KSE Center for Food and Land Use Research at Kyiv School of Economics

Ministry of Agrarian Policy and Food of Ukraine

AGRICULTURAL WAR LOSSES REVIEW UKRAINE

Rapid Losses Assessment Issue 2

10th of November, 2022

INTRODUCTION: $34.25 BILLION OF AGRICULTURAL WAR LOSSES

After eight months of Russia's full-scale war against Ukraine, the damage toll to Ukraine's agriculture reached $6.6 billion, or nearly 23% of its capital stock. Agricultural War Damages Review regularly provides details on the structure and estimates of damages[1]. Damages, however, usually fall short of the economic losses. While damages reflect the destruction of tangible assets and inventories, the losses estimate the foregone revenue due to lower quantities of goods produced and additional costs the producers bear because of the war.

Compared to the report's previous issue, the total amount of losses increased by **$10.8 billion, resulting in $34.25 billion in losses**. The key drivers of the increase are depressed domestic prices due to the export disruptions and soared export costs (**$3.1 bn.**), the inclusion of the losses for winter crops in the 2023 calendar year (**$3.0 bn.**, the only category that was not included in the previous issue of the report)), and an increase in the production losses for the annual crops (**$4.7 bn.**) in the 2022 calendar year. The increase in production losses for annual crops in 2022 is caused by both lowered expected harvest and changes in the methodology of estimations.

APPROACH

The rapid agricultural losses assessment was conducted in accordance with the World Bank and FAO methodologies[2]. Similarly to the agricultural war damage assessment, we estimated the losses using the indirect method. We started with establishing a baseline scenario, i.e. – what would the production be without the war. For the annual crop production, we used the average production levels for the calendar years 2020-2021 to set a baseline scenario – the production volume without any disruption caused by

[1] **KSE Agrocenter. 2022.** *Agricultural War Damages Review Ukraine. Rapid Damage Assessment. Issue 2.* https://kse.ua/wp-content/uploads/2022/11/Damages_report_issue2-1.pdf

[2] **GFDRR, World Bank Group, European Union, United Nations. 2017.** *Agriculture, Livestock, Fisheries & Forestry. PDNA Guidelines Volume B* 49 pp. https://www.gfdrr.org/en/publication/post-disaster-needs-assessments-guidelines-volume-b-2017

Conforti, P., G. Markova, and D. Tochkov. "FAO's methodology for damage and loss assessment in agriculture." *FAO Statistics Working Paper Series (FAO) eng no. 19-17* (2020). https://www.fao.org/3/ca6990en/CA6990EN.pdf

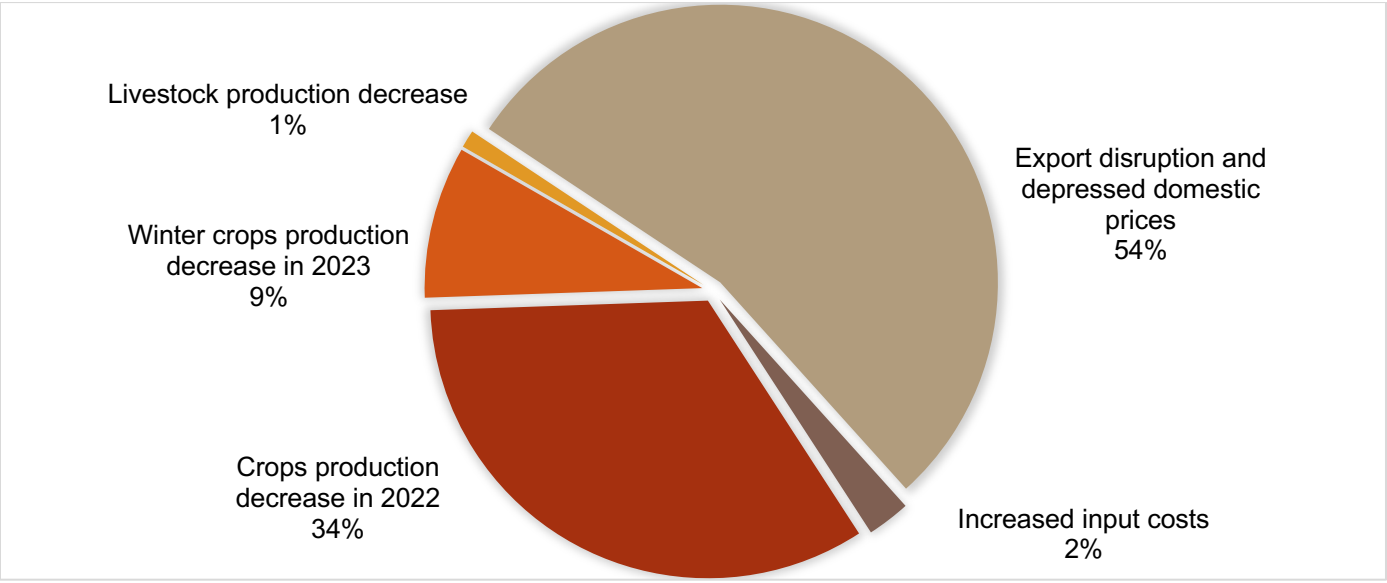
the RF invasion. We then used the Ministry of Agrarian Policy and Food (MAPF) data to estimate changes in the sowing areas and yields[3].

For the winter crops production – we used the MAPF data (as of the end of August) on the harvesting campaign to estimate the decline in both, harvesting area and in yields per hectare. For the spring crops, we use the sowing area as a measure of declining harvesting area and the change in the winter crops' yields as a proxy for the change in spring crop yields. Furthermore, we attribute 70% of the yield reduction, compared to the baseline scenario, to the effect of war and thus count it as part of the production losses.

The losses in perennial crops and livestock production are functions of the 2021 production quantities and changes in the production assets. The latter relie s on our damage estimates.

Another methodological change that contributed to an increase in production losses in comparison to the previous issue of the Losses Review – in the previous issue we estimated the losses caused by the lower production for export-oriented commodities at the current prices and included the same foregone production in the estimation of the losses caused by the export disruption. In this issue of the Review we estimate the production losses using the pre-invasion prices for all products.

FIGURE 1. LOSSES DUE TO:



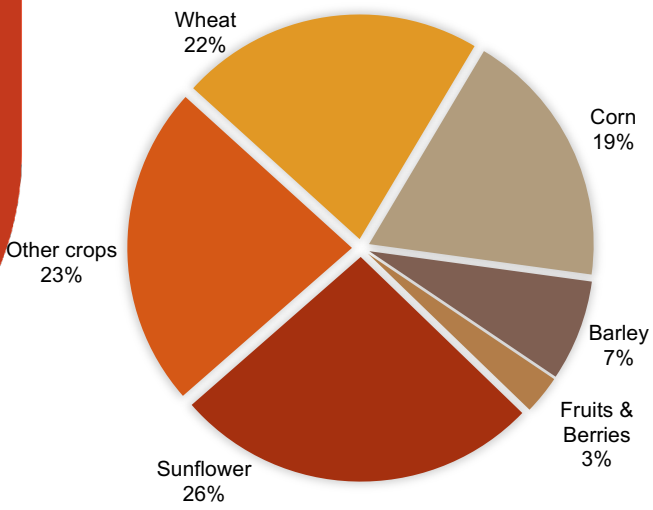
CROP LOSSES DUE TO LOWER PRODUCTION IN 2022 $11.2 BILLION

The most significant drop in the estimated 2022 harvest is for the barley (estimated 38.8% fall in the 2022 harvest, compared to the baseline), wheat (33.3%), and sunflower (30.9%) since a substantial share of these crops is produced in the areas directly affected by the war. Compared to the baseline scenario, a relatively less pronounced decrease in the 2022 harvest is expected for corn, i.e., 18.3% . This is mainly because the corn belt of Ukraine is located in the center of the country, – above the occupied South and below the liberated North of Ukraine. However, the realized production losses for corn could be higher due to farmers' potential inability or unwillingness to collect the harvest and decisions to postpone the corn harvesting campaign deep into the next year. The combined losses due to lower production of the abovementioned crops result in **$8.5 billion**.

According to our estimates, the harvest for other annual crops in the 2022 calendar year is expected to be 17.4% lower than the baseline scenario, resulting in another **$2.7 billion**. This estimate is $647 m. lower than the $3.3 bn. in estimated losses for this category in the previous issue of the Review.

[3] All estimations are accessble via link https://kse.ua/kse-impact/tsentr-doslidzhen-prodovolstva-ta-zemlekoristuvannya/

FIGURE 2. CROP LOSSES IN 2022



2023 WINTER CROPS LOSSES DUE TO LOWER PRODUCTION $3.0 BILLION

At this point, we can already say with a high degree of certainty that the war already severely affects the 2022 sowing campaign of winter crops. In estimating the war-induced production losses for the 2023 winter crops, we make a bald assumption that the production levels for 2023 winter crops will remain on par (the same yields and harvesting area) as in this year's winter crops harvesting campaign. The production losses for the next year's harvest of the winter crops could be even higher due to lower yields caused by the lower quality of planted seeds and lesser application of crop protection measures and fertilizers and by a possible decrease in the sowing area, all driven by the farmers' lack of working capital as a result of depressed domestic prices for export-oriented commodities.

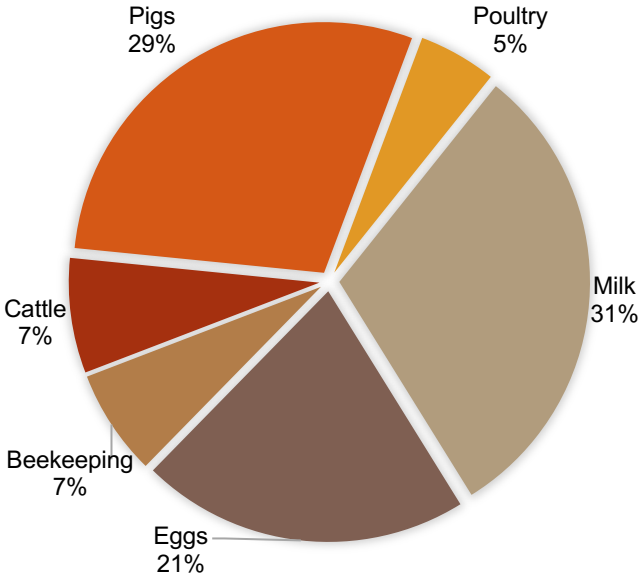
At this moment, the most substantial estimated production loss for the following year's winter crops is for wheat - **$2.4 bn**., followed by the **$318 m.** and **$312 m.** in losses for rapeseed and barley correspondingly.

LIVESTOCK LOSSES DUE TO LOWER PRODUCTION $348.7 MILLION

In this issue we use the fine-tuned damage coefficients derived from the representative survey to arrive at more precise livestock output losses. We estimate yearly foregone production for the cattle, sheep & goat, pigs, and poultry in live weight. As a part of livestock production, we also evaluate the yearly decrease in milk, egg, and beekeeping production. Compared to the previous version of the Review, we also estimate the livestock production damages for only one year of the foregone production rather than three years as estimated in the previous issue of the Review.

Assuming similar productivity, we expect a modest decrease in livestock production, i.e. within 10% range compared to the baseline scenario. The yearly losses in livestock and beekeeping production are estimated at **$348.7 million**.

FIGURE 3. STRUCTURE OF YEARLY LOSSES IN LIVESTOCK PRODUCTION



PERENNIAL CROP LOSSES DUE TO LOWER OUTPUT $322 MILLION

Similarly to the estimates for the decrease in livestock production, we use the results of the damages estimations. Namely, the decrease in the perennial crops area, coupled with an assumption of the same yield as in the baseline period are applied for estimating the perennial crops production change. Given that the replanted gardens will not fruit for multiple years since replanting, we estimate the production losses for three years of lower berries production and five years of lower production for all other perennial crops.

The combined production losses for perennial crops are **$322 m.** The **$59.2 m.** out of which result from the lower pome fruit production, **$89.5 m.** from the lower berries production and **$173.4 m.** from the lower stone fruit production.

REVENUE LOSSES DUE TO LOGISTICS DISRUPTION $18.5 BILLION

One of the RF invasion consequences is a decrease in the farm-gate prices for export-oriented commodities (wheat, corn, barley and sunflower). The initial decrease in domestic prices was caused by the RF naval forces' blockade of Ukrainian ports. Naval blockade required rerouting the export supply lines from the maritime export to the export through railway, river ports, and trucks. It led to a substantial increase in shipment prices (from approximately $30 a tonne all the way up to $200 a tonne) and a decrease in the demand for such commodities since the export capacity plummeted. If the average volume of monthly export fluctuated in a range of 5-7 million tonnes before the RF invasion, in the first months since the invasion, it fell by a factor of five.

Decreased demand and higher shipment costs led to the weighted average decrease in domestic prices by 33.7% at the moment of preparing the previous report. Since then, the grain deal with the UN and Turkey[4] expanded the export capacity, but at the same time Ukraine started the harvesting campaign, boosting the supply of agricultural commodities on the domestic market. Still, the exporting capacities remain lacking, and the shipment cost remain high. Coupled with the increased supply due to the new harvest, it keeps domestic prices for export-oriented commodities in a deep dive. Given the high uncertainty regarding the functioning of the grain corridor caused by the RF's groundless claims and Ukraine's inability to export from the ports that fall outside the grain deal, we assume that a substantial increase in domestic prices in the nearest term is unlikely. The domestic prices for export-oriented commodities in the middle of September were 60.7% lower than the pre-invasion prices, resulting in an estimated **$18.5 billion** in lost revenue for Ukrainian agricultural producers.

LOSSES DUE TO HIGHER INPUT COSTS $862 MILLION LOSS

Supply disruptions also led to an increase in agricultural input prices, in particular for the key ones - fertilizers and fuel. After accounting for lower fertilizer application due to lower sowing area caused by RF occupation and lower sowing intensity in the active warzones, the increased fertilizer cost accrued to additional $377.1 million in losses for Ukrainian farmers. The estimated increase of 39 USD cents per liter of diesel induced additional $485.1 million of losses for Ukrainian agricultural producers.

[4] Grain deal – informal name of the "Black Sea Grain Initiative" – the two sets of agreements signed by Ukraine, Turkey, and the UN as well as the RF, Turkey, and the UN. The goal of the initiative is to establish a humanitarian maritime corridor to allow ships to export grain and other foodstuffs from Ukraine.

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ANNEX. TABLE 1. LOSSES VALUE BY CATEGORY

Losses due to crops production decrease in 2022				
Item	Baseline volume, million tonnes	2022 forecasted volume, million tonnes	Domestic unit price, $/Kg	Value of losses, million
Wheat	30.8	20.55	$0.28	$2,513
Corn	36.84	30.1	$0.27	$2,143
Barley	9.53	5.83	$0.27	$837
Sunflower	14.91	10.3	$0.72	$3,032
Pome fruits	1.45	1.39	$0.21	$59
Stone fruits	0.53	0.48	$0.65	$173
Berries	0.14	0.12	$2.14	$89
Other crops	71.06	58.65	$0.22	$2,667
Losses due to winter crops production decrease in 2023				
Item	Baseline volume, million tonnes	2022 forecasted volume, million tonnes	Domestic unit price, $/Kg	Value of losses, million
Winter Wheat	28.47	18.7	$0.28	$2,390.5
Winter Barley	3.52	2.11	$0.27	$312.2
Winter Rapeseed	3.49	4.53	$0.59	$317.8
Winter Rye	0.36	0.3	$0.16	$11.8
Losses due to livestock production decrease				
Item	Pre-war 2021 forecasted volume, thsd. heads	2022 forecasted volume, thsd. heads	Domestic unit price, $/ Kg	Value of losses, million
Cattle	2,704	2,492	$1.75	$25.8
Pigs	5,559	5,052	$1.34	$101.4
Sheep & Goats	1,089	994	$1.41	$0.7
Poultry	193,940	182,267	$0.87	$17.5
Milk, thsd. tons	2,751	2,453	$0.35	$105.9
Eggs, mill. pcs	6,929	6,016	$80.74 / thsd. pcs	$73.7
Honey, tons	45,276	34,768	$2.00	$23.4
Beewax, tons	416	334	$5.00	$0.4
Losses due to logistics disruption and lower prices for export-oriented commodities				
Item	Affected volume, million tonnes		Difference in farmgate prices in 2021 and 2022, $/Kg	Value of losses, million
Wheat	25.93		$0.17	$4,444
Corn	41.57		$0.17	$7,175
Barley	6.68		$0.17	$1,167
Sunflower	15.17		$0.38	$5,712
Losses due to higher production costs				
Item	Amount needed for 2022		Increase in prices	Value of losses, million $
Fertilizer	3.21 million tonnes		$117.52 per tonne	$377
Fuel	1,240 million liters		$0.39 per liter	$480
Total, million USD				**$34,254**