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Agro-Ecological Assessment for the Transition of the Agricultural Sector in Ukraine. Part I: Socio-Economic Aspects

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Interim Report **IR-06-052**

Agro-ecological assessment for the transition of the agricultural sector in Ukraine

Part I

Socio-economic aspects

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Abstract

Since 1991, Ukraine has been undergoing a transformation of its economic and social system to enable the transition to a market economy. There are a number of positive developments that have already resulted from the changes in the socio-economic environment.

However the transformation of farming systems into new forms did not greatly improve the sustainable use of natural resources or strengthen the economic performance, so that the influence of this intervention on sustainability of farming systems in Ukraine has had more negative than positive results. Large-scale farms continue to over-exploit natural resources and new private farmers, lacking in experience, knowledge and financial resources, continue to use obsolete technologies that are economically inefficient and may cause land degradation. All the components of the farming sector such as agricultural enterprises, household plots, and individual private farms, still remain problematic in terms of efficiency and are constrained by policies and inadequate markets.

While economic conditions for agriculture have changed considerably since the beginning of the 1990s, agricultural policy in Ukraine was focused on trying to revive the production level, without the comprehensive analysis of agro-ecological conditions, internal and external markets, infrastructure, farmers' incentives etc. Rational agricultural land use is imperative in Ukraine. Existing agricultural systems are not appropriate for changing production, technological, economic or ecological realities. There is an urgent need for major policy changes in Ukraine towards rural welfare growth, sustainable agriculture and efficient land management, and establishment of agricultural market networks supported by adequate legislation. With the additional pressure of transition to a market economy, a new agricultural paradigm is required.

This paper is the first in a series of reports on "Agro-ecological Assessment for Transition of the Agricultural Sector in Ukraine". The reports aim at further elaboration of integrated strategies and policies towards maintaining the sustainability of natural resources and the environment while remaining economically viable and internationally competitive.

This paper on "Socio-economic analysis" describes the main socio-economic features of the transition processes in the Ukrainian agricultural sector, trends in agricultural production, and changes in its farming systems and land use.

The second report "Land Resources and Agricultural Productivity: Methodology and Results" provides the inventory of natural (land, climatic) resources and the evaluation of biophysical limitations and potentials of the crop production in Ukraine at the national and regional levels.

The third paper "Climate Change Impacts on Agricultural Productivity: Methodology and Results" investigates impacts of climate change/variability on the crop production and land use change in Ukraine on national and regional scales and indicates possible ways of adaptation over the coming three decades.

Acknowledgments

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Acronyms, Abbreviations and Definitions

The terminology used to describe different categories of land and farms follows the standard Ukrainian legal definitions.

Total land area is the area of land, including inland water-bodies, within the state boundary.

Agricultural land is defined as land systematically used in agricultural production. It includes arable land, orchards, vineyards, hayfields and pastures. The information on land and distribution of it by types of agricultural land and land users in the report is based on the data from "Report on land availability and distribution by land users and kinds of land", published by State Committee of Land Resources of Ukraine.

Arable land is land used for crop production, including perennial grass, fallow lands, bare fallow and land in greenhouses.

Household plots are parcels of land that are owned by private individuals, and do not exceed 2 ha, but may be enlarged by leasing additional land.

Private farms are the new Western-type farms that emerged during the reform, owned by private individuals, and are up to 100 ha, but may be enlarged by leasing additional land.

Agricultural (farm) enterprises (generally large farms) are owned by legal entities such as cooperatives, partnerships, collective farms, joint stock companies or are owned by private individuals.

AEZ Agro-Ecological Zoning
FSU Former Soviet Union
GDP Gross Domestic Product
GAO Gross Agricultural Output
Hrn Ukrainian Hryvna

Agro-ecological assessment for the transition of the agricultural sector in Ukraine

Part I: Socio-economic aspects

Natalia Mishchenko
Kateryna Gumeniuk

Introduction

Agriculture has always been an important sector of the national economy. In the former Soviet Union (FSU), Ukraine was by far the most important component of the Union's agricultural system. Given highly fertile soils combined with favourable climatic conditions, domestic agriculture was oriented towards output maximization and food supply to other Soviet republics. Occupying about 3% of the land mass and 16% of agricultural land of the FSU, Ukraine produced more than 25% of the gross agricultural output (GAO).

Since independence in 1991, Ukraine began to restructure its agriculture. The major objective of agricultural reforms was primarily to create a more efficient and market oriented sector. However, the process of transformation has proven to be more complex and slower than originally envisaged. Agricultural GDP declined by about 50% between 1990 and 1999, recovered somewhat during 2000 to 2002, and further declined by 18% in 2003. The economic decline in the nineties was in part the result of a general poor economic performance, dramatic decrease of incomes in rural areas, the collapse of agricultural exports, and the disruption of the former markets; ineffective agricultural policies related to production planning and taxation, inputs and technologies, management and trade. The agricultural sector, mainly subsistence farming, played an important role as a social safety net by absorbing surplus of rural labor.

Agrarian reforms and farm restructuring are important components of a transition to a market economy. However the transformation of farming systems into new forms did not greatly improve the sustainable use of natural resources or strengthen the economic performance, so that the influence of this intervention on sustainability of farming systems in Ukraine has had more negative than positive results. Large-scale farms continue to over-exploit natural resources and new private farmers, lacking in experience, knowledge and financial resources, continue to use obsolete technologies that are economically inefficient and may cause land degradation.

Even after a decade of economic and structural changes, there still is an urgent need in Ukraine for comprehensive agricultural development strategies, and effective institutional transformation for sustainable agricultural rural development. While economic conditions for agriculture have changed considerably since the beginning of the 1990s, agricultural policy in Ukraine was focused on trying to revive the production level, without the comprehensive

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analysis of agro-ecological conditions, internal and external markets, infrastructure, farmers' incentives etc. Rational agricultural land use is imperative in Ukraine. Existing agricultural systems are not appropriate for changing production, technological, economic or ecological realities.

There is an urgent need for major policy changes in the Ukraine towards rural welfare growth, sustainable agriculture and effective land management, and establishment of agricultural market network supported by adequate legislations. With the additional pressure of transition to a market economy, a new agricultural paradigm is required.

This case study is devoted to analyzing the economic, social and environmental transformations in the Ukrainian agriculture. A description of farming systems in Ukraine has been compiled, including a description of the country's natural conditions, such as climate, soils, and land use. Changes in the farming systems' environment during the 1990's, the socio-economic and policy-institutional environment, the transformation of major farming system types, which are dominant in Ukraine, individual household plots, private commercial farms, and agricultural enterprises are analyzed. This report is based on information and data provided by State Statistical Committee of Ukraine. Information from other sources is referenced.

1. General land use characteristics

1.1. Climate and agro-ecological zones

With a population of 48.5 million (2001), Ukraine covers a total land area of 60.3 million ha. The country has very little unused land; practically all the territory (over 92%) is engaged in economic activities.

Most of Ukraine consists of fertile plains and plateaus, mountains being found only in the west (the Ukrainian Carpathians), and in the Crimean Peninsula in the extreme south. About 95 % of Ukraine's land mass is situated on the East European Plain and 5 % in Carpathian and Crimean mountains (Zastavniy, 1994). The climate is temperate sub-continental over most of the territory. Only the southern Crimean coast has subtropical Mediterranean features. Summers are warm across the greater part of the country, hot in the south. Winters vary from cool along the Black Sea to cold further inland. The average annual temperature varies between 5-6°C in the north-east to 9-11°C in the south-west. Precipitation is the highest in the west and north. Flat areas receive on average 300-700 mm of precipitation annually, mountainous regions up to 1200 mm. The climate is generally favorable for agricultural crops.

Ukraine has five distinct agro-ecological zones (Starodubtsev *et al.,* 2000; Medvedev *et al.,* 2003) including three major natural regions – Polissya (woodland and marsh), Forest-Steppe, and Steppe, and two mountainous regions near the borders of the country – Ukrainian Carpathians and Crimean Mountains.

Polissia lies in the northwest and north and occupies an area of 11.4 million ha or 19% of the country. It is humid lowland, moderately warm in summer and cold in winter. More than one-third of this area is arable land. The abundant rainfall provides favorable conditions for forest vegetation: nearly one-quarter of the area is covered with mixed woodland. The soils are generally well drained, except for a substantial portion of swampy land. Over 600 thousand ha (60%) of the country's peat lands are concentrated here. During the Soviet period, major efforts were undertaken to drain these swamplands and reclaim the land for agriculture. Conditions are favorable for cereals, flax, potatoes, forage crops and beef-dairy cattle-raising.

In areas south of Polissia, Forest-Steppe zone covers 20.1 million ha or 34% of the country. This is a relatively warm region, where the woodlands alternate with steppe areas. Arable land covers about two-thirds of the region, forest about one-eighth. The total area of forested land was originally about half of the area, however much of this land has been converted for agriculture. The Forest-Steppe zone has fertile soils and provides the most stable conditions for annual and perennial crops, such as sugar beet and grain, and for beef-dairy cattle-raising and pig rearing.

Steppe zone in the south occupies about 25 million ha or 40% of the country. There is very little forest land in Steppe, which mostly consists of flat, treeless plains, mainly cultivated. The other areas of the Steppe are protected in nature reserves. For a long time grassy steppe plains have been extensively used as natural pastures. Most of the primary steppe areas with fertile top soils have been reclaimed and transformed into arable land. By the end of the 1970s, Steppe became the most massively cultivated region dominated by intensive large-scale farming (Martynenko O., Kobzev O., Oginskiy A., 2001). Arable land

covers more than two-thirds of this area. The relatively low annual precipitation and hot, dry summers in Steppe require a tillage system that is oriented at conserving soil moisture. In this zone, supplementary irrigation is applied. This zone is particularly used for growing winter wheat and sunflower.

The Carpathian Mountains in the extreme west occupy about 3 million ha and the Crimean Mountains in the southern end of Crimea peninsula occupy almost 1 million ha. In these mountainous areas the lower slopes are covered with mixed forests, the intermediate slopes with pine forests, and meadows are widespread at higher altitudes. Highland hayfields and pastures are used for cattle and sheep rearing. Both mountainous regions play an important part in the country's economy, in particular for tourist and recreation business.

1.2. Main soil types

Vegetation and climate differs within ecological zones and are major factors responsible for the distribution of different soil types in Ukraine (Zastavniy, 1994; Starodubtsev *et al.,* 2000; Medvedev *et al.,* 2001; Medvedev *et al.,* 2003; USDA/NOAA, 1999; Nosko B., Prister B., Loboda M., *et. al.*, 1994). From northwest to southeast the soils may be divided into three major types: a zone of podzolic intergraded soils, a central belt consisting of the fertile Chernozems, and the southeast zone of chestnut and salinized soils near the Black Sea.

Podzolic soils occupy about one-fifth of the country's area. These soils extend mostly in the north and northwest and dominate over 70 percent of the total in Polissia region. In northern Ukraine, where the growing season is relatively short, these soils are characterized by low humus content, high acidity and low natural fertility. The sandy nature of these soils causes a low water holding capacity, resulting in inefficient use of both rainfall and fertilizers. To produce good yields these soils require considerable applications of fertilizers and lime. The podzolic soils are less fertile than the Chernozem or Chestnut soils.

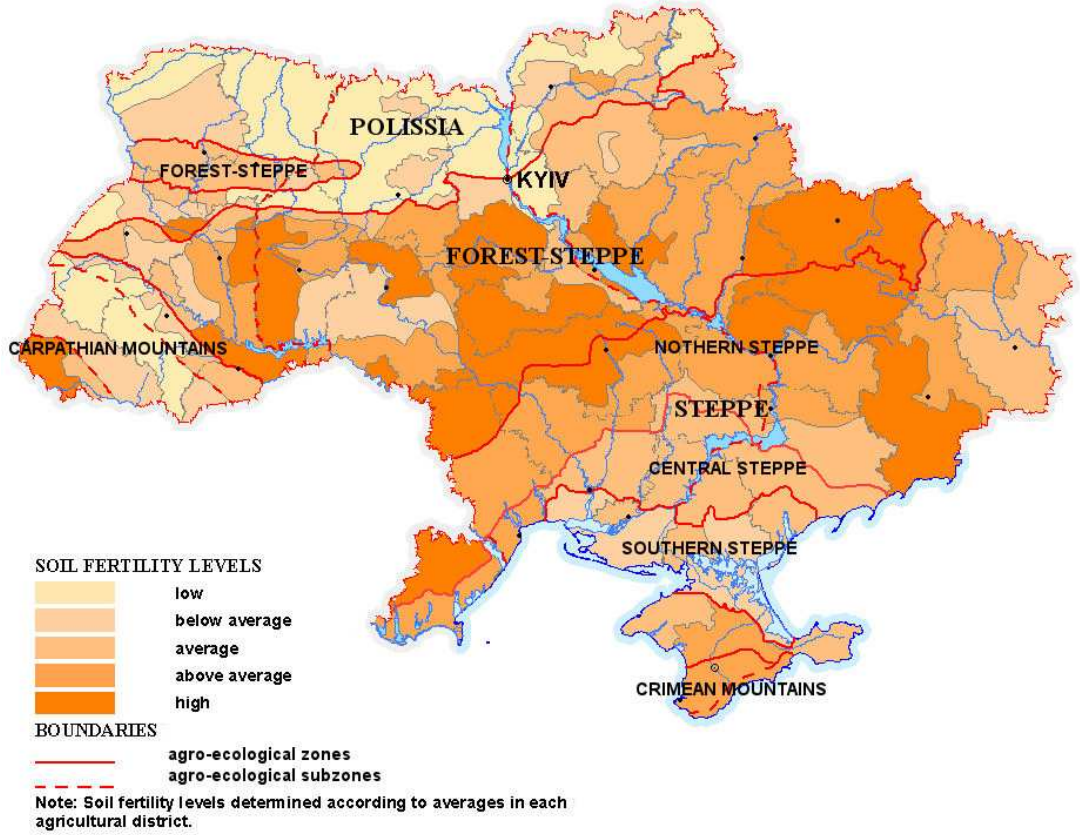
Chernozems are located in central Ukraine. Chernozems were formed on flat plains in loess-like deposits. Chernozems occupy about two-thirds of the total territory of Ukraine and dominate most of Forest-steppe and Steppe zones. They may be divided into three broad varieties: in the north a belt of the so-called typical (deep) Chernozems (the most fertile, rich in humus; about 1.0-1.5 m thick); further south and east a zone of ordinary Chernozems (equally rich in humus, about 80-90 cm thick); and the southernmost belt of dry southern Chernozems (less humus and about 40-70 cm thick). Chernozem soils are most valuable for agriculture due to their high natural fertility. They are fine grained and easily cultivated.

Other important soils are gray forest soils and podzolized black-earth soils in various uplands and along the northern and western perimeters of the Chernozems. These soils are well-suited for agriculture and occupy much of remaining territory.

Along the coastlines of the Black Sea and the Sea of Azov, a rather narrow strip of Chestnut soils is found, which tend to be increasingly salinized to the south as they approach the Black Sea. Chestnut soils are less fertile than the Chernozems, however, like the Chernozems, these soils are well structured and easy to cultivate. The productivity of Chestnut soils is mainly limited by the lack of rainfall.

Calcic Chernozems and brown forest (often with gravel) soils prevail in the Crimean Mountains, while the Carpathians are characterized by mountain-forest and soddy-brown soils with low content of humus, leached and heavy acid soils.

Generally, considering the whole of Ukraine, the natural fertility of the soils is high (see Map 1). Agricultural regions are located in central and southern Ukraine. In the total area of the country's arable lands 68 percent is dominated by Chernozems (Medvedev *et al.*, 2001). All highly productive soils are concentrated particularly in the Forest-Steppe Zone (Table 1).



Map 1. Soil Fertility in Ukraine

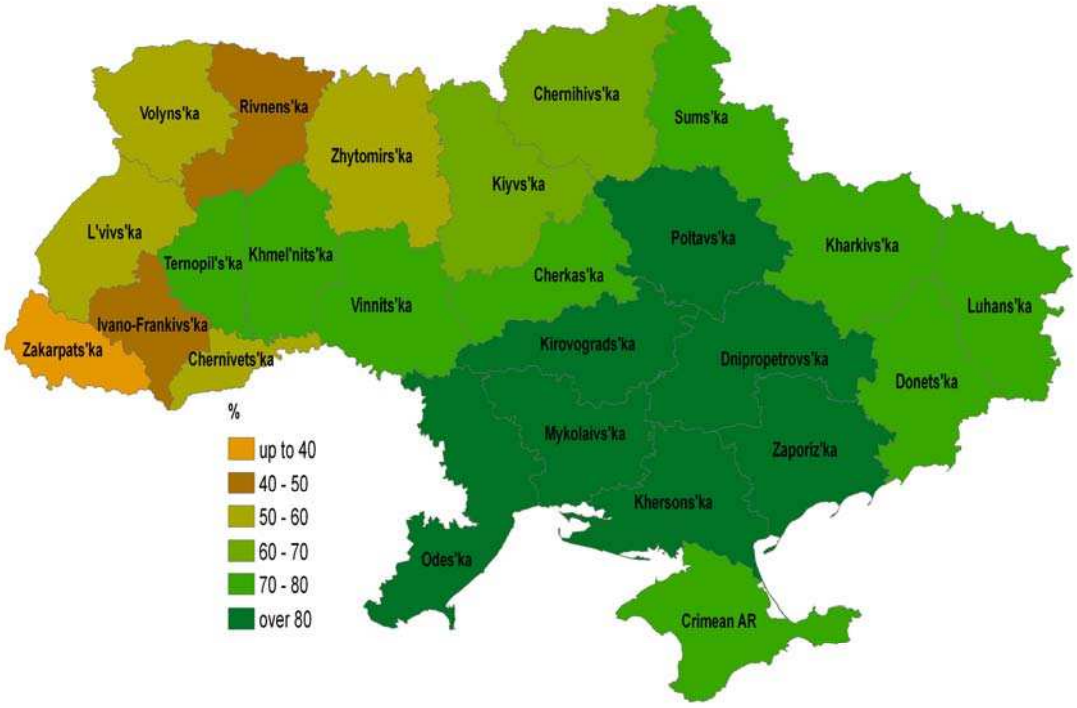
Source: Atlas of Ukraine, 2000, Institute for Geography NASU / Intelligence Systems GEO.

Table 1. Highly productive agricultural land in Ukraine (10^6 ha, 1998 est.)

Region	Agricultural land			Arable land		
	Total	Especially valuable	Share, %	Total	Especially valuable	Share, %
Polissia and Carphatians	7.5	1.5	21	5.1	1.38	25
Forest-Steppe	13.6	7.4	54	11.4	7.2	63
Steppe and Crimean Mountains	18.4	5.9	32	15.3	5.7	37
Ukraine	39.6	14.9	38	31.8	14.2	45

Source: Compiled from Danilishyn B. *et al.* (1999).

All agricultural land covers almost 42 million ha, of which 78% is sown with annual crops (arable lands). The share of the agricultural land is most prominent in Central (Forest-Steppe) and especially in Southern (Steppe) zones, where more than 80% of all land is cultivated (Map 2). The lowest shares are in the mountains and foothill regions of the Carpathians and Crimea, as well as in the Polissia zone with relatively infertile soils with frequent peat-marsh patches, making these less fertile soils impractical for large-scale crop production.



Map 2. Agricultural land shares (%)

Source: State Land Committee.

1.3. Land use changes.

Table 2 shows the changes in land use in Ukraine. In 2001, agricultural lands occupied about 70% of the territory, forest and forest-covered areas 17%, built-up areas – 4%, and internal waters occupy another 4%.

Agricultural land use in the last decade (1990-2001) showed a slight decrease mainly affecting cultivated land; annual crop land deceased by about 3%, and perennial crop land by more than 12%. These decreases brought about an increase of pastures and fallow land, while part of the cultivated land was adsorbed by urbanization. Decreases in cultivated land were most pronounced in Polissia and Carpathians (more than 9%); in Forest-Steppe, the decrease was 4 %, and in the highly cultivated Steppe Zone and the Crimea, about 1%.

The overall reduction in annual croplands in 1990s (3%) was disproportional in comparison with the 50% of decrease in gross agricultural output during the same period. This decrease is the combined result of deteriorating land management, lack of agricultural inputs and increase of unused agricultural land. The latter may amount up to 2 millions ha according to recent estimates. Agricultural output per ha of cropland in monetary terms declined in 2000 in comparable prices from Hrn 1,160 to Hrn 584 during the same period.

Table 2 shows an upward trend in built-up areas, which have increased by almost 300 thousand ha (or about 14%) over the period 1990-2001. Substantial urbanization is concentrated near big cities – Zaporizhia, Kyiv, Kharkiv, Dnipropetrovsk, Odesa and Lviv, and, in particular, in the industrial Donets'ka and Luhans'ka oblasts. About 40% of the Ukrainian population currently lives in urban agglomerations.

Table 2. Main land use categories

	1968		1990		2001		Changes over 1990-2001	
	10^3 ha	% total area	10^3 ha	% total area	10^3 ha	% total area	10^3 ha	%
Total area	60355	100.0	60355	100.0	60355	100.0	0	0
Total agricultural land:	43019	71.3	42030	69.6	41817	69.3	-213	-0.5
Arable land	*34361	56.9	33571	55.6	32573	54.0	-998	-3.0
Fallow lands	-	-	5	0.0	396	0.7	+391	78-fold
Perennial crops	1407	2.3	1058	1.7	924	1.5	-134	-12.7
Hayfields (cutting)	2547	4.2	2304	3.8	2407	4.0	+103	+4.5
Pastures	4704	7.8	5092	8.4	5517	9.1	+425	+8.3
Forests and forest-cover land	9468	15.7	10230	16.9	10426	17.3	+196	+1.9
Built-up areas	n.a.	-	2161	3.6	2449	4.1	+288	+13.3
Marshlands	782	1.3	885	1.5	949	1.6	+64	+7.2
Other lands	4922	8.2	2451	4.1	2288	3.8	-163	-6.7
Water bodies	2164	3.6	2435	4.0	2426	4.0	-9	-0.4
Irrigate agricultural land	757	1.2	2598	4.3	2324	3.9	-274	-10.5
Drained agricultural land	1431	1.4	2857	4.7	2959	4.9	+102	+3.6

* Incl. Fallow lands

Source: 1968 – Encyclopedia of the Ukrainian SSR. – Kiev, 1970 – vol. 2. – P. 26.
1990, 2001 – data of State Land Committee/State Statistics Committee of Ukraine

Ukraine has a total of 2.4 million ha of water bodies. The largest, River Dnipro, was transformed in 1950-70s into a cascade of large reservoirs, 855 kilometers long with a water-filled area 7 thousand km^2. It has facilitated the construction of 6 hydroelectric stations which provide 4% of the total electricity production in Ukraine; the stored water allows irrigation of more than one million hectares in the Southern part of Ukraine and improves the water supply to industrial centers.

The present area of the Dnipro reservoirs is 700 thousand ha. Much of this territory was in use in the past as highly productive farm land (265 thousand ha) and forest (270 thousand ha), the formation of the riverbanks caused the loss of an additional 6 thousand ha of farm land (Ministry for Environmental Protection and Nuclear Safety of Ukraine, 1997).

However, intensive construction for water management purposes instigates large-scale changes in soils and environment not only near the objects of construction, but in the entire basins of the rivers with regulated runoff. Realization of the main purposes of construction (power generation, irrigation, flood control, etc) caused submersion of fertile soils in river valleys, soil water-logging, salinization and swamp formation on the rim of the reservoirs. According to estimates (Danilishin B., Dorohuntsov S. *et al,*. 1999), between 200 and 500 thousand ha of agricultural land around the constructed water reservoirs is now affected by water-logging and inundation.

1.4. Irrigation and drainage.

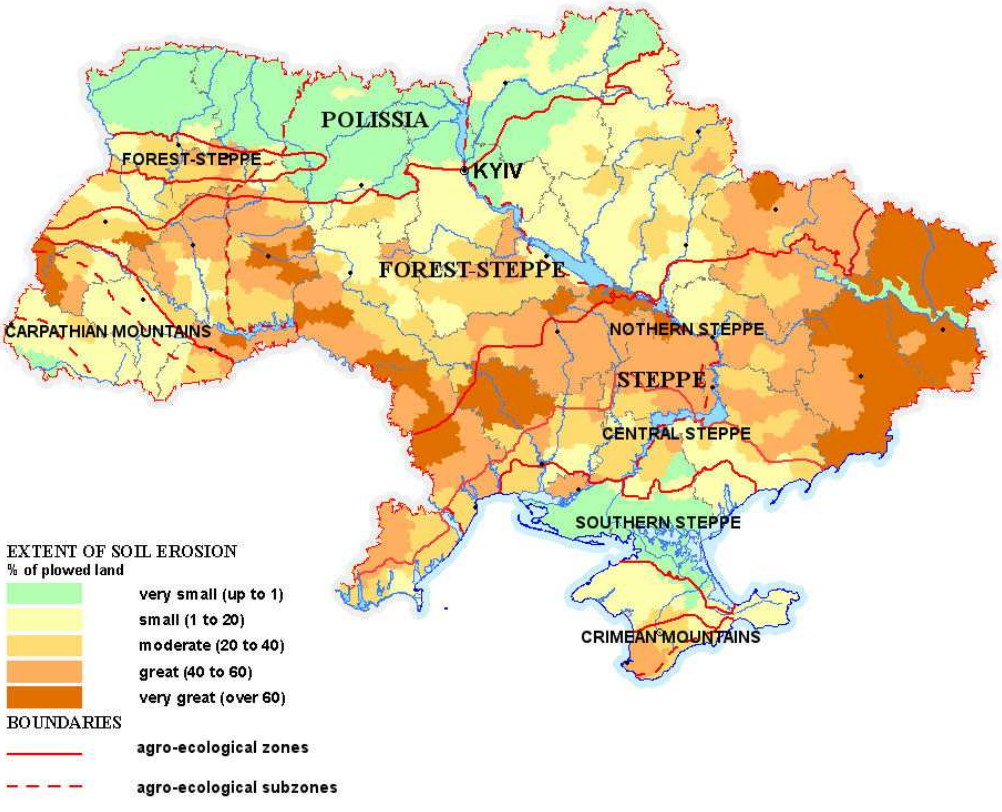
Irrigation is mainly concentrated in the south of the Ukraine. In 1990, irrigated lands covered about 3 million ha, i.e., about 7% of the total croplands. During the 1990s, large scale irrigation was discontinued; the land was used for rain-fed crop production. In 2004, the irrigated areas used in farm enterprises have declined to 1.5 million ha, of which only 367 thousand ha were actually irrigated. Lack of capital is the main cause for the abandoning irrigation practices in farm enterprises. In 2004, about 72% of irrigated land was used for growing cereals (50%) and industrial crops (22%), such as sunflower and soybean. About

10% of the irrigated land was used for growing vegetables, and the remaining 17% for fodder crops.

The total area of the drained lands has increased slightly during the 1990s by about 3 million ha. However approximately 1 million ha of these drained areas needs reclamation. In reality 40% of the drained lands are in use for crop production, the rest is under forage crops and pastures of low productivity. Because of high expenses of liming and low input farming practices, the stock of drained land is declining. It is difficult to reclaim these soils and only their re-naturalization can be achieved (Medvedev *et al.*, 2003).

1.5. Soil degradation.

Soil degradation linked to the exploitation of land resources is a widespread problem influencing land productivity in Ukraine (Map 3). According to the National Report on Environment (1999), soil erosion affected 57% of the arable land, of which some 32% by wind erosion, 22% by water erosion, and 3% by a combination of both. According to estimates by the Ukrainian Institute for Soil Science and Agrochemistry Research, the loss of organic matter in soils is in the range of 0.6-1.0 ton per ha annually (Medvedev *et al.*, 2001). Main problems are: (i) compaction of the topsoil, which is deteriorating the soil structure, water holding capacity, root penetration, tuber development, run-off of mineral fertilizer; (ii) insufficient replenishment of nutrients both chemical and organic fertilizers taken out of the soil by crops.



Map 3. Extent of Soil erosion in Ukraine

Source: Atlas of Ukraine, 2000, Institute for Geography NASU / Intelligence Systems GEO.

1.6. Forests.

Forests and forested areas occupied about 10 million ha or 16% of the Ukraine, i.e. 0.2 ha per capita. Forests areas are mainly found in the northern flat part of Ukraine (Polissia) and in mountain regions of the Carpathian and Crimean mountains that have the greatest forest areas.

Forests play a vital role in soil and water conservation, as well as for recreational areas. About 45% of Ukraine's forests serve general and natural protective purposes and can be considered as natural forest. However, forest areas are highly fragmented, and large parts are increasingly threatened by deforestation.

Over one third of the Ukrainian forests are used for wood production (Dubin V., 1999). Average yield per 1 ha of this production forest is about $4m^3$ of round wood, varying from almost $5m^3$ in the Carpathians to $3m^3$ in Steppe (Medvedev V., 2002). Forest areas in the Carpathian Mountains have been declining for decades because of excessive timber harvesting during the 1950s and 1960s. The total yield is about 9 million m^3 of wood annually matching about 25% of national requirements. Consequently, Ukraine imports much of its round wood and paper.

Table 3. Historical and present forest cover

Zone	Maximum forest cover during last 1000 years (%)	Present forest cover (%)
Polissia	72.8	26.1
Forest-Steppe	52.0	13.0
Steppe	20.0	3.5
Carpathians	76.0	40.2
Crimea	14.2	10.0
Ukraine	44.4	15.6

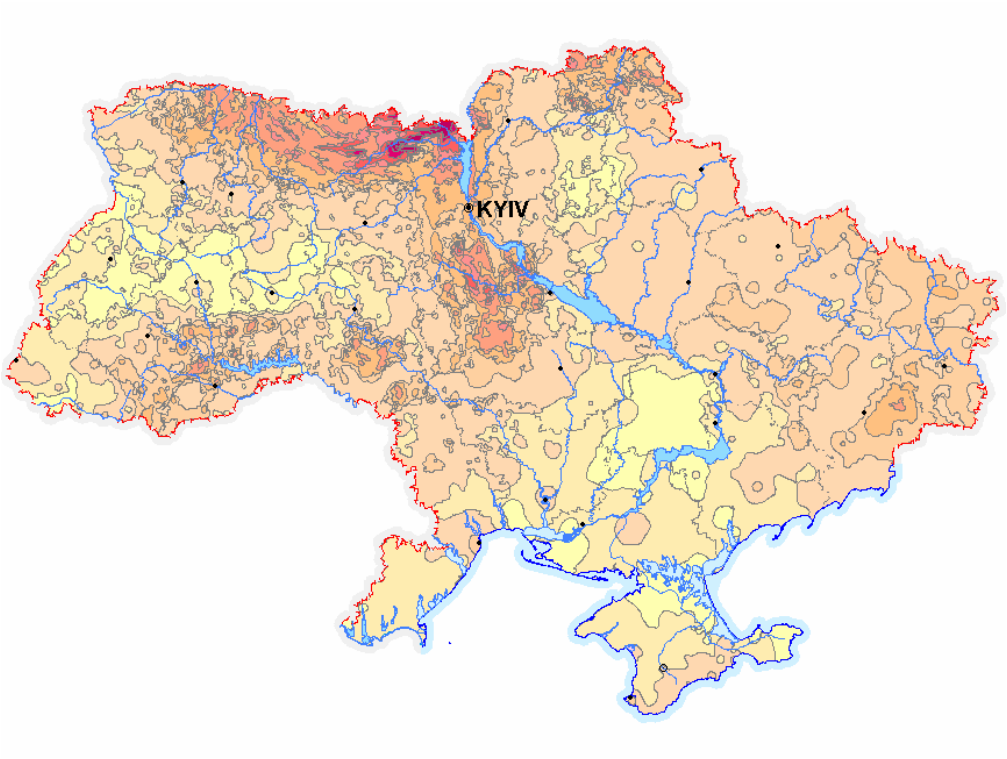
Source: Danilishyn B. *et. al*. (1999) – p. **332**

During the last millennium the area under forest comprised about half of the country. In particular in the Forest-Steppe zone (Table 3) most of the original forests were cut down in favour of the expansion of agriculture. The Council of Studies of Productive Forces of Ukraine (1998) projects that, by 2015, further change in forest areas will be insignificant.

1.7. Chernobyl accident and its impact on land use.

After the Chernobyl accident, large areas of Ukraine, Belarus and Russia were badly contaminated by radiation, resulting in the evacuation and resettlement of over 300 thousand people. More than 5% of Ukraine's territory was contaminated to high levels (> 40,000 Bq/m2 Cesium-137) (Map 4).

In terms of agricultural land, 4.6 million ha or 12% of Ukraine's farmland areas were affected by high levels of contamination. The highest levels of Cesium-137 were in the surface layers of the soil in the 74 most contaminated counties located in Zhytomyrs'ka, Kiyvs'ka, Chernihivs'ka, Rivnens'ka, Cherkas'ka, Volyns'ka, Ternopil's'ka, Ivano-Frankivs'ka, Sumska, Chernivets'ka, Vinnits'ka administrative oblasts of Ukraine. Due to unsafe levels of radiation, about 180 thousand ha of arable land were removed from agricultural use. Forests of Ukraine were also seriously affected with the areas contaminated totaling over 3 million ha (Nosko B., Prister B., Loboda M., *et. al.*, 1994). Presently concern continues about the soil and forest contamination with Stroncium-90 and Cesium-137, which have half-lives of about 30 years.



Map 4. Cumulative local contamination with Cesium-137 (natural + Chernobyl)
Sources: Atlas of radioactive contamination of Ukraine, Ministry of Emergencies of Ukraine (1999).

2. Agriculture in the transition

Ukraine is endowed with large areas of fertile soil and has a long tradition of agricultural prominence. The country was a significant grain exporter in the early 20th century. In the FSU the Ukrainian agriculture was an integral part of the centrally planned economy with the overall goal to achieve food self-sufficiency. Basic production targets were formulated in the national plans. Both the sown areas of the main crops and levels of agricultural production were dictated by the central government and party. Given climate and soil considerations, Ukraine has been very important for agricultural production of the FSU. About 55% of Ukraine land area was sown with all crops, of which about half were grains. Ukraine was therefore referred to as the breadbasket of the FSU (Table 4). In the FSU, Russia and Ukraine jointly produced more than 70% of grain, meat and milk (Figure 1).

Table 4. Population and land use in the FSU (1986-90 average)

	Population		Total land		Sown area		Total Grains			
							Area		Production	
	10^6 persons	%	10^6 ha	%	10^6 ha	%	10^6 ha	%	10^6 tons	%
Russia	146.0	51	1708.0	77	119.0	57	65.6	58	104.3	53
Ukraine	51.3	18	60.4	3	32.8	16	15.5	14	47.4	24
Kazakhstan	16.4	6	271.7	12	35.5	17	24.1	21	24.1	12
Other republics	70.6	25	187.9	8	23.0	11	8.4	7	20.7	11
Total FSU	284.3	100	2228.0	100	210.2	100	113.7	100	196.5	100

Source: State Statistical Committee of the FSU

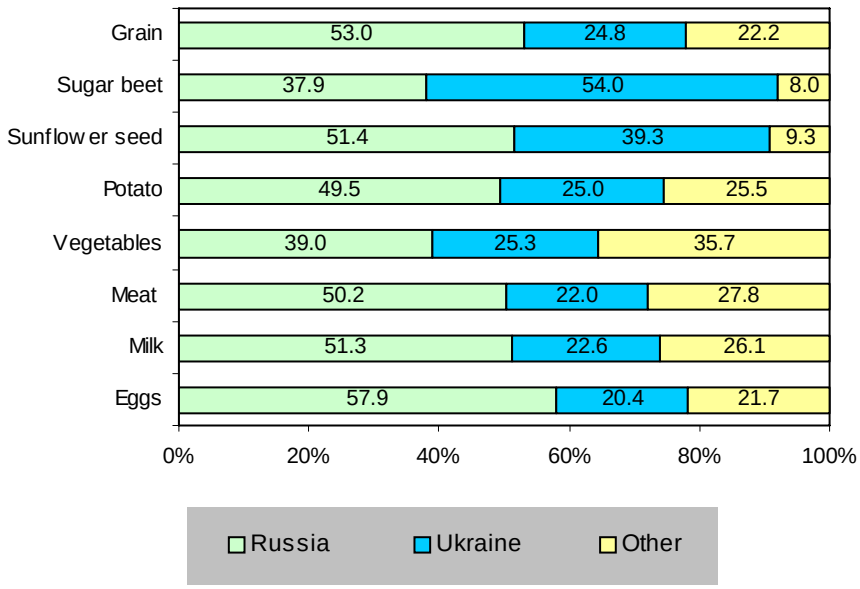


Figure 1. Russia and Ukraine production shares of agricultural commodities in USSR, 1988-1990

After the breakup of the FSU in late 1991, Ukraine, like other former republics, began to restructure its agriculture. Great diversity in natural resources and variability in agricultural production created the need for new economic and trade relations among the new republics of the FSU. However, thus far this has resulted in considerable frictions and protectionist policies. As a consequence, at present the FSU republics have only formed loose trade links.

Transition refers to the transformation from a tightly administered, centralized and heavy subsidized agriculture to a market based competitive agro-food sector; and involves a process which by nature, includes elements as price and trade liberalization, land reform, privatization of upstream and downstream sectors, and development of market infrastructure.

Since the early 1990s, the dominant development trend throughout the majority of transition countries in Europe and FSU was characterized by a strong decrease of output. By the late 1990s, in the transition economies of all FSU republics, agricultural production was below pre-reform levels. Ukrainian agriculture experienced one of the deepest and most prolonged declines in comparison to other FSU republics. In most FSU republics, the initial recession in agriculture was followed by a modest economic growth after about five years since reforms started, while in Ukraine the decline continued until 2000 (Figure 2). The primary cause of this decline was the collapse of the entire economy, followed by the breakdown of the economies of the other FSU Republics. The recession in Ukraine was further deepened by slow and inconsistent market reforms during most of the 1990s.

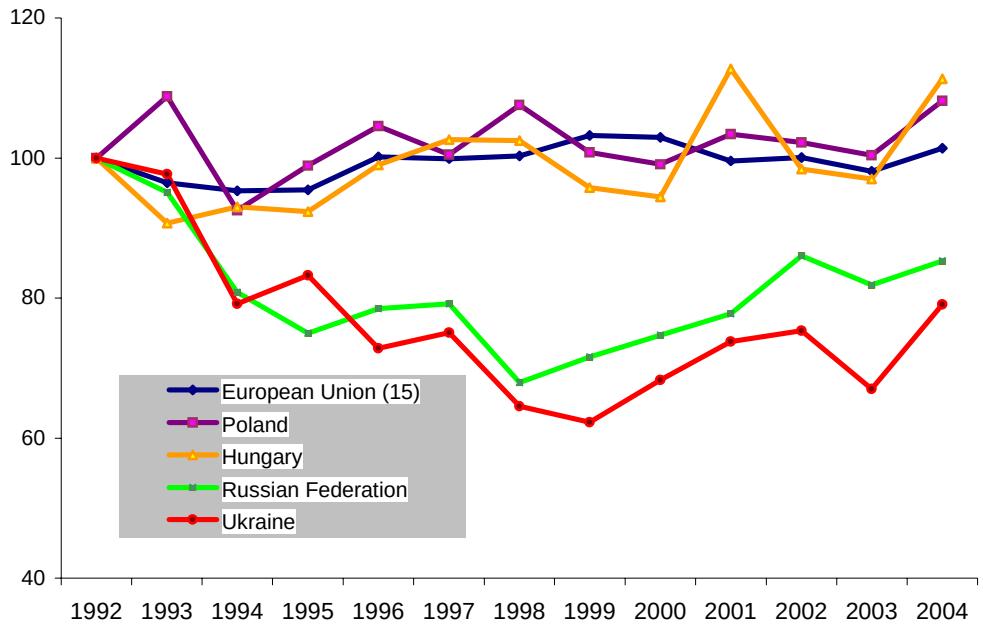


Figure 2. Agricultural Production Indices (1992=100)

Political changes and the beginning of reforms in the early 1990s created a completely new situation for agriculture.

Ukraine's agriculture has been going through a severe depression in the early 1990s. Between 1991 and 1999 the agricultural GDP in Ukraine declined by 51%. After 1999, improvements in land reform and farm enterprises restructuring have provided a base for agriculture to become more efficient. As a result in 2000 and 2001, gross agricultural output (GAO) recovered annually by 10%, increasing slightly by 1.2% in 2002, and declined in 2003

by 18% mainly due to weather conditions during the cropping season, in 2004 it increased again by about 19%. (Table 5.)

Table 5. Position of Agriculture in the National Economy

	Units	1990	1995	1996	1997	1998	1999	2000	2001	2002	2004
Share of agriculture in:											
GDP (value added)	%	18.6	14.9	13.3	13.9	13.7	13.5	16.3	16.3	14.6	12.1
total employment	%	19.8	22.5	21.8	22.1	22.5	22.7	23.4	24.8	25.2	19.7
capital investment	%	21.3	8.1	7.8	7.0	5.0	4.6	3.6	5.0	5.2	4.5
Gross agricultural output (GAO)*	10^9 Hrn	104.4	67.8	61.3	60.2	54.4	50.7	55.6	61.4	62.1	65.8
GAO, 1990=100	%	100	64.9	58.7	57.7	52.1	48.6	53.3	58.8	59.5	63.0
Share in GAO of:											
crop production	%	50.2	56.7	57.0	61.6	56.5	54.4	60.4	61.6	59.9	64.3
livestock production	%	49.8	43.3	43.0	38.4	43.5	45.6	39.6	38.4	40.1	35.7
farm enterprises	%	72.5	55.1	48.5	47.5	44.2	43.2	38.0	41.3	40.2	39.7
private sector**	%	27.5	44.9	51.5	52.5	55.8	56.8	62.0	58.7	59.8	60.3
Agro-food export	10^6 US$	…***	2861	3049	1801	1379	1419	1377	1824	2389	3473
Share of agro-food export in total export	%	…	21.8	21.2	12.7	10.9	12.3	9.4	11.2	13.3	10.6
Agro-food import	10^6 US$	…	1184	1448	898	1051	946	908	1126	1114	1908
Share of agro-food import in total import	%	…	7.6	8.2	5.2	7.2	8.0	6.5	7.1	6.6	6.6
GAO, 1990=100;											
farm enterprises	%	100	49.4	39.3	37.8	31.8	29.0	27.9	33.5	33.0	34.5
private sector	%	100	105.8	109.9	110.1	105.6	100.1	120.0	125.3	129.1	137.8

* in 2000 comparable prices

** households and private farmers (since 1991)

*** no data

The role of agriculture in the Ukrainian economy has declined during the transition period, both in term of percentage of GDP and the share in total investment. In 1990, the share of agriculture in GDP was about 19%. By 2004, the share of agriculture in GDP had fallen to 12%. During the 1990s, the relative importance of agriculture has declined due to rapid decrease in agricultural output in comparison to other sectors of economy. Since the early 1990s, capitalization of the agricultural enterprises has been nearly stagnant. Capital investments in the Ukrainian economy were generally reduced, but their decline in agriculture was especially drastic. Thus, in 2000, the overall investments (in comparable 2000 prices) in the economy amounted to 25% of 1990 level, in agriculture the figure was near 4%.

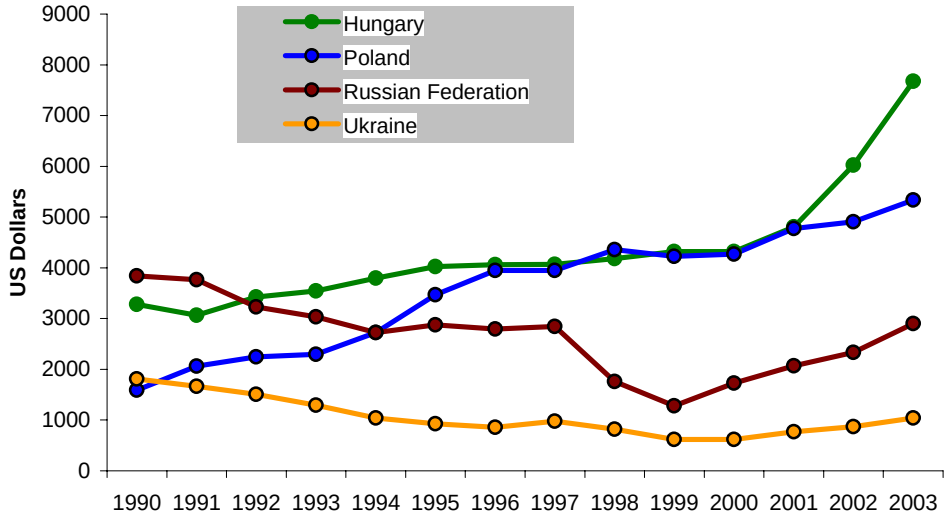
Relative to other countries with similar agricultural capacity, Ukrainian agricultural exports are low. The share of agriculture in total exports halved during the 1990s. For example, in 2004 the share of agro-food exports in total trade of Ukraine was about 11%, even though increase in absolute terms was observed in the period 2001-2004. Given Ukraine's agricultural resources, trade policy has critical importance for sustainable agricultural development.

Presently, about 20% of the labor force depends on primary agriculture as the main source of income. Taking into account those employed in related sectors, namely, in processing and food industries, in storage and transportation and other branches of the agrarian infrastructure, the share of agrarian employment in Ukraine's economy increases almost to 40%.

The total number of people in the rural areas that lost their jobs during the 1990s was about 3 million. In 1990, the share of persons involved in the subsistence farming accounted for almost 4% of all employed in agriculture. In 2000, this proportion grew to almost 45%. By 2001, household plot production was the primary source of income for the average rural household. Therefore, during the transition, subsistence farming has served as a social safety net by absorbing surplus labor, providing food and cash income, and preventing social disaster.

Economic reforms have transformed substantially the structure and volume of the agricultural production. For most of the 1990s, the main reason of the fall in agricultural GDP was a sharp decline in the sector of farm enterprises of Ukraine and their weak potential to operate under the new economic environment. State collective farm enterprises, holding approximately 92% of agricultural land in Ukraine, were the dominant agricultural producers in 1990, delivering almost 70% of the gross agricultural output. They produced more than 95% of grain, sugar-beet and sunflower seed production and about two thirds of the livestock output. Private subsistence plots occupied 6% of agricultural land and their share in the gross agricultural output was around 30%, producing mainly potatoes, vegetables and fruits. The role of these two groups of producers has changed substantially during the last decade. Since 1996, livestock production on the subsidiary plots has gradually overtaken that of collective farms.

The most significant change in GAO was the very sharp decline in livestock production from about one-half to one-third of the total value of agricultural output. The main reason for this change was the decline in demand for animal products caused by a more than 60% drop in real per capita income in Ukraine during 1990-2000 from 1808 US dollars to their lowest level of 617 US dollars respectively. Only since 2000, with the general economy slightly recovering, has the per capita income started to rebound, and in 2003 amounted to 1364 US dollars (Figure 3).



Source: United Nations Statistics Division.

Figure 3. Annual per capita income in Ukraine and other selected countries, 1990-2003

Table 6 shows the consumption shift in the 1990s from high-quality food products with high-income elasticity (such as meat and milk) to cheaper grain products, potatoes and vegetables in Ukraine. While in 1990 per capita day average intake was 3597 kcal, of which foodstuffs of livestock origin was 1025 kcal; in 2000 the figures had decreased to 2560 kcal (29%) and 520 kcal (49%) respectively.

Table 6. Per Capita Consumption of Basic Food Products in Ukraine, kg

	1990	1991	1994	1995	1996	1997	2000	2001	2002	2003	2004
Meat & meat products	68	65	43	39	37	35	33	31	33	35	39
Milk & milk products	373	346	256	244	230	210	199	205	225	226	226
Eggs (pieces)	272	256	183	171	161	151	166	180	209	214	220
Fish & fish products	18	12	4	4	4	5	8	11	12	12	12
Sugar and sugar products	50	50	33	32	33	31	37	40	36	36	38
Vegetable oil	12	11	9	8	9	8	9	10	11	11	13
Potatoes	131	116	136	124	128	134	135	140	133	138	141
Vegetables	103	102	84	97	92	91	101	105	108	114	115
Fruit & berries	47	36	27	33	35	40	29	26	29	33	34
Bread and cereal products	141	143	135	128	124	127	125	130	131	125	126

Table 7. Per Capita Consumption of Basic Food Products in Ukraine and European Union, kg

	EU15, average 1995-1999*	Ukraine 2000	Norms	
			Recommended	Minimum
Meat and meat products	98	33	83	52
Milk and milk products	296	199	380	341
Eggs (pieces)	222	164	290	231
Bread and cereal products	111	124	101	94
Potatoes	78	135	124	96
Vegetables	119	101	161	105
Fruits, berries	105	29	90	68
Fish and fish products	25	8	20	12
Sugar and sugar products	38	37	38	32
Vegetable oil	20	9	13	8

* calculated from Food Balance Sheets, FAO.

Table 7 characterizes food consumption in Ukraine and in EU countries and the norms that are recommended by Nutrition Institute of the Ukrainian Ministry of Health. Their comparison shows that the present domestic nutrition pattern is much lower than the average European one and it corresponds more with minimum standards of food consumption adopted in Ukraine, than to the recommended ones. The situation is critical with regard to the consumption of fish and fish products, fruits, berries and grapes, meat and meat products.

The expenditures on food during the 1990s increased from 33% to 65% of the average family income. In addition, a considerable demonetization of the food market took place. In 2000, according to the household income data, 70% of the food consumed was purchased for money and 30% came from the household subsistence production. An average household produced 25% of the consumed meat products, 30% of dairy products, 31% of eggs, 57% of potatoes, 43% of vegetables, and 35% of fruit and berries.

Table 8 shows the overall changes in the sown areas of the basic agricultural crops in Ukraine. The general trend for grains was a decline (notably the areas occupied with maize for grain and legumes) for most of the 1990s, as the demand for feed grain decreased, and farm-gate prices for grains substantially dropped. This trend came to an end in 2000, when sown areas under grain increased again, due to a number of factors including an improved market situation, a halt in the government intervention in the grain market, expansion of the private sector in both production and marketing and some recovery of grain export.

Table 8. Cultivated area of main agricultural crops, 10^3ha

	1985	1990	1995	1999	2000	2001	2002	2003	2004
All sown area	32656	32406	30963	28313	27173	27928	27539	25081	26752
Grain and legumes	16077	14583	14152	13154	13646	15586	15448	12495	15433
winter wheat	6651	7568	5324	5767	5316	6831	6833	2356	5139
spring barley	2897	2201	4130	3318	3645	3590	3978	5059	4157
maize for grain	2581	1234	1174	793	1364	1291	1311	2170	2467
legumes	1626	1424	1103	514	408	432	486	558	387
Industrial crops	3669	3751	3748	4340	4187	3779	4072	5357	4971
Sugar beet	1641	1607	1475	1022	856	970	897	773	732
sunflower	1480	1636	2020	2889	2943	2502	2834	4001	3521
Potatoes, vegetables and cucurbitaceous	2208	2073	2165	2166	2277	2188	2161	2155	2105
potatoes	1528	1429	1532	1552	1629	1604	1590	1585	1556
vegetables	499	456	503	497	538	490	479	480	476
Fodder crops	10702	11999	10898	8653	7063	6375	5858	5074	4243
Fallow land	1656	1427	1570	2990	3213	2712	2692	3509	2330

Sown areas for sugar beet decreased between 1990 and 2000 with more than 50% from 1.6 to 0.7 million ha. A similar situation occurred in the sown areas for fodder crops, as demand for livestock feed declined, and farm-gate prices for livestock fell to levels that forced producers to move to low external input production. In 1990, fodder crops occupied 12 million ha i.e., more than one third of total sown area, while in 2000 this share was reduced to one quarter or 5 million ha. This strong decline was mainly due to the abandonment of large-scale livestock farming and shifting towards more profitable cropping activities such as the exportable barley and sunflower seed production.

Sown areas for vegetables and potatoes remained almost unchanged as these crops are grown mainly on households' plots. Only the sown areas for sunflower increased from 1.6 million ha in 1990 to 4 million ha in 2003, driven by increased profitability and price stability of the export market for sunflower seeds.

Generally, in the late 1990s, production levels for main crops and livestock commodities were much lower in comparison with the pre-reform period.

Table 9 shows a considerable decline in the volumes of crop output for 1985 and over the period 1990-2004.

Table 9. Changes in crop production in Ukraine, 1985,1990-2004, 10^6 tons

Year	Total grains	of which		Sugar beet (factory)	Sunflower seeds	Potatoes	Vegetables
		wheat	other grains				
1985	38.9	16.5	23.4	38.3	2.2	20.3	7.4
1990	51.0	30.4	20.6	44.3	2.6	16.7	6.7
1991	38.7	21.2	17.5	36.2	2.3	14.5	5.9
1992	38.5	19.5	19.0	28.8	2.1	20.3	5.3
1993	45.6	21.8	23.8	33.7	2.1	21.0	6.0
1994	35.5	13.9	21.6	28.1	1.6	16.1	5.1
1995	33.9	16.3	17.7	29.6	2.9	14.7	5.9
1996	24.6	13.6	11.0	23.0	2.1	18.4	5.1
1997	35.5	18.4	17.1	17.7	2.3	16.7	5.2
1998	26.5	14.9	11.5	15.5	2.3	15.4	5.5
1999	24.6	13.6	11.0	14.1	2.8	12.7	5.3
2000	24.5	10.2	14.3	13.2	3.5	19.8	5.8
2001	39.7	21.4	18.4	15.6	2.3	17.3	5.9
2002	38.8	20.6	18.3	14.5	3.3	16.6	5.8
2003	20.2	3.6	16.6	13.4	4.3	18.4	6.5
2004	41.8	17.5	24.3	16.6	3.1	20.7	7.0

Total grain production declined from 51 million tons in 1990 to 25 million tons in 2000. After that, a recovery took place with an exception of the year 2003 where climatic conditions affected production levels. Over the period 1990–2004 the annual production of grain varied strongly (standard deviated of about 7.2 million tons or a CV of more than 20%). Considerable fluctuations occurred as well in wheat production (CV of 28%) (Figure 4). In years allegedly prone to less favourable weather conditions (2000, 2003), wheat production declined markedly in comparison to other grains.

Production of sugar-beet and sugar declined sharply as extensive domestic sugar production suffered increased competition from imports. Sugar was one of the most subsidized commodities in Ukraine. Ukraine was the main supplier of sugar to the other republics of FSU. The large scale sugar-beet/sugar production included 192 sugar processing plants of which only a few factories are presently properly functioning. The total processing capability is estimated in the order of 50 million tons of sugar-beet annually, with production in recent years of some 14-15 million tons of sugar-beet. The sugar-beet processing plants are highly concentrated in a few oblasts, notably Poltavs'ka and Vinnits'ka, where during the "Soviet period" the most sugar-beet was produced.

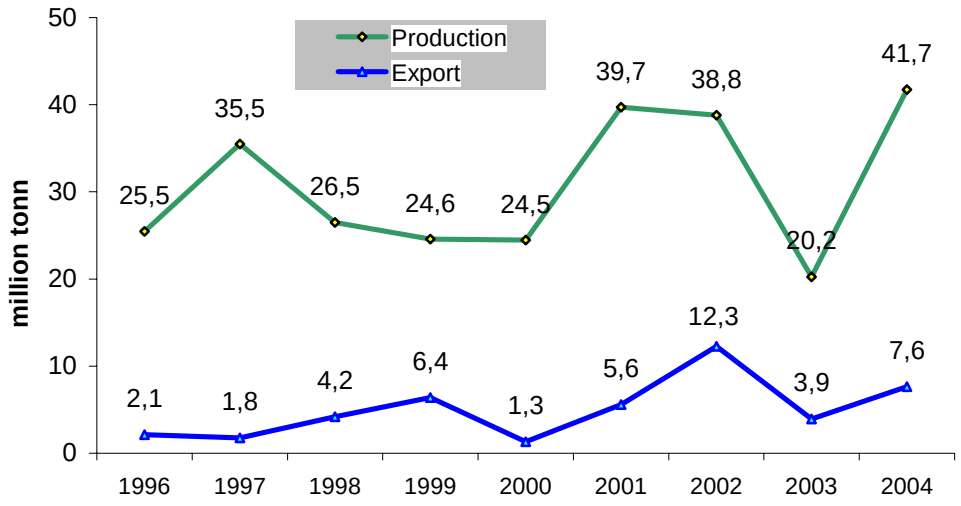


Figure 4. Grain production and export in Ukraine

In the early 1990s, Ukraine lost the Russian sugar market due to the active competition from the West. Domestic per capita consumption of sugar declined from 50 kg in 1990 to 30 kg in 1997, but has recovered slightly in recent years, the output of sugar-beet was reduced by 31 million tons (70%) between 1990 and 2000. The high cost of sugar-beet production and inefficient processing facilities render it unlikely that sugar exports can be rehabilitated on a sustainable basis.

The production of potatoes and vegetables has been rather stable. Ukraine is one of the world's largest producers of potatoes. Per capita consumption of potatoes is about 132 kg per year (the 1998–2001 average). During the years after independence, large-scale commercial cultivation of potatoes and vegetables almost vanished. Presently these commodities are solely produced by the household sector (99% of the total potato and 80% of the vegetable production in 2000). The households that produce potatoes and vegetable use most for own consumption with some surplus being sold on local markets.

Sunflower is the single crop that has increased in production quantity. Sunflower seeds amount to 95% of the total oilseed output in Ukraine. This crop was relatively profitable throughout the 1990s. Driven by this profitability, producers have maintained sunflower production levels. Under the planned economy, practically all sunflower seed output was procured by state agencies at fixed prices. Since reforms started, primary oilseed market has been substantially privatized. Presently this market is export-oriented, with about 40-60% of total production of sunflower seeds being exported. With a substantial export of sunflower, the domestic oil processing capacities remained under-utilized. For this reason, the Ukrainian government imposed export restrictions.

Transition from the former subsidized system to market oriented agriculture, affected development of the livestock sector. The decreasing trend has been observed in the livestock sector (Table 10) with meat production down by about two thirds and livestock numbers falling more than half over the period 1990-2000.

Table 10. Livestock inventories and output during the transition in Ukraine

	1990	1995	2000	2001	2002	2003	2004	% decline from 1990	
								2000	2004
Inventories, 10^3 head									
Cattle	24623	17557	9424	9421	9108	7712	6953	-62	-72
Cows	8378	7531	4958	4918	4716	4284	3953	-41	-53
Hogs	19427	13144	7652	8370	9204	7322	6466	-61	-67
Sheep, goats	8419	4099	1875	1965	1984	1859	1770	-78	-79
Poultry	246104	149748	123722	136811	147445	142374	152783	-50	-38
Output, 10^3 ton									
Beef	1985	1186	754	646	704	723	614	-62	-69
Pork	1576	807	676	591	599	631	559	-57	-65
Poultry meat	708	235	193	239	300	324	376	-73	-47
Milk	24508	17274	12658	13444	14142	13661	13787	-48	-44
Eggs (mln. pieces)	16287	9404	8809	9668	11309	11477	11955	-46	-27

Facing competitive market conditions, livestock producers have not been able to attain profitable ways of livestock breeding based on the traditional rearing process. With the high cost of the main production factors and the relatively low farm-gates prices for livestock, most large farm enterprises were, and remain, unprofitable. The abolishment of the subsidies to livestock producers during the Soviet era also resulted in a decline in the livestock sector.

The fall in agricultural output has been considerable in the sector of large farm enterprises over the 1990s (Table 11). Crop production in this sector decreased from 41 billion Hrn (in 2000 comparable prices) to the lowest level of around 15 billion Hrn or by almost 3 times. Rapidly declining production caused major changes in input use. Labor in crop production vastly decreased from 2 billion to 730 million man-days. Agricultural use of inputs (fertilizers, fuel, and machinery) also declined drastically. Gasoline and fuel use declined from 8 million tons to 2.3 million tons. Fertilizer use, initially highly subsidized declined from almost 4 million tons to 280 thousand tons or by 13 times. This dramatic decrease in input use was the cumulative result of relative input/output price ratios, macroeconomic instability (high inflation rate in 1991-93, currency appreciation in 1995-98 followed by rapid depreciation in 1998) which resulted in financial distortions in agriculture, and reduction in government subsidies for agriculture. In 2000 and 2004, mineral fertilizers were applied only on 22% and 44% of the sown areas, in comparison with 83% in 1990. For organic fertilizers these numbers are respectively 3% of all sown areas in 2000 - 2004 compared to 18% in 1990.

Table 11 shows that for most of the 1990s, Ukraine's agricultural enterprises suffered declining efficiency in terms of total value of output per unit of land and input use, labor, fertilizers and fuel use. However, since 2000, with some progress in agricultural reforms, positive developments in efficiency have occurred, except for 2003. Productivity in term of value of output per unit of land has declining steadily from 1065 Hrn/ha to 429 Hrn/ha between 1990 and 1999. However, productivity of farm labor, after an initial slowdown from 19.5 Hrn/man-day in 1990 to 14.3 Hrn/man-day in 1994, began to recover slightly since the mid 1990s.

Table 11. Crop output and input use of Ukrainian farm enterprises, 1990-2004

Year	Crop Output 10^6 Hrn in 2000 comparable prices	Agricultural Land 10^3 ha	Labor 10^3 person-days	Gasoline and Fuel 10^3 Tons	Fertilizer 10^3 Tons of active matter
1990	41217	38705	2119	--	4242
1991	32700	36284	2006	8055	3700
1992	29018	36491	1906	6990	--
1993	31506	35414	1823	6007	2021
1994	23704	35426	1657	5529	--
1995	23112	35184	1329	5088	--
1996	18572	35016	942	4394	525
1997	20636	34864	925	4020	562
1998	15989	34500	835	3356	514
1999	14598	34065	791	2738	418
2000	15329	29878	729	2267	279
2001	18883	28414	749	2182	401
2002	17699	26938	942	1945	399
2003	12293	24840	761	1709	379
2004	19370	23502	737	1678	519
Average annual growth (fall) rate, %					
1991-1999	-9.6	-0.8	-11.0	-12.6	-23.9
2000-2004	6.0	-5.8	0.3	-7.2	16.8
Output per unit of input, 10^3 Hrn					
1990	–	1.065	19.5	--	9.7
1991	–	0.901	16.3	4.1	8.8
1992	–	0.795	15.2	4.2	--
1993	–	0.890	17.3	5.2	15.6
1994	–	0.669	14.3	4.3	--
1995	–	0.657	17.4	4.5	--
1996	–	0.530	19.7	4.2	35.4
1997	–	0.592	22.3	5.1	36.7
1998	–	0.463	19.2	4.8	31.1
1999	–	0.429	18.5	5.3	34.9
2000	–	0.513	21.0	6.8	55.0
2001	–	0.665	25.2	8.7	47.1
2002	–	0.657	18.8	9.1	44.3
2003	–	0.495	16.2	7.2	32.4
2004	–	0.824	26.3	11.5	37.4

n.a. = not applicable, --- = not available.

The essential reason for the substantial loss in agricultural outputs of Ukrainian farm enterprises was the deterioration of trade, followed by price and trade liberalization in 1992. During the USSR era, Ukraine supported agriculture with heavy subsidies, setting artificially low prices for inputs and relatively high prices for outputs. Price liberalization corrected some of these distortions. Considerable increase in input prices (notable for oil) was especially noticeable in the first half of the 1990s, as prices adjusted to world market prices. Ukraine depends greatly on imports of gas and oil, therefore the rapid liberalization of the energy market has had a direct negative impact on agricultural production thus, during 1990-2000, the share of fuel and lubricants increased from 5% to 24% in the total farm input costs.

Following the 1992 price liberalization, farm-gate prices in Ukraine increased somewhat, but less than input prices. Table 12 shows index prices for Ukrainian farms. Input prices, especially for fuel, power and fertilizers, increased strongly as compared to farm-gate output prices. Based on this data, purchasing capacity of agricultural producers on the market of inputs for agriculture in 2000 steadily decreased to 15% from the level of 1990 (average input/output ratio is 131/883 = 0.15).

Table 12. Price indexes for agricultural inputs and outputs for Ukrainian farms, %

	1990	2000
Outputs		
Grain	100	182
Sunflower	100	122
Potatoes	100	237
Sugar beet (factory)	100	239
Vegetables	100	145
Fruit and berries	100	104
Beef and veal	100	76
Pork	100	129
Poultry	100	152
Milk	100	125
Eggs	100	186
*Average**	*100*	*131*
Inputs		
Oil products and fuel	100	1095
Electric power	100	798
Mineral fertilizers	100	606
Purchased fodder	100	340
*Average**	*100*	*883*

*Weighted index for the above listed items

Source: Paskhaver B. *et. al.*, 2001.

This price disparity resulted in severe economic problems and strong financial losses for farm enterprises. According to the data of the Ukrainian Ministry of Agriculture, by the beginning of 2000, the total creditor debt of farm enterprises amounted to 15 billion Hrn, of which almost 7 billion Hrn (or 46% of total debt) was owing to commercial firms – suppliers of material-technical resources (fuel, mineral fertilizers, plant chemical protection means, seeds, etc.).

Table 13. Operational machinery in farm enterprises

(End of year; 10^3 units)

	Tractors	Grain combine harvesters	Trucks
1985	503	110	266
1990	495	107	296
1995	469	91	278
1996	442	86	262
1997	406	79	247
1998	374	74	257
1999	347	70	245
2000	319	65	227
2001	296	61	209
2002	274	57	195*
2003	251	54	177*

* Annual average

Investment in agriculture also declined during the 1990s. This was partly due to the preferential treatment of investments for the agricultural sector in the pre-reform period. Since the early 1990s, capital investments in the Ukrainian economy were generally reduced, but their decline in agriculture was especially drastic. In 2000, the capital investments (in comparable prices) in the total economy decreased to one quarter of the 1990 level. Investments in agriculture however decreased almost 25 fold to just above 4% of the investment level in 1990. As a result, the stock of agricultural machinery depreciated substantially due to lack of maintenance, spare parts and high costs of its use. Table 13 shows that usable agricultural machinery in Ukrainian farms declined by 30-50%. Most farm enterprises presently suffer from the lack of investment not only for technological modernization, but also rather for maintaining the existing equipment. Reversing this declining trend in farm investment is critical to the revitalization of Ukrainian agriculture.

Although during recent years, many economic problems in the Ukrainian agriculture have been addressed, the general situation with the economic performance of farm enterprises is still poor. A sizeable number (almost 34%) of large farm enterprises remain unprofitable. Table 14 provides an overview of economic performance of farm enterprises during the period 1990-2004. This data shows the deterioration of the economic performance during the 1990s.

Table 14. Economic performance of farm enterprises* in Ukraine

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number of farm enterprises	12421	12358	12410	12500	12421	12646	13160	12818	11820	10256	9000
Share of unprofitable farms enterprises, %	0.4	30.2	68.5	87.2	91.9	84.2	34.5	43.9	53.8	50.5	33.8
Share of profitable farms enterprises, %	99.6	69.8	31.5	12.8	8.1	15.8	65.5	56.1	46.2	49.5	66.2
Profitability level, %	37.2	10.6	–11.2	–23.9	–28.3	–22.1	9.0	5.0	-1.9	-0.03	12.6

* Farm enterprises keeping the full accounting

The profit reduction was due to the following market failures: a) the credits for agriculture are expensive and short termed; b) the relationships between traders and agricultural producers are not evenhanded; c) the market transactions for domestic sales and exports involved large costs; d) the domestic market is difficult to access for farm enterprises due to the existence of a chain of intermediary companies.

3. Subsistence Agriculture

Most of the Ukrainian families farm small household plots. These small farms rely on manual labor with a bare minimum of mechanization and produce agricultural goods mainly for their own consumption. Subsistence farming played an important role during the economic transformation in Ukraine. Household food production and access to land have been important in providing food security during the 1990s. In the FSU, the household's plots were unwanted and doomed to gradual extinction. Nevertheless in 1990 subsistence farms occupied about 3 million ha, i.e. 6 % of the Ukraine's agricultural lands. These average sized 0.5 ha household plots were used to produce potato, vegetable, fruit and livestock products.

The transition period was marked by a significant increase of land used for subsistence farming. The ongoing land privatization process provided easy access to the land for millions of households. According to statistical data, there are over 17 million households in Ukraine, from which over two-thirds (12 million) are engaged in small subsistence farming, of which almost 6 million households live in rural areas.

Table 15. Land use changes of household's plots

	1990	1995	2000	2001	2002	2003
10^3 ha						
Land area used	2792	5917	8958	10162	11387	13269
Agricultural land	2669	5589	8543	9736	10939	12799
Arable land	2162	3803	6075	6998	7905	9215
Perennial crops	375	454	465	476	489	507
Fodder crops and pastures	132	1332	1947	2185	2417	2865
% of total						
Land area used	6	13	22	25	29	34
Agricultural land	7	14	22	26	29	34
Arable land	7	12	19	22	25	30
Perennial crops	36	44	53	55	58	61
Fodder crops and pastures	2	20	34	39	45	54

The number of household plots increased strongly in the mid-90s. The main reason was the drastic reduction in real incomes notably in rural areas. The share of wages in agricultural production cost declined from 33% in 1990 to about 13% in 2000. By 2000, wages in agriculture were half of the average wages in Ukraine. This very low income led to widespread poverty. In 2001, 37% of the rural population had incomes below the poverty line[1]. On average, rural households use about 70% of their income on food. As a result, household plot farming became popular as a source of food and cash income.

Household plot farms became the dominant type of subsidiary farming. The households enlarged their own household plots with additional land allocated by Government in the early 1990s for this purpose, and from large farm enterprises that became available as

[1] As of 2001, the monthly per capita income below 56 Hrn (10 US$).

the result of the ongoing privatization process. The share of household land in Ukraine increased steadily. By 2003, more than 6 million ha were attached to subsistence farms including almost 3 million ha withdrawn land shares from the large farm enterprises. At present, the household producers use up to 13 million ha of agricultural land of which 9 millions ha is used for crops. About 0.5 million ha are occupied by individual gardens or orchard plots. These plots are usually located in suburban areas and are used by citizens mainly for rest and recreation. The remaining almost 3 million ha of private land is allotted for haymaking and livestock grazing. Typically for rural areas, the livestock in summer is managed in community herds on village grazing land (Table 15).

The role of the household producers has constantly been growing and their contribution to the gross agriculture output (GAO) was about 60% in recent years. Since 1996 household plot farming has dominated the supply of basic food products. The household plots currently turn out about one third of grain and sugar-beet production, practically all potatoes and vegetables and more than two thirds of the livestock products (meat and milk) (Table 16). In 2003 the subsistence farms owned 59% of the cattle, 69% of the hogs and 70% of the poultry. The strong growth in household production was mainly driven by the unemployment and deterioration of real incomes.

Table 16. Agricultural output of subsistence (household) farming

	1990	1995	2000	2001	2002	2003
10^3ton						
Grain	1445	2748	4495	8046	9319	5638
Sugar beet	3	766	1605	3167	3780	3027
Sunflower seed	62	126	432	407	544	678
Potato	11939	14111	19561	17069	16390	18190
Vegetable	1965	4367	4974	5386	5352	5983
Meat	1259	1186	1225	1165	1201	1195
Milk	5874	7831	8989	9808	10674	10981
% of total production						
Grain	3	8	18	20	24	28
Sugar beet	-	3	12	20	26	23
Sunflower seed	2	4	13	18	17	16
Potato	71	96	99	98	99	99
Vegetable	26	69	80	86	86	86
Meat	29	52	74	77	73	69
Milk	24	45	71	73	76	80

Recent estimates (State Statistic Committee, 2005) show that the size of household plots varies greatly (Table 17). For example 50% is smaller than 0.5 ha, and only 3% is bigger than 5 ha.

Table 17. Distribution of household plots (2004)

Size (ha)	Number (%)	Share of total land in household use, %
< 0.5	50.3	13.6
0.5 – 1	31.2	21.6
1- 5	15.7	27.9
5 – 10	1.7	11.2
>10	1.1	25.7

Table 18 presents differences in the sown area by size of household plots. More than 50% of all sowed areas in the small households are under potato. Middle-sized household plots from 0.5 to 1 ha cultivate mainly potato and vegetables, grain and fodder. Larger household plots (> 1 ha) produce mainly grains (up to 58% of all sown areas), and industrial crops (up to 20%) e.g., sugar-beet and sunflower. Large farm enterprises have been reducing sugar-beet production, and at present, the main part of the sugar-beet production comes from individual household plots, contracted directly by sugar refineries.

Table 18. Sown areas of main commodities in household plots in 2004, (%)

Crops	Average	By household plot size		
		< 0.5 ha	0.5-1 ha	>1 ha
Total sown area	100.0	100.0	100.0	100.0
Grains and leguminous	47.5	20.9	32.4	57.7
of which: wheat	25.5	10.9	24.9	26.7
barley	43.1	10.8	23.5	49.0
maize	22.2	68.6	39.5	15.7
rye	2.1	2.4	4.2	1.6
other	7.1	7.1	7.9	7.0
Industrial crops	13.7	1.2	3.0	19.8
of which: sugar beet	16.3	28.1	71.7	13.3
sunflower seed	80.6	71.1	27.5	83.4
other	3.1	0.8	0.8	3.3
Potatoes	19.7	50.6	34.7	8.7
Vegetables	4.8	14.6	6.4	2.3
Fodder crops	14.3	12.7	23.5	11.5
Reference: share of not used arable land	8.6	2.7	2.2	11.6

The role of household plots for subsistence during periods with economic stress has demonstrated that these archaic forms of farming remain important. Because manual work is prevalent and minimum agro-chemicals are applied, individual holdings are less susceptible to increased prices for inputs. In the context of sustainable land use, these household farms play a dual role. On one hand, these farms feature as the environmental friendly farming with very little investments or budget expenditures. Their anthropogenic impacts on the environment are characterized by the high degree of adaptation to natural landscape. On the other hand, this economically inefficient production mode is justified for survival and will come and go with emergence and easing of economic stresses.

Prospects of household plot farming vis-à-vis consolidation in economically viable sizes of commercial farms remain unclear. Several factors are supporting the transformation of household plot farming into commercial farms to be the foundation for an expanded and successful private sector, including the low taxation; direct marketing; low prime production costs; and rapid respond to demand change, and possibilities to produce organic farm products. On the other hand, these farms are mainly based on manual labor, and practically do not use mechanization, and further, due to the lack of capital and their small size and structure, household farms may turn out to be conservative both in adopting the new agricultural technologies and to be integrated into modern forms of agribusiness. Most probably over time, with substantial outside support, only a small proportion of household plot farms may be transformed into specialized commercial farms.

4. Private Commercial Farming

There were no "western types" private farms, owned and managed by individuals during the Soviet era in Ukraine. At the beginning of the reforms, there were great expectations for the rapid establishment of private medium-sized commercially oriented farms. In 1991, a Law on Private Farmers was adopted, which allowed individuals who were willing to start a new privately owned farm to be allocated 50 ha of land from the state. In 1992, there were almost 15 thousand farms with average farm size of about 20 ha. Until 1999 the rate of increase of private farms was rather slow. However, with the adoption of the Law on Land Lease in 1999, whereby private farmers could expand their holdings, the size of individual farms almost doubled in 2000. Currently there are about 43 thousand private farms with average size 72 ha (Table 19).

Table 19. Private Farming in Ukraine

Year	Number of farms, units	Agricultural land used, 10^3 ha	Average farm size, ha	Share in all agricultural land, %	Share in value of total agricultural output, %
1992	14681	292	20	0.7	
1993	27739	558	20	1.3	
1994	31983	699	22	1.7	
1995	34778	786	23	1.9	
1996	35353	835	24	2.0	0.6
1997	35927	932	26	2.2	0.8
1998	35485	1029	29	2.5	0.7
1999	35884	1162	32	2.8	1.0
2000	38428	2158	56	5.2	1.9
2001	41599	2586	62	6.2	3.1
2002	43042	2823	66	6.8	3.5
2003	43016	3095	72	7.4	2.7

Tables 19 and 20 show that the role of private farmers in agriculture is still insignificant. In 2002, the share of individual private farms production was only 3.5% of the country's gross agricultural output (GAO), with 5.5% share of total crop production and 0.5% share of total livestock production). In a deteriorated and risky economic environment, private farmers produce mainly profitable crops, i.e., exportable cereals and sunflower (occupying respectively 67% and 20% of sown areas of private farms). In 2002, private farms produced 9 % of total cereal output, almost 12 % of sunflower seeds, and near 7% of sugar-beets. Private farmers so far have hardly turned to capital-intensive livestock production.

Table 21. Production shares of private farms (%)

	1995	2000	2001	2002	2003
Grains	1.5	5.1	8.1	9	7.7
winter wheat	1.3	5.2	8.7	9.6	7.6
spring barley	2.0	5.7	9.0	10.2	9.4
maize for grain	0.6	4.2	5.4	5.1	6.0
millet	2.6	10.3	12.8	12.9	13.4
buckwheat	5.6	10.5	13.3	11.5	11.4
Sugar beet	2.2	5.7	6.7	8.1	8.4
Sunflower	3.0	1.0	11.0	13.4	14.1
Potato	0.1	0.3	0.4	0.4	0.5
Vegetable	0.5	1.4	1.5	1.9	2.0
Meat	0.3	0.5	0.5	0.5	0.7
Milk	0.2	0.5	0.6	0.6	0.6
Eggs	0.1	0.1	0.1	0.1	0.1

Table 22 shows different trends of the relative distribution of private farms in the three main agricultural zones of the Ukraine. In Polissia and Carpathian zones the trend is rather downwards while in Steppe the trend is on the increase.

Table 21. Distribution of private farms by agricultural zones

	Number of farms						Agricultural land used					
	1990		1995		2003		1990		1995		2003	
	%	units	%	Units	%	units	%	10^3 ha	%	10^3 ha	%	10^3 ha
Polissia and Carpathians	80	265	14	4984	13	5818	47	1.9	8	61.0	8	252.0
Forest-Steppe	11	38	22	8132	23	10625	38	1.5	21	174.7	25	808.2
Steppe and Crimea	9	29	65	23997	65	29900	15	0.6	71	586.3	67	2103.3
Ukraine	100	332	100	37113	100	46343	100	4	100	822.0	100	3163.5

Medium-sized private producers in Ukraine have difficulty accessing start-up and working capital and have to compete with large farming enterprises for the better land parcels. Marketing channels, especially for export grains and sunflower seed, were set-up to handle production from the large-scale farms and are not yet geared towards the requirements of medium sized private farms. Farmers interested in expansion are hindered by a lack of short- and long-term credit. Private farms in Ukraine are vulnerable due to relatively high specialization for maximizing profitability, thus these farms dependent on market situation and on weather conditions.

The relative absence of medium-sized commercially oriented farms is the challenge Ukraine is facing. Subsistence farms are too small to be commercially viable in long term and a significant number of the large-scale farm enterprises remain inefficient.

5. Agribusiness

One of the main constraints for the development of the private farm sector is inadequate market infrastructure. The former planned system based on very large collective farms does not provide for the requirements of a market-oriented private sector.

While undertaking reforms, Ukraine did not pay much attention to the establishment of a market infrastructure. This was an important cause for the decline in agricultural output and farm instability. Inadequate market infrastructure increases production and transaction costs and restricts access for the agricultural producers. According to estimates by a German Advisory Group, due to the poor transportation and storage, high marketing surcharges etc., agricultural producers in Ukraine received only 40% of the export price, in comparison to German farmers receiving about 70% in 1999 (Cramon-Taubadel S. von, Striewe L., 2000). In Ukraine, marketing costs are high and can reach 15–20% of the farm-gate price, which reflects, on the one hand risks in trade operations, and, on the other hand, monopolization in marketing and input supply chains.

Privatization of the upstream and downstream parts of the agro-food chain began in the mid 1990s and made significant progress by 1999. Most agribusiness companies that facilitate agricultural development were fully or partially privatized. Marketing chains became more efficient. Presently there are a few major producers in the food processing branches, which are dominating the domestic market. They are fiercely competing with each other, increasing both output of processed food and demand for agricultural inputs. In 2000, domestic food processors had recaptured more than 95% of the domestic food market. Some Ukrainian products that comply with international standards are being exported.

In 1998 the Ukrainian League of Agricultural Complex Businessmen and the Ukrainian Grain Association, were founded. The Ukrainian Grain Association totals about 70 domestic and foreign firms and they control some 80% of the trade transactions on the grain and oil crops markets. At the same time, their interests may not coincide with the common public interest as their activities may lead to the market monopolization and a decrease in farm incomes.

It is possible to single out several large agribusiness structures groups operating on the Ukraine's market. The first group has arisen on the base of privatization of the former large state agri-service structure of the monopolistic type. The second group consists of firms that have begun to be engaged in agribusiness by virtue of situation, when as a result of widespread exchange operations in the economy in early 1990s, many commercial suppliers of fuel, fertilizes to agricultural enterprises have faced the necessity of independent sales of agricultural commodities (grain, sunflower). However, the profitability of the large-scale agricultural trade has contributed to their systematic involvement in the agribusiness. During recent years, many commercial firms developed resource programs and began to be engaged in leased farming. In 1995, private investments constituted only 2.5% of total investments in agrarian economy and in subsequent years they remained practically unchanged. By 2000, their share increased up to 15%.

Foreign companies, including the transnational ones, also noticeably mastered the Ukrainian agricultural market. For example, the American firm Cargill, which among five

transnational companies controlling half of the world's wholesale grain trade, presently is the largest exporter of Ukrainian grain and sunflower seed. Until 2001, Black Sea ports (such as Odessa and Ilyichevsk), through which Ukraine's grain is exported, operated under capacity constraints exporting about 7 million metric tons of grain. With the foreign investments Ukraine is making significant progress in increasing its export facilities. In 2002, the domestic commercial seaports increased their grain export facilities. The aggregate export capacity of the Ukrainian ports reached 12 million tons of grain in 2002, that is, a 71% increase compared to 2001. Ilyichevsk Port capacity has reached 5.2 million tons of grain a year and Odessa – up to 2.6 million tons. New facilities also are being built in Nikolaev and Kherson (OECD/ECSSD, 2004).

The important feature of the recent agricultural transition is the expansion of commercial agribusinesses in agricultural production. Since the late 1990s intensive development of commercial agricultural land use by various types of agribusiness structures has taken place in the Ukraine. New, vertically integrated producers are emerging in the agriculture and food sector, with finance and management often coming from the non-agricultural sectors. Many of them have been organizing profit-oriented agricultural production by leasing large parcels of land, formerly operated by the collective farms. The spectrum of agribusinesses is very wide. It includes firms and companies of the following types: agricultural, industrial-agricultural, non-agricultural, foreign, mixed-type, specialized purpose-oriented production unions created for growing specific crops (for example, rapeseed), machinery stations founded with the assistance of commercial and semi-commercial structures, and even sugar refineries. The expansion of commercial agribusinesses in agriculture is especially notable in Forest-Steppe and northern Steppe regions endowed with the most fertile soils.

During recent years, many agribusiness organizations carried out large-scale vertically integrated models of lease-cooperative land use with a single control over the cycle of production, processing and marketing. For example, the «Viaduk» concern includes over 100 farm enterprises located in 19 oblasts of Ukraine. Viaduk is engaged in growing cereals and oilseeds with sown areas in 1999 amounted to 500 thousand ha, of which almost half was leased (Unian-Agro, 1999). Production, processing and sales are carried out according to a single business-plan on share-bases contracts on joint activities. Viaduk, diversifying its operations, is the owner of over 40 modern machinery stations providing land-cultivation services for farm enterprises. The basic farm enterprises were selected with regard to the optimization of the stations' service areas comprising 6-12 thousand ha of land. The concern's commercial units are engaged with input supply to farms, and the purchasing and marketing of farm produce.

There are different experts' opinions on commercial agricultural businesses in the domestic agrarian market. Many Ukrainian economists consider that commercial intermediary agents' activities on the non-organized market has resulted in a sharp growth in price disparity, wasting the farms' financial resources and degrading their market position. Especially in 1992-94, concealed subsidies by agriculture of up-stream and down-stream branches and, especially, trade intermediary agents, occurred. Nevertheless, from the point of view of the common competition process, the re-allocation of capital into attendant links of the food production chain, mainly, into undeveloped marketing ones, was inevitable. It should be noted that co-operation of agricultural producers in Ukraine, as the result of which the real balance of market forces can be achieved, is still at an initial stage. An incomplete privatization process will hamper the development of the co-operative structure, marketing and other agri-service cooperatives.

Assessment of lease-based agricultural land use cannot be uniformly positive or negative. On the one hand, such activity allows large-scale commercial production on the basis of modern technologies, and systematization of vertical links within the food chain. On the other hand, the interests of agribusiness, by their nature, are oriented to the realization of fast-return projects with low capital intensity. Within the framework of lease-based land use, commercial firms in most cases avoid their own agricultural production as a type of activity with lower profits and higher risks than mechanized land-cultivation services, input provision or marketing of the products.

There are certainly signs to consider agribusiness as a potential agent of agricultural growth. Presently, its status as main investor in the agrarian sphere, associative links with traditional producers, diversified activities and well-developed marketing undoubtedly brings certain advantages in the distribution of capital within the food chain. Thus, with the participation of commercial capital, approximately 500 machinery stations with modern equipment have been created in Ukraine. They are located mainly in the Forest-Steppe and Steppe zones favorable for stable harvests. Some agribusiness companies are also making investments to organize profitable livestock production.

There are grounds to consider that, with the officially declared land markets, many agribusiness structures are interested in shifting from nominal to real land ownership. In general, a more stable situation in that sphere could support the process of vertical integration in the food production chain with a perspective to create multi-profile agri-firms and technologically innovative and investment-based land use.

6. Structural transformation of the agricultural sector

Ukraine has a large-scale agricultural sector. Before 1990, producers of agricultural goods were almost exclusively larger state and collective agricultural enterprises. National statistics qualified them as a public (collective) sector. In 1990, over 12 thousand such enterprises operated on 38 million ha (92%) of the country's agricultural land producing over 70% of the gross agricultural output. On average, one enterprise comprised of about 3 thousand ha of agricultural land, of which about 2.5 thousand ha of land was actually cultivated. Land management in these enterprises was not always economically efficient or environmentally sustainable. Large-scale indiscriminant land use in many cases led to degradation. Highly concentrated livestock production created environmental hazards as well as hampering efficient distribution of feed production.

In Ukraine, so far conditions are lacking for a well-coordinated privatization process and restructuring of agricultural enterprises. At the macro-level, the focus has been on technological aspects of land distribution rather than on market incentives and social aspects such as re-grouping of shareholders into competitive market-oriented entities. This has resulted in an ad hoc, mainly formal transformation of farm enterprises, causing generally poor conditions for agricultural production, degradation of the quality of agricultural land due to nutrient mining, and deterioration of financial resources for many of the farm enterprises.

Market adaptation of farm enterprises was essentially a simple passive reaction to the crisis-related aggravation of the general economic situation. It was not until late 1998 – early 1999 that conditions and incentives came into effect for a real organizational farm modernization. Meanwhile several critical preconditions had taken root: a) most of the former formally reformed farm enterprises had gone bankrupt; b) the favorable tax regime (according to the Law "On Fixed Agricultural Tax" since 1998, over 10 different taxes and charges were substituted by a single fixed land tax); c) the legislation allowing the lease of land and the use of leased land for commercial purposes was adopted, and d) the President of Ukraine issued a Decree for the Government to take urgent measures directed at compulsory restructuring of the 10.7 thousand collective agricultural enterprises. Additional policy decisions in 2000 and 2001 benefited the agricultural sector in the short run, but may not be sustainable or desirable in the long term. As an example large government debt write-offs and restructuring of former collective farms, high import tariffs for agricultural products and a beneficiary taxation system for agriculture, boosts agricultural output initially, but is unsustainable.

Despite positive trends, there is a growing concern regarding the progress of structural transformation of farm enterprises and its impact on the economic performance of the agricultural sector. The emphasis is now on the economic feasibility of the different ownership/farm-size categories and the potential of farm enterprises to increase the efficiency of agricultural production in the context of reforms.

6.1 Description of main farm categories

In the analysis of farm profitability, survey data for of 12,365 farm enterprises has been used; making 96% of the number of farm enterprises that were registered in the national statistics of 2001. The enterprises surveyed belong to various types in terms of ownership and

management and are distributed over all administrative regions and agricultural zones of Ukraine. In the following, we distinguish and describe five distinct farm types, i.e., companies, private enterprises, co-operations, other non-state agricultural enterprises and state enterprises (Table 22).

Companies. Function on the basis of large-scale lease of land and property. Company farm types dominate numerically (almost 55% of all enterprises surveyed) and cultivate 57% of total agricultural land. Companies are mainly concentrated in the zones with large areas of arable lands and the most fertile soils –Forest-Steppe and in Steppe. A typical "company" has close to 2,000 ha and employs fewer than 150 labourers. This category includes limited liability and joint-stock companies (both closed and open), and were formed from the restructured state farms The principals, conditions and procedures of the functioning and management of these mainly correspond to those of similar forms of business in other countries – partnerships and corporations. The property of companies as legal entities is exclusively their founders' property. However, land is not included in statutory fund of agricultural companies in Ukraine, so all agricultural lands are leased which creates potential instability and hampers credit access.

Private enterprises. This category is second in importance and a promising form of business. Private (privately lease-based) enterprises consist of almost 24% of all enterprises surveyed and tend to be located in Forest-Steppe and in Polissia. They cultivate about one-fourth of total agricultural land. A typical private enterprise has about 1,500 ha and employs around 120 labourers. Most private enterprises are reformed collective enterprises, where the land and property shares are concentrated in the hands of a single executive. Such farms are single-owned entity which is traditional for a market economy. This organizational form allows greatly simplified decision-making. Principal problems of such farms are related to the considerable misbalance between owned and leased capital. Thus, the ratio of owned to rent capital is 1:175.

Co-operatives. This is the third group in importance (almost 20% of all agricultural enterprises in Ukraine). Cooperatives cultivate about 16% of the agricultural land and are distributed quite evenly in all zones. An average agricultural co-operative has about 2,000 ha and the highest number of workers among non-state units of about 160. Under Ukrainian conditions, the co-operatives were introduced not because they were considered as an efficient form of economic management, but often it was just the most simple way to proceed with collective production after the primary privatization. The positive perception of cooperative idea by the peasants and their conservatism towards other form of economic management played a role as well. At the same time, co-operatives usually have a large number of founders (members), which complicates farm-level organization and management. Agricultural co-operatives' activities are based on the principles of limiting dividends on shares and the distribution of incomes according to performance as well as 'one member-one vote' management approach. Outsiders (non-members) can be hired as managers of co-operatives. The co-operatives are considered as a transitory form of economic management, which over time will transform into independent private entities.

Other non-state agricultural enterprises. This category is represented mainly by a variety of collective entities whose operation is not directly stipulated by current legislation. In some cases, the creation of such enterprises was caused by the management's (collective's) intention to reform property relations rapidly and to simplify the transfer of property. In practice, this leads often to instability, as their activities are not clearly described in their statutory documents. At the same time some of these enterprises are rather successful, for example the agro-firms, which alongside with production have been successful in developing trade relationships.

State enterprises: About 3% of all agricultural enterprises remain state-owned, which have on average about 2,600 ha and 210 workers per enterprise. This category include state enterprises used for the purposes of agricultural science and education, seed farming, animal breeding, production of medicinal plants and other specialized agricultural production, as well as the rural subsidiary holdings of state-owned enterprises, institutions, and organizations. These enterprises in many respects could avoid problems, which other types have undergone during the reforms.

Table 22. Summary statistics of agricultural enterprises surveyed.

	Total	Companies	Private (private lease-based)	Co-operatives	Other non-state enterprises	State enterprises
Units						
Ukraine	12365	6729	2916	2078	291	351
Polissia	3132	1311	994	709	50	68
Forest-Steppe	5265	3134	1190	668	151	122
Steppe	3968	2284	732	701	90	161
Agricultural lands occupied*, 10^3 ha						
Ukraine	22935.9	13056.6	4579.9	3786.9	585.5	927.1
Polissia	3704.6	1610.5	1101.5	828.9	46.5	117.2
Forest-Steppe	8823.7	5428.5	1759.4	1121.0	230.6	284.2
Steppe	10407.6	6017.6	1719.0	1837.0	308.4	525.7
Average size of unit, ha						
Ukraine	1855	1940	1571	1822	2012	2641
Polissia	1183	1228	1108	1169	930	1724
Forest-Steppe	1676	1732	1479	1678	1527	2330
Steppe	2623	2635	2348	2621	3426	3265
Average workers per unit						
Ukraine	141	143	118	161	127	210
Polissia	111	103	112	122	79	158
Forest-Steppe	144	141	126	181	123	217
Steppe	149	145	112	181	161	227
Distribution by the number, %						
Ukraine	100.0	100.0	100.0	100.0	100.0	100.0
Polissia	25.3	19.5	34.1	34.1	17.2	19.4
Forest-Steppe	42.6	46.6	40.8	32.1	51.9	34.8
Steppe	32.1	33.9	25.1	33.7	30.9	45.9
Ukraine	100.0	54.4	23.6	16.8	2.4	2.8
Polissia	100.0	41.9	31.7	22.6	1.6	2.2
Forest-Steppe	100.0	59.5	22.6	12.7	2.9	2.3
Steppe	100.0	57.6	18.4	17.7	2.3	4.1
Distribution by the agricultural land, %						
Ukraine	100.0	100.0	100.0	100.0	100.0	100.0
Polissia	16.2	12.3	24.1	21.9	7.9	12.6
Forest-Steppe	38.5	41.6	38.4	29.6	39.4	30.7
Steppe	45.4	46.1	37.5	48.5	52.7	56.7
Ukraine	100.0	56.9	20.0	16.5	2.6	4.0
Polissia	100.0	43.5	29.7	22.4	1.3	3.2
Forest-Steppe	100.0	61.5	19.9	12.7	2.6	3.2
Steppe	100.0	57.8	16.5	17.7	3.0	5.1

* including leased lands

6.2 Results

Table 23 shows the indicators of specialization, which is calculated as a share of the basic branch in the total commodity output. Column 2 within each farm-size interval shows the profitability of the corresponding activity. Column 3 reports on the most important agricultural products. The table shows that overall the grain crops production is the dominating branch. In the region of Forest-Steppe, it is supplemented, as a rule, with sugar-beet production, and in the Steppe zone, with growing sunflower seeds.

For the group of small enterprises of all types (up to 1,000 ha) it is difficult to define the tendencies of specialization. Small enterprises prove to be fairly effective in the production of eggs and poultry, but unprofitable in meat and milk production. Overall, the small enterprises' specialization is fairly heterogeneous, which may reflect, to a certain extent, the difficulties that they face in search of new market niches.

Middle and large private-lease enterprises (over 1,000 ha) look the most specialized, growing grain crops, sugar beet in the Forest-Steppe or cereals, sunflower in the Steppe. Overall, the level of their plant-growing specialization varies from 45 to 60% in the Forest-Steppe zone and from 60 to 70% in the Steppe zone.

Cooperatives have levels of specialization in the production of market-attractive crops comparable in many aspects with those of private-lease enterprises and companies. The same is correct also for the agricultural production processing at cooperatives which can testify to its smaller degree of orientation towards the market demand.

The state enterprises in Ukraine have the largest specific weight of food processing up to 55%, with the highest share 64% in the Steppe.

Figure 6 gives a general picture of profitability of economic activity in various organizational forms, depending on the land use size on the whole in Ukraine that is fairly complex. It shows that in the range of land use up to 1000 ha a sharp decrease of effectiveness (in the terms of profitability) is observed. Thus, this range is the most critical and testifies that small reformed farm enterprises, being at the same time potentially high-yielding, face the biggest difficulties under present conditions.

Figure 6 shows that state enterprises' activity has been the most effective in a wide range of land use sizes. This conclusion is confirmed by official statistical data: in 2001, the state farm enterprises had a level of profitability of 143%, the non-state enterprises of all types only about 5%. The state sector success has been achieved by a break-even result of the main mass of enterprises in all zones of Ukraine, and especially in the Steppe zone. This result was not unexpected, as the state enterprises had to cope with restructuring and had support under crisis conditions. They specialize on the production of grain crops, fruit, grapes, and also special kinds of plant-growing production. They are engaged in unprofitable meat-milk production on a limited scale. In comparison with other types of enterprises the field of processing has been well developed which gives them additional advantages. Figure 6 also shows that other non-state enterprises sized in the range of 500-1,000 ha were the most unprofitable ones in all zones. The enterprises of these two categories do not play an essential role in today's Ukraine's agriculture, and it is necessary to pay attention to new forms of management.

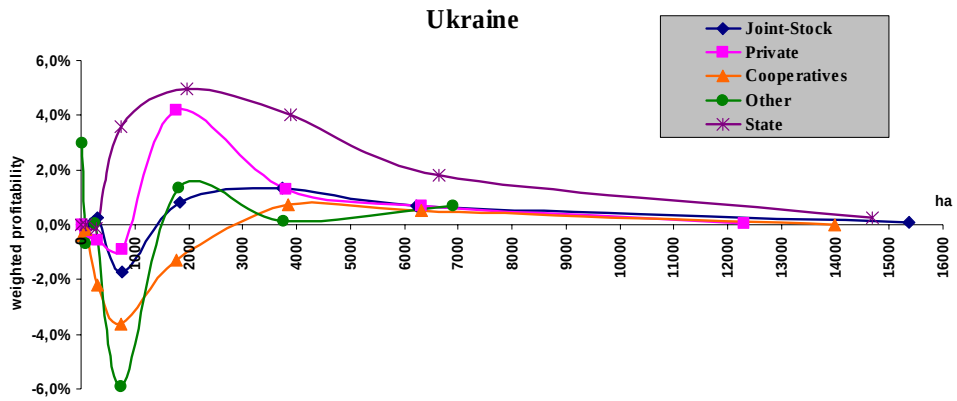


Figure 6. Weighted profitability for different types of agricultural enterprises in Ukraine

Among the reformed non-state enterprises, the most successful ones were the private-lease enterprises, which were in the lead in a wide range of land use sizes (from 3,000 up to 10,000 ha), and first place in the zones of Forest-Steppe and Steppe. At the same time, small private-lease enterprises (up to 1,000 ha) had negative results, mainly because of an essential orientation towards meat-milk production, which was unprofitable under conditions of the prevailing market situation, especially in the zone of Forest-Steppe (See Figure 7).

There is approximately the same situation, with the results of middle and large enterprises turning out to be effective (especially in the zone of Steppe) and small ones - non-effective (in the zone of Polissia), forms on separate consideration of joint-stock companies. As compared with the private-lease enterprises, the joint-stock companies are less effective. The co-operatives turned out to be the least effective in comparison with private-lease enterprises and joint-stock companies. In the Forest-Steppe zone, large joint-stock companies are inferior, not only to private-lease enterprises, but also to co-operatives.

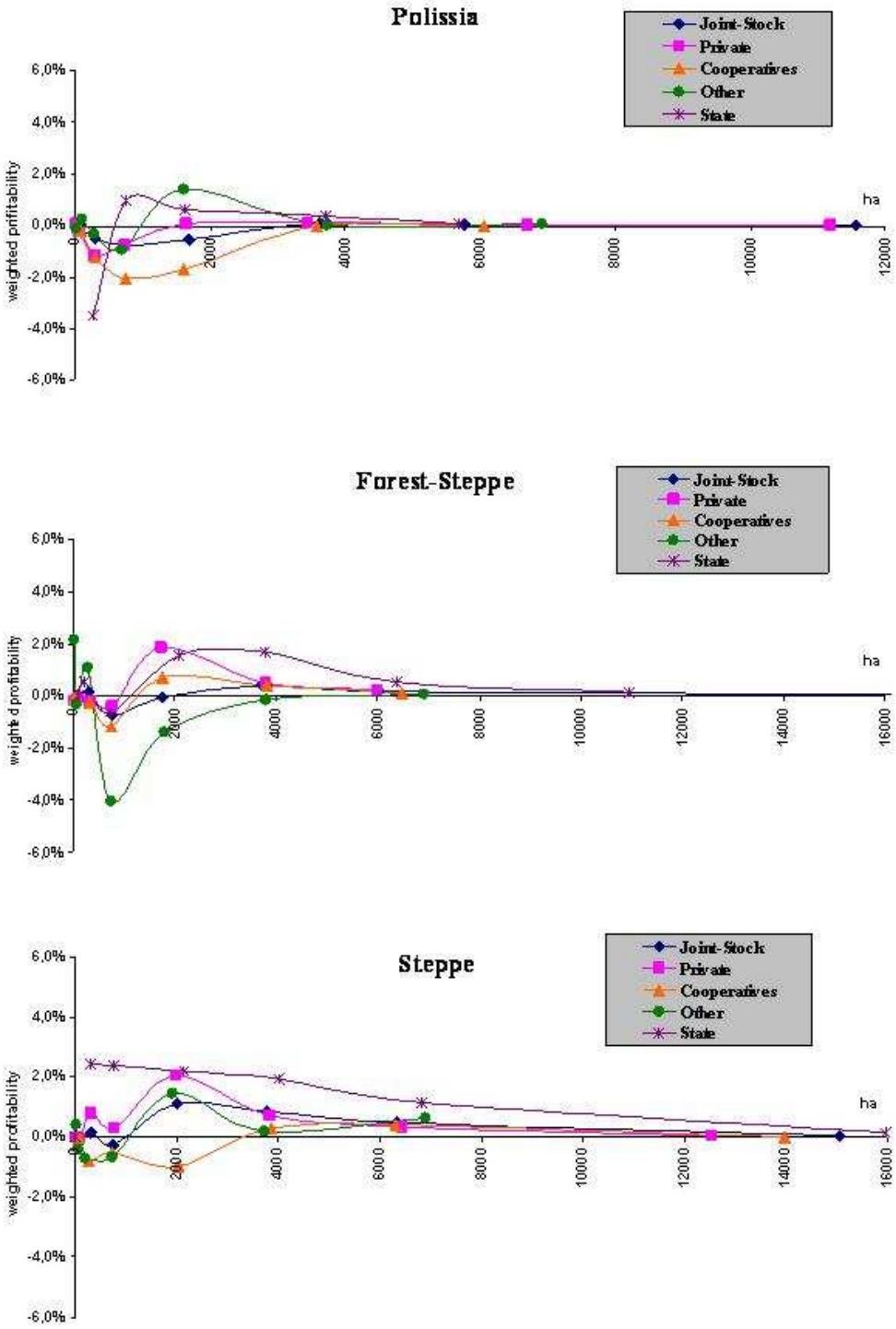


Figure 7. Weighted profitability for different types of agricultural enterprises within agro-ecological zones in Ukraine

6.3 Discussions and Conclusions

The situation of all types of farm enterprises mainly remains fairly complex and unstable, and their development trends are very vague. It seems that in the near future an essential part of them will have to be considerably transformed. It is related primarily with the low standard of mechanization and technology used. There could also be a change in the territorial proportions of agriculture with an increase in agricultural production in Polissia and Forest-Steppe and a relative decrease in Steppe. As the result of agricultural technologies deterioration, the decline of irrigation melioration, the Steppe regions are turning to be dependent on climatic fluctuations and are not able to overcome periodical droughts.

From the regional point of view, the farm enterprises' situation in the zone of Polissia is the most problematic. The enterprises here are the most unprofitable, especially the small sized. Because of natural-climatic peculiarities, they cannot use the advantages of the south regions and develop by means of the present export orientation. During the 1990s, this zone lost its long time specialization on potatoes and flax production for which they have the best natural conditions. The production of potatoes has shifted to households throughout Ukraine. The decline in the traditional flax production in Polissia has been influenced by the loss of external markets, the restricted possibilities for marketing of raw materials in Ukraine, the financial crisis of flax processing plants, and the radioactive contamination of the territories as a result of the Chernobyl accident.

Thus, the problem of survival, restructuring, and the search for a new specialization is very acute today for farm enterprises of Polissia. The policy of active stewardship in private business development on the land, with the aim of maximum possible involvement of the rural population is especially important for the Polissia regions. Over time, it will allow the medium sized enterprises to become more viable with production oriented mainly on the domestic market. A considerable part of the rural regions in the western Ukraine should have the possibility to develop organic agriculture, in particular, milk and meat production. With the recovering of the population's purchasing capacity, the organic production may have good prospects in urbanized Ukraine, contributing to the production of quality food and expanding the ecologically friendly land use. Besides, it will provide market economy advantages for small-scale farms.

In the zone of Forest-Steppe, the high-yielding black soils containing 5 - 5.5% of humus are concentrated and provide the best conditions for maintaining a sustainable and effective agriculture. Nevertheless, the prospects of development of the farm enterprises of the zone remain complex. The present zone is exposed to changes in its traditional specialization - the growing of sugar beet. During the 1990s, Ukraine lost the competition for external markets for sugar, first on the capacious Russian market from which foreign food processing companies have forced it out. Therefore the role of large specialized enterprises of Forest-Steppe, which over many years were the main producers of raw materials for sugar-refineries, have decreased considerably. As it is seen from this study, presently the bulk of farm enterprises in the Forest-Steppe zone are already re-oriented to grain production. It seems this process will evolve to create pre-conditions for a grain-fodder base recovery in the Forest-Steppe zone and development of meat-milk cattle, pig-breeding, eggs and poultry production, which are of strategic importance for Ukraine.

Presently a considerable part of farm enterprises of the Forest-Steppe zone engaged in meat and milk production suffers from the absence of effective models of livestock farms. The inherited technologies are the main reasons for the non-profitability of the livestock production, which is the case on small enterprises. The possible transformation of small enterprises to medium sized dairy-production farms and pastoral livestock breeding could be part of this transition.

The situation of farm enterprises in the Steppe zone remains fairly problematic. They have a pronounced orientation towards the production of grain crops and sunflower seeds, a considerable part of which is exported unprocessed. The close proximity to the Black Sea ports plays an important role through which the main export deliveries from Ukraine are carried out. With the existing high prices of transportation and storage, this gives the possibility to the enterprises to gain an additional 10-25 Hrn per ton of grain.

The uncontrolled expansion of sunflower production in the South is a cause for concern in Ukraine. During the period 1996-1999, the areas under sunflower were expanded by 38 %, at the expense of its extensive growing in the Steppe regions. The farm technology norms stipulate a restricted saturation of the crop rotation with sunflower sowing, and its return to the former field is allowed not earlier than in 7 - 10 years. Violation of these rules before and at present contributes to considerable exhaustion of the soils, particularly in the arid south. Under the limited domestic market, a preferably export-raw materials orientation of the farm enterprises in the Steppe is, evidently, the main possibility, in spite of negative impact on the country's land cover. However, from the point of sustainable agriculture it must undergo considerable changes.

Our analysis confirms the superiority of the private (private lease-based) farms, except milk and cattle farming, especially in small farms. This is wholly consistent with the general perception of many Ukrainian experts that the private farm is the promising model for the future development. However, it is fully correct for medium and large farm enterprises for production activities of spatial nature. Small private-lease enterprises still adhere to having mixed specializations. In general, companies are less effective. One of the possible reasons for the companies' reduced effectiveness may lie in the fact that they are more exposed to influence of agribusiness, which carry out an extractive policy. Among the newly reformed enterprises, the cooperatives are the least successful. This may be a result of their weaker internal rebuilding and the inherited orientation, as pre-reform collectives were usually mixed farms, while private farms and company specialize mainly on market attractive commodities.

There are a number of positive developments that have already resulted from the changes in the socio-economic environment. However, transformation of farming systems into new forms did not improve much the strengthening and sustainable use of natural resources and economic performance, so the influence of this intervention on sustainability of farming system in Ukraine has had more negative, than positive results: large-scale farms continue to over-exploit natural resources and new private farmers, with lack of experience and knowledge and financial resources, use obsolete technologies that cause soil degradation. All the components of the farming sector: agricultural enterprises, household plots, and individual private farms, still remain problematic in terms of efficiency and are constrained by the lack of appropriate policies and inadequate markets. Today, the large-scale farms do not have enough funds and resources for carrying out intensive operations (using mineral fertilizers and pesticides), that under certain conditions, could be the basis for the sustainable farming. Less intensive land-use and animal husbandry in Ukraine could make it possible for an introduction of ecological methods of agricultural management (organic farming).

Even after a decade of economic and structural changes, there is still an urgent need in Ukraine for comprehensive agricultural development strategies, and effective institutional transformation for sustainable agricultural rural development. While economic conditions for agriculture have changed considerably since the beginning of the 1990s, agricultural policy in Ukraine was focused on trying to revive the production level, without the comprehensive analysis of agro-ecological conditions, internal and external markets, infrastructure, farmers' incentives etc. Rational agricultural land use is imperative in Ukraine. Existing agricultural systems are not appropriate to changing production, technological, economic, ecological realities. There is an urgent need for major policy changes in Ukraine towards rural welfare

growth, sustainable agriculture and efficient land management, and establishment of agricultural market network supported by adequate legislations.

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Table 23. Summary statistics of specialization and profitability of production by organizational forms and farm sizes of farm enterprises in Ukraine in 2001

		1. Up to 50 ha			2. 50,1–100 ha			3. 100,1-500 ha			4. 500,1–1000 ha		
		Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products
1. Companies	Plant growing	34,7	31,2	other	9,6	-6,2	grains	29,8	22,9	other, grains	**50,0**	**15,0**	**grains**
	Stock-breeding	**36,6**	**5,7**	**eggs**, **other**	**65,6**	**23,2**	**eggs**	**38,9**	**7,7**	**eggs, poultry**	27,4	-16,4	cattle, milk
	Food processing	14,3	-3,7		12,6	-11,0		16,6	-0,3		10,1	2,1	
	Services	14,3	11,1		12,1	1,1		14,7	18,2		12,5	12,0	
	Total	*100,0*	*12,5*		*100,0*	*11,5*		*100,0*	*11,8*		*100,0*	*2,8*	
2. Private (private lease-based) units, inc. Individual farms	Plant growing	13,7	5,2	grains	35,1	7,5	grains	**53,9**	**11,9**	**grains, sugar-beet**	**57,8**	**21,3**	**grains, sugar-beet**
	Stock-breeding	**69,5**	**10,9**	**eggs, poultry**	**40,4**	**-11,4**	**cattle, milk**	22,3	-16,6	cattle, milk	24,7	-19,7	cattle, milk
	Food processing	5,8	1,4		10,0	-1,0		10,3	9,1		9,1	7,3	
	Services	11,0	21,8		14,5	17,0		13,4	32,9		8,4	19,8	
	Total	*100,0*	*10,6*		*100,0*	*-0,7*		*100,0*	*5,8*		*100,0*	*6,5*	
3. Cooperatives	Plant growing	**51,6**	**8,1**	**other, grains**	39,3	22,5	grains, sunflower	**50,1**	**-1,3**	**grains, sugar-beet**	**58,2**	**15,8**	**grains, sugar-beet**
	Stock-breeding	24,1	-29,6	cattle, milk	**39,8**	**-17,8**	**pig, cattle**	28,7	-18,4	cattle, eggs	24,9	-31,9	cattle, milk
	Food processing	4,5	6,7		2,4	-30,8		6,4	-20,4		5,9	-8,4	
	Services	19,8	1,3		18,5	7,9		14,7	15,9		11,0	6,2	
	Total	*100,0*	*-5,5*		*100,0*	*-1,1*		*100,0*	*-6,3*		*100,0*	*-3,5*	
4. Other non-state enterprises	Plant growing	11,5	27,3	other	10,8	7,8	grains, potatoes	**39,5**	**18,8**	**grains, other**	**59,0**	**4,5**	**grains, sugar-beet**
	Stock-breeding	28,8	19,1	eggs, poultry	32,5	-18,4	cattle, pig	36,3	0,5	other, cattle	16,5	-23,9	cattle, milk
	Food processing	**56,7**	**34,1**		0,1	-33,3		5,5	26,2		8,0	-18,8	
	Services	3,0	4,9		**56,6**	**-11,6**		18,8	25,0		16,5	6,7	
	Total	*100,0*	*27,6*		*100,0*	*-12,3*		*100,0*	*12,8*		*100,0*	*-3,3*	
5. State enterprises	Plant growing				83,6	-15,5	grains, sugar-beet	27,5	**40,2**	**other, grains**	**44,5**	**52,6**	**grains, other**
	Stock-breeding	100,0	-3,7	other	**10,2**	**-45,2**	**other, cattle**	3,0	-22,9	milk	7,4	-22,9	milk, cattle
	Food processing				3,5	2,7		55,0	29,9		40,4	67,1	
	Services				2,6	10,4		14,5	-27,1		7,8	0,9	
	Total	*100,0*	*-3,7*		*100,0*	*-19,0*		*100,0*	*16,6*		*100,0*	*41,7*	

		5. 1000,1–3000 ha			6. 3000,1–5000 ha			7. 5000,1-10000 ha			8. Over 10000 ha		
		Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products	Share of sales, %	Profitability, %	Main products
1. Companies	Plant growing	**54,2**	**30,7**	**grains, sugar-beet**	**57,2**	**39,5**	**grains, sunflower**	**53,4**	**47,1**	**grains, sunflower**	**45,9**	**52,8**	**grains, sunflower**
	Stock-breeding	23,0	-13,0	cattle, milk	23,8	-4,4	milk, cattle	26,1	8,5	milk, pig	15,9	14,0	pig, milk
	Food processing	12,2	10,6		9,1	3,6		11,8	13,2		27,2	38,6	
	Services	10,6	12,3		9,9	14,7		8,7	18,0		11,0	28,9	
	Total	*100,0*	*13,1*		*100,0*	*20,0*		*100,0*	*27,9*		*100,0*	*38,6*	
2. Private (private lease-based) units, inc. Individual farms	Plant growing	**56,1**	**40,4**	**grains, sugar-beet**	**62,0**	**46,7**	**grains, sunflower**	**52,1**	**57,5**	**grains, sunflower**	**59,0**	**92,1**	**grains, sunflower**
	Stock-breeding	25,1	-8,4	milk, cattle	21,4	-2,7	milk, cattle	25,2	16,1	milk, cattle	17,1	-18,8	cattle, milk
	Food processing	10,4	7,8		9,7	8,8		15,7	11,0		6,1	20,8	
	Services	8,4	15,3		6,8	11,4		7,1	15,4		17,8	0,6	
	Total	*100,0*	*18,7*		*100,0*	*26,0*		*100,0*	*33,3*		*100,0*	*34,2*	
3. Cooperatives	Plant growing	**52,2**	**30,7**	**grains, sugar-beet**	**57,8**	**43,1**	**grains, sunflower**	**56,2**	**48,2**	**grains, sunflower**	**66,1**	**27,2**	**grains, sunflower**
	Stock-breeding	29,0	-16,0	cattle, milk	23,3	-12,5	milk, cattle	24,9	4,1	milk, cattle	22,5	16,4	milk, cattle
	Food processing	11,5	3,5		12,5	-1,1		12,2	-1,5		9,2	-26,6	
	Services	7,3	10,2		6,4	10,0		6,7	11,6		2,2	47,2	
	Total	*100,0*	*8,5*		*100,0*	*17,0*		*100,0*	*24,6*		*100,0*	*17,2*	
4. Other non-state enterprises	Plant growing	**54,4**	**23,1**	**grains, sugar-beet**	**48,9**	**26,1**	**grains, sunflower**	**44,2**	**36,3**	**grains, sunflower**	**42,5**	**23,0**	**grains, sunflower**
	Stock-breeding	18,4	-6,2	milk, cattle	15,4	-7,7	milk, cattle	18,4	27,4	milk, cattle	49,6	-2,3	eggs, pig
	Food processing	15,6	16,1		11,6	0,9		11,3	13,3		5,8	-8,6	
	Services	11,6	14,3		24,0	8,3		26,1	17,5		2,1	1,3	
	Total	*100,0*	*14,4*		*100,0*	*12,1*		*100,0*	*26,5*		*100,0*	*6,7*	
5. State enterprises	Plant growing	**46,3**	**49,2**	**grains, other**	**51,5**	**70,1**	**grains, other**	**58,9**	**45,1**	**grains, sunflower**	**55,8**	**77,0**	**grains, sunflower**
	Stock-breeding	20,1	-11,5	milk, cattle	23,4	1,2	milk, cattle	22,8	-4,1	milk, cattle	30,4	-7,5	milk, cattle
	Food processing	24,8	23,1		18,7	11,7		10,8	-2,1		6,6	3,5	
	Services	8,7	7,4		6,4	6,0		7,5	4,5		7,2	-31,8	
	Total	*100,0*	*21,8*		*100,0*	*31,3*		*100,0*	*21,1*		*100,0*	*22,9*	