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March 2008

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MPRA Paper No. 7787, posted 15 Mar 2008 18:37 UTC

Production and productivity of Bulgarian agriculture in post war years

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Abstract

This study is a first attempt to clarify major trends and factors of changes in production and productivity in Post-Second World War Bulgarian agriculture. It incorporates an interdisciplinary approach and specifies crucial institutional, economic, organizational, technological etc. factors affecting development of agricultural production and productivity. Firstly, evolution of agricultural production and productivity is analyzed, and effect of labor, land and livestock productivity on different productions assessed. Secondly, evolution and impact of main technological factors (application of chemicals, mechanization, irrigation, introduction of new varieties etc.) are examined. Third, stages in property rights development and restructuring of farms are presented, and their effects on production and productivity evaluated. Forth, paces in modernization of public policy, its key elements (central planning, price and trade regulations, support programs etc.) and implications for agriculture are identified. Fifth, evolution and role of the demands for farm products is assessed. Next, changes in labor quantity and composition, and their impact on agricultural production and productivity are scrutinized. Finally, effects of climate changes and weather extremes on agriculture are underlined.

Key words: evolution of agricultural production, productivity; political, institutional, economic, organizational, international, technological, natural factors; post-second world war agriculture; Bulgaria

Introduction

In Bulgaria there are ideal natural conditions (soils, water, climate) for development of agriculture and for production of a great variety of crop and livestock produce. Since the Second World War country's agriculture has gone through a number of fundamental changes in property rights and organizational structures – cooperation of peasants in 1950s and 1960s; enormous concentration of farming in large public farms in 1970s and 1980s; post-communist transformation and evolution of new farming structures since 1990¹. Moreover, there has been a significant evolution of farming technologies, agricultural labor, food markets, modes of governance, public support policies, climate variations etc. All these have had a huge implication

¹ Transition to a modern market economy completed successfully and Bulgaria joined EU on January 1, 2007.

for composition and dynamics of agricultural production and progression of productivity.

This study is a first attempt to clarify major trends and factors of changes in production and productivity in Post-Second World War Bulgarian agriculture. It incorporates an interdisciplinary approach and specifies crucial institutional, economic, organizational, technological etc. factors affecting development of agricultural production and productivity. *Firstly*, evolution of agricultural production and productivity is analyzed, and effect of labor, land and livestock productivity on different productions assessed. *Secondly*, evolution and impact of main technological factors (application of chemicals, mechanization, irrigation, introduction of new varieties etc.) are examined. *Third*, stages in property rights development and restructuring of farms are presented, and their effects on production and productivity evaluated. *Forth*, paces in modernization of public policy, its key elements (central planning, price and trade regulations, support programs etc.) and implications for agriculture are identified. *Fifth*, evolution and role of the demands for farm products is assessed. *Next*, changes in labor quantity and composition, and their impact on agricultural production and productivity are scrutinized. *Finally*, effects of climate changes and weather extremes on agriculture are underlined.

The study is based on a great amount of statistical and other official data. In addition, expert assessments are extensively used to compensate shortages in quantity and reliability of information for different periods of development of Bulgarian agriculture.

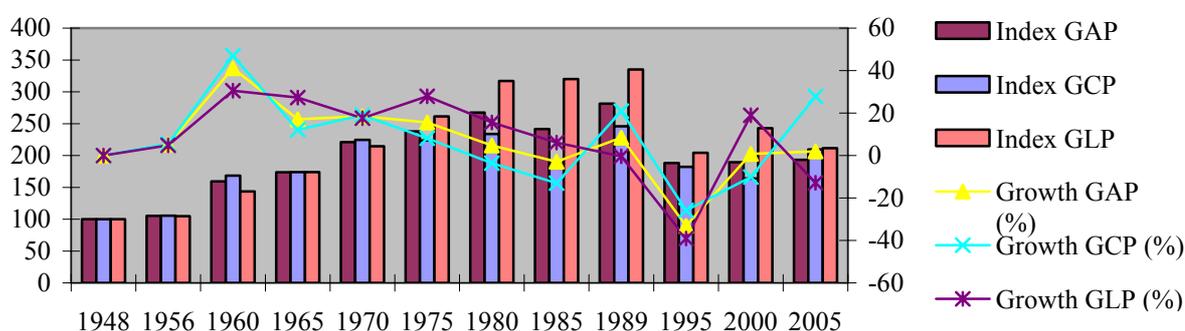
Evolution of agricultural production

Post Second World War period has seen a huge augmentation of agricultural production in Bulgaria. By the end of 1980s the value of Gross Agricultural Product (GAP) almost tripled comparing to 1948 (Figure 1). The growth rate of Gross Crop Product (GCP) and Gross Livestock Product (GLP) was particularly big during the second part of 1950s. A double digit growth in GAP continues until 1975 mostly due to the large increase in GLP. In 1970s and 1980s the growth of GCP is low and even negative which is coupled with insignificant and negative enlargement of GLP after 1980. There was a vast decline in crop and livestock productions after 1989 with a trend for recovery of GCP in recent years.

All major crop productions but rye have experienced a significant growth in post-war years (Figure 2). Comparing to 1948 the expansion of physical volume reaches 2,5 times for grape, 3 folds for oriental tobacco, 4 times for wheat and apples, 5 times for maize and cotton, 7 folds for sugar beat, 8 times for potatoes, 9 folds for burley, 10 times for sunflower and alfalfa hay, and 11 folds for tomatoes. Most crop outputs grew significantly until 1975 (with exception of cotton and rye hitting the top in 1956). There was a slow-down or even negative growth of many industrial and permanent crops, vegetables, and some grains during 1975-1989. A number

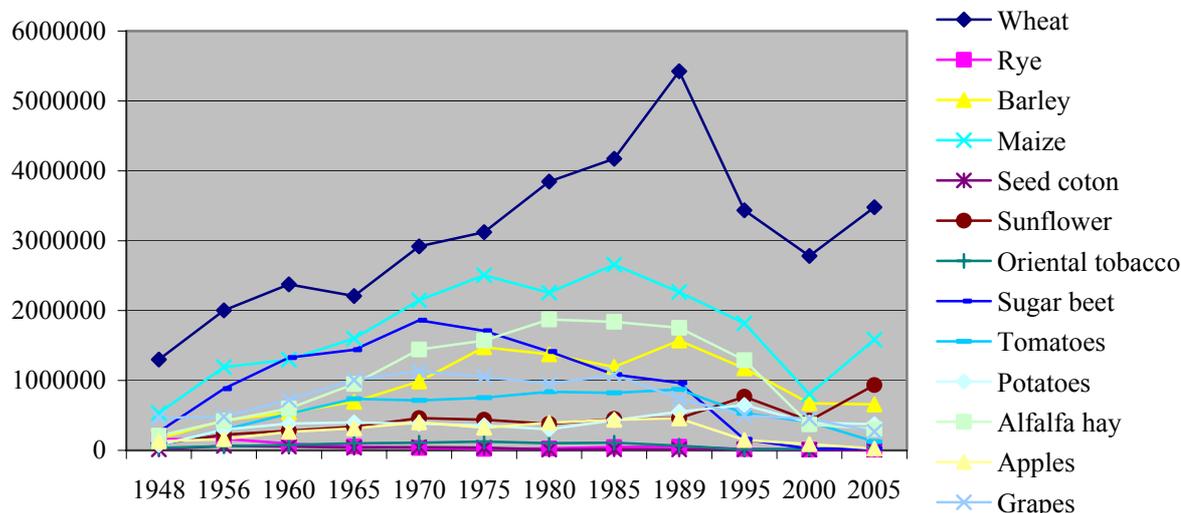
of major productions like cotton, table grape and rye got to lower levels than in 1948. Final decade of the last century saw a sharp decline in all crop productions (but sunflower) ranging from a third for potatoes, a half for wheat, to 60% for corn and burley, three quarters for tomatoes, Alfalfa hay and table grape, and up to 94% for apples. Certain important productions were reduced to a tiny fraction of their 1948 level – grapes (57%), apples (20%), sugar beat and cotton (9%), and rye (8%). There has been a reverse trend for growth in wheat, maize and tobacco productions after 2000.

Figure 1: Evolution of agricultural production in Bulgaria



Source: National Statistical Institute

Figure 2: Dynamics of crop productions in Bulgaria (tons)

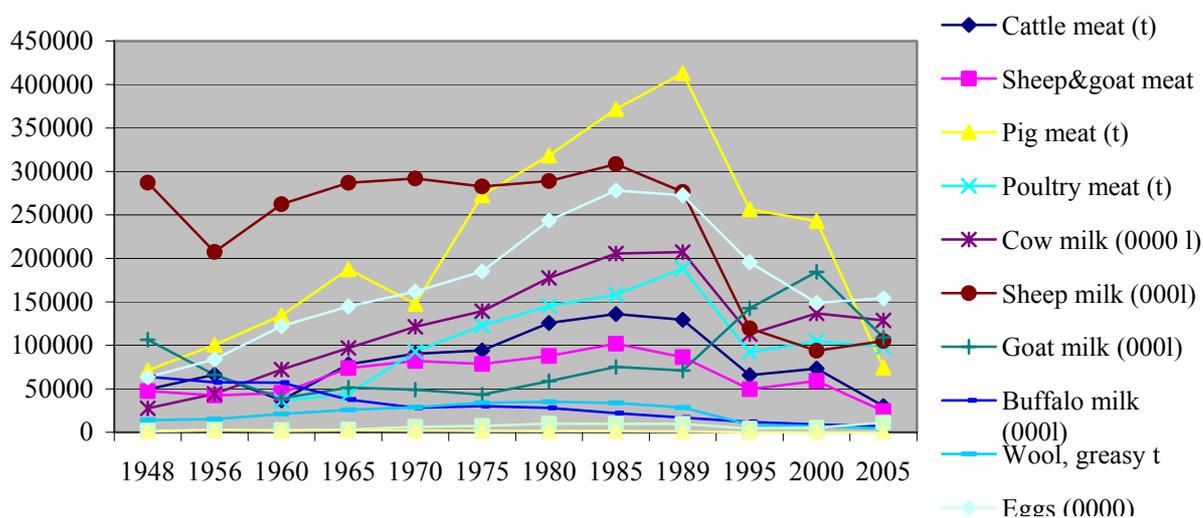


Source: National Statistical Institute

Livestock production has also seen a dramatic dynamics since 1948 (Figure 3). Until 1989 there was a considerable increase in production of cow milk, honey, eggs, wool, and meats from pigs, cattle, sheep and goat, and poultry where growth in physical output reached 752%, 600%,

440%, 250%, 580%, 260% and 520%² accordingly. The largest expansion for all these products was after 1960. On the other hand, a number of traditional productions experienced zero growth (e.g. sheep milk) or significant decline after 1948. By 1989 goat and buffalos milks shrunk by 30% and two-thirds while cocoons (after 2 folds growth until 1956) was reduced by a quarter. After 1989 there has been a dramatic fall in all livestock outputs but goat milk – production of pig, cattle, sheep and goat meats declined by 82%, 77% and 72% accordingly; poultry meat by 51%; cow, sheep and buffalo milks by 45%, 66% and 59%; wool by 85%, eggs by 45%, honey by 57%, and cocoons disappeared. In recent years there is a slight recovery of sheep milk, honey and eggs productions. However, current output for major products like pig meat and goat milks is just above 1948 level. Other productions are still far below the 1948 level – cattle meat (61%), sheep and goat meat (52%), sheep milk (37%), wool (31%), and buffalos milk (11%).

Figure 3: Dynamics of livestock productions in Bulgaria



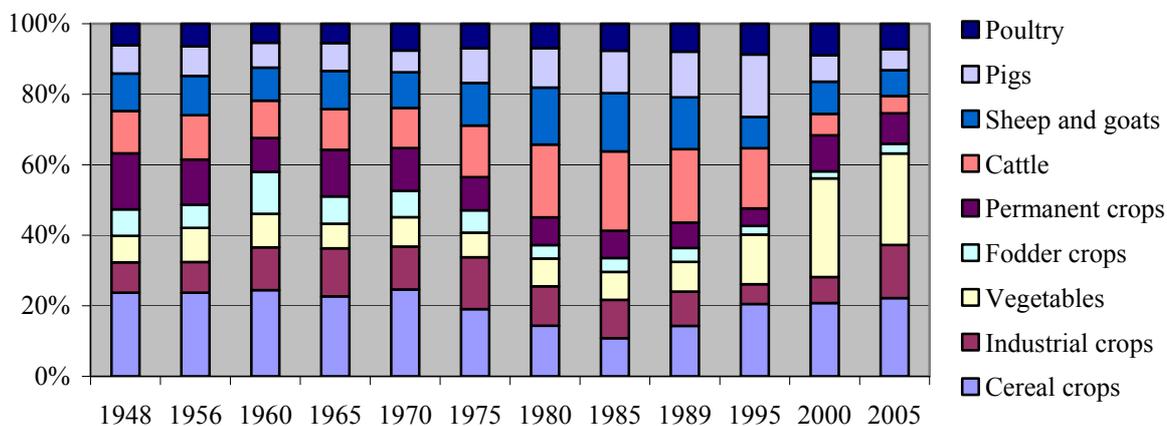
Source: National Statistical Institute

The post-war evolution of agricultural productions has been associated with substantial changes in the importance of crop and livestock sectors and individual sub-sectors (Figure 4). Livestock production comprises a third of the value of GAP until 1970 having its share increased after that and being a dominating sector until the end of 1980s. After 1995 the share of livestock sectors sharply diminished down to just 22% of GAP in recent years. Contribution of cereals was the greatest until 1975 and they make the first (until 1995) or the second (since 1995) biggest sector after 1989. Cattle accounted for the best part of GAP between 1979-1995 while pigs contributed significantly during 1989-1995. Industrial crops extended to the second most important production in 1960-1975 returning their importance since 2000. Vegetable production

² Data for poultry are compared with 1960 level.

has seen its share augmented since 1989 now having the largest portion in GAP in past decade.

Figure 4: Composition of Gross Agricultural Product in Bulgaria



Source: National Statistical Institute

Evolution of agricultural productivity

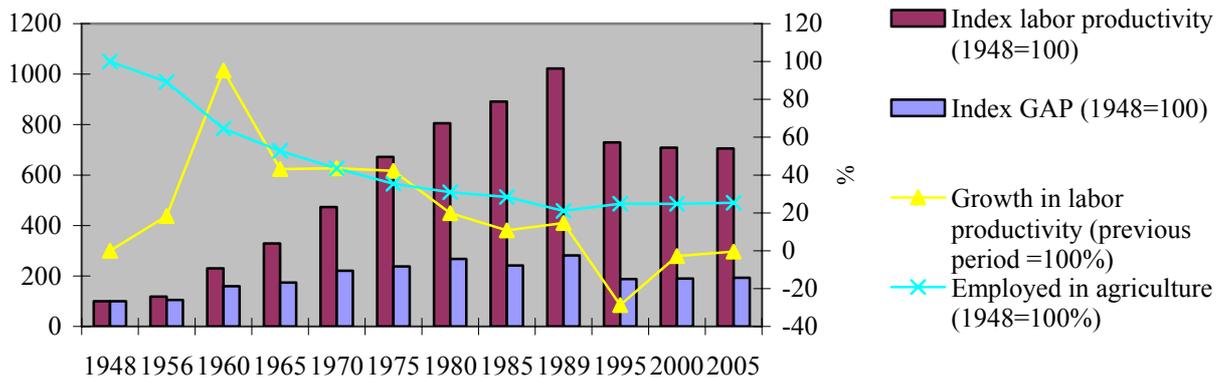
There has been more than ten folds growth in aggregate labor productivity³ in post-war agriculture (Figure 5). Augmentation of productivity continues until 1989 with a particularly high rate until 1975 and a slower expansion (2-4% a year) afterwards. There was a parallel process of sharp reduction of employed persons in agriculture which amount dropped to one-fifth of 1948 figure. Throughout that period the increase of labor productivity exceeds considerably the growth in GAP. Therefore, the entire enlargement of production comes from the boost in labor productivity. After 1989 there has been an immense fall in labor productivity (with 29% by 1995, and a minor rate afterwards) along with a 20% rise in number of employed in agriculture. The later could not compensate the lost in labor productivity and GAP plummeted by a third by 1995. Since then there has been a tiny growth in GAP fully coming from employment of additional workforce.

There has been also a considerable increase in productivity of land after 1948 both in terms of rising of average yields and improvement of crop (and livestock) structure. The yields per ha for all crops has augmented significantly – with 80%-130% for Alfalfa hay, oriental tobacco and sunflower, 400% for wheat, burley and potatoes, and more than 600% for maize (Figure 6). Yields of most crops improved until eighties and significantly diminished after 1989. Yields of

³ Labor productivity is calculated by dividing GAP by average number of employed in agriculture (NSI).

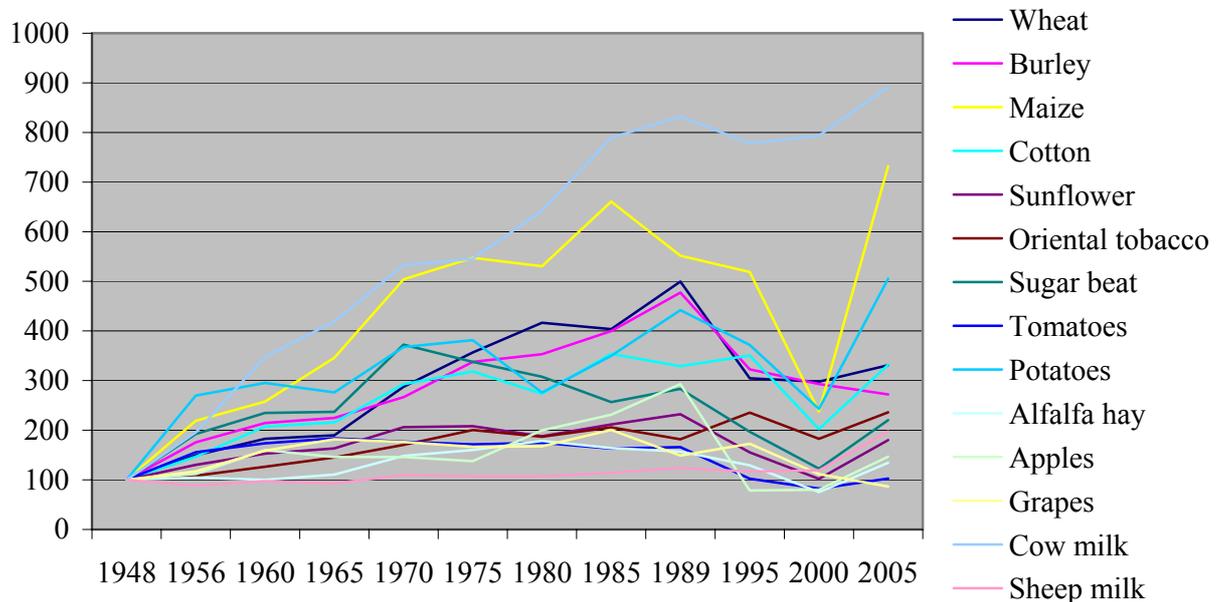
every crop but rye have grown after 2000 but they are still below 1989 level. Maize and potatoes recovered after 1989 regression achieving the top rates in recent years. Oriental tobacco is the only exception keeping upward trend until present.

Figure 5: Dynamics of labor productivity in Bulgarian agriculture



Source: National Statistical Institute

Figure 6: Dynamics of crop and livestock yields in Bulgaria (1948=100)

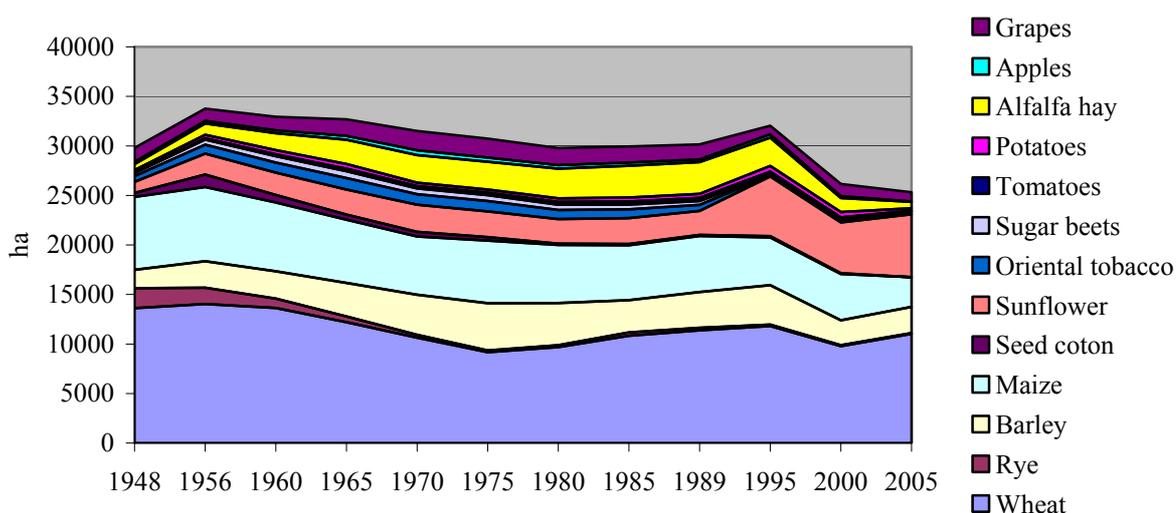


Source: National Statistical Institute

In post war period there has been substantial changes in crop structure and the extend of productive use of farmland (Figure 7). Cereals accounts for the major part of planted area but their share decreased after 1956 (rye almost vanished). Furthermore, areas devoted to wheat and

maize shrunk while burley and sunflower extended significantly. Farmland for vegetables and Alfalfa hay extended considerably until 1989 and took a good portion of all Utilized Agricultural Area (UAA) until 2000. Major industrial crops (cotton, sugar beat, tobacco) got a huge enlargement in 1956-1965 but gradually lost their importance afterwards (sugar beat and cotton nearly disappeared). During 1965-1975 fruits and vineyards reached a great expansion but diminished since then. Merely burley, vegetables, apple and sunflower had their surface spread out after 1989 but only the later one has not plummeted. In recent years wheat and sunflower dominate, and along with maize and burley account for 90% of UAA. There was a 13% increase in utilized farmland in 1950s which gradually was reduced back to 1948 level during 1975-1989. After 1989 there was a slight expansion of UAA until 1995 and a significant reduction since then.

Figure 7: Planted area for major crops in Bulgaria



Source: National Statistical Institute

Until 1989 for most crops growth rates of productions are higher than the (positive, negative) rate of progression in planted areas (Table 1). Thus the dynamics of output is achieved with an increase in average yields during the period. Moreover, for wheat and maize the expansion of productions is accomplished with decreasing the planted areas. For burley, sunflower and vegetables both yields rise and extension of utilized area contributed to augmentation of production. After 1989 a negative rate in productions dominates and that is caused both by decrease in crop surface and fall in yields (reduction of areas is less that in output). Boost in some productions in different years come through intensive (e.g. maize), extensive (e.g. sunflower, oriental tobacco) or mix ways (e.g. wheat, sunflower, oriental tobacco).

Table 1: Growth in crop productions and planted areas (proceeding period=100)

Productions	1956	1960	1965	1970	1975	1980	1985	1989	1995	2000	2005
Wheat - output	54,2	18,6	-7,1	32,2	7,0	23,2	8,5	30,0	-36,7	-19,0	25,0
Wheat - area	3,0	-2,8	-10,6	-12,7	-13,8	5,5	11,9	5,1	3,8	-17,2	12,6
Rye - output	6,05	-41,7	-40,2	-39,6	-40,6	34,3	75,6	6,3	-63,5	-35,0	0,0
Rye - area	-17,3	-43,2	-37,4	-50,9	-42,5	19,3	65,6	-21,9	-45,8	-35,0	0,0
Barley - output	152,4	26,8	28,0	42,1	49,8	-6,8	-13,2	31,7	-25,4	-42,5	-2,7
Barley - area	43,7	3,6	22,3	19,8	18,2	-10,9	-23,3	10,3	10,4	-36,7	5,0
Maize - output	122,9	8,8	23,4	34,1	16,7	-10,0	17,7	-14,7	-19,8	-55,7	97,2
Maize - area	1,7	-7,4	-8,2	-7,9	7,4	-7,1	-5,5	2,2	-14,7	-3,4	-35,9
Cotton - output	357,8	-15,4	-28,5	19,8	-15,3	-70,1	33,6	-18,2	9,1	-53,7	-80,2
Cotton - area	211,8	-40,2	-31,2	-11,7	-22,2	-65,2	3,4	-12,1	2,4	-19,8	-87,9
Sunflower- output	146,3	25,7	20,1	36,9	-5,0	-13,6	18,4	1,9	67,3	-44,5	119,8
Sunflower - area	89,0	7,2	12,2	8,5	-5,7	-4,3	5,1	-7,1	149,9	-15,3	24,2
Or.tobacco - output	70,0	31,5	31,6	7,8	15,6	-18,6	6,2	-40,1	-81,6	78,7	81,9
Or. tobacco - area	56,9	12,7	14,7	-8,3	-1,6	-12,6	-3,6	-32,1	-85,8	130,5	40,6
Sugar beets - output	230,2	50,7	8,4	29,3	-8,1	-17,3	-23,3	-10,9	-83,7	-85,3	7,2
Sugar beets - area	71,7	23,4	7,4	-17,7	1,3	-9,3	-8,0	-19,3	-76,6	-76,4	-40,4
Tomatoes - output	315,4	78,4	40,5	-3,1	5,4	11,2	-2,0	6,3	-39,3	-22,7	-69,1
Tomatoes -area	166,7	60,0	32,8	0,6	8,9	9,0	4,9	4,5	-1,5	-3,8	-75,3
Potatoes - output	276,8	29,3	4,5	-5,0	-6,6	-15,3	43,3	28,4	17,3	-38,7	-5,5
Potatoes - area	39,6	18,2	11,6	-28,6	-10,0	17,1	13,0	1,6	39,4	-6,2	-54,6
Alfalfa hay-output	98,8	42,5	59,0	51,7	8,8	19,2	-1,8	-4,5	-26,5	-71,1	-18,2
Alfalfa hay - area	90,2	49,1	43,4	13,4	0,7	7,0	6,6	-0,0	-10,8	-50,3	-54,3
Apples - output	23,3	64,7	19,2	27,3	-19,1	21,5	11,0	4,6	-67,5	-40,3	-70,6
Apples - area	10,1	15,3	30,6	27,3	-14,2	-16,3	-4,2	-17,3	21,4	-41,4	-84,0
Grapes - output	3,4	49,8	39,6	12,6	-7,0	-9,7	13,4	-31,2	-32,8	-9,5	-41,1
Grapes - area	-11,7	10,4	22,1	16,1	-1,7	-10,1	-5,3	-7,2	-42,1	40,3	-24,1

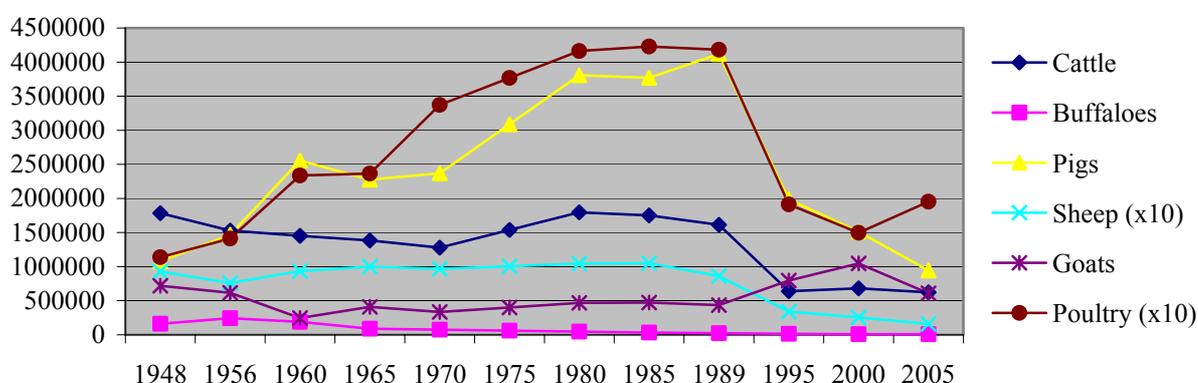
Source: National Statistical Institute

In post war years there has been a significant improvement in livestock productivity as well (Figure 6). For cows and buffalo-cows yield growth was steady until 1989 and after falling-back it hits the top in recent years. For sheep and goats the real yield rise have come after 1985 as hike is particularly big for goat milk after 1989 and sheep milk most lately.

There have been also considerable changes in numbers and structure of livestock and poultry (Figure 8). The total amount of animals decreased by 12% until 1956. Furthermore, the quantity of sheep was kept almost unchanged until 1975 and had some growth in first part of

1980s. Cattle were below the 1948 level until returning back to initial number during 1980-1985. Buffaloes have been in decrease since 1950s. Amount of poultry and pigs increased substantially until 1989. Sheep accounts for the biggest portion in total livestock but lost its lion share (71%) along with all other animals but pigs. After 1956 pigs took over the second place from cattle and enlarged its 1948 portion of 8% to 29% in 1995. After 1989 there has been a huge decline in numbers of poultry and livestock but goats. Now all kind of animals are below their 1948 level. Sheep dominates in total livestock quantity (42%) followed by pigs (25%), cattle and goats (16% each).

Figure 8: Dynamics of livestock numbers in Bulgaria



Source: National Statistical Institute

Table 2: Growth in milk productions and milking animals (proceeding period=100)

	1956	1960	1965	1970	1975	1980	1985	1989	1995	2000	2005
Cow milk	60,6	63,1	34,3	25,1	14,7	27,5	15,8	0,8	-45,5	21,1	-6,0
Cows	108,9	37,3	11,1	2,0	21,2	10,3	-7,4	-2,3	-43,0	19,6	-19,3
Buffalos milk	-10,2	-0,6	-34,2	-24,5	6,2	-6,5	-21,8	-23,2	-29,7	-24,9	-21,7
Buffalo-cows	-23,9	-26,8	-31,2	-39,4	-16,5	-34,7	-40,8	-10,9	-41,7	-24,2	-4,4
Sheep milk	-27,7	26,4	9,4	1,7	-3,2	2,3	6,7	-10,3	-56,8	-21,6	12,1
Ewes	-18,5	12,0	15,0	-13,8	-1,0	2,3	0,0	-17,2	-54,1	-23,2	-34,8
Goat milk	-37,9	-41,0	31,8	-4,7	-11,6	35,6	27,9	-5,5	100,8	29,2	-40,8
She goats	-26,4	-51,8	43,7	-7,7	-18,7	43,6	8,7	-5,7	79,0	20,4	-35,9

Source: National Statistical Institute

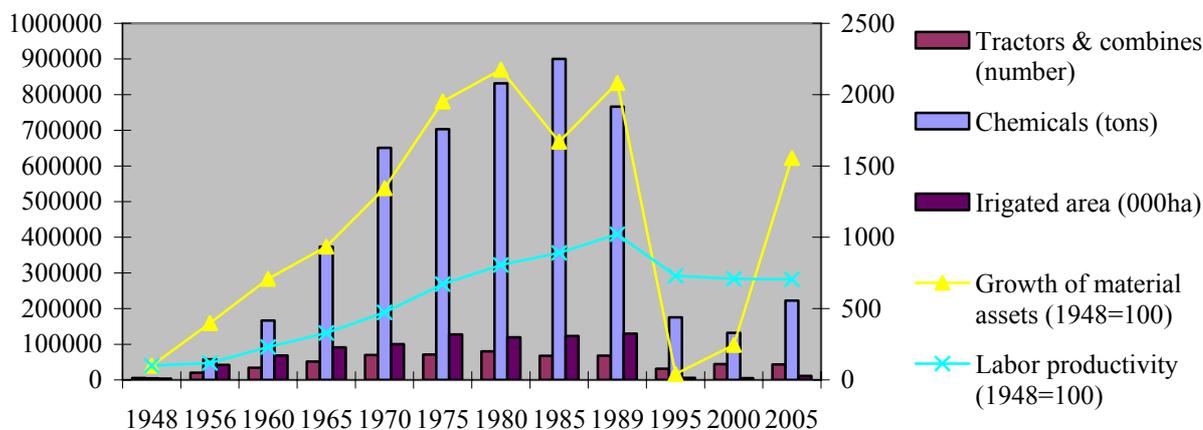
Until 1980 the growth in production of cow milk was due to increase in number of milking cows and to a highest extend due to the rise in productivity of animals (Table 2). In 1980s augmentation of milk production is attained with decreasing heads of cows (entirely through

improvement of productivity). Dramatic decline in buffalo milk production has been caused predominately by the drop in number of buffalo-cows coupled in certain periods (1985-1989, 2000-present) with lost in productivity. Dynamics in sheep milk production in different years has been affected both by positive and negative changes in ewes and their productivity. Major factor for variation of goat milk production are changes in the she-goat number but until recently it has been accomplished with a growth in productivity.

Technological factors of agricultural production and productivity

The Post-Second World War agriculture in Bulgaria was characterized with primitive technologies and low productivity - there were few tractors and no combines, utilization of chemical fertilization was rare and pesticides were unknown, and irrigated farmland comprised less than 1% of utilized area. Since 1948 there has been a dramatic development of technological factors in agriculture having enormous effect on level of production and productivity (Figure 9).

Figure 9: Evolution of technological factors in Bulgarian agriculture



Source: National Statistical Institute

Firstly, there was a massive mechanization of agricultural operations and entire productions associated with application of tractors and combines. Until late 1960s the number of tractors increased more than 11 folds (21 folds in “15 horse power” equivalent). Besides, combines were introduced after 1950 and their amount rose 5 times for the same period. Wide spreading of tractors and combines was particularly high until 1970 when. As a result a significant portion of crop production activity was mechanized by 1960 and nearly entirely mechanized in 1960s. The later contributed considerably for increasing labor productivity and freeing workforce for other sectors of the economy. Mechanization was also responsible for

dropping the number of cattle used as draught animals after 1948. While in 1952 the later comprises 55,7% of total energy power in agriculture, this share drops to 14,8% in 1960 and 3,7% in 1970 (NSI). Mechanization of most operations was an essential factor for immense development of cereals and some industrial crops productions (sunflower, sugar beat). In 1960s and 1970s a new generation of machineries replaced old one enhancing further productivity and intensifying production. Since 1950s much of livestock and poultry operations were also greatly mechanized. For instance, by 1970 as much as 81% milking of cows, 60,9% manure cleaning, 54,3% of watering, and 34% of forage distribution were mechanized in cow farms.

Secondly, application of chemical fertilizers multiplied considerably in 1950s and by 1985 augmented 190 times over the 1948 level (150 folds for Nitrogenous, 275 folds for Phosphate, and 440 times for Potash). During the same period pesticides were broadly introduced and by 1980 reached 5 times the 1956 level. Chemical fertilization and crop protection was a key factor for increasing land productivity and crops yields. Chemicalization of agriculture also contributed significantly for extension of crop structure (enlargement of horticulture and permanent crops) and expansion of livestock (milking cows, pigs) and poultry. On the other hand, the enormous application of chemicals in nineties was associated with increasing chemical contamination of soils, waters, and farm produce, and increasing lands affected by acidification and salinity.

Third, irrigation was another important factor for improving crop yields and production structure. Until 1956 irrigated area increased 10 times and it covered a quarter of the total arable land by 1975. Irrigation helped overcome severe shortages of water in summer periods affecting most crops. It was mostly responsible for decreasing areas for maize, and expansion of some industrial crops (sugar beat, cotton), vegetables, and fodder (and thus livestock and poultry) productions. Furthermore, in 1970s modern irrigation techniques were introduced (e.g. spraying, precise watering) leading to increasing the efficiency. For instance, until 1975 on 60% of irrigated areas spraying irrigation was used comparing to just 2% in 1960. Nevertheless, intensification of irrigation contributed to a great extend to erosion and salinisation of great parts of farmlands.

Forth, new crop varieties and hybrids were broadly introduced with improved yields, resistance, and quality for mechanical cultivation, harvesting and processing. In addition, quality indicators of many fruits and vegetables were ameliorated. Furthermore, new productions such as Alfalfa hay, sugar beat emerged and/or expanded. All these led to expansion of entire crop sectors (grain, oils seeds, vine grapes, vegetables, and fruits), livestock production, and related industries (vine; food and oil processing etc.).

Improvement of technological bases of agriculture was a result of considerable augmentation of the material assets in the sector. The later had a sizeable growth until 1989 with a slowdown in the beginning of 1980s. The extension of mechanization and irrigation follows the dynamics of new capital investment (Figure 9). What is more, the rate of growth in material

assets overpasses the growth in labor productivity. The later is an indicator for a capital-intensive (consuming) growth in agricultural production and labor productivity.

After 1989 the total amount of used chemical fertilizers and pesticides has declined considerably. There has been also a sharp reduction of irrigated farmland as merely 2-5% of existing irrigation network has been practically used (mostly less-effective gravitation watering). The level of new capital investment has been insignificant, which practically stopped renovation of out-of-dated and amortized machineries, building, irrigation facilities, orchards and vineyards. Manual labor and animal power started to be broadly used in small-scale farming. All these have had a direct negative effect on crop yields, size and structure of production, and labor productivity. What is more, a negative rate of fertilizer compensation of intakes of nutrition elements dominates (since 1990 being 90% for N, 34% for P, and 11% for K) causing severely degradation of large agricultural lands.

Impact of property rights development

Post-Second World War changes in property rights structure have affected enormously the development of agricultural production and productivity.

Firstly, in 1946 farmland ownership exceeding 20ha (30ha in a North-East region Dobridja) was nationalized. Around 60% of confiscated property was given to poor peasants while another part was used to set up State Agricultural Farms (DZS). Agrarian reform affected few landlords and 5,3% of farmland as 128000 peasants acquired ownership titles. The number of farms increases by 13% while peasants got higher incentives (ownership rights on entire output) to improve productivity. In addition, sizeable machineries were forcefully taken away (1948 Law for Buying Large Farm Equipment) and used to set up State Machinery Stations (MTS). That affected few farms and eventually led to more efficient use of scare machinery.

Secondly, during 1948-58 all farmers were forcefully collectivized into producers cooperative following 1945 Law for Labor Cooperative Agricultural Farms (TKZS). Private entrepreneurship in agriculture (land, labor, marketing deals) was restricted while land rent in TKZS gradually reduced and abandoned (1958). Production structure in cooperatives was greatly determined by state orders for supply of farm produces. Almost all cooperatives members were small-holders or landless peasants. Therefore, guaranteed state purchase, collective decision-making, team production and distribution of income according to labor input created opportunities (coordination, incentives) for increasing productivity in new collective farms. In addition, cooperative members and workers in other sectors were allowed small-scale “personal” plots, livestock and poultry for household consumption. After 1956 TKZS accounted for the greatest share in farmland, all kind livestock (but goats), major productions and GAP (Table 3). In

seventies the initial enthusiasm in cooperative system disappeared and the coops economic and financial performance deteriorated.

Table 3: Share of different farms in total agricultural resources and GAP in 1960 (%)

Indicators	TKZS	DZS	Personal farms	Private farms
Gross Agricultural Product	72,6	6,8	19,7	0,9
Farmland	79,9	6,6	8,0	5,4
Cattle	67,1	5,7	23,9	3,3
Buffalos	30,1	1,5	64,8	3,6
Pigs	54,5	7,7	35,2	2,7
Sheep	63,2	5,5	29,9	1,4
Goats	4,9	0,5	91,5	3,2
Poultry	38,9	2,5	55,6	3,0
Bees	17,4	1,6	77,2	3,8

Source: National Statistical Institute

Third, in the beginning of 1970s property rights of cooperatives were additionally restricted when production was further “socialized”. All TKZS were integrated into huge Agro-Industrial Complexes (APK) and soon lost economic and organizational independency. Farmers were practically turned into wage workers which distanced producers motivation from improvement of production and productivity. In 1970s and 1980s, personal farms were further promoted aiming to deal with stagnation in productivity and shortages of quantities and varieties of agricultural products. These private farms possessed insignificant share in total resources⁴ but strong incentives (private ownership on entire product) contributing considerably to GAP and major productions (Table 4). In 1980s more management rights were given to basic production units of APK (Brigades) in order to enhance team incentives for growth in productivity. By the end of 1980s the later included rights to govern public property, form and distribute profit, posses bank account etc. and had some positive impact on efficiency. However, until the collapse of the socialist model (end 1989) the deficiency in incentives for high productivity prevailed while farms resources and production structure rested under strict state control.

Forth, a large scale restitution of collectivized or nationalized farmland and agrarian assets and privatization of state agrarian property was undertaken after 1990 (1991 Land Law, 1992 Law for Privatization of State Property). Privatization took almost 10 years to complete affecting more than 85% of agricultural land and turning a three-quarters of Bulgarian households into owners of portions of farmlands and assets of ancient public farms (Bachev, 2000). The

⁴ Private farms was closely linked to public sector in terms of inputs supply, marketing etc.

restoration of private property rights gave strong incentives for private entrepreneurship and increasing productivity. In few years almost entire agricultural production came from the private sector. In time of hardship, the employment in farming increased since many used acquired resources to produce food for household consumption and get additional income.

Table 4: Share of private farms in farmland, value of agricultural products, and physical outputs of major productions in 1989

Indicators	%	Products	%	Products	%	Products	%
GAP	27,3	Cereals	13,2	Cattle meat	35,8	Sheep milk	43,6
GCP	22,4	Vegetables	41,6	Sheep & goat meat	64,8	Goat milk	99,6
GLP	36,0	Potatoes	53,6	Pig meat	44,8	Buffalo milk	75,6
Farmland	10,1	Fruits	44,3	Poultry meat	58,3	Eggs	48,5
		Grapes	48,8	Cow milk	18,6	Honey	85,8

Source: National Statistical Institute

However, the mode and pace of privatization (distribution of resources to farmers and non-farmers, restitution of land in original real borders, physical distribution of material assets and livestock, lack of full ownership titles for long time, practical difficulties and mismanagement) had significant negative impact on production and productivity (Bachev, 2007). Most farmland of large commercial farms was supplied through provisional lease-in contracts and no interests in long-term investment (for improving land productivity) and preferences for one-season crops (expansion of sunflower and wheat) dominated. Furthermore, a substantial part of livestock, buildings, irrigation facilities, vine yards, and orchards were abundant or destroyed, and a huge portion of productive farmland left unused for a long period of time. All these were among the main reasons for the general fall in agricultural production, crop yields and labor productivity after 1989. In recent years, privatization of agrarian resources and activities has been giving positive results and there is an upward trend in major productions and productivity.

Restructuring of farms

Post war agriculture was the leading sector in Bulgarian economy and employed 82% of the workforce. It was dominated by numerous small-scale farms (Table 5) producing a wide range of products for household consumption. Specialization and commercialization were not developed and productivity was low. Following the restructuring of farms has been a major factor affecting agricultural production and productivity.

Firstly, creation and evolution of TKZS accelerated concentration of agrarian resources, centralized decision-making, promoted internal division and specialization of labor, allowed

large-scale introduction of machineries (and exploration economies of scale and scope), let rapid dissemination of new technologies and varieties, assured individuals against various risks etc. Consequently, for a short period of time an immense growth across productions and overall progress in productivity was achieved. Cooperatives were producing a large number of products and providing services, infrastructural support etc. which brought about improvement of villages and peasants welfare. A number of DZS were also set up as large specialized enterprises in all regions. The later contributed to growth in production and productivity in certain areas (cereals, livestock) and supported dissemination of progressive technologies in TKZS. Two consecutive size augmentations of TKZS were undertaken (1959 and 1969) merging them into United TKZS. That extended possibilities for product and functional specialization of coops internal divisions. However, it also took decision-making further away from farmers and the specific problems of villages, and damaged cooperative incentive system (income redistribution, equal remuneration). Consequently, there was some slow-down and regression of productions and productivity during 1960s.

Table 5: Evolution of farming structures in Bulgaria

Type of farms	1944	1946	1958	1960	1972	1985	1989	1995	2005
Private farms*	1100000	1256000	n.a.	n.a.	n.a.	1600000	1600000	1772000	515300
Average size (ha)	3,9	3,5				0,4	0,4	1,3	1,8
% in farmland	99,4	96,2	23,4	13,4	10,2	9,9	10,1	46,5	33,5
Cooperatives	110	480	3290	932	725	678**		2623	1525
Average size (ha)	240,9	359,6	1263,7	4266,2	4430,0	4000,0		800,0	584,1
% in farmland	0,6	3,8	73,6	79,9				40,7	32,6
DZS		86	49	67	149	196**			
Average size (ha)		116,3	3426,5	4419,4	4220,0	2100,0			
% in farmland		0,2	3,0	6,6					
APK					170	306***			
Average size (ha)					25735,7	13661,1			
% in farmland					89,8	90,1			
Collective farms							2101		
Average size (ha)							2423,1		
% in farmland							89,9		
Agri-firms								2200	3704
Average size (ha)								300,0	249,4
% in farmland								12,8	33,8

* After 1989 Unregistered farms; ** Sub-units of APK ; *** 8 Industrial-Agro-Complexes included

Source: National Statistical Institute

Secondly, after 1970 APK were set up as large regional associations integrating all TKZSs, DZSs and MTSs. The later, initially were "independent members" but in 1975 transferred into highly specialized internal divisions of APKs. Most APKs involved food processing, agricultural services and marketing, and even non-agricultural activities. There was some regional specialization but principally APKs were responsible for food supply of local communities producing a broad range of products. APKs had a great potential (land, labor, equipment, capital) to increase efficiency through centralized coordination, heavy investments and modernization, internal specialization, vertical integration, exploration of economies of scale and scope, risk sharing and mitigation. Consequently, they achieved some progress in capital (mechanization, chemical) intensive productions and high-tech areas such as cereals, sunflower, greenhouses, modern irrigation and spread of pesticides. A number of large vertically integrated regional or national complexes (Industrial-Agro Complexes, Science and Production Organizations, Economic Associations) were also established in sugar, viticulture-vine, fruits-vegetable, seeds of high quality, pig, cattle and sheep, poultry. They were bigger than APKs and integrated farming with strong research and processing capacities. These organizations were able to address better problems with coordination of vertical links (single management) and were responsible for a huge expansion of some productions (pig, poultry) during 1970s and 1980s.

All agrarian organizations were managed like state companies and their production and technological structures, allocation of resources, and relations with upstream and downstream industries were strictly controlled by the State. Public enterprises had weak incentives structure (equal remuneration, redistribution, mismanagement), little adaptability to diversified needs of consumers, bad economic performance, and generated serious environmental problems ("over-intensification", livestock over-concentration). Public farming sector was overpopulated with excessive bureaucratic staff at farm, APK, regional, and national levels ranging 23-30% from the agricultural employment⁵. There were many reorganizations aiming at improving efficiency as size, number and internal composition of agrarian organizations changed almost every year⁶. This "organizational" and management instability additionally enhanced deficiency of public structures. Destruction of APKs started in 1987 when their sub-units (Brigades, Divisions) were given a status of "basic economic unit" and eventually turned into "self-managing" collective farms⁷. The later had some positive effect and resulted in

⁵ Comparing to 13-15% during the cooperative period.

⁶ Initially concentration of APK increased while their number reduced to just over 140.

⁷ They were (re)established in location and size very similar to the "village based" TKZSs and DZSs in the middle of 1950s.

augmentation of certain (intensive) productions and productivity until 1990.

Third, public farms were liquidated or privatized after 1989 and a new farming structure emerged dominating by numerous small-scale farms and few large cooperatives and agri-firms. Moreover, for a long period of time a significant portion of agrarian resources were governed by ineffective “temporary” structures such as Privatization Boards, Liquidation Councils, Land Commissions etc. The later had no interests in safeguarding resources and increasing productivity, and contributed considerably for destruction of agrarian capital and productions (mismanagement, corruption) (Bachev, 2000).

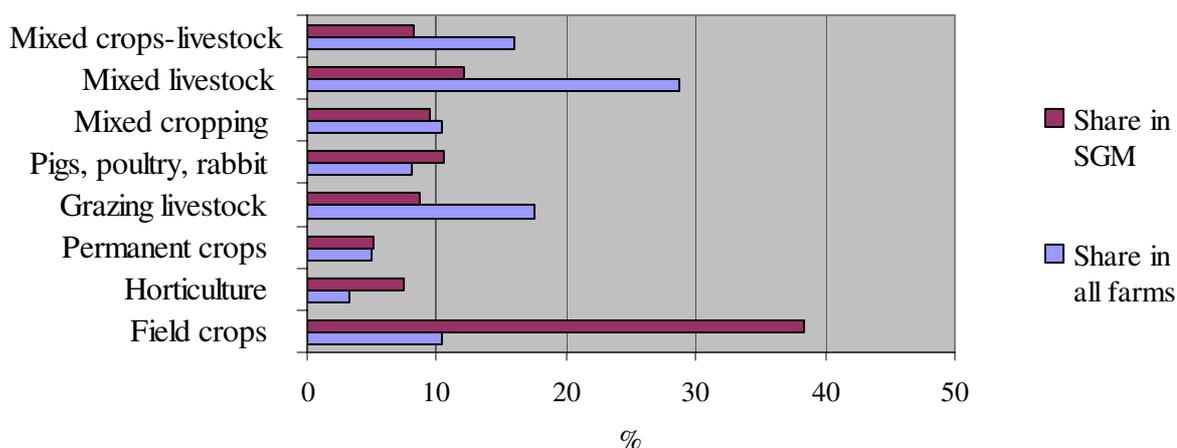
Post-communist transformation was characterized with high uncertainty and instability, undeveloped or missing markets, and badly specified and enforced rights. In these conditions a small-scale subsistence, semi-market, and part-time farming was an effective mode for productive use of available farmland and labor, cheap and safe food supply for households, and secure additional income (Bachev 2007). Small holdings accounts for the majority of agricultural employment, most of the livestock, and a good part of total farmland and overall output. Even now almost 1 million Bulgarians are engaged in farming on part-time bases and use it as supplementary income source (MAF). More than three-quarters of farms are less than 1 ha, averaging 0.5 ha and cultivating 9.5% of UAA. Most livestock holdings are “unprofessional” with few heads (97%) but breeding 96% of the goats, 86% of the sheep, 78% of the cattle, and 60% of the pigs in the country. Less than 40% of all farms report they sell products, and in more than 50% of cases those are surpluses not consumed by households (MAF). The share of later farms is quite big for major products like eggs (86%), grapes (60,5%), potatoes (58,1%), fruits (46,5%), milk (42,2%) and vegetables (33,6%). In small-scale farms primitive (labor intensive, mechanization and chemical free) technologies are used, productivity is low, and production capacity is insignificant (restricted resources, no entrepreneurial capital, low household demand, large diversification, advanced age of farmers). Namely huge subsistence and part-time farming has been greatly responsible for the backward “technological development”, sharp fall in productivity and major productions (horticulture, permanent crops, livestock), and some environmental problems (over or under-grazing of pastures, destruction of biodiversity, contamination of soils, water and air) after 1989 (Bachev, 2008).

High interdependency of agrarian agents skills (previous specialization, team working tradition) and portions in acquired resources (farmlands, indivisible assets) as well as member orientation and easy entrance-exit policy were key factors for a rapid development of new production cooperatives (Bachev, 2007). The cooperatives were efficient during first years of transition concentrating on profitable wheat and sunflower, supplying members with important products and services (food, forage for private animal, mechanization, processing), providing employment for members, exploring economies of scale/scope on production and transaction

activities. However, most coops were badly managed, had lower productivity than non-cooperative farms, failed to adapt to evolving members needs and market demands, and experienced significant funding problems (due to unlike investment preferences of diverse members). All that led to reduction of cooperative activity and massive failures (almost 40% of cooperatives ceased to exist since 2000).

Unspecified or “ideal” character of the ownership after 1990 let also rapid consolidation of farmland under management of few large enterprises – unregistered farms, partnerships, and agro-firms. These farms are highly specialized in few profitable products, strongly interested in expansion and investment, and maintain high competitiveness and productivity. However, they also contribute to degradation of farmland and environment not-respecting crop rotation, non-compensating N, K and P intakes, distracting biodiversity, and practicing poor manure management (Bachev, 2008).

Figure 10: Share of farms with different specialisation and contribution to SGM of agriculture in Bulgaria



Source: Ministry of Agriculture and Forestry, 2004

Since 2000 the transfer of farmland management to specialized and more efficient (professional) structures accelerates which is associated with an upward trend in major crop productions and productivity. Mix farms and holdings with grazing animal dominate but specialized farms produce the greatest part of the Standard Gross Margin (SGM) of agriculture (Figure 10). What is more, a tiny number of farms are bigger than 100 European Size Unites⁸ – 0,3% in permanent crops, 1,6% in field crops, 0,2% in pigs and poultry, 0,4% in horticulture , and 0,25 in mix cropping. However, the later farms produce a significant share of SGM in relevant

⁸ 1 ESU = 1200 Euro.

groups – 62,8%, 54,1%, 54,2%, 26,5% and 28,3% accordingly. On the other hand, sustainability of commercial small-scale cropping farms and most livestock holdings is very low which prevent improvement in horticulture, permanent crops and livestock sectors (Bachev, 2007).

State agricultural policies

Evolution of State policies has been a crucial factor for the development of agricultural production and productivity.

Firstly, during the communist period state mandatory orders for structure of production and output were used to govern public farms (and judging for the performance). Central plan indicators covered all aspects of farms activity - areas for each crop, numbers of different animals, technological and economic parameters etc. Producers were given freedom to “increase productivity” (output) above planed limits and enlarge individual and collective income. Achieved (improved) level of productivity was normally included as mandatory requirement in next round of planning which demotivate workers to put additional efforts. Organizational composition of farms, modes of their internal management (including personality of appointed staff), forms and limits of income distribution, relations with upstream and downstream counterparts, all they were determined by the authority without taking into consideration the specific technological, efficiency etc. needs of farms.

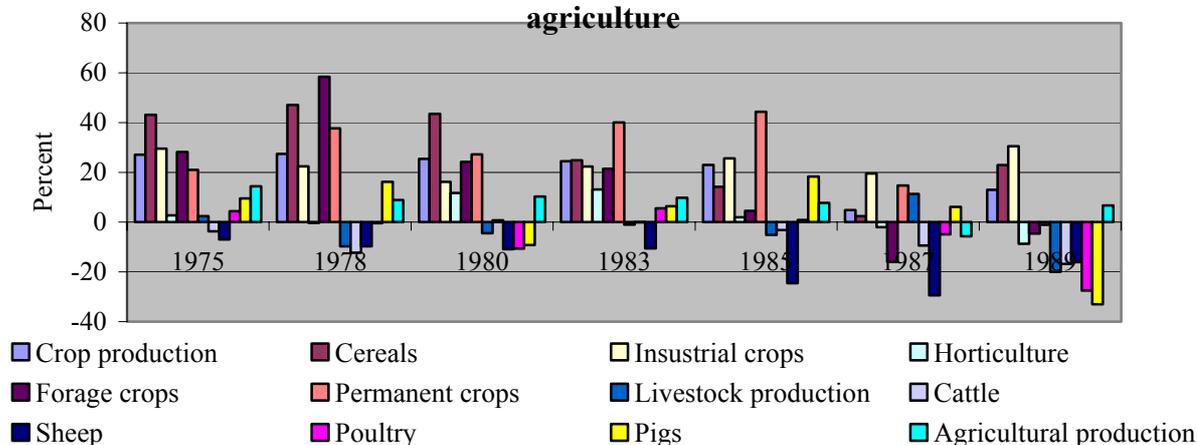
Furthermore, agricultural markets and prices were strictly controlled by State authorities. In first years, there was a policy for low purchase prices of farm produce in order to fund development of infant industry. After that, there was a “social policy” to suppress the increase in farm-gate prices in order to keep low the agro-food retail prices. Price levels were decided in a centralized manner and not connected with demand, variations in climate and production conditions etc. Similarly, foreign trade was strictly regulated and executed by state monopolies with restricting system of import quotas, duties, and fees.

These policies led to ineffective use of existing production potential, weak incentives for producers to increase productivity and quality, and huge disproportions (regular over-supply or undersupply of farm products). Consequently, there was a significant variation in efficiency of divers sectors, individual productions and farms in different years (Figure 11). That necessitated complicated redistribution of income within farms and sector-wide (and thus increasing the portion of centralized income of farms)⁹ as well as balancing losses from the national budget. All these further distanced farmers incentives from improving production and productivity (farmers

⁹ For instance, in 1959 the centralized portion of Net Income of TKZS was 10,5% and by 1969 it enlarged to 23,7% (Annual Reports of TKZS).

often were facing situation when the more they produce more losses they occur, and vice versa).

Figure 11: Profitability of major productions in Bulgarian agriculture



Source: Annual Summary Reports of Agricultural Organizations

Centralized management of agriculture had some success until the end of 1950s when productivity was low, production structure and technologies simple, and demand for basic farm products rising. For a short period of time there was achieved a significant progress in introduction of new varieties, technologies, mechanization, fertilizers and pesticides, modernization of major productions, augmentation of output, and growth in productivity. That was assisted by development of a strong public research and service (education, veterinary, irrigation, plant protection, hail prevention), industrial (feed, food, fertilizer, farm equipment) and infrastructural support to agriculture. However, this model started to show serious deficiency when production developed, technologies become complicated, and demand for product quality and variety extended. Since 1960s until the collapse of the model in 1989 numerous reorganizations were undertaken and a great number of “new economic mechanisms” experimented to enhance motivation and improve productivity. The later tried to improve central planning system giving partial freedom to farms and/or their divisions in choosing production structure, forming and distributing profit, selecting counterparts, exporting products etc. All these measures were not comprehensive while frequent changes in the “rule of the game” were causing further destruction of the incentive and production system.

Secondly, since 1990 there has been a fundamental liberalization of markets and economic activity and introduction of modern (western type, EU) institutions. Market adjustment was characterized with a high discrepancy between rises in prices of farm products and farm inputs and inflation rate (Table 6). The growth in crop and livestock products prices were much behind the price index of industrial inputs for agriculture - fertilizes, herbicides, combined fodder, machineries. The later caused a considerable reduction of farm inputs utilization and a fall in

agricultural production and productivity. What is more, until 1997 there were Government control on retail prices of basic foods as well as export restrictions (bans, quotas, licensing) restraining further farms investment for growth in production and productivity.

Table 6: Price indexes during post-communist transition in Bulgaria (1990=100)

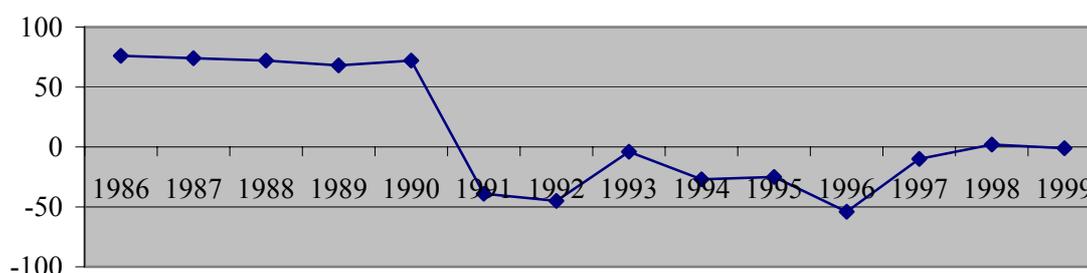
Price index of:	1991	1992	1993	1994	1995	1996	1997	1998	1999
Farm products	276	322	486	861	1509	3380	39227	41777	37307
Crops	267	293	451	820	1257	3807	35559	36768	35113
Livestock products	267	359	529	912	1823	2847	43806	49501	36878
Nitrate fertilizers	1193	1721	1727	3750	5321	14396	183545	275873	612121
Phosphate fertilizers	1127	1658	1877	3542	5077	12962	165260	211285	187384
Herbicides	1308	2118	4284	8621	13909	14913	190138	215035	205965
Combined fodder	271	422	779	1207	1648	5238	40539	39907	n.a.
Tractors	816	1574	2858	3847	7496	31942	415399	449075	422005
Retail food	476	812	1263	2415	3835	8487	103927	124920	115551
Consumer Price Index	439	787	1228	2296	3722	8300	98132	120008	123095

Source: National Statistical Institute

Furthermore, transitional Bulgarian farming was one of the least supported in Europe. The high pre-reform Aggregate Support to Agriculture sharply fallen after 1990 staying in negative territories until 1998 (Figure 12). Moreover, modern public institutions and infrastructure crucial for farming development were/have not been built in the country: public system for enforcement of laws, regulations, and private contracts does not work well; essential property rights (on environmental resources, special and organic products) are not well defined or enforced; public support programs are rarely governed effectively and in the best interest of the legitimate beneficiaries; badly needed agricultural advisory system was not established until 2000 and it does not serve the majority of farms; urgently needed public system for agrarian insurance has not been introduced; crucial agrarian and rural infrastructure (wholesale markets, irrigation, roads, communication technologies) has not been modernized; public support for initiating and developing farming associations has not been given; multifunctional role of agriculture was not recognized and supported until 2007. Above and beyond, privatization and restructuring of major state monopolies in food processing, farm inputs supply, irrigation etc. was delayed or still incomplete (e.g. irrigation, Tobacco Holding), or it was associated with establishment of new private monopolies (e.g. food processing). All these additionally deteriorated farms situation being particularly bad for dairy holdings and grape and vegetable producers where small and badly organized farms dominate. Newly evolving farming structures were left unassisted to compete on internal and international markets with heavily subsidized farm products from EU

and neighboring countries. The later deters effective modernization and adaptation of weak local farms in major sub-sectors (horticulture, fruits, livestock), diminishes their competitiveness and sustainability, and leads to a significant decline in most productions.

Figure 12: Agrargate Producer Support Estimate in Bulgarian Agriculture (percent)

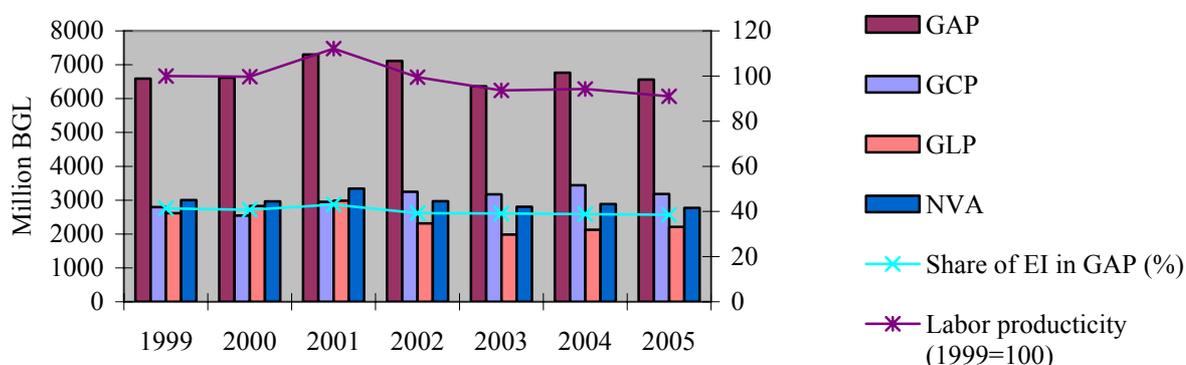


Source: OECD, 2000, p.130

There has been a considerable progress in public support to agrarian sector since 2000 in various directions - subsidies, preferential credits, investment subsidies, price guarantee etc. The public aid mostly affected cereals and tobacco producers leading to some recovery in these sectors. Nevertheless, until EU accession (2007) the overall support to farms rests very little and much below the level in EU and other countries in the region. For 2001-2005 the share of the Special Assistance Programme for Agricultural and Rural Development (SAPARD) investments and subsidies in Gross Value Added (GVA) were 3,6% and 1,8% accordingly. At the same time, portions of the State Fund Agriculture's investment credit in the GVA was 0,4%, and short-term (credits and subsidies) support in the GAP 0,8% (Bachev and Kagatsume, 2006). Besides, only a small proportion of the farms benefits from some form of public assistance most of them being large (and highly productive) enterprises. For instance, SAPARD supported merely 7,7% of agro-firms, 2,3% of cooperatives, and 0,1% of unregistered farms. Subsequently, adaptation of farms to EU quality, safety, environmental, animal welfare etc. standards has been hampered; and growth in productivity and competitiveness severely restricted; and technological and income disparity between farms of different type, sub-sectors and regions broadened. The negative effect has been particularly great for most livestock farms leading to further reduction and ceasing activity and regression in production in recent years (Bachev and Nanseki, 2008).

In last years there has been some progress in crop production and a considerable decline in livestock sector (Figure 13). The level of GAP varies around 1999 amount while generated Net Value Added (NVA) and Entrepreneurial Income (EI) have been decreasing. Since 2002 there has been a step-back in the labor productivity measured as NVA per employed in agriculture – it fell 9% bellow 1999 level. Both rise in agricultural employment and shrink in NVA are responsible for that regression.

Figure 13: Dynamics of agricultural production and productivity in Bulgaria



Source: National Statistical Institute

Evolution of demand for farm products

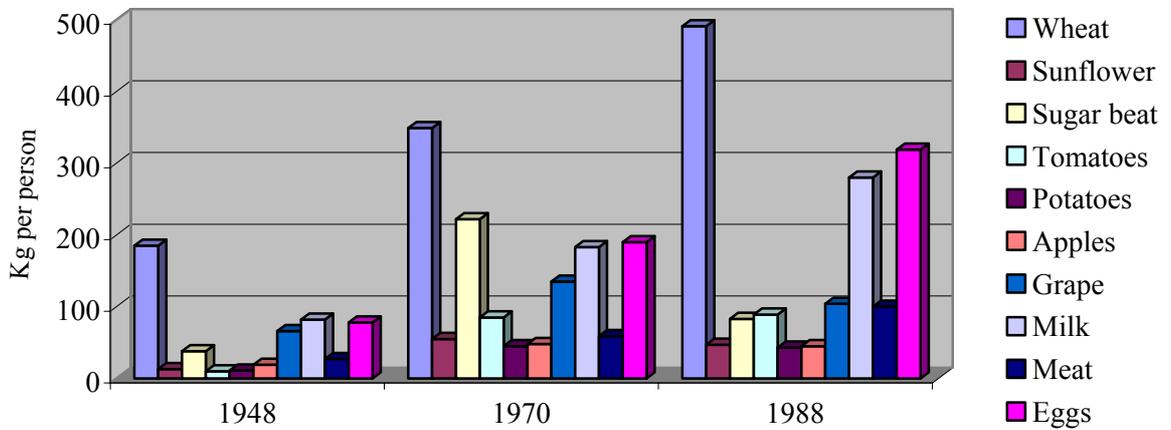
Evolution of the demand for farm products has been a key factor for dynamics of agricultural production. Right after the war production and consumption of major farm products per capita was low (Figure 14). Since then, there was an increasing demand for agricultural products as a result of population growth, enlargement of urban (non-farming) population, and rising households income. Furthermore, in 1950s and 1960s there was a considerable growth in food processing industries creating new big demand for farm produces. Consequently, by 1970 production of major farm produce per capita boosted – doubled for wheat, milk, meat and fruits, and multiplied 4 times for sunflower and 6 folds for vegetables. Consumers demand for fresh and processed farm products continues to augment and diversify significantly until 1989 being a key factor for farming development.

Another major factor for considerable augmentation of a number of productions (vegetables, fruits, vine, tobacco) was the vast expansion of agro-food export after 1960. In seventies and eighties 30% to 50% of agricultural production was exported. Especially favorable was the “agro-food specialization” of Bulgaria within enormous market of the Council for Mutual Economic Assistance (CMEA) including communist countries for East Europe and USSR. For 1981-85 and 1986-87 the agro-food export for CMEA accounted for 59,7% and 82,2% accordingly as USSR took the greatest share.

After 1990 there was a sharp fall in demand for farm products affecting negatively agricultural production. *Firstly*, consumption of all major farm and food products decline considerably. One of the main reason was a sizeable reduction of population (10%) after 1989

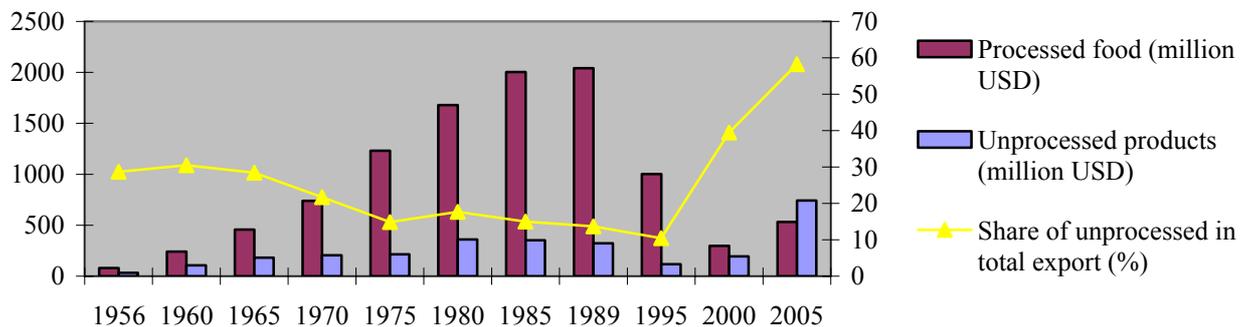
due to unprecedented immigration, low birth rate and natural causes. However, a chief factor was a drastic decline in consumption per capita due to the high unemployment (up to 15%), nominal plunge in wages, and increased food costs in households budget (from 32% in 1989 up to 40-50% in next years). By 1997 consumption of population drops by half of the 1990 level reaching particularly low for food stuff with high income elasticity - milk, cheese, meat and meat products (Figure 16). Since 1998 there has been improvement of consumption of agro-food products but its level is still below 1990 level. Besides, demand for novel and quality import agro-food products grows affecting adversely the recovery of local productions.

Figure 14: Production of major farm products per capita in Bulgaria



Source: National Statistical Institute

Figure 15: Evolution of agro-food export of Bulgaria

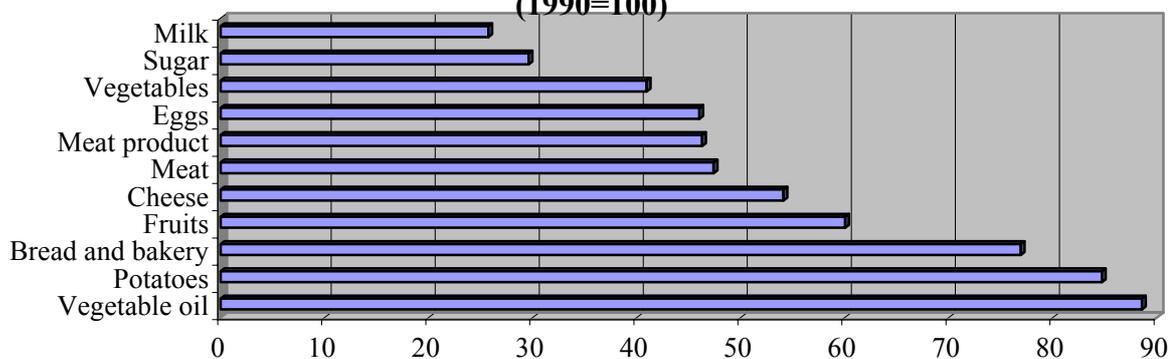


Source: National Statistical Institute

Secondly, huge and assured CMEA market for Bulgarian agro-food product collapsed in 1991 leading to reduction of country's export to that direction. Just until 1992 the share of CMEA countries in agro-food export fall more than twice due to competition or political reasons (e.g.

Russia). Some other traditional markets (Yugoslavia, Cuba, Libya, Iraq) were also lost because of UN embargos, new political ties etc. Meanwhile, agreements with EU for liberalizing trade were signed (1993) but a number of quantity (quotas, licensing) and qualitative (food-safety etc.) restrictions as well as needs for changing export structure (specific product, quality, processing etc. requirements) restrained a rapid redirection of export. Since 2000 there is an upward trend in agro-food export driven by intensifying trade with EU and OECD countries (taking more than 50% and around 20% of the export accordingly) as well as recovery of some traditional markets in Middle East and former USSR. However, since 1995 unprocessed farm products dominates in agro-food export restricting number and amount of products, access to certain markets, export profitability, and thus the effective demand for revival of agricultural production.

**Figure 16: Food consumption per capita in Bulgaria in 1997
(1990=100)**



Source: National Statistical Institute

Third, in certain years consumption and export of cattle, sheep and poultry products diminished considerably due to cases or danger from mad-cow disease (1997-2000), foot and mouth disease (2000-2001) and avian influenza (2003-2004) affecting badly respective productions

Finally, some traditional export oriented productions (like tobacco and cigarettes) have been negatively affected by new trends for reduction of consumption and diminishing international demands for these products.

Labor factor

Changes in quantity and composition of agricultural labor have been a significant factor for development of farms and evolution of productivity. Right after the war there were few specialists with university and high education in agriculture. During communist period public farms were equipped with highly qualified labor of different type – economists, agronomists, engineers,

veterinarians, livestock specialists etc. Until 1970 the number of labor with university and high specialized education augmented more than 4 times comparing to 1957. In addition, highly qualified staff of more than 100 agrarian research institutes and experimental station supported adaptation and dissemination of new technologies and varieties at farm level. That led to a rapid modernization of agricultural production and increase in productivity. Subsequently, there was a massive reduction of share of employed persons in agriculture to under 17% in 1989. Along with that, there was a process of transferring independent farmers, cooperative members, and off-farm workers (agricultural services, food processing, administration) into “workers and employees” of new public farms. Until 1970 the later increased 9 folds over 1948 number of 30000. The amount of “employed” white and blue-collar workers rose significantly during APK period and tripled between 1970 and 1975.

On the other hand, since the beginning of 1970s public farms started experiencing considerable shortages of low qualified manual labor for some critical operations (harvesting of yields etc.) in labor intensive productions like vegetables, tobacco, fruits, grape, corn, hops. Consequently, mandatory “brigades” of off-farm labor (students, other sectors blue and white collar workers) were extensively used to supply needed seasonal labor. Public farms benefited from such massive and cheap assistance but also had to face the negative effect on productivity from an extensive use of not-qualified and unmotivated labor (significant yields and quality losses). Furthermore, there was a tendency for ageing of employed persons in farms (especially workers) due to less-attractive working conditions and wages comparing to non-farm sectors¹⁰. Above and beyond, in 1988-89 more than 300000 ethnic Turks were deported from the country, which affected particularly badly agriculture and some major sub-sectors such as tobacco and livestock productions.

Since 1990 there has been a significant change in quality of agricultural labor. A part of former specialists of public farms set up own holdings, agri-firms or cooperatives while others (younger and more educated) left the sector. On the other hand, there were a great number of new comers without technological knowledge consisting of people who lost their employment in other sectors, retired persons, and individuals (or households) facing income insecurity and/or shortages. Consequently, number of employed in agriculture augmented (up to 26% in 2000) while quality of labor deteriorated significantly. Furthermore, practically all managers of newly evolved private structures had no any skills and knowledge for managing a private farm in market conditions. Even now most farmers have “only practical experience in agriculture” and very few secondary vocational education (2%) and high education (1%) (MAF). Moreover, more than 40%

¹⁰ In 1980s, the salaries and pensions in farming sector were 30% and 70% bellow the levels in industry.

of farm managers are older than 65 and more than a half of employed are in pre-retired or retired age. All these put serious restrictions on effective farm adjustment, enlargement and growth in productivity (low investment activity and entrepreneurs, limited training or learning by doing capability, no alternative employment opportunities). In addition, there has been a considerable delay in restructuring of public systems of agrarian education, research, and extension (and to some extent they still do not serve new farm structures effectively). The later further impedes an effective modernization and adaptation of farms (bad technological and managerial decisions are widespread).

Climate changes

Weather extremes and changes in climate have had serious implication for dynamics of production and productivity. Most crops are usually sensitive to weather extremes and that causes some yields variation. For instance, poor harvests in 1985 and 1986 necessitated significant grain imports. Until 1989 there were systems for combating draught (effective irrigation) and hail prevention counter-balancing forces of nature and avoiding huge losses in yields. Besides, there was a public assurance for compensation of damages from other natural hazards like hoar-frost, fires, floods, mudslides. However, since 1990 there is no effective system for risk prevention and insurance, and weather extremes affect badly agricultural production (Bachev and Nanseki, 2008). Moreover, during that period there were registered one of the hottest (1994, 2000) and the driest (1990, 1992, 2000) years of the last century. In addition, 2006 and 2007 were abnormal with few rains during winter and spring and heavy summer storms and floods. Consequently, weather factor enhanced the negative effect of other major factors for declining agricultural production and productivity.

Conclusions

Post-Second World War agricultural production in Bulgaria has had a dramatic evolution. There was a significant growth in major productions and productivity until 1970. Agrarian reform, cooperation of farmers, public planning and support, introduction of new technologies and mechanization, improvement of labor quality, development of internal demand for farm products and international cooperation within CMEA, all they were responsible for this progression. In 1970s and 1980s technological modernization, expansion of production and productivity growth continued but with a slower pace. Furthermore, there was a considerable change in production structure with increasing importance of livestock sectors and decline in some traditional productions like cotton, table grape, rye, sheep and buffaloes. Centralized

governance and over-concentration of farms, and related management and incentive deficiency contributed significantly for disproportions, under-performance and environmental problems during that period. There was a dramatic fall in most productions (but sunflower and goats) and regression in technologies and productivity after 1989. That was a consequence of fundamental institutional transformation, market adjustments, reduced consumption, ineffective public support, collapse of traditional international markets, increase in amount and deterioration of quality of labor, extreme weather, and domination of temporary, low productive, and unsustainable farming structures. In recent years, there has been a reverse trend for recovery of some productions (wheat, maize, tobacco, poultry) due to improvement of institutional and market environment, progression of public support, and modernization of farms. However, most productions and productivity are still far below the pre-reform level.

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