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SOME CHARACTERISTICS OF THE HUNGARIAN AGRICULTURE IN THE 1990s*

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Due to the natural conditions agriculture played a definitive role in the Hungarian economy in the past and even today. The share of agriculture in the GDP is 3.7 percent, and agricultural land area is 63 percent of the total. According to the General Agricultural Census 2000 almost 1 million units were engaged in any kind of agricultural activity.

The agricultural sector experienced dynamic growth during a few short periods in the second part of the past century, as the measures introduced in 1945, 1961 and 1990 resulted in structural changes which then completely reshaped the production conditions prevailing during the preceding years, through the introduction of new agricultural policies and changes in land ownership. In the 1990s production was below the level of the period between 1989–1990. In the study the authors analyse the sectoral characteristics of the changes in agricultural production by type of holdings.

Keywords: Agricultural production; Agricultural transformation.

The performance of agriculture is dependent on very complex natural, economic and social impacts, affecting agricultural production. Such complex factors can reinforce each other, which means that unfavourable conditions, may strengthen further the negative effects. We cannot discount the fact that agriculture is a business of live organisations, and factors such as the weather, have an extreme impact on production results. Consequently, the uncertainties of production may still be present, even if not to the same extent as before. In addition, the production is heavily influenced by factors such as the quality and position of the cultivated land, the materials used, the quantity and quality of equipment used, the labour and market conditions. These factors have a complex impact on the optimal production structure.

In global terms, agricultural production increases by approximately annual two percent which is more or less in line with population increase. In areas outside Europe the growth is faster. Production figures in Europe are more or less stagnating. In the 1990s, the average European annual level was one to three points lower than in preceding periods.

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At the end of the XXth century, in the economically developed European countries the somewhat increasing volume of agricultural products was yielded in an ever decreasing agricultural area, using increasingly less labour and more equipment and materials. The relatively similar tendencies have affected the agriculture of the countries of the European Union in a same manner, and have resulted in slow restructuring and increase in quality.

In Hungary, the agricultural sector experienced dynamic growth only during a few short periods in the last half century, as the measures introduced in 1945, 1961 and 1990 resulted in structural changes completely reshaped the production conditions prevailing during the preceding years, through the introduction of new agricultural policies and changes in land ownership. Following the establishment of co-operatives in the 1950s, production ceased to improve for a considerable period, while after 1956 a lot of the co-operatives were liquidated. Consequently, for 50 years, agricultural production volumes went through alternating periods of growth and stagnation.

The performance of the Hungarian agriculture has been significantly lagging behind the European average. In the 1990s production was 20-30 percent below the level of the period between 1989 and 1991 (see Table 1). Such underperformance was not justified. With sensible economic and market measures, the transition could have been made more seamless, at least a drop of this magnitude could have been avoided.

Table 1

Agricultural production volumes, 1989–2000
(Index: 1990=100.0)

Year	World	Europe	Hungary
1989	.	.	105.0
1990	100.0	100.0	100.0
1991	101.2	99.9	93.8
1992	103.5	97.8	75.0
1993	104.1	96.0	67.7
1994	107.1	93.7	69.8
1995	109.3	94.4	71.6
1996	113.7	98.0	76.1
1997	116.5	98.3	73.6
1998	118.2	98.5	74.1
1999	121.2	99.8	74.4
2000	122.9	99.1	69.6

Source: FAO database.

For centuries, Hungarian agriculture has been characterised by a lack of capital. Due to the slow return of investment, the industrial capital has only shown limited interest towards agriculture. During the last 50 years, there was only one period, between 1960 and 1970, when Hungarian agriculture enjoyed subsidies that resulted in considerable increase in the volume of agricultural production. Consequently, Hungarian agricultural production achieved the standards of Western European countries with developed agricultural industry. Since then, after a period of stagnation, the agricultural output has dropped.

The latest changes that started in 1990 have still not levelled out, and no long-term solutions have been found, even though the expected requirements related to the accession to the European Union have become increasingly known, inquiring further, unavoidable structural changes.

1. AGRICULTURAL PRODUCTION AND THE MAIN FEATURES OF STRUCTURAL CHANGES BETWEEN 1989 AND 2001

The political and economic transition of the 1990s manifested within the agricultural industry in a gradual, and multi-stage manner. The return of land ownership to the original owners or to new candidates has not happened without problems, and could not be fully accomplished.

At the same time, the liquidation of co-operatives and state farms has resulted in a considerable loss of assets. Even the previous level could not be maintained. Many of the resulting, mainly small farms could only perform at low standards, due to the lack of suitable tools and equipment. In the lack of a thoroughly assessed agricultural policy, following the loss of eastern markets, both production volumes and agricultural exports have dropped.

In Hungary, agricultural production practically stopped growing in the late 1980s. This was followed by a dramatic drop in the 1990s.

The gross value of agricultural production dropped during the 1990s, and it was approximately 20 to 40 percent under the level of the 1980s (see Table 2).

Table 2

Volume indices of gross agricultural production, 1989–2001
(Index: 1990=100.0)

Year	Crop production and horticultural products	Live animals and animal products	Total
1989	110.2	100.2	105.0
1990	100.0	100.0	100.0
1991	102.5	84.4	93.8
1992	76.1	73.8	75.0
1993	69.1	66.1	67.7
1994	75.9	63.3	69.8
1995	77.3	65.5	71.6
1996	84.9	66.6	76.1
1997	84.0	62.6	73.6
1998	80.9	66.5	74.1
1999	82.8	65.4	74.4
2000	70.9	67.9	69.6
2001	93.7	66.9	80.6

The domestic drop was smaller for crop production (10-30%) than for animal husbandry, which only managed to reach two thirds, or less of the level of 1990. The performance of crop production has fluctuated considerably, while the level of animal husbandry has consistently remained at a low level since 1993.

The volume indices of intermediate consumption considerably fell behind the previous figures; in most years significantly less funds were used in agricultural production than in previous periods (see Table 3).

Table 3

Volume indices of intermediate consumption
(Index: 1990 = 100.0)

Year	Total	Of which:		Agricultural output without intra-agricultural use
		agricultural origin	industrial origin	
1989	112.2	114.7	110.9	102.9
1990	100.0	100.0	100.0	100.0
1991	86.7	86.3	97.1	95.8
1992	67.1	59.4	78.8	79.3
1993	63.9	50.4	77.9	72.4
1994	67.2	63.1	77.0	71.7
1995	68.0	63.6	78.1	73.8
1996	69.4	66.0	78.6	78.9
1997	66.0	65.9	72.8	75.7
1998	65.1	55.3	77.9	79.2
1999	67.7	56.0	81.6	79.4
2000	67.7	47.4	87.4	75.6
2001	75.6	53.8	97.0	87.9

In ten years, the prices of industrial products used in agriculture have increased (see Figure 4). Although the comparative ratio of agricultural prices versus industrial prices did not change significantly; agricultural prices were already lagging behind the average price growth of industrial products used in agriculture (see Figure 1). The only year this trend did not prevail was 2000, when the ratio between prices of agricultural and industrial products did not increase. Since 1990, this ratio has been increasing every single year.

The high inflation prevailing during the 1990s had also affected the agricultural production. Between 1990 and 2001 the producers' price level of agricultural products has increased fourfold, while that of goods and services used for agricultural production has grown sixfold. The disadvantageous relative movements of output and input prices resulted in a decrease of nearly one-third in the income level of agricultural producers. The change in terms of trade was not gradual: in 1992, 1994, 1995 and 2000 the producers' prices grew faster than input prices. This negative tendency accelerated in the second half of the 1990's.

A smaller increase in price levels was recorded in 2001. The price level of vegetables, fruits grew above the average, while that of live animals (especially cattle), cereals and pulses grew below the average during the period under review. Among products used for agricultural input the price increase of seeds and energy (mainly diesel oil) was outstandingly high. The price level of feeding stuff of industrial origin amounting to 40 percent of the purchases of producers grew below the average due to decreasing demand as a result of the drop in the number of animals.

Figure 1. Agricultural terms of trade
(Index: 1990=100.0)

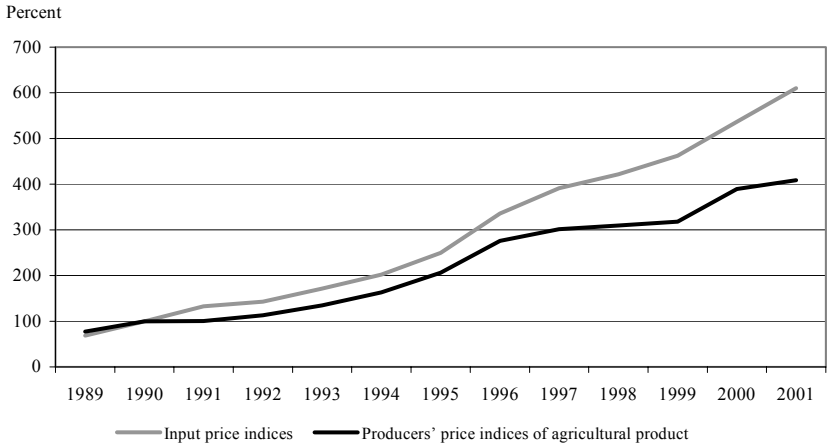


Table 4

Components of agricultural terms of trade
(Index: 1990=100.0)

Year	Price index of			Agricultural producers' price index	Terms of trade
	Agricultural inputs	Plant cultivation and horticulture	Animal husbandry		
1991	132.6	98.2	102.8	100.4	75.7
1992	143.2	105.9	122.2	113.2	79.1
1993	171.8	134.4	135.9	135.1	78.6
1994	202.1	152.3	176.4	163.1	80.7
1995	250.0	200.5	213.7	206.4	82.6
1996	335.8	290.7	255.9	276.0	82.2
1997	391.1	290.2	315.5	301.4	77.1
1998	422.0	280.0	348.8	309.9	73.4
1999	462.1	306.2	332.5	317.9	68.8
2000	536.5	400.5	373.8	389.3	72.6
2001	610.6	378.5	447.4	408.7	66.9

In Hungarian agriculture the share of active earners decreased from over 50 percent to under 10 percent during the XXth century. In the more industrialised countries, this phenomenon had already begun in the first half of the XXth century. In the last 30 years, the number of agricultural labour force dropped by half in Europe (in the EU 15 member states the drop has been even more dramatic; the ratio, already low previously, has decreased to below 5 percent). In the 1990s, only the Czech Republic had a lower ratio of agricultural earners in the Central European region than Hungary, while within the EU member states Spain, Italy, Portugal and Greece had higher and Finland had equal in 1995. However Poland and Hungary plays a leading role compared to other Central and Eastern European countries in terms of the size of cultivated land and agricultural pro-

duction. The mentioned countries import more agricultural products than export; while Hungarian agricultural foreign trade balance has been consistently and significantly positive since long.

The reason for the decrease experienced in the last 10 years was the cessation of part-time employment in the former co-operatives. With the liquidation of large-scale agricultural companies lots of people lost their living, and older workers typically chose retirement. A high proportion of the available labour force could not find alternative employment, especially in smaller settlements. Those, who upon liquidation of the large-scale agricultural companies, chose to make a start in small-scale, family-based farming, did not employ extra people, and many of them worked only within the family farms part-time. Their number are reflected amongst those in full-time employment (see Table 5.).

Table 5

The number and proportion of employed labour force, 1989–2001

Year	Number of employees in national economy (thousands)	Of which employed			
		in agriculture, game farming and forestry		in the food industry	
		thousands	percent	thousands	percent
1989	.	.	.	.	.
1990	4 880	693	14.2	234	4.8
1991	4 520	538	11.9	231	5.1
1992	4 083	460	11.3	210	5.1
1993	3 827	349	9.1	197	5.2
1994	3 752	328	8.7	180	4.8
1995	3 679	295	8.0	157	4.3
1996	3 648	302	8.3	165	4.5
1997	3 646	288	7.9	160	4.4
1998	3 698	279	7.5	159	4.3
1999	3 812	270	7.1	155	4.1
2000	3 849	252	6.5	152	4.0
2001	3 860	239	6.2	156	4.0

The net worth realised in the Hungarian agricultural industry considerably falls behind the average level of most EU countries, and this is the basic reason for lower yields.

2. SECTORAL CHARACTERISTICS OF THE CHANGES IN AGRICULTURAL PRODUCTION

Among the European countries it is only in Denmark and Hungary where the proportion of arable land exceeds or nears 50 percent of the total area of the country. In terms of production, these two countries are outstanding as the majority of their agricultural produce is exported i.e. both countries are net exporters of agricultural products. However, in the last decade, Hungary fell behind in this race, and no future solution has been outlined to remedy this situation.

The area of arable land and land used for the key land use categories, apart from orchards, has been gradually declining since 1990. However, the figures of individual years do not provide an objective picture of the changes that have taken place, as they do not reflect the frequent changes in ownership, and the state land registration could not properly track the changes in cultivation types either.

The orchard and vineyard census carried out in 2001 has reassuringly clarified the actual area used for these two cultivation areas, using the latest technical tools available. However, other cultivation areas still require further clarification. It is quite probable that there are pieces of land, totalling several hundreds of thousands of hectares that are not cultivated any longer due to their poor quality and because of the low revenues that can be achieved.

It is not worth keeping arable land that has not been used for sufficiently profitable cultivation as a meadow. It would be more justified to plant forests on or utilise them in an alternative way. The situation is very similar with grapes; family vineyards, typically planted with older grape varieties require modernisation due to their age and neglected state.

There has not been a considerable fluctuation in the area of orchards for the last decade, although only the area changes of orchards can be taken satisfactory. In the last decade, grassland has reduced by over 10 percent, and the grass yields of these areas have frequently remained unutilised (see Table 6).

Table 6

*Agricultural area by land use categories, 1989–2001**
(1000 hectares)

Year	Arable land, garden	Vineyard	Orchard	Grassland	Agricultural area
1989	5 052	140	95	1 197	6 884
1990	5 054	138	95	1 186	6 473
1991	5 056	137	94	1 173	6 460
1992	4 742	135	95	1 164	6 136
1993	4 747	132	93	1 157	6 129
1994	4 749	132	93	1 148	6 122
1995	4 806	131	94	1 148	6 179
1996	4 811	131	94	1 148	6 185
1997	4 820	131	96	1 148	6 195
1998	4 819	130	96	1 148	6 193
1999	4 816	127	96	1 147	6 186
2000	4 601	106	95	1 051	5 854
2001	4 614	93	97	1 061	5 865

* In certain years the criteria of cultivation sector classification were modified.

The decline in the more valuable cultivation sectors has resulted in an increase in the area of forests, and land removed from cultivation (either used for construction or for other non-agricultural purposes). In the period studied the area of forests has increased by nearly five percent, while the area of uncultivated land grew by nearly 50 percent (see Table 7).

Table 7

Changes in the regularly uncultivated areas
(1000 hectares)

Year	Forest	Reeds	Fish-pond	Uncultivated land
1989	1 688	40	27	1 064
1990	1 695	40	27	1 068
1991	1 701	40	26	1 076
1995	1 763	41	27	1 293
2000	1 770	60	32	1 588
2001	1 772	60	32	1 574

The share of the individual cultivation sectors within the total agricultural production is traditionally in line with the distribution of the usage of arable land; however, this aspect has been losing its dominance for the last few years (see Table 8).

Table 8

Changes in the utilized agricultural area by legal forms, 1989–2001
(1000 hectares)

Year	Companies and agricultural enterprises	Co-operatives	Private farmers	Total
	arable land on 31 May			
1989	2 148	5 113	979	8 240
1990	2 146	4 938	1 152	8 236
1991	2 325	4 589	1 314	8 228
1992	2 820	4 031	1 072	7 923
1993	2 481	3 733	1 747	7 961
1994	2 396	2 570	3 080	8 046
1995	2 269	2 084	3 658	8 011
1996	2 294	1 900	3 823	8 017
1997	2 094	1 730	4 212	8 036
1998	2 129	1 585	4 323	8 036
1999	2 319	1 413	4 304	8 035
2000	2 480	1 120	3 704	7 716*
2001	2 592	815	3 965	7 730**

* Of which 412 thousand hectares removed from agricultural cultivation.
** Of which 357 thousand hectares removed from agricultural cultivation.

The land of former large agricultural co-operatives was mainly distributed among individual farmers. However, the transformation, when changes in ownership took place was not entirely transparent, the areas newly received often went through several stages of transformation.

The distributed land was not always cultivated, due to a lack of either appropriate tools or necessary labour. Many poor quality pieces of land were not even worthy of cultivation, and this was often realised only after shorter or longer periods of unsuccessful attempts. Certain non-agricultural enterprises also obtained land; consequently, such

pieces of land were removed from agricultural control. There was also a tendency for regular changes in land ownership.

The total volume of land belonging to companies and enterprises has hardly transformed, even though lots of changes have taken place in terms of the various farming styles. The greatest decline has occurred in terms of co-operatives. In 2001, the total area of their arable land was only slightly over 15 percent of that in 1989. Their decline was gradual, and the decrease in their arable land has mainly benefited individual farms. The changes that have taken place in various directions and on different scales, have resulted a shift in the number of land-owning farms and in the distribution of land.

The number of the smallest and the largest farms, as well as the size of the arable land belonging to them have decreased, to benefit medium-size farms. Despite of this, medium-sized farms still do not represent the weight they should. In parallel, the number of individual farms has gradually decreased: in 1981, as much as 1531 thousand farms participated in agricultural production, while this figure was 1398 thousand in 1991 and 967 thousand in 2000. In 2000, the average accumulated size of small and large holdings was 6.5 hectares, despite of the fact that nearly 90 percent of landowners still owned less than five hectares (see Table 9).

Table 9

Distribution of the number of farms and their utilized agricultural area by the size of land, 1981, 1991, 2000
(percent)

Size (hectares)	Distribution of the					
	number of farms			arable land		
	1981	1991	2000	1981	1991	2000
– 1	93.0	81.4	70.3	7.2	5.0	2.8
1.1 – 5	6.7	12.5	19.1	4.8	5.5	6.5
5.1 – 10	0.1	4.3	4.6	0.1	4.2	4.9
10.1 – 50	0.1	1.6	4.8	0.1	5.0	15.2
50.1 – 100	0.0	0.2	0.6	0.1	3.1	5.9
100.1 – 500	0.0	0.1	0.5	0.3	5.2	12.1
500.1 – 1000	0.0	0.0	0.1	0.3	4.0	6.0
1000.1 –	0.1	0.0	0.1	87.1	68.0	46.6
Total	*100.0*	*100.1*	*100.1*	*100.0*	*100.0*	*100.0*

The change of ownership has taken place differently in the various land use categories. The process described is best represented by the changes in the area of arable land. It also should be considered however that the area of arable land shown in the various surveys decreased by over 10 percent in 12 years.

In crop production cultivation of the land, and, within that, the growing of grain crops, remained the key cultivation sector in the last decade.

The land sowing structure has changed unfavourably. The sowing area of grain crops has increased, while the share of other crop types has dropped, despite a continuous decrease in the total area of land (see Table 10).

Table 10

*Structure of sown area on arable land, 1989–2001**
(percent)

Year	Cereals	Potato and pulses	Industrial crops	Rough and succelent fodders	Vegetables	Other crops	Total sowing area	Proportion of unsown arable land
1989	60.5	4.8	14.2	17.5	2.3	0.7	100.0	2.0
1990	59.8	4.1	12.8	19.0	2.5	1.8	100.0	1.4
1991	60.2	3.5	14.1	12.5	2.4	7.3	100.0	2.1
1992	60.7	3.9	14.0	16.1	1.9	3.4	100.0	7.0
1993	62.9	3.6	13.2	14.8	1.9	3.6	100.0	8.7
1994	64.6	2.7	13.4	14.1	2.2	3.0	100.0	5.0
1995	60.8	2.8	16.1	13.9	2.6	3.8	100.0	4.1
1996	62.6	2.5	15.8	9.2	2.4	7.5	100.0	4.6
1997	64.5	2.6	14.5	8.4	2.9	7.1	100.0	4.7
1998	64.4	3.0	12.9	8.4	2.5	8.8	100.0	4.5
1999	57.3	2.5	19.5	8.6	2.5	9.6	100.0	9.0
2000	70.5	1.9	13.2	6.9	2.2	5.3	100.0	8.2
2001	73.5	1.6	12.5	6.5	2.1	3.8	100.0	4.2

* The proportion of land occupied by arable land crops.

The yield of individual arable land crop fluctuates year by year. Averages of several years somewhat balance these annual fluctuations and, consequently, give a better idea of long-term changes in proportions. For the last ten years, the increase in the sowing land of autumn wheat, maize and rape seed has been considerable. The sowing area of sugar beet, potato and papilionaceaous fodder plants has decreased. Rape seed has shown a dynamic trend, while sufficient amounts of sugar beet have been produced on a smaller area of land. The sowing area of sunflower first increased, then dropped. There was no need to maintain previous levels of rough fodder plants, consequently, a much lower proportion has been harvested (see Table 11).

Table 11

Volume indices of production of crops and horticultural products, 1989–2001
(Index: 1990 =100.0)

Year	Cereals and pulses	Industrial crops	Rough and fermented	Vegetables	Fruits	Grapes
1989	125.8	110.0	114.1	95.8	112.1	72.2
1990	100.0	100.0	100.0	100.0	100.0	100.0
1991	122.8	119.1	100.5	100.5	93.4	82.9
1992	78.1	87.4	71.7	79.8	86.0	68.6
1993	67.7	71.7	65.2	75.2	89.8	66.4
1994	88.4	82.7	75.5	77.0	77.3	67.1
1995	88.3	99.7	79.0	86.9	54.3	59.2
1996	86.9	109.1	78.2	92.6	77.0	74.5
1997	105.0	81.5	75.1	92.9	66.5	81.8
1998	93.0	89.4	77.4	106.1	64.8	78.4
1999	81.1	109.0	76.7	115.6	67.5	62.3
2000	72.9	68.3	45.6	86.9	80.1	76.3
2001	108.4	87.3	53.8	102.6	72.9	125.3

Within the individual plant groups, the cultivation of grain crops, industrial plants and grapes has shown smaller decrease. The drop has been most significant in the cultivation of rough and green fodder plants. The dramatic situation characterising the production of rough and fermented fodder is due to a decrease in the number of animals. In most of the previous years, there was a 30-40 percent drop in the cultivation of grapes and fruits.

For the last ten years, the standard of plant cultivation has been at the mercy of various climate factors. The majority of average yields were around 50-80 percent of previous levels for most plants, although in some instances performances of over 100 percent of the previous levels have been achieved (see Table 12).

Table 12

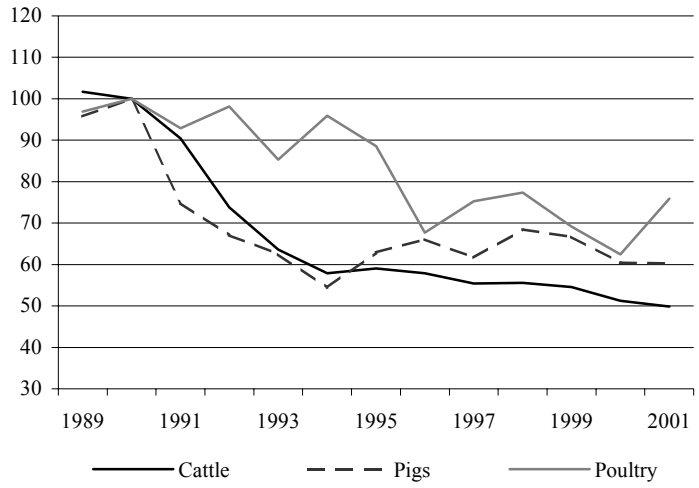
Key figures for main plants on arable land, 1986–2001

Plant	1986–1990	1991–1995	1996–2000	2001
	average			
	Harvested area (1000 hectares)			
Grain crops in total*	2 780	2 706	2 745	3 081
of which:				
wheat	1 272	1 030	1 076	1 206
maize	1 106	1 128	1 088	1 258
Sugar beet	118	118	84	66
Sunflower	367	423	432	320
Rape seed	..	39	106	110
Potato	45	54	56	36
Lucerne	301	269	214	155
	Harvested produce (1000 tons)			
Grain crops in total*	13 896	11 294	11 967	15 047
of which:				
wheat	6 214	4 394	4 079	5 196
maize	6 225	5 127	6 279	7 858
Sugar beet	4 513	3 709	3 328	2 903
Sunflower	745	743	681	632
Rape seed	..	64	173	205
Potato	791	1 108	1 132	908
Lucerne	1 574	1 275	1 085	843
	Average yield (kilogrammes/hectares)			
Wheat	4 880	4 250	3 790	4 310
Maize	5 630	4 410	5 670	6 220
Sugar beet	38 400	31 450	39 650	43 780
Sunflower	2 030	1 750	1 570	1 960
Rape seed	..	1 640	1 620	1 870
Potato	17 740	14 820	17 350	21 280
Lucerne	5 240	4 590	4 990	5 420

* Until to 2001 without millet, buckwheat, broomcorn seed, rice.

In animal husbandry, the annual fluctuation of product volumes has been less than in the cultivation of plants, and has levelled out at about two thirds of the previous level. Changes in livestock have varied considerably by breed (see Figure 2).

*Figure2. Changes in livestock**
(Index: 1990=100.0)



* December data.

The animal density projected to agricultural land has reduced by 46 percent, which is due to a considerable fall in the number of heavier animals (see Table 13).

Table 13

*Volume indices of production of live animals and animal products, 1989–2001**
(Index: 1990=100.0)

Year	Cattle	Pigs	Sheep	Poultry	Other
1989	103.5	95.1	136.1	99.8	.
1990	100.0	100.0	100.0	100.0	100.0
1991	87.3	84.4	90.0	81.1	84.4
1992	82.1	64.7	73.2	76.1	90.8
1993	69.0	58.0	50.1	72.8	92.3
1994	64.3	51.2	41.2	77.0	95.6
1995	65.0	55.2	47.5	79.3	86.1
1996	64.0	61.3	38.5	77.1	84.6
1997	63.6	51.2	34.8	82.6	75.2
1998	66.6	54.5	38.2	88.5	79.6
1999	66.7	56.7	28.8	81.7	78.2
2000	67.3	55.5	35.8	91.0	80.4
2001	68.6	51.7	37.6	93.2	67.3

* Including animal products.

The drop in the number of cattle, pigs and sheep has been balanced by poultry production, which has remained close to the previous level. The production of other breeds has decreased considerably, which can be explained by the changes in domestic con-

sumption and reduced exports. Due to its relatively lower price, poultry has increasingly replaced the consumption of the meat of larger animals.

For ten years, the number of animals within the various breeds not only decreased but sometimes widely fluctuated (see Table14).

Table 14

*Number of livestock at end-of-year, 1989–2001**
(1000 animals)

Year	Cattle	Of which: cows	Horses	Pigs	Of which: brood sow	Sheep	Adult poultry**
1989	1 598	646	.	7 660	701	.	30 146
1990	1 571	630	76	8 000	624	1 865	31 121
1991	1 420	559	75	5 993	482	1 808	28 912
1992	1 159	497	75	5 364	467	1 752	30 535
1993	999	450	71	5 001	401	1 252	26 542
1994	910	415	78	4 356	335	947	29 847
1995	928	421	71	5 032	436	977	27 549
1996	909	414	70	5 289	379	872	21 062
1997	871	403	72	4 931	345	858	23 419
1998	873	407	73***	5 479	391	909	24 082
1999	857	399	74***	5 335	379	934	21 526
2000	805	380	75	4 834	348	1 129	19 422
2001	783	368	60	4 822	343	1 136	23 618

* Since 1996, on December 1
** Since 1997, without guinea-fowl (the 1996 livestock consisted of 135 thousand animals).
*** Estimation.

Table 15

Livestock structure by species, 1989–2001

Year	Cattle	Pigs	Horses	Sheep	Poultry	Number of notional animal unit per 100 hectares of agricultural land
	distribution of notional animal unit (percent)					
1989	49.7	34.0	2.3	5.8	8.2	39.6
1990	49.0	35.6	2.4	5.2	7.8	39.6
1991	52.5	31.6	2.8	6.0	7.1	33.5
1992	49.3	32.5	3.2	6.6	8.4	30.7
1993	48.4	34.5	3.4	5.4	8.3	26.9
1994	48.3	32.9	4.1	4.5	10.2	24.6
1995	46.8	36.2	3.6	4.4	9.0	25.7
1996	46.1	38.2	3.5	3.9	8.3	25.5
1997	45.8	37.0	3.8	4.0	9.4	24.5
1998	43.9	39.2	3.8	4.1	9.0	25.7
1999	44.4	39.4	3.9	4.3	8.0	25.0
2000	43.4	37.2	4.0	5.4	10.0	25.3
2001	42.4	37.2	3.2	5.5	11.7	25.2

In terms of the distribution of notional animal unit, the proportion of poultry stock has grown. Apart from a drop in the number of cattle, the proportion of other animals has

significantly not changed. The animal density index denoted in adult notional animal unit has fallen by 36 percent (see Table 15).

The production of key products of animal origin has followed the downward trend of livestock numbers, especially in the area of fish meat, wool and hens' egg production.

Table 16

Production of key products of animal origin, 1989–2001

Year	Animals for slaughter (1000 tons)	Meat (1000 tons)	Fish (tons)	Cow's milk (million litres)	Wool (tons)	Hens' egg (million pieces)
1989	2 260.0	1 308.2	27 300	2 779.0	8 764	4 576.0
1990	2 219.7	1 286.7	24 981	2 763.0	7 337	4 679.1
1991	1 975.7	1 132.7	19 932	2 417.6	4 218	4 443.3
1992	1 726.0	995.0	20 293	2 234.1	4 526	4 163.9
1993	1 512.6	874.9	16 923	2 019.5	4 092	4 210.8
1994	1 404.9	823.5	17 944	1 878.2	3 875	3 877.0
1995	1 402.0	833.3	16 342	1 919.6	3 274	3 466.5
1996	1 499.3	903.6	15 269	1 918.1	3 243	3 273.2
1997	1 394.3	855.1	16 370	1 931.3	2 959	3 387.9
1998	1 427.5	889.0	18 022	2 045.2	3 046	3 387.7
1999	1 442.9	879.8	19 052	2 044.5	3 387	3 189.8
2000	1 566.0	974.3	19 662	2 080.6	3 369	3 171.4
2001	1 452.6	.	18 150	2 079.7	3 917	3 276.9

The average yield per animal has generally improved due to the reduced number of animals, especially the production of milk per cow and the average egg yield per hen.

Table 17

Key animal husbandry indicators, 1989–2001

Year	Milk yield per cow (litre)	Wool yield per sheep (kilogramme)	Egg yield per hen (pieces)
1989	4 883	4,0	177
1990	4 935	3,5	186
1991	4 663	2,3	188
1992	4 737	2,5	189
1993	4 613	2,3	188
1994	4 660	3,1	191
1995	4 893	3,5	191
1996	4 846	3,3	199
1997	4 985	3,4	207
1998	5 362	3,6	203
1999	5 310	3,7	202
2000	5 335	3,6	217
2001	5 516	3,4	213

Between 1991 and 2000, the mechanical traction power of agriculture increased by 1.6 percent, following a temporary decrease. 60 percent of the traction power was pro-

vided by tractors. In the second half of the period, there was a considerable increase in the number and capacity of tractors. Other machine types have stayed on approximately the same level, while the number of lorries used in agriculture considerably dropped in 10 years (see Table 18).

Table 18

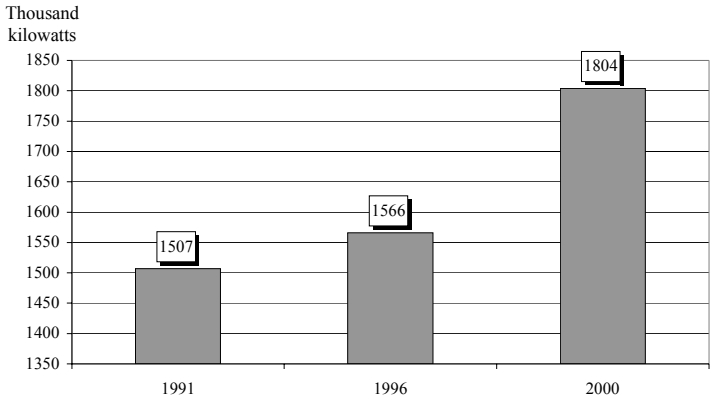
The number and capacity of prime movers, 1991, 1996, 2000

Year	Tractors	Combine harvesters	Other self propelled machines	Lorries	Other prime movers
			Thousand pieces		
1991	92	11	.	41	.
1996	92	9	11	38	63
2000	113	12	13	26	11
			Engine capacity (thousand kilowatts)		
1991	4 347	1 350	864	3 132	.
1996	4 867	1 150	723	2 692	255
2000	5 883	1 426	696	2 053	49

In 10 years, the mechanical traction power capacity per 1000 hectares of agricultural land has gradually expanded, due to an increase in mechanical capacity and a drop in the size of the cultivated area.

The average capacity of tractors remained practically unchanged in the three highlighted years (47, 53, 52 kilowatts). (See Figure 3.) The age of agricultural prime movers is high, on an average of 15 years, and they are mainly of Eastern European origin.

Figure 3. Traction power capacity, 1991, 1996, 2000



The number of agricultural buildings decreased further in the last ten years, due to a drop in yields and the number of animals. The capacity of cow-sheds and pig accommodation has decreased by 11 or rather 9 percent since 1996, while shelter for sheep and horses has grown. The usage of accommodation capacity has only slightly improved for most breeds, as the number of livestock within individual breeds has changed along a

similar pattern. The capacity of grain silos and other storage places decreased during the last few years. The area of land occupied by greenhouses and plastic covered greenhouses has significantly increased, which can be considered as one of the most significant achievements of the last decade. The utilisation of key fuels considerably dropped in the last decade.

The situation is very similar to the use of fertilisers. The effective agent content of artificial fertilisers used per unit of land has dropped to a fraction of previous levels, although there has been some improvement since 1998 (see Table 19).

Table 19

Use of fertilisers, 1989–2001

Year	Components in the active ingredients of fertilisers used				Kilogrammes of fertiliser per hectares*
	nitrogenous	phosphatic	potassic	total	
	1000 tons				
1989	582	265	374	1 221	231
1990	358	127	186	671	127
1991	140	23	33	196	37
1992	148	21	20	189	38
1993	161	25	21	207	41
1994	222	27	31	280	56
1995	191	29	27	247	49
1996	203	34	33	270	54
1997	206	42	37	285	57
1998	248	39	41	328	65
1999	262	39	45	346	69
2000	258	45	52	355	74
2001	275	58	62	395	82

* For arable lands, garden, vineyard and orchard.

Table 20

Foreign trade of foods, 1989–2001
(at current prices, HUF billion)

Year	Imports	Exports	Export surplus	Imports as percent of exports
1989	38	124	86	30.6
1990	41	139	98	29.5
1991	47	176	129	26.7
1992	48	184	136	26.1
1993	65	156	91	41.7
1994	97	209	112	46.4
1995	102	330	228	30.9
1996	124	365	241	34.0
1997	167	463	296	36.1
1998	200	520	320	38.5
1999	201	474	273	42.4
2000	248	551	303	45.0
2001	281	650	369	43.2

The decreasing trend of agricultural production value was primarily due to a drop in expenditures on new means of production, labour and other materials used for production. The production volume of Hungarian agriculture, which had dropped by its third, generally met the domestic consumption requirements. However, there were other two factors to consider: on the one hand, food exports continually decreased during the decade, and on the other hand there was more competition from several countries, which tried to reduce their superfluous food supplies by selling them on the Hungarian market or abroad, thus damaging Hungarian export potential. This is not entirely clear from the HUF value figures, but it may be more clearly signalled by the changes in ratios (see Table 20).

The privatisation of agricultural co-operatives and farms in the 1990s radically changed the production structure of agriculture, which considerably affected the productivity as well. During the period under review, Hungarian agricultural statisticians conducted a number of censuses and sample surveys, with findings evaluated in several reports and publications every year. However, the need has now emerged for a summary analysis of the trends of the last decade. This study is meant to fill in this gap, by presenting the trends of the period. It is expected to be beneficial for both those interested in agriculture and decision-makers.

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CONCLUSIONS OF AGRICULTURAL HISTORY, REQUIREMENTS OF AGRARIAN POLICY*

PÁL ROMÁNY[1]

The scientific study of agrarian policy is indispensable. Not only to identify solutions to secure mankind's nutritional requirements, but also to understand intrinsic social links between farm businesses and agricultural regions. A study of the latter and the development of answers to these vital issues are performed most effectively at national level. In formulating agrarian policy, a synthesis of the lessons of agricultural history is as crucial as the integration of research findings in farm sociology and agricultural economy. The application of mathematical methods is also an additional requirement. All these tasks require professionally trained staff and a relatively stable research environment. This is all the more needed in Hungary because, with the failure of 'imported agrarian policy' and the liquidation of what was called 'the Hungarian agrarian model' at the end of the last century, the sector has lost its sense of direction. In order to stem the tide of rural exodus, prevent large masses from abandoning farming and return to production levels known in the past, new programs are needed and the agrarian society must be stabilised.

KEYWORDS: Agricultural history; Agrarian policy; Agricultural program.

For years it has been a common notion, shared even by scientists, that agriculture has lost its traditional relevance. Statistical data demonstrate the way in which its contribution to the GDP has shrunk to a few percentage as well as the way in which the cost of food takes an ever-decreasing share in household budgets. In summer 2001, the question whether the development of an agrarian policy is justified and, if so, in what form was a key issue at an international conference in Rome.[2] However, the age-old and fundamental argument whether or not and especially how the Earth can maintain mankind may perhaps be put to rest today. The present paper address challenges attempts to underestimate agrarian policy, agricultural economics or agriculture as a whole, and all simplified conclusions deduced from the natural shift in proportions.

* Based on a lecture delivered at the Hungarian Academy of Sciences on November 19, 2001, organised by Section IV. of the Academy and the Szent István University as part of a conference, 'The Day of Hungarian Science'. The paper's topic forms part of OTKA's research project No. 029844. The Hungarian version of this study was pblished in the *Statisztikai Szemle* Vol. 80. No. 7. p. 663–673.

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[2] CAESAR Rómában, 2001-ben. (2001) *Számvetés*. Vol. 2., No. 2., p. 1–12. old., and *Romány P.* (1996): Az elveszejtett agrárápolitika. *Magyar Nemzet*, March 26., and *Fertő I. – Éder T.* (eds.) (1998): Az agrárpolitika gadaságtana. Századvég Kiadó. Budapest.

The fact that in technologically advanced societies the number of active farm workers has decreased, as a result of the social distribution of labour, precisely confirms the opposite of what is often proclaimed and enacted in undue haste. When the reliable food supply for an increasing number of the population depends on the efficiency and resolution of a decreasing number of people, the role of those 'few' (whether called farm-hand, landwirth, farmer or anything else), will obviously grow in significance. The fact that in the average family budget the cost of food has dropped to 8 to 10 percent does not in any way diminish the crucial importance of the production, distribution and daily availability of provision. In fact, the consumer expects an ever-improving level of services from all participants of the sector.

It is evident that, as a result of expanding incomes, spending on non-food items continues to claim a larger share in the consumer basket, including car maintenance, services etc. Should this lead to less need for food and an agrarian policy relegated to the sideline? Does it not suggest instead that when agriculture provides reliable supply with provisions for 80 to 90 percent of the population (due to the declining number of self-sufficient farms) and could even guarantee its survival in times of international conflicts, the agrarian sector deserves special attention; and not only for the sake of agriculture itself, but also for the stability of the entire economy and the needs of society? Without domestic production, inadequate and dwindling supplies produced by 'primary producers', what comes next? Should we look for basic foodstuff on foreign markets? And if that fails, should we return to rationing? As was declared at the United Nations's 1973 General Assembly that from a moral point of view, there is no difference whether a man is killed in war or whether he is condemned to starve to death by the indifference of others. At the 1974 Meeting of the Club of Rome, *Willy Brandt* stated that they must find the way out of poverty, because if they fail to learn this lesson in time, thousands of thugs will terrorise those considered 'affluent' today. Recent events lend special relevance to these and similar warnings.

For a long time, Hungary has counted on its relatively favourable agricultural resources, keeping its interests in mind, it ensured its products were in demand in foreign markets. (Particularly when its other products were not really marketable.) With the exception of a few short periods, Hungary managed to maintain this ability over the past century. The quantity of food sold in domestic and foreign markets grew steadily (agricultural exports in particular), while the farm population continued to decrease until it became less than one tenth of what it was a hundred years ago.[3] By the logic of mathematics, agriculture today should produce at least ten times more than a century ago. In turn, it should enjoy a correspondingly higher social prestige and the attention of science devoted to its improvement. The sector should be taken seriously not because of the percentage of its producers within the general population, their absolute numbers, or by virtue of some 'primeval force' they may represent, but simply due to the important role they perform. One should avoid confusing cause and effect, GDP and photosynthesis, exports and balance sheet, as is so often the case.

[3] *Balás Á. – Hensch Á.* (1896): *Magyarország földművelése.* Földmívelés-, Ipar- és Kereskedelemügyi M. Kir. Minisztérium kiadása „.... 75 percent or ¾ of the country's population is engaged in primary agricultural production or makes a living in that sector, i.e., belongs to the class of primary growers, while the industrial sector employs 17 percent of the population ..." p. 99. In 1996 302 thousand individuals (8.2%) were employed in agriculture, forest management and fisheries, and 972 thousand (26.6%) in industry. (*Magyar statisztikai zsebkönyv, 1996*. Központi Statisztikai Hivatal, Budapest. 1997. p. 42.)

I insist, not for the first time, that we must restore the rights of agrarian policy as a scientific pursuit, the analysis of agrarian policy as the twin disciplines of agricultural economy and farm sociology. These subjects (including agricultural history, rural and co-operative policies) were taught and researched in Hungary by such professors and academicians as *István Bernát*, *Jenő Czettler*, or *Imre Nagy* and *Ferenc Erdei* as well as *Sándor Domanovszky*, *Károly Ihrig*, *Mihály Kerék* or *István Szabó*. We should not forget *Vilmos Lázár* and *Rudolf Andorka*, former presidents of the Agricultural History Committee of the Hungarian Academy of Sciences.

After due revaluation, it is high time to restore a sense of continuity. Utopias must be set aside, theories need to be put in balance, and enduring values must be preserved and utilize. In the words of *Domokos Kosáry*, academician and founding editor of *Agrártörténeti Szemle*: 'Accepting our past in humility as a mature nation, without anguish and self-mutilation is, instead of weakness, the sign and the very source of strength'.[4]

LESSONS, REQUIREMENTS AND THE XXTH CENTURY

We have had plenty of lessons to learn from the most recent agricultural development. We must choose among them. We probably do not select those sufficiently proven by scientific methods. In a survey of the following five propositions, we may have to resort to some hypotheses as well.

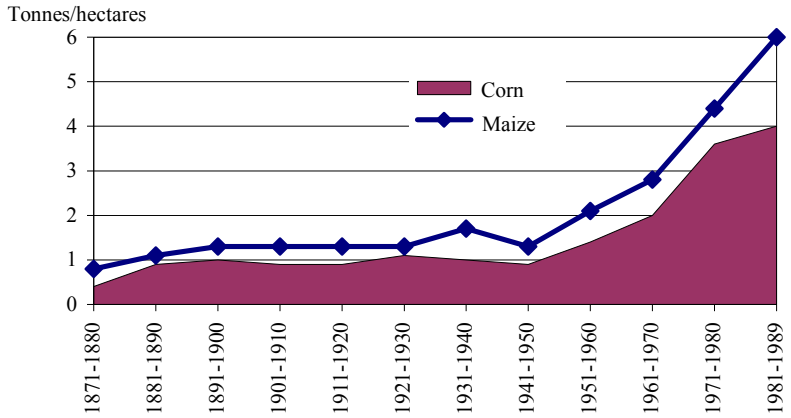
1. Our first already proven proposition is that by the last third of the past century, Hungarian agricultural output reached the level of top European producers. Besides a number of other factors, which shall be discussed in the following, we maintain that these results were due to cooperation between science and practical implementation as well as the professionalism and flexibility of the participants involved. The age was characterised by innovation in land cultivation and forestry, in food industry and water management. All other contributing factors cited with justification (i.e., the hard work of farmers, political balancing, and many other elements of what was called 'the Hungarian agricultural model') can be traced back to expertise acquired through hard work, its application and a perhaps unique offensive by agricultural engineering that may never be repeated. This was a huge achievement (demanding to be continued), even allowing that it was not unprecedented. During the ministership of *Ignác Darányi*, who was the minister of agriculture for twelve years at the turn of the XXth century, both the development of a network of research labs and professional training achieved significant results. Rural development was served already with the establishment of Ministry Agencies in the Mountain Region (Munkács),[5] and in Székelyföld[6] and, along with other laudable measures, the first steps were taken for the protection of natural resources in the regions of Lake Balaton and the High-Tátra Mountains.

These favourable initiatives could not be continued in the XXth century. Until the 1945 land reform in the middle of the century, the country's landholding system remained unchanged. Between the two world wars, school system was expanded while lag-

[4] Quotation from *Ágnes Tóth* (1988): Kosáry Domokos: A történelem veszedelmei. *Forrás*, Vol. 20., No. 1. p. 94.
[5] Munkachevo now in Ukraine.
[6] Now in Romania.

ging agricultural production improved little without significant contributions of science and expertise. For a long time, yields remained at XIXth century levels, as illustrated in the following Figure.[7]

Average yields of Hungary's two main plant: corn and maize



Source: Based on data provided by *Béla Győrffy*.

For the first time in the history of the nation, average corn yield exceeded 2 thousand kilogrammes per hectares in 1965, and reached twice that is 4 thousand kilogrammes per hectares in 1977 (see Table 1).

Table 1

Average yields of corn, over a 50-year period

Year	Average yield (kilogramme per hectares)	Total production (thousand tonnes)	Sown area (thousand hectares)
1939	1630	2688.6	1650.7
1948	1150	1583.1	1379.4
1965	2170	2442.6	1125.5
1971	3070	3921.9	1273.2
1977	4050	5319.0	1311.2
1984	5410	7392.0	1360.6
1993	3050	3020.7	986.0

Source: *Magyarország népessége és gazdasága.* Múlt és jelen. Központi Statisztikai Hivatal, Budapest. 1996. p. 104–105.

There can be observed three to fourfold increases from the same acreage (see Table 2.). It is evident without further elaboration that this level of improvement constituted a sort of green revolution itself; it required new crop varieties and advanced technical and financial support structures. The ten-tonne leaps in maize production point to that direc-

[7] Farmworkers and farm-servants did not send their children to school. *Gyula Illyés* mentioned in his book, *Puszták népe*: I do not know one field-hand who would send his son to secondary school […] Anyone caught reading a book before the war (World War I. – *P. R.*) was labelled as uppity, after the war simply as communist. (Századvég Kiadó, Budapest, 1993. p. 207.)

tion as well. These achievements also defined the quality of plant cultivation and that of agriculture as a whole, as well as the decline, which followed in the 1990s.

Table 2

Average yields of maize over a 50-year period

Year	Average yield (kilogramme per hectares)	Total production (thousand tonnes)	Sown area (thousand hectares)
1939	1840	2185.3	1186.1
1966	3160	3906.7	1237.1
1973	4090	5963.2	1472.9
1975	5020	7171.7	1422.8
1982	6860	7959.2	1157.8
1992	3650	4404.9	1159.0

Source: *Magyarország népessége és gazdasága.* Múlt és jelen. Központi Statisztikai Hivatal, Budapest. 1996. p. 104–105.

However, for the sake of our future, we should pay close attention to past achievements of the Hungarian Academy of Science, the performance of the research–training network and its lessons. The first endogenous maize hybrid of Europe was developed in Martonvásár. The new technology, variety and production methods gained nationwide acceptance in Hungary in just one or two years. Hungarian agriculture applied all new achievements of biochemistry, genetics and reproduction biology practically overnight (in secret, when it was necessary). Zygota transplantation was adopted from Canada, hybrid technology from Iowa, aerial plant protection from the Soviet Union, and the insecticide Simazin was acquired from Switzerland. Few people are aware that for decades Hungarian cartography and remote sensing experts have served the needs of agriculture with their space images of the highest quality. Tens of thousands studied in the country's agriculture universities, in vocational schools or received local training. Many lessons of these advances have not yet been drawn and await further study.

But one thing is already evident: in the last third of the past century the improvement of Hungarian agriculture production followed its own direction, while it remained open to any new information coming from Europe or the world. The method employed may have been defined as some kind of production system or what was called 'Tessedik Socialist Brigade' (as, for instance, the papillonaceae plant seed program started by the academicians *Andor Jánossy* and *G. Adolf Manninger* after 1956), the emphasis was always on the primacy of expertise and concentration to the task at hand with a minimum of protocol. At the same time, these programs brought development and nationwide recognition to small agricultural communities. The unique achievements of agriculture are also illustrated by the fact that in fifty years the number of towns more than quadrupled; villages became urbanised.

The first requirement from practitioners of agrarian policy and agricultural sciences in general (based on lessons of agricultural history as well) is that they should promote scientific achievements and represent their professional position at every forum. Putting theory into practice and selecting among alternatives continues to be the responsibility of decision-makers. This responsibility extends to providing opportunities for the dissemi-

nation of expert opinions. The current outdated and backward state of agrarian policy is not caused by the lack of preparation on the part of relevant disciplines (i.e., farm management, property law or civil engineering), but rather by the ignorance of decision-makers, the tangled and often conflicting interests of stakeholders in position.

It is my conviction that scientists (in this case representatives of agricultural history, agrarian policy and agricultural economics) are bound to make their voices heard today as well.[8] For they had not only swore under oath, but are well trained to follow their vocation and mission. They must take up the challenge posed by the growing deficit of knowledge among producers and managers, including distributors of farm products and people working in related services. A comprehensive teaching–learning program needs to be developed. Not only because of the country's upcoming accession to the EU, but for our own sake and at more than elementary level.

2. The second lesson is the need for stability. This is based on the fact that the entire XXth century Hungarian agriculture had all but two or maximum three peaceful decades of development. Years of war and political turmoil followed each other with monotonous regularity. A long succession of latifundia, entailed property, the promised land reform, war economy, mandatory contributions, restructuring and its reversals, and the transfer of property followed each other. No wonder, investment capital avoided agriculture and the middle-class failed to take root in the countryside. Moreover, the promise of social mobility was realised only during short periods.[9]

A careful study of data from the century under review does not support the idea that the wide fluctuations in agricultural output were due to climatic conditions. Comparative annual data collected from 1950 indicate that large year-to-year fluctuations in output (and not only in average yields, but also in total agricultural product) were caused by constant disruptions in management and distribution, by a looming threat of political and institutional quarters. In other words, in addition to purely economic and climatic factors, the crisis was brought about primarily by the intolerant enforcement of extraneous considerations with no regard to the structure of economy. Looking at a few numbers: in half a century, Hungarian agriculture experienced four setbacks compared to total production levels it had already achieved in the past. First in 1952 and 1953, second in 1956, third in 1960 and 1961 and then in the 1990s. Total output dropped significantly by 50 points from a high of 220 index of 1989 (taking 1960 output as 100 percent). The lowest point came in 1993 (142), but we have not seen a true recovery to this day (see the columnar composition on the next page).

Our negative world record is matched by three countries outside the former Soviet member countries, namely Bulgaria, Slovakia and Cuba (in the latter country, 1999 agricultural output in volume dropped to 60 percent as compared to the 1989–1991 base).[10]

[8] The Agricultural Sciences Section of the Hungarian Academy of Sciences expressed its dissenting opinion prior to the collectivisation drive of 1958, and *Ferenc Erdei* laid out his concerns in a letter to political leaders. These have been ignored by decision-makers, just as was the case in 1992 when the Section called attention to anomalies in the sector, forwarded to politicians by the Presidency of the Academy.

[9] *Rudolf Andorka* (1989) considered as the greatest achievement that upward mobility for agricultural workers' children improved significantly (*Társadalomtudományi Közlemények*. Vol. 18. No. 2., p. 192).

[10] If we take 1989–1991 as a base of the gross agricultural production, then in 1999 the total world average comes to 117.3. The adequate figures are in Hungary 72.3, in Bulgaria 63.8, in Slovakia 72.1 and in Cuba 62.0. (*FAO Quarterly Bulletin of Statistics*; 1999. No. 3–4.)

Total agricultural output against 1950 figures

Year	Percentage	Year	Percentage
1950	100	1969	155
1951	117	1971	157
1952	86	1973	171
1953	105	1975	183
1954	105	1977	198
1955	118	1978	200
1956	102	1980	206
1957	117	1982	226
1958	123	1989	220
1959	128	1991	196
1960	120	1993	142
1961	118	1994	146
1962	122	1995	147
1967	144	2000	148

Source: *Magyarország népessége és gazdasága.* Múlt és jelen. Központi Statisztikai Hivatal, Budapest. 1996. p. 103.

Our lag cannot be excused by a 250 percent performance in crop production (compared to a 1990 base, but calculated at current prices), which without the price adjustment barely reaches 70 to 75 percent. And we have not even mentioned the decline in improvements and capital investments which should serve future production.

One should not forget that for agents in agriculture faith in stability, ownership and distribution structures and the future of farming enjoy priority above all other considerations. The rural community and agriculture in general must be an island of peace and stability. The process of embourgeoisement and property rights are also closely linked. In the darkest years one encounters a series of disruptions and the resulting erosion, which is evident in the repeated changes of the agrarian elite. One cannot eliminate with impunity or, to put it mildly, leave on the sidelines eminent experts who, among others, maintained accurate records of the soil structure of a particular field. The effects of these mistakes can be measured in billions, and repeated several times over many generations.

Building on the future viability of agricultural regions is a crucial issue of rural development as well,[11] allowing and accepting that various regions of the country and their agricultural potential show great variation. Competition is a function of diversity and varied talents. There have never been two enterprises that would be identical in their operations or performance. The real question lies in the rate of gross value added, wages and income levels based on one cultivated hectare and one employee.

In short (in addition to familiarity with legal, political, administrative and other requirements) for recovery one needs to have a thorough knowledge of farming and reaction mechanisms as well as other professional tools to understand the problems of agrobusiness. A bit of wisdom and attendant patience are also recommended. Moreover, there is a need for personal continuity in key agricultural positions, allowing the development of skills listed previously and that of public trust.

[11] *R. Kapusinsky*, the globe-trotter publicist wrote: As long as the countryside is backward, the entire country will remain backward ... As long as the young man settled in the big city sees his village as an exotic scenery, the nation he belongs to has not yet joined the modern world. *P. R.* (2001): Az agrárpolitika tizenkét pontja. *Gazdálkodás*, Vol. 65., No. 2., p. 15–21.

3. The third lesson we should not forget is the fact that agriculture and forest management are seasonal in nature and require shift-work at the height of season. Labour requirement is not shaped by social conditions. Wherever possible, the first problem is solved by the introduction of everbearing crops, while in many places they still try to solve the lack of sufficient farm-hands by employing seasonal employees, migrant workers, youth (temporary) camps, military recruits or family members, etc. Cash flow is similarly seasonal. The creation of financial bridge and, particularly, the establishment of business operations providing regular and stable income may represent true solutions. Large farming co-operatives in Hungary have developed subsidiary production or service operations (e.g., quarrying, egg powder production) and they have integrated small-scale production (by smallholders, small- and medium-size operators). They employed a unique combination of creative solutions. They operated 'agro-businesses' and what are called agro-industrial complexes. State administration encouraged these efforts. Agricultural experts from China studied the methods of diversification and adapted those achievements to their conditions.

The method of relying on several sources lost none of its relevance in the age of recently re-discovered 'multi-functional' agriculture recommended by the EU. In Hungary, balancing the wages of agricultural and non-agricultural workers' at the given period and the socio-political emancipation of the former ones must be regarded as the greatest achievement of the approach. It also reduced the number of long-distance commuters and successfully integrated traditional and modern production and management solutions. It created local employment opportunities, benefiting both agricultural production and the community at large. Today, the 20 to 30 percent or even larger loss in agricultural wages carries the risk of a new wave of migration.

Current agrarian policy must take account of previously discussed issues, and not only from the point of welfare, but also for reasons of business and regional policy. At the same time, the complementary aspects of farming and forest management and other successful forms of cooperation should not be neglected either.

4. The fourth lesson relates to the lifestyle of Hungarian agricultural communities. Agricultural history (but agricultural sociology and agrarian policy even more so) records epochal changes and their consequences that characterise the period under discussion. Former positions in the social hierarchy underwent radical change or disappeared completely. The farm community gradually lost its sharecropper gang-leaders and pickers, and farms started to do without the granary, the yoke oxen and the oven in the living room. At harvest time, the lead mower was replaced by the combine operator, as was the teamster by the tractor driver, and further changes were still to come. While in 1949 seventy-three percent of all homes in the countryside had one room, in 1994 only 14 percent. The traditional self-sufficient farming family that once purchased barely more than salt and kerosene for lighting from the local general store is long gone. With all players having been replaced, why use the old scenario? Once vibrant traditions have been relegated to the stage of folklore festivals.

One can argue whether such haste was justified; whether the drastic transition caused more harm than good, or wonder if there is need for gas heating where traditional fuel sources are still abundant. But competition brought on by modernisation, the desire for a breakthrough in villages and small towns had no patience for more delay. As the farmer

was despised for things he could have been proud of, he was eager for change and impatient to make up decades of lost opportunities in a few years.

However, instead of just the countryside, the entire country has fallen behind. For instance, one could look at the level of mechanisation: in 1938 375 inhabitants had one car as compared to 24 in Denmark.[12] While today the same index stands at 5 persons per car, rural communities lose population at an alarming rate. In small villages (from Cserhátszentiván to Bakonyszentiván) the number of young inhabitants under 18 has dropped to 10 to 15 percent. Demographic analysis can and must be performed urgently, but that is evidently not enough any longer, and the same is true for welfare programs. A balance between agricultural population and farm structure must be created before one may even start discussing embourgeoisement.

There is a need for agrarian policy built on rural research, long-term and realistic regional policy and thorough restructuring. We must also be prepared for the task of large-scale reforestation projects.[13] All this requires time, scientific foundations and national commitment from intellectual, economic and legislative quarters, even if local communities receive more and effective support from government agencies, the church and society in general. If the farm population inevitably continues to decline, Hungary may forever lose the chance to develop intensive farming methods along the Dutch model.

One of the most important and attractive challenges for agrarian policy doctrine may be defined as follows: how to coordinate various resources to generate the best results for agricultural production, the farm community and the national economy as a whole, making sure that the rural population comes out ahead. Moreover, the following pitfall must also be avoided: 'Private farmers attached to state budget through an umbilical cord may easily become an economic and political burden as well loss-making co-operatives of the past years', as the academician *Csaba Csáki* stated recently.

5. And finally, a few words about foreign trends and the rest of the world. Many signs point to the fact that Hungarian agriculture turned into itself, shows little interest for the latest international trends, innovative policies, agricultural and scientific advances in Europe and the neighbouring countries.[14] Only a few years ago, the Food and Agricultural Organisation (FAO) of the UN highly appreciated the contribution of Hungary to the solution of third-world agricultural problems and erected the FAO-office for Central and Eastern Europe in Budapest. What advantage have we taken of this position? The World Bank would hire Hungarian agricultural experts to analyse farm conditions in the former Soviet Republics, and other opportunities could be mentioned, opportunities that are missed for the most part.

Referring back to our opening thesis, in our opinion the argument that agriculture in general or in Europe has reached marginal status (allegedly supported by statistics, an argument deserving little attention) is based on a fundamentally flawed logic.

Undoubtedly, trends of the past 100 to 150 years point to a gradual shift to other sectors of the economy. However, the process of this restructuring is not repeated the same

[12] *Magyar Statisztikai Zsebkönyv*, 1939. Magyar Kir. Statisztikai Hivatal, Budapest, p. 294.

[13] *Solymos R.* (2001): Gondolatok az erdőprogrammról – erdőstratégiáról. *Gazdálkodás*, Vol. 65., No. 4., p. 8–15., *Veress L.* (2001): Falvaink balsorsa. *Valóság*, Vol. 64. No. 9., p. 54.

[14] *Hoffmann T.* (1998): *Európai parasztok*. Osiris Kiadó, Budapest. The working culture of peasantry everywhere becomes history, while it is not replaced by modern farm operations. *Nagy O.* (1989): *A törvény szorításában.* Gondolat. Budapest. The village as viable living space for the young has ceased to exists. (Report from Romania. *P. R.*); *Hayes, J.* (ed.) (1975): *That we may eat U. S*. Department of Agriculture. U. S. Government Printing Office, Washington.

way from one country to another. There might be similarities and some overlaps, but there are no one-size-fits-all solutions. (If there were such uniformity, it would not be called agriculture.) National agrarian policy had a chance to evolve where and when leaders recognised the historical moment and realised what free movement the limitations and opportunities of the age afforded. In Hungary, *Ignác Darányi* and *Ferenc Erdei* were among those few who attained such insight. They managed to turn their knowledge of local conditions and international experience to the benefit of the nation, at least in theory.

Hungary will fall farther behind unless the country rediscovers what had already been known and practised by abbots of monasteries, members of medieval guilds and bailiffs: one must understand the needs of others and cooperate in as many ways as possible. In other parts of the economy, consortiums and other old-new forms are gaining ground. In agriculture, however, the term 'co-operative' has lost its credibility, and the term 'agriculture association' used even by Darányi has also become exiled. In a welcome but insufficient development, the Agricultural Committee of the Hungarian Academy of Sciences set up again a co-operative sub-committee. But much more would be needed. As in 1946, the responsible ministry should set up a co-operative unit under the supervision of a re-established Agrarian Policy Department. Most important of all, the principles of mutual support, the lessons of centuries should be taught, respected and adopted. For, instead of 'garage slaughter-houses', the road to the Danish model and international standards leads through co-operatives and well-run export operations. As early as the XIXth century, the Országos Magyar Gazdasági Egyesület (Hungarian National Econonic Association) was among the first to promote the idea of farm associations.[15]

While this goes beyond the scope of the present overview, one more issue must be discussed here. The problem of caring for an ageing farm population in scattered farms goes back to 25 to 30 years (taken up by agricultural co-operatives at the time), but today the problem has spread to villages. In the Western European countries the stability of farming communities has been established over several generations. With their contributions made before, farmers earned and secured their right to decent care in old age. And if they let their lands go for the 'improvement of property structure', they were granted special retirement benefits, having been practiced in France since 1961.[16] In Hungary the old form of life has disappeared, while protection offered by the new one has not yet been realised.

The country is far behind in providing answers to current issues facing the farming community. This is one of the key responsibilities of national agrarian policy. And we should note that the justification of national scope in issues of agrarian policy is advocated and practised in a number of EU member countries.[17]

Instead of a discussion of various agrarian policies, let us simply look at a long-forgotten definition: 'Being a synthetic discipline […], the theoretical definition of agrarian policy is a difficult task; by its very nature, our attempts at definition keep

[15] *Az Országos Magyar Gazdasági Egyesület Alapszabályai*. (1892) Hungária Könyvnyomda. Budapest,

[16] *Romány P.* (1965): Franciaország. In.: *Romány P.*: *Mezőgazdasági üzemekben Skandináviától Itáliáig*. Mezőgazdasági Kiadó, Budapest. p. 172.

[17] *R. Künast,* German Federal minister said on February 8, 2001 in the Bundestag that the majority of Germans demand a new agrarian policy. She tried to convince most federal states to take an active role in its development. Signals from Brussels are rather encouraging. The Germans recommend to Brussels to expand their freedom of movement to reform farm supports at the national level. (BMELF Sajtószolgálat, No. 6–7, February 12, 2001)

shifting between scientific and practical considerations, or a combination of the two ...', is how *Jenő Czettler*, professor of agrarian policy and economic history at József Nádor University of Technology and Economics defined it. 'From a scientific point', professor Czettler continues, 'agrarian policy is anchored in the regular study of historic, natural, economic, public policy, social and partly cultural factors whose combined effect and management shape agricultural production to provide most efficiently a livelihood for smaller and wider social groups and their historically developed agricultural needs […] within the bounds set by nature.'[18]

Key objectives have not changed in decades. To realise them, our work must be taken up each year anew.[19]

A defined set of equations determines whether agriculture and the farm community is destined for success or failure; whether a given agricultural region is abandoned and becomes vulnerable or survives as a viable area. In designing an optimal action plan, the application of the tools of mathematical methods will be indispensable and, even with the best achievements of cybernetics, human creativity and trained people will remain key to any solution.

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To sum up one can state:

1. Relative to its size, Hungary has the largest percentage of arable land (over 60 percent of its territory) in Europe, an asset that may be further exploited in the future;

2. Hungary's agricultural structure, topography and traditions, as well as its wealth in human resources offer sufficient room for manoeuvring its agriculture into a favourable position;

3. Future social, economic and scientific development must be promoted by agricultural economics through soil management, i.e., boosting profits in agricultural production, and agrarian policy by identifying solutions for social issues resting on indigenous foundations.

At times agriculture is considered as a gift of nature. However, modern agriculture requires professionalism and a lot of careful work, and a quality of life that stands up to the competition posed by other sectors of the economy. National agrarian policy and strategy as well as a system of regulations must rest on such solid foundation. The better the conditions created for realising these objectives, the better chance our agricultural production has to meet both domestic and international requirements. Simultaneously, our other main objective, sustainable development will become a feasible strategy as well.

In creating conditions for agricultural development, agricultural experts may not place their full trust in the presumed omnipotence of the markets or the illusory 'supremacy' of a planned economy. Theories and the best and proven experimental methods of agrarian policy must be dusted off and applied in practice, accepting the fact that agrarian policy has always been and will remain a defining force in all our future efforts.

[18] *Czettler J.* (1945): *Agrárpolitika*. Vol. 1., p. 66, p. 69.

[19] It would be naive to write off agriculture and food production as a negligible segment of the economy. A recent, albeit arguable, position from London. *Colin Tudge* (2001): Az eke. In*: Az elmúlt 2000 év legfontosabb találmányai*. Vince Kiadó, Budapest, p. 28.

HOLDING STRUCTURE IN HUNGARIAN AGRICULTURE*

IVÁN OROS[1]

The productivity of the agrarian sector is a result of the quantity and quality of available production instruments (including arable land, livestock, machinery and labour force etc.), and the coordinated use of these factors. In countries at higher level of economic development, a volume growth in food production has been achieved parallel with the reduction of both the labour force employed in agriculture and the area of land used, bolstered by increasing external support. Hungary's aspiration to access the European Union has created a new situation when the country has to make a serious choice.

Throughout the twentieth century, Hungary's agricultural sector had to face various problems both in the economic and the social scene. Rural Hungary suffered the most critical damage due to the fact that within 50 years, three fundamental changes occurred in the structure of the cultivation and ownership of land.

Even after 1990, we are still waiting for a truly efficient solution. There has been a 30–40 percent drop from the earlier level of production, and this depression has not been appropriately addressed by recent agricultural policies. A concentration of ownership, similar in tendencies to what is in progress in the EU countries, has started in Hungary, resulting in the reduction of the number of small individual farms and adding up to more and more farms of optimum size. Nearly half of Hungary's arable land area is cultivated by various associated business enterprises.

KEYWORDS: Agricultural holding structure; Agrarian policy.

The agrarian sector of Hungary has undergone three dramatic restructuring processes since 1945, each of which had a major social and economic impact on a wide stratum of the population. The agrarian sector was 'overpopulated' as early as in the XIXth century. The hunger of the rural population for land was a fact up until the mid-twentieth century. These problems were not the least mitigated either when the communist agrarian perspectives were forced on the sector, or after the transition whereby Hungary is still lacking a scientifically grounded long-term agrarian policy to set the direction of progress.

In the following, we wish to outline the historical background of the present situation, and to give some indication of a feasible option for development. The work that is cur-

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rently under way in preparation for the accession to the EU has clearly set the most expedient path to take.

HISTORICAL BACKGROUND AND OBJECTIVES FOR THE FUTURE

Both the obsolete structure of the agrarian sector and the critical social situation of the rural population survived the so-called 'land reforms' and re-allotments of land of the XIXth century, as well as those following World War I, fundamentally unchanged. Land sales stagnated, apart from the few allotments of house building plots which were smaller than the smallest category of farm land, the miniature holding. The number and proportion of large holdings hardly changed until 1945, and the importance of this category remained the same even after the Treaty of Trianon which reduced the territory of Hungary dramatically (see Table 1).

Table 1

The number and area of agricultural holdings according to size categories, in percentages, 1895 and 1935

Denomination		Miniature 0 – 5	Small 5 – 100	Medium 100 – 1000	Large 1000 –	Total
		cadastral acres				
Number of holdings	1895	53.6	45.4	0.8	0.2	100.0
	1935	72.4	26.8	0.7	0.1	100.0
Total area	1895	5.8	45.5	15.4	32.3	100.0
	1935	10.1	41.8	18.2	29.9	100.0
Of which, arable land	1895	6.8	57.6	16.1	19.5	100.0
	1935	12.3	53.1	14.5	20.1	100.0

As there was hardly any capital available on loan, the sales turnover of land gradually decreased after the 1920s, and the unit price of smaller holdings was higher than that of those which were large enough to make production feasible, while there was a large portion of land properties with restricted marketability, due to entailment of other reasons. Then in the 1930s, the debt owed by rural farmers grew in value, and therefore they could not take up any more loans for land purchases. As a consequence, by the 1940s various scenarios had been developed to resolve the situation of the ailing agrarian sector by way of land reforms. The provisional government that was set up in Debrecen and took office at the end of 1944, immediately set out to draft a land reform bill which was issued as a decree on March 15, 1945. This same bill was enacted by the Parliament in September the same year.

Owing to the slow development of the industry and other sectors, the proportion in the population of those involved in agricultural production was close to 66 percent at the beginning of the XXth century, and exceeded 50 percent even after World War II. These rates are indicative of the high demand for land at the time. In the land reform, 640 thousand people were assigned holdings with an average size of 2.9 hectares (5.1 cadastral acres). These properties were given partly to those with no earlier land holdings and

partly to those who held small ones, as an addition. Those who had agricultural qualifications, could claim larger holdings.

With this land reform, the overwhelming dominance of large holdings was eliminated, and the farm structure was now characterised mainly by micro and small holdings, which meant an improvement in the social situation of the farming population but impeded the creation of an efficient production structure. In 1949, 81 percent of all holdings was smaller than 10 cadastral acres (i.e. 5.8 hectares). There were hardly any medium sized holdings left. Another hardship for the new smallholder stratum was that they did not yet have the necessary tools of production. At the same time, as a consequence of war damage, the whole sector showed a dismal picture in 1945. It should be noted that more than half of all war-related damage was suffered by the agricultural sector, and there were no livestock, machines or seeds in sufficient quantity. In total, war damage to agriculture amounted to twice of the national income from agriculture in 1938. Despite all these drawbacks, smallholders rectified the worst of damage remarkably quickly, and famine could eventually be avoided thanks to the food produced by the devoted work of these small farmers. The development of agriculture, however, was set back by the insufficiency of capital and a voluntaristic economic policy.

The agrarian policy of the 1950s was based on Stalinist principles, which curtailed the perspectives of the sector severely, and hampered production as well. The system of requisitions, following the Soviet example, caused immense damage by depriving smallholders of their last reserves, and even of their stocks reserved for continuing production, for an extremely low compensation. Often administrative and quite violent forces were used in collecting what was due to the state. Also, the forced implementation of the 'kolkhoz' (collective farm) system and the pressure to join co-operatives further aggravated the situation. The consequence was dramatic: the level of agricultural production slumped, parallel with the related income, and a quarter of a million holders left their land in just a few years. Large stretches of land were abandoned and uncultivated. Concurrently, those who were forced to join a co-operative, were unable to avail themselves of the necessary tools and assets. The mitigation of the political tension that occurred in 1953 brought no more than temporary changes. It was not until after 1956 that the agrarian sector could permanently maintain a production level that was higher than before the war.

From 1959 on, the issue of co-operatives was pressed anew, and in only three years, the remaining individual farmers were, almost without exception, organised into these larger production units. The forced pace of co-operative organisation meant a rude intrusion into rural life, which resulted in many former farmers having to take up employment in other sectors. As the tools used earlier by smallholders were no longer feasible for use in a large production unit, significant state support was handed out to supply new ones. Even if these investments were out of proportion to the economic potentials of the country, they eventually proved productive. For a couple of years, the rate of development was outstanding even in international comparison. Therefore, the agrarian sector of Hungary could make up its lag behind Western countries in a very short time. The results in cereal and meat production were especially convincing.

The sector now became polarised, comprising 1500 large production units and 1.5 million small agricultural producers (with family farming plots or land taken out on

commission). The production structure was polarised, as well. The large production units preferred those plants which were easy to cultivate with machines, and, as for livestock, they usually preferred cattle and sheep, while smallholders were mainly involved in the growing of vegetables and fruit, as well as raising pigs and poultry. Still, the large plants also increasingly integrated these latter activities.

The profitability of the agrarian sector deteriorated in the 1980s as a consequence of the global economic recession, and a number of production units became non-profitable. With the economic crisis lingering and even aggravating, the volume of production either stagnated or slumped in certain regions.

Following the transition of 1989, the sector underwent considerable transformation once again. At the beginning of this period, emphasis was placed on the compensation of those who had lost their land and other belongings. However, this effort, even though it served the best interests of social justice, could not be carried out without mistakes and unfavourable consequences. Given the fair cause it served and the masses of people it affected, compensation should have been conducted in practice with much more care and circumspection, as well as with a preliminary assessment of the expected outcome. Further, there should have been a consensus of the intended structure of agriculture, the principles of granting subsidies and providing capital, as well as of the structure of food exports and imports.

The following points sum up the most important problems arisen in the past ten years in the Hungarian agriculture:

– agricultural production dropped between 1984 and 1994 by 40 percent, and there has been no significant improvement since;

– the compensation process became extremely protracted, and as a result of uncertainties, the area of land under cultivation continuously decreased, while the area of unsown land multiplied in some years;

– there was no sufficient foresight applied to the creation of a comprehensive holding structure. While many preferred the formerly dominant small and medium holding structure as a solution, without reference to the direction of development in Europe, others insisted on the creation of so-called farming holdings without taking into account that this requires the concentration of land ownership and the significant external subsidy system implemented. The experience of Western European countries shows that a long period of development and substantial external capital supply is required for the necessary modernisation and specialisation of this type of holdings;

– the idea of integration and of co-operatives was discarded by many, although it is evident in more developed countries that the various forms of cooperation are continuously gaining ground in the agrarian sector. The cooperation of smaller holdings would be especially desirable in order to achieve benefits in the fields of production organisation, sales, necessary mechanisation etc. Obviously, both in Hungary and in other countries, this idea of cooperating is less popular among smallholders than in holdings with production plants where the advantages are much more recognised;

– land ownership and land use have separated as the result of compensation. A number of people obtained land ownership who, for either subjective or objective reasons, could not undertake involvement in direct farming. Thus, in 1994, 41 percent of the aggregate area of

private holdings (883 000 hectares) was leased out and used mostly by enterprises and co-operatives. Two third of this land was given out during compensation in the preceding years, and the remaining one third had been held by the same farmers earlier as well. There was an increasing interest in the rental and purchase of land by foreigners, too;

– unfavourable turns in the market, as well as the suppressed producer prices in agriculture, impelled producers to cut production costs. Thus, the quality of feeds and sowing seeds deteriorated as compared to the previous situation, while the volume of fertilisers used dropped to the third of the former figure;

– the retrograde symptoms in plant cultivation also impacted the development of livestock farming, where the stock of cattle and pigs dropped by nearly 50 percent, while production and price factors kept on changing unpredictably. No market intervention or official price regulation was effected. The quality of feed also deteriorated, and so did the variety distribution (which had earlier been relatively homogeneous), and overall veterinary hygiene;

– additionally, no effort was made to retain markets in order to maintain the earlier volume and quality of production.

The long list of deficiencies clearly demonstrates the necessity of a reformed agrarian policy. Agricultural production should be organised along modern principles, in line with current market conditions, both in terms of upgrading the production methods, and sales. Feasible accomplishments of the past and the 1990s should be drawn upon for selecting the most crucial elements which should then be implemented to promote development with care and circumspection. The co-existence of various production schemes should be encouraged, and reasonable conditions fostering genuine development created.

AGRARIAN TRENDS IN EUROPE

In preparation for a development scheme and future path proposed for Hungary, a brief overview follows concerning the history of the countries of the European Union.

In 1998 only 121 million hectares of arable land was brought under agricultural cultivation in Europe, a figure 5.6 percent lower than in 1970. During nearly 30 years, the population of Europe grew, even at a pace lower than earlier, by a remarkable 10 percent, totalling nearly 730 million people by 1999. The 15 present member states of the EU showed a slightly lower rate of population growth (9.2%), while the rest of the continent was characterised by an even higher value.

The increase in the number of active wage earners was in excess (at 17.4%) of the rate of population growth, becoming nearly 360 million in 1999, which equals 49.3 percent of the total population. The same indicator in 1970 was at 45.1 percent. The proportion of those employed in the agrarian sector decreased at a lower rate in the EU than in other European countries (see Table 2).

European Union member states are not homogeneous, in fact, they are characterised by significant differences. There is an economically substantiated division between the North and South, or even more realistically, between the North, the Middle and the South. In the ‘Southern countries’ (including Italy, Spain, Portugal and Greece), the proportion of earners employed in agriculture is significantly higher within the entire popu-

lation than in Northern countries (with the exception of Ireland and Finland). The peculiar feature of the countries in the central areas of Europe is a developed industry as well as relatively favourable conditions of agricultural activities. These countries have succeeded in building and maintaining an advanced food industry by the development of agricultural technology and processing industry.

Table 2

*The number and proportion of active wage earners employed in the agrarian sector in Europe, by groups of countries**

Year	Active wage earners in the agrarian sector					
	number (million)			share of total active wage earners (percent)		
	Europe	of which:		Europe	of which:	
		EU**	non-EU countries		EU**	non-EU countries
1970	40.5	18.5	22.0	19.8	12.9	36.5
1980	29.8	13.3	16.5	13.7	8.6	25.9
1990	24.3	10.4	13.9	10.4	6.2	21.4
1995	21.3	8.6	12.7	8.6	4.9	19.3
1999	18.2	7.9	10.3	7.5	4.5	15.3
1999 as a percentage of 1970	44.9	42.7	46.8	37.9	34.9	41.9

* Without the Commonwealth of Independent States – CIS.
** Data for the 15 current member states.

Northern countries are characterised by worse conditions in terms of natural and environmental factors, therefore the per unit food supply capacity of these countries is lower. Among the countries involved in accession process with the EU, the Czech Republic and Hungary are close to the average of the 15 EU countries in terms of the proportion of active wage earners employed in agriculture. In these two countries, less people are employed in the agrarian sector than in the other pre-accession countries. The share of people employed in agriculture is significantly lower in Hungary than in some of her neighbours (see Table 3).

In Europe, the area of plough-land providing for the food supply (per capita) shrunk by 14 percent between 1970 and 1995. Six percent of this decrease was due to the withdrawal of marginal soils from cultivation, while the rest to demographic reasons. This means that today the food requirement of the entire population is satisfied by using a smaller area of land; moreover, production is even temporarily suspended on a part of this land. Manual work has gradually been replaced by automated processes requiring less human labour but more expertise, while new varieties with better yields, and new chemical agents etc., have been introduced. Increased productivity has boosted yield volumes and stocks alike. All these have implied a considerable growth in costs which can only be covered by appropriate external sources. In developed countries these resources are coming mainly from a combined domestic and international agricultural support system. Important changes are now expected in this field, as the accession will require the

European Union to transform its current subsidy system. There are various indications that the subsidies granted earlier will be reduced, and 'newcomers' will receive a lower level of support than the current members. It is an open question how all these measures will affect the exports and imports of food, or food prices.

Table 3

Distribution of wage earners in the main sectors in some European countries, 1995–1996

Country	Agriculture	Industry and construction	Services
	proportion (percent)		
United Kingdom	2.0	27.5	70.6
Luxemburg	2.4	23.0	74.5
Belgium	2.7	27.6	69.6
Germany	2.9	35.3	61.8
Sweden	3.3	25.9	70.9
The Netherlands	3.8	22.9	73.3
Denmark	3.9	26.4	69.7
France	4.8	26.5	68.6
EU average	*5.1*	*29.8*	*65.1*
Czech Republic	6.5	42.0	51.5
Italy	6.7	32.2	61.1
Austria	7.4	30.3	62.3
Finland	7.9	27.1	65.0
*Hungary**	*7.9*	*33.1*	*59.0*
Spain	8.6	29.4	62.0
Slovakia	9.2	38.9	51.9
Ireland	10.9	55.1	34.0
Portugal	12.7	32.9	54.5
Greece	20.3	22.9	56.8
Poland	22.0	32.3	45.7

* The corresponding figures for 2000 are 6.1; 35.0; 59.9.

The number and proportion of those employed in agriculture is higher in the 'southern' countries, where horticulture, requiring more manual labour, is more prevalent (see Table 3). At the same time, the average size of holdings is smaller in these countries since horticulture provides a sufficient level of income even from smaller land areas. Due to the given natural conditions, in this respect no considerable change is expected to take place in the future. As far as the patterns of its agricultural production are concerned, Hungary is in many respects similar to this region. Therefore, the ratio of the agricultural population is likely to become close to the figures of the southern region rather than falling to the level of the Central and Northern European member states of the EU.

In the past 10 years, the number of farms has decreased at an almost even pace in the EU countries (at –2.3 percent annually). The persistence of this trend could suggest that the same factors affect each country's agriculture in a uniform way, and that the farm structure has changed similarly across the Union. In fact, however, this process fundamentally varies by countries, depending on their historic heritage and specific circumstances.

Between 1987 and 1995 in the 12 early member states of the EU, the number of farms decreased by 20 per cent, solely as a result of a reduction in the total number of holdings of less than 50 hectares, and a 20 to 25 percent reduction in the agricultural area cultivated by these farms. At the same time, larger farms gained dominance, as within ten years, their share in arable land grew from 50 percent to over 60 percent. Although nearly 60 percent of all farms is smaller than five hectares, they cultivate a mere 6 percent of the arable land (see Table 4).

Table 4

The number of farms in each size category of cultivated land (EU 12)

Category of holding size (hectares)	Number of holdings (thousand)		1995 (Index: 1987=100)	Distribution of farms (percent)	
	1987	1995		1987	1995
– 5	5 125	4 062	79.2	59.3	58.6
5 – 20	2 099	1 563	74.5	24.3	22.5
20 – 50	946	752	79.5	10.9	10.9
50 – 100	326	347	106.4	3.8	5.0
100 –	148	206	139.3	1.7	3.0
Total	*8 644*	*6 930*	*80.2*	*100.0*	*100.0*

The proportions of cultivated land changed even more dramatically than the number of farms (see Table 5).

Table 5

Changes in the composition of cultivated land by farm size (EU 12)

Category of holding size (hectares)	Cultivated land area (thousand hectares)		1995 (Index: 1987=100)	Distribution of cultivated land (percent)	
	1987	1995		1987	1995
– 5	8 916	7 011	78.6	7.7	5.9
5 – 20	21 353	15 776	73.9	18.5	13.2
20 – 50	29 505	23 876	80.9	25.6	19.9
50 – 100	22 101	23 987	108.3	19.1	20.0
100 –	33 526	49 057	146.3	29.1	41.0
Total	*115 401*	*119 707*	*103.7*	*100.0*	*100.0*

The concentration of land ownership is obviously continuing, while those farms which can achieve an optimum level of resource use, and increase their size, gain increasingly important role in the agrarian sector. We will have to wait and see what the ceiling of this expansion is.

The number of farms was about seven million in 1997, which is 5 percent lower than two years earlier. The average cultivated land area of these farms was 18.4 hectares as against the 17.5 hectares in 1995. The growth of the average area is closely and negatively correlated with the number of wage earners in agriculture. As we proceed to

the south, the average size of farms is decreasing. Taken together the agricultural sectors of Greece, Italy, Portugal and Spain, the average size of farms is ten hectares, while the mean of the remaining eleven countries is 36 hectares. That is, the former figure is less than half, and the latter double of the EU average. The nearly fourfold difference is a good indicator of the still unlevelled differences between individual member states, rooting in economic, geographical and historical factors. Typically, mainly the northern countries apply modern agricultural technology, which means that the problems these countries face are different from those of the southern countries where the strong concentration of farm sizes, which is a fact elsewhere, is still hindered by the rural overpopulation, insufficient land and capital supply, and the dominance of horticulture. (As compared to the 10 hectare average farm size in the southern countries, Hungary had in 2000 a 2.7 hectare average in individual holdings, a 663 hectare average in associated holdings, and a total average of 8.3 hectares. Both Italy and Greece have a lower average.)

Table 6

Number and average size of farms in the EU countries in 1997

Country	Farms	
	number (thousand)	average cultivated land area (hectares)
United Kingdom	233.2	69.3
Denmark	63.2	42.5
Luxemburg	3.0	42.3
France	679.8	41.7
Sweden	89.6	34.6
Germany	534.4	32.1
Ireland	147.8	29.3
Finland	91.4	23.8
Spain	1208.3	21.2
Belgium	67.2	20.6
The Netherlands	107.9	18.6
Austria	210.1	16.3
Portugal	416.7	9.2
Italy	2315.2	6.4
Greece	821.4	4.3
EU 15 total	*6989.2*	*18.4*

This process gained even more impetus between 1995 and 1997. The number of farms in the 15 EU countries fell by 5.2 percent. Within this, the number of holdings of less than 10 hectares decreased by 6.3 percent, of those between 10 and 50 hectares, by 4.3 percent, while there were 2.2 percent more holdings above 50 hectares than two years earlier.

Eurostat has been classifying farms since 1975 according to their economic extent, in so-called European Size Units (ESU). The yield of agricultural production is expressed as a standardised indicator which equals the gross production value less the total of expendi-

tures. This value is totalled for each farm and calculated in the relevant national currency, then converted into ecus.

This classification according to economic extent suggests an even more intensive concentration than what was seen in the land area figures. Among the first nine EU members, the ESU value grew by 227 percent between 1975 and 1997. The relevant distribution of farms in this group of countries is summarised in Table 7, according to the value per farm indicator.

The ESU indicator increased at the greatest rate in countries which have been members since 1975. This fact demonstrates the importance of the time factor, and the growth trend is still continuing. The average increase of the ESU value was 5.8 percent between 1995 and 1997.

Table 7

Classification of farms according to ESU

ESU	In 1975	In 1997
	percent	
– 4	60.0	48.0
4 – 40	38.1	37.1
40 –	1.9	14.9
Total	*100.0*	*100.0*

Between 1995 and 1997, farm sizes in the 15 current member states followed the pattern indicated previously. This suggests that only those existing farm owners have good perspectives for the future who can achieve high yields. As for Hungary, these trends indicate that if Hungary chooses a similar path of evolution in the agrarian sector, those farms are likely to become competitive which use intensive and efficient methods and have at least 20 hectares (later, 50 hectares) of land, provided that their specific productivity is at par with EU levels. At the same time, it is conceivable that even farms with a smaller area could operate with a profit, if they have a more specialised production structure (such as horticulture and special products).

The existing agricultural structure and the high level of production as well as productivity of labour in the EU countries have resulted from substantial investment, through a process of development having been experienced for decades. Due to a pressure to accommodate to a competitive market, significant assets have been accumulated in the farms that survived. The value added of production (adjusted with support and taxes) increased from 116 billion ecus in 1983 to 142 billion in 1993. Production volume grew at a higher rate in the southern countries, and it either stagnated or declined in Scandinavia. Out of the total GDP of the member states, 4.1 percent was generated in the agrarian, forestry and fishery sectors in 1983, while in 1993 the same ratio was 2.8 percent.

More information is available concerning the price and value of land, that is, the most crucial asset in agriculture, than about the value of other fixed assets. Nominal land prices (expressed in ecus) in the various member states have fluctuated within a sixfold range in the past couple of decades, and there has been little variation in the ranking of

price levels by countries. It is, however, obvious that land prices in the EU are multiples of those prevalent in Hungary.

Substantial investment of capital is required to purchase a well equipped farm of reasonable size, which impels the necessity to solicit the investment of external (i.e., non agriculture generated) capital. From the income generated and accumulated from production, farmers can cover certain developments and buy smaller additions to their land. The former is necessary to sustain competitiveness, and it also allows farmers to approximate an optimum farm size that is larger and makes better use of the available technical equipment. The majority of member states offer favourable credit facilities for the launch of new farms. It is common, even if not very widespread, practice to avail young farmers of farming land. Applicants for this scheme must have both education and sound production experience in agriculture. By creating competitive advantage for the young generation, young farmers are not forced to struggle themselves through the numerous and susceptible stages of growing from a smallholder to an optimum farm size, while the already established and consolidated farming structures are not abandoned when elderly farmers retire from work. When a new farm is set up, local residents are privileged, and foreigners may be assigned land or farms only through capital import. The conditions of obtaining land are liberal in most EU countries, apart from certain specific restraints in place in some of the member states (e.g., Denmark). The foregoing thus must be taken into account by any newly formed agricultural policy for Hungary, too.

In the past decades, characteristic changes have occurred in animal husbandry. In 1997 only every second farm raised livestock, of which 31 percent had poultry (426 heads on the average), 16 percent pigs (101 on the average), and 26 percent cattle (45 on the average). Through a longer path of evolution, livestock farming has gradually shifted from small and large sized farms, to concentrate primarily in medium sized holdings.

The specialisation of production is a process still under way, while the proportion of farms mostly or wholly involved in either plant cultivation or animal husbandry is increasing. Farms with diverse profiles applying traditional production schemes and thus being involved in more than one sector are phased out. As the security of production and sales are strengthened, a former inclination of farms to rely on multiple sectors is gradually replaced by preference for specialised production characterised by flexible adoption to the demand, and high output volumes but a small number of product types.

In 1995, 94 percent of those employed in agriculture were family members. In countries including Greece, Finland and Italy, nearly all the work was performed by families, while in Denmark, the United Kingdom and the Netherlands, family members made up approximately 75 percent of all agricultural workers.

RURAL POPULATION AND AGRARIAN POLICY IN HUNGARY

Before 1990, large agricultural production units, although they had an advantage in technological terms, employed more people than necessary. Recent economic organisations rely on a significantly smaller staff per unit of land. The earlier practice of overstaffing was in many respects the product of social policy.

As soon as the large producing organisations were dissolved or restructured, those employees who were affected by this 'internal unemployment' became redundant and actually unemployed. As in rural areas there is little chance to find a job, the unemployment rate soon became much higher in small communities than in the cities, in which situation the subsequent privatisation of land did little to help. This third fundamental rearrangement of land ownership in the same century produced profound restructuring but little progress in the agrarian sector. In the absence of a clear and consistent agricultural policy, the whole of agriculture and rural areas became characterised by permanent uncertainty. No definite management structure was developed, and only a few relatively modern farms were formed due to the lack of capital and credit. The majority of individual farmers worked their land in the traditional manner, at the smallholder's level.

By 2001, the number of people employed in agriculture has decreased to 252 thousand, from 911 thousand in 1988. Only half of this headcount is directly involved in agricultural work, the rest performs other, related tasks, just as before (see Table 8).

Table 8

The number and percentage of active wage earners in agriculture and forestry

At the beginning of year	Number of active wage earners (thousand)	Active wage earners as a percentage of total active earners in the economy		
		Agriculture	Forestry	Total
1988	911	17.8	1.0	18.8
1989	888	17.4	1.0	18.4
1990	863	17.0	1.0	18.0
1991	752	15.2	0.9	16.1
1992	589	13.0	0.9	13.9
1993	392	9.3	0.8	10.1
1994	345	8.8	0.5	9.3
1995	324	8.5	0.4	8.9
1996	304	7.7	0.6	8.3
1997	289	7.4	0.5	7.9
1998	279	7.0	0.5	7.5
1999	270	6.6	0.5	7.1
2000	252	6.1	0.4	6.5

The share of workers employed in food industry stabilised in the 1990s at around four percent. In the last ten years, the number of wage earners in agriculture fell by more than 600 thousand. Contradictorily enough, two thirds of the 1988 headcount left the sector despite the fact that more than 500 thousand people were given in total more than two million hectares of land in five years. The decrease in the number of agrarian employees was most dramatic between 1991 and 1993, but it continued into the most recent years. Some of the older co-operative members exercised their right of early retirement. Many became unemployed: in 1996, agriculture had a 13.8 percent unemployment rate as opposed to the national average of 9.1 percent.

The number of those involved in agricultural production showed an inverse proportion to the size of the settlement. In localities with less than five thousand inhabitants, the rate of unemployment was higher than 16 percent. On account of their lack of qualifica-

tion and the absence of sufficient tools for agricultural production, it is almost impossible for the poor rural population to find new job, therefore unemployment in these regions is very difficult to eliminate. The future of these people is, at the turn of the millennium, one of the most pressing problems Hungarian society must face.

The long-term decrease in the number of active wage earners in agriculture does not imply that reliance on human work has similarly diminished in the sector. A large number of people not registered as agrarian employees, are participating in agricultural production. Activities performed either part-time or as a second job, are increasingly characteristic of the agrarian sector of Hungary. Traditional agriculture related activities continue to engage the non-agricultural population to an even larger extent than in other countries. This is especially true for households which own small stretches of land. Of those who left the sector in the past fifty years, many have retained their agrarian background, continuing to live in rural areas and cultivating a certain area of land. Part-time farmers primarily come from these groups. Prevalence of part-time agricultural work was proven by the latest Általános Mezőgazdasági Összeírás (General Agricultural Census) in 2000, which found that only 13 percent of the 959 000 registered farmers worked independently, while the rest had other sources of income as well (see Table 9).

Table 9

Distribution of farmers according to main employment in 2000

Form of employment of farmer	Farmers	
	number (thousands)	percentage
Active wage earner employed in agriculture	128	13.3
Non-agrarian active earner	291	30.3
Agrarian pensioner	159	16.6
Non-agrarian pensioner	305	31.8
Agrarian, unemployed	12	1.3
Non-agrarian, unemployed	39	4.1
Other inactive, agrarian	6	0.6
Other inactive, non-agrarian	15	1.6
Dependant	4	0.4
Total	*959*	*100.0*

Nearly half of the farmers were pensioners. At the time of this census, nearly two million persons over 14 years of age lived in households with some land property. Of them, about 75 percent did agricultural work, which does not mean that they lived exclusively on their income from agriculture, as most of them had other sources of income, as well. In terms of work days completed, these two million people could be classified in 1999 as follows:

1 – 45 workdays	49.9,
46 – 90 workdays	28.1,
91 – 135 workdays	10.8,
136 – 180 workdays	5.0,
181 and more workdays	6.2 percent.

In 2000, only 5 500 permanent and around 47 000 seasonal workers were reported to be employed in private farms. On the average, permanent employees worked 160 days, and seasonal workers worked 13 days in the preceding year. In addition, farms also reported to have required an average of five days' work done by relatives and friends. The staff of economic organisations is continuously decreasing. The number of those employed full-time dropped to 115 000 in 2000, as opposed to 589 000 in 1990.

PRODUCTION STRUCTURE AND THE STATUS OF AGRICULTURAL SUPPORT

During re-privatisation, only part of the land was accompanied by the appropriate tools of production and acquired by owners with appropriate expertise. The majority of holdings were allocated to people who had grown already old or otherwise unable to obtain production tools other than what they had from traditional smallholder's activities, while others who could not undertake working on their land and did not care enough to maintain the productivity of the farm, finally leased out their land. This caused a new separation between land ownership and land use.

After 1990, agriculture-related capital investment within the whole of the economy amounted to around three percent, a rate much lower than the proportion of agricultural production in total production and exports. Investment in machinery was especially insufficient and inappropriate, and large areas remained uncultivated. The level of both fertiliser supplies and irrigation fell significantly, as well as the use of sowing seeds sold in sealed containers, and livestock. As a consequence of the combination of these factors, production rates dropped by around 40 percent in the first years of the 1990s. During these ten years, the area of land under cultivation shrank dramatically (see Table 10).

Table 10

Area of cultivated land between 1990 and 2000

Year	Arable land and gardens	Vineyard	Orchard	Agricultural
	area (thousand hectares)			
1990	5054	139	95	6473
2000	4602	106	95	5854
2000 as a percentage of the 1990 value	91.1	76.3	100.0	90.4

Such a dramatic reduction in the area of cultivated land normally reduces the level of attainable yield as well. The ratio of unsown fields to the total arable area greatly increased since the start of the decade, in spite of the nearly 10 percent reduction in the area of plough-lands. The area distribution of field plants was unfavourable, too. As far as individual plant groups are concerned, the level of cereal production continued to grow, and there was no significant change in the volume of vegetables which play an important role in healthy nutrition. Legumes and potatoes were now grown in a smaller area. The reduced production of fodder roots and brassicas was attributable to the decrease in the stock of cattle and sheep. In addition, the yield of grasslands slumped, too, while the area assigned to industrial plants fluctuated to some extent (see Table 11).

Table 11

Structure of sowing, i.e. the distribution of various field crops
(percent)

Year	Cereals	Potato and legumes	Industrial plants	Fodder roots and brassicas	Vegetables	Other plants	*Total cultivated land*	Uncultivated plough-land
1990	59.8	4.1	12.8	19.0	2.5	1.8	*100.0*	1.4
1991	60.2	3.5	14.1	12.5	2.4	7.3	*100.0*	2.1
1992	60.7	3.9	14.0	16.1	1.9	3.4	*100.0*	7.0
1993	62.9	3.6	13.2	14.8	2.2	3.6	*100.0*	8.7
1994	64.6	2.7	13.2	14.1	2.6	3.0	*100.0*	5.0
1995	60.6	2.8	16.1	13.9	2.4	3.8	*100.0*	4.1
1996	62.6	2.5	16.8	9.2	2.9	7.5	*100.0*	4.6
1997	64.5	2.6	14.5	8.4	2.9	7.1	*100.0*	4.7
1998	64.4	3.0	12.9	8.4	2.5	8.8	*100.0*	4.5
1999	57.3	2.5	19.5	8.6	2.5	9.4	*100.0*	9.0
2000	70.5	1.9	13.2	6.9	2.2	5.3	*100.0*	8.2

The unfavourable trends in crop production affected animal husbandry as well. In these ten years, the stock of all animal species shrank. Calculated in livestock unit, the stock of animals raised was 43 percent lower in 2000 than ten years earlier, with the stock of cattle especially decreasing. The density of animals per unit of agricultural land decreased by 46 percent (see Table 12).

Table 12

Livestock structure by species

Year	Cattle	Pigs	Horses	Sheep	Poultry	Number of animals per 100 hectares of agricultural land
	as a percentage of the total livestock					
1990	49.0	35.6	2.4	5.2	7.8	39.6
1991	52.5	31.6	2.8	6.0	7.1	33.5
1992	49.3	32.5	3.2	6.6	8.4	30.7
1993	48.4	34.5	3.4	5.4	8.3	26.9
1994	48.3	32.9	4.1	4.5	10.2	24.6
1995	46.8	36.2	3.6	4.4	9.0	25.7
1996	46.1	38.2	3.5	3.9	8.3	25.5
1997	45.8	37.0	3.8	4.0	9.4	24.5
1998	43.9	39.2	3.8	4.1	9.0	25.7
1999	44.4	39.4	3.9	4.3	8.0	25.0
2000	43.4	37.2	4.0	5.4	10.0	25.3

Economic development in the XXth century was markedly characterised by the increasing support given to agriculture. Industrialised European countries understood that agriculture is unable to counterbalance from its own resources the relatively slow return of capital invested, coupled with low profitability, which hindered intensive capital input. Agricultural production became dependent on external aid as its competitiveness fell compared to other sectors of the economy. Therefore, the entire production volume had to be planned in advance. Support was effected by increased subsidies and preferential

credit facilities. At the same time, it was also realised that domestic agricultural production must be continued at any price, since it being free of the influence of external markets, ensures the supply of food to the entire population, it prevents or resolves serious social problems, and counteracts the dramatic loss of population in rural regions. As for Hungary, the accession to the EU will even more accentuate these problems. The competitiveness of agriculture must be maintained or increased, in order, to form – following the accession – productive liaisons in the market, and to improve the market environment for agricultural products.

The agricultural policy of the 1990s failed to arrive at these conclusions. It is not realistic to expect that an agrarian sector with a minimum level of support, remain competitive with the products of other countries with much higher level of agricultural support. Although production and sales subsidies and support have somewhat increased in the past ten years, the level of subventions, as applied in EU countries, is still at a very far reach. Also, part of the support granted was actually used to mitigate the pressing social problems of rural Hungary (i.e. aid to small holdings).

Calculated at current prices, agriculture, forestry and food processing still received little central support during the past years, and the changes in support schemes were rather unpredictable. The following amounts were granted in agricultural support from the budget of the Földművelésügyi és Vidékfejleszéti Minisztérium (Ministry of Agriculture and Regional Development) (including regional development subsidies donated in each year):

1993	52.2	
1994	83.9	
1995	81.2	
1996	99.2	
1997	92.8	
1998	127.0	
1999	144.4	
2000	140.6	billion Hungarian forints.

By the time Hungary eventually accesses to the EU, it must be secured that the current structure and proprietorship conditions in the agrarian sector conform to both the expectations of the Community and the interests of Hungary. Neither agricultural nor food industrial undertakings may be confronted with a structure of ownership where foreign interests come to supersede local ones. The agrarian sector of Hungary has good natural conditions, and can be integrated in the EU to the benefit of both parties, and its exclusion from the western markets must be prevented. The past and recent periods of decline or stagnation must be followed at last by positive developments. This prompts the creation of a clear and straightforward new agricultural policy, to provide optimal foundations for long-term development, and at the same time to raise the present extremely low income of agricultural workers.

FORMS OF PRODUCTION

By the turn of the millennium, the agricultural production scheme has gradually changed, to arrive at a situation where about 55 percent of all products are produced by

individual farmers and 45 percent by enterprises. The distribution of arable land roughly corresponded to the same proportions (even if the data for 2000 show a somewhat different picture, as this was the first occasion when the earlier reductions of arable land, as well as the areas held by non-agricultural institutions and left uncultivated, were included in the report) (see Table 13).

EU membership will certainly bring about significant changes according to which the area of cultivated land may have to be reduced, and forests to be planted in these inactive arable lands. The changes in 2000 were in harmony with those trends.

After 1990, the compensation policies following the transition focused on the reprivatisation of land, and the elimination of a land ownership structure based on large production units. The lands of large undertakings, as well as their production tools, were mostly assigned to the new individual farmers and business associations. Nevertheless, the size of these small farms was far from the optimum size prevalent in Western Europe, and the majority could hardly attempt to achieve profitability in production due to the lack of appropriate tools. Only a very low number of 'family farm' type holdings (with 30-60 hectares of land) were established. Instead of cultivating it, many of the new land owners leased their land out, which meant that the bulk of production and the produce sold continued to come from various forms of enterprises. Apart from the newly established limited liability companies, private enterprises, shareholding companies and deposit partnerships, quite a few farmers decided to join in a renewed form of co-operative (see Table 13).

Table 13

Area used by the main forms of enterprises, 1989–2000

Year	Private farmers	Companies and economic organisations	Co-operatives	*Total*
	land of production at May 31 (thousand hectares)			
1989	979	2 148	5 113	*8 240*
1990	1 152	2 146	4 938	*8 236*
1991	1 314	2 325	4 589	*8 228*
1992	1 072	2 820	4 031	*7 923*
1993	1 747	2 481	3 733	*7 961*
1994	3 080	2 396	2 570	*8 046*
1995	3 658	2 269	2 084	*8 011*
1996	3 823	2 294	1 900	*8 017*
1997	4 212	2 094	1 730	*8 036*
1998	4 323	2 129	1 585	*8 036*
1999	4 304	2 319	1 413	*8 035*
2000	3 774	2 346	1 175	*7 706**

* Of which, 412,000 hectares were under non-agricultural use.

The upstaging of agricultural co-operatives has been continuous since 1990. The area cultivated in this form of cooperation decreased each year, and in 1994 they held less than half of their area in 1988. Between 1994 and 2000, the area of co-operatives again shrank to less than half. At the same time, the land area held by economic organisations

changed within a narrower range, as the land lost by co-operatives was primarily added to private holdings (see Table 14).

Table 14

The distribution of the number of farms and their area by land size categories

Land size category (hectares)	Farms			Arable land area		
	percent					
	1981	1994	2000	1981	1994*	2000
– 1	93.0	81.4	70.3	7.2	5.0	2.8
1.1 – 5	6.7	12.5	19.1	4.8	5.5	6.5
5.1 – 10	0.1	4.3	4.6	0.1	4.2	4.9
10.1 – 50	0.1	1.6	4.8	0.1	5.0	15.2
50.1 – 100	0.0	0.2	0.6	0.1	3.1	5.9
100.1 – 500	0.0	0.1	0.5	0.3	5.2	12.1
500.1 – 1000	0.0	0.0	0.1	0.3	4.0	6.0
1000.1 –	0.1	0.0	0.1	87.1	68.0	46.6
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

* Partly estimated figures.

In twenty years, the holding size structure of agricultural land has also undergone substantial changes. The reduction in the number of farms affected the smallest ones most (not considering those users of land whose holdings are smaller than the minimum farm size). The area held by economic organisations with more than 1000 hectares is considerably smaller than ten or twenty years ago, yet they hold nearly half of agricultural land (see Table 14).

During the past 13 years, the former holdings of socialist co-operatives were privatised, and the state now holds very few land. The main forms of production following the previously mentioned restructuring are summarised in Table 15.

Table 15

Distribution of land held by the various forms of production
(percent)

Year	Private farmers	Economic organisations	Co-operatives	*Total*
1988	11.3	26.1	62.6	*100.0*
1994	38.3	29.8	31.9	*100.0*
2000	51.7	32.2	16.1	*100.0*

The future of land ownership policy is dubious. The present agrarian administration has set out to continue the elimination of co-operatives. The farms held and operated by foreigners are looking to an uncertain future, too. Another open question concerns the functioning of the state land fund. Co-operatives are often restructured into limited liability companies, which is no more than a formal transformation. The objectives of the agricultural policy should be worked out, and optimum solutions found, as soon as it is pos-

sible (to note: the statistical reports of the EU do not differentiate between the various forms of production). According to the General Agricultural Census, the number of private farms was near 960 000 in 2000. [2]

There is a substantial variation among individual farms as concerns the objective, the value, the income, physical size, or tools, etc. of production. Farms are most easily categorised according to the European Size Units which is a composite indicator of the performance of production units. Unfortunately, the introduction of this indicator in local practice is being delayed, and therefore we have to continue to categorise farms according to size.

The number *of private farms* was 31 percent lower in 2000 than in 1991, equalling only 64 percent of the 1981 value. This reduction, equivalent to the rate of 3 percent per year, occurred over a very short period of time, and was due to the decrease in the number of agrarian employees, a pronounced process of migration towards cities, and maybe most importantly, to the reduced profitability of small holdings. The number of farms dropped especially dramatically after 1994. This process certainly indicates a devaluation of the agricultural work performed in small and micro farms.

More than 500 000 private household farms and ancillary farms were closed down. The area of private farms more than tripled since 1990. Their average area grew from 0.46 hectares to 2.75 hectares, representing a sixfold increase (see Table 16).

Table 16

The distribution of private farms according to size of holding, in 1991 and 2000

Size of arable land held (hectares)	Number of holdings			
	thousands		percent	
	1991	2000	1991	2000
0 – 1	1257	686	90.0	71.5
1 – 5	132	178	9.5	18.6
5 – 10	5	43	0.4	4.5
10 and over	2	52	0.1	5.4
Total	*1396*	*959*	*100.0*	*100.0*

It is evident from this analysis of the holding size structure that smaller farms were closed down while larger ones survived, and privatised land was added to these latter. The number of farms of more than one hectare doubled, and of those of more than five hectares multiplied. The distribution data of these two surveys accentuate changes even more, as the weight of holdings with larger areas grew to 77 percent. Farms with more than 10 hectares represented 5.4 percent, but the area they cultivated represented two-thirds of the arable lands of all private holdings (see Table 17).

The number of farms of 1 to 5 hectares increased by 35 percent between 1991 and 2000, while their share in the total land area doubled. In 1991 only 1646 private farmers

[2] In the General Agricultural Census, farm was defined as a production unit with at least 1500 square metres arable land, or 500 square metres of orchard or vineyard, or one larger animal, or 50 poultry, rabbits, other furred animals or pigeons, or five bee families, and included intensive horticultural units and agricultural service providers.

held farms of over 10 hectares, while the same figure was 51 000 in 2000. Of these latter farms, 2467 was larger than 100 hectares.

Table 17

The distribution of cultivated land area according to holding sizes, in 1991 and 2000

Size of land (hectares)	1991	2000
0 – 1	52.9	6.8
1 – 5	35.9	15.7
5 – 10	5.6	11.6
10 and over	5.6	65.9
Total	*100.0*	*100.0*

When the General Agricultural Census was taken, farmers were interviewed about the aims of their work, as well. According to the results 60 percent worked to cater for their own needs, while 31 percent sold their surplus produce, and only 8 percent had sales as their primary aim of production (around 1 percent was mainly involved in the supply of services).

The nearly 700 000 farms with less than five hectares of land aimed first of all at catering for traditional household consumption, relying on a small stretch of land, few tools and only a few animals. In this stratum, the proportion of elderly people is high (approximately 250 000 farms) who are predominantly single, lacking the necessary strength or tools to attempt modern farming, let alone the upgrading of their farms. Their economic weight therefore is limited, as much as their expected activities in the future. It deserves notice, however, that among those with small land areas there are (even if only a few) units of production which are involved in commercial production in specific sectors (such as growing grapes, vegetable, fruit or special plants, or engaged in intensive livestock farming of specific species, or the supply of agricultural services), and which generate considerable profit. The rest of these farms, especially those with more than ten hectares, are mainly involved in commercial production. These latter – including family farms and a few large production units – can become the true pioneers of competitive farming. Their total number exceeds 50 000. In view of the objectives of the EU, the future of these farms is almost certain, as they can expect development support (although its implementation may take place only gradually).

Although there was a substantial growth in the number *of economic organisations* of various forms (not including private entrepreneurs), the land cultivated by these enterprises has continuously shrunk in the past ten years. Agricultural co-operatives are gradually withdrawing to ever decreasing areas, while the other forms have increased their land area. After 1995, both the number and the land area of agricultural enterprises exceeded that of co-operatives (see Table 18).

In Hungary, the employment of paid workers has considerable consequences in terms of the related duties and contributions. The ceiling of the optimum farm size is yet to be

determined. For private farmers, this size is now around 100 hectares. As for enterprises, a size of about one thousand hectares may be justified. In the case of exceptionally well-organised or extensive farms (especially including co-operatives), this limit may even be exceeded, subject to the specific circumstances. The agrarian policy of Hungary has not yet developed a position regarding the exact limit of farm sizes. At any rate, we must not aim either at the creation of a new large holder stratum, or setting obstacles to spontaneous development.

Table 18

Number and area of agricultural enterprises between 1990 and 2000

Year	Number of organisations				Area of land (thousand hectares)			
	Business organisations	Co-operatives	Other forms of enterprises	Total	Business organisations	Co-operatives	Other form of enterprises	Total
1990	155	1 326	22	1 503	880	4 938	1 046	6 864
1991	269	1 384	32	1 685	1 113	5 200	1 062	7 375
1992	413	1 253	108	1 774	1 058	4 229	1 028	6 315
1993	503	1 412	88	2 003	1 006	3 427	1 124	5 557
1994	674	1 303	173	2 150	909	2 287	1 152	4 348
1995	877	1 232	269	2 378	2 028	1 994	175	4 197
1996	1 184	1 180	246	2 610	1 990	1 863	141	3 994
1997	1 581	1 137	252	2 970	1 979	1 710	135	3 824
1998	1 885	1 085	291	3 261	2 002	1 562	146	3 710
1999	2 159	1 010	303	3 472	2 031	1 370	133	3 534
2000	3 701	959	728	5 388	2 333	1 090	143	3 566

The average size of economic organisations continued to decline in these ten years, from 5677 to 630 hectares in the case of business organisations, and from 3724 to 1137 hectares in the case of co-operatives.

The size of farms held by associated organisations wildly varied in 2000. Half of the reporting enterprises held less than 100 hectares, while 15 percent of the organisations with arable land holdings owned 80 percent of the aggregate land area. The majority of the land held by enterprises was, thus, utilised by farms exceeding with more than one thousand hectares.

Table 19

Distribution of enterprises and cultivated land by farm size category, in 2000
(percent)

Area of land (hectares)	Distribution of enterprises		Distribution of land	
	Business organisations	Co-operatives	Business organisations	Co-operatives
– 10	14.2	2.5	0.1	0.0
10.1 – 50	29.4	5.6	1.4	0.2
50.1 – 100	12.7	3.4	1.5	0.2
100.1 – 500	27.2	24.2	10.0	5.9
500.1 – 1000	5.8	20.6	6.7	13.5
1000.1–	10.7	43.7	80.4	80.2
Total	*100.0*	*100.0*	*100.1*	*100.0*

In 2000 only 62 companies held more than 5000 hectares of land, and these utilised 36 percent of the land of all economic organisations (see Table 19).

The category of *business organisations* includes limited liability companies, shareholding companies, general partnerships and deposit partnerships. During the past ten years, the number of these enterprises has increased twenty times, while the land area held by them stagnated at around 100 000 hectares between 1990 and 1994, and has stayed close to 200 000 hectares since 1995 (see Table 20).

Table 20

The number and land area of economic organisations

Year	0-1	1-10	11-50	51-100	101-500	501-1000	1001-	Total	Area of land (thousand hectares)	Area per farm (hectares)
	hectares of land									
1990	-	8	2	4	7	7	127	155	879	5676
1991	-	13	9	8	21	22	196	269	1113	4137
1992	-	20	36	20	63	49	225	413	1058	2561
1993	-	18	38	37	104	74	232	503	1006	2000
1994	-	26	64	40	188	100	256	674	909	1348
1995	-	23	69	74	273	137	301	877	2028	2312
1996	3	41	187	153	348	157	295	1184	1990	1681
1997	10	75	355	230	443	176	292	1581	1978	1251
1998	14	115	449	282	543	186	296	1885	2002	1062
1999	20	146	566	302	645	186	294	2159	2031	941
2000	111	415	1089	468	1008	215	395	3701	2333	630

Co-operatives. From the mid-1960s, land-related legislation was primarily targeted at the concentration of land ownership and land use, as well as the consolidation of socialist ownership. At the beginning, there was an urge to enforce land ownership by the state. Later when co-operatives were organised, the land assigned to them came from two sources: more than one quarter was made up of the remnants of state-owned land, while the rest was brought in by the land owners integrated as members into the co-operatives. In the course of privatisation, most of these lands were returned to their original owners, while other members decided to continue farming jointly. The latter solution was not favoured by agrarian policy, and was diminished through various measures. The number of co-operatives slumped by 28 percent in ten years, and their land area shrank to one fifth (while the number of production units with more than 1000 hectares decreased to 25percent of the historic figure).

In 1997, the Hungarian Central Statistical Office carried out a survey among the legal successors of the co-operatives that had existed until 1988 (see Table 21). This survey covered the surviving enterprises, while private farmers working on the land previously held by co-operatives, were disregarded. The difference between the original land area of co-operatives and the area held by their successors, was deemed to have been placed under individual farming. The importance of agricultural co-operatives continuously declined from 1990, with a parallel decrease in the land area worked, and livestock held, by them. The density of cattle stocks remained at around the same level, while the density of pigs increased to some extent (see Table 22).

Table 21.

The number and land area of agricultural co-operatives

Year	0–1	1–10	11–50	51–100	101–500	501–1000	1001–	Total	Land area (thousand hectares)	Area per farm (hectares)
	hectares of land									
1990	–	–	7	1	25	26	1267	1326	4938	3724
1991	–	5	6	5	26	41	1301	1384	5200	3758
1992	–	2	8	6	38	51	1148	1253	4229	3375
1993	–	10	29	23	104	149	1097	1412	3427	2427
1994	–	9	37	38	149	234	846	1313	2287	1756
1995	–	8	17	39	171	246	751	1232	1994	1619
1996	–	7	14	36	166	254	103	1180	1863	1579
1997	1	5	31	27	173	236	664	1137	1710	1504
1998	–	7	37	27	166	237	611	1085	1562	1440
1999	–	10	42	21	190	191	556	1010	1370	1356
2000	–	24	54	33	232	197	419	959	1090	1136

Table 22

Changes in the share of co-operatives in agricultural land and production

Item	1988	1996	2000
	Share of co-operatives (percent)		
Of arable land	75.7	30.5	20.5
Of area under cultivation	61.2	23.2	15.2
Of gardens, vineyards and orchards	13.3	4.1	2.0
Of wheat production	84.1	40.9	19.1
Of the stock of cattle	61.5	43.0	26.9
Of the stock of pigs	30.3	20.8	14.0
Of the stock of poultry	19.8	13.7	8.4
Of the stock of sheep	57.2	18.1	6.6
	Per 100 hectares of cultivated land		
Number of employees	10	5	4
	Per 100 hectares of agricultural land (heads)*		
Cattle	23.0	22.4	20.6
Pigs	55.9	63.0	64.2
Sheep	28.1	9.0	7.1
Horses	0.4	0.2	0.1
Adult poultry	156.0	146.8	98.3

* On December 31, 1988; December 1, 1996; and December 1, 2000.

The statistical survey conducted in 1997, as far as land areas were concerned, almost entirely covered the enterprises that were set up on the land previously held by co-operatives. In 1997 as much as 54 percent of the land of former co-operatives was utilised by private farmers. Of the remaining land, 36 percent was cultivated by agricultural co-operatives, while ten percent by farms in the other enterprise categories. Regional variance was remarkable. The work and management of co-operatives altered fundamentally during the last ten years preceding the survey. Both in terms of economic and social factors, today co-operatives are not in any way parallels of the former agricultural co-operatives. Probably the most important instance of change was that co-operatives employed half the labour force per unit of land in 1997 than ten years earlier. This form of association was most significant in the traditional sectors, including cultivation of land crops

(especially cereals) and in cattle raising, although their stocks of pigs and poultry also remained nearly at the same level. The per unit density of livestock decreased to the third in the case of sheep only, as sheep breeding was taken over from co-operatives by private farms and full-time shepherds. Co-operatives had a somewhat higher level of traction power relative to their land area, than before.

The official agricultural policy has promoted the process of eliminating co-operatives, although the surviving co-operatives have been characterised by a higher-than-average production quality, and improved productivity of work. The former large unit sizes, as already mentioned previously, were reduced partly through individual compensation transactions, and partly by the fact that the remaining land was split up between various companies. This is also supported by the fact that on the area formerly utilised by one hundred co-operatives, an average of 174 successor organisations are operating at present. Half of the former co-operatives remained in whole in 1997, the rest either dissolved or was split up. Almost one tenth of the 1256 co-operatives existing in 1988, that is, 118 units were completely dissolved and terminated. The majority of these held smaller areas. The proportion of co-operatives that were reformed as single production units, was the highest in this category, too. Half of the former co-operatives continued to work in the same form, while the larger ones were split up to found several enterprises. There is a direct correspondence between farm sizes in 1988 and the number of organisations at present.

A PATH FOR THE FUTURE

In the coming years, the crucial task facing Hungarian agriculture is the accession to the European Union, and this is what the schedule of agricultural policy must conform to. It is obvious that the interests of Hungary and the Community are, at least for a certain duration, out of harmony. Hungary is interested in the fullest possible utilisation of its agricultural production potentials, in the soonest restoration of the previous production levels, a corresponding growth in efficiency, increased export of agricultural products, and the elimination of the disadvantage of agrarian workers in terms of income. However, the EU is most likely to restrain that increase in production by applying quota systems. Such curbing of production may cause the current level to stagnate for some time, which, coupled with the withdrawal of land from production, means further restriction that could even more exacerbate the social problems of rural Hungary.

The future role of private farms and agricultural enterprises, each category representing roughly half of the entire sector, must be clarified. It is likely that the private household farming, small garden and hobby categories of production, inherent in the life habits of the Hungarian population, will survive at the same or even increased level. The future of smaller private farms is rather hopeless in terms of production, as their efficiency is very low, thus their survival largely depends on social support. These farms are expected to become excluded from the international markets of most goods on account of their rudimentary technology and an incapability to adhere to uniform type requirements in production, and are likely to sooner or later give up production altogether, serving as a land reserve for the continued concentration of ownership.

The most viable form of private farming will probably evolve from the so-called family farms which have higher production capacities, and which are specialised in the pro-

duction for the market. The expected subsidies are also foreseen to promote the consolidation of these farm types. Yet, it can become a problem that individual farms with more than 100 hectares of land may become dependent on extra labour force (i.e. paid workers) when production already exceeds the capacity of the families.

A number of business organisations hold land areas of several hundred or even thousand hectares. The dissolution of former co-operatives has been forced by agrarian administrations hitherto, but there has no definite set of objectives or a perspective scheme been developed with respect to the rest of organised production forms. (Continued dissolution of co-operatives is of dubious merit, since that would impel the owners to look after their lands of two or three hectares each, earlier leased by the co-operatives, and these owners would use their lands with reduced efficiency or not at all).

As far as the further development in the EU is concerned, the dominance of family run farms will be gradually taken over by larger units where hired workers are employed (e.g. in the United Kingdom or Germany). The share of farms with more than 100 hectares was three percent in the EU in 1995. These farms, however, already utilised over 40 percent of the land under cultivation. As concentration progresses, the agrarian sectors of other countries are likely to take this route of development, as well. That is, in the future the number of small individual farms is expected to decrease further. The ideal solution would be to add their land areas to those of family farms by way of purchase (through a state operated land fund) or leasing out. The process of concentration is likely to speed up following EU accession when the extent of production subsidies will be determined. It is to be seen what measures will regulate the future of economic organisations and how they will be integrated into the newly shaped structure of agricultural production.

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The ideal natural conditions of Hungary are indicative of potentials for agricultural production that remain unmatched within Europe. To use those opportunities, however, Hungary must face and solve a number of economic and social problems. Only a consistent and long-term agricultural policy can ensure that these potentials will be realised completely in a EU context, integrated into the agrarian sector of the Union. The most important elements in this work include selecting a direction for the evolution of the holding structure, the establishment of an ideal subsidy system, and to increase the level of income from agricultural work.

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AGRICULTURAL PRODUCTIVITY INDICATORS

PÉTER SZABÓ[1]

Eurostat is recently developing agricultural productivity indicators for the member states of the European Union as a response to the common Agricultural Policy reform 'Agenda 2000' and in anticipation of greater interest from policy makers and analysts alike. The provisional derived productivity data of the member states are published in the annual publication of the Eurostat 'Income from agricultural activity'. The author makes an attempt to set up similar indicators for the Hungarian agricultural industry using data from Economic Accounts for Agriculture (EAA) and Agricultural Labour Input statistics (ALI).

KEYWORDS: Multi-factor productivity; Partial productivity; EAA; ALI.

The two main objectives of the Common Agricultural Policy (CAP) of the EU are to increase agricultural productivity and to provide fair standard of living for the agricultural community. Reflecting on the reforms to the CAP introduced under the title 'Agenda 2000', the Eurostat embarked on the development of new agricultural productivity indicators, which has caught the attention of both politicians and analysts.

The Economic Accounts for Agriculture (EAA), revised in 1997, and the closely related Agricultural Labour Input (ALI) statistics provide a consistent framework for defining the productivity indicators. The so-called agricultural income indices, regularly derived from EAA and ALI statistics, are in fact productivity indicators, which measure the state of the sector. The methodological development aims at the development of two productivity indicators, although their final definition depends on further research and the data available.

PRODUCTIVITY INDICATOR TYPES

What is productivity? A productivity indicator is a fraction, the numerator of which is a measure of output and the denominator is a measure of input indicator. Output is measured as a function of four inputs (production factors): capital, labour, land and raw materials. The indicators are created to compare the growth rates of member states' rather than their productivity levels (although they may be studied as well in the future).

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Productivity indicators can be classified into two categories:[2]

1. partial productivity: relates an output indicator to a single input indicator,
2. multi-factor productivity: relates every output indicator to a bundle of input indicators.

Both types have their advantages and disadvantages. Partial productivity is easy to measure and understand but it does not reflect the fact that in reality output can be dependent on the interaction of several production factors. Multi-factor productivity is much better at that point but it requires a substantial amount of input data.

The output factors of the productivity indicators are taken at basic prices, which include product subsidies. This is in harmony with the primary objective of the EAA, the measurement of income from agricultural activity, and is the best to reflect the price actually retained by the producer. Eurostat also made experimental calculations with producer prices, and the results were very similar.

The multi-factor productivity indicators have been given greater priority, because they allow a better comparison among the member states. Partial productivity indicators are more suitable for comparisons within a single country. Eurostat is working on the development of the following two indicators.

Multi-factor productivity. The member states agreed that the productivity indicators will be based on the (constant) volume indicators of output and input, which are derived from EAA and ALI statistics. The numerator is the volume of agricultural industry output in basic prices at 1995 euro prices. The denominator is the volume of a bundle of agricultural input factors at 1995 prices. These factors are capital (weighted by the current euro prices of depreciation data), raw materials (weighted by the current euro prices of intermediate consumption) and labour (the use of paid labour weighted by the current euro prices of compensation of employees and the use of unpaid labour weighted by the implicit average compensation by employee).

Depreciation, used in the weighting of capital input, is in fact not the most suitable indicator. The OECD proposes the use of the value of fixed assets, but it is difficult to measure. The term 'raw materials' is not well defined. Actually both the index and the weight refer to a broader concept: intermediate consumption in agriculture, including the value of products (seeds, fertilisers, pesticides etc.) and services (maintenance, veterinary fees etc.) used in production.

The OECD manual recommends the adjustment of labour input for differences in type of labour (age, education etc.) but Eurostat does not calculate such indicator due to the lack of all necessary data. The base year for the calculation of the productivity indicator is 1995 both for the output and the input indices. The partial indices are weighted by the Fisher-index number formula (the geometric average of the indices weighted at the 1995 and the current year prices).

Several things must be taken into account when analysing these indicators.

– Output refers only to production in the physical sense, but there are social and environmental factors as well (such as desertification etc.).

[2] In theory there is a third kind of productivity indicator reflecting every production factor, but because there are no reliable data on the price of agricultural land and it is methodologically implicated to take into account the implicit rental of owner-occupied land such an indicator is not calculated.

– Depreciation, used in the weighting of capital, may require empirical correction.

– The labour input data are not broken down by age, sex and education. The Annual Work Units (AWU) used by the member states differ to a great extent and, those persons working more than those in full employment cannot be calculated as more than one AWU.

The partial (single-factor) productivity is proposed as a secondary indicator only, mainly for comparing different industries within a single member state. The data are also derived here from EAA and ALI statistics. The numerator of the indicator is the gross value added of the agricultural industry at 1995 euro prices, while its denominator is the agricultural labour input expressed in Annual Work Units.

AGRICULTURAL PRODUCTIVITY IN HUNGARY

The adaptation of the calculation methods in Hungary was made possible by the recent introduction of EAA and ALI statistics. The delayed introduction of these systems compared to the current member states has not just drawbacks but also advantages.

The lack of time series is always a problem when introducing new statistics. Productivity is substantially affected by the weather among other things, and trends can be identified only in the course of several years. The Hungarian Central Statistical Office (HCSO) has been publishing the EAA since 2000, however, due to capacity shortages, retrospective data are available only from 1998. Because in the case of such a short time series every single year counts, the year 1997, a year with raw and unpublished but still comparable data is included in the calculation. Consequently, our base year can only be 1997, instead of 1995.

In Eurostat calculations, the indicators used for weighting are expressed in euro. As the indicators are not intended to measure productivity levels, the following experimental calculation is made in Hungarian forints.

To generate EAA data, member states are required to supply data compared to the previous year, the supply of 1995-based data being optional. Because of the volatility of the Hungarian agricultural industry and the rapid structural changes, the HCSO calculates EAA data only on the basis of previous year. (At first, we calculated the gross output on a fixed base as well but these data significantly differed from those on the basis of the previous year.) The volume indices of the output and the individual production factors could only be calculated on a (quasi) 1997 basis by chaining of the indices at prices of the previous year. In the (Fisher-)weighting of the partial input indices the base year weights were also used.

THE RESULT OF CALCULATIONS IN EUROPEAN COMPARISON

As opposed to the dynamic growth in many of the EU member states, the Hungarian productivity indicators fluctuate in an irregular manner depending on good or bad weather. The slight increase in the trend is only due to the fact that the number of those working in agriculture is falling steadily.

The volume of gross output stagnated in the period under review (see the table). Although there are no comparable EAA data from the first half of the 1990s, the time series based on traditional national methodology suggests that output volumes have plummeted

by as much as 30 percent since the beginning of that decade (most of the decline happened in the early years of the decade). During the same years, the output volumes in the EU either slowly grew or stagnated.[3]

Agricultural productivity
(Index: 1997 = 100)

Indicator	1997*	1998	1999	2000	2001	2002**
Volume index of gross agricultural output	.	100.9	100.4	94.7	104.9	100.3
Volume index of gross value added	.	103.9	100.6	84.2	101.3	89.4
Volume index of depreciation	.	99.0	98.1	93.7	94.3	95.8
Volume index of total labour input	.	96.8	93.9	87.1	82.8	79.1
Volume index of intermediate consumption	.	98.6	100.4	102.9	107.3	107.5
Depreciation at current prices***	78 499	95 085	104 689	118 583	122 821	130 926
Compensation of employees at current prices***	104 772	109 744	114 650	121 313	133 403	143 950
Imputed compensation of unpaid labour at current prices***	432 075	462 121	529 480	545 475	627 368	699 349
Intermediate consumption***	578 515	599 086	639 782	739 142	888 292	890 967
Multi-factor input at current prices***	1 193 860	1 266 037	1 388 601	1 524 512	1 771 885	1 865 192
The weight of depreciation in the multi-factor productivity indicator	0.07	0.08	0.08	0.08	0.07	0.07
The weight of total agricultural labour in the multi-factor productivity indicator	0.45	0.45	0.46	0.44	0.43	0.45
The weight of intermediate consumption in the multi-factor productivity indicator	0.48	0.47	0.46	0.48	0.50	0.48
Multi-factor productivity indicator****	.	103.2	103.2	99.4	109.7	106.8
Partial (labour) productivity indicator****	.	107.3	107.1	96.7	122.4	113.1

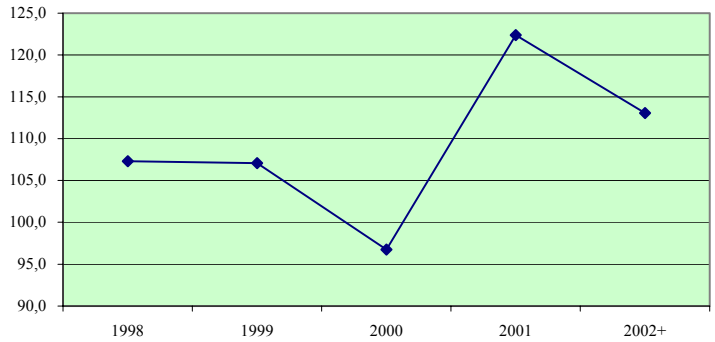
* Estimated data.
** Preliminary data.
*** HUF million.
**** Percent.
Note: The time sequence of the partial and multi-factor productivity indicators are shown by Figure 1 and 2.

The gross value added fell more than 10 percent between 1997 and 2002. In the EU member states, the value added usually grew more rapidly than the output. The weight of the production factors in the multi-factor productivity indicator showed little or no change over the course of the examined period. Their share in the input bundle is the same as in most of the member states (intermediate consumption, total labour, depreciation).

The weight of intermediate consumption was 48 percent in 2000, which is pretty close to the 51 percent EU average. The annual changes in its volume are smaller (more stable) than those in the output and gross value added (not surprisingly: it is necessary to plough, sow, fertilise etc. every year while the yield is quite uncertain). The Hungarian volume index has been increasing for four years, which may indicate the start of positive changes. The corresponding data in the EU show either a moderate increase or a small decline.

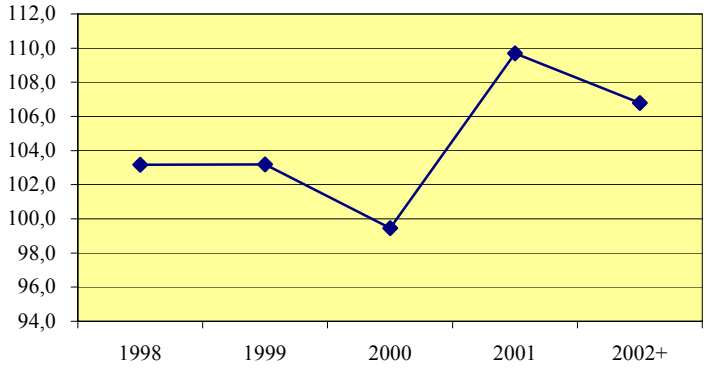
[3] Unfortunately, the used literature does not offer data about the EU 15 (and member state data often cover different periods of time).

Figure 1. Partial labour productivity indicator
(Index: 1997 = 100)



The weight of compensation of employees shows a wide variance within inputs among the member states, from 16 percent in Austria to 47 percent in Finland, the EU average being 35 percent. With the two extreme values left out, the member states can be classified into two groups. In the 'southern' countries and Ireland the proportion of labour is high while in the 'northern' ones the same proportion is low. With its 44 percent, Hungary comes among the 'southern' countries, characterised by fragmented, mainly family farms.

Figure 2. Multi-factor productivity indicator
(Index: 1997 = 100)



The volume of labour decreases steadily year by year in every EU country (and in Hungary, too). This process has been going on in the EU for decades and still does not show any sign of slowing down. This production factor (and the more stable output) has the greatest influence on the growing productivity in the EU. The slight increase in the Hungarian productivity is also a result of this phenomenon. As opposed to the declining volume, the per-capita compensation grew significantly, inflating the current price data as well.

The weight of depreciation was stable at seven to eight percent. This is below the EU average (14%), in fact there is no such a low value in any of the member states. The main

reasons are obsolete equipment and overcapacity (in buildings). The expected average use of fixed assets is significantly longer, therefore their depreciation rate is smaller than in the EU countries.

The volume of depreciation in Hungary decreased until 2000, then, in the course of the past two years, it surged back as subsidising policies brought about impressive investments, which, in turn, expanded the basis of depreciation: the stock of fixed assets. The picture is a mixed one in EU member states; there are examples for increase and decrease as well.

My opinion is that, the weight of fixed assets is grossly undervalued in the index. If member states had accurate data about the value of the stock of the fixed assets at replacement costs, this item would have the highest share in the output bundle (it would be 20 to 30-times more than the value of depreciation at current prices). This would cause the data to show a significantly different (worse) picture about the trend of agricultural productivity of the EU. The General Agricultural Census of 2000 has provided a reliable data background of fixed assets in Hungary, which offers a basis for not only depreciation estimates but also some future experimental calculations. Changing the weight of capital input would further deteriorate Hungarian data.

FUTURE TASKS

Productivity calculations have been a part of 'Income from agricultural activity' annual publication of the Eurostat for the past two years. The published data are getting more comprehensive from year to year. Hungarian productivity data will be fully comparable with EU data once they will be available as from the base year (1995) at least. Furthermore, the fixed price EAA data on fixed base will also have to be compiled (recently only data compared to the previous year are available). The conditions of converting to euro are already in place.

The methodology developed by Eurostat is not to be considered as the final one since there are several constraints to its use. Therefore the present indicators are expected to change and/or be supplemented. In my view, one possible way of development can be replacing depreciation by the capital stock within the multi-factor productivity indicator. A precondition of this is to supplement the accounts of the EAA with the balance sheet, which has been planned for so long. Another possible (although longer-term) direction of development is the inclusion of environmental factors. The environment is becoming more and more important which is apparent in the agricultural subsidy system of the EU. A major obstacle of the development, however, is that environmental factors are difficult to quantify.

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THE PROFITABILITY OF AGRICULTURAL ENTERPRISES IN THE EUROPEAN UNION AND IN HUNGARY

GÁBOR KOVÁCS[1] – GÁBOR UDOVECZ[2]

The study analyses the recent development of the profitability of Hungarian agricultural enterprises in comparison to those of the present EU member states and discusses what to expect after the accession. The comparison of the incomes of the past was based on the data of the Hungarian and the EU Farm Accountancy Data Network while in the forecasts for the period after the EU accession the models of the Research and Information Institute for Agricultural Economics (RIIAE) were applied.

Among others the comparison shows that the net income per hectare of agricultural area is only one third that of the EU average. This lagging behind is due to several factors; such as, low input efficiency, low level of subsidies, unfavourable farm structure, poor machinery etc.

The price mechanism of the markets will probably slightly change the incomes to be expected after the EU accession. The income generating capacity of agriculture will remain subsidy-dependent. The authors state if the producers react appropriately to the changes and if the direct payments from the EU budget are supplemented from the national budget then the entrepreneurial incomes might increase by 7-9 percent in 2004 compared to 2001. The increase might be even larger if further subsidies to be granted in national authority will also be made available.

In the sectors not covered by CAP subsidies (pig, poultry and most fruit and vegetable production) profitability increase can only be ensured by increasing considerably the competitiveness and by implementing the restructuration, which has been delayed for a long time.

KEYWORDS: Incomes of agricultural holdings; EU accession; Farm Accountancy Data Network (FADN).

With the accession of Hungary to the European Union, it is high time to face with the recent situation of the agricultural sector and assess its prospects in the new competitive environment. The so-called Farm Accountancy Data Network (FADN) appears to be a viable tool for this purpose as it is based on the concept of income generated. At the same time, after the accession, this European database will be used to assess the implementation – both the results and the problem areas – of the Common Agricultural Policy (CAP). The elements of profitability and achievable income will no doubt retain their distinguished significance. These indicators describe not only the

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efficiency achieved in a given past period, but also the prospects of future competitiveness.

A „COMMON DENOMINATOR": THE FARM ACCOUNTANCY DATA NETWORK

The European Commission established a common representative information system in 1965 for the determination of incomes and business analysis of agricultural enterprises and thereby to facilitate the implementation of the Common Agricultural Policy. This system is called the Farm Accountancy Data Network. Each member state is obliged to supply relevant data to this information system. Data concerning nearly 60 000 agricultural enterprises are now collected in the 15 current member states of the EU, partly to comply with the mentioned obligation and partly for own internal purposes of the various member states. The units surveyed represent a universe of farms of approximately four million. Data suppliers are volunteers wishing to join the network, their selection is based on a certain set of criteria. These participants supply their accounting data for the purposes of the network. Thereafter, these data are handled anonymously, strictly adhering to data protection regulations, and are used for statistical purposes exclusively. Although data collection practices in individual countries may deviate to some extent from the system applied at the Community level (i.e. in Brussels), the common FADN receives data with uniform content and format, following certain conversion procedures.

Subsequent to the political changes of the late 1980s and early 1990s, information on the financial, property and income status of the newly established or restructured agricultural business entities in Hungary, and on the changes therein was scarce, even though various agricultural and non-agricultural organisations – including educational institutions, research institutes, consultants, trade unions and financial institutions – would have welcome such data. There has been (and there still is) an urgent need to remedy this situation, not solely on account of internal demand but also in order to facilitate the integration of the country into the EU.

Striving to resolve this problem, in 1995 the Ministry of Agriculture commissioned the Research and Information Institute for Agricultural Economics (RIIAE) to commence the establishment of the EU's FADN network in Hungary. Later, Act CXIV of 1997 on the development of the agricultural sector set forth the creation of such a network and thus lay the legal foundations of the system. The term commonly used in Hungarian for the network (tesztüzemi hálózat – pilot farm network) follows a German pattern. RIIAE started this work in 1996, covering more and more counties and data supplier units in its statistical assessment. A considerable number of foreign experts were also involved in the projects (PHARE, TRANSFORM) aimed at resolving various methodology and organisational issues. Through a process of gradual evolution, the network reached national coverage by 2001, collecting data from nearly 1900 agricultural enterprises. The data processed are summarised in the Institute's annual publications, edited both in Hungarian and English. The most important findings of the analyses performed are incorporated into the relevant ministerial reports on the status of the agricultural sector. The country progress reports issued by the Commission of the EU have repeatedly featured positive comments regarding the development of the FADN system.

METHODOLOGICAL ISSUES RELATED TO FADN

From the perspective of achieving the objectives of the agricultural policy, the point of reference should be market oriented enterprises with professional management, reaching or exceeding a certain threshold size. Even if such units represent a minority in number, they account for the overwhelming majority of total production. The mentioned threshold size is set individually for each country, and is used as the lowest value at which a holding can be considered for the purposes of FADN. A sample is taken of the units reaching or exceeding the threshold value in size and constituting the so-called field of observation. Detailed surveys are then conducted with respect to this sample. The threshold size is to be specified so that the field of observation consists of 'commercial' farms i.e. farms generally ensuring the full-time employment of one producer and acceptable income for him and his family members.

To be able to exactly specify the assessed population, as well as to effect classification according to farm size, it is necessary to formulate a measure of farm size which can be applied to all types of agricultural enterprises regardless of their activity. It is commonly known that natural (or physical) parameters (such as the size of land, number of animals, number of employees, volume of produce sold) are unsuitable for comparing the size of enterprises with different activities and using different production procedures. Therefore, a unit of measurement convertible into pecuniary value was introduced to characterise the economic size of a farm, called the European Size Unit (ESU).

The interpretation of such a European size unit rests on the concept of Standard Gross Margin (SGM). SGM is a reflection of the unit of production volume, and is related to the value added, in that it equals the gross output less direct variable costs. The qualification standard signifies that these values are not defined for individual production units but rather as a normative value calculated from the average of figures from farms across various regions and from several years. The size unit is computed in each EU member state centrally, and in the majority of cases by a designated research institute (in Hungary RIIAE is responsible for calculation). The SGM value corresponding to the unit of production (e.g. one hectare of wheat or one dairy cow) is multiplied by the actual production volume of each farm. Thereafter, the respective values for individual product groups are summed up to arrive at the total SGM of the given production unit. The total SGM of a farm is a function of two factors, namely, the physical size of each sector, and the mean (statistical) profitability of production (the individual profitability of the farm in question does not bear significance here as normative values are used). Through the application of the SGM concept, the multifaceted elements of farm size are translated into computable and comparable figures.

At present, the European Size Unit is set at EUR 1200 of Standard Gross Margin (the value of 1 ESU, expressed in euros, can be subject to modification depending on the rate of inflation). We should note that the method set out in the foregoing for the calculation of total SGM is suitable, in addition to assessing farm size, for defining another major characteristic of production: that of the farm's profile (type of farming). This latter is achieved by examining whether there are any sectors or sub-sectors that provide the predominant portion of the SGM value. If, for instance, at least 66 percent of the SGM

value is generated from the keeping of dairy cows, then the farm can be considered as a specialised dairy production unit. (Where, alternatively, no such predominant sector is identified, the farm will be classified as a production unit with mixed agricultural profile.)

The threshold value (expressed as a multiple of ESU) varies by member states. In setting such a limit, both the commercial farm size and the so-called coverage requirement need to be considered. This latter means that the farms assessed should cover around 90 percent of overall production, arable land use and the number of employees.

In Hungary, 2 ESUs[3] are defined as the minimum farm size for FADN, meaning the assessment of over 91 thousand production units using a sample of 1900 to 2000 units.

The Annual Work Unit (AWU) is often used as a unit of measurement in calculating the indicators that express the profitability of farms included in the network (and generally in agrarian statistics of the EU). This unit is used to measure work performance: one AWU equals the annual work performance of a full-time employee whose age and health condition permits him/her to perform full-value work. The AWU of part-time workers is calculated by dividing the number of working hours performed by the annual number of working hours normally completed by a full-time employee (which, for Hungarian calculations was 2200 working hours).

A COMPARISON OF PROFITABILITY INDICATORS

The results of the alignment of Hungary's FADN system with EU standards already allow for comparisons between farms in Hungary and EU member states in a uniform system, based on an identical set of indicators. The following sections will set out the development of the most important economic parameters of the Hungarian FADN system, complemented with those based on information from the EU's FADN. Data for Hungary will be compared to the EU average values as well as to data from France, Italy, Austria and Portugal, countries relatively comparable with Hungary in terms of production quality and/or production structure. Data for Hungary relate to the year 2001, while those for the EU to 2000.[4]

The characteristics of production structure

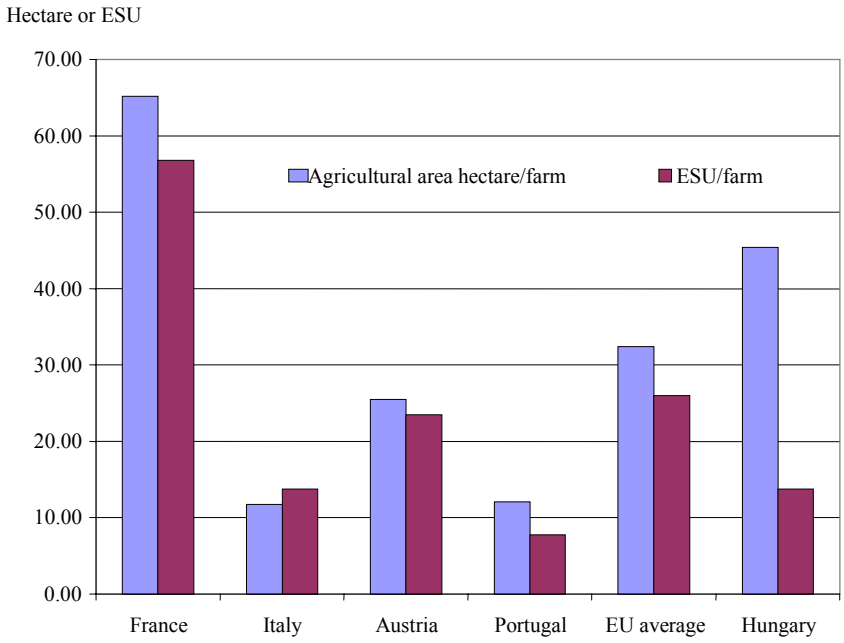
The average cultivation area of the Hungarian assessment is 45.4 hectares, as opposed to the 32.4 hectare EU average. Among the countries studied, the largest production units are found in France, with their 65 hectare average size being over double the EU average, and nearly 1.5 times larger than the average Hungarian farm. The production units of Austria have on average 25.5 hectares of cultivated land, which makes them 20 percent

[3] The corresponding SGM of EUR 2400 (nearly HUF 600 000) could be secured in Hungary, in the average of years 1996 to 1999, by growing wheat on 12 hectares or sugar beet on 4 hectares, or by keeping four dairy cows. In the Netherlands, the threshold size is 16 ESU, while in Germany, France, the United Kingdom and some other EU countries, 8 ESU. The same limit is 2 ESU in Italy, and in Portugal, farms of 1 ESU can already be included in the set of farms under enquiry.

[4] There is no earlier data for Hungary, that is why we had to use a comparison based on data from a single year. Another problem is that the database did not contain information from the year 2000 for three EU member states (Germany, The Netherlands and Greece) at the time when this study was prepared, and therefore EU average contains only the mean figures of 12 countries.

smaller than the Community average, while both Italy and Portugal have average farm sizes at around the 12 hectares (see Figure 1).

Figure 1. Main characteristics of average farm size



When comparing economic production unit sizes expressed in the standard European Size Unit, one is compelled to expect a rather unfavourable situation of profitability of production for agricultural enterprises in Hungary: the economic size of Hungarian farms is no more than half of the EU average (13.7 ESU as opposed to 26.0 ESU). Even if the Hungarian figure equals the Italian and is nearly twice as much as the Portuguese, these two EU member states are characterised by a significantly lower average land size per production than the Hungarian unit (and probably the same is true for other resources). The size of French farms is outstanding even as measured in ESUs.

The relationship between farm size as expressed in cultivation area and in SGM depends on the average per hectare SGM value of the given country. The latter is predominantly influenced by the profitability of production and the structure of production activities (including the intensity of land use, and the density and the composition of livestock) (see Figure 2). This index is the highest in the case of Italy, where nearly 20 percent of all land under agricultural cultivation is occupied by plantations and vegetable fields (with high nominal SGM values): this proportion is double the EU average. In addition, farms in Italy are engaged in highly intensive pig and poultry fattening, as well as milk production. Similarly to Italy, Portugal has a high proportion of plough-land plant cultivation, the effect of this factor on economic size is greatly degenerated by a relatively lower quality of production. As for France, the same indicator barely exceeds the EU15 average despite the high nominal SGM for plantations

and greenhouse vegetable farming. This is the consequence of the low profitability of plough-land plant cultivation and the widespread practice of extensive cattle raising in pastures. The per hectare SGM of Austria is not outstanding in value even if it is 15 percent higher than the EU average, as there is a high proportion of meadows and pastures mainly occupied by cattle-raising related activities. In the case of Hungary, it is both the low profitability and the moderate intensity of production that result in an index not even reaching 40 percent of the EU average.

Figure 2. SGM per one hectare of cultivated land
(SGM/ hectare)

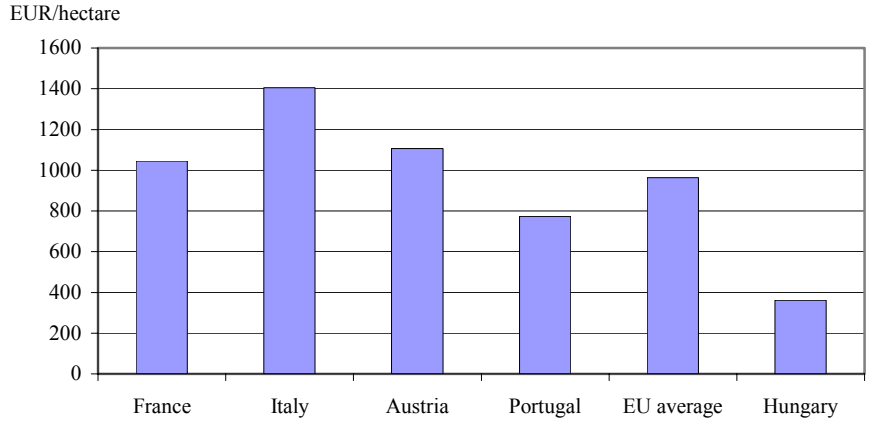


Table 1

Distribution of production units by type of farming
(percent)

Type of farming	France	Italy	Austria	Portugal	EU average	Hungary
			Specialised farms			
Field crops	24.1	30.7	12.8	12.5	23.8	35.1
Horticulture	2.8	3.1	–	3.4	3.5	4.2
Permanent crops	15.3	39.2	8.0	28.1	28.6	7.7
Grazing livestock	37.8	7.9	49.1	13.0	23.3	8.9
Granivores	1.6	0.4	6.2	0.7	1.5	8.1
			Mixed profile farms			
Mixed cropping*	3.9	13.1	4.8	22.4	9.5	12.3
Mixed livestock**	3.2	1.1	7.0	8.3	2.3	10.1
Mixed crops-livestock	11.5	4.7	12.2	11.7	7.5	13.7
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

* With a dominance of plough-land plant production, vegetable and flower growing, vine and fruit cultivation, in various combinations.

** With a dominance of grazing livestock and granivores, in various combinations.

Note: Due to rounding the total can be different from 100 percent here and in the following tables.

Source: Here and in the following tables own calculations based on the FADN Public Database (http://europa.eu.int/comm/agriculture/rica) and on the database of the Hungarian FADN.

Farms in the European Union are characterised by a high level of specialisation. Eighty percent of all farms are specialised in the production of a single product or product group (i.e. more than two-thirds of their SGM is generated from such production), and only 20 percent have mixed profiles (see Table 1). An identical proportion is detected in the comparison of the role of these two groups in generating SGM, where the distribution is the same, 80:20 percent. In Hungary, however, no more than 64 percent of production units are specialised in this respect. The share of such production units in SGM generation (66%) broadly equals their ratio.

Farm structure in the EU (restricting our reference to the farms covered by FADN only) is predominantly characterised by plantations (grape, fruit, tropical fruits, olives), whose share is 28.6 percent, followed by farms specialised in plough-land plant cultivation (23.8%), and farms specialised in cattle and sheep raising (23.3%). In Hungary, plough-land plant cultivation has a dominant share (35.1%) among the 91 000 production units with a size over 2 ESU. This category is followed by mixed profile plant and animal husbandry farms (13.7%) and mixed profile plant cultivating farms (12.3%).

When examining the role of farm groups with various activities profiles in SGM generation, the situation in the EU is dominated by farms specialised in plough-land plant cultivation (28.6%); farms raising animals on mass fodder rank second (with 27 percent); while the share of plantations is a mere 15.7 percent even if these comprise the most populous group (this indicates their relative scatteredness) (see Table 2). In Hungary, the group of plough-land plant cultivation is not only the most numerous group but has the highest share in SGM generation (32.1%) as well. The second place is occupied by mixed profile plant production and animal husbandry farms (17.8%), whereas the third place is occupied by pig and poultry farms (17.6%), whose share in SGM generation is over double that of their ratio (which implies, along with a relatively lower sectoral profitability, that a smaller portion of actors controls a greater part of production). The share of mixed profile plant farms in SGM generation (7.9%) is, however, significantly lower than their ratio.

Table 2

The distribution of SGM by type of farming
(percent)

Type of farming	France	Italy	Austria	Portugal	EU average	Hungary
	Specialised farms					
Field crops	29.2	31.1	15.6	16.4	28.2	32.1
Horticulture	6.1	9.1	–	5.4	6.2	2.9
Permanent crops	16.9	28.5	8.2	23.8	15.7	4.6
Grazing livestock	25.2	11.5	37.1	18.7	27.0	8.5
Granivores	1.9	1.8	10.2	7.2	4.1	17.6
	Mixed profile farms					
Mixed cropping	4.4	10.3	6.0	14.0	5.5	7.9
Mixed livestock	3.5	1.3	7.8	5.3	2.8	8.7
Mixed crops-livestock	12.8	6.5	15.1	9.4	10.5	17.8
Total	*100.00*	*100.0*	*100.00*	*100.00*	*100.00*	*100.0*

Let us proceed to examine the distribution of the number of farms and SGM generation across the various size categories (see Tables 3 and 4).

Table 3

The distribution of farms by the various size categories
(percent)

Activity profile	France	Italy	Austria	Portugal	EU average	Hungary
0 – <4 ESU	–	32.2	–	64.02	23.6	55.1
4 – <8 ESU	–	28.0	–	18.91	19.6	25.9
8 – <16 ESU	15.6	19.0	44.1	9.73	19.4	10.8
16 – <40 ESU	43.3	14.3	44.8	5.34	21.2	4.7
40 – <100 ESU	32.8	5.3	10.9	1.64	12.5	1.7
>= 100 ESU	8.3	1.3	0.3	0.36	3.8	1.8
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Note. The table corresponds exclusively to farms in the field of observation. As the threshold size in France and Austria is 8 ESU, the table does not contain data for farms smaller than that size, even though such units actually exist. The threshold value is 2 ESU in Italy and Hungary and 1 ESU in Portugal. Therefore, row 1 of the table (0 – < 4 ESU) shows only the number of farms larger than the threshold value.

Table 4

The distribution of SGM by the various size categories
(percent)

Activity profile	France	Italy	Austria	Portugal	EU average	Hungary
0 – <4 ESU	–	7.46	–	24.77	3.01	11.3
4 – <8 ESU	–	11.75	–	16.04	4.67	10.6
8 – <16 ESU	4.18	15.67	22.54	16.21	9.31	8.8
16 – <40 ESU	25.68	26.05	50.22	19.39	23.16	8.5
40 – <100 ESU	42.80	22.69	25.76	13.84	31.62	7.5
>= 100 ESU	27.34	16.38	1.48	9.74	28.22	53.4
Total	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.0*

Our comparison will not be perfect due to the differences in the size of threshold values, but considering that the farms under review generate at least 90 percent of production in all cases, we can ignore the rest for the time being, at least for the purposes of this comparison. The farm structure of France appears to be the most balanced. The distribution of the number of farms converges to their standard distribution. The majority of farms belongs to the medium size category, and they are characterised by considerable economic weight (expressed in their share in SGM generation). At the same time, farms of smaller and larger sizes are also represented in sufficient numbers at both ends of the scale. The size of large farms is also appropriate as they generate 27 percent of SGM, with their 8 percent ratio. The farm structure of Austria is already less symmetric, showing a dominance of the lower size category both in terms of number and economic weight. As for the other three countries, each is characterised by a fragmented farm structure. It is doubtless that Hungary shows the most peculiar pattern namely the great

majority of farms, i.e. over 80 percent are classified in one of the two lowermost size categories, while bearing little weight in economic terms (a 12 percent share in SGM). The medium size category is characterised by a low number of farms and similarly by low economic significance. Another extremity is that the less than 2 percent of farms in the highest size category represent 53 percent of the total SGM generation.

Profitability

In Hungary, the per hectare gross output is two thirds of the EU average, but still 15 percent higher than the Portuguese figure. At the same time, the per hectare value of intermediate consumption is closer to EU values, even at given certain necessary economising measures. This indicator in Hungary is higher than 90 percent of the Community average, and more than 70 percent higher than the corresponding index of Portuguese farms. While according to the European average, each one euro of intermediate consumption is matched with EUR 1.85 output, the same proportion in Hungary is only 1.35. This is a composite effect of the difference between agrarian and industrial price levels, and low cost efficiency.

Table 5

Determination of income indicators
(EUR/hectare)

Indicator	France	Italy	Austria	Portugal	EU average	Hungary
Gross output	1730.2	2388.8	2134.2	926.1	1571.5	1062.7
– Intermediate consumption	1002.9	997.0	1071.1	461.0	850.7	787.4
– Depreciation	278.3	375.7	495.6	159.3	229.5	69.6
+ The balance of current subsidies and taxes	267.4	340.1	615.3	154.3	274.9	45.9
= Net value added	716.4	1356.2	1182.8	460.1	766.3	251.6
– Cost of external factors*	305.7	221.3	166.9	114.7	245.9	197.8
Of which: wages	121.2	149.9	46.0	86.0	120.1	139.4
+ Balance of subsidies and taxes on investments	15.5	8.9	-46.2	33.5	5.9	8.6
= Family farm income**	426.3	1143.8	969.7	378.9	526.3	62.4
Gross farm income***	547.4	1293.8	1015.7	464.9	646.5	201.8

* Wages and related costs paid after external labour force; rental paid for land and agricultural buildings; interests paid.

** As neither the wage costs related to the use of work time of family members nor the cost of land and capital held by the family are considered as costs, this indicator is only partially suitable for comparisons between family farms and associated enterprises or the integrated evaluation thereof.

*** To somewhat compensate for the 'distortions' caused by the previous indicator, the costs of employee wages and related costs are not considered here (indicator is not used in the EU FADN).

The net value added is calculated as the gross production output less intermediate consumption and depreciation (in Hungary this latter value is no more than 30 percent of the EU average per each hectare). Net value added is EUR 252 per hectare in the case of Hungary, as opposed to the EUR 766 per hectare EU average (see Table 5).

The differences in net value added are, not in an insignificant manner, caused by the differences in the extent of subsidies less taxes. In Hungary, this latter value, expressed as a per hectare figure, is a mere 17 percent of the EU average. Had the per hectare net

current subsidies reached the EU average, Hungary's net value added would have exceeded the Portuguese value by 4 percent.

The indicator of family farm income is not suitable for the purposes of a comparison between Hungary and the EU member states, on the account of differences in the legal regulations concerning property and labour. The same is apparent in a larger than realistic disadvantage reflected by the indicator: the EU average is more than eightfold of the Hungarian value. The per hectare gross farm income is an indicator reflecting the reality better, it suggests a 'mere' over threefold difference in favour of the indicator in the EU.

Although the profitability indicators calculated per each unit of cultivated land allow for valid comparisons, they fail to provide a complete account of the profitability status of the enterprises concerned. In order to produce a more faithful assessment, the efficiency of the use of other resources should also be examined. From a Hungarian perspective, the results are exceptionally favourable if one examines the development of income as compared to fixed assets or the total asset value. In Hungary, the value of per hectare total fixed assets is only a fraction of the corresponding EU average (see Table 6). This is due, among other factors, to a relatively low level of land prices, as well as to a higher proportion of land on lease than in an average EU setting, furthermore to the fact that the value of land on lease is not considered according to Hungarian accounting standards. Yet, the fact that the value of buildings, breeding stock, machinery and current assets is significantly lower than the EU average reflects an actually worse condition of equipment on the part of Hungarian producers, coupled with outdated and highly depreciated means of production.[5] Nevertheless, Hungary's gross income per unit of asset value is higher than either the EU average or the same figure in any of the member states examined. At the income per unit of labour force, we are confronted with the same situation as in the case of projecting our calculations to the area of cultivated land: the Hungarian figure is barely higher than one third of the EU average.

Table 6

Data related to the profitability of assets and labour force

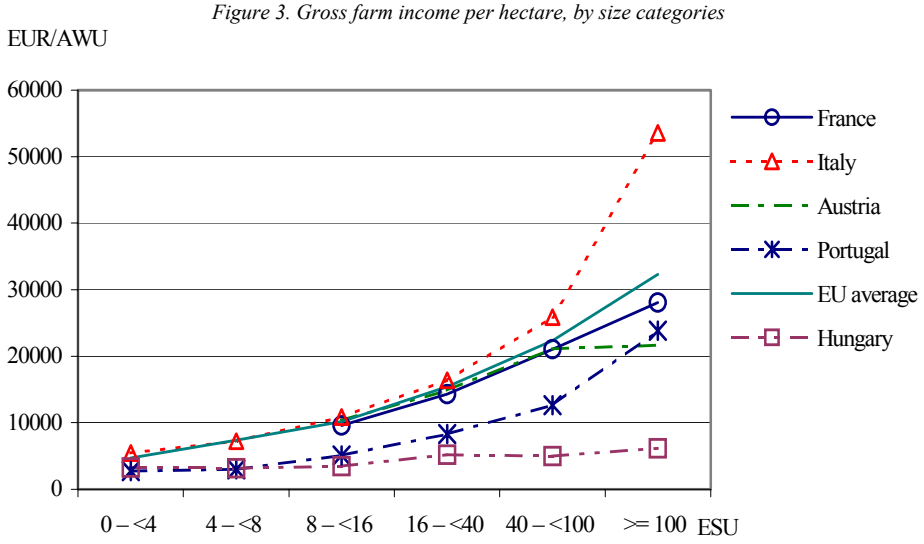
Indicator	France	Italy	Austria	Portugal	EU average	Hungary
Total asset value (EUR/hectare)	4 174.0	24 305.2	11 183.1	4 042.0	8 354.0	1 189.9
Of which:						
land and permanent crops (EUR/hectare)	787.7	18 486.5	2 821.1	2 266.8	4 853.5	203.2
buildings (EUR/hectare)	613.0	2 301.3	4 898.0	479.4	1 033.2	250.5
machinery (EUR/hectare)	726.6	1 698.4	1 872.6	607.7	759.9	283.6
breeding livestock (EUR/hectare)	424.5	354.5	278.7	172.5	341.1	92.7
current assets (EUR/hectare)	1 622.3	1 464.5	1 312.8	515.6	1 366.4	359.97
Labour force utilisation (AWU/100 hectare)	2.8	9.4	7.2	10.3	4.3	4.3
Gross farm income (EUR/100 EUR total asset value)	13.1	5.3	9.1	11.5	7.7	17.0
Gross farm income (EUR/AWU)	19 610.4	13 760.9	14 076.1	4 500.0	15 177.5	4 679.7

[5] Another reason could be for the different valuation of capital assets, as these are carried out in the EU FADN system at replacement value, while the Hungarian FADN book value is based on the actual purchase price (and is re-valued from time to time). The lag of Hungary in terms of the value of per hectare capital assets would be somewhat lesser if a uniform valuation method were applied.

As a general rule, the efficiency of production increases parallel with an increase in the holding size. This phenomenon can be explained in terms of advantages such as fuller employment allowed by larger farm sizes, as well as better capacity utilisation, and nominal savings effected in complementary capital expenditure etc. As for the factors of production and income per unit of land area, these effects are not necessarily present, as the smaller the dimensions are the more intensive land cultivation becomes.

For a proof of the existence of such an economy of scale, on can see the data distributed by holding sizes (see the Appendix). The indicators of the EU member states, apart from some minor fluctuations, suggest an advantage on the side of larger holding sizes. The same holds true for Hungary, too, although the differences are significantly slighter. It is exceptionally conspicuous that the larger Hungarian holdings have yet failed to generate such an impressive improvement in the efficiency of live labour utilisation as witnessed in Western Europe, where the gross operating income per unit of labour force is nearly tenfold if the two extreme size categories are examined, while the same difference in Hungary is lower than double (see Figure 3).

Figure 3. Gross farm income per hectare, by size categories



As a consequence of the differences in the nature of various activities (sectors), it is highly difficult to compare the efficiency of land use, even if this is the most fundamental element of agricultural production. Yet we should formulate an obvious conclusion, namely that on the basis of net value added per unit of land (and gross operating income) vegetable farms are by far the most efficient, while plough-land plant producers, who receive the majority of community funding, are found at the rear end of the list.

Considering all EU member states, the indicator of gross income per unit of asset value is similarly the most favourable in farms specialised in vegetable growing, while in terms of labour force efficiency, holdings raising livestock on grain feed rank first. We may therefore conclude that the competitive position of a sector is not defined by direct income support provided by the European Union. The two production categories

receiving the highest level of funding (i.e. plough-land plant growing and mass fodder based livestock farming) are found in the middle rank as far as the efficiency of labour force is concerned, and among the very last ones in terms of the efficiency of asset use.

The result is the same when examining the situation in Hungary. Vegetable farms rank first with respect to each profitability indicator, and the situation of grain feed based livestock farms has so far been also favourable. The lowest ranking groups are comprised of cattle and sheep farms, as well as plantations.

CHANGES IN INCOME FOLLOWING THE ACCESSION TO THE EU

The redemption of fixed assets, as well as the appropriate employment of current expenditure will continue, even following Hungary's accession to the EU, to be dependent on general economic conditions and competitiveness. The question is even more intriguing as substantial changes are expected to take place in both of the mentioned areas. The approximation of input and output prices will continue, the fluctuation of prices will even out due to the institutional prices and the system of intervention. The system of community support is heading for dramatic changes, while competition is ever more obviously getting accelerated in every sector. The development of income generation and self-sustainability will depend on the composite effect of all these factors. Still, the key element appears to be the success of accommodation to such changes from the part of the producers.

Income expected from price revenues

According to *Mária Orbánné Nagy*, 'The producer prices of the European Union and Hungary have undergone considerable approximation in the 90s, particularly in the second half of the decade' (*Orbánné*; 2002. p. 15.).[6]

The highly differentiated approximation of producer prices (15-30 percent on average) was a consequence of decreases in the EU prices and increases in prices on the Hungarian market. As early as in 2000, the relative price levels triggered diverse reactions on the part of the Hungarian producers: hopefulness in some, and anxiety in others, as regards their expected competitiveness. In 2000, years before the actual accession the price advantage of Hungarian goods diminished and even competitive disadvantages evolved in the case of certain products. At this time, the categories where Hungarian producers had competitive advantage (i.e. lower prices) contained cattle for slaughter, sugar beet, and the majority of vegetables and fruits. Yet, there was but a slight advantage, at an annual average, in terms of pig for slaughter, chicken for slaughter, lamb, potatoes, eggs and sunflower. The prices of these products were, in certain periods during the late 90s, higher in Hungary than the comparable prices in the market leading countries. The producer prices of the rest of the products fluctuated at around the EU15 average, with more frequently lower than higher prices.

[6] „Az Európai Unió és Magyarország mezőgazdasági termelői árai között jelentős közeledés ment végbe a kilencvenes évtizedben, különösen az évtized második felében."

Such a relatively fast adjustment of prices (along with the associated cost pressure) continued unabated after 2000, and is expected to do so up to the date of EU accession, and even beyond. According to the estimates of prestigious agrarian forecast organisations (FAPRI, OECD, EU, FAO), as well as of Hungarian professionals, any effective price advantage remains up to 2003, the time of accession, only applies in the case of certain vegetables and fruits, cattle for slaughter, maize and sugar beet.

Table 7

Producer prices in Hungary and the EU, 2003
(EUR per 100 kilograms)

Product	Price in Hungary	Weighted price of EU 15	Hungarian price in percent of EU price
Cattle for slaughter	84	105	80
Pig for slaughter	105	105	100
Chicken for slaughter	72	75	96
Lamb	200	200	100
Cow milk (3.6 percent)	27.2	29.0	94
Egg	5.2	5.8	90
Wheat	10.5	11.2	94
Barley	10.2	11.0	93
Maize	930	11.8	76
Rice	29	28.6	101
Potato	12	13	92
Sugar beet (tonnes)	25	41	61
Sunflower seed	19	19.5	97
Onion	1 405	23.0	63
Tomato	37	62	60
Cucumber	43	43	100
Apple	23	35	66
Pear	19	45	42

Source: *Orbánné* (2002).

Despite of the fast approximation of prices, the increase of market prices may, in theory, lead to extra incomes following the EU accession, precisely as an effect of the accession. Such a theory may be true in practice, as well. However, one must consider that the greater part of such an increase in the output prices will be absorbed by the additional costs related to the EU accession. Unfortunately, the phenomenon of the gap between the prices of industrial and agrarian goods is not unknown in the EU, either. At the time of accession (and thereafter), nearly all input materials will become more expensive, with the single exception of diesel oil. There will also be an increase in the prices of feeds, fertilisers, spare parts, medications for animals etc., which means that the situation of realistic pricing will hardly satisfy producers' hopes for extra income. And, what is more, a number of effects resulting in increase of costs will emerge: some new and some already existing ones, all intensifying in their impact. Such costs will include those of live labour, prices of land, rentals, as well as the capital expenditure on projects related to market access, environmental protection, and compliance with regulations on animal welfare. In

conclusion, the market price movements expected in connection with EU accession offer but the slightest hopes of alleviating the current scarcity of income.

The expected effect of supports on income

Assistance from the state, both in the practice of the EU and Hungary at present, are focused, in the long term, on the approximation of the level of income to that of other sectors of the economy, beside other, specific professional objectives. Yet, this approximation has not been extremely successful. Given the current market situation with no access to such support, farms would soon become bankrupt massively both in the EU and in Hungary. Therefore, it can be stated that the system of financial self-sustainability is not a realistic target in the agrarian sector, especially in respect of the most important agricultural activities. Both profitability and the development of income generation capability depend heavily on state assistance. The level of such support had always been lower in Hungary than in the competitor countries, and it was further reduced in the years following the transition. Having experienced the 'outcome' of such policies, the nominal amount of assistance kept growing from one year to another. Yet, this has not been sufficient to ensure a proportionate growth of corporate and personal income or to alleviate the serious shortage of income, mainly due to the gap between industrial and agrarian price levels, as well as falling levels of efficiency. The state support in agriculture was:

average of years 1994 to 1997	81.9
1998	110.6
1999	137.1
2000	137.6
2001	191.8
2002	204.5
2003 (projected)	234.9 billion HUF.

It seems that the support available in the years 2002 and 2003 will not mean a breakthrough in terms of increasing solid income. And to make things worse, neither the improvement of long-term competitiveness is possible, nor is the effective resolution of short-term problems. Therefore, more income insufficiency in the future is almost inevitable. The only hope for any substantial change lies in the EU accession and the consequent changes in the conditions of the support system. Based on all the information available at present, the likelihood of such a positive change is now increasing, but according to reasonable estimates it will only take place some time after 2005, while a high level of uncertainty remains as regards the first years of the membership, especially in 2004 (see Table 8).

Pursuant to the prevailing agricultural law, the Hungarian agrarian sector will be entitled to a total of HUF 260 billion of state support in 2004, depending on the rate of economic growth and inflation. This amount is becoming available through normative market regulatory actions undertaken by the EU, as well as direct payments, efforts targeting rural development, and the related additional national payments announced in the course of the negotiations. From the perspective of support, this means, certainly with some oversimplification, that the situation will not vary from that before accession. It is evident that the level of income will also be similar. Therefore, no quick quality improvement can be

expected from the influx of such an amount. There are, however, two areas where substantial changes may occur. Firstly there is the option to increase this HUF 260 billion assistance amount by additional support given in national competence, which would undoubtedly improve the income balance of the sector as compared to the situation before accession. Secondly, the structure of support will undergo radical reforms, and so will the related mechanisms of spending these amounts. The share of support directly linked to certain products (sectors) will increase. Another positive effect can be a strong concentration of assistance in favour of cereals, as well as plants with high oil and protein content, together with meat cattle. One outcome is easy to foresee: the income status and financial self-sustainability of farms specialised in the mentioned products are likely to improve. There is an also positive expectation, namely, that the change in the support structure, as well as a stricter surveillance over the utilisation of central aid, will trigger a positive impact on welfare, which may become evident also in the form of extra income.

Table 8

Possible level of assistance in 2004–2005
(HUF billion)

Denomination	In 2004			In 2005		
	EU	additional national support	total	EU	additional national support	total
Market actions	25	–	25	25	–	25
Direct payments	70	85	155	85	85	170
Of which						
plant cultivation	65	79	144	78	78	156
animal breeding	5	6	11	7	7	14
Rural development*	60	16	76	67	19	86
Of which						
complementary action	40	6	46	43	7	50
structural funds	20	10	30	24	12	36
Total	155	101	256	177	104	281
National assistance	-	.	.	–	.	.
Sum total	155	.	.	177	.	.

* With actual utilisation rates between 40 and 60 percent.

As far as incomes are concerned, the future handling of problematic product sectors subsidised in the current system, but not in the EU (such as pig or poultry breeding), will entail increased risk and uncertainty. The income status of these product groups is not much improved by the fact that the income position of the agricultural sector as a whole is expected to become more favourable as regards central support from 2005 onwards.

Total income from agricultural production

The total magnitude of income realised from agricultural production in Hungary, and the changes likely to take place can be estimated using the Economic Accounts for Agriculture System (EEA) based on a uniform methodology applied by EU countries.

Our calculations for a forecast for 2004 were based on the revised EEA data compiled by the Hungarian Central Statistics Office (HCSO). Computations were performed according to the models HUSIM (Hungarian Simulation Model) and OPAL (Operative Political Analysis System) a computerised model of the Agricultural Accounts System operated by RIIAE.

According to the results of such modelling, it can be forecast that market actors react to changes in a favourable manner, but are compelled to compete with the former member states without being granted additional national support, both gross and net value added will drop by 2-3 percent due to a forced selection in favour of critical branches, while the net income of enterprises would suffer a 15 percent fall.

Our forecast is different if we consider the additional national support that has been undertaken and that is directly linked with individual product groups. This very likely scenario would mean that both value added and producer's income would increase (on account of the altered composition of sector-linked and non-sector-linked aid), as follows. A moderate rise in prices and improved efficiency, coupled with HUF 85 billion in national top up assistance, would result in EEA calculations in a 7 to 9 per cent increase in both gross and net value added and producers' income (which, in the case of private farms, includes wages, making it a mixed content income) in the year 2004, as compared to figures from 2001. Moreover, this positive effect may become even more accentuated if community and top-up national support can be supplemented by other assistance granted with national competence. Evidently, we must add that this increment, constituting a theoretical possibility, is a calculated income, induced by restructuring in the assistance model (i.e. a decrease in functional support in favour of product-related support). Any effective income increase can only be expected if the earlier system (in Hungary) proves itself to have been overspending, and the lack of funds will not be visible in the area they are taken away from. In any other event, this positive development remains a mere play with methodology, meaning nothing more than taking money out from one pocket and placing it in the other.

To sum up, a statement can be formulated concerning agricultural income: in the largest product group of Hungarian agricultural production (that of cereals and plants with oil, protein and fibre content) profitability will improve as early as 2004, and even more so thereafter, resulting in a consolidation of financial self-sustainability. As for the product groups not affected by the CAP aid (such as pig and poultry breeding, as well as the majority of vegetables and fruits), entry into the unified European market will primarily mean greater competition, with all the inherent opportunities and risks. The future and income generating capability of the area of these product groups will depend on external factor (i.e. support available from the Hungarian national budget), as well as the competitiveness of private and associated enterprises. In order to effectively improve competitiveness, however, more factors are needed including capital expenditure in support of increased efficiency and market access, as well as strong interest representation and cooperation among producers. We must not forget that a long-pending fundamental restructuring should also be undertaken in these latter product groups if the Hungarian agricultural sector is to improve profitability. The farms with the lowest level of organisation and productivity must discontinue their present activities, allowing their markets and means of production to be taken over by more efficient production units. This is the only

way of restructuring that has the promise of any extra income for producers. If such a process is appropriately controlled and speedy enough, then the income of product groups receiving CAP assistance and exposed to greater competition will be higher already in 2004–2005 than in the years preceding the accession.

APPENDIX

Table A 1

The income indicators of farms participating in FADN, by size categories

Country	0 – <4	4 – <8	8 – <16	16 – <40	40 – <100	>= 100
	ESU					
France						
Gross output (EUR/hectare)	-	-	1 223.9	1 433.9	1 702.9	2 199.6
Net value added (EUR/hectare)	-	-	521.5	588.7	681.2	958.8
Gross farm income (EUR/hectare)	-	-	469.4	476.5	507.0	715.9
Gross farm income (EUR/100 EUR total asset value)	-	-	11.8	11.5	12.5	16.1
Gross farm income (EUR/AWU)	-	-	9 571.1	14 295.8	21 030.7	28 045.2
Italy						
Gross output (EUR/hectare)	1 776.0	1 946.2	1 838.2	2 368.2	2 941.1	3 744.1
Net value added (EUR/hectare)	982.9	1 045.0	1 047.6	1 251.5	1 567.3	2 592.0
Gross farm income (EUR/hectare)	939.3	1 020.3	1 009.4	1 193.3	1 473.6	2 452.4
Gross farm income (EUR/100 EUR total asset value)	3.7	4.0	4.8	5.4	6.0	8.0
Gross farm income (EUR/AWU)	5 479.2	7 240.9	10 883.5	16 369.9	25 886.9	53 555.8
Austria						
Gross output (EUR/hectare)	-	-	2 121.2	2 109.6	2 223.2	1 653.4
Net value added (EUR/hectare)	-	-	1 192.0	1 183.5	1 187.6	834.6
Gross farm income (EUR/hectare)	-	-	1 034.9	1 040.6	964.2	581.2
Gross farm income (EUR/100 EUR total asset value)	-	-	7.7	9.4	10.8	9.4
Gross farm income (EUR/AWU)	-	-	10 348.7	14 888.2	21 089.4	21 654.9
Portugal						
Gross output (EUR/hectare)	764.3	1 031.4	944.2	1 067.3	929.9	971.5
Net value added (EUR/hectare)	417.1	488.3	466.1	490.1	415.1	566.3
Gross farm income (EUR/hectare)	480.0	477.7	454.3	475.6	390.3	527.4
Gross farm income (EUR/100 EUR total asset value)	8.4	8.6	13.1	15.1	17.6	21.3
Gross farm income (EUR/AWU)	2 729.4	2 976.2	5 088.7	8 292.7	12 641.8	23 853.0
EU average						
Gross output (EUR/hectare)	1 286.2	1 436.4	1 198.2	1 314.2	1 568.3	2 186.5
Net value added (EUR/hectare)	747.6	860.9	650.7	661.3	705.3	1 026.7
Gross farm income (EUR/hectare)	744.6	836.4	598.2	579.9	564.8	806.3
Gross farm income (EUR/100 EUR total asset value)	5.1	5.4	6.1	7.7	8.7	9.7
Gross farm income (EUR/AWU)	4 706.9	7 399.0	10 183.5	15 437.8	22 360.7	32 312.0
Hungary						
Gross output (EUR/hectare)	901.6	842.9	825.9	1 031.1	1 050.8	1 229.3
Net value added (EUR/hectare)	263.4	187.4	150.1	198.6	185.1	309.5
Gross farm income (EUR/hectare)	239.7	167.4	126.8	160.4	140.5	235.1
Gross farm income (EUR/100 EUR total asset value)	14.1	11.7	9.6	10.0	13.6	26.3
Gross farm income (EUR/AWU)	3 292.9	3 161.2	3 468.9	5 173.5	5 000.1	6 162.2

Table A 2

The income indicators of farms participating in FADN, by activity profiles

Country	Specialised farms					Mixed profile farms		
	field crops	horticulture	permanent crops	grazing livestock	granivores	mixed cropping	mixed livestock	mixed crops-livestock
France								
Gross output (EUR/hectare)	1 087.7	28 362.7	7 622.1	1 205.3	11 828.2	1 866.82	3 067.48	1 460.52
Net value added (EUR/hectare)	474.5	11 736.5	3 941.1	485.4	2 168.0	762.03	796.26	529.19
Gross farm income (EUR/hectare)	324.0	11 001.9	3 164.3	380.9	1 550.9	589.95	596.36	384.74
Gross farm income (EUR/100 EUR total asset value)	12.8	43.5	15.9	10.4	12.2	13.86	10.75	11.55
Gross farm income (EUR/AWU)	19 911.5	21 710.4	24 637.8	16 088.2	21 550.0	17 854.5	18 014.51	18 696.6
Italy								
Gross output (EUR/hectare)	1 267.8	31 305.5	3 613.7	2 428.4	19 706.7	2 185.2	2 822.3	2 397.7
Net value added (EUR/hectare)	818.1	17 130.0	2 471.2	1 015.1	7 102.4	1 359.1	1 242.5	1 174.7
Gross farm income (EUR/hectare)	745.6	16 750.0	2 419.6	967.3	6 957.0	1 309.0	1 180.2	1 109.3
Gross farm income (EUR/100 EUR total asset value)	3.3	16.8	6.3	6.1	8.5	5.0	5.9	6.4
Gross farm income (EUR/AWU)	11 571.9	17 914.4	13 127.7	18 925.5	51 639.7	10 471.7	15 962.8	16 823.2
Austria								
Gross output (EUR/hectare)	1 164.6	-	7 254.4	2 538.1	2 719.6	2 144.7	2 376.5	447.0
Net value added (EUR/hectare)	783.6	-	2 475.5	1 305.6	1 412.9	926.9	1 237.9	1 119.9
Gross farm income (EUR/hectare)	623.5	-	2 184.0	1 182.4	1 171.3	752.5	982.3	928.8
Gross farm income (EUR/100 EUR total asset value)	10.7	-	10.1	8.9	7.4	8.9	7.2	9.9
Gross farm income (EUR/AWU)	19 207.4	-	13 423.4	12 752.9	15 639.3	12 883.3	12 158.9	16 982.9
Portugal								
Gross output (EUR/hectare)	1 108.8	5 565.2	994.3	789.1	23 651.3	945.2	594.8	591.1
Net value added (EUR/hectare)	630.3	2 401.9	565.9	304.1	5 435.5	470.0	343.5	351.1
Gross farm income (EUR/hectare)	598.3	2 402.6	565.9	280.1	5 762.9	538.6	331.5	396.6
Gross farm income (EUR/100 EUR total asset value)	16.8	21.0	9.4	11.0	21.0	9.6	9.9	13.6
Gross farm income (EUR/AWU)	6 670.2	4 513.9	4 082.0	4 945.5	12 493.0	3 114.3	2 911.5	5 566.7
EU average								
Gross output (EUR/hectare)	989.9	26 226.7	3 355.8	1 171.5	10 141.8	1 645.6	2 738.6	1 459.3
Net value added (EUR/hectare)	528.7	13 000.0	2 140.4	510.0	3 081.3	951.7	937.9	610.6
Gross farm income (EUR/hectare)	408.6	12 380.8	1 967.6	418.1	2 596.2	876.1	751.0	480.7
Gross farm income (EUR/100 EUR total asset value)	5.6	24.3	10.0	6.6	12.2	7.5	8.6	7.7
Gross farm income (EUR/AWU)	16 202.6	17 306.5	14 237.4	14 606.6	32 747.2	11 273.6	13 813.1	16 411.8
Hungary								
Gross output (EUR/hectare)	606.9	2 609.8	1 973.2	1 095.4	7 335.3	870.7	1 673.6	954.5
Net value added (EUR/hectare)	147.0	1 157.1	522.9	223.0	1 258.7	316.7	496.8	205.7
Gross farm income (EUR/hectare)	105.5	1 124.6	438.0	183.1	1 042.3	284.4	437.7	155.1
Gross farm income (EUR/100 EUR total asset value)	15.3	36.8	8.0	12.9	21.5	22.4	22.5	15.7
Gross farm income (EUR/AWU)	4 913.9	5 775.8	2 820.8	3 313.0	5 532.0	5 728.0	5 252.1	4 164.1

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PLANTATION CENSUSES IN HUNGARY*

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Viticultural statistics is a part of Hungarian agricultural statistics having a long and eventful history. Though data on vine-growing and vine-production from the period before the Austrian statistical service are also available, confident figures emerged only in the last third of the XIXth century. The censuses of 1895 and 1935, covering orchards the first time along with the vineyards and vine-production, are also important sources of historical data. Censuses of the plantations were conducted in the second half of the 1950s and the first half of the 1960s. Then, after a forty-year gap, the census of 2001, compliant with the EU standards, followed. In addition to the historical background, the author provides a detailed account of the preliminary findings of the vineyard and orchard census of 2001.

KEYWORDS: Plantation censuses; Agricultural statistics; Grape and fruit production.

Due to the favourable climate, grape and fruit plantations, i.e. perennial plant cultures producing yield for several years at a permanent location, occupy a larger portion of the agricultural area in Europe than in other parts of the world. Similarly to the Mediterranean countries, in Hungary grape production is much more important than would follow from the size of the country's population. Meanwhile, in fruit (especially apple) production the difference is a lot less significant.

CENSUSES OF GRAPE PRODUCTION TILL THE END OF THE XIXTH CENTURY

The first written reference to viticulture in Hungary was found in a literary work by *Victor Sextus Aurelius*, a Roman writer who lived in the IVth century. In about 276, Emperor *Probus* commanded his idle troops to drain a marsh in the town of Sirmium of Lower Pannonia (today the town of Mitrovica in Kosovo) and to plant vine-branches in its place. There are other sources proving that vine-growing was introduced in the Carpathian basin by the Romans and then was learnt from them by the people living there. Hungarian documents from the XIth century often refer to data on viticulture, meaning that by that time grape had been grown nearly in the entire country. By the XII–XIIIth

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centuries vine-regions had been formed, among them the most famous ones were the Szerém, Ruszt and Szekszárd regions. Hungarian viticulture and viniculture acquired European reputation in the XIVth–XVth centuries.

Although in areas under Turkish occupation during the XVIth–XVIIth centuries the importance of vine-production decreased, in the northern and western counties it had not only maintained its central role but also underwent some quality improvement. Finer grape varieties were introduced, and this is also the time the famous Tokaj wine dates back to.

The XVIIIth–XIXth centuries brought a rapid growth in the number of villain – especially cottar – vineyards in Hungary, which is attributed to the peculiar legal status of vine-estates and the special features of viticulture. In those days, vine-growing was the most popular form of commodity production of certain strata of the peasantry. Production, however, concentrated mainly on quantity and not quality.

Besides cereals, the commodity that first appeared in the censuses to characterise the agriculture of a certain region was wine. Prior to the establishment of an official statistics organisation, the main purpose for censuses was to levy taxes. The most significant censuses – conducted in 1715, 1720 and 1728 – were ordered by the Hapsburg Emperor, and they already contained figures on the area used by different branches of agriculture, including data on vineyards.

In addition to nation-wide censuses, from 1772 the counties themselves also collected data on the areas of production, which were then sent to the municipalities to form the basis of aggregations for the whole country. The first such report which already contains data on areas used for grape production was dated back to 1780. The figures collected on serfs under Marie Theresa were summarised in a report prepared by the Chancellery in 1786; its findings, however, became only known around the 1890s.

Another important source is the cadaster taken under the rule of Joseph II, which already recorded vineyards owned by the nobility; moreover, it used a uniform unit of measurement (i.e. Austrian acres) for calculating the areas utilised in the various agricultural branches. Even though we cannot reconstruct the entire document, the fact that it has been compiled should be regarded as a milestone in methodology.

At that time, two difficulties had to be overcome in terms of establishing the area of vineyards and the volume of vine-production: the diversity of the units of measurement on one hand and the rudimentary quality of land-survey techniques on the other. Insufficient land-survey techniques, coupled with the missing data of the lands of noblemen up to the end of the XVIIIth century, hampered the construction of a wholesome picture. Despite the availability of sources and techniques for complementing the data, prior to *Károly Keleti* specialists had failed to use them. In fact, figures concerning the Hungarian agriculture – including vineyard areas – at the end of the XVIIIth century and in the early XIXth were chiefly based on the reports submitted to the Emperor in 1789.

According to a survey conducted in 1828 – which probably underestimated the area of vineyards – 141 thousand cadastral acres were used for grape production. In 1831 *Ferenc Schams* (who criticised Hungary's backwardness in viticulture and vine-production) put the total area used for grape production to 1.5 million Hungarian acres (this estimation was based on adapted figures). Meanwhile Schams also objected to the fledgling practice of flatland grape production. The works of *Elek Fényes* also cite, with minor

adjustments, data published by Austrian statisticians. Fényes estimated the grape growing area of Hungary at about one million acres.

The most important survey of the era, i.e. the interim land register of 1850, was carried out between 1850 and 1867. However, as this survey only involved the correction of previous data on areas used in the different branches of agriculture and test surveys but no land surveys actually took place, the quality of data later became the subject of criticism.

According to the statement made by the Helytartótanács (Council of directorates) in 1865 – the figures which were probably based on the records kept by the financial directorates – Hungarian vineyards totalled 574 thousand cadastral acres. The official Austrian statistical publication titled 'Tafeln zur Statistik der Oesterreichischen Monarchie' (*Statistical Tables for the Austrian Monarchy*) estimated the Hungarian grape production area (without Transylvania, Croatia, Slavonia and Vojvodina) at 400–500 thousand Austrian acres between 1830 and 1865.

The figures published by Károly Keleti in 1867, citing the Ministry of Finance as its source, show that at that time the area used for grape production was 512 thousand cadastral acres.

After the Austro-Hungarian Compromise in 1867 an official Hungarian statistical service was established, which resulted in the regular production of viticultural statistics. At the international statistical congress, held in the Hague in 1869, where Hungary first participated as an independent state, Hungarian statisticians were assigned to develop the methodology for statistics on international viticulture and viniculture. Károly Keleti prepared two projects, one of them elaborated a program for Hungary in detail while the other contained a more general description of surveys to be conducted in other European countries.

The Hungarian program included, as subjects of data collection, the layout of the vineyard, the quality of the soil, the distribution of the grape production area by holder, the estimated price of grapes, the method of cultivation, the varieties grown, the costs of cultivation, the volume of grapes and wine produced, as well as the quality and price of the wine made. Data were gathered by town and city magistrates and forwarded to the Statistical Office for processing. Other, mainly descriptive information was supplied by economic associations and vine-growing specialists. Retroactive data were collected on the counties between 1860 and 1872, while for the year 1883 the number of vineyard holders, the area of vineyards and the volume of wine produced – broken down to white, red and rosé – was stated by town. Contrary to the figure shown in the cadastral survey, Károly Keleti stated that in Hungary 584 000 cadastral acres were used for vine-growing.

It was unfeasible to collect such detailed data on viticulture each year. Therefore in subsequent surveys annual data collection covered only the area, the volume of must produced and sold, the volume of fermented wine by variety, the price of must and wine, and the amount and price of grapes sold. It remained the town magistrates' responsibility to supply the data. This methodology was used up to 1890, but significantly changed owing to the phylloxera that quickly spread during that time.

After a break-out in 1875 in the neighbourhood of the town of Panchova, phylloxera quickly spread and culminated in 1895. Thus, the agricultural census of 1895 recorded data on vineyards at the peak of the vine pest. Of the five volumes publishing the results

of the census, the second devoted a separate study to the issue of phylloxera. According to the survey, vine-growing land in Hungary had shrunk from the 639 000 cadastral acres in 1885 to 286 000 cadastral acres by 1895, i.e. to 45 percent of its former size. The most severe damage was suffered by growers on mountains and hills.

The universal spreading of phylloxera required the inclusion of new questions, such as: area fully destroyed by phylloxera, soil type, productivity of the grape variety, the area of American plantations and questions about other grape diseases. This questionnaire was used until 1904.

The analysis of the results in the previous period indicates that as opposed to the estimated one million acres in the first half of the XIXth century, comparing the statistics on viniculture produced by Károly Keleti and the findings of other surveys, in the first half of the XXth century vine-growing land occupied less than 500 000 cadastral acres. The data published on the areas was only suitable to reflect the differences in land proportions among the regions.

It is difficult to estimate the quantity of wine produced, as the data supplied are not reliable. Given that the annual yield fluctuation is much higher than in the case of other plants, establishing either the actual commodity production or the average production by statistical means would be rather complicated. In the XIXth century, estimates in most cases sought to determine the volume based on the size of the vine-growing area and the average yield.

Among the various methods of calculation, perhaps the most peculiar one was that of *Márton Schwartner,* who tried to establish Hungary's vine-production based on consumption data. According to the population census conducted during the reign of Joseph II, the population of the Hungarian mother country was 7.5 million. Schwartner claimed that children (who did not drink wine) accounted for one-third of the population; another third was made up of the poor and of women, who were not supposed to drink either; and there were half a million people who allegedly disliked wine. Thus, assuming that the remaining 2 million drank one 'icce'[2] (about 0.88 litres) a day, annual domestic consumption was put to 12 million 'akós'[3] (one 'akó' is approximately 57 litres). Schwartner also assessed the quantity of wine exported, used for distillation, as well as deteriorated or unsold wine, and so came to a total of 18 million akós per year.

A Statistical Yearbook published in Vienna established Hungary's wine production at 22 million akós per year for the period between 1829 and 1840. According to the calculations of Elek Fényes in 1847, the amount of wine produced was even higher than before, 28 million akós. In 1865 the Helytartótanács published information regarding the size of the various vine cultivation branches in Hungary, broken down to villages. The appendix of this publication included the volume of wine produced by counties, indicating separately the amount of red, white and rosé. This work assessed Hungary's wine production at 7.4 million akós.

In his viticultural statistics, Károly Keleti embarked on a detailed analysis of harvest results. His calculations showed that in a good year 25 million, in an average year 15 million, and in a weak year 6 million akós of wine were produced in Hungary. 1873, when

[2] Old Hungarian unit of measurement of capacity.
[3] Old Hungarian unit of measurement of capacity.

5.5 million akós were harvested, was considered a bad year. Subsequent surveys, however, did not verify the assumptions of Keleti because his method produced overestimated results.

The Statistical Office has been collecting data on vine-production since 1873. The best harvest so far was the one in 1878 with 12 million akós of wine. Towards the end of the 1880s, vine-production turned to a gradual decline; in the 1890s the quantity of wine produced dramatically fell due to the spreading phylloxera and mildew. The 1895 survey found that merely 2.6 million akós of wine had been produced.

The analysis of figures concerning Hungarian vine-production shows that the closest approximation of the real volume was first given in the 1895 survey, prepared by the Helytartótanács, but actual data was only yielded by the censuses carried out after the establishment of the official statistical organisation.

Previous descriptive statistics omitted the consumption of grapes as a fruit. However urbanisation, the development of transportation and changes in eating habits soon brought about a boom in table-grape production. In the 1860s, for instance, collection of table-grape varieties became something of a trend. The viticultural statistics compiled by Károly Keleti already contained a question about the volume of grapes sold. According to his estimation, during the period between 1860 and 1873 one hundred thousand quintals of raw grapes were sold a year. Adding the amount consumed by the people in the country, he put unprocessed consumption to 300 thousand quintals. Obviously, owing to the phylloxera, this volume also decreased dramatically.

XXTH CENTURY STATISTICS ON VITICULTURE

During the years of World War I, vine-production fell back as grapes were destroyed on nearly 20 thousand hectares while another part of the vineyard deteriorated due to the absence of care. By the mid 1930s, the formerly 220 thousand hectare productive area had shrunk, but it started to expand again by the early 1940s. Following World War II, the area of vineyards decreased yet again, which trend continued until the 1960s. Thereafter, owing to large scale grape planting, the vine-growing area has grown over 200 thousand hectares for a whole decade. During the last quarter of the XXth century production was ceased on more than half of the former production area, which, however, did not result in a proportionate decrease in harvested amounts. Plantations cultivated with improved methods and skill yielded greater harvests after turning productive. As more advanced varieties gained popularity, the quality of wine also improved. Average production increased to reach its peak in the 1960s. A favourable phenomenon was recorded: the extreme fluctuation of production abated.

The majority of grape varieties consumed as fruit still consisted of vine-grapes; in most years, their proportion accounted for about 5 to 6 percent of the harvest. During the last quarter of the century table-grape varieties grown around the house, in worker allotments or small yards have gradually gained popularity.

Statistics on viticulture underwent changes during the XXth century. The previous data collection method recording information by settlements and relying on municipalities was replaced by the regular survey of large producers, supplemented with estimates on the production of minor ones. Local estimates were also compared

with procurement figures. For several years, excise officers also surveyed the amount of wine produced by vine-growers in order to levy the wine-tax, which – incidentally – also assisted more accurate production data (however, it was still insufficient to provide the full picture).

The first census to provide data based on a uniform method was the site-survey of vineyards, conducted by the Hungarian Central Statistical Office (HCSO) in the 1960s. Due to the insufficiency of funds and skilled labour, this census, including sample measurements, took as much as five years. The census covering the majority of vineyards in most counties was carried out in 1965. Site-inspections were conducted from mid-July until the harvest each year, so that the varieties could be determined with certainty.

The census was carried out in each settlement where, according to the records of the Állami Földmérési és Térképészeti Hivatal (ÁFTH – State Geodesic and Mapping Office), a minimum of 10 cadastral acres of vineyards was recorded in the year of the survey. In these settlements each vineyard with an area exceeding 360 square metres was surveyed based on a site-inspection and classification. The questionnaire collected details on areas in excess of 1 400 square metres, while in smaller vineyards only the condition of grapes was observed and recorded. Abandoned vineyards were registered separately, by variety. Special attention was paid to the survey of historic vine-regions.

The census of the vine-growing areas of state farms and co-operatives was conducted by the county directorates of HCSO, based on the records of the farms. To facilitate the census, the county inspectorates of ÁFTH prepared draft maps on the majority of villages and also compiled a list indicating topographical lot numbers and the names of owners.

The census was followed by the calculation of national data. Since the figures collected during the census concerned various years, the results were adjusted by data of new plantations and cessation of vine-growing since the survey. The adjustment also involved the estimation of the size of unsurveyed lands, below the threshold value; thus, the aggregate and published data included the entirety of vine-lands (247 thousand hectares) in Hungary. The data were published by the administrative offices and vine-regions.

Following the vineyard census of the 1960s, the full-scale agricultural surveys conducted once a decade and annual data collections targeted only the most important features of grape-growing lands. The volume of harvest was determined by the full-scale observation of large factories and companies, and complemented by the calculated or estimated data of private holders among whom a sample survey was conducted. It is interesting that while around 1980s large holdings produced the majority of the harvest, from the 1990s small producers have taken the lead.

THE HISTORY OF ORCHARD SURVEYS

The history of statistics on fruit production is not as diverse as that of vine-growing. This may be attributed to the fact that the statistical observation of fruit production possess some difficulties. Harvest results can be calculated based on the area occupied by fruit trees and this method would appear to be sufficient for systematically planted orchards. However, in order to establish average yields, a wide array of other factors must also be taken into consideration. A further difficulty is posed by the fact that the majority

of fruit trees grow not in closed plantations but in backyards, on arable land, in vineyards or simply along the road. In such cases the number of fruit trees could be considered. There are three methods for the statistical survey of fruit trees:

1. The first is to make an interview with the owners; this method was applied in general agricultural surveys.

2. The second is to include mainly orchards where intensive production is pursued (orchards producing for the market), where accurate data can be collected concerning the conditions and volumes of production.

3. As compared with the previous methods, the most accurate result can be achieved by counting the fruit trees.

In the early publications of the official Hungarian statistical service, data on fruit production were devoted disproportionately small room compared to its significance. The first time owners were asked how many fruit trees they had was in the comprehensive agricultural censuses of 1895 and 1935. Though in both cases the figures served only for the purpose of general information, they prove that at that time the number of fruit trees, as compared to the size and population of Hungary exceeded that of the neighbouring countries.

At the beginning of the XXth century fruits were mainly produced for home consumption (eaten raw, used for preservation or the distillation of spirits) and only the surpluses were sold on the market. At that time, closed orchards were virtually non-existent. Information concerning harvest expectations could only be obtained from crop reports and later from production reports compiled by the news agency of the Földművelésügyi Minisztérium (Ministry of Agriculture). These reports were based on the data supplied by local experts and market sales figures.

Even though the 1930s brought the expansion of the canning industry and fruit exports also resumed, no considerable changes happened in the supply of statistical data.

After World War II, many small-holders planted fruit trees. This may be one of the reasons for orchards having surveyed as an independent agricultural branch in land registers since 1950. In just one decade, the 60 thousand acres of orchards registered in the 1950s has doubled. Plantation area reached its peak in the 1970s (with 172 thousand hectares in 1971). Following a constant decrease, this area shrank to less than 100 thousand hectares during the mid-1980s, when it stabilised. The fluctuation can be attributed to the new plantations of large companies and cessations of production by the same. The data on orchards provided little help for calculating production volumes. Owing to the unreliability of data, a survey of fruit trees was conducted in 1959.

The program of the census was developed by the Hungarian Central Statistical Office, with the involvement of all interested organizations. In 1959, a site-inspection was carried out and the main fruit tree varieties were counted; then, based on the data, a representative survey was made to establish the age, condition and yield capacity of the fruit trees. The survey established the number of apple, pear, quince, cherry, sour cherry, plum, apricot, peach, almond, walnut and chestnut trees, and the area where berries (such as gooseberry, currant, raspberry and strawberry) were grown. Fruit trees were registered in two main age-groups (i.e. producing and non-producing), and then classified according

to four installation methods. Fruits planted around the house, among vine-rows, in orchards producing for the market and scattered plantations were also indicated. In berries, no such distinction was made among the various production methods. This full-scale survey was conducted between May 3 and October 15 of 1959 by way of site-counting, without interviewing the owners. Owners' names were only registered in the case of orchards producing for the market.

Fruit trees growing along public roads were counted by the employees of the Közlekedés- és Postaügyi Minisztérium (Ministry of Transportation and Post). The number of trees turned out unexpectedly high, showing nearly a three-fold increase on the number recorded in 1935. In addition to new plantations made in the meantime, this significant difference could be attributed to the technique applied in the surveys. The counted stock of trees indicated a substantial increase in number in the years preceding 1959 as non-producing, young trees accounted for nearly one-third of the stock. Fruit-tree density per one hundred hectares, calculated considering nearly 90 million fruit trees, exceeded similar data of the neighbouring countries by almost 50 percent. Forty percent of the fruit trees and 30 percent of the vineyards were located in small gardens around the house, and the proportion of orchards producing for the market represented less than 10 percent of the whole country's stock. Berries were grown on 6,000 hectares, of which 35 percent accounted for raspberry, 23 percent for strawberry and 22 percent for gooseberry production.

These new basic figures were complemented by several further sample surveys, e.g. on the distribution of varieties, on plantations, or on the determination of the yield based on estimated production. Despite the favourable results, these surveys were not conducted regularly. Even though during the next decade the number of trees was recorded every year, taking into consideration the plantations and off-cuts, and the data calculated were published each year, the method applied was increasingly unsuitable for following the changes.

The next occasion when the number of fruit trees was recorded was the general agricultural census in 1972. The method of sample surveys was applied in 20 percent of the villages. Compared to the 1959 census, the results showed a 10 percent decrease. It marked a significant progress in statistics that from 1963 regular surveys were carried out to establish the major data on orchards producing for the market. These surveys provided reliable data on core fruit production, which also facilitated estimates on the total fruit production of the country. The share of orchards producing for the market from total production increased from 30 percent to over 50 percent during the 1960s and 1970s.

Agricultural surveys conducted after 1972 registered the tree stock based on reports completed by the owners. Data on production prior to 2001 were published on the basis of the full-scale survey of large farms and the representative data of smaller holdings. The results were supported by balance sheets and surveys recording the turnover and prices.

THE 2001 PLANTATION CENSUS

Owing to the radical structural changes that have taken place recently in Hungarian agriculture, including the branches of viticulture and fruit production, and the possibility of our accession to the EU made the performance of the first complex plantation census

of the XXI[st] century a topical issue. The last official statistics involving the entirety of plantations was produced in Hungary at the end of the 1950s and in the early 1960s.

Pursuant to the provisions of Act CXLIII of 2000, the Hungarian Central Statistical Office conducted a census on vine-growing lands and orchards between June 1 and October 15, 2001. Professional preparation and performance of the census was assisted by the Földművelésügyi és Vidékfejlesztési Minisztérium Szőlészeti és Borászati Kutató Intézete (Research Institute for Viticulture and Enology (Kecskemét) of the Ministry of Agriculture and Rural Development) and the Érdi Gyümölcs- és Dísznövénytermesztő Kutató-fejlesztő Kht. (Research Institute for Fruit-growing and Ornamentals, Érd). Meanwhile, the Földmérési és Távérzékelési Intézet (Institute of Geodesy, Cartography and Remote Sensing) and regional land offices contributed to create the conditions for mapping. The act ordering the census denominated the Hungarian Central Statistical Office as the institution primarily responsible for the performance. In the course of preparatory works an expert team, including specialists from the Ministry of Agriculture and Rural Development, research institutes and the trade associations concerned, developed the detailed program of the census. Considering domestic and international requirements, the expert team decided on performing the census in two work-phases and prepared the documents to be used accordingly.

The two basic units of the survey were on one hand the users of vineyard and/or orchard areas and the plantations on the other. Surveyors were instructed to pay special attention to entering topographical lot numbers as well as statistical and professional features on the questionnaires and registers correctly; they were requested to equally attend to the proper use of the so-called spot and cadastral maps (taken by means of remote sensing and space photography) and to marking the plantations on these maps.

According to the Act ordering the census, the list of addresses identifying the users of vineyards and orchards was compiled from the data supplied by the land offices, the Vám- és Pénzügyőrség Országos Parancsnoksága (Hungarian Customs and Finance Guard) and the Hegyközségek Nemzeti Tanácsa (National Council of Wine Communities), and from the directory prepared for the more than 9 000 districts of the Általános Mezőgazdasági Összeírás (ÁMÖ – General Agricultural Census). As a result, the registers of surveyors contained a total of 367 thousand addresses.

The census of plantation users was mainly performed by surveyors who had proven their abilities during the ÁMÖ or were skilled surveyors. They were chosen from among vine- and fruit-growing specialists and village agronomists, who surveyed the plantations in their respective districts. The multi-level executive organisation established for the purposes of the census ensured that the quality management tasks be concentrated; thus, it facilitated the uniform quality of the statistical and professional data supplied.

In the first phase, 4 200 surveyors were assigned to perform the survey of vine- and/or fruit-growing plantations. The job, completed in just two weeks, was assisted and inspected by 590 agents and 200 regional representatives. The database resulting from these questionnaires constituted the basis for the survey of plantations by site-inspection during the second phase of the work.

The second phase, which involved the survey of plantations and the registration of their features on the site, was performed by 1 600 surveyors in three and a half months, co-ordinated and supervised by 590 professional and 145 regional representatives. Hav-

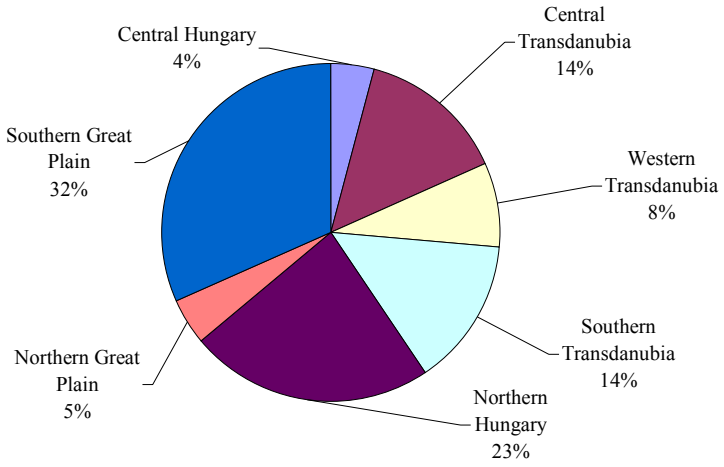
ing visited 4 500 sites in their districts and inspected areas marked with a lot number, a total of 291,000 questionnaires and nearly 200 000 records were completed by the surveyors on vine and fruit plantations. Compliance with professional requirements related to vine and fruit production was monitored in each county by an expert selected at the recommendation of the research institutes.

After the processing of questionnaires on users, vineyards and orchards, as well as the registers, a database was generated from the information gathered, which could then be used to compile a register meeting domestic and international data requirements and helping to plan and perform the tasks of representative statistical surveys in the forthcoming years.

VINEYARDS IN 2001

The total area of vineyards in Hungary is 92 782 hectares,[4] of which 98 percent is of plantation size, i.e. segments of land planted with grapes, of or above 500 square metres.

Figure 1. Distribution of vine-growing areas by region



Nearly 32 percent of the vineyards is located on the Southern Great Plain (see Figure 1), and 28 percent in Bács-Kiskun county. From the counties, the smallest vine-growing area was registered in Békés (56 hectares). Land segments used for vine-growing are as follows:

– 22.5 percent is classified as undersized area, and represents less than 2 percent of the total vine-growing area,

– more than 90 percent is smaller than 0.5 hectare and represents a little more than 31 precent of the total vineyard area,

– less than 1 percent has an area of 5 or more hectares, but accounts for more than 37 percent of the total area of vineyards (see Figure 2).

[4] For the same period, data in the real-estate register shows 127.2 thousand hectares.

Figure 2. Concentration of vineyards

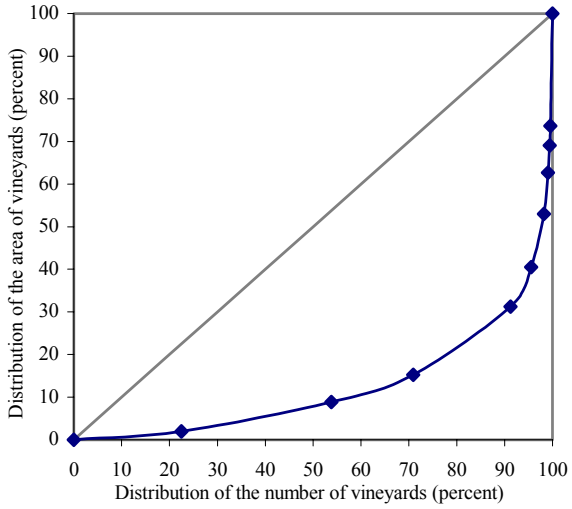


Table 1

Average size of vineyards

Region	Plantation size	Undersized	Aggregate
	area (hectare)		
Central Hungary	0.5011	0.0256	0.3275
Central Transdanubia	0.2863	0.0305	0.2445
Western Transdanubia	0.1527	0.0321	0.1298
Southern Transdanubia	0.3214	0.0310	0.2523
Northern Hungary	0.6451	0.0235	0.4548
Northern Great Plain	0.2104	0.0258	0.1542
Southern Great Plain	0.8560	0.0254	0.7317
Total	*0.4047*	*0.0279*	*0. 3199*

The average vineyard size is 0.32 hectare, hardly reaching 0.4 hectare in the case of plantations, and less than 300 square metres in the case of the undersized areas. As opposed to the 0.73 hectare average size in the Southern Great Plain region, and within that, the nearly 0.8 hectare average size in Bács-Kiskun county, in Western Transdanubia (owing to geological conditions and the settlement structure) the average size of vineyards is less than 0.13 hectare (see Table 1). As for the counties, the average size of vineyards remains below 400 square metres in Zala and 1 000 square metres in Szabolcs-Szatmár-Bereg.

More than two-third of the vine-growing areas was used for white and nearly one quarter for red wine grape varieties, while a little less than four percent for the production of table grapes. (The area of other vineyards to be grubbed up or yielding substandard quality exceeded three percent.) In Central Transdanubia the proportion of white wine varieties approached 90 percent, while that of red wine varieties in the Southern Transdanubian region

exceeded 40 percent. The proportion of table and other grape varieties was registered to be the highest in the Northern Great Plain region (9 and 23 percent, respectively).

Figure 3. Distribution of vineyards by grape variety and region

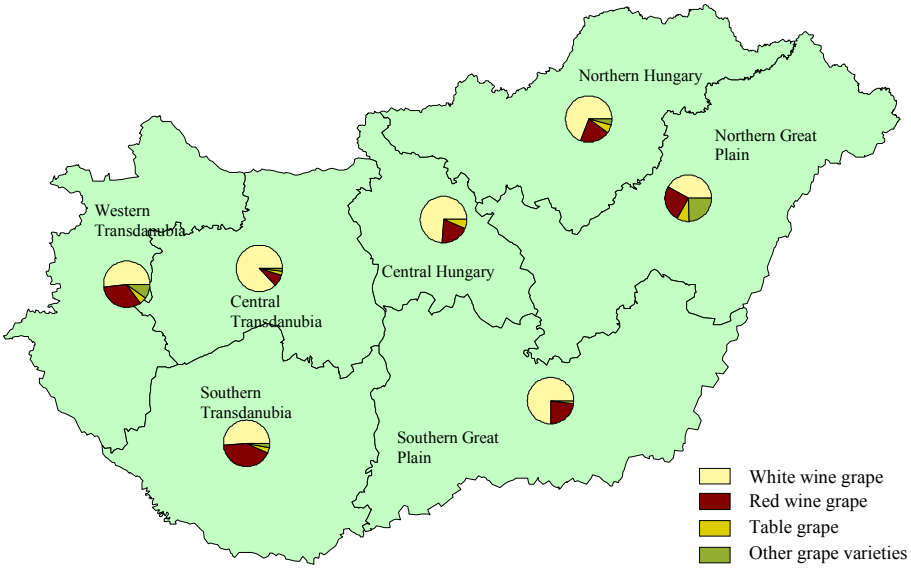


Table 2

Distribution of grape producers by grape variety

Region	Only white wine grape	Only red wine grape	Only table grapes	Only other varieties	Mixed varieties	Total
	producers (percent)					
Central Hungary	26.38	5.89	15.05	3.09	49.60	100.00
Central Transdanubia	46.36	3.98	3.55	3.36	42.75	100.00
Western Transdanubia	24.29	6.73	2.35	12.81	53.82	100.00
Southern Transdanubia	18.18	10.12	2.91	6.41	62.38	100.00
Northern Hungary	39.81	5.72	8.81	15.96	29.71	100.00
Northern Great Plain	10.51	5.98	12.50	32.75	38.26	100.00
Southern Great Plain	46.78	10.51	10.05	0.77	31.88	100.00
Total	*31.71*	*7.21*	*6.70*	*10.15*	*44.22*	*100.00*

Note: Due to rounding, the total of the lines differs from 100.00 percent.

Private farmers account for 99.7 percent of vine-growers. Nearly 72 percent of the farms grow white, 40 percent red wine grape varieties, while 30 percent produces table grapes and nearly 19 percent other grape varieties.

The proportion of farms growing only white wine varieties exceeds 31 percent, while those producing only red wine grape varieties is over 7 percent. Less than 7 percent of

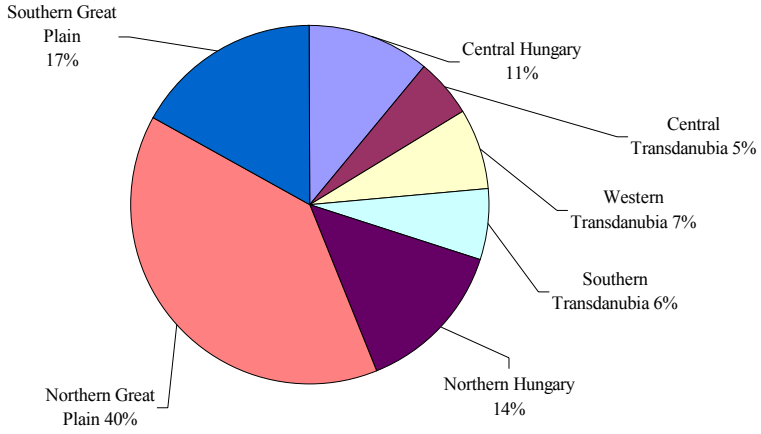
the farms grow exclusively table grapes, and more than one tenth only other grape varieties, while nearly 45 grow miscellaneous varieties (see Table 2).

Nearly 10 percent of vine-growers produce only for consumption, and more than one third only for vine-making. Three fourths of producers grow grapes only for household consumption, 2 percent sell the entirety of the harvest directly and 15 percent indirectly.

THE AREA OF ORCHARDS IN 2001

The total area occupied by fruit trees and shrubs in Hungary is 97 508 hectares,[5] of which more than 90 percent reach the size of a plantation, i.e. are located in orchards of or above 1 500 square metres (in the case of berries, this threshold was 500 square metres). Nearly 40 percent of orchards are located in the Northern Great Plain region, (34 percent in Szabolcs-Szatmár-Bereg county alone), while hardly more than 5 percent in the Central Transdanubian region. Among the counties, the smallest orchard areas were recorded in Budapest (310 hectares) and Komárom-Esztergom county (780 hectares).

Figure 4. Distribution of orchards by region



About the orchards:

– one third are classified as undersized area and represent less than 2 percent of the total orchard area,

– nearly 90 percent lie on less than 0.5 hectare, representing less than 17 percent of the total orchard area,

– 2 percent lie on 5 hectares or more, but represent 60 percent of the total orchard area (see Figure 5).

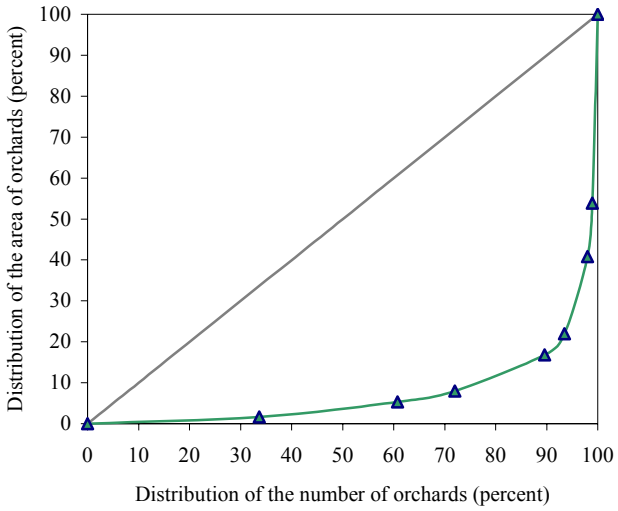
The average size of orchards is half a hectare, with large divergences through the country: in Central Hungary the average size is 1 hectare, in the Western Transdanubian

[5] For the same period, the real-estate register shows 90.3 thousand hectares.

region it hardly reaches 0.3 hectare; when analysed by county, in Békés and Nógrád the average orchard area is 1 331 and 1 633 square metres respectively, while in Komárom-Esztergom county it is nearly 2 hectares.

The average area of the plantations is somewhat more than 1.5 hectares, between 1.28 (Southern Transdanubia) and 3.08 hectares (Central Transdanubia) in the various regions. By county, the average plantation area ranges between 0.6 (Nógrád county) and nearly 6.8 hectares (Fejér county).

Figure 5. Concentration of orchards



Fruits grown on trees occupy 93 percent of the orchards, while berries 7 percent. In Hungary, apple has maintained its dominance in orchards, the selected varieties occupying nearly half of the total area. At the same time, pear is grown in less than one third of the area devoted to apple. The total area of quince and medlar accounts for less than 1 percent of the total orchard area in the country. Of stone-fruits (grown on 40 percent of the total orchard area) sour cherry proved to be the most popular with 39 percent, followed by plum and peach with 20 percent each and apricot with 15 percent. The share of cherry orchards is merely 4 percent. Nuts are grown on 5 percent of the total orchard area in Hungary; among them the most important is walnut, produced on 82 percent of the adequate area. Berry production is dominated by raspberry (its production area almost reaches that of cherry and elder). Red and white currant is grown on the same size of land as blackcurrant; their aggregate area exceeds 2 percent of the total orchard area. Of the area of various berries, blackberry occupies 7 percent, while the area of strawberry and gooseberry, take 6 and 5 percent respectively. The area where other varieties of berries are grown is less than 1 percent.

The censuses have yielded data of great importance concerning the distribution of plantations by variety, which can have a major impact on the principles of future planning. The European Union also requires the detailed data of the plantation censuses, as

they play a significant role in the exports of the given product and the establishment of quotas.

To conclude, we should note that beyond the figures shown in the statistics concerning vineyards and orchards, there are other production areas in both branches (e.g. vine-arbours around the house, scattered fruit trees). Even though the bulk of the produce comes from the surveyed plantations, in order to determine the total fruit consumption of the population a statistical method is required for the analysis of the yield.

APPENDIX

Vineyard areas and vine-production between 1861–2000

Year	Vineyard area (hectare)	Vine-production* (1 000 litres)	Year	Vineyard area (hectare)	Vine-production * (1 000 litres)
1861	.	3 242 145	1927	221 858	1 699 574
1862	.	3 961 543	1928	222 264	2 868 751
1863	.	3 042 715	1929	215 565	2 316 711
1864	.	2 323 261	1930	213 098	3 742 330
1865	.	2 684 911	1931	214 177	3 628 922
1866	.	2 104 710	1932	212 395	3 309 539
1867	.	3 738 339	1933	210 821	2 869 302
1868	.	4 084 112	1934	211 629	2 365 536
1869	.	3 602 408	1935	214 525	2 659 572
1870	.	3 298 105	1936	214 135	4 223 720
1871	.	4 053 732	1937	216 982	4 162 656
1872	357 745	2 443 263	1938	218 878	3 079 186
1873	357 745	3 674 704	1939	220 380	3 885 538
1874	358 001	1 479 204	1940	222 605	821 916
1875	358 796	5 432 263	1941	225 356	1 466 157
1876	360 266	1 619 367	1942	228 602	3 913 130
1877	360 046	3 089 316	1943	235 376	3 650 690
1878	361 724	6 997 476	1945	239 164	3 103 500
1879	362 229	5 508 119	1946	238 320	3 622 600
1880	362 233	2 122 059	1947	237 152	2 340 600
1881	361 254	3 804 080	1948	237 924	2 731 100
1882	366 813	3 711 630	1949	233 639	3 172 800
1883	364 273	4 183 826	1950	230 186	3 600 000
1884	367 808	3 951 864	1951	228 460	3 226 300
1885	367 653	4 861 394	1952	225 295	2 637 400
1886	363 562	3 596 213	1953	215 799	1 785 800
1887	352 794	4 498 882	1954	215 799	1 858 700
1888	342 520	3 411 856	1955	201 413	3 367 700
1889	333 932	3 812 295	1956	195 658	2 330 100
1890	311 120	2 636 340	1957	195 678	3 259 610
1891	254 207	1 230 626	1958	198 555	5 294 502
1892	248 831	816 560	1959	200 745	3 257 330
1893	226 100	929 987	1960	203 644	2 956 420
1894	219 842	1 387 014	1961	204 372	3 507 586
1895	202 865	1 928 984	1962	219 039	3 131 343
1896	206 897	1 445 741	1963	229 312	4 243 455
1897	205 468	1 130 823	1964	242 614	5 545 158
1898	208 477	1 137 678	1965	246 563	2 424 827
1899	214 484	1 725 623	1966	244 950	3 366 573
1900	221 838	1 642 643	1967	239 693	4 789 383
1901	.	.	1968	236 141	4 843 234
..	.	.	1969	233 501	5 613 781
1913	214 701	.	1970	229 715	4 378 858
1920	.	.	1971	222 323	4 289 002
1921	209 648	3 235 461	1972	218 488	5 034 290
1922	215 672	4 293 659	1973	213 339	6 231 453
1923	221 325	4 318 008	1974	210 330	4 258 118
1924	222 255	1 268 506	1975	206 216	4 950 805
1925	221 324	3 201 849	1976	199 843	4 511 148
1926	221 335	1 205 611	1977	191 798	3 274 355

(Continued on the next page.)

(Continuation.)

Year	Vineyard area (hectare)	Vine-production* (1000 litres)
1978	185 703	3 019 956
1979	173 829	3 303 610
1980	167 744	5 707 900
1981	161 282	3 904 700
1982	159 257	6 781 800
1983	156 656	6 275 000
1984	154 741	5 072 800
1985	153 564	2 890 000
1986	147 444	4 417 000
1987	144 861	3 263 000
1988	142 168	4 707 000
1989	140 345	3 852 000
1990	138 476	5 472 192
1991	136 432	4 607 113
1992	135 011	3 877 832
1993	131 673	3 644 144
1994	131 916	3 694 134
1995	131 334	3 289 376
1996	130 934	4 188 280
1997	130 874	4 472 088
1998	129 658	4 333 980
1999	127 066	3 338 782
2000	105 882	4 299 259

* Data before 1873 do not include *aszú* (dry old Tokaj) wine.

Source: Yearbooks, announcements and thematic publications of the official statistical service and the Hungarian Central Statistical Office.

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THE RENEWED STATISTICS OF WINE AND FRUIT PLANTATIONS

LÁSZLÓ CSORBA[1] – DR. LÁSZLÓ PINTÉR[2]

Pursuant to the Act of CXLIII/2000 the Hungarian Central Statistical Office made a fruit tree and vineyard basic survey between June 1 and October 15, 2001. As a result of the survey, data are provided relating to almost 300 thousand plantations as well as farms and households dealing with grapes and/or fruit production. The data of the survey and the map-support of the survey as well as the development of processing tools required the development of a data management application not used before in Hungarian agricultural statistics.

KEYWORDS: Agricultural statistics; Plantation-survey; Geographic Information System;

In Hungary the previous census of the vineyard and orchard areas had been assessed almost fourty years before the census of plantations in 2001. Over the decades elapsed since then, the general agricultural censuses ensured in every ten years (not always comprehensive) statistical data on the plantations.

The aim of carrying out such censuses – apart from the replenishment of generation of missing pieces of information – was to provide realistic and true data to ensure the well-founded management of the agricultural sector, including the promotion of the export and sales planning, as well as the elaboration of support systems and development concepts. The survey should serve as the basis for the further development of the agricultural statistical information system, and should contribute to the harmonisation of the Hungarian agricultural statistics to the European Union.

The present survey was carried out pursuant to the Act of CXLIII/2001 by the Hungarian Central Statistical Office (HCSO), between June 1, and October 15, 2001. For the implementation of the plantation census, a census network having grapes and fruit producing technical experiences, and good local knowledge had to be established, with the effective and supporting participation of professional research institutes, municipalities and association of wine growing communities.

Pursuant to the legislation, a stock had to be taken of identification data of the plantation users (name, home address, or name and headquarters of the organisation), the

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characteristics of the plantation, as well as the data relating to the processing and storage capacity linked to the plantation, and the data relating to the use (sales) of the products.

THE SHORT HISTORY OF THE CENSUSES OF VINEYARD AND ORCHARD AREAS [3]

The census of vineyards in Hungary was started at the beginning of the eighteenth century. The census organised by the council of directorates in 1865 was the first to provide realistic data, which – relating to the area of the country then – stated a vineyard area of almost 321 thousand hectares.

Phylloxera at the end of the XIXth century, and later the two world wars significantly decimated wine plantations, and the continuous decrease lasted until the 1960s. After then, however, due to vineyard planting of large scale holdings, the area was again over 200 thousand hectares for a decade. This was the time of the second major wine census, which – also including the year of the pilot survey – took place from 1960 to 1965.

Orchards were first registered at the end of the XIXth century in 1895, within the first General Agricultural Census. Later, it was followed by a full-scope census in 1935. On the basis of the data compiled it could be ascertained that the amount of fruit-trees compared to the number of population was over the level of the neighbouring countries. The area of orchards reached its largest size in the seventies of the XXth century at 172 thousand hectares. This area was being continuously reduced until 1986; then dropped somewhat below 100 thousand hectares, and stabilised at that level in the nineties.

Before the plantation census in 2001 – similarly to the vineyards survey – the last fruit-tree census had been made almost forty years earlier (between 1956 and 1959). The Hungarian Central Statistical Office made the census of vineyard and fruit-tree plantations in 2001 on such a historical background.

FULL-SCOPE CENSUS OF WINE AND FRUIT PLANTATIONS IN 2001

The Földművelési és Vidékfejlesztési Minisztérium Szőlészeti és Borászati Kutató Intézete (Research Institute for Viniculture and Enology (Kecskemét) of the Ministry of Agriculture and Rural Development, as well as the Érdi Gyümölcs- és Dísznövénytermesztő Kutató-fejlesztő Kht. (Research Institute for Fruit-growing and Ornamentals, Érd) were instrumental in the technical preparation and implementation of the census by way of finalising the questionnaires and technically controlling the work of the interviewers.

Pursuant to the Act providing for the census, the land registry offices, the regional offices of the Ministry of Agriculture and Rural Development and Vám- és Pénzügyőrség Országos Parancsnoksága (the Hungarian Customs and Finance Guard), and the association of the wine-growing communities have handed over to the Hungarian Central Statistical Office the registration identification numbers of wine and fruit plantations in their administrative records, and the information about the names, addresses and headquarters of their users. An address list was prepared from these data and the list of farm addresses

[3] A more detailed description of the history of plantation censuses is given by *Laczka, É.* in this issue p.80–95.

from the General Agricultural Census carried out in 2000, which served as the first estimation and definition of the plantation users.

The census took place in two phases. In the first phase, which lasted from June 1 to 15, 2001, the interviewers called on the known plantation users at home or at their headquarters on the basis of the address list. A so-called 'user' questionnaire was drawn up about the user and the total wine and fruit area in use, which among others contained the identificational data of the user, the land area size of the farm, the size of wine and/or fruit areas, their geographical positions, topographical numbers, the year of plantation, and the existence of irrigation or organic farming. After processing the completed questionnaires, some lists (check lists) were created which offered great help during the field survey in the second work-phase. The spot- and cadastral-maps used for the field survey were supplied to the Hungarian Central Statistical Office by the Földmérési és Távérzékelési Intézet (Institute of Geodesy Cartography and Remote Sensing). The manual of wine and fruit varieties with illustrations and descriptions helped in accurate variety identification. During the field survey, the interviewers with wine and/or fruit production knowledge and experience recorded the features of the plantations to the questionnaires.

In the second phase, the (type B) questionnaire had to be completed only about wine areas (plantations) larger than 500 square metres, while areas smaller than that only had to be entered on a list. The wine questionnaire among others contained the plantation size (by topographical number), date of plantation, way of cultivation, line and plant distances, stock use, the produced varieties, and the condition of the plantation. In addition to complete the questionnaires, the location of the plantations had to be indicated in the cadastral maps supporting the census.

Pursuant to the Act providing for the census, only the areas of 1 500 square metres or larger planted with fruit species with trunks could be considered as plantation areas. In the case of berries, this size category was 500 square metres or bigger. Questionnaires (type C) had to be completed about these plantations, and in the case of smaller areas, only their sizes had to be entered on a list.

As a result of the survey of wine and fruit areas, data are available about almost 300 thousand plantations and farms or households dealing with wine and/or fruit production. (Summary of the characteristics of wine and fruit plantations, and their regional data are presented in the Appendix.)

The census data – apart from being entered into the agricultural statistical database system – also form the basis of the plantation register and the source of farm-register maintenance. The data available, the map support of the survey as well as the development of data management tools required the development of a data management application not used in Hungarian agricultural statistics so far.

PLANTATION STATISTICAL GIS[4]

The system of Plantation Statistical GIS (PSGIS) is on the one hand a GIS software application in support of the completion of agricultural statistical tasks, and on the other

[4] This is an application developed in the framework of the Digital Map Project as part of the PHARE HU9909-03-02 project under the title of Development of agricultural statistics. The development was made by the Danish BlomInfo A/S consortium (project leader), with the cooperation of Geometria Térinformatikai Rendszerház Kft. and Mapscan Kft .

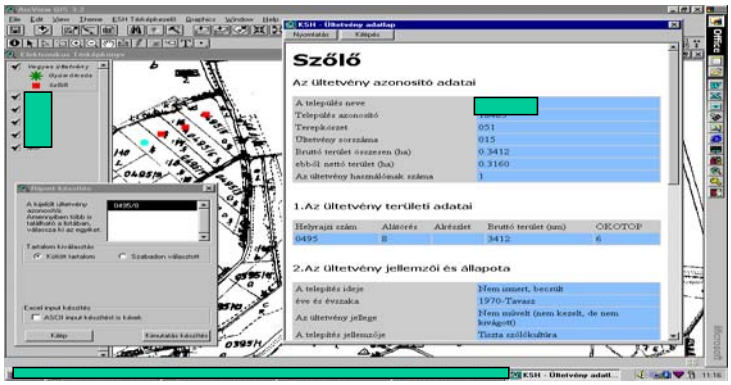
hand a so-called electronic book of maps (e-Book), which is a data collection copied on CD, containing the geo-coded data of plantations and pictures of clear cut maps.

The tasks to be completed by the PSGIS digital map managing system can be briefly summarized as described in following the points:

– Entry and documentation in an electronic format of the geographical location of wine and fruit plantations based on the census of 2001

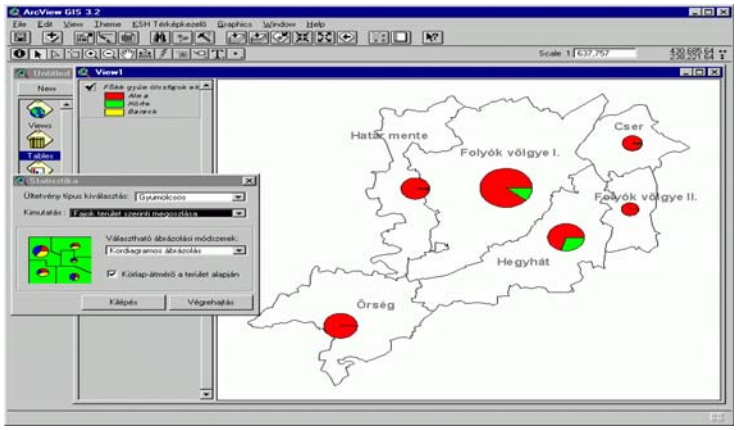
– Connecting the geographical location of plantations with the related census and statistical (aggregate) data (see Figure 1: displaying the plantation related data for the plantation selected in the map or identified with the topographical number, together with the map data management.)

Figure 1. Display of plantation data



– Management of digital borderlines of public administrative or other territorial units – formed from settlements – to ensure graphic display of statistics on wine and fruit registers (see Figure 2).

Figure 2. Display of management of digital borderlines of units



– Ensuring digital borderline management of the previous territorial units for the territorial analysis and processing of agricultural statistical data with standard GIS tools.

The basic pillar of the GIS application is the geo-code, which is the identifier of a territory, a territory-dependent object, or eventually an object group according to the definition accepted in GIS. It enables a link between the territories or objects and the related characteristic values. In the application ensuring the GIS data management of wine and fruit plantations, the geo-code is the co-ordinate given in the unified countryside projection, determined on the basis of the geographical identification of plantations (linked to the topographical number and to the property registration of the land area).

The plantation statistics GIS application is based on the alphanumerical data (technical plantation information) of the plantation census and the map data.

Maps used

The most important graphic map data sources were the 1:10 000 scale maps covering the rural area of all the Hungarian settlements. This is the most cost efficient domestic map product for financial management, planning and statistical purposes, in which the identification of plots can be done. The 1:4000 scale urban area index map sheets had been used in that cases where plantations were located in certain urban areas. The geographical database of the Digital Map is built upon the database (DB) of administrative boundaries of Hungary that is a structured digital DB on settlement level.

The operating data files of PSGIS

The operation of PSGIS is basically ensured and supported by three databases:

1. The e-Book is a *database,* which contains the raster maps of the concerned settlements on a CD-ROM, as well as the geo-code data of plantations. This enables the management of spatial statistical data and maps independently from the data network, and by its use, the regional directorates of the Hungarian Central Statistical Office can have access to spatial data without putting an extra load on the data network.

2. Data tables including the results of standard statistical processing, that is the *data of statistical data items represented in thematic maps*.

3. Primary map layer for handling public administration units and their borders.

Key functions of PSGIS

The general objective of PSGIS is to support the development of agricultural statistics. The PSGIS functions are personified by two ‘products’, the digital map and the electronic map-book.

The digital map is a software application with the help of which:

– various agricultural statistical reports can be generated,
– future statistical surveys can be designed,

– regular statistics can be completed both for internal and external use,
– background database maintenance can be ensured, and
– the spatial data of the survey can be checked graphically on the screen.

The electronic map-book ensures a map background for the analyses made with statistical data and it supports:

– the topographical reference of statistical data,
– the 1:10 000 scale abstraction level identification of environmental objects,
– the general and statistical oriented PSGIS functions.

The future of PSGIS

The PSGIS system may be further developed in two directions. One is a broader functionality offered in the registration of wine and fruit plantations. Further statistical data may appear, such as the location of wine cellars, their storage capacity, and thus, several analytical options may be executed. A direct link may be established with administrative (e.g. land use, wine-growing community) registers. The system may also provide support for property policy measures. The other option may be to enlarge the system to the whole land use statistics to all such territories (land details, plants) on which statistical surveys are made.

The GIS application is capable of enhancing the efficiency of spatial and map-representable processes. However, to use GIS systems, reference maps are needed. A solution should also be found for the spatial references of data to be managed. Unfortunately, the poor data infrastructure is an obstacle of development. The assortment of digital products is small, there is no full coverage in the area of large-scale maps, and there are no address lists equipped with co-ordinates.

In this map-deficient state, PSGIS found a cost-efficient solution by transforming the overview cadastral maps to image files, and deriving geo-codes from them. The planned time-period of the solution is four to five years. After that, it can be expected that the forced replenishment of missing digital reference maps will cease to be the main problem of GIS developments. Then by way of the geo-codes the descriptive data of the Hungarian Central Statistical Office will become connectable to the underlying state products (digitalised vector maps).

The PSGIS system enriches the representation and analysis options of agricultural statistical census data. Compared to the application of vector core data, geo-code is a compromise, but it gives a solution with which the border changes of territorial units can be followed, and enables varied, even micro-level analyses by the application of spatial interpolation tools.

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Table 1

Age and variety-structure of the vineyards
(hectares)

Territorial unit	Size of plantation area	Vineyard under threshold	Total	Age of plantation (years)						Varieties			
				under 3	3–5	6–9	10–19	20–29	30 and over	white wine	red wine	table grapes	other grapes
Budapest	112.98	5.07	118.05	–	–	4.05	53.26	39.32	16.35	85.99	2.40	14.05	2.94
Pest county	3 648.18	52.99	3 701.17	73.56	115.77	29.47	1 272.65	1 115.15	1 041.49	2 282.26	575.62	72.42	544.28
Central Hungary	*3 761.16*	*58.06*	*3 819.22*	*73.56*	*115.77*	*33.52*	*1 325.91*	*1 154.47*	*1 057.84*	*2 368.25*	*578.02*	*86.47*	*547.22*
Fejér county	4 122.72	91.87	4 214.59	77.13	172.69	129.39	2 158.59	619.10	965.91	3 464.89	373.33	61.39	137.26
Komárom-Esztergom county	2 221.05	60.33	2 281.38	269.77	41.16	39.66	531.75	610.25	728.50	1 703.47	156.42	43.20	188.24
Veszprém county	6 649.61	66.23	6 715.84	293.75	215.54	187.42	2 030.32	2 099.68	1 823.15	5 225.39	429.31	24.28	688.59
Central Transdanuibia	*12 993.38*	*218.43*	*13 211.81*	*640.65*	*429.39*	*356.47*	*4 720.66*	*3 329.03*	*3 517.56*	*10 393.75*	*959.06*	*128.87*	*1 014.09*
Győr-Moson-Sopron county	2 550.34	24.17	2 574.51	112.86	55.63	58.16	1 047.27	808.17	468.25	1 017.13	1 356.05	6.15	97.26
Vas county	1 170.93	60.35	1 231.28	12.21	12.69	36.46	305.66	312.31	491.71	430.68	357.20	7.68	307.26
Zala county	3 371.85	227.06	3 598.91	23.41	40.71	70.48	530.54	776.69	1 930.21	1 565.48	127.20	28.63	1 465.07
Western Transdanubia	*7 093.12*	*311.58*	*7 404.70*	*148.48*	*109.03*	*165.10*	*1 883.47*	*1 897.17*	*2 890.17*	*3 013.29*	*1 840.45*	*42.46*	*1 869.59*
Baranya county	3 204.89	61.23	3 266.12	385.40	249.18	176.51	1 178.00	694.95	520.86	1 460.24	1 368.61	31.47	229.11
Somogy county	4 017.91	167.14	4 185.05	163.46	59.28	47.22	2 348.06	894.47	505.45	2 579.40	863.25	117.77	354.84
Tolna county	5 501.71	112.54	5 614.25	432.20	234.93	94.17	2 832.60	1 114.21	793.59	1 994.96	2 899.93	103.44	335.11
Southern Transdanubia	*12 724.51*	*340.91*	*13 065.42*	*981.06*	*543.39*	*317.90*	*6 358.66*	*2 703.63*	*1 819.90*	*6 034.60*	*5 131.79*	*252.68*	*919.06*
Borsod-Abaúj-Zemplén county	8 657.71	255.94	8 913.65	324.84	206.82	202.72	2 307.79	1 950.55	3 665.05	7 038.13	519.17	49.06	749.85
Heves county	12 341.65	21.49	12 363.14	1 204.64	847.69	226.57	4 878.61	3 913.37	1 270.76	8 146.85	3 851.77	87.60	41.84
Nógrád county	524.39	34.58	558.97	0.46	1.69	2.45	131.52	186.92	201.39	209.28	151.28	8.70	123.64
Northern Hungary	*21 523.75*	*312.01*	*21 835.76*	*1 529.94*	*1 056.20*	*431.74*	*7 317.92*	*6 050.84*	*5 137.20*	*15 394.26*	*4 522.22*	*145.36*	*915.33*
Hajdu-Bihar county	1 454.80	101.67	1 556.47	2.47	3.17	8.04	94.12	279.09	1 067.90	395.53	56.16	31.46	938.50
Jász-Nagykun-Szolnok county	1 769.46	22.92	1 792.38	78.79	30.17	4.15	564.03	587.82	504.51	950.79	492.37	19.77	259.52
Szabolcs-Szatmár-Bereg county	769.37	84.87	854.24	1.76	3.12	6.00	57.69	129.88	570.90	234.89	39.11	25.76	444.34
Northern Great Plain	*3 993.63*	*209.46*	*4 203.09*	*83.02*	*36.46*	*18.19*	*715.84*	*996.79*	*2 143.31*	*1 581.21*	*587.64*	*76.99*	*1 642.36*
Bács-Kiskun county	26 239.09	84.40	26 323.49	1 914.64	1 218.09	1 138.02	10 320.92	8 066.01	3 581.41	19 007.87	5 733.93	257.82	489.88
Békés county	40.99	20.82	61.81	0.13	0.32	0.63	2.91	3.82	33.21	11.41	7.33	2.41	11.42
Csongrád county	3 051.38	32.18	3 083.56	73.48	103.92	39.41	1 217.50	1 067.30	549.83	1 846.80	1 031.71	43.17	80.72
Southern Great Plain	*29 331.46*	*137.40*	*29 468.86*	*1 988.25*	*1 322.33*	*1 178.06*	*11 541.33*	*9 137.13*	*4 164.45*	*20 866.08*	*6 772.97*	*303.40*	*582.02*
Total	*91 421.01*	*1 587.85*	*93 008.86*	*5 444.96*	*3 612.57*	*2 500.98*	*33 863.79*	*25 269.06*	*20 730.43*	*59 651.44*	*20 392.15*	*1 036.23*	*7 489.67*

Table 2

Distribution of vineyards by the size of area and shortage of vinestocks
(hectares)

Territorial unit	Area of vineyards					Shortage of vinestocks						
	0.05–0.099	0.1–0.99	1.0–4.99	5.0–9.99	10.0–	under 5	6–10	11–20	21–30	31–40	41–50	50 and over
	hectares					percent						
Budapest	*1.40*	*5.35*	*73.68*	*32.54*	0.00	*1.89*	*32.58*	*57.78*	*17.15*	*3.58*	–	–
Pest county	*175.00*	*916.41*	*474.65*	*395.65*	*1 686.51*	*668.21*	*1 250.08*	*684.60*	*259.42*	*260.01*	*222.69*	*303.14*
Central Hungary	176.40	921.76	548.33	428.19	1 686.51	670.10	1 282.66	742.38	276.57	263.59	222.69	303.14
Fejér county	*546.37*	*1 044.56*	*242.38*	*455.49*	*1 834.07*	*1 645.66*	*1 135.27*	*697.12*	*346.57*	*128.99*	*108.46*	*60.88*
Komárom-Esztergom county	*356.28*	*739.21*	*292.01*	*122.94*	*710.55*	*695.54*	*442.87*	*679.27*	*223.41*	*56.52*	*42.58*	*80.93*
Veszprém county	*397.85*	*3 656.64*	*1 513.81*	*609.81*	*471.47*	*3 259.32*	*1 250.08*	*1 165.72*	*436.57*	*215.07*	*143.87*	*179.20*
Central Transdanuibia	1 300.50	5 440.41	2 048.20	1 188.24	3 016.09	5 600.52	2 828.22	2 542.11	1 006.55	400.58	294.91	321.01
Győr-Moson-Sopron county	*167.71*	*278.09*	*162.91*	*165.91*	*151.94*	*1 055.72*	*519.70*	*666.41*	*198.26*	*47.89*	*36.53*	*25.84*
Vas county	*340.81*	*504.11*	*46.94*	*24.23*	*254.84*	*814.54*	*165.51*	*140.96*	*21.18*	*7.25*	*4.99*	*16.60*
Zala county	*1 426.67*	*1 774.03*	*111.17*	*34.38*	*25.72*	*1 720.43*	*714.24*	*467.38*	*161.70*	*68.31*	*99.90*	*140.03*
Western Transdanubia	1 935.19	3 036.99	673.42	580.26	867.36	3 590.69	1 399.45	1 274.75	381.14	123.45	141.42	182.47
Baranya county	*362.74*	*1 335.38*	*689.48*	*378.50*	*438.74*	*1 841.86*	*699.83*	*396.44*	*193.66*	*37.33*	*16.92*	*18.93*
Somogy county	*496.48*	*814.88*	*491.63*	*554.33*	*1 660.57*	*1 693.24*	*1 287.38*	*736.26*	*174.71*	*52.64*	*59.33*	*14.31*
Tolna county	*503.30*	*1 497.04*	*746.32*	*618.79*	*2 136.29*	*2 294.01*	*1 414.83*	*1 265.68*	*359.49*	*102.92*	*28.13*	*36.63*
Southern Transdanubia	1 362.52	3 647.30	1 927.43	1 551.62	4 235.60	5 829.11	3 402.04	2 398.38	727.86	192.89	104.38	69.87
Borsod-Abaúj-Zemplén county	*595.79*	*3 546.00*	*1 322.94*	*956.51*	*2 236.57*	*3 402.38*	*2 308.30*	*1 520.16*	*711.41*	*234.76*	*192.97*	*287.84*
Heves county	*63.21*	*1 576.07*	*4 458.26*	*2 414.98*	*3 829.17*	*5 299.70*	*2 645.28*	*2 597.06*	*1 062.87*	*429.63*	*126.38*	*180.71*
Nógrád county	*72.72*	*120.97*	*41.35*	*59.63*	*229.81*	*62.51*	*200.05*	*156.95*	*51.71*	*30.70*	*9.30*	*13.21*
Northern Hungary	731.72	5 243.04	5 822.55	3 431.12	6 295.55	8 764.59	5 153.63	4 274.17	1 825.99	695.09	328.65	481.76
Hajdu-Bihar county	*299.38*	*984.00*	*65.52*	*34.37*	*71.48*	*416.38*	*411.25*	*299.60*	*153.63*	*76.88*	*46.87*	*50.23*
Jász-Nagykun-Szolnok county	*74.84*	*399.37*	*321.72*	*253.65*	*719.91*	*364.30*	*496.62*	*539.08*	*237.37*	*53.42*	*16.67*	*61.95*
Szabolcs-Szatmár-Bereg county	*230.30*	*431.96*	*42.02*	*53.12*	*11.96*	*285.80*	*166.81*	*149.22*	*73.13*	*43.63*	*24.82*	*25.90*
Northern Great Plain	604.52	1 815.33	429.26	341.14	803.35	1 066.48	1 074.68	987.90	464.13	173.93	88.36	138.08
Bács-Kiskun county	*230.42*	*9 064.74*	*8 493.23*	*2 249.33*	*6 201.44*	*13 902.31*	*6 115.56*	*3 746.88*	*926.93*	*476.10*	*300.00*	*771.31*
Békés county	*14.93*	*14.93*	*1.14*	–	*10.00*	*11.78*	*7.30*	*8.65*	*2.48*	*0.56*	*0.24*	*10.00*
Csongrád county	*64.75*	*628.07*	*667.14*	*395.72*	*1 295.68*	*782.31*	*790.04*	*418.41*	*266.21*	*114.17*	*116.85*	*563.40*
Southern Great Plain	310.10	9 707.74	9 161.51	2 645.05	7 507.12	14 696.40	6 912.90	4 173.94	1 195.62	590.83	417.09	1 344.71
Total	*6 420.95*	*29 812.57*	*20 610.70*	*10 165.62*	*24 411.58*	*40 217.89*	*22 053.58*	*16 393.63*	*5 877.86*	*2 440.36*	*1 597.50*	*2 841.04*

Table 3

Area of fruit plantations by territorial units

Denomination	Central Hungary	Central Trans-danuibia	Western Trans-danubia	Southern Trans-danubia	Northern Hungary	Northern Great Plain	Southern Great Plain	Total
Plantations								
number	4561	1554	3513	3992	8823	26112	11264	59819
share (percent)	7.6	2.6	5.9	6.7	14.7	43.7	18.8	100.0
Gross area								
size (hectare)	10976.83	4844.88	5603.53	5170.50	12283.54	35733.33	15321.04	89933.65
share (percent)	12.2	5.4	6.2	5.7	13.7	39.7	17.0	100.0
Net area								
size (hectare)	10475.72	4629.21	5161.20	4957.20	11681.06	34502.87	14654.37	86061.63
share (percent)	12.2	5.4	6.0	5.8	13.6	40.1	17.0	100.0
	Area of plantations (hectares)							
Apples	2013.95	1021.98	2536.63	1264.48	3467.05	24363.76	4596.25	39264.10
Pears	151.93	139.80	567.82	75.60	498.14	354.07	259.29	2046.65
Quinces	1.50	0.14	–	16.40	0.73	11.86	69.78	100.41
Medlars	–	–	–	–	–	–	0.94	0.94
Applefruits total	*2167.38*	*1161.92*	*3104.45*	*1356.48*	*3965.92*	*24729.69*	*4926.26*	*41412.10*
Cherries	319.38	107.89	57.64	74.26	292.11	190.41	177.36	1219.05
Sour cherries	2567.24	1000.64	410.65	437.53	1351.92	4933.33	2592.15	13293.46
Apricots	1187.29	672.74	81.58	665.55	1631.61	184.14	1324.61	5747.52
Peaches	1576.11	521.01	33.41	835.76	451.39	512.72	3229.28	7159.68
Plums	1380.46	292.03	182.66	410.10	1060.98	1773.34	1744.84	6844.41
Kernel fruits total	*7030.48*	*2594.31*	*765.94*	*2423.20*	*4788.01*	*7593.94*	*9068.24*	*34264.12*
Walnuts	214.32	234.14	411.07	557.55	471.42	1070.01	285.17	3243.68
Almonds	31.70	159.42	5.48	35.47	15.37	0.35	8.90	256.69
Chestnuts	23.12	25.80	333.52	73.32	11.12	–	0.37	467.25
Hazelnuts	13.29	1.35	4.03	16.87	5.33	3.84	44.29	89.00
Nuts total	*282.43*	*420.71*	*754.10*	*683.21*	*503.24*	*1074.20*	*338.73*	*4056.62*
Raspberries	243.22	5.52	171.67	183.25	688.32	131.31	0.24	1423.53
Raspberries-dewberries	0.25	–	0.66	1.57	0.66	0.09	–	3.23
Dewberries	30.68	18.26	27.17	16.38	314.74	96.79	0.95	504.97
Red- and white currants	377.63	76.29	99.45	80.54	248.53	136.45	0.90	1019.79
Blackcurrants	88.66	63.41	95.72	35.20	521.99	52.11	1.80	858.89
Jostaberries	–	–	0.38	0.05	0.54	–	–	0.97
Gooseberries	19.81	9.80	0.08	0.11	67.48	270.57	8.49	376.34
Strawberries	113.23	17.75	28.31	40.81	80.10	68.94	73.11	422.25
Elders	104.54	260.97	108.17	135.82	499.49	346.57	226.38	1681.94
Buckthorns	17.40	0.30	–	–	–	2.20	4.52	24.42
Bilberries	–	–	5.11	–	–	–	–	5.11
Beams	–	–	–	0.60	2.04	–	4.80	7.44
Small fruits	*995.42*	*452.30*	*536.72*	*494.33*	*2423.89*	*1105.03*	*321.19*	*6328.88*