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Agricultural Policy Report

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## **Agricultural Outlook Ukraine 2017-2030**

### **Effective regulation: modelling of the agricultural sector under conditions of improved regulatory framework**

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## **About the Project "German-Ukrainian Agricultural Policy Dialogue" (APD)**

The project German-Ukrainian Agricultural Policy Dialogue (APD) started 2006 and is supported up to 2018 by the Federal Ministry of Food and Agriculture of Germany (BMEL). On behalf of BMEL, it is carried out by the mandatory, GFA Consulting Group GmbH, and a working group consisting of IAK AGRAR CONSULTING GmbH (IAK), Leibniz-Institut für Agrarentwicklung in Transformationsökonomien (IAMO) and AFC Consultants International GmbH. Project executing organization is the Institute of Economic Research and Policy Consulting in Kyiv. The APD cooperates with the BVVG Bodenverwertungs- und -verwaltungs GmbH on the implementation of key components related to the development of an effective and transparent land administration system in Ukraine. Beneficiary of the project is the Ministry of Agrarian Policy and Food of Ukraine.

In accordance with the principles of market economy and public regulation, taking into account the potentials, arising from the EU-Ukraine Association Agreement, the project aims at supporting Ukraine in the development of sustainable agriculture, efficient processing industries and enhancing its competitiveness on the world market. With regard to the above purpose, mainly German, but also East German and international, especially EU experience are provided by APD when designing the agricultural policy framework and establishing of relevant institutions in the agriculture sector of Ukraine.



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### **Disclaimer**

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## Preface

*While policy development and implementation remains a political process, evidence based<sup>1</sup> decision making in policy negotiations has become rather common. The Joint research centre (JRC) of the European Commission (EC), for example, provides the European Union's (EU) policies with science and knowledge based support. Throughout the whole policy cycle which includes definition of problem areas, political debates, policy development and implementation, JRC analyses a wide range of economic, social and environmental impacts of envisaged policies. It as well provides with suggestions on the policy instruments for mitigation of the least, and, enforcement of the most, desired policy effects. With such information at hand, policy makers are enabled to develop more optimal policies. The research center uses advanced analytical tools. They include economic simulation and projection models for the agricultural sector, farm level and international trade models.*

*As from 2014 on, in the framework of Deep and comprehensive free trade area agreement between Ukraine and the EU (DCFTA), Ukraine set a course on reformation of its agricultural policy to less regulated and more market oriented. In order to assist Ukraine in dealing with this task, the German-Ukrainian Agricultural Policy Dialogue (APD) took initiative, and the Ministry of agrarian policy and food of Ukraine (MAPF) supported it, to develop an advanced up-to-date tool for quantitative assessment of the effects of policy measures on the agricultural sector of Ukraine. In accordance with the best practices of the EU and Germany, the economic policy simulation model of the agricultural sector, AGMEMOD<sup>2</sup> model, was chosen for this purpose.*

*AGMEMOD is developed and maintained by the AGMEMOD Partnership which is a consortium of numerous universities and research institutes across Europe and beyond. The core group is located in Germany (Thünen Institute of Market Analysis) and the Netherlands (Wageningen Economic Research) and coordinates and combines the work done with AGMEMOD model. The AGMEMOD model is an econometric, dynamic, multi-product, multi-national partial equilibrium model that allows projecting and simulating effects of policy measures on agriculture of the EU in general, the EU Member states, as well as some other countries such as Ukraine, Former Yugoslav Republic of Macedonia, Turkey and Russia. Because the country model for Ukraine has already been developed by the members of the AGMEMOD Partnership, the APD aimed at updating and improving it with regards to the interests of stakeholders of the Ukrainian agricultural sector.*

*In order to foster successful achievement of this purpose, not only a special APD activity was launched, but also the Core advisory group was established. This group includes representatives of the Ukrainian government and public agencies, local and international scientists, business stakeholders and representatives of the non-governmental organizations. They assist in data collection, identification of key characteristics of the Ukrainian agricultural sector and their implementation into the AGMEMOD model, development of approaches for modeling of the policy scenarios and many other modeling aspects.*

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<sup>1</sup>Evidence based decision making is a process for making decisions that is grounded in the research, practical and relevant contextual evidence (Vetoviolence 2012, [https://vetoviolence.cdc.gov/apps/evidence/docs/EBDM\\_82412.pdf](https://vetoviolence.cdc.gov/apps/evidence/docs/EBDM_82412.pdf))

<sup>2</sup>AGMEMOD model <http://www.agmemod.eu/index.php/information/about-agmemod>

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*This report contains the analysis of impact of improved legislative framework at the agricultural enterprise level on the agricultural sector of Ukraine. The respective modeling results are compared to the results of the Baseline scenario (see previous APD report on modelling with AGMEMOD<sup>3</sup>).*

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<sup>3</sup>APD (2017): Agricultural Outlook Ukraine 2017-2030. Baseline: projection of development of the agricultural sector in current economic and political frameworks and absent monetary state support. Kyiv

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*The authors would like to express special gratitude to the Director of the Institute of Market analysis of the Johann Heinrich von Thünen Institute, Martin Banse and his colleagues Verena Wolf and Petra Salamon for their constant assistance and recommendations regarding the modeling approach and implementation of policy scenarios in the model. We also thank the representative of JRC, Guna Salputra, for her advice and suggestions regarding extension of, and policy modeling with, AGMEMOD.*

*We thank sincerely the representatives of the Ukrainian Club of Agribusiness (UCAB) – Taras Vysotskyi (the General director), Oleksandra Kovalchuk, Darya Grycenko and Oleksandr Donchenko, representatives of the National Academy of Agrarian Sciences (NAAS) – Juk Valeriy (the vice President), Yurii Lupenko (the Head of the Institute of agricultural economics of NAAS), and Shamil Ibatullin, the Dean of the Economic faculty of the National university of life and environmental sciences of Ukraine – Anatolii Dibrova, representatives of the Institute of economic research and policy consulting (IER) – Oleh Nivevskyi and Veronika Movchan, representative of the State service of Ukraine for geodesy, cartography and cadaster – Ihor Slavin, the Head of the association "Land union of Ukraine" – Andriy Koshyl, representative of the association "Agrarian union of Ukraine" – Larysa Starikova, and representative of the Kyiv school of economics – Denys Nizalov for their support in data collection, as well as helpful criticism, suggestions and advice they have provided to the activity.*

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## Executive summary

In the framework of EU-Ukraine Association agreement (DCFTA), the economy of Ukraine, as well as the agricultural sector in particular has to adjust – step by step – to EU regulations. Many State regulations stem still from the socialist time and are often misused as a source of income via corruption schemes.

In this context Ukrainian policymakers explore deregulation potentials to ensure sustainable growth of agricultural sector. The current scenario modelling is addressing this issue. In particular, it refers to the elimination of excessive regulations at the farm level. As the recent study of Ukrainian Agribusiness Club (UCAB) and German-Ukrainian Agricultural Policy Dialogue (APD) on “Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms”<sup>4</sup> indicated, conforming to numerous regulations of farming activities takes 2-6% of manager’s time and accounts for 1-3% of operational budget of the enterprises.

The present research focuses on estimating possible effects of deregulation and introduction of more effective regulations at the farm level. For quantitative assessment of these effects AGMEMOD model was used. AGMEMOD is a dynamic, partial equilibrium, multi product and multi country model that provides with projections of the effects of changes in agricultural policies on production, consumption, import and exports. The current study involves five different producer groups – public enterprises, households, private family farms, agricultural enterprises with land bank of less than 5,000 ha (smaller enterprises) and more than 5,000 ha (larger enterprises). These groups are disaggregated on the regional level as well.

Corresponding to the findings of the study “Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms”<sup>4</sup> three modelling scenarios were analyzed under the assumptions that deregulation would lead to reduction of production costs by 1%, 4% and 7%. These scenarios are called correspondingly: (i) “Effective regulation, 1%”, (ii) “Effective regulation, 4%” and (iii) “Effective regulation, 7%”. The results of the Effective regulation scenarios have been compared to the results of the Baseline scenario<sup>5</sup>, published in July, 2017. The Baseline scenario represents “status quo and no public support” conditions and includes

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<sup>4</sup>UCAB and APD (2017): Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms. Kyiv

<sup>5</sup>APD (2017): Agricultural Outlook Ukraine 2017-2030. Baseline: projection of development of the agricultural sector in current economic and political frameworks and absent monetary state support. Kyiv

assumptions that economic and general policy frameworks remain as they were in 2015.

Results of the current study indicate that improvement of regulative framework at the farm level will mostly have marginal effects on the production, consumption, import and export of grains and oilseeds. Nevertheless it shows positive impact on development of more profitable crops, namely wheat, corn, sunflower, rapeseed and soy bean. While barley, oats and rye sectors are expected to experience adverse effects from the introduction of effective regulation. Export of barley is projected to cease and rye exports are projected to be lower under Effective regulation when comparing to Baseline.

However, there are several exceptions from the general trend of crops and oilseeds production for particular producer groups in particular regions of the country. As for wheat production, all producer groups in Donbas and Steppe regions with the only exception for private farms in Donbas region will experience decrease. The exceptions – where production of barley is expected to increase – is in the cases of large enterprises and private farms in Donbas region and in case of smaller enterprises in Steppe region. Corn production will decrease in smaller enterprises of Donbas region, larger enterprises of Forest Steppe and Mixed Forest regions, as well as in private farms in Steppe region and public enterprises. Concerning sunflower production, it will increase in private farms in Donbas, Forest Steppe and Mixed Forest regions, as well as in larger and smaller enterprises in Mixed Forest region. Despite the general trend, the model projects decrease of rapeseed seeds production in public enterprises, smaller enterprises and private farms in Donbas and Mixed Forest regions, larger enterprises in Forest Steppe region. Soya beans production decreases in larger enterprises in Forest Steppe region and among all the producer groups in Donbas and Steppe region.

In total, farmers are expected to shift to crops that are more profitable and at the same time production of grains and oilseeds is expected to increase. Thus, improvement of regulative framework will most likely contribute to higher value added of agriculture.

*It should be noted that the estimations are subject to a range of uncertainties mainly related to factors such as, for example, climate change, economic and financial shocks. Weather variations which affect crop yields on an annual basis are not considered in the outlook period either. Instead, the projected yields are based on, to a certain extent, average values of the past yields. All these may lead to certain differences between the projected and observed values. In this context it should be noted that AGMEMOD is built upon statistical data which mainly originate from Ukrainian official sources. Trustworthiness of these data plays the key role in reliability of the modelling results.*



## Acronyms and abbreviations

<b>APD</b>	German-Ukrainian Agricultural Policy Dialogue
<b>DCFTA</b>	Deep and comprehensive free trade area agreement
<b>EU</b>	European Union
<b>ha</b>	hectare(-s)
<b>GDP</b>	Gross domestic product
<b>MAPF</b>	Ministry of agrarian policy and food of Ukraine
<b>t</b>	tonne (-s)
<b>UCAB</b>	Ukrainian Club of Agricultural Business

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# Chapter 1

## Introduction

Nowadays Ukraine is on the way of profound reformation process, which involves different aspects of country's policies. In 2014-2015 started the decentralization and deregulation processes that also involved reforms in agricultural sector of the economy. In order to access EU market, considerable effort has been directed to harmonization of the national agricultural and food legislation with the EU legislation. Furthermore, Strategy for agriculture and rural development 2015-2020<sup>6</sup> of the Ministry of agrarian policy and food of Ukraine (MAPF) addresses the development of industrial and social infrastructure in order to increase the competitiveness of agricultural sector, as well as focuses on improving the quality and safety of food and the preservation of natural resources. Regulation of production related activities at the farm level received special attention of the MAPF. As recent World Bank's report "Enabling business in agriculture" states: "Well-designed laws and regulations — supported by strong institutions and efficient administrative procedures — are necessary for agriculture to prosper"<sup>7</sup>. Reducing excessive regulations of agricultural activities improves business environment that contributes to increasing competitiveness and growth of the sector.

### Deregulation of agricultural sector

Present report is based on an earlier study which was jointly conducted by Ukrainian Agribusiness Club (UCAB) and German-Ukrainian Agricultural Policy Dialogue (APD) on "Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms"<sup>8</sup>. According to the authors of the research: "A number of laws and regulations which are, to a large extent, relics of the Soviet Union's legislation, create unnecessary disruptions in daily work of agricultural producers, increase transaction costs of their products and corrupt the primary purpose of such legislation: ensuring competent and proper agricultural practice". These regulations are listed in Box 1.

*Box 1* Regulatory measures that were taken into consideration

- \* Mandatory registration of land rent agreements by the public notary service
- \* Control of land ecology
- \* Mandatory coordination and allowances for movement of big transport
- \* Daily medical testing of employees
- \* Limitation of weekly working hours
- \* Quarantine control of fields sown
- \* Fire safety regulation
- \* Herd number control
- \* Food prices regulation
- \* Mandatory reporting of statistics

The results of the study indicated that around 1-3% of the annual operational budget of agricultural producers is spent on compliance with the regulations, including official payments

<sup>6</sup><http://minagro.gov.ua/node/16025>

<sup>7</sup>World Bank (2016): Enabling business in agriculture 2016. Comparing regulatory good practices. World Bank

<sup>8</sup>UCAB and APD (2017): Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms. Kyiv

for public service as well corruption related costs.

Moreover, due to the ineffectiveness of routine control operations, middle and top managers are forced to invest considerable amount of their time into negotiation and communication with the public authorities. Roughly estimated, approximately 2-6% of the managers' working time is spent on work and coordination with the state authorities. Other transaction costs involve time expenses on preparation of the necessary documentation.

Opportunity cost of these time-consuming operations is time that could be spent on development of business model and on the productivity optimization. Furthermore, some regulation cannot be simply applied to a number of agricultural producers that have already switched to the modern technologies that are still not taken into account by actual legislation. Therefore, there is a necessity to make regulations clear and accessible for agricultural producers.

## **AGMEMOD Ukraine model**

For assessing the effects of minimization of excessive regulations on the agricultural sector, AGMEMOD modelling tool was used. This is an econometric, dynamic, multi-national, multi-product partial equilibrium model, which projects impacts of changes in the agricultural policy on the sector in 2017-2030<sup>9</sup>.

The impacts modelled include changes in production, consumption, prices, as well as export and import quantities of a number of agricultural products. Modelling results are disaggregated with respect to the regions – Donbas, Mixed forest, Forest steppe and Steppe, and producer groups – public enterprises, households, private family farms, agricultural enterprises with land bank less than 5,000 ha (smaller enterprises) and more than 5,000 ha (larger enterprises).

In order to perform the projection, a scenario has to be developed. This scenario may contain a range of agricultural policy and sector, as well as general macroeconomic assumptions or expectations conditioning the evolution of the sector. In general, AGMEMOD Ukraine model considers conditions of DCFTA between Ukraine and the EU and of other trade agreements, annexed Crimea, military unrest in Donbas region etc. as they were in 2015.

Macroeconomic factors that are exogenous to the model include the following: Gross domestic product (GDP), GDP deflator, exchange rate of national currency, population in Ukraine and world market prices of commodities. The values of these exogenous variables are taken from the projections of various institutions until the year 2030. Other values like production costs, land rental prices and number of agricultural producers are assumptions.

## **Modelling scenarios**

In March 2017, APD experts presented the projection of agricultural sector of Ukraine until the year 2030 in "status quo and no public support" conditions. This scenario is called Baseline and includes several assumptions. In particular: economic and general policy frameworks remain until 2030 as they were in 2015 and agricultural sector does not receive any public support throughout the whole modelling period.

<sup>9</sup>APD (2017): Agricultural Outlook Ukraine 2017-2030. Baseline: projection of development of the agricultural sector in current economic and political frameworks and absent monetary state support. Kyiv

Scenarios developed for estimating the effects of improved regulatory framework at the farm level on production, consumption and trade of the major agricultural crops in Ukraine include "Effective regulation, 1%", "Effective regulation, 4%" and "Effective regulation, 7%". They are developed with respect to the findings of the study on deregulation potential in Ukraine described in "Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms"<sup>10</sup>. In particular, it is assumed that producers include expenses related to ineffective regulation into their production costs and the respective share varies within 1-7%. Thus, „Effective regulation, 1%“ scenario represents 1% reduction of production expenses; „Effective regulation, 4%“ – 4% reduction and „Effective regulation, 7%“ scenario – 7% reduction.

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<sup>10</sup>UCAB and APD (2017): Deregulation potential in the agricultural sector of Ukraine: A bottom-up analysis from the perspective of farms. Kyiv

## Chapter 2

### Modelling results

The following chapter presents AGMEMOD modelling results with regard to Baseline and three Effective regulation scenarios that indicate changes in production, consumption, import and export of major crops in Ukraine by the year 2030. It will focus on comparing the results of Baseline and "Effective regulation, 7%" scenario, since this scenario represents reduction of production costs by 7% and has greater changes in the modeling outcome when compared to the outputs of "Effective regulation, 4%" and "Effective regulation, 1%" scenarios.

#### 2.1 Grains and Oilseeds

Results of projection of development of grains and oilseeds sectors under Baseline and Effective regulation scenarios are presented in Table 2.1.

*Table 2.1* Modeling results for grains and oilseeds under Baseline and Effective regulation

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
<i>Grains</i>				
Production	Baseline	51,348.3	54,262.0	5.67%
	Effective regulation, 1%		54,344.8	5.84%
	Effective regulation, 4%		54,593.4	6.32%
	Effective regulation, 7%		54,842.3	6.80%
Consumption	Baseline	28,826.0	36,227.9	25.68%
	Effective regulation, 1%		36,237.0	25.71%
	Effective regulation, 4%		36,264.7	25.81%
	Effective regulation, 7%		36,292.3	25.90%
Import	Baseline	177.7	374.1	110.55%
	Effective regulation, 1%		374.1	110.56%
	Effective regulation, 4%		374.1	110.58%
	Effective regulation, 7%		374.2	110.59%
Export	Baseline	22,216.0	20,548.1	-7.51%
	Effective regulation, 1%		20,623.2	-7.17%
	Effective regulation, 4%		20,848.8	-6.15%
	Effective regulation, 7%		21,074.6	-5.14%
<i>Oilseeds</i>				
Production	Baseline	12,343.8	13,903.2	12.63%
	Effective regulation, 1%		13,928.2	12.84%
	Effective regulation, 4%		14,003.3	13.44%
	Effective regulation, 7%		14,078.5	14.05%
Consumption	Baseline	8,744.1	7,540.0	-13.77%
	Effective regulation, 1%		7,551.7	-13.64%
	Effective regulation, 4%		7,586.6	-13.24%
	Effective regulation, 7%		7,621.5	-12.84%
Import	All scenarios	16.9	14.6	-13.76%
Export	Baseline	3,221.0	6,356.0	97.33%
	Effective regulation, 1%		6,369.4	97.74%
	Effective regulation, 4%		6,409.5	98.99%
	Effective regulation, 7%		6,449.7	100.24%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

Results of the projection summarized in Table 2.1 show that production of both grains and oilseeds is expected to increase by the year 2030. For grains, it will increase to 54,262.0 thousand t under Baseline and to 54,842.3 thousand t under "Effective regulation, 7%". In turn, production of oilseeds is expected to increase to 13,903.2 thousand t under Baseline and to 14,078.5 thousand t under "Effective regulation, 7%". In both cases production increases at higher rates with the reduction of production costs, i.e. under Effective regulation scenarios.

According to the projection, consumption and import of grains and oilseeds is projected to change insignificantly.

Decrease in export of grains is not as prominent under Effective regulation scenario when compared to Baseline. Under Effective regulation export will account for 21,074.6 thousand t, while under Baseline – 20,548.1 thousand t.

As regards oilseeds, increase in export under Effective regulation scenario is greater than in Baseline: 6,449.7 thousand t and 6,356.0 thousand t respectively. Thus, there can be concluded that Effective regulation enhances the effect of Baseline, as positive rates of the indicators are projected to increase at higher rates.

In general, it is projected that impact of change in agricultural policy towards less regulation on farm level will contribute to higher production, and export volumes of grains and oilseeds. Changes in consumption and import quantities among the scenarios are rather minimal.

## 2.2 Wheat

Results of projection of development of wheat sector under Baseline and Effective regulation scenarios are presented in Table 2.2.

*Table 2.2* Modeling results for wheat under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	21,157.4	24,206.9	14.41%
	Effective regulation, 1%		24,246.1	14.60%
	Effective regulation, 4%		24,363.9	15.16%
	Effective regulation, 7%		24,481.9	15.71%
Consumption	Baseline	12,512.3	13,306.3	6.35%
	Effective regulation, 1%		13,314.5	6.41%
	Effective regulation, 4%		13,338.9	6.61%
	Effective regulation, 7%		13,363.5	6.80%
Import	All scenarios	1.5	2.23	43.34%
Export	Baseline	7,994.3	10,890.2	36.22%
	Effective regulation, 1%		10,921.7	36.62%
	Effective regulation, 4%		11,016.2	37.80%
	Effective regulation, 7%		11,111.0	38.99%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

As can be seen from Table 2.2, wheat production is projected to increase to 24,206.9 thousand t under Baseline and to 24,481.6 thousands under "Effective regulation, 7%" scenario. Concerning regional distribution, producer groups in Donbas and Steppe regions will experience decrease of production. With only exception for private farms in Donbas region, where production will increase (see also Table A.1 in Annex).

Increase rates of wheat consumption under Effective regulation scenarios are rather inconsiderable.

Modelling results show that export quantity is expected to increase by 2030, when compared with average value in 2008-2014. Under Baseline, it will reach 10,890.2 thousand t, under "Effective regulation, 7%" – 11,111.0 thousand t. Wheat import will increase to the same rate of 43.34% for all the scenarios including Baseline.

Overall, the projection shows that effect of the Baseline, in terms of increase of production, consumption and export of wheat will be enforced with the establishment of favorable regulative framework in agricultural sector of Ukraine. Thus, reduction of production expenses will contribute to the growth of wheat sector.

## 2.3 Barley

Results of projection of development of barley sector under Baseline and Effective regulation scenarios are presented in Table 2.3.

*Table 2.3* Modeling results for barley under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
Production	Baseline	8,585.4	6,989.8	-18.59%
	Effective regulation, 1%		6,988.4	-18.60%
	Effective regulation, 4%		6,984.0	-18.65%
	Effective regulation, 7%		6,979.6	-18.70%
Consumption	Baseline	5,346.1	9,111.3	70.43%
	Effective regulation, 1%		9,110.9	70.42%
	Effective regulation, 4%		9,109.9	70.40%
	Effective regulation, 7%		9,108.8	70.38%
Import	Baseline	13.4	2,121.5	15,671.63%
	Effective regulation, 1%		2,122.6	15,679.59%
	Effective regulation, 4%		2,125.9	15,703.97%
	Effective regulation, 7%		2,129.2	15,728.73%
Export	All scenarios	3,322.0	close to 0	minimal value

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

As can be observed in Table 2.3, production of barley is expected to decrease to 6,989.8 thousand t under Baseline and even further to 6,979.6 thousand t under "Effective regulation, 7%". Because barley production drops under all of the scenarios, it may be concluded that with improvement of general regulative environment in the agricultural sector, barley production in Ukraine will continue decreasing at higher rates. When taking into account regional distribution, the only exceptions where production of barley is expected to increase is in the cases of large enterprises and private farms in Donbas region and in case of smaller enterprises in Steppe region (see Table A.2 in Annex).

Consumption is projected to increase in general by 70% in 2030, when compared with average value of 2008-2014 with slight differences among the scenarios.

High rates of import accompanied by almost zero export of barley in 2030 are explained by growth of animal production sector that contributes to increased demand for animal feed. Domestic production will not be able to satisfy the need for barley as animal feed use. The effect is enhanced with improvement of the regulative framework.



## 2.4 Corn

Results of projection of development of corn sector under Baseline and Effective regulation scenarios are presented in Table 2.4.

*Table 2.4* Modeling results for corn under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	19,583.2	21,212.6	8.32%
	Effective regulation, 1%		21,258.2	8.55%
	Effective regulation, 4%		21,395.3	9.25%
	Effective regulation, 7%		21,532.6	9.95%
Consumption	Baseline	9,000.8	11,945.8	32.72%
	Effective regulation, 1%		11,947.9	32.74%
	Effective regulation, 4%		11,954.0	32.81%
	Effective regulation, 7%		11,960.2	32.88%
Import	Baseline	40.2	18.8	-53.28%
	Effective regulation, 1%		18.8	-53.28%
	Effective regulation, 4%		18.8	-53.25%
	Effective regulation, 7%		18.8	-53.23%
Export	Baseline	10,714.9	9,316.4	-13.05%
	Effective regulation, 1%		9,360.0	-12.64%
	Effective regulation, 4%		9,491.0	-11.42%
	Effective regulation, 7%		9,622.1	-10.20%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

From Table 2.4 can be concluded that production of corn is expected to increase to 21,212.6 thousand t under Baseline and to 21,532.6 thousand t under "Effective regulation, 7%". Projection shows rise of corn production under all three scenarios of Effective regulation. Hence, there can be made a conclusion that with introduction of Effective regulation, production rates of corn will continue to grow at higher rates.

Concerning regional and producer group distribution, production of corn will decrease in smaller enterprises of Donbas region, larger enterprises of Forest Steppe and Mixed Forest regions, as well as in public enterprises and private farms in Steppe region (see Table A.3 in Annex).

Consumption of corn is supposed to increase by 2030, when compared with average value of 2008-2014 under all of the scenarios with rather minimal variation. Import of corn is projected to decrease by approximately 53% by 2030 with inconsiderable differences among the scenarios.

Export is projected to decrease as well. Under Effective regulation scenarios, this decrease is less prominent than under Baseline. In particular, under Baseline export is expected to amount to 9,316.4 thousand t and under "Effective regulation, 7%" to 9,622.1 thousand t.

In conclusion, under Effective regulation scenarios, production is expected to increase at higher rates when compared to the Baseline. Volumes of import and export will continue to decline. Overall, with introduction of less regulation of farm-level activities corn sector will be impacted positively.

## 2.5 Oats

Results of projection of development of oats sector under Baseline and Effective regulation scenarios are presented in Table 2.5.

*Table 2.5* Modeling results for oats under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	621.2	537.7	-13.44%
	Effective regulation, 1%		537.1	-13.54%
	Effective regulation, 4%		535.3	-13.83%
	Effective regulation, 7%		533.4	-14.13%
Consumption	Baseline	618.3	578.2	-6.48%
	Effective regulation, 1%		575.88	-6.58%
	Effective regulation, 4%		574.12	-6.86%
	Effective regulation, 7%		577.63	-7.14%
Import	Baseline	7.2	41.5	473.84%
	Effective regulation, 1%		41.5	474.26%
	Effective regulation, 4%		41.6	475.64%
	Effective regulation, 7%		41.7	477.02%
Export	All scenarios	8.1	1.0	-88.12%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

Effect of introduction of Effective regulation on oat sector is rather minimal, especially in terms of consumption, import and export quantities. In Table 2.5 modelling results show that production of oats is expected to decrease. Since production rates fall under all three scenarios, there can be expected that with introduction of Effective regulation, production will continue to decrease at higher rates.

In total, reducing production expenses on farm level contributes to higher rates of decrease of production of oats. This is related to the fact that production expenses of the other crops are lower as well, that leads to increased profitability of more profitable crops. Thus, the reduction in production quantities of oats is explained by farmers switching to production of more profitable commodities.

## 2.6 Rye

Effective regulation is projected to have inconsiderable impact on production, consumption, import and export of rye. Where production and consumption decreases at higher rates under Effective regulation scenarios when compared to Baseline.

Import is projected to cease, since domestic needs would be satisfied by the production. While export will increase to higher rate under Baseline comparing to Effective regulation scenarios.

Result of projection of development of rye sector under Baseline and Effective regulation scenarios are presented in Table 2.6.

**Table 2.6** Modeling results for rye under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	691.3	539.9	-21.90%
	Effective regulation, 1%		539.8	-21.93%
	Effective regulation, 4%		539.2	-22.00%
	Effective regulation, 7%		538.7	-22.08%
Consumption	Baseline	677.0	510.3	-24.62%
	Effective regulation, 1%		510.3	-24.63%
	Effective regulation, 4%		510.0	-24.66%
	Effective regulation, 7%		509.8	-24.69%
Import	All scenarios	2.7	no value	-100%
Export	Baseline	23.2	29.6	27.54%
	Effective regulation, 1%		29.5	27.11%
	Effective regulation, 4%		29.2	25.73%
	Effective regulation, 7%		28.8	24.31%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

## 2.7 Sunflower seeds, oil and meal

Result of projection of development of sunflower seeds sector under Baseline and Effective regulation scenarios are presented in Table 2.7.

**Table 2.7** Modeling results for sunflower seeds under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	8,270.0	7,107.9	-14.05%
	Effective regulation, 1%		7,118.0	-13.93%
	Effective regulation, 4%		7,148.7	-13.56%
	Effective regulation, 7%		7,179.2	-13.19%
Consumption	Baseline	7,341.0	5,548.9	-24.41%
	Effective regulation, 1%		5,559.4	-24.27%
	Effective regulation, 4%		5,591.0	-23.84%
	Effective regulation, 7%		5,622.5	-23.41%
Import	All scenarios	12.2	8.3	-32.31%
Export	Baseline	554.3	1,545.6	178.85%
	Effective regulation, 1%		1,545.3	178.78%
	Effective regulation, 4%		1,544.2	178.59%
	Effective regulation, 7%		1,543.2	178.40%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

As Table 2.7 shows, production of sunflower seeds is projected to decrease to 7,107.9 thousand t under Baseline and to 7,179.24 under "Effective regulation, 7%" scenario in comparison to average value in 2008-2014 (8,270.04 thousand t). However, modeling results show that in some regions of Ukraine, production will increase, in particular: in private farms in Donbas, Forest Steppe and Mixed Forest regions, as well as in larger and smaller enterprises in Mixed Forest region (see Table A.4 in Annex). Consumption rates are expected to decrease by the year 2030 as well.

Import is projected to drop by 32.31% under all of the scenarios. Change of export among the scenarios is insignificant: slightly higher under Baseline when compared with Effective regulation scenarios.

In total, for sunflower seeds sector, with the introduction of Effective regulation there can be expected that production and consumption rates will be decreasing at slower rates. Lower

increase of export rates under Effective regulation scenarios indicate that in case of export, Effective regulation does not enforce the effect of the Baseline.

Results of projection of development of sunflower oil and meal sectors under Baseline and Effective regulation scenarios are presented in Table 2.8.

*Table 2.8* Modeling results for sunflower oil and meal under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
<i>Sunflower oil</i>				
Production	Baseline	3,187.2	2,364.8	-25.80%
	Effective regulation, 1%		2,369.4	-25.66%
	Effective regulation, 4%		2,383.1	-25.23%
	Effective regulation, 7%		2,396.8	-24.80%
Consumption	All scenarios	554.2	759.7	37.08%
Import	All scenarios	30.6	119.2	289.70%
Export	Baseline	2,674.5	1,724.3	-35.53%
	Effective regulation, 1%		1,728.9	-35.36%
	Effective regulation, 4%		1,742.6	-34.84%
	Effective regulation, 7%		1,756.4	-34.33%
<i>Sunflower meal</i>				
Production	Baseline	3,108.5	2,277.9	-26.72%
	Effective regulation, 1%		2,282.3	-26.58%
	Effective regulation, 4%		2,295.5	-26.15%
	Effective regulation, 7%		2,308.7	-25.73%
Consumption	All scenarios	385.1	286.8	-25.53%
Import	All scenarios	119.2	6.2	710.00%
Export	Baseline	2,724.0	1,997.3	-26.68%
	Effective regulation, 1%		2,001.7	-26.52%
	Effective regulation, 4%		2,014.9	-26.03%
	Effective regulation, 7%		2,028.1	-25.55%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

Table 2.8 shows that regarding sunflower oil and meal sectors, under Effective regulation scenarios decrease of production and export is not as prominent as under Baseline, when compared to averages value of 2008-2014. For sunflower oil, production will account for 2,364.8 thousand t under Baseline compared with 2,396.8 thousand t under "Effective regulation, 7%". Its export will decrease to 1,756.4 thousand t under "Effective regulation, 7%" and to 1,724.3 thousand t under Baseline from 2,674.5 in 2008-2014. As for sunflower meal, production is projected to decrease by 26.72% under Baseline and by 25.73% under "Effective regulation, 7%", while export decreases by 26.68% and 25.55%, respectively. Changes in consumption and import rates of these two commodities are very marginal.

In conclusion, sunflower oil and meal sectors will experience higher volumes of production and export with the introduction of Effective regulation when compared to the Baseline. Nevertheless, these indicators will still be characterized by negative trends.

## 2.8 Rapeseed seeds, oil and meal

Results of projection of development of rapeseed seeds sector under Baseline and Effective regulation scenarios are presented in Table 2.9.

*Table 2.9* Modeling results for rapeseed seeds under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	1,951.5	4,045.3	107.29%
	Effective regulation, 1%		4,056.9	107.89%
	Effective regulation, 4%		4,091.8	109.68%
	Effective regulation, 7%		4,126.8	111.47%
Consumption	Baseline	281.6	527.5	87.34%
	Effective regulation, 1%		528.0	87.52%
	Effective regulation, 4%		529.6	88.07%
	Effective regulation, 7%		531.1	88.63%
Import	All scenarios	2.9	2.3	-21.13%
Export	Baseline	1,664.3	3,520.0	111.50%
	Effective regulation, 1%		3,531.1	112.17%
	Effective regulation, 4%		3,564.4	114.17%
	Effective regulation, 7%		3,598.0	116.18%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

As indicated in Table 2.9, production of rapeseed seeds is projected to increase to 4,045.3 thousand t under Baseline and 4,126.8 under “Effective regulation, 7%” scenario when comparing to average value in 2008-2014 of 1,951.5 thousand t. Since values are increasing, it may be concluded that production of rapeseed seeds will continue to grow with the improvement of the regulative environment.

Despite the general trend, the model projects decrease of rapeseed seeds production in public enterprises, smaller enterprises and private farms in Donbas and Mixed Forest regions, larger enterprises in Forest Steppe region (see Table A.5 in Annex).

Rates of rapeseed seeds consumption are projected to increase. Under “Effective regulation, 7%” scenario it will amount to 531.1 thousand t and under Baseline to 527.5 thousand t.

Import levels decrease by 21.13% independently of the modelling scenario. Rapeseed seeds export is projected to reach 3,520.0 thousand t under Baseline and 3,598.0 thousand t under “Effective regulation, 7%” scenario. Hence, Effective regulation will enhance the effects of the Baseline, since levels of production, consumption and export of rapeseed seeds are increasing at higher rates.

It may be concluded that with improvement of regulative environment in the agricultural sector, rapeseed seeds sector will continue to expand.

Results of projection of development of rapeseed oil and meal sectors under Baseline and Effective regulation scenarios are presented in Table 2.10.

*Table 2.10* Modeling results for rapeseed oil and meal under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
<i>Rapeseed oil</i>				
Production	Baseline	50.2	88.0	75.40%
	Effective regulation, 1%		88.2	75.82%
	Effective regulation, 4%		88.8	77.05%
	Effective regulation, 7%		89.5	78.29%
Consumption	All scenarios	31.8	58.5	84.13%
Import	All scenarios	0.3	0.8	125.42%
Export	Baseline	18.7	30.3	61.49%
	Effective regulation, 1%		30.5	62.60%
	Effective regulation, 4%		31.1	65.91%
	Effective regulation, 7%		31.7	69.22%
<i>Rapeseed meal</i>				
Production	Baseline	69.6	121.5	74.45%
	Effective regulation, 1%		121.7	74.86%
	Effective regulation, 4%		122.6	76.09%
	Effective regulation, 7%		123.5	77.33%
Consumption	Baseline	47.1	95.9	103.85%
	Effective regulation, 1%		96.1	104.14%
	Effective regulation, 4%		96.5	105.06%
	Effective regulation, 7%		96.9	105.95%
Import	All scenarios	0.7	0.01	-98.61%
Export	Baseline	23.3	25.5	9.66%
	Effective regulation, 1%		25.7	10.31%
	Effective regulation, 4%		26.1	12.15%
	Effective regulation, 7%		26.5	14.05%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

Table 2.10 indicates that with regard to rapeseed oil and meal sectors, Effective regulation scenarios enforce the effect of Baseline by providing higher rates of production increase. Rapeseed oil production amounts to 88.0 thousand t under Baseline and 89.5 thousand t under "Effective regulation, 7%" when compared to average value in 2008-2014 of 50.1 thousand t. Rapeseed meal production increases to 25.5 thousand t under Baseline and 26.5 thousand t under "Effective regulation, 7%" from average value of 2008-2014 of 23.3 thousand t.

Consumption and import of rapeseed oil increases by 84.13% and 125.4% respectively under all the scenarios. Consumption of rapeseed meal increases by 103.85% under Baseline and 105.95% under "Effective regulation, 7%" scenario. Import of rapeseed meal ceases.

With regard to export, there can be observed that Effective regulation enhances the effect of Baseline, since oil and meal exports are increasing at higher rates under Effective regulation.

In conclusion, with the elimination of excessive regulations on farm level, rapeseed oil and meal sectors are projected to have higher rates of production and export, while import decreases.

## 2.9 Soya beans, oil and meal

Result of projection of development of soya beans sector under Baseline and Effective regulation scenarios are presented in Table 2.11.

*Table 2.11* Modeling results for soya beans under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
Production	Baseline	2,122.2	2,750.0	29.58%
	Effective regulation, 1%		2,753.2	29.73%
	Effective regulation, 4%		2,762.8	30.18%
	Effective regulation, 7%		2,772.4	30.63%
Consumption	Baseline	1,121.5	1,463.6	30.50%
	Effective regulation, 1%		1,464.2	30.55%
	Effective regulation, 4%		1,466.0	30.71%
	Effective regulation, 7%		1,467.8	30.87%
Import	All scenarios	1.7	4.0	128.75%
Export	Baseline	1,002.4	1,290.4	28.73%
	Effective regulation, 1%		1,293.0	28.99%
	Effective regulation, 4%		1,300.8	29.77%
	Effective regulation, 7%		1,308.6	30.54%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

According to the modelling results presented in Table 2.11, by 2030 soya beans production is expected to increase to 2,750.0 thousand t under Baseline and 2,772.4 thousand t under “Effective regulation, 7%” scenario. As regards regional distribution, production of soya beans decreases in larger enterprises in Forest Steppe region and among all the producer groups in Donbas and Steppe region (see Table A.6 in Annex).

Consumption and import rates of soya beans increase to almost the same level under all of the scenarios. Export rates grow as well. In particular, it is projected to reach 1,290.4 thousand t under Baseline, while under “Effective regulation, 7%” scenario it will account for 1,308.6 thousand t that is 30.5% higher than average value of 2008-2014.

It can be concluded that Effective regulation enhances effect of the Baseline, since all positive indicators increase at higher rates.

Results of projection of development of soya oil and meal sectors under Baseline and Effective regulation scenarios are presented in Table 2.12.

*Table 2.12* Modeling results for soya oil and meal under Baseline and Effective regulation scenarios

Indicator	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change compared with 2008-2014
<i>Soya oil</i>				
Production	Baseline	84.9	100.8	18.66%
	Effective regulation, 1%		100.9	18.79%
	Effective regulation, 4%		101.2	19.17%
	Effective regulation, 7%		101.5	19.55%
Consumption	All scenarios	31.9	63.0	97.41%
Import	All scenarios	0.07	0.1	-54.21%
Export	Baseline	53.1	37.8	-28.86%
	Effective regulation, 1%		37.9	-28.65%
	Effective regulation, 4%		38.2	-28.05%
	Effective regulation, 7%		38.6	-27.45%
<i>Soya meal</i>				
Production	Baseline	362.4	425.5	17.42%
	Effective regulation, 1%		426.0	17.54%
	Effective regulation, 4%		427.3	17.92%
	Effective regulation, 7%		428.7	18.29%
Consumption	All scenarios	382.7	724.3	89.25%
Import	Baseline	45.2	299.8	562.71%
	Effective regulation, 1%		299.3	561.69%
	Effective regulation, 4%		297.9	558.68%
	Effective regulation, 7%		296.6	555.70%
Export	All scenarios	7.1	no value	-100.00%

<sup>1</sup>t – tonnes. Consumption includes also use for animal feed and processing

Source: APD

According to Table 2.12, for soya oil and meal sectors Effective regulation scenarios enforce the effect of Baseline by providing higher rates of production for both sectors. Decrease of export of soya oil is lower under Effective regulation scenarios when compared to Baseline. Thus, soya oil production increases by 18.66% under Baseline compared with 19.55% under "Effective regulation, 7%". Its export decreases by 28.86% and 27.45%, respectively, under Baseline and Effective regulation, 7%".

As for sunflower meal, production is projected to increase to 425.5 thousand t under Baseline and to 428.7 thousand t under "Effective regulation, 7%" when compared to the average value of 362.4 thousand t in 2008-2014. Soya meal import increases by 562.71% and 555.7%, respectively. Import of soya oil decreases by 54.21% under all the scenarios.

Soya meal export ceases and consumption does not change depending on the scenarios. In general, it may be concluded that impact of improvement of regulative environment is generally positive for the markets of soya beans, oil and meal.



## Chapter 3

### Conclusions

Modelling results show that impact of effective regulation on the agricultural sector at the farm level is not very significant. There are, nevertheless, quite a few improvements, especially with regard to enhanced production rates of crops and oilseeds.

In general, the results show marginal differences among indicators in the scenarios of Effective regulation when compared to Baseline. Thus, maximum positive difference (indicator's value increases) between the Baseline and Effective regulation scenarios' output regarding production is 2%, and maximum negative difference (indicator's value decreases) is -1.4%.

Results of the modelling show increasing production rates under Effective regulation for wheat, corn, rapeseed seeds, rapeseed oil and meal, soya beans, soya oil and meal. On the other hand, production decreases at higher rates for barley, rye, oats, sunflower seeds, oil and meal.

In most of the cases Effective regulation enforces the effect of the Baseline in terms of further increase of positive indicators or further decrease of negative indicators. As an example, production and consumption of rye and oats and production of barley will decrease at higher rates with the improvement of regulative framework. However, in some cases, Effective regulation does not enhance the effect of the Baseline and has an adverse effect on positive indicators: export of rye and sunflower seeds, import of soya meal and consumption of barley increase more moderately under Effective regulation when compared to Baseline. On the other hand, negative indicators decrease not as substantially under Effective regulation as under Baseline. They include indicators of sunflower seeds, oil and meal markets.

Results of the modelling are quite optimistic for oilseeds sector. Total oilseed production and export increases at higher rate and consumption decreases more modestly with the improvement of regulation of on-farm activities. Concerning rapeseed seeds, oil and meal, as well as soya beans, oil and meal – positive indicators will increase at higher rates under Effective regulation. As for grains, Effective regulation enforces the effects of the Baseline so that production, consumption and import of grains will increase at higher rates. Export rates will recover. If to review each subsector of grains in particular, there can be indicated that wheat and corn sectors will experience positive effects of Effective regulation, and barley, oats and rye sectors – negative.

Effective regulation leads to decrease of barley, rye and oats production, but this fall is compensated by increase in production of wheat and corn. Thus, the conclusion can be made that Effective regulation scenarios support the results of Baseline and highlight the fact that in the long-run farmers tend to shift to more profitable crops like wheat, corn, soya beans and rapeseed seeds. This conclusion and modeling results in general may be useful for those stakeholders of the Ukrainian agricultural sector that are involved in improvement of the regulative framework in the sector.

## Annex

*Table A.1* Modelling results of wheat production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	376.9	619.2	64.30%
	Effective regulation, 1%		620.1	64.54%
	Effective regulation, 4%		622.9	65.28%
	Effective regulation, 7%		625.7	66.01%
Smaller enterprises	Baseline	886.7	2,417.8	172.68%
	Effective regulation, 1%		2,420.9	173.03%
	Effective regulation, 4%		2,430.4	174.10%
	Effective regulation, 7%		2,439.9	175.16%
Private farms	Baseline	150.5	211.0	40.23%
	Effective regulation, 1%		211.7	40.66%
	Effective regulation, 4%		213.6	41.96%
	Effective regulation, 7%		215.6	43.26%
Total	Baseline	1,414.0	3,248.0	129.70%
	Effective regulation, 1%		3,252.7	130.03%
	Effective regulation, 4%		3,266.9	131.03%
	Effective regulation, 7%		3,281.1	132.04%
<i>Forest Steppe</i>				
Larger enterprises	Baseline	1,998.7	2,429.7	21.56%
	Effective regulation, 1%		2,436.2	21.89%
	Effective regulation, 4%		2,455.8	22.87%
	Effective regulation, 7%		2,475.3	23.84%
Smaller enterprises	Baseline	4,018.7	6,050.2	50.55%
	Effective regulation, 1%		6,056.3	50.70%
	Effective regulation, 4%		6,074.6	51.16%
	Effective regulation, 7%		6,093.0	51.62%
Private farms	Baseline	808.8	1,159.2	43.32%
	Effective regulation, 1%		1,162.5	43.73%
	Effective regulation, 4%		1,172.4	44.95%
	Effective regulation, 7%		1,182.3	46.17%
Total	Baseline	6,826.3	9,639.1	41.21%
	Effective regulation, 1%		9,702.8	41.44%
	Effective regulation, 4%		9,750.5	42.14%
	Effective regulation, 7%		9,655.0	42.84%
<i>Steppe</i>				
Larger enterprises	Baseline	893.7	690.2	-22.76%
	Effective regulation, 1%		694.0	-22.34%
	Effective regulation, 4%		705.3	-21.08%
	Effective regulation, 7%		716.6	-19.82%
Smaller enterprises	Baseline	3,340.9	2,461.4	-26.32%
	Effective regulation, 1%		2,469.2	-26.09%
	Effective regulation, 4%		2,492.6	-25.39%
	Effective regulation, 7%		2,516.0	-24.69%
Private farms	Baseline	1,235.2	1,068.3	-13.51%
	Effective regulation, 1%		1,072.7	-13.16%
	Effective regulation, 4%		1,085.8	-12.10%
	Effective regulation, 7%		1,099.0	-11.03%
Total	Baseline	5,469.8	4,220.0	-22.85%
	Effective regulation, 1%		4,235.9	-22.56%
	Effective regulation, 4%		4,283.7	-21.68%
	Effective regulation, 7%		4,331.6	-20.81%
<i>Public enterprises</i>				
Total	Baseline	290.8	381.2	31.10%
	Effective regulation, 1%		381.8	31.30%
	Effective regulation, 4%		383.6	31.92%

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
	Effective regulation, 7%		385.4	32.54%
<i>Donbas region</i>				
Larger enterprises	Baseline	513.5	273.7	-46.69%
	Effective regulation, 1%		274.7	-46.50%
	Effective regulation, 4%		277.5	-45.95%
	Effective regulation, 7%		280.4	-45.40%
Smaller enterprises	Baseline	800.9	506.1	-36.81%
	Effective regulation, 1%		507.0	-36.69%
	Effective regulation, 4%		509.7	-36.36%
	Effective regulation, 7%		512.3	-36.03%
Private farms	Baseline	437.8	473.5	8.13%
	Effective regulation, 1%		473.7	8.19%
	Effective regulation, 4%		474.5	8.37%
	Effective regulation, 7%		475.2	8.54%
Total	Baseline	1,752.2	1,253.3	-28.47%
	Effective regulation, 1%		1,255.4	-28.35%
	Effective regulation, 4%		1,261.7	-27.99%
	Effective regulation, 7%		1,267.9	-27.64%

<sup>1</sup>t – tonnes

Source: APD

*Table A.2* Modelling results of barley production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	85.7	56.6	-33.88%
	Effective regulation, 1%		56.5	-34.09%
	Effective regulation, 4%		55.9	-34.72%
	Effective regulation, 7%		55.4	-35.34%
Smaller enterprises	Baseline	215.8	172.6	-20.00%
	Effective regulation, 1%		171.9	-20.33%
	Effective regulation, 4%		169.8	-21.33%
	Effective regulation, 7%		167.6	-22.33%
Private farms	Baseline	40.4	12.1	-69.93%
	Effective regulation, 1%		12.0	-70.13%
	Effective regulation, 4%		11.8	-70.75%
	Effective regulation, 7%		11.6	-71.37%
Total	Baseline	341.8	241.4	-29.38%
	Effective regulation, 1%		240.4	-29.67%
	Effective regulation, 4%		237.5	-30.52%
	Effective regulation, 7%		234.5	-31.39%
<i>Forest Steppe</i>				
Larger enterprises	Baseline	458.8	3.7	-99.20%
	Effective regulation, 1%		3.7	-99.20%
	Effective regulation, 4%		3.7	-99.19%
	Effective regulation, 7%		3.7	-99.19%
Smaller enterprises	Baseline	1,378.7	628.2	-54.44%
	Effective regulation, 1%		626.5	-54.56%
	Effective regulation, 4%		621.6	-54.91%
	Effective regulation, 7%		616.6	-55.27%
Private farms	Baseline	325.8	1.6	-99.51%
	Effective regulation, 1%		1.6	-70.13%
	Effective regulation, 4%		1.6	-70.75%
	Effective regulation, 7%		1.6	-71.37%
Total	Baseline	2,163.4	633.4	-70.72%
	Effective regulation, 1%		631.8	-70.80%
	Effective regulation, 4%		626.9	-71.02%
	Effective regulation, 7%		622.0	-71.25%
<i>Steppe</i>				

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
Larger enterprises	Baseline	268.7	0.8	-99.71%
	Effective regulation, 1%		0.8	
	Effective regulation, 4%		0.8	
	Effective regulation, 7%		0.8	
Smaller enterprises	Baseline	1,449.2	1,449.1	-0.01%
	Effective regulation, 1%		1,449.7	0.03%
	Effective regulation, 4%		1,451.4	0.15%
	Effective regulation, 7%		1,453.0	0.27%
Private farms	Baseline	547.4	530.1	-3.14%
	Effective regulation, 1%		531.0	-2.98%
	Effective regulation, 4%		533.8	-2.48%
	Effective regulation, 7%		536.5	-1.98%
Total	Baseline	2,265.3	1,980.0	-12.59%
	Effective regulation, 1%		1,981.5	-12.53%
	Effective regulation, 4%		1,986.0	-12.33%
	Effective regulation, 7%		1,990.4	-12.13%
<i>Public enterprises</i>				
Total	Baseline	117.3	72.0	-38.66%
	Effective regulation, 1%		71.9	-38.70%
	Effective regulation, 4%		71.8	-38.84%
	Effective regulation, 7%		71.6	-38.96%
<i>Donbas region</i>				
Larger enterprises	Baseline	75.1	84.9	12.96%
	Effective regulation, 1%		85.0	13.08%
	Effective regulation, 4%		85.2	13.43%
	Effective regulation, 7%		85.5	13.79%
Smaller enterprises	Baseline	174.7	99.6	-43.02%
	Effective regulation, 1%		99.4	-43.10%
	Effective regulation, 4%		99.0	-43.33%
	Effective regulation, 7%		98.6	-43.57%
Private farms	Baseline	84.9	92.3	8.73%
	Effective regulation, 1%		92.1	8.48%
	Effective regulation, 4%		91.5	7.73%
	Effective regulation, 7%		90.8	6.98%
Total	Baseline	334.8	276.8	-17.32%
	Effective regulation, 1%		276.5	-17.40%
	Effective regulation, 4%		275.7	-17.64%
	Effective regulation, 7%		274.9	-17.88%

<sup>1</sup>t – tonnes

Source: APD

**Table A.3** Modelling results of corn production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	1,116.3	1,102.4	-1.25%
	Effective regulation, 1%		1,104.0	-1.11%
	Effective regulation, 4%		1,108.8	-0.68%
	Effective regulation, 7%		1,113.6	-0.25%
Smaller enterprises	Baseline	1,335.5	2,197.8	64.57%
	Effective regulation, 1%		2,203.5	65.00%
	Effective regulation, 4%		2,220.7	66.29%
	Effective regulation, 7%		2,238.0	67.58%
Private farms	Baseline	134.9	208.8	54.84%
	Effective regulation, 1%		209.5	55.36%
	Effective regulation, 4%		211.7	56.93%
	Effective regulation, 7%		213.8	58.51%
Total	Baseline	2,586.7	3,509.0	35.66%
	Effective regulation, 1%		3,517.0	35.97%
	Effective regulation, 4%		3,541.2	36.90%
	Effective regulation, 7%		3,565.4	37.84%

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Forest Steppe</i>				
Larger enterprises	Baseline	4,359.4	2,911.2	-33.22%
	Effective regulation, 1%		2,921.0	-33.00%
	Effective regulation, 4%		2,950.4	-32.32%
	Effective regulation, 7%		2,979.9	-31.64%
Smaller enterprises	Baseline	5,076.8	5,508.6	8.51%
	Effective regulation, 1%		5,522.8	8.79%
	Effective regulation, 4%		5,565.5	9.63%
	Effective regulation, 7%		5,608.2	10.47%
Private farms	Baseline	820.8	959.0	16.84%
	Effective regulation, 1%		961.9	17.19%
	Effective regulation, 4%		970.6	18.25%
	Effective regulation, 7%		979.3	19.30%
Total	Baseline	10,257.0	9,378.9	-8.56%
	Effective regulation, 1%		9,405.8	-8.30%
	Effective regulation, 4%		9,486.5	-7.51%
	Effective regulation, 7%		9,567.4	-6.72%
<i>Steppe</i>				
Larger enterprises	Baseline	514.0	395.9	-22.97%
	Effective regulation, 1%		397.8	-22.61%
	Effective regulation, 4%		403.3	-21.54%
	Effective regulation, 7%		408.8	-20.46%
Smaller enterprises	Baseline	1,279.2	2,443.6	91.02%
	Effective regulation, 1%		2,451.2	91.62%
	Effective regulation, 4%		2,474.0	93.40%
	Effective regulation, 7%		2,496.8	95.18%
Private farms	Baseline	469.7	274.3	-41.60%
	Effective regulation, 1%		275.5	-40.63%
	Effective regulation, 4%		278.9	-39.90%
	Effective regulation, 7%		282.3	-41.36%
Total	Baseline	2,263.0	3,113.9	37.60%
	Effective regulation, 1%		3,124.5	38.07%
	Effective regulation, 4%		3,156.2	39.47%
	Effective regulation, 7%		3,188.0	40.88%
<i>Public enterprises</i>				
Total	Baseline	110.9	58.7	-47.10%
	Effective regulation, 1%		58.8	-47.01%
	Effective regulation, 4%		59.0	-46.74%
	Effective regulation, 7%		59.4	-46.48%
<i>Donbas region</i>				
Larger enterprises	Baseline	50.8	96.3	89.37%
	Effective regulation, 1%		96.2	89.21%
	Effective regulation, 4%		96.0	88.76%
	Effective regulation, 7%		95.7	88.29%
Smaller enterprises	Baseline	113.2	0.8	-99.28%
	Effective regulation, 1%		0.8	-99.28%
	Effective regulation, 4%		0.8	-99.27%
	Effective regulation, 7%		0.8	-99.27%
Private farms	Baseline	100.2	233.3	132.89%
	Effective regulation, 1%		233.4	133.00%
	Effective regulation, 4%		233.8	133.33%
	Effective regulation, 7%		234.0	133.64%
Total	Baseline	264.2	330.4	25.06%
	Effective regulation, 1%		330.4	25.08%
	Effective regulation, 4%		330.5	25.11%
	Effective regulation, 7%		330.6	25.14%

<sup>1</sup>t – tonnes.

Source: APD

*Table A.4* Modelling results of sunflower seeds production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	70.7	171.2	141.95%
	Effective regulation, 1%		171.2	141.95%
	Effective regulation, 4%		171.2	141.98%
	Effective regulation, 7%		171.2	141.99%
Smaller enterprises	Baseline	152.6	513.7	236.52%
	Effective regulation, 1%		515.6	237.82%
	Effective regulation, 4%		521.6	241.73%
	Effective regulation, 7%		527.6	245.67%
Private farms	Baseline	15.0	31.4	109.19%
	Effective regulation, 1%		31.3	108.85%
	Effective regulation, 4%		31.2	107.92%
	Effective regulation, 7%		31.0	106.92%
Total	Baseline	238.4	716.2	200.44%
	Effective regulation, 1%		718.1	201.26%
	Effective regulation, 4%		724.0	203.71%
	Effective regulation, 7%		729.8	206.17%
<i>Forest Steppe</i>				
Larger enterprises	Baseline	508.2	332.9	-34.49%
	Effective regulation, 1%		333.7	-34.34%
	Effective regulation, 4%		336.1	-33.87%
	Effective regulation, 7%		338.5	-33.40%
Smaller enterprises	Baseline	1,387.9	1,276.3	-8.04%
	Effective regulation, 1%		1,275.8	-8.08%
	Effective regulation, 4%		1,274.2	-8.19%
	Effective regulation, 7%		1,272.6	-8.31%
Private farms	Baseline	306.5	339.8	10.89%
	Effective regulation, 1%		340.7	11.17%
	Effective regulation, 4%		343.3	12.02%
	Effective regulation, 7%		345.9	12.87%
Total	Baseline	2,202.7	1,949.1	-11.51%
	Effective regulation, 1%		1,950.3	-11.46%
	Effective regulation, 4%		1,953.6	-11.31%
	Effective regulation, 7%		1,957.0	-11.15%
<i>Steppe</i>				
Larger enterprises	Baseline	402.6	138.2	-65.66%
	Effective regulation, 1%		139.0	-65.47%
	Effective regulation, 4%		141.3	-64.91%
	Effective regulation, 7%		143.5	-64.35%
Smaller enterprises	Baseline	1,922.8	1,338.7	-30.38%
	Effective regulation, 1%		1,342.4	-30.19%
	Effective regulation, 4%		1,353.4	-29.61%
	Effective regulation, 7%		1,364.5	-29.03%
Private farms	Baseline	790.3	577.3	-26.95%
	Effective regulation, 1%		579.7	-26.65%
	Effective regulation, 4%		586.9	-25.74%
	Effective regulation, 7%		594.0	-24.83%
Total	Baseline	3,115.7	2,054.3	-34.07%
	Effective regulation, 1%		2,061.1	-33.19%
	Effective regulation, 4%		2,081.6	-32.53%
	Effective regulation, 7%		2,102.0	-33.85%
<i>Public enterprises</i>				
Total	Baseline	79.9	31.6	-60.41%
	Effective regulation, 1%		31.7	-60.28%
	Effective regulation, 4%		32.0	-59.83%
	Effective regulation, 7%		32.4	-59.39%
<i>Donbas region</i>				
Larger enterprises	Baseline	220.35	99.7	-54.76%
	Effective regulation, 1%		100.1	-54.56%
	Effective regulation, 4%		101.4	-53.97%

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
	Effective regulation, 7%		102.7	-53.38%
Smaller enterprises	Baseline	472.2	360.3	-23.70%
	Effective regulation, 1%		360.0	-23.75%
	Effective regulation, 4%		359.3	-23.90%
	Effective regulation, 7%		358.6	-24.06%
Private farms	Baseline	318.2	396.7	24.68%
	Effective regulation, 1%		396.7	24.67%
	Effective regulation, 4%		396.6	24.65%
	Effective regulation, 7%		396.6	24.63%
Total	Baseline	1,010.8	856.7	-15.24%
	Effective regulation, 1%		856.9	-15.22%
	Effective regulation, 4%		857.4	-15.17%
	Effective regulation, 7%		857.9	-15.12%

<sup>1</sup>t – tonnes

Source: APD

Table A.5 Modelling results of rapeseed seeds production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	134.4	162.6	20.94%
	Effective regulation, 1%		163.0	21.31%
	Effective regulation, 4%		164.6	22.44%
	Effective regulation, 7%		166.1	23.57%
Smaller enterprises	Baseline	190.5	296.4	55.57%
	Effective regulation, 1%		297.8	56.33%
	Effective regulation, 4%		302.2	58.64%
	Effective regulation, 7%		306.6	60.97%
Private farms	Baseline	34.9	19.0	-45.55%
	Effective regulation, 1%		19.4	-44.29%
	Effective regulation, 4%		20.8	-40.45%
	Effective regulation, 7%		22.1	-36.52%
Total	Baseline	359.8	477.9	32.83%
	Effective regulation, 1%		480.3	33.50%
	Effective regulation, 4%		487.6	35.51%
	Effective regulation, 7%		494.9	37.55%
<i>Forest Steppe</i>				
Larger enterprises	Baseline	216.2	176.5	-18.38%
	Effective regulation, 1%		177.8	-17.80%
	Effective regulation, 4%		181.6	-16.01%
	Effective regulation, 7%		185.5	-14.21%
Smaller enterprises	Baseline	480.6	835.6	73.84%
	Effective regulation, 1%		837.1	74.17%
	Effective regulation, 4%		841.8	75.14%
	Effective regulation, 7%		846.4	76.10%
Private farms	Baseline	114.9	137.1	19.31%
	Effective regulation, 1%		137.2	19.38%
	Effective regulation, 4%		137.5	19.58%
	Effective regulation, 7%		137.7	19.78%
Total	Baseline	811.8	1,149.2	41.56%
	Effective regulation, 1%		1,160.9	41.91%
	Effective regulation, 4%		1,152.1	42.99%
	Effective regulation, 7%		1,169.6	44.07%
<i>Steppe</i>				
Larger enterprises	Baseline	88.5	138.6	56.53%
	Effective regulation, 1%		139.0	57.08%
	Effective regulation, 4%		140.5	58.74%
	Effective regulation, 7%		142.0	60.41%
Smaller enterprises	Baseline	335.5	1,463.4	336.18%
	Effective regulation, 1%		1,466.9	337.23%
	Effective regulation, 4%		1,477.5	340.40%

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
	Effective regulation, 7%		1,488.1	343.56%
Private farms	Baseline	173.6	735.8	323.70%
	Effective regulation, 1%		738.2	325.10%
	Effective regulation, 4%		745.5	329.30%
	Effective regulation, 7%		752.8	333.50%
Total	Baseline	597.7	2,337.7	291.13%
	Effective regulation, 1%		2,344.2	292.21%
	Effective regulation, 4%		2,363.6	295.46%
	Effective regulation, 7%		2,383.0	298.70%
<i>Public enterprises</i>				
Total	Baseline	12.3	38.5	213.28%
	Effective regulation, 1%		38.3	211.65%
	Effective regulation, 4%		37.7	207.01%
	Effective regulation, 7%		37.1	202.21%
<i>Donbas region</i>				
Larger enterprises	Baseline	4.8	11.9	146.40%
	Effective regulation, 1%		11.9	147.44%
	Effective regulation, 4%		12.0	150.34%
	Effective regulation, 7%		12.2	153.24%
Smaller enterprises	Baseline	5.3	5.1	-4.23%
	Effective regulation, 1%		5.1	-4.42%
	Effective regulation, 4%		5.0	-4.79%
	Effective regulation, 7%		5.01	-4.23%
Private farms	Baseline	4.4	3.0	-31.55%
	Effective regulation, 1%		3.0	-31.77%
	Effective regulation, 4%		3.0	-32.00%
	Effective regulation, 7%		3.0	-31.77%
Total	Baseline	14.6	20.0	37.26%
	Effective regulation, 1%		20.2	37.53%
	Effective regulation, 4%		20.3	38.35%
	Effective regulation, 7%		20.0	39.18%

<sup>1</sup>t – tonnes

Source: APD

*Table A.6* Modelling results of soya beans production among different regions and producer groups under Baseline and Effective regulation scenarios

Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
<i>Mixed Forest</i>				
Larger enterprises	Baseline	54.8	108.6	98.26%
	Effective regulation, 1%		108.6	98.26%
	Effective regulation, 4%		108.6	98.30%
	Effective regulation, 7%		108.6	98.32%
Smaller enterprises	Baseline	135.0	521.3	286.06%
	Effective regulation, 1%		522.3	286.78%
	Effective regulation, 4%		525.2	288.94%
	Effective regulation, 7%		528.0	291.08%
Private farms	Baseline	19.2	68.0	254.67%
	Effective regulation, 1%		67.9	254.15%
	Effective regulation, 4%		67.6	252.74%
	Effective regulation, 7%		67.3	251.28%
Total	Baseline	209.0	697.9	233.95%
	Effective regulation, 1%		698.8	234.38%
	Effective regulation, 4%		701.4	235.64%
	Effective regulation, 7%		704.0	236.90%
<i>Forest Steppe</i>				
Larger enterprises	Baseline	375.0	275.9	-26.43%
	Effective regulation, 1%		276.9	-26.17%
	Effective regulation, 4%		279.9	-25.37%
	Effective regulation, 7%		282.9	-24.57%
Smaller enterprises	Baseline	646.0	804.3	24.51%
	Effective regulation, 1%		804.9	24.61%



Producer group	Scenario	Value in 2008-2014, thousand t <sup>1</sup>	Value in 2030, thousand t	Change in 2030 compared with 2008-2014
	Effective regulation, 4%		806.8	24.90%
	Effective regulation, 7%		808.7	25.19%
Private farms	Baseline	114.3	241.2	111.06%
	Effective regulation, 1%		241.6	111.49%
	Effective regulation, 4%		243.1	112.77%
	Effective regulation, 7%		244.6	114.06%
Total	Baseline	1135.3	1321.4	16.39%
	Effective regulation, 1%		1323.5	16.58%
	Effective regulation, 4%		1329.8	17.14%
	Effective regulation, 7%		1336.2	17.69%
<i>Steppe</i>				
Larger enterprises	Baseline	99.4	21.6	-78.21%
	Effective regulation, 1%		21.7	-78.18%
	Effective regulation, 4%		21.8	-78.09%
	Effective regulation, 7%		21.9	-77.99%
Smaller enterprises	Baseline	239.0	96.0	-59.83%
	Effective regulation, 1%		96.4	-59.80%
	Effective regulation, 4%		96.7	-59.68%
	Effective regulation, 7%		96.1	-59.58%
Private farms	Baseline	52.3	25.3	-51.53%
	Effective regulation, 1%		25.4	-51.40%
	Effective regulation, 4%		25.6	-51.01%
	Effective regulation, 7%		25.8	-50.63%
Total	Baseline	390.7	143.0	-63.40%
	Effective regulation, 1%		143.2	-63.35%
	Effective regulation, 4%		143.8	-63.20%
	Effective regulation, 7%		144.3	-63.06%
<i>Public enterprises</i>				
Total	Baseline	28.8	39.1	35.53%
	Effective regulation, 1%		39.1	35.60%
	Effective regulation, 4%		39.2	35.70%
	Effective regulation, 7%		39.2	35.81%
<i>Donbas region</i>				
Larger enterprises	All scenarios	0.4	0.1	-74.80%
Smaller enterprises	All scenarios	3.3	0.3	-91.46%
Private farms	All scenarios	0.5	0.2	-54.44%
Total	All scenarios	4.1	0.6	-85.69%

<sup>1</sup>t – tonnes  
Source: APD