85	155	94	84	107	-24.2
<i>barley</i>	17	26	14	38	49	89	37	8	28	25	37	15	-11.6
<i>spring cereals</i>	1,196	1,353	1,036	1,464	1,501	1,366	1,204	2,034	1,847	1,836	3,003	2,294	91.7
<i>wheat</i>	167	231	189	240	341	351	460	957	742	744	1,523	1,109	6.6
<i>barley</i>	843	923	730	976	922	770	513	752	714	656	982	796	-5.5
<i>triticale</i>	22	26	13	29	25	31	41	50	65	66	103	89	4.1
<i>oat</i>	118	114	63	120	141	143	94	128	164	163	184	163	38.8
<i>buckwheat</i>	13	16	9	21	21	15	14	26	31	28	36	37	2.8
<i>mixed cereals</i>	32	39	27	53	19	33	35	47	50	55	58	42	33.2
<i>grain maize</i>	3	5	5	26	32	24	47	72	79	121	115	56	18.8
<i>Rapeseed</i>	205	201	170	312	330	416	417	484	633	550	502	512	2.5

Source: Central Statistical Office of Lithuania (<http://osp.stat.gov.lt/en/temines-lenteles57>)

Over the period of 2004–2015, the yielding capacity of grain crops and the area under crops went on increasing; therefore, the grain resources increased considerably (by 2.1

times), beginning stocks (by 54%), and self-sufficiency level increased to 318%. Over the considered period exports of grain and grain products increased significantly, by 6.2 times.

In the year of 2004 20% of production of grains was exported, whereas in the period of 2013–2015, the export comprised 62%. In 2015 the largest share of exported grain (76%) consisted of wheat. In the last few years Lithuania appeared as an important wheat exporter on the global market [9]. In 2014–2015 year, Lithuanian common wheat export was positioned in the fifth place, in terms of exported quantity in the EU-28. The major share of common wheat (30%) was exported to Saudi Arabia. Whereas, in 2004, the main export of common wheat destination was Belarus (47%).

The use of grains for domestic purposes

decreased by 18%, mainly due to decreased the grain use for animal fodder. The cattle herd decreased by 9% in 2015, as compared to 2004. Just 31% of the production has been used for domestic needs in 2015. Since production increased more rapidly than consumption for domestic needs, in 2015, as compared to 2004, the share of consumption for domestic needs decreased by 54 percentage points. Due to increased capacities of private storage the endings stocks were much higher in 2015 (Table 3). It is worth noticing that storage capacities made farmers less dependent on grain prices volatility.

Table 3. Balances of grain and grain products in 2004–2015, thousand tonnes

Indicators	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*	Change 2015 compared to 2004,%
Beginning stocks	1,466	1,508	1,027	756	1,084	1,300	1,273	866	1,255	2,036	2,041	2,250	53.5
Production	2,917	2,870	1,893	3,073	3,484	3,892	2,867	3,304	4,737	4,567	5,324	6,521	2.2**
Import***	207	187	271	294	415	199	294	409	477	425	488	283	37.0
Total resources	4,371	4,565	3,191	4,123	4,983	5,392	4,434	4,579	6,469	7,028	7,852	9,054	2.1**
Export***	583	1,181	838	906	1,840	2,068	1,709	1,475	2,438	2,931	3,557	3,639	6.2**
Domestic uses	2,499	2,356	1,597	2,133	1,843	2,052	1,859	1,849	1,995	2,057	2,046	2,049	-18.0
seeds	258	216	220	228	214	231	221	229	240	250	281	303	17.8
animal fodder	1,571	1,504	823	1,263	1,019	1,194	981	1,036	1,142	1,197	1,162	1,119	-28.8
losses	93	71	38	62	52	57	53	52	54	52	68	69	-25.8
industrial uses	148	155	134	169	176	179	243	179	204	206	181	204	37.9
human consumption	430	410	381	412	382	391	362	353	347	351	354	353	-17.7
Per capita consumption, kg	125	120	112	122	114	117	117	117	116	119	121	121	-3.2
Ending stocks	1,508	1,027	756	1,084	1,300	1,273	866	1,255	2,036	2,041	2,250	3,366	2.2***
Self-sufficiency level, %	117	122	119	144	189	290	154	179	237	222	260	318	201****

Notes:*author calculations; **times; ***in grain equivalent; ****percentage points.

Source: Agriculture in Lithuania 2014.

The purchase prices of grain mostly depend on global prices in Lithuania. In 2015 the purchase prices for grain in Lithuania were by 4.7% higher than in 2014, though have not

reached the level of prices recorded in 2011–2012. The highest rise in prices was for buckwheat – by 58%, oats by 21%, and rape by 16% in 2015 (Table 4).

Table 4. Average purchase price of grains in 2004–2015, EUR per tonne

Kind of grain	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average price 2004-2015
Grain total	99	87	111	183	172	115	150	190	205	176	150	157	150
wheat	105	86	117	186	172	115	158	194	208	179	154	160	153
rye	89	76	101	153	139	72	113	175	176	136	117	114	122
barley	99	94	103	186	150	92	129	179	200	178	140	144	141
malt barley	116	118	125	234	191	114	146	208	226	213	172	167	169
triticale	88	79	96	156	127	78	136	161	188	146	126	124	125
oats	80	66	85	145	129	59	89	159	161	118	100	121	109
buckwheat	176	181	239	261	192	163	318	349	297	267	263	415	260
maize	144	123	142	217	249	117	181	181	205	167	146	144	168
Rapeseed	191	181	244	259	363	243	318	422	456	349	293	341	305

Source: Central Statistical Office of Lithuania (<http://osp.stat.gov.lt/en/temines-lenteles57>)

In the structure of rye bread and white bread made from wheat flour retail price the farmer's share comprises about 10%. It is worth noticing that just 10% of total grain production is used for human consumption, which remains quite stable in considered years. Though, the purchase prices of grain

have not much influence on human consumption and retail prices of grain products. In 2005–2015 retail prices of rye bread and of white bread made from wheat flour increased by 2.2 and 1.9 times, respectively (Fig. 2).

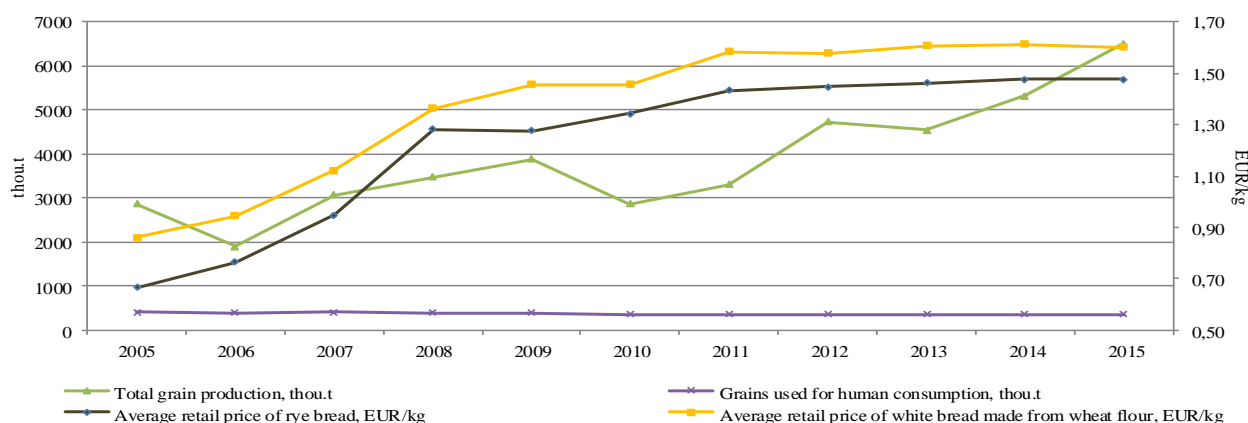


Fig. 2. Grain production, grains for human consumption and retail prices of rye bread and of white bread made from wheat flour, 2005–2015
 Source: Central Statistical Office of Lithuania (<http://osp.stat.gov.lt/en/temines-lenteles57>)

Specialist cereals, oilseeds and protein crops' farms income depends on grain purchase prices as sales revenue composed 75% that farms received for the crops in 2014. It should also be noted that the level of support with subsidies to 1 ha of UAA increased by 80% in 2014, as compared to 2004. The relation of subsidies to family farm net income amounted to as much as 117% in 2014, by 66 percentage points more than in 2004. The average family net income gained by Lithuanian specialist cereals, oilseeds and protein crops' farms per family work unit (FWU) in the period of

2004–2014 was even by 2.0 times higher than the gained income in all farms (Fig. 3). The higher income was one of the factors which made the cultivation of grain crops attractive to Lithuanian farmers.

The grain stocks both in the world and in Lithuania go on increasing; this meaning that under favourable climatic conditions purchase prices will not reach the level of the prices of 2011–2012. Therefore, the farmers specialist in cereals, seeking to retain the permanent family farm income should use the internal or/and external risk management instruments.

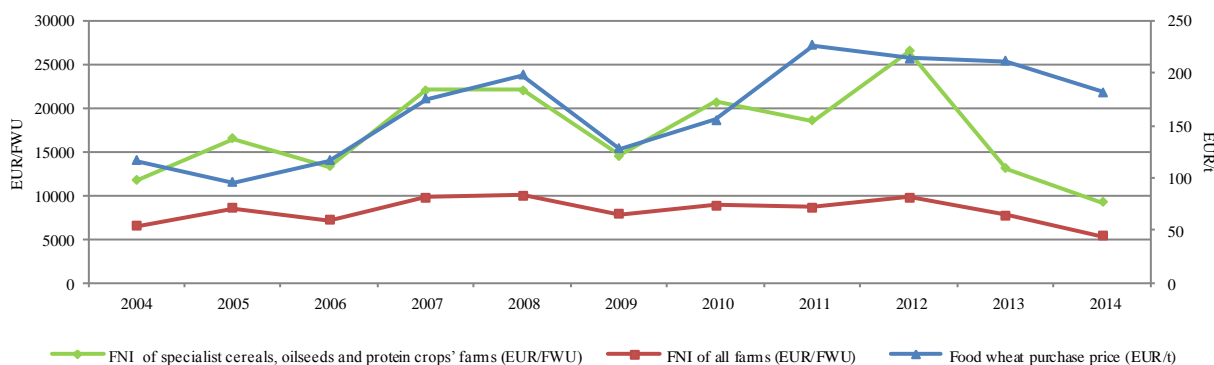


Fig. 3. FNI of specialist cereals, oilseeds and protein crops' farms, of all family farms and food wheat purchase price, 2004–2014
 Source: FADN 2004–2014 data; AIRBC data (<http://www.vic.lt/?mid=343>)

One of the measures for management of external risk of farm income is the insurance of areas under crop, aimed to reduce a risk increased due to the climatic change. Only about 15% of the area under cereals was

covered by insurance in 2014. According to the FADN data, specialist cereals, oilseeds and protein crops' farms are highly specialized

. Over the period of 2004–2014 the share of cereals and rape seeds output accounts for about 86% of the total output in these farms. Specialist cereals, oilseeds and protein crops' farms should make more use of the internal farm capacity to reduce the agricultural business risk, for example, the development of other gainful activities like agri-tourism, agricultural services. Specialist cereals, oilseeds and protein crops' farms in 2014, generated the income share from the other agricultural activities made only 2.5% of the total income.

CONCLUSIONS

After the accession to the EU, a significant improvement of grain sector is observed. The main findings of this research as follows:

- the area under grain crops in 2015, as compared to 2004, increased by 64%. Most of all increased the areas under wheat (2.4 times);
- over the period of 2004–2015, the yielding capacity increased by 37%;
- in 2015, the production of grain crops was by 2.2 times more than in 2004. The increase in grain production recorded in 2015 due to 8% larger grains crop area and by 12.9% higher yielding capacity;
- in considered period the grain resources increased considerably (by 2.1 times), beginning stocks (by 54%), and self-sufficiency level reached 318%;
- over the period exports of grain and grain products increased significantly, and in the period of 2013–2015 the export comprised 62% of grain crops production;
- in 2015, the largest share of exported grain (76%) consisted of wheat. In 2014–2015 year, Lithuanian common wheat export was positioned in the fifth place, in terms of exported quantity;
- the main export destination in 2004 of common wheat was Belarus, whereas in 2015, the major share of common wheat was exported to Saudi Arabia;
- the average family net income gained by Lithuanian specialist cereals, oilseeds and protein crops' farms per FWU in the period of 2004–2014 was by 2.0 times higher than the

gained income in all farms;

-the grain stocks both in the world and in Lithuania go on increasing; this meaning that under favourable climatic conditions purchase prices of grain will not reach the level of the prices of 2011–2012. Therefore, the farmers specialist in cereals, seeking to retain the permanent family farm income should consider using the internal or/and external risk management measures.

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