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STRUCTURAL CHANGE REQUIREMENTS IN THE BULGARIAN DAIRY SECTOR AIMING AT HIGHER COMPETITIVENESS WITHIN THE EU

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List of Abbreviations

AC	Agriculture Census
AFPC	Agriculture and Food Policy Centre
AWU	Annual Work Units
BNB	Bulgarian National Bank
CAP	Common Agricultural Policy
CEE	Central and Eastern Europe
CEEC	Central and Eastern European Countries
CEFTA	Central European Free Trade Agreement
CIS	Commonwealth of Independent States
CMO	Common Market Organisation
CPI	Consumer Price Index
ECM	Energy Corrected Milk
EFTA	European Free Trade Association
ESU	Economic Size Unit
EU	European Union
EUROSTAT	European Statistical Institute
FADN	Farm Accountancy Data Network
FAO	Food and Agriculture Organization
FAPRI	Food and Agricultural Policy Research Institute
FCM	Fat Corrected Milk
FDI	Foreign Direct Investment
FLIPSIM	Farm Level Income Policy Simulation Model
FSS	Farm structure survey
GDP	Gross domestic product (Development of GDP shares in Bulgaria 2000-2004
GVA	Gross Value Added
Ha	hectares
IACS	Integrated Administration and Control System
IAMO	Institute of Agriculture Development in Central and Eastern Europe
IFCN	International Farm Comparison Network
LDC	Less Developed Countries
LPIS	Land Parcel Identification System
LSU	Livestock Unit
LU	Labour Units
MAF	Ministry of Agriculture and Forestry
MEE	Ministry of Economy and Energy
MTS	Machinery-Tractor Station
NPARD	National Plan for Agriculture and Rural Development
NSI	National Statistical Institute - Bulgaria
NVMA	National Veterinary-Medical Agency
OECD	Organisation for Economic Co-operation and Development
PA	Paying Agency

PHARE	Poland and Hungary Assistance for Restructuring the Economy
PU	“Producer Union”
RAP	Registered Agricultural Producer
SAPARD	Special Accession Programme for Agriculture and Rural Development
SAPS	Single Area Payment Scheme
SFA	State Fund of Agriculture
SGM	Standard Gross Margin
SPS	Single Payment Scheme
SW	“Strong/Weak points”
TIPI-CAL	Technology Impact and Policy Impact Calculations
TKZS	Labour-Cooperative Agriculture Farm
UAA	Utilized Agricultural Area
US	United States
VAT	Value Added Tax
VFL	Veterinary Framework Law
WTO	World Trade Organization

1 Introduction

Following the political changes in the countries of Central and Eastern Europe of 1989, Bulgaria has experienced a difficult transitional period. Liberalisation has increased competition among different enterprises, but some economic sectors and industries have not been affected to the same extent by these structural changes. The process of reforms and transition to market based agriculture has been a difficult and painful period for the Bulgarian food and agricultural sector. As a result of the reduction of livestock and the decrease of animal productivity, the total raw milk output of the Bulgarian dairy sector was reduced by more than 45 per cent between 1990 and 1996. In addition, a dramatic reduction of milk quality could be observed. This was caused by the small-scale structure of the milk production after privatisation, the lack of investment capital and therefore of production technology, as well as mismanagement in the dairy farms and political mistakes (Panayotova and Adler 1999).

1.1 General Background

Agriculture traditionally played a significant role in the Bulgarian economy (Table1.1). In the last decade, Bulgaria was a major exporter of fresh and processed fruits and vegetables within the Eastern Block. Since 1997 the government has made rapid progress in implementing the broad reform program. But because the reform program had made such limited progress before 1997, a number of important components of the transition were still outstanding at the beginning of 2000, and Bulgarian food products are not very competitive on the international market.

Table 1-1 Development of GDP shares in Bulgaria 2000-2004 (%)

	2000	2001	2002	2003	2004
Agriculture	13.9	13.4	12.1	11.6	10.9
Industry	30.1	29.6	29.1	29.7	30.0
Services	56.0	57.0	58.8	58.7	59.1

According to the 2003 Agricultural Census, 1 373 004[1] people were involved in agro-activities, and 335 913 of them were full-time employed. 87% of the full-time employed were family employed and only 13% were employed for wages. The paid employment provides full-time jobs while the family employment – primarily part-time work. Generally the older population group is involved in agriculture; 66% of the employed are above 55 years of age, while only 5% are younger than 34.

[1] Among approximately 3,2 million average annual number of employed persons in 2003 (Statistic Yearbook 2005)

The number of agricultural holdings in 2003 was 684 229, managing 2,9 million hectare of Utilised Agricultural Area (UAA). Among agricultural managers only 3% had any level of agricultural education, and most of them were hired managers (in 3146 of all the enterprises).

Their distribution per legal status was: 7 110 – juridical persons and sole traders, who cultivate approximately 2 million ha of agricultural land, corresponding to 70% of the UAA in the country; this calculates into 284.9 ha per holding on the average; 1 997 of them were cooperatives taking care of 40% of the UAA, this is equal to 585.9 ha per holding on the average. The holdings that belonged to physical persons were a great number – 677 119, but they utilize 30% of total UAA; i.e. 1.3 ha on the average (Table 1.2).

Small-size land cultivation prevails in the country – a large number of holdings (78%) take care of up to 1 ha of land. The larger holdings (managing more than 10 ha) are merely 2% of the total number, but they take care of 83% of the UAA.

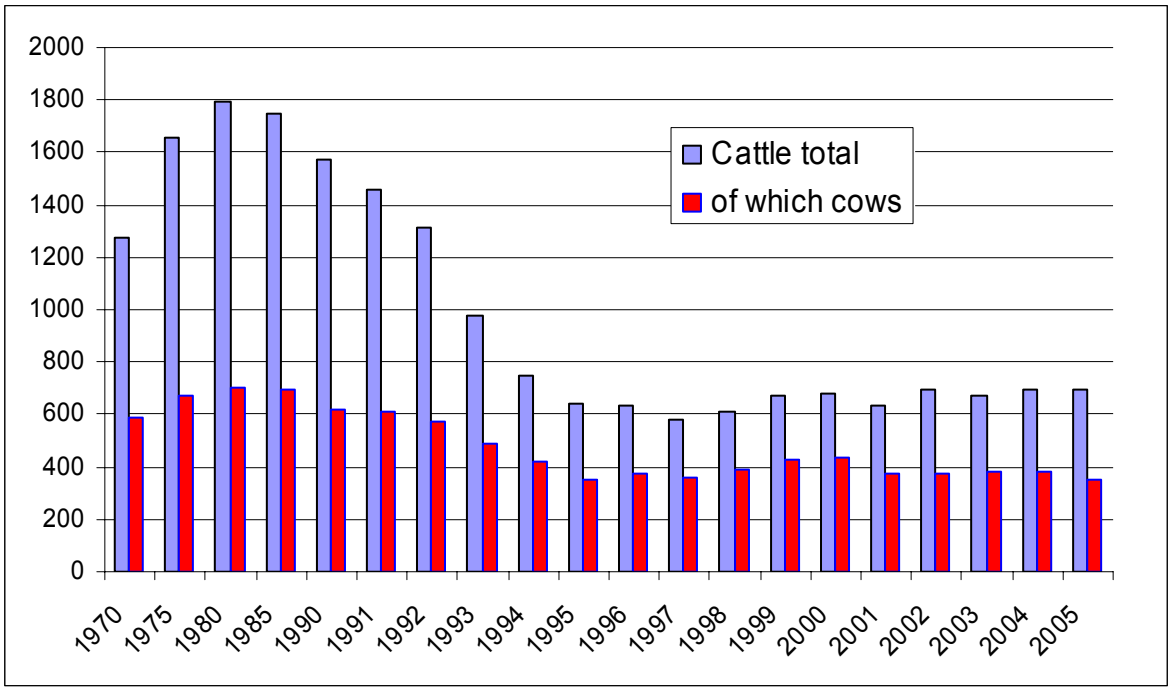
Table 1-2 Percentage of holdings with some UAA, per legal status and per size of UAA cultivated (MAF 2006)

Legal status of the holdings	holdings with UAA		UAA (ha)	
	2003	2005	2003	2005
Total	100%	100%	100%	100%
physical persons	99,00%	99,00%	30,29%	33,51%
sole traders	0,44%	0,41%	11,74%	12,99%
cooperatives	0,30%	0,29%	40,26%	32,64%
trade companies	0,20%	0,25%	16,15%	19,15%
partnerships and other	0,05%	0,04%	1,56%	1,71%

At the beginning of the transition, the government started the privatisation process by restoring ownership of the state-owned material assets, animals included, to their former owners. Unlike in the other CEEC (Central and Eastern European Countries), however, this process had a disastrous effect on Bulgarian agriculture. The official public acts and laws of Government not only virtually destroyed the co-operative farms' assets, they also destroyed production capacities. The development of an unfavourable production structure and therefore a loss of productivity, mass slaughtering and uncontrolled export of animals were the result (Panayotova and Adler 1999).

Although the heard size is not the only factor that is decisive for milk production, but it is a very important one. During the 90s, most of the developed countries as well as CEEC showed a downward trend in the number of reared animals. This reduction amounted to 5%in the EU member countries, but also to about 15-25% in CEEC. In Bulgaria a small reduction in livestock figures could also be observed for the late 1980s. But the dramatic changes in the structure of agriculture after 1990 have had a disastrous effect on the number of milk-producing animals. Cattle and sheep livestock were affected most, being reduced by approx. 63 per cent between 1990 and 1997, while the number of goats had increased by 96% (Figure 1.1). Especially in 1992, a large number of cattle, sheep and buffalo were exported (Panayotova and Adler 1999).

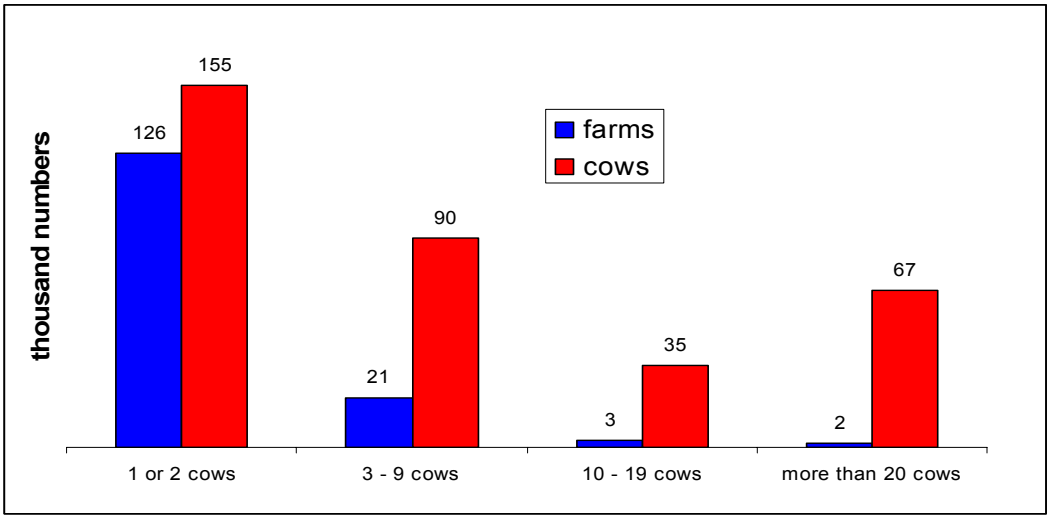
Figure 1-1: Development of Bulgarian cattle and dairy cow population from 1970 to 2005



Source: MAF – Agrostatistic department

During 2005 the number of farms breeding dairy cows diminished by 14.6% compared to 2004. The cows themselves were 5.3% less and presented 57.8% of the cattle. 63.4% of the farms breeding milk cows possess just one cow, which is 27.6% of the whole amount of dairy cows. Farms with more than 100 cows have roughly 9.4% of the cattle and 5.3% of the dairy cows (Figure 1.2).

Figure 1-2: Dairy cows and dairy farms according to herd size in thousands, 2005



Source: MAF – Agrostatistics department

On the other hand, the majority of dairy farms are operating on no more than 1ha of arable land (Table 1.3), which confirms the small-scale size not only by number of animals but also by arable

land size. Despite the increased activity in the land market in 2004/2005, there were still factors constraining it:

- fragmentation among the many inheritors, complicated legal rights and procedures
- low prices of land in some regions preventing the owners to sell
- expectations that land price will rise after 2007

With only 11% of all dairy farms cultivating more than 2,5 ha of land each, about 31% of the farms with 1 cow work on less than 0,5 ha each, although pastured land is not included in this statistic and it is still a main source of feeding in majority of the farms[2]. Despite the extreme number of farms in the first two groups, the trend of "more cows - more land" can be observed among farms with more than 3 cows.

Table 1-3 Dairy farms per number of dairy cows according to the size of arable land

		Size of arable land cultivated (ha)		
		< 0,5	*0,5 to 2,5*	*>2,5*
Dairy farms per number of cows	1 cow	50214	70627	6772
	2 cows	10115	23658	5600
	3 till 9 cows	4189	10207	6334
	10 cows	162	244	401
	11 till 15 cows	149	238	491
	16 till 22 cows	92	117	352
	more than 23 cows	58	73	572
		34%	55%	11%

Source: MAF – Agrostatistics department - census of agricultural producers 2003

1.2 Major problems of the Bulgarian dairy sector include:

The observation of the study area based on the quantitative data from the national statistic (MAF 2006) defines the following major problems of Bulgarian dairy farm structure:

- Small-scale (dualistic) farm structure
- Lack of economic performance
- High production costs
- Low quality
- Insufficient possibilities for implementing the EU CAP reform

[2] The pastured land is all the grassland of the municipality and it is used by all the farmers, still for free.

1.2.1 Subsistence or commercial farming

It is difficult to provide a widely accepted definition of the term *subsistence agriculture* since it has been used "synonymously with such other concepts as traditional, small scale, peasant, low income, resource poor, low-input or low technology farming" (Brüntrup and Heidhues 2002). A wide range of views of what constitutes subsistence agriculture is presented in Wharton (1970). Arguably the simplest definition of subsistence is that of Mosher (1970) who defines subsistence farmers as those who sell less than 50% of their production. This measures subsistence from a production point of view. Alternatively, subsistence may be defined with regard to consumption, e.g. "farming in which crop production, livestock rearing and other activities are conducted mainly for personal consumption" (Todaro, 1995). Although the former definition is more convenient with regard to building quantitative models, due to the relative ease of obtaining the relevant data (Beckmann and Pavel, 2000; Mishev et al., 2002), the latter is more appropriate for measuring the significance of subsistence in the overall agricultural economy (Tho Seeth et al., 1998; Caskie, 2000; Kostov and Lingard, 2002). To add to the above ambiguities, since "the subsistence factor underlines every economy" (Gudeman, 1978), any measure of subsistence may vary from almost zero to 100%. Therefore 50% is a rather arbitrary cut-off point and the 'pure' subsistence state of 100% is unrealistic.

The economic hardship of transition has led to transforming agriculture into a social buffer that is a sector that provides some, although insufficient income and employment. Employment is a source of income, while producing own food saves income that can be spend on something else.

Economic research is generally dominated by a rationality paradigm. Economic decision making within this paradigm is viewed as a maximising procedure. In general, the latter represents the decision-making as a choice amongst a well-defined set of alternatives. Some authors question this by applying a mental accounting methodology they deduced from some significant characteristics of Bulgarian subsistence agriculture (Mishev and Kostov 2001). The choices that subsistent farmers face in transition economies are defined by the unstable economic situation characterized by underdeveloped institutions and a generally high level of uncertainty (Mishev and Kostov 2001). The big uncertainty removes the differences between market and self-sufficiency oriented farmers, thus acting as a driving force for agricultural decommercialisation.

A major characteristic of small-scale subsistent farming is the diversification of production activities, therefore we can barely find any economy of scale. At the same time small-scale subsistent farms are using a labour intensive system of production as a substitution for the scarcity of capital and machinery (Kostov and Lingard 2004 -1).

1.2.2 The EU accession and Bulgaria dairy farm structure

For dairy farmers, the most important aspects since the country's accession into EU have been the quota system for milk production and the direct payment per cow and hectare of arable land. They react by sharply decreasing the culling ages of dairy cows (as a total 4% of the herd when

the norm would be 20-25%) in the first place and, in addition, stirring up the arable land market in the rural areas. Many farmers (small and medium size) are accumulating animals in numbers which make the average lactation age in the herd very high. This leads to a low average milk yield per cow and may bring about a "demographic" disaster in the near future when they will have to cull a significant number of cows. Nevertheless, before such a likely disaster, they will expect to increase their income by the subsidy and direct payments. What they forget is that the main target is to increase the quality of the raw milk.

In order to prepare the agriculture of Bulgaria for CAP of EU, the National Plan for Agriculture and Rural Development (NPARD) 2000-2006 was created. The main goals of SAPARD[3] implementation are set by this plan, aiming at the creation of alternative activities in rural areas. These activities should attract labour from small-scale and semi-subsistent farms to give-up farming and provide investment capital for the rest of the farms that are able to use it in order to become more efficient – therefore competitive. Nevertheless, in spite of the resources available, the overall impact on farm structure has been insignificant (Janssen, Hlebarov et al. 2005). Still, some 80% of the farms in Bulgaria are small-scale semi-subsistent ones.

1.3 Objectives of the study

While many studies examine the policies and their implication, evaluation etc.(top-down approach), very few are concerned about the other point of view – the "bottom up" approach.

The analysis intends to help farmers in their choice of the shape, size and direction of structural development. In order to become sustainable and competitive in the new conditions, a farmer has to use all the available resources in the form of opportunities, investment subsidies and direct payments. For the majority of farmers this is an extremely complicated system of actions, activities and decisions, all bound together and influencing one another in an intricate way. Therefore, science has the obligation to provide them with examples of complex decisions and alternative strategies to help them with the orientation in this situation. For this reason the objectives of this study are:

- to analyze the current dairy farm structure;
- to investigate changes brought by CAP;
- to conceptualize and develop typical Bulgarian dairy farm using IFCN methodology;
- to draw and analyze farm level development strategies 2006-2016;
- to project optimal future dairy farm structure;
- to provide recommendations.

Additionally, the analysis will present to the policy makers a model of a typical (not a statistical average) dairy farm that would develop into the present socio-economic conditions with the current

[3] The Special Accession Program for Agriculture and Rural Development

policy. The typical farm approach is closer to the real decision pattern of the farmers than the logical conclusions from the statistically observed behaviour. As a specific subject of the study we have:

- to develop a conceptual framework of factors and linkage influencing dairy farm size and growth prospects;
- to determine the minimum dairy farm size to be able to accomplish successful development strategies according to the current constraints and opportunities;
- to assess the optimal dairy farm size, which will be most efficient and less risky for the farmers, with respect to the socio-economic framework for the next 10 years.

The general hypothesis is that there is a certain core of dairy farms (still small-scale semi-subsistent ones) which are able to become efficient and competitive if they manage to find the right combination of the current opportunities for dairy farming in the country.

In the review of the available literature, empirical evidence was found that until a farm reaches a certain minimal size of activities, i.e., a farm size that is necessary to consider it commercial instead of small-scale subsistent, there cannot be any efficiency in any economic sense. In particular, such minimal size is defined in different ways by most of the support programs of the government; for example, eligible for dairy subsidy is a farmer who has at least 10 dairy cows at the moment of applying. The detailed hypotheses state:

- The current typical dairy farm (BG-34) can double its size and increase significantly its income while reducing the risk for the household, if the size is tripled, it will multiply the risk and make it even higher than it was.
- The improvement of the financial and resource management is the key element necessary for the majority of dairy farms to step upon stable ground for future development.

1.4 Scope and limitations

The scope of the study covers the Bulgarian dairy sector as parts of the livestock breeding holdings are described by the national[4] statistics as follows:

An economic unit is considered to be an agricultural holding if it meets at least one of the following production criteria:

1 cow; 2 bovines; 1 female buffalo; 2 buffalos; 1 reproductive female (equidae); 1 breeding sow; 5 pigs; 5 female sheep; 2 breeding goat; 50 laying hens; 100 broilers; 10 productive beehives; 10 rabbits – breeding females; 1 reproductive male used for services.

The observation of the study area is based upon the representative statistical data from the Agriculture Census (AC), from which we used a selection of all the agricultural holdings with dairy

[4] It is in harmony with the EU regulation for Agro and Rural statistics

cows. The descriptive analysis of the data shows that among the large number of farms with one cow, many could be categorized as farms with another type of specialization – tobacco, vegetables, cash crop production etc. Unfortunately, the specialization criterion is not sufficient as to exclude them from the aggregate dairy holdings since they are significant both in number of animals and quantity of milk produced. To avoid the influence of the large number of farms with one cow, the descriptive analysis is processed separately for them and then for the rest of the farms.

While both the 2003 census and the 2005 survey are used for the study of the dairy sector in general, typical farm models are used for farm level analysis. Nevertheless, the farm level analysis could be done with other data sources; a comparison of their advantages and disadvantages is given in the following table:

Table 1-4 Possible farm data sources and their advantages and disadvantages.

Source	Advantage	Disadvantage
Individual farm data	Very realistic picture of one particular farm	Results obtained can't be generalised Too specific
Averages of statistics or existing surveys	Representative	Technologies used and economic results can't be linked
Averages of own surveys	Good overview on farm situation	See above Very high time input
Typical farm models	Realistic picture of farming Good relation between time input and data quality	Not representative in a statistical sense

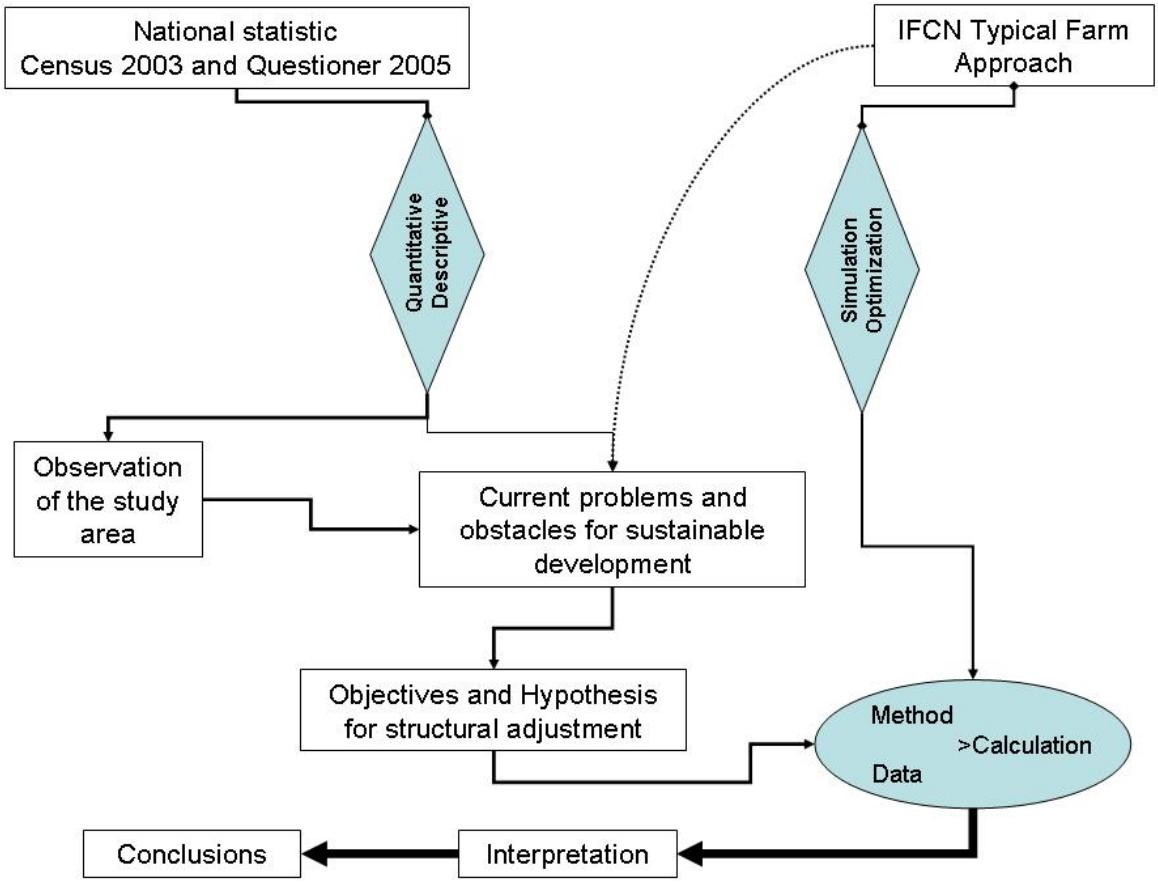
1.5 Methodology and structure of the thesis

The AC-2003 and FSS-2005[5] provide the quantitative data for the description of the study area – the structure of a Bulgarian dairy farm. Descriptive statistical techniques are used to reveal the specifics and characteristics of the study area, as well as to point out the general problems.

To achieve the objectives of the study, the hypotheses are tested by a certain simulation of strategies for dairy farm structural development. The farm level analysis is performed using the typical farm approach and the TIPICAL model of IFCN.

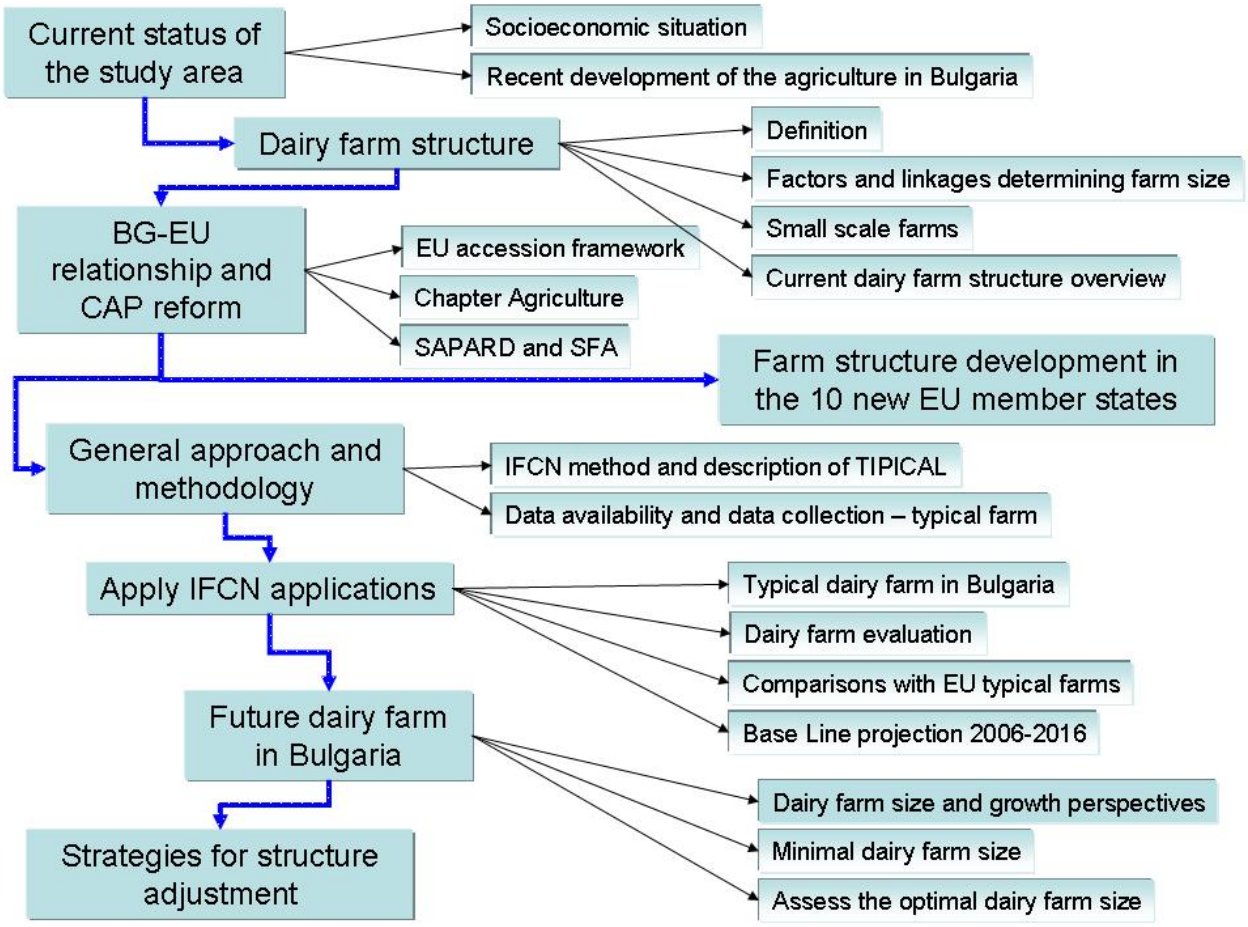
[5] AC2003 - Agricultural census 2003; FSS2005 – Farm structure survey 2005

Figure 1-3: Structure of the study



The thesis is organized in seven chapters (Figure 1.4). Following the Introduction, Chapter Two introduce the current situation of the study area. After the literature review and definitions for farm size and farm structure, the accent is put over the factors and linkages that determine them. The second part of Chapter Two present definition of subsistence farming, its place and role in Bulgaria as well as some general characteristics. In the third part review of the current socioeconomic situation in Bulgaria with some of the most important factors of the economical development, intend to prepare some background for the following analysis. The chapter ends with a brief description of the EU accession framework, description of the government instruments for policy and structural development and some discussion about expected consequences form CAP implementation.

Figure 1-4: Structure of the thesis



The technical part is given in Chapter 3. The general approach and description of the data is followed by the analysis methodology. A subchapter describes the general concept of the TIPICAL model of IFCN. Chapter 4 examine in general the current farm structure in Bulgaria and in particular the dairy farm structure with accent to the typical case.

Chapter 5 deal with the Farm Level Analysis – the core of the thesis. After the description of the typical dairy farm, there follow the comparisons with German and Polish typical dairy farms. The financial analysis and the comparisons with some specially selected EU dairy farms reveal the strong and weak points in to the structure of the Bulgarian typical dairy farm. The three strategies for structural development are simulated in the following section by some assumptions made for the general economic situation and its development in the projected horizon. The chapter ends with the modelling of the future typical dairy farm in Bulgaria.

Chapter 6 closes the thesis with conclusions drawn from the analysis and recommendations about the structural development in the conditions brought by CAP of EU. Comprehensive summary of the thesis in English and German is given after the last chapter, followed by Appendixes and References.

2 Structure and current situation of the study area

The chapter begins with some basic definitions for farm size and structure. The conceptual framework of factors and linkages that determinate them follows. The analysis of the factor and linkages is followed by a subchapter dealing with the major characteristic of the Bulgaria agriculture – small scale subsistence farms.

In order to put in place the conceptual framework and to explain the phenomena of subsistence farming, an overview of the current socio-economic environment in Bulgaria is given in subchapter 2.2. The current situation is complement with presentation of the existing policies for farm structure and sustainability reforms that target the major issues in the sector.

2.1. Farm structure and farm size

2.1.1. Definitions

Agricultural structure has been shaped by many factors including economic, cultural, historical, political, technological and geographical conditions. Components of agricultural structures are enterprises, land, labour and capital, and they comprise the productive capacity of the region (Happe 2004).

Farm structure is defined both in terms of legal status and farm size, the latter being measured either in hectares or in value of output. Both these aspects are addressed on a theoretical level and deliver a useful compendium of available knowledge about farm structure and production (Hughes 2000).

In many studies, “farm” is synonymous with “holding”, a term used in the international recommendations for the 1970 world census of agriculture issued by the United Nations Food and Agriculture Organization. According to traditional economic theory, a holding is a combination of production factors divided into (Figure 2.1):

- labour force (including the holder himself/herself)
- land
- other tangible capital (buildings, machinery, livestock, etc. – see (Medin and Wilson 1973).

In general, the **size of arable land** is considered a major criterion for a classification of farm structure. On the other hand, the combination of production factors strongly depends on the type of agricultural production. While a dairy farm would probably need one hectare of arable land per cow, a farm with 10 bee colonies probably doesn’t need any land at all. In many studies land

distribution is the first and main criterion for comparison of farm structure or its development over time (Lerman 1999; Mathijs and Swinnen 1999; Davidova and Buckwell 2000; Ciaian and Swinnen 2006; Lerman 2006).

The sample survey *Structure of Agricultural Holdings in Bulgaria Crop Year 2004/2005* is the first farm structure survey (FSS) after the 2003 census that is in compliance with the EU requirements. The definition of agricultural holding is set in the Agricultural Census of Republic of Bulgaria Act from 2003[6]. According to it, an agricultural holding is an independent economic entity, which produces agricultural products, has independent management and meets at least one of the following criteria:

- manages 0,5 ha UAA[7] or 0,3 ha of arable land;
- grows 0,2 ha meadows or 0,1 ha of specialised crops (vegetables, strawberries, fruit trees, vineyards, nurseries, tobacco, hops, seeds, and seedlings, flowers, aromatic and medicinal plants, etc.);
- breeds 1 cow or 1 buffalo-cow, or 1 reproductive male animal (bull of service, stallion, boar) or 1 sow, or 5 ewes, or 2 breeding female goats, or 50 laying hens, or 100 broilers, or 10 breeding female rabbits, or 10 bee colonies, or quails or other special types of animals (silkworms, ostriches, Angora goats, Angora hares)(MAF 2006).

Apart from size, the land tenure is also an important factor providing valuable information on farm structure. In some studies (Heady 1971; Lerman, Csaki et al. 2002; Jones, Kalmi et al. 2005) land tenure forms are the basis for defining optimal farm size, comparing performance or a decisive factor for developing the farm structures.

Another general production factor that describes farm structure is the rest of the **tangible capital** – buildings, machinery, livestock etc., or the overall assets structure of the farm. While size and shape of the real capital strongly depends on the type of the farm and farming system in use, their value depends on the purchase price, lifetime, the depreciation method and/or the current market price. The scale in EU statistics is in the European Size Unit (ESU). For each enterprise on a farm (for instance wheat, dairy cow or vineyard), a standard gross margin (SGM) is estimated, based on area (or number of heads) and a regional coefficient. The sum of such margins in a farm is its economic size, expressed in ESU, where 1 ESU = 1 200 EUR. Due to differences in the coverage of units of less than 1 ESU across Member States, they are not comparable between countries. Therefore EuroStat focuses its analysis on the holdings of at least 1 ESU. Consequently, each farm is classified in the community topology by its economic size and its type of farming, depending on the share of each enterprise. For instance, a farm where breeding cows account for more than 2/3 of its economic size, it is classified as specialist pig rearing (MAF 2006).

The last production factor - **labour**, determines farm structure according to its origin – own or hired. In small, family-labour-based farms the owner is the operator and the family provides the large bulk of the regular labour requirements throughout the year. This definition does not exclude the hiring of other people but because family farm members work side-by-side with hired labour

[6] SG, issue 17 dated 21 February 2003
[7] Utilised Agriculture Area

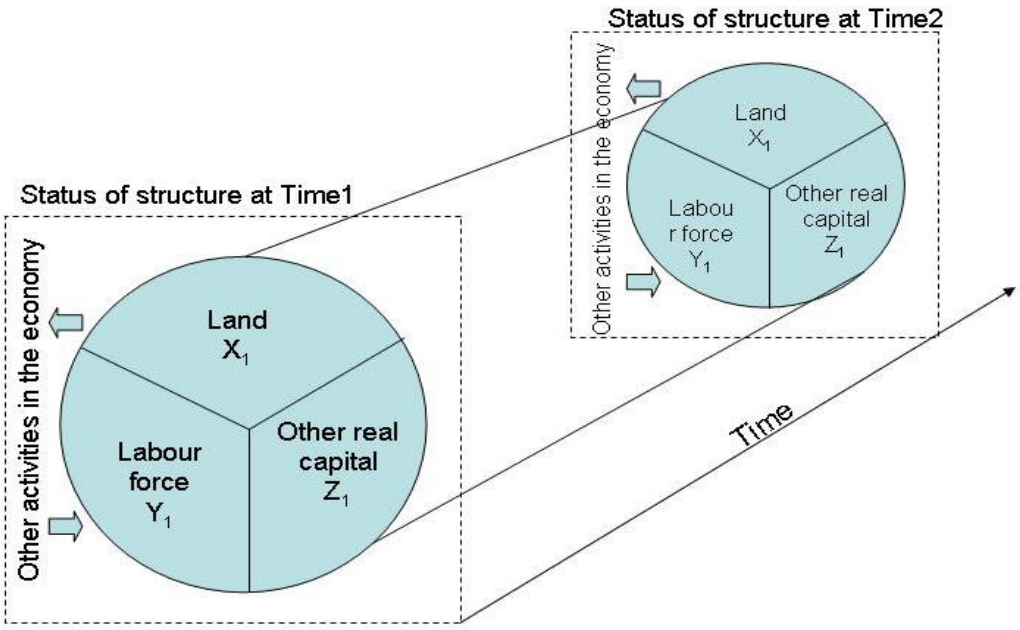
they can monitor their work effort efficiently. Hired labour on large farms is much harder to monitor and may result in shirking (Zyl, Miller et al. 1996).

The current farm structure in CEEC is a result of about 17 years of "farm restructuring" depending on the pre-reform farm structures, on the design of the privatization and transformation policies (influenced by political and economic factors), on the implementation of the policies, and on a series of factors, including the economic and social environment, all of which affect the restructuring process (Lerman 1999).

According to the aims of the study and/or the method used, the size of the farm is presented either by the size of arable land or one of the following: number of animals, sales, value of real capital, economic units, etc. In short, the measurement of farm size is presented with respect to the factors monitored and the comprehensives of the study.

Consequently, in the context of this study, initially we use "farm structure" when describing the dairy sector according to number of farms as per size groups, and later in "farm level analysis" we use "farm structure" as the combination of production factors involved in an agricultural holding.

Figure 2-1: Simple model of a holding (Medin and Wilson 1973)



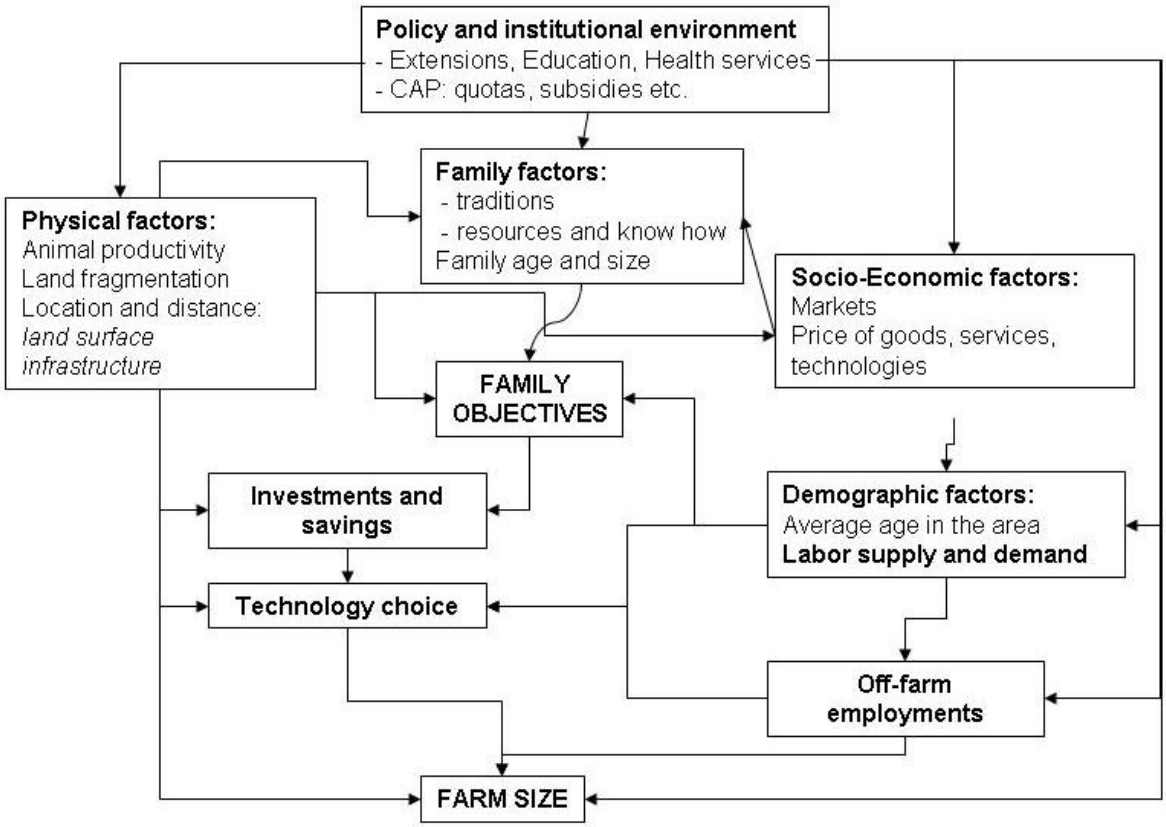
The status of the holding structure at Time1 (relative size of each production factor involved) is changed to structure in Time2 under the influence of a variety of internal and external factors. Figure 2.2 illustrates these factors and the linkages between them.

2.1.2. Factors and linkages determining dairy farm size – conceptual framework

Normally, the farm survival depends on its profitability, both in absolute and relative terms. To remain viable, a firm must offer return that is both sufficient to cover the owner's financial obligations and be competitive with returns from alternative investments.

Besides the objectives and needs of the family, other factors also affect dairy farm size by influencing the choice of strategy that farmers need to adopt for improving or sustaining their living standards (Frohberg 1999). Such factors are found at national, regional, farm and family levels. At national level, government policies, international markets and world prices affect living standards of farmers directly. Government policies affect allocation of village resources and also extension services available to the farmers. We observe the effect of these factors by comparing the status of the structure in two different points in time (Figure 2.1).

Figure 2-2: Factors and linkages determine dairy farm size



2.1.2.1. Family factors

On one hand, family size and age structure predetermine family objectives. A bigger family with young children and some old grand-parents would need more income while a retired couple with no children would only need work to make use of their spare time and some small financial help since their pension is not enough for some sightseeing around the world. On the other hand, the family size and age structure is the first limitation on farm size with respect to the available family labour force.

Family size also determines the size of the available land, animals, buildings and machinery, and in the case of Bulgarian farming they come from restitution and privatization. Very often only few family members remain in the rural area while the rest of the relatives are spread across the country with no intent to make use of the resources they have inherited. It is a common practice to delegate the rights to use these resources to the closest relative that they have in the village. Therefore, the bigger family implies more relatives, hence more resources to manage. On the other hand, there are "young rural families" with no relatives in the area that they are currently living in, and consequently no own recourses from restitution. They are young both in age and in the time they are settled in the village. In past times the government forced many families from the minorities[8] from the Rodopi region[9] to migrate to rural areas in order to supply the rural industries and agriculture with fresh labour and to help them better integrate into the Bulgarian society. Those people have little own arable land but since they were working in former cooperatives they managed to get many items of machinery and buildings by privatization.

Traditions could be divided into two aspects – old and new. The old one is that of the aged people in the rural area that created the cooperatives back then. The new one is the education and experience of the younger population which was working in the cooperatives in the last several years. Using this criterion we can separate the present small-scale subsistent and medium size farms into two types, the first one with the experience of a household small-scale farming from the beginning of the 19th century, the second one with highly mechanized agriculture from the communist era.

2.1.2.2. Physical factors

While landscape and climate determine the system of farming with respect to the available feed and animal breeds, the influence on the firm size is more indirect. If we consider the farm location as a physical factor, it determines the size in two directions – predisposed to grow in size in order to utilize the advantages of the area, or constrained in size by the lack of close animal feed resources. The areas with special climate conditions (high altitude, dry areas or such with extreme temperature abnormalities), usually require special (local) animal breeds, that in general are characterised by lower productivity and high endurance or/and adaptability.

[8] It is not clearly defined that they are minorities – the common name for them is "pomaks" and it is common belief that these are Bulgarians who were converted by force into Mohammedanism 400 year ago. Since then, they have been living in isolation.

[9] The Rodopi mountain (range) – in the south-east of Bulgaria, close to the border with Turkey.

The local infrastructure in the form of roads, communications and transport system could be considered as a constraining physical factor especially with respect to the fresh produce which requires the proximity of processing plants.

2.1.2.3. Socio-economic factors

The leading factor is the markets – their proximity and size. Since supply and demand are the major driving forces of the economy, they determine the size and shape of the farm activities, while in another situation not the demand of products but the price of service, goods and technologies has a decisive role. This is the situation in rural areas where the combination of the lack of markets and alternative employment opportunities predispose subsistent agriculture. In this type of situation the price of input materials and agro services are main constrains for the farm size and especially for the choice of a production system.

While the presence of a favourable market would lead to agricultural commercialization, the extending of the production is not possible unless there are conditions for access to the specific capital needed for this expansion. There are two sources for capital accumulation: financial resources and own assets (Kostov and Lingard 2004 -1). The availability of financial resources is dependent upon the sales of production and other income while the own assets are part of the family factors described above. Although some capital goods have to be “produced” in agriculture, others may be bought. When some assets are purchased, we transform money into some specific tangible capital, or we have a substitution of one form of capital to another. Consequently the process of capital accumulation requires the initial capital to be currently and/or temporarily substituted. Regardless of the availability of such assets that are appointed to the family and physical factors, the conditions necessary to transform them into desirable capital are part of the socio-economic factors (rural bank system) and policy and institutional environment (income policies, subsidy and support programs etc.).

Risk exposure can also affect farm size and structure (Chavas 2001). This is relevant because risk markets are typically underdeveloped in agriculture, implying that most farmers face a significant price risk (due to biological lags in production process) as well as a production risk (due to weather effects and pest problems). Therefore, in some conditions risk exposure gives some economic advantages to smaller farms and provides a disincentive for increasing farm size. On the other hand, larger farms may have access to better risk management strategies that can help reduce risk exposure. In general, it seems that larger farms are more likely to develop under conditions of reduced risk exposure and/or more refined risk management schemes.

2.1.2.4. Policy and institutional environment

The current government policies could be defined in two directions. The first one is towards reducing the number of agricultural holdings (especially subsistent ones) by creating alternative

employment opportunities for the rural population. The second one is towards structure development from predominant subsistent to predominant commercial farming.

Restricting farm size policies	Encouraging farm size policies
Rural development policies -alternative employments -social support policies Environmental rules and regulations	Variety of support programs (SAPARD, SFA, PHAR etc) Rural banking system development Extension services initiatives Production, export, assets and input material subsidies
Production quotas Farm Size constrained subsidies	Income support policies Tax policy Subsidies

Income support policies can contribute to the capital accumulation process which is a prerequisite for expanding production, as long as the farmers apply income from agricultural activities. At the same time there are policies for “alternative income” with the idea to shift resources from agriculture to other sectors. Tax policies in agriculture are often designed to stimulate capital investment (e.g., through investment tax credits or depreciation allowances that reduce taxable income). While capital-intensive farms tend to be larger, tax policy can favour larger farms and thus provide an incentive for increasing farm size.

The production quota system is another factor constraining farm size (production), regardless that the quota can be purchased or sold depending upon current market conditions.

Very often the subsidy policy has a dual effect on farm size when there is an eligibility requirement for a given size of agricultural activities. If such a subsidy is essential for the farm, it either encourages growth or discourages further agricultural activities (Kleinhanss, Murillo et al. 2007).

A well-developed institutional system has to be present for a successful implementation of the policies. The Common Market Organisation (CMO) of EU, for example, requires a series of measures and legislations to be adopted for each product involved. The milk quota is one of the several mechanisms of CMO for milk and milk products for which institutions like the National Milk Board and independent laboratories for quality control need to be fully functional.

With the rise of consumer concerns for food safety, product quality in agriculture started to play a significant role. For a farm to capitalize on the growing demand for organic food, there has to be a well-developed system for quality control – institutions and laboratories that certificate the production, etc. In some situations this has allowed some small farms (typically more labour- and less capital-intensive) to survive and prosper even while facing relatively high production costs.

The situation regarding environmental regulations appears to be the same as with the risk exposure. When larger farm operations generate pollution problems that are increased by the concentration of on-site pollutants, environmental regulations may favour smaller farms. In spite of this, larger farms would still have access to better abatement technologies that could improve their ability to manage agricultural externalities.

While agricultural extension services are essential for the farm structure development, the presence of health and education services in the area plays a more indirect role. Agricultural extensions may have more relations with forming and sustaining the traditions in the area, therefore improving some "family factors", as well as equalizing the working conditions in agriculture with those in the industries and urban areas.

Also, the *demographic factor* is relevant with respect to the labour supply and productivity. The typically aged rural population is the main source of labour in agriculture. It supplies the labour intensive production system, but it is not qualified for working with more advanced technologies in capital intensive systems.

The available opportunities for off-farm employments are essential for the rest of the family members, especially in the case of small farms. While alternative activities provide employment opportunities as a "way out" of farming, off-farm employments are seen as a subsidiary activity, as it provides additional income or utilise the labour force that can't be used by the farm. Off-farm employment is vital for the small farms and is one of the "strategies" for reducing the risk of farming. In some situations off-farm employment is the only source for (initial) capital accumulation (by very small farms) needed for eventual growth.

The choice between *investing and saving* is guided by the ffamily objectives determined by the socio-economic, family and physical factors described above. Technological change makes it possible for workers and management to narrow and increase the size of physical assets needed for cost reduction (Mathijs and Swinnen 1998). The technology choice along with other factors depends on the investment opportunities and the capacity of the farm. A typical situation is that, for a given technology, average cost tends to decrease with size, up to some capacity beyond which average cost increases. As the farm increases, a shift to a better adapted technology can be done through capital investment and mechanization in order to reduce the costs. Therefore, as long as farms have access to a technology adapted to their size, there may not be great efficiency gains from changing farm size (Chavas 2001). Alternatively, when the access to a better adapted technology is restricted, e.g. due to higher capital cost (capital market imperfections), the farms tend to remain in their current size on the condition that other factors do not interfere.

Finally Farm Size appears to be a function of:

> what the family needs + what the farmer is capable of + what the market demands + what is encouraged by the government policy + what are the resources available for production + are there other available resources and the options for utilising them = optimal farm size according to the constraints given.

2.1.3. Small scale subsistence farms

The aim of this sub-chapter is to lay down some important definitions and characteristics of small-scale subsistent farms necessary as a background for later discussions. The nature of subsistent farming in Bulgaria, as well as in other transition countries from CEE has particularities which require special attention with the aim for a better understanding of the processes and trends in the development of the sector.

2.1.3.1. Introduction

The transition process in CEEC leads to a tremendous increase of the subsistence type of agriculture. While this phenomenon is universally present, it varies from one country to another. The transition is viewed as a process that has to bring about the market into the economy, the same one that went missing in agriculture (Kostov and Lingard 2004 -1). Yet, expansion of subsistence agriculture has been perceived as a paradox, which simply does not fit this definition of transition. The economic theory views subsistence agriculture as implicitly irrational and contradicting the sound economic logic and principles, which incline to consider it as a temporary phenomenon that will perish as transition advanced. This is also the prevailing opinion on the nature of subsistence agriculture in transition economies, as well as in general. Government support to subsistence agriculture was mainly done through agricultural development policies, the main objective being to have subsistence farmers participate in markets. The strategy was to make farmers produce more by introducing new technologies and consequently bring their output to the market. Some authors (Kostov and Lingard 2004 -3) challenged this viewpoint and argued that subsistence is not only a logical consequence from worsened economic conditions at the individual level, but it contributes to overall market stability. The argument is that the reaction of the small farm sector to market signals is weak and a conventional market-oriented agricultural policy may not have a substantial influence on it.

A rather serious attempt to address the problem of subsistence agriculture in Eastern Europe was a workshop held at the Institute of Agriculture Development in Central and Eastern Europe (IAMO) in May 2001. The workshop laid down some specific characteristics of subsistent agriculture, as well as some solutions to the problem (Abele and Frohberg 2003).

It appears that there is no consensus about whether it is a problem or not while there is no uniform on the criteria for classifying the subsistent agriculture as a problem. First some authors stipulated that the role of subsistent agriculture is to buffer hardships arising from the economic transition process, as there are no other alternatives (Mishev and Kostov 2001). Others like Von Braun (2001) and Lohlein (2001) defined that subsistent agriculture really is a problem and correlate that the lower the national income is, the higher is the number of subsistence plots in the country. Yefimov (2001) suggests that creating income alternatives in rural areas is a decisive prerequisite for overcoming subsistence agriculture. Nuppenau's (2001) added that making farms more efficient is a necessary but not a sufficient solution to the problem of subsistence agriculture

and this cannot be done by agricultural policies alone. Investments in agriculture and subsequent farm growth (Petrick and Tyran, Noev 2001) and improvement of institutions (Wehrheim and Wobst 2001) are the other proposed solutions to make subsistent farmers become market-oriented.

2.1.3.2. Definition of subsistence agriculture

The agricultural sector in CEEC is characterized by a significant number of small-scale farms in terms of their relative size. This small-scale farming has characteristics similar to those practices of subsistence agriculture observed in many developing countries. One should keep in mind “similar”, first, because CEEC are not “developing” but “transition” countries, and, second, the main difference is behind the circumstances that brought such a structure which are completely different from those in the developing countries.

Subsistence farming is not new in economics. This phenomenon characterizes agricultural and rural economies in many LDCs[10]. The term subsistence agriculture is often used as synonymous with other concepts such as traditional, small-scale, peasant, low income, resource poor, low-input or low technology farming (Brüntrup and Heidhues 2002). It can be defined with regards to production or consumption or with an emphasis to the prevalence of non-marketed production alongside some marketed production as semi-subsistence.

To shed some light on the disagreements about the role and nature of subsistence agriculture in transition, Kostov and Lingard (2004;2005) consider two basic models explaining the self-sufficient orientation of poor, small-scale farmers. The first one is based on the transaction cost concept, implies a price band determined by the effective price received for items sold and the effective price for items purchased. There might exist a range of products and factors for which equilibrium between supply and demand occurs within this price band. In this case, the equilibrium (shadow) price is higher than the sale price and lower than the purchase price, with the result that neither sale nor purchase are desired, and there is self-sufficiency in this commodity or factor. Thus a commodity is not by its nature a tradable or non-tradable one, and a farm is then defined as subsistence- or market-oriented by externally determined prices and transaction costs specific to each decision unit.

The other model is built on the finding of extreme risk aversion of poor farmers. The transaction cost model only considers the price risk, while risk-based explanations of subsistence behaviour consider a much wider range of risks. When survival of the household is at stake and subsistence production offers an effective protection, the degree of risk aversion will increase and thus poor farmers cannot be considered risk neutral but rather risk averse (Brüntrup and Heidhues 2002).

The preferred definition of subsistence agriculture relates it to the **share of marketed produce**, the lower the share the higher is the degree of subsistence orientation. Among the characteristic of this definition found in the contribution of the IAMO workshop, is that subsistence farms are small and with low capital endowment, which often contributes to low competitiveness.

[10] Less Developed Countries

They also suffer from remoteness to urban centres and have poor access to markets. The latter especially shows an important aspect: off-farm income opportunities are scarce and of low revenue for subsistence farmers. This hints that macro-economic conditions are also important factors driving subsistence agriculture.

The widespread existence of subsistence patterns is not temporary and the problem lies not just in the nature of subsistence, but in its significant size and place in the overall agricultural economy.

Table 2-1 Percentage of bought quantities in total household consumption of some food products in Bulgaria, 1989-1997

Products	1989	1991	1992	1993	1994	1995	1996	1997
Vegetables	75,9	71,4	60,0	59,9	63,6	68,1	59,8	63,9
Meat products	74,1	64,2	57,8	59,3	61,1	66,1	59,8	54,1
Milk	**80,2**	**82,4**	**68,5**	**60,6**	**59,4**	**52,4**	**52,4**	**48,3**
Potatoes	55,2	46,0	39,5	39,9	44,4	39,6	44,3	48,2
Meat	70,4	65,6	54,9	52,0	55,0	54,5	48,8	44,1
Fresh fruits	55,6	60,0	62,3	51,5	45,0	46,1	49,2	39,7
Eggs	39,4	39,6	41,2	43,5	38,8	40,9	38,4	34,4

Source: National Statistic Institute, Household Budgets Data

The main future of small scale agriculture is the loose and incomplete link with the market. The data from Table 2-1 clearly reveal the tendency towards self-sufficiency since the share of marketed quantities in total consumption has declined during the transition. Meanwhile the statistics account a tremendous drop in consumption of dairy products (liquid milk -37,7 %) during the 1990s (Table 2-1), therefore the reason of declined bought quantities could be: an increase of self-sufficient production or a decrease of consumption, but most probably it is both of them. In short, we can discuss subsistence agriculture when its relative share in total agricultural production becomes sizeable and can seriously influence the market by radically decreasing the consumption (bought quantities).

It has to be mentioned that there is a certain historical issue concerning subsistence agriculture. Small-scale subsistence farming is not a phenomenon that jumped out of the transition process. It has existed along the last five decades in most of the CEEC in different shapes and sizes (Kostov and Lingard 2004 -2). Collectivization in the agriculture in CEEC was combined with similar mechanization as it was in the Western countries, together with an intensive development of rural industries taking out labour from agriculture in general and from subsistence in particular (by increasing the income). Therefore, at a certain point “private farming” becomes a first household support activity and afterwards just an activity driven by tradition (out of habit) and the available labour force of the aged rural population. With respect to Bulgaria, the last one addresses mainly the so-called 0,1 hectare “kitchen garden” typical of all the rural areas. Demographically speaking, at the end of the 1980s and the beginning of the 1990s in most CEEC the rural

population is highly aged, logically retired persons who at the beginning of the transition bleed a terrible shortage of cash income due to the tremendous inflation. While still able to work, there were no employment opportunities not only in the rural areas but in the urban ones too. This was accompanied by restitution and privatization, or from the point of view of this aged persons, everything returned to the state it was in before “the socialist times”. Combining the lack of work opportunities with restitution of land and privatization of other factors of production left the aged rural population with only one choice: to secure their food requirements with subsistence farming and, if possible, to market the surplus for some cash income.

Employment as a source of income is not available, while producing own food saves income (retirement payments) that can be spent on something else. The lower monetary propensity to buy, therefore, forces this relatively large “kitchen garden” to become small-scale farms, more self-sufficiency orientated and dependent on household production (Mishev and Kostov 2001).

So far subsistence agriculture is defined as: small scale farming with more than 50% subsistence production and relatively aged labour. Since this thesis is concentrated over dairy farming, an in-depth analysis of the share of subsistence by products is needed. For instance, a small scale farm in Bulgaria would be with a cow, several sheep and poultry as well as a kitchen garden and a total of 2,5 hectares of arable land. Assuming that 80% of the total production is for self consumption and only 20% is a surplus, this surplus could possibly be marketed. Or, in other words, the opportunity to sell products determines the amount for self consumption – in the presence of unsuitable prices the farmer will be willing to consume more and sell less. At the same time the lack of markets and the inclusion of non-economic considerations in the decision-making process are important aspects of subsistence agriculture. Subsistence behaviour could cause a perverse supply response (Ozanne 1999) or an unusual consumption response which could invalidate the conclusions of a market-grounded analysis (Kostov and Lingard 2004 -6). The shares of products marketed depend on many factors, but mostly on the structure of the local market. While nearly all of the crop production is seasonal, therefore relatively unreliable as a permanent source of income, milk could be considered as a product to be marketed all the year round. Consequently, milk is a product that can be entirely marketed (not only the surplus) while other products’ surpluses are not always marketed. For an extensive description of the decision making process whether to produce for consumption or sell, see (Kostov and Lingard 2004 -5; Kostov and Lingard 2004 -6).

In fact, milk is a major source of income for small scale farms in general (Table 2.3). For instance, from the 2003 census of agricultural producers, from a total of 169 thousand dairy farms with less than 3 cows in Bulgaria, only 52756 thousand appear to be 100% sufficient (no marketed products) and round about 116 thousand (some 70%) have some sales of unprocessed and/or processed products (Table 2.2).

Table 2-2 Sells of Unprocessed and Processed farm products from Bulgarian dairy farms with less than 3 cows for 2003

Farm products		Processed sells		Total
		No	Yes	
Unprocessed sells	No	52756	508	53264
	Yes	112229	3667	115896
Total		164985	4175	169160

Source: Agricultural Census of Bulgaria 2003, own calculations

Table 2-3 Proportion of unprocessed agricultural products sold and consumed by the household, for all the farms with less than 3 dairy cows in Bulgaria, 2003

Products	Sells	Self consumption
	Percent	Percent
fresh milk	95,40%	4,60%
eggs	3,10%	96,90%
honey	1,70%	98,30%
beeswax	0,70%	99,30%
wool	14,20%	85,80%
grapes	2,40%	97,60%
fresh fruits	1,30%	98,70%
potatoes	12,20%	87,80%
fresh vegetables	4,70%	95,30%

Source: Agricultural Census of Bulgaria 2003, own calculations

In this thesis subsistence agriculture is characterized by small-scale semi-subsistence farming or small-scale household farms with regard to the number of cows. Small scale dairy operation not always refers to small scale farming since the farm could have other large scale activities at the same time. Later a detailed analysis endeavoured to separate the farm with less than 3 cows into subsistent and other farms – with respect to the marketed products, other farm activities, notability of farm work for the household etc.

2.1.3.3. Subsistent farming and Efficiency

There are different types of efficiency, but very often technical efficiency is interpreted as an economical one. The tendency towards greater mechanisation in Western agriculture, over the last century, is seen as unqualified technical progress, synonymous with efficiency. However, the substitution between factors of production is dependent upon their relative price. This is defined by Kostov and Lingard as nothing else but “reflection of the underlying increase in real wages, that is in the relative price of labour”(Kostov and Lingard 2004 -1).

Opposite to the Western economies, the dramatic economic reform in transition countries results in a declining price of labour. Based on the definition above, efficiency should than lead to substitution of labour for capital, or in terms of agriculture, to encourage labour intensive technologies like the one in subsistent farming. To “test” the extent to which this regressive technical change is needed, Kostov and Lingard (2004 – 1) use the “opportunity cost” calculations and estimate the “degree of inefficiency”[11].

“The latter means that for any type of economic behaviour one can define a "utility function" that has been maximised by this behaviour. Only by trying to "objectivise" some implicitly subjective notions such as opportunity costs can such calculations be meaningful. But by doing so we lose the original economic meaning of the opportunity cost concept” (Kostov and Lingard 2004 - 1).

2.1.3.4. Conclusion

Subsistence farming uses resources which could be used somewhere else in market-oriented farming and other sectors and its existence may cause a loss of overall production efficiency. Despite this loss of efficiency at the aggregate level, subsistence farmers may be efficient with regard to their own utility functions or family objectives. Subsequently, from a conventional economics point of view, small-scale farmers are doubtful to react to government policies in a normal, "rational" way. Yet, when they dominate the production of some products, predictions based on “normal” economic models may be treacherous (Kostov and Lingard 2004 -1).

2.2. Current socioeconomic environments in Bulgaria

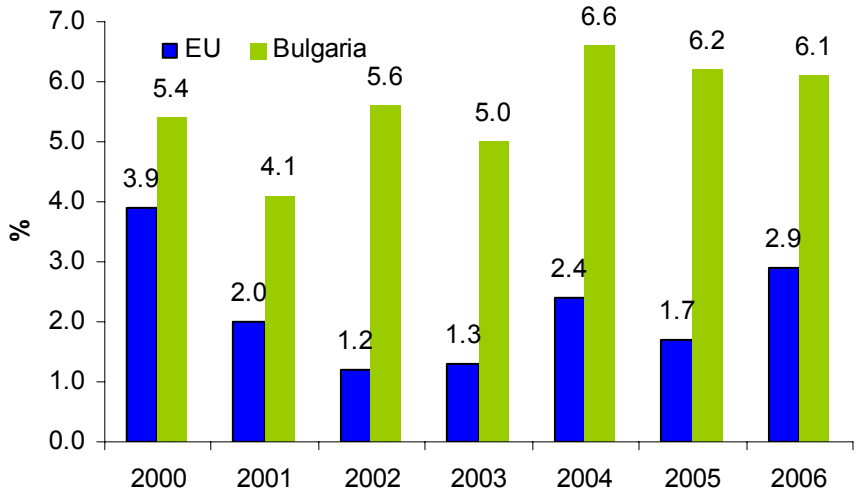
With respect to the factor and linkages determining the farm size as well as in general, the current socioeconomic situation in Bulgaria is discussed in the following subchapter.

Bulgaria - 2005 Comprehensive Monitoring Report – where nothing else is stated in this sub-chapter, citations are from (European_Commission 2005).

The last seven years were the years of remarkable progress along the way to long-term stability and sustainable growth. The average GDP growth over the period 2000-2006 reached 5,4 %, while the average growth for EU-25 was 2,2%. It was a result of the rational macroeconomic policy combined with the observation of a strict budget discipline and accelerated structural reforms (MEE 2007).

[11] It is evident that such calculations should apply at the aggregate level, because it is impossible to test for individual utility orderings.

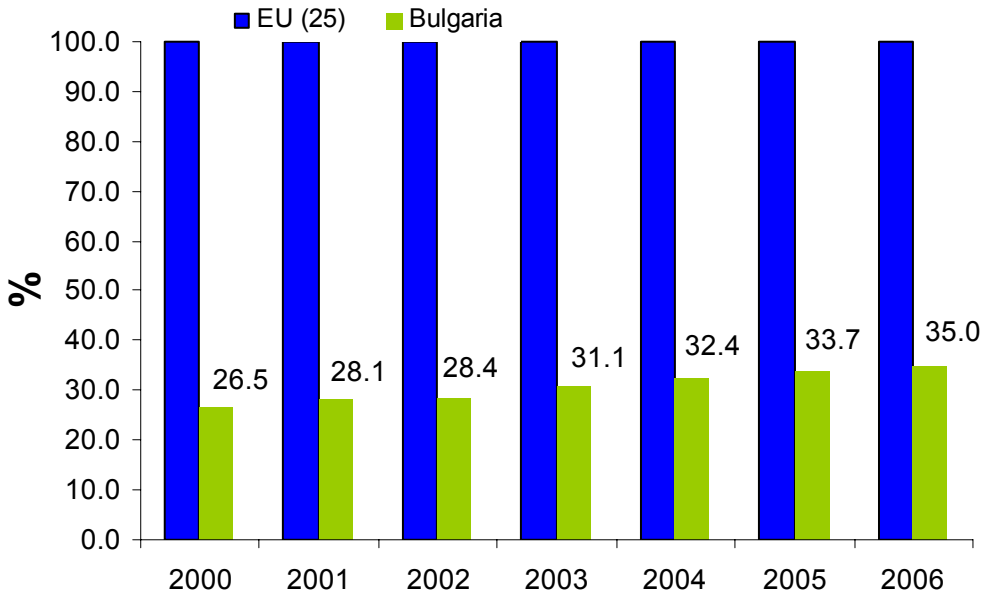
Figure 2-3: Real GDP Growth Rates (% change on previous year)



Source: Eurostat, NSI(MEE 2007)

The main driving forces of the high economic growth over the last years are the rapid development of the private sector, investments and export. At that time their growth considerably outruns the EU-25 average growth. Export is expected to be the main contributor to growth in the period 2007-2009. This will result in a gradual limitation of the negative impact on the external sector.

Figure 2-4: GDP per Capita in Purchasing Power Standards (EU-25 = 100)



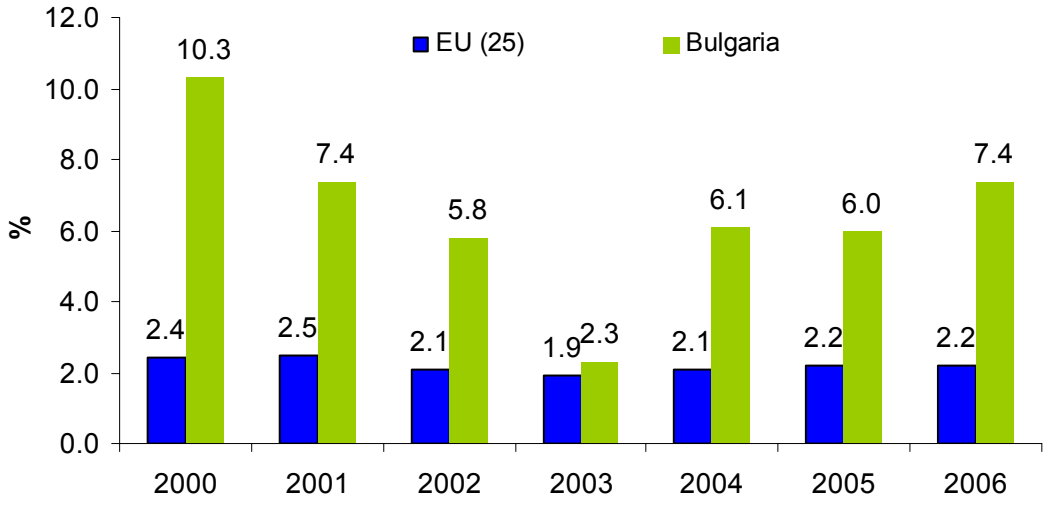
Source: Eurostat

Due to the greater trust and the increased attractiveness of the country as a member of the Common Market, investments kept their high share in GDP. The future income expectations, which

come from the sustainable growth of real incomes over the last years, gave an additional boost to consumption growth. In spite of the fact that the incomes of Bulgarian citizens are growing, currently they are vastly below the standards for developed EU economics. GDP per capital in the country is around 1/3 on the EU-25 average level, in terms of Purchasing Power Parity.

The high economic growth was at the backdrop of relatively low inflation. After the economic crisis and hyperinflation in 1997, the inflationary processes were harnessed and inflation was reduced to single-digit values.

Figure 2-5: Inflation Rate (Annual average rate of change in Harmonized Indices of Consumer Prices)



Source: Eurostat

The accumulated inflation at the end of 2006 is 6,5% and the average annual inflation – 7,4%. The government decided to determine the price dynamics on one occasion by increase of excise duties on fuels and tobacco products. This decision was prompted by a desire for acceleration of implementation of treaty obligations undertaken in the process of EU accession. The other major motive was to avoid accruing and joint influence of several inflationary factors in the period. At that time inflation had to be kept at low levels in order to meet the Maastricht criterion. In this way Bulgaria can successfully join the EUR-zone.

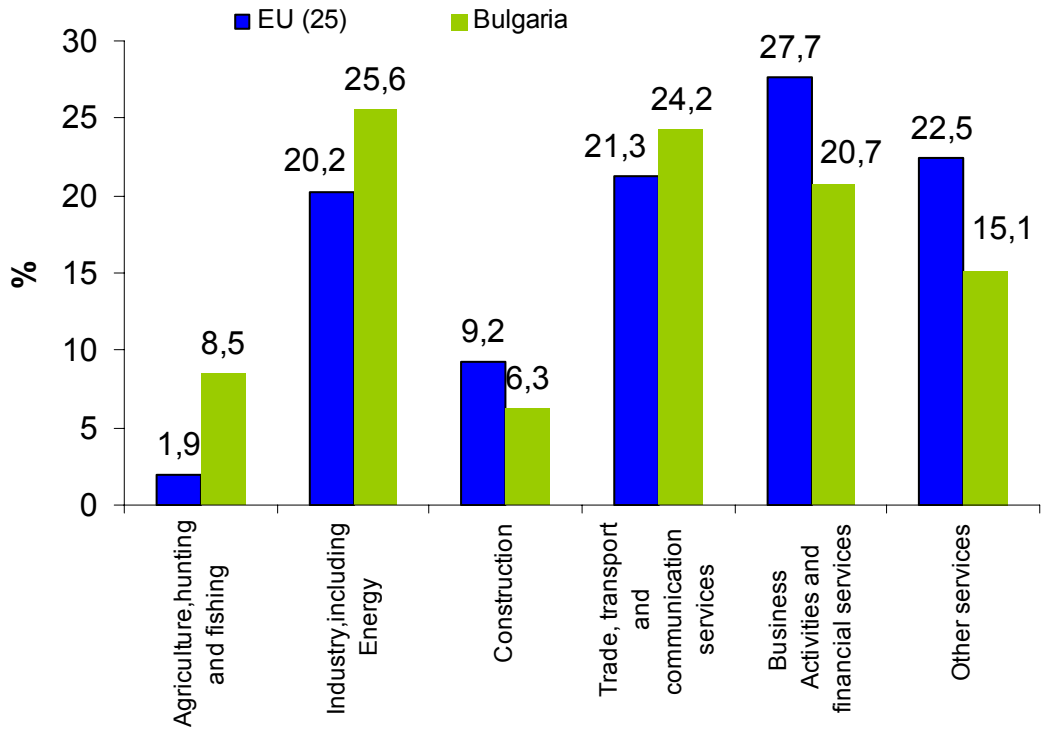
High economic growth is expected to continue in the period 2007-2009 with more than 6% GDP growth annually. Balanced budgets and the ratio state debt to GDP are to be maintained below 30%. The forecast is that the average annual inflation will decrease to 3% by the end of the period. Inflation levels and pressure from an increasing current account deficit are the major risks facing the country. Priority tasks for the upcoming years are attracting large amounts of FDI, absorbing EU funds and maintaining stringent fiscal discipline. Thus, the financial and macroeconomic stability of the country is not threatened with the current account deficit (MEE 2007).

2.2.1. Gross Value Added by Economic Sectors

The service sector (share of 60% in 2006) is the one with the largest share in GVA among the economic sectors. It is followed by the industrial sector (31,4%) and the agricultural sector (8,5%).

Major changes in the economic structure in the period 2000-2006 are the decreasing share in GVA of the agricultural sector (from 13,9% in 2000 to 8,5% in 2006), the increasing shares of construction (from 5,6% to 6,3%), trade, transport and communication services (from 20,9% to 24,2%).

Figure 2-6: Gross value added by sectors, 2006 (% of all branches)



Source: Eurostat

The share of value added of the agricultural sector stands at 8,5%. It remains significantly higher than the EU- 25 average (1,9% of GVA in 2006). In 2006 the sector decreased its production activities, and the real decrease was by 1,9%. According to the government sources, the main reasons for the unsatisfactory results of the agricultural sector over the last years (2004-2007) are the unfavourable agro climatic conditions (MEE 2007). The agricultural sector employs 20,6% of all employed, but has the lowest labour productivity.

The high unit cost of production is the major problem, which still faces the development of the agricultural sector in the country. The average sale prices of most agricultural products are very

close to production expenses. This is the reason for the discouragement of many agricultural producers from developing production activities making no profit. Thus, the share of uncultivated agricultural land increases.

The industrial sector (including electricity and construction) has a strong representation in the inter-sector links of the Bulgarian economy. It builds about half of the internal market of non-investment goods and services used in production and employs almost 990 000 people (27,6% of all employed). The ratio of GVA to the gross volume of production is defined as efficiency of the sector. It declined from 25,7% in 1997 to 23,3 % in 2006. At the same time industry remained the most inefficient sector of the Bulgarian economy. As a result of the favourable external factors, such as high international prices of raw materials and a corresponding increase in sales triggering growth, in 2006 the real growth in the sector was 8,3%, while in 2005 it stood at 4,7%. The most dynamically developing sector, which made 11,3 % growth in 2006, is manufacturing. However, it still makes the lowest level of labour productivity among all industrial sectors.

Over the last years, the service sector is an important factor for economic growth because of its accelerated development. The share of the sector over the last years reached 60% of the total gross value added of the economy. The export of services has increased twice (from 2,4 billion EUR in 2000 up to 4,0 billion EUR in 2006) over the period 2000-2006 in which the export of tourist services increased up to 76 %.

The reforms implemented in the economy, such as privatization, de-regulation of the monopolies in energy, insurance, banking, telecommunication and the transport sectors, etc, determine the positive trends in the service sector. It provides more than 50% of the total employment of the active population.

2.2.2. Foreign Trade

As a result of membership in the World Trade Organization, CEFTA and the agreements with the EU, liberalization of foreign trade occurred. The foreign trade regime of the country is transparent and predictable. Bulgaria has had more than 200 countries as trade partners in the last several years. The main markets of Bulgarian exports are 40 countries, including the EU-25 member states. They have a share of 55% in the total Bulgarian export and 90% of exports are directed to them. All 40 commercial partners, with few exceptions, are members of WTO. They have regional trade agreements, thus ensuring the observation of common trade rules.

The export of the country in 2006 reached almost 12 billion EUR. Compared to the previous year, an increase of 26,6% was registered. In 2000, the export doubled. For the first time in 2006, compared to the previous four years, the export growth (26,6 %) left behind the import growth (25 %). However, the trade deficit of the country reached 21,5 % of GDP.

In 2005, the expanded EU was the biggest strategic market for Bulgaria regarding realization of farm produce, both processed and raw. The relative share of export to EU-25 in market value was 46,3% of the overall agricultural export, while the import was 54,7%. The exchange of agricultural

goods between Bulgaria and EU-25 rose by 21,23 % compared to 2004 - from 899,1 to 1 090 million US dollars. Bulgaria managed to maintain a positive trade surplus with an increase of 19.25% (from 69.1 in 2004 to 82.4 million US dollars in 2005 r.). In 2005, the biggest share in the agricultural export of Bulgaria for EU-25 was held by Greece (17,9%), Spain (13,8%), Germany (13,6%), Italy (12,8%) and France (10,5%)

The top places of Bulgarian agricultural export for EU-25 in 2005 were meat and meat sub-products – 8 133,9 tons at a value of 67,237 million US dollars; wheat 412 719 tons at a value of 45,935 million US dollars; sunflower – 134 959,4 tons at a value of 42,774 million US dollars; fresh grape wine – 40 315,6 tons at a value of 43,277 million US dollars; raw or unprocessed tobacco – 12 211,8 tons at a value of 38,271 million US dollars; bakery, sweetened bakery products – 15 557,1 tons at a value of 37,437 million US dollars; meat from sheep or goats, fresh or frozen – 6 835,4 tons at a value of 35,574 million US dollars; cheese and curds – 6 759,7 tons at a value of 22,602 million US dollars and corn – 158 552,3 tons at a value of 18,442 million US dollars.

Import from EU-25 was mainly from Greece (21,1%), the Netherlands (13,4 %), Germany (11,9 %), France (8,3 %), Italy (7,9 %), Poland (6,7 %) and Hungary (6,6 %).

In 2005, the largest share of imported agricultural goods of EU origin were: food products containing no fats, sacharosis, isoglucosis; preparations used for foods for animals; coffee; oil, fat and liquid oil from cocoa; fats and oils of animal or vegetable origin; ethylic alcohol; chocolate; pork meats, fresh, cooled or frozen; extracts, essence and concentrates from coffee, tea, meats and pluck from domestic birds, fresh, cooled or frozen.

After the accession of the Czech Republic, Hungary, Poland, Slovakia and Slovenia to the EU in 2004, Bulgaria, Romania and Croatia joined the Central European Free Trade Agreement (CEFTA) in 2005. In 2005, the agrarian goods exchange of Bulgaria, Romania and Croatia rose by 24 % from 113,823 million US dollars to 141,171 million US dollars with respect to 2004 (Fidrmuc 2005).

Bulgaria's foreign trade with agrarian goods with the EFTA[12] countries is not very active, and in 2005 a decrease of goods exchange by 23,95 % was recorded - from 25 251 thousand US dollars in 2004 to 19 203 thousand US dollars (with 6 048 thousand US dollars). Among the countries from EFTA, the Swiss Confederation is the most preferred partner of the Bulgarian exporters of agricultural goods. In 2005 the relative share of the export to Switzerland constituted 87,27 % of the whole export for the EFTA countries, and that of import was 85,31 %.

According to data from the Customs Agency, in 2005 the agrarian export to the OECD countries[13] represented 26,5% of the total for agriculture, and import - 18,5%. Export for 2005 increased by 18,8 % (from 282,4 million US dollars in 2004 to 335,59 million US dollars in 2005), and import – by 3,4 % (from 165,5 million US dollars to 171,2 million US dollars). In the last two years Bulgaria formed a positive trade balance with agricultural goods with the OECD countries. In 2005 the positive trade balance increased by 47,4 million US dollars, or 40,6 %, which is a result of the overtaking growth of export.

[12] The European Free Trade Association (EFTA) – Norway, Switzerland, Iceland, Liechtenstein.
[13] The Organisation for Economic Co-operation and Development (OECD).

Under the conditions of strong competition in agricultural trade, receiving preferential access to the national markets of other countries, on the basis of agreements concluded for free trade, acquires an ever increasing significance for the agrarian sector. In 2005, there were functional agreements in agricultural and food trade with the following countries: Turkey (1998), Macedonia (1999), Israel (2001), Albania (2003), Croatia (2001), Serbia and Montenegro (2004), Moldova (2004) and Bosnia and Herzegovina (2004).

The CIS (Commonwealth of Independent States) countries continue to play an important role in the trade balance of agricultural goods, from the point of view of the restoration of Bulgaria's positions on these important markets. In 2005 the Bulgarian export of agricultural goods for the CIS countries increased by 25 % (from 62 million US dollars to 77,5 million US dollars). The export to the Russian federation in 2005 increased by 14,5 million US dollars, or 34,9% with respect to the previous year, and import decreased from 4,3 million US dollars for 2004 to 1,6 million US dollars for 2005, or 62,8 %. The positive trade balance that occurred amounts to 54,4 million US dollars, increasing with respect to 2004 by 17,2 million US dollars, or 46,2 %.

2.2.3. Investments

Investments are one of the main factors causing the high and sustainable economic growth and the intensive development of the national economy. Gross investments (gross fixed capital formation) have increased more than three times for the period 2000 – 2006 reaching 6,6 billion EUR. In 2006 investments in comparable prices showed an increase of 17,6 % compared to the previous year or making 20,9% relative share of GDP.

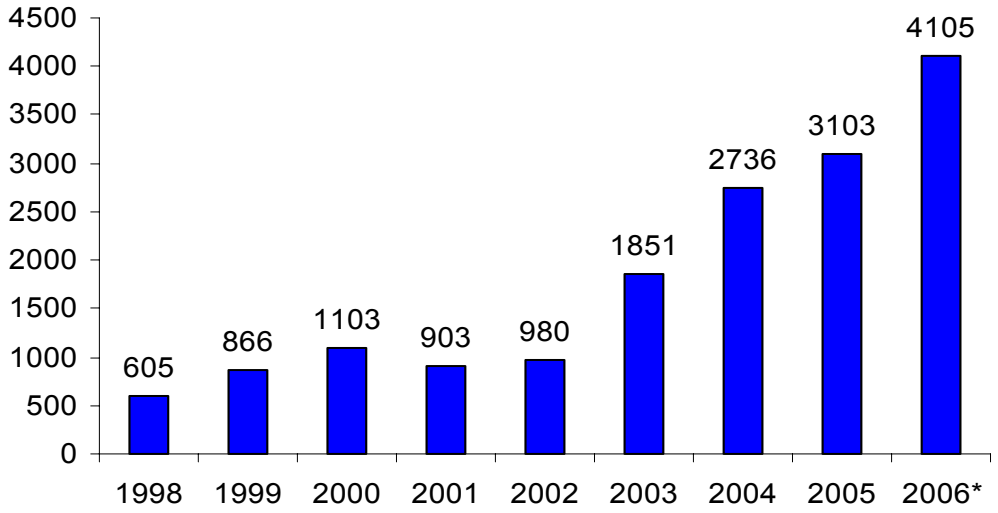
The investment activity is positively influenced by the structural reforms in the economy and the setting up of market conditions. In the last six years, the expenses for acquisition of long-term fixed assets have increased almost three times - from 2,8 billion EUR in 2000 to 7,9 billion EUR in 2006. The relative shares of the cumulative expenses for acquisition of long-term fixed assets per sectors are shown below:

Manufacturing industry	20,4%
Trade, repair and technical maintenance	17%
Transport, storage and communications	15,4%
Production and distribution of electricity and heating energy, gas fuels and water	7,5%
Real estates, renting and business services	7,7%
Construction	7,4%
Hotels and restaurants	6,3%

The constant growth of the volume of the FDI in the country caused the reaching of the impressive amount of 4,1 billion EUR in 2006 or 16,4% of GDP. FDI in Bulgaria now make up a considerable share of GDP and gross fixed capital formation. However, Bulgaria still has a low profile in terms of investor awareness, and image-building activities should promote specific areas

of competitive advantages. In order to capitalize on herding and clustering behaviour, investment-generating activities should promote the country as a suitable destination for investment in certain sectors. This kind of approach is more likely to attract investment than the general promotion campaign that has been carried out until now. If only certain sectors have attracted a larger number of foreign investors, knowledge and awareness of Bulgaria will increase. Companies from a variety of sectors, following the herding phenomenon, will be expected to enter the country.

Figure 2-7: Foreign Direct Investment (million EUR)



*Preliminary data Source: BNB

In the beginning, most of the foreign investment was privatisation-related. Paying no attention to a dip in 2001-2002, privatisation flows have remained fairly constant. Expansion and Greenfield investments, which have been primarily market-seeking, have caused the entirety of FDI growth. There have been some limited investments in particular sectors, nevertheless Bulgaria has not been developing as an export platform. The observation for the 2002-2005 period is that investment totals were dominated by a few very large investments, while a lot of small and medium sized investments made up a low proportion of the total investments (Damianova, Slancheva et al. 2005).

FDI (Foreign Direct Investment) in the agro-food sector has increased significantly since the beginning of the reforms in transition countries. The impact of FDI on the agro-food sector in transition is significantly larger than is usually thought. Important effects on productivity, output, and trade are observed not only in the upstream sector where FDI actually take place, but also at the farm level (Gow and Swinnen 1999). The spillover to the farm level is the direct consequence of FDI-induced vertical contracting. As a part of this vertical integration, many agro-businesses taken over by foreign companies have implemented production support programs, including financial and investment assistance programs and extension support.

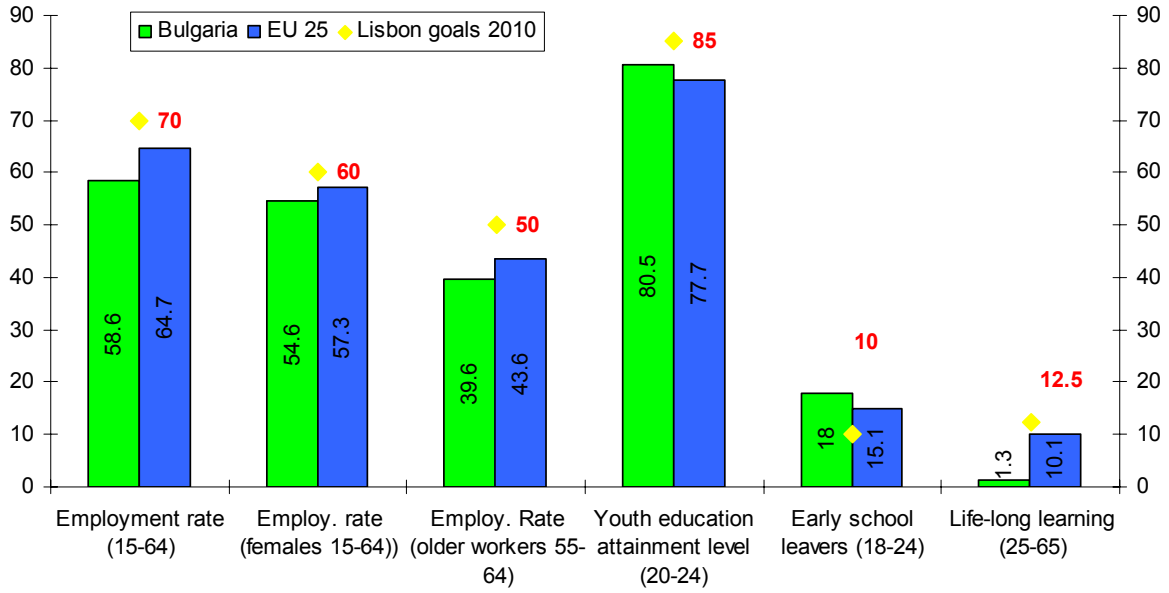
2.2.4. Human Capital

There was a constant tendency of population decrease in recent years. The significant changes in the demographic structure of the population are as a result of the social and economic changes in the standard of life. The decreasing number of the population and worsening of the age structure are the main problems. The population of Bulgaria was 7,7 million at the end of 2006. It decreased by 5,8%, or 470 178 people, for the period 2000-2006. The negative birth rate and external migration are the main factors for the decrease.

In 2006, the total average age of the population was 41,4 years. The tendency for an aging population leads to changes in the demographic structure and in the distribution of the active population. The level of the economically active population between 15 and 64 years has increased from 61,6% in 2000 to 64,5 % in 2006. However, it still lags behind the EU-25 average rate of 70,5 %.

The Bulgarian workforce traditionally has a high level of education. The share of young people in Bulgaria between 20-24 years with higher education is above the EU-25 average. Nevertheless, the majority of those are not employed in the field of their speciality. They are working at positions requiring a lower qualification level. The quality of education has debased in the last years. At the same time the provision of some types of a follow-up education still remain underdeveloped. Life-long learning in Bulgaria remains far below EU-25 average level.

Figure 2-8: Lisbon goals about the level of employment and education

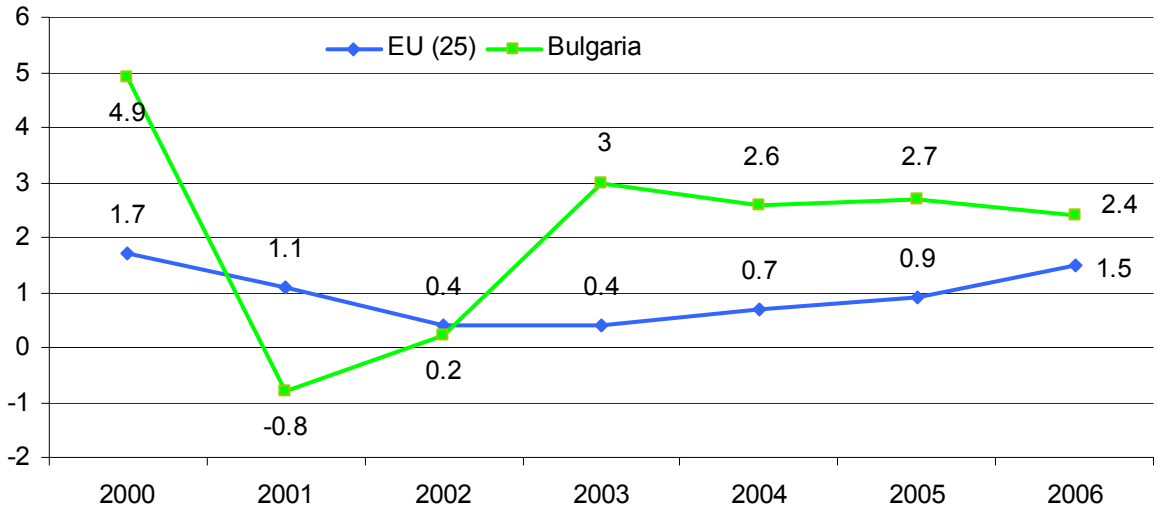


Source: Eurostat

Caused by the restructuring of the economy, the employment level decreased from 1997 (3,16 million employed) to 2001 (2,97 million employed). After 2001, employment increased and in 2006 it reached the level of 1997. For the last four years employment rates in Bulgaria (2,4 %) are above

the EU-25 average (1,5 %). However, the employment rate between 15 and 64 years in 2006 is 58,6%, lagging being EU-25 64,7% of average employment (Damianova, Slancheva et al. 2005).

Figure 2-9: Employment Growth (Annual % change in total employed population)



Source: Eurostat

About 1 million people worked in agriculture in 2005, among which full-time employees were 254 thousand. The workforce in the sector follows the tendency for a decrease of the number of farms – in 2005 people for whom agriculture is a source of income were about 20% less than in 2003. A decrease is being observed in all age groups, the most marked one being in the group over 65 years of age (by about 80 thousand people in comparison with 2003) and in the group of up to 35 years of age (55 thousand people less).

The volume of labour input in the agricultural sector is equivalent of 626,7 annual work units[14] (AWU). The share of the full time employed is about 22% less compared with the one from 2003 or 596,7 thousand AWU while the seasonal workers contribute 28 thousand AWU.

The average age of the farm managers is 59,5 years, 2/3 of them are older than 55 years and only 14,5% below 45 years old. Agriculture is a source of supplementary income for about 354,1 thousand people – part time farmers.

[14] According to the EU definition, one AWU is equal to the hours work by a person employed on a full-time basis during the whole year.

2.2.5. EU accession negotiation

Bulgaria, by its geopolitical situation in South-East Europe, constitutes an interface between the European Union (EU) and the Balkan and the Black Sea region. After the fall of the Berlin wall and the emergence of a democratic regime, Bulgaria very soon established diplomatic relations with the EU in 1989. In 1990 it signed a Trade and Cooperation Agreement with the EU. In 1993, a far-reaching Association Agreement was signed, called “Europe Agreement”, which already indicated Bulgaria's goal of becoming a member of the EU. This agreement, which created a free trade zone between Bulgaria and the Member States, was already part of the strategy of the EU to prepare Bulgaria for accession, which also included substantial financial and technical assistance.

2.2.5.1. General development

Status of the negotiations - Bulgaria concluded technically the accession negotiations with the EU on 15 June 2004. As regards the economic criteria for accession, Bulgaria continues to be a functioning market economy (EC 2005). The persistence of the current pace of its reform path should enable Bulgaria to cope with competitive pressure and market forces within the Union. Bulgaria has broadly maintained macroeconomic stability, even if external deficits have further risen. It continued implementing its structural reform programme, although not equally vigorously in all fields. In most chapters of the acquis either Bulgaria was ready or preparations were being made to resolve the last outstanding issues by accession (May 2006).

Or in short:

There remain six areas of serious concern, which require urgent action:

- setting up a proper integrated administration and control system (IACS) in agriculture, (acquis chapter 7);
- building-up of rendering collection and treatment facilities in line with the acquis on TSE and animal by-products (acquis chapter 7);
- clearer evidence of results in investigating and prosecuting organised crime networks (acquis chapter 24);
- more effective and efficient implementation of laws for the fight against fraud and corruption (acquis chapter 24);
- intensified enforcement of anti-money laundering provisions (acquis chapter 24);
- strengthened financial control for the future use of structural and cohesion funds (acquis chapter 28).

The Commission, as guardian of the Treaties monitoring Bulgaria's preparations for accession, in order to ensure that this country can meet all the duties and requirements of a fully-fledged Member State by accession, in the interest of both current Member States and Bulgaria.

2.2.5.2. Chapter Agriculture of the accession agreement

The agricultural chapter covers a large number of binding rules, many of which are directly applicable. The proper application of these rules and their effective enforcement by an efficient public administration are essential for the functioning of the Common Agricultural Policy. This includes the setting up of management systems such as a paying agency and the Integrated Administration and Control System, and also the capacity to implement rural development actions. EU membership requires integration into the common market organisations for a range of agricultural products, including arable crops, sugar, animal products and specialised crops. Lastly, this chapter covers detailed rules in the veterinary field, which are essential for safeguarding animal health and food safety in the internal market, as well as in the phytosanitary field, including issues such as the quality of seed, plant protection products and harmful organisms (EC 2005).

The main highlights of the government policy in the field of agriculture are outlined in the 2005 Program for Sustainable Agriculture and Rural Development. The efforts are targeted at raising the competitiveness of the Bulgarian agriculture with a view to its exports orientation and integration with the common European market. The process of reinstating the ownership over agricultural land has actually been completed. The passed laws (on lease, on cooperatives, on irrigation associations) are a prerequisite for establishing and intensifying market relations in agriculture. Still pending remains the matter of consolidation of the restitutioned agricultural land with a view to intensification of the land market and raising the efficiency of agricultural production. The Draft-Law on Consolidation of Farm Land has been prepared, however its application will require considerable funds, which have not yet been raised (CED 2002). Some comments have recently appeared in the electronic media about this draft-law and the whole history of its development, qualifying it as "communistic" and circumscribing the private property of land. The author explains about the difficulties of obtaining proper information on law development from the pages of the Committees, especially the one of Agriculture and Forestry Committee, as well as the fact that from 8 Draft-Laws only the one from socialist party was passed (Stanchev 2007).

The Agriculture Chapter was opened for negotiations with the EU on 21 March 2002. The intent of the Ministry of Agriculture and Forestry (MAF) was for this chapter to be closed by December 2003 but actually this took place in June 2004[15]. The agreements reached in this field would outline the framework for Bulgarian agriculture development in the forthcoming years. Alongside with the further harmonization of the legislation, which implies amendments of another 30 ordinances by the end of 2002, the ongoing liberalization of trade in agricultural products between Bulgaria and the EU and the licensing of Bulgarian producers for exports to the EU, another topical matter is the establishing of the required institutions and administrative structures for application and control

[15] http://www.evropa.bg/en/del/eu-and-bulgaria/eu-bulgaria-negotiations.html

over the compliance with the newly adopted legislation, the restructuring and refurbishment of veterinary and phyto-sanitary laboratories and border control points, as well as the development of agro-statistics in compliance with the EU requirements. The introduction of a number of information systems, conducting of the necessary surveys and monitoring will allow for accumulation of official statistics about the allocation of agricultural crops in the different parts of Bulgaria, statistics which Bulgaria, being a candidate for accession to the EU, will have to submit to Eurostat on an annual basis.

Although the accession took place on 1st of January 2007, several important issues related to factors and linkages formulated previously in subsection 2.1.2, were left behind. With respect to the institutional environment, no real progress was reported regarding the setting up of the Paying Agency (PA). Strategic decisions have still to be formalised regarding critical issues such as the option to apply SAPS (Single Area Payment Scheme) or SPS (Single Payment Scheme), and subsequently there is a need to decide on the minimum size of eligible agricultural holdings, the complementary national direct payments and the appropriate budget. The procedures and checklists for the CAP schemes have been identified and developed. In addition, a substantial amount of work remains to be done in particular with regard to the development of the IT system and the training of staff on the new IT system.

A similar situation has to be described currently as concerns setting up the Integrated Administration and Control System (IACS). The associated legislation remains to be adopted. Bulgaria has made some progress, in particular as concerns the preparation of a master plan, but much work remains to be done. The setting up of a land parcel identification system (LPIS) is a source of concern since no real progress can be reported regarding the establishment of ortho-photos – so far no ortho-photos have been acquired - and their subsequent digitisation. Other basic elements, such as the customisation of the IACS software based on the Austrian system, pre-registration of farmers, on-the-spot controls and training of staff are still to be undertaken. There must be serious concerns over Bulgaria's rate of progress in this area and urgent attention must be paid to this issue if Bulgaria is to have a fully-functioning IACS by the accession (EC 2006).

No real progress could be reported in relation to the CMO for milk till 2005. Legislation was adopted in 2006, to enforce the CMO for milk and measures taken to put in place the milk quota as well as most of the mechanisms for the common market organisation for milk and milk products. The database including the basic quota register was finalised, covering all producers and direct sellers; allocation of the indicative individual quota was done for 2006 as a test year. The process of approval of purchasers is on good track. The National Milk Board and one of the eight regional milk boards were set up but a clear distribution of tasks and responsibilities between all the bodies involved in implementing the milk quota system was missing till the end of 2006. Detailed rules for management of milk quotas and of the national reserve had yet to be adopted. Despite the fact that the rest of regional milk boards were set up in 2006, they are still not fully operational nor are the independent laboratories for the analysis of fat content at all individual milk factories. The laboratories were neither installed nor accredited during the test year (2006) which seriously endangered the whole operation.

By adopting the Veterinary Framework Law (VFL) Bulgaria established the basis for transposing into its national legislation the acquis concerning animal health, animal welfare, veterinary public health and the horizontal veterinary control instruments. The VFL entered into force on 1 May 2006. Nevertheless the EU norms and standards on animal welfare were not yet fully enforced then.

2.2.6. Conclusions

Despite the “good words” of the EC Regular Reports, every paragraph in them had the same ending sentence: “...but further steps are still needed in order to complete the preparations for accession.”

With such a recommendation ends the progress on Paying Agency, the area of trade mechanisms and the CMO for wine and alcohol, milk and beef meat and veterinary sector.

Nevertheless Bulgarian economy has achieved a stable economic growth in the period 2000 - 2004. The GDP growth was boosted by the growth in all components of domestic demand. The improvement in the business environment resulted in a significant growth in the demand for investment. The stable growth of the economy has led to a gradual increase in the real incomes and employment, which in turn contributed to the growth in domestic consumption. Domestic consumption was also supported by the expansion in bank credit. Exports also registered growth in the period 2000 - 2004, but the growth in imports was higher, which resulted in the increasing current account deficit. Since 2001 there has been growth in employment and reduction in unemployment in Bulgaria.

Agriculture makes a significant contribution to GDP, exports and employment but its relative share has been decreasing over the last decade (MAF 2007). That is explained by the slow and uneven growth of the sector, and the faster growth of the national economy.

2.3 Policies for farm structures and sustainability

2.3.1. Special Accession Program for Agricultural and Rural Development

The Special Accession Program for Agricultural and Rural Development (SAPARD) has been a major support instrument for Bulgarian farming in recent years. The broad goals for its implementation were set by the 2000-2006 National Plan for Agriculture and Rural Development (NPARD). NPARD aims at: modernizing and improving the efficiency and competitiveness of farms and food processing according to EU standards; sustainable development of rural regions in lines with leading ecological practices; creation of alternative employment in rural areas and new incentives for younger farmers; diversification of economic activities and building of modern rural infrastructure etc. Half of the investments for carrying out SAPARD projects come as subsidies, out of which 75% are from EU and the rest from the national budget.

Up to date 10 measures for implementing SAPARD have been accredited: Measure 1.1 "Investment in agricultural holdings"; Measure 1.2 "Improvement of processing and marketing of agricultural and fishery products"; Measure 2.1 "Developments and diversification of economic activities, creation of opportunities for multiple activities and alternative income"; Sub-measure 1.2.1 "Wholesale Markets"; Measure 1.4 "Forestry, afforestation of farmlands, investments in forest holdings, processing and marketing of forest products"; Measure 1.5 “Establishment of producers' organizations”; Measure 2.2 “Renovation and development of villages, preservation and conservancy of rural heritage and cultural traditions"; Measure 2.3 “Developments and improvement of rural infrastructure"; Measure 3.1 “Improvement of vocational training”; and Measure 4.1 “Technical assistance”.

Until the middle of 2005 as much as 1910 projects were approved with total investments of 768.8 million EUR and 381.3 million EUR of eligible subsidies. There has been a significant increase in the number and average size of projects since the launch of SAPARD. By the end of May 2005 more than 50% of the projects were successfully completed and subsidies paid to beneficiaries. Almost all funded projects (but 3 small one) cover Measure 1.1, 1.2, and 2.1 (Table 2.4). SAPARD investments and subsidies progressively take a good share in the Gross Value Added (GVA) of the sector.

The impact of SAPARD on Bulgarian farming is considerable, having in mind the scope of the Programme (for 2000-2006 EU annual grant of 52.124 million EUR), and deficiency of agrarian credit and investment resources in the country[16]. Both publicized experiences and formal assessment show that successful projects have contributed a great deal to modernization and efficiency of implementing farms.

[16] Since 1998 share of agrarian credit in portfolio of commercial banks is bellow or on 2% level (BNB).

Table 2-4: Number and size of completed SAPARD projects in Bulgaria (EUR)

Year	Indicators	Measure 1.1.	Measure 1.2.	Measure 2.1.	Total	Project size	Share in GVA
2001.00	projects	8	1	0	9		0.11
	investments	1605792	288303	0	1894096	210455.00	
2002.00	projects	81	12	4	97		1.69
	investments	17480898	9280607	342685	27104190	279425.00	
2003.00	projects	224	45	19	288		4.77
	investments	40246818	31343898	1511089	73101806	253826.00	
2004.00	projects	294	73	80	447		8.29
	investments	54073943	71205163	11574328	136853434	306160.00	
2005*	projects	102	30	31	164		n.a.
	investments	18879414	37516293	6008238	62426163	380647.00	
Total 2001-2005	projects	709	161	134	1004		3,63**
	investments	132286865	149634265	19436341	301357471	300157.00	1,82**
	subsidies	66143431	74817132	9718170	150678733		

Source: MAF * until end of May 2005 ** for 2001-2004

Despite its original direction to support all prospective farms, the majority of SAPARD projects have been granted to larger and highly commercialized enterprises. The bulk of funded projects under Measure 1.1 have been for high and rapid pay-off investments such as cereals (63%) and machinery (83%). Complicated bureaucratic procedures, massive paper work and formal requirements, enormous efforts and costs for preparing, winning, and carrying out projects (for putting together proposals, related inspections, finding money-lenders, lobbying, bribe payments etc.), all they let only a small fraction of Bulgarian farms have access to SAPARD. Up to date, only 0.1% of farms have got support to their investment by that program, most of them being firms and cooperatives located in more developed regions of the country[17]. In fact, SAPARD has been mainly accessible for the richest, most powerful, large-scale, and as, a rule, “less needy” farms and organizations[18]. Besides, SAPARD resources have not been appropriate to support (and induce) huge capital investments necessary for modernization of outdated or deficient farm assets and rural infrastructure in the country.

Projects selection criteria equally put some limits for application of the best part of farms – e.g. the obligation to find funding and complete a project before receiving any subsidy; the requirement to match subsidy with 50% of own financing; prerequisites to have past farming history and a certain amount of livestock (at least 15 milk cows, 100 milking sheep and/or water buffaloes, 30 pigs); compulsory non-income generation investments (e.g. in animal welfare, environment preservation etc.); the necessity to present future marketing contracts for 50% of processed outputs; age restrictions etc. Besides, the uniform criteria for farms in all regions of the country and

[17] Under Measure 1.1 portion of agro-firms and cooperatives in funded projects is 64% and 23% while 7.7% of all agro-firms, 2.3% of cooperatives, and only insignificant number of unregistered farms got funding from the program. Few projects are in less-developed regions: South-West, North-West, and mountainous parts of the country (Interim Assessment of SAPARD Program in Bulgaria, MAF, 2004).

[18] Assessment reviles that majority of beneficiaries under Measure 2.1. are non agricultural companies.

excluding some prospective areas of activity, they put additional restrictions for application of many farms (Janssen, Hlebarov et al. 2005).

Last but not least important, SAPARD has not practically addressed important aspects of farm and rural sustainability such as social and economic cohesion, environmental issues, water management, animal welfare, preservation of biodiversity etc. Therefore, a substantial improvement in the management and organization of SAPARD (and future agrarian and rural development programs) is to be undertaken, which is to: introduce new measures associated with farm and rural sustainability; reduce disparity between farms, sub-sectors and regions; enhance transparency and efficiency of project selection and control; increase accessibility for prospective small and middle-size farms; decrease direct and hidden costs for participants etc (Kostov and Lingard 2004 -4).

2.3.2. State Fund Agriculture

Until recently the State Fund of Agriculture (SFA) has been the major instrument for government support to farm structures. SFA provides targeted credits and subsidies for all type of farms producing for market. Its short-term finance lines include targeted credits and subsidies for major productions and activities. Since the beginning of transition the Government intervention in short-term finance supply has been a critical factor for carrying out the most important production operations of larger commercial farms. In recent years there has been a significant shift in the policy associated with a considerable increase in targeted subsidies and a sharp reduction of short-term crediting (Table 2.5). Although the overall level of intervention (short term credit plus targeted subsidies) is almost unaffected, the change in the structure of support (namely the form of direct subsidies) is appreciated by producers. As a whole, that form of aid reaches a minor number of producers and its share in GVA is low.

Table 2-5 Support to Bulgarian farms from the State Fund of Agriculture (EUR, percent)

Indicators	2000	2001	2002	2003	2004	2004/2000
1. Investment credit						
Number of projects	614	229	135	897	298	48,53
Total amount	19856531	17519928	6429123	231135446	4755014	23,95
Project average size	32340	76506	47623	25792	15956	49,34
Share in GVA	0,59	0,47	0,18	0,71	0,14	
2. Short-term credit						11.35
Number of contracts	3635	3258	3381	n.a.	n.a.	
Total amount	15267687	13198233	12521028	6378366	1732768	
Share in GVA	0,94	0,73	0,78	0,42	0,10	
3. Targeted subsidies						
Number of contracts	6506	6265	8141	16415	16191	248,86
Total amount	5405378	9688316	12585050	22134848	18406508	340,52
Share in GVA	0,33	0,54	0,79	0,44	1,11	

Source: MAF

SFA also provides credit and subsidies for long-term investments of market-oriented farms through 3 specific programs (“Crop production”, “Livestock husbandry”, and “Agricultural machinery”) and 2 sub-programs (“Alternative Agriculture in the Rhodopi Mountain”, and “Agriculture Development in Northwestern Bulgaria”). Different types of schemes have been used giving opportunity to match to the specific situation and needs of applying farms (resource endowment, stage of development, project size, priority areas) and employing different modes of funding ("with money and at the risk of SFA", "with money of SFA and at the risk of commercial banks", subsidizing interest rate and/or investments, providing explicit guarantee from SFA).

In recent years, investment credit has been targeted at small and medium-size producers, and at less developed regions in order to improve the farmers’ access to direct subsidy schemes and the capacity to apply for SAPARD. Indeed, a major portion of funded projects has been proposals coming from unregistered farms and the average size of projects has been getting smaller (Table 2.4). Besides, almost half of the investments have gone to projects in two less developed regions of the country (2004). Nevertheless, the relative share of farms supported by SFA and its part in GVA is not considerable. Moreover, complicated procedures and high costs for participating farms, the impossibility for application by informal partnerships and widespread mismanagement and corruption, they all have prevented the relatively smaller (and most needy) farms to get access to SFA programs. Last but not least important, after the “pick” in 2003 both number of funded projects and amount of provided credits have been substantially cut down.

2.3.3. Other instruments

In recent years there has been further harmonization of the national support policy with the EU legislation. For instance, the Law for Intervention in Markets of Agricultural Products was adapted which is based on the EU regime for interventions in the sector “Field cultures” and market for slaughterhouse produce. However, actual Government actions have been entirely focused on protecting consumers through reducing and stabilizing prices (e.g. along the “wheat - flour – bread chain”) rather than increasing farmers’ income.

Legislation for granting export subsidies for processed and unprocessed agricultural products was also introduced. Consequently, for the first time in 2004 export subsidies of 1.5 million EUR were paid for cheese from sheep and cow milk, lamb meat, caned fruits and vegetables, eggs for consumption, and domestic rosters and hens. This positively affected the demand for respective products and eventually influenced (stabilized) the income of producers.

In addition, there have been a number of initiatives of the Ministry of Labour and Social Policy supporting individuals and farms: “Employment though Support of Business”; “Micro-credit Guarantee Fund”; “Preservation of Yield 2005”; “Increasing Employment and Qualification in Apiculture”; “Agricultural Producers”; “From Social Payments to Employment”; “Overcoming Poverty”. These programs have given some assistance to participating few individuals and farms in getting access to preferential credit, starting up or extending farming activities, obtaining grants and other payments etc. Nevertheless, due to the projects’ small scope (less-developed regions, jobless individuals, subsistent farms), insufficient and unsustainable support (short term, limited funds), unachievable requirements (necessity to have own farmland and assets, mandatory insurance at the expense of participants), their overall impact on farming structures have been insignificant.

2.3.4. Regional dimensions

Estimates on the Aggregate Level of Support to Agriculture in Bulgaria demonstrate that until recently it was very low, close to zero or even negative (OECD, 2000). There has been considerable progress in public aid to the agrarian sector since 2000. However, overall support to farms rests very little, and much below the level in EU and other countries in the region. Only a small proportion of farms benefits from some form of public assistance (price guarantee, preferential credit, or various sort of targeted subsidies and grants). The majority of Bulgarian farms are either unsupported or obtain insignificant public back up. Hence they are exposed to direct market pressure and compete unsuccessfully with heavily subsidized foreign rivals on domestic and international markets alike. Furthermore, there are strong incentives to get “additional” CAP support by all farms as far as costs of acquisition (registration, paper work, compliance with restrictions) are smaller than anticipated net benefits.

What is more, the general institutions and infrastructure essential for effective farming and rural development have not been built in the country:

- a public system for the enforcement of laws, regulations, and contracts does not work well;
- often public support programs are not governed effectively and in the best interest of legitimate beneficiaries, and they bring about a bigger disproportion between farms of different types, sub-sectors and regions;
- the newly established system for agrarian extension does not serve majority of farms and include rural development issues;
- the privatization of the irrigation system has not been completed; the badly needed system for agrarian insurance has not been introduced;
- crucial agrarian and rural infrastructure (wholesale markets, irrigation, roads etc.) has not been modernized;
- public support for initiating and developing farming associations has not been given; the multifunctional role of agriculture has not been recognized and specific standards for environmental protection, animal welfare etc. have not been set up.

All that has delayed the modernization of Bulgarian farms comparing to EU (quality, environmental etc.) standards and progress made in other transitional countries. For instance, renovation of outdated machinery, orchards, vineyards etc. has been very slow; fertilizer compensation of extracted nitrogen, phosphates and potassium has been extremely low; large-scale operators apply monoculture and do not comply with biodiversity norms; significant farmland is not properly maintained or abandoned; most livestock farms hardly meet EU standards; structural, sector and regional differences have been broadened etc. All that will have serious negative implications for the long-term sustainability of considerable number of farms in the years to come (Bachev 2005).

2.3.5. Expected consequences of CAP implementation

The country's accession to the EU and the implementation of CAP will give new opportunities for Bulgarian farms. EU funding for agriculture from 2007 on alone will be 5.1 times higher than the overall level of the present support to farming. More specifically, short-term CAP impact on farm structure is to be expected in the following directions: firstly, it will introduce and enforce a "new order" (regulations, quality and safety standards, protection against market instability, export support etc.) which will eventually intensify agrarian transactions and increase their efficiency. Further integration and opening up of markets will enhance competition and will require from Bulgarian farms to exaggerate any comparative advantages they may possess(low costs, high quality, specific character of produces; innovation potential etc.).

Secondly, a significant part of farms will start receiving direct payments[19]. During 2007-2009 all farms will get a single payments according to amount of utilized agricultural land[20]. Depending on the Government decision for the minimum size of UAA for supporting a farm (which could be from 0.3 ha to 1 ha) the direct payments will be somewhere between 69 - 74.2 EUR per ha in 2007, 82.8 - 89.1 EUR per ha in 2008, and 96.8-104.1 EUR per ha in 2009. Besides, farms may get additional payments from the national budget[21]. Consequently from 153640 up to 668000 and more farms will be eligible for direct payments.

Having in mind the current state of support (low or none) the direct payments will augment the level of farm sustainability through increasing general (net) income or preventing its possible reduction. Moreover, direct payments will improve environmental performance of farms since they will be coupled with mandatory requirements for "keeping farmland in good agricultural and environmental condition". Direct payments could even induce usage of some less-productive and presently abandoned lands, and provide new income in certain less favourable and mountainous regions of the country.

On the other hand, this mode will support otherwise "inefficient" structures (small-scale, part-time, and cooperative farms) and non-market forms (such as subsistence and cooperative farming). As a result the relative sustainability of these farms will increase – small scale-operations will become viable; cooperatives will be able to pay rent; subsistence farming will turn to be more profitable etc. Besides, direct payments will tend to move up farmland price and rent, and thus enlarge the costs for land supply in the biggest farms[22]. At the same time small-scale operators (which are mainly organized on owned land) will retain entire subsidies and see their income increased. Subsequently transformation of land management to the most effective forms as well as

[19] EU funds allotted for market support for 2007-2009 accounts for 388 million EUR (MAF).
[20] From EU for direct payments there will be available 200.3 millions, 240.4 millions, and 281 millions for 2007, 2008 and 2009 accordingly, which corresponds to 25%, 30%, and 35% of the EU- 15 level of direct payments for the relevant year. Phasing will continue until complete balancing in 2016. There is a possibility for extension of Single Area Payment Scheme until 2011 (MAF).
[21] Bulgaria will be in a position to add the direct payments from the national budget up to 55% from the EU level of direct payments in 2007, 60% in 2008, 65% in 2009, and by 30% over the applicable levels of the relevant year since 2010 (MAF).
[22] Currently a half of UAA in unregistered farms and 90% in legal entities is leased land (MAF).

restructuring of farms will be delayed[23]. What is more, the EU funds will be effectively used to subsidize directly the consumption (food self-supply) of a good part of Bulgarian population.

Third, significant funds for rural development will be available from the EU exceeding 4.7 times the relevant current level[24]. This amount of resources will let more and relatively smaller farms to get access to public support scheme and invest in modernization of their enterprises. Furthermore, new important activities will be effectively financed such as diversification of farming; commercialization of local products; renovation of villages and infrastructural development; agro-environment protection and animal welfare; support for less favoured areas and regions with environmental restrictions; afforestation of farmland; restructuring of semi-market holdings; Community standards; food quality; producers' organizations etc. All that will let carrying out essential for agriculture and rural areas activities - commercialization and diversification of farming, introduction of organic farming, maintaining productivity of and biodiversity on currently abandoned farmland, revitalizing mountainous agriculture etc. That will bring additional income for farmers, and create new employments in rural area, and enhance overall performance and sustainability of individual farms. Besides, it will extend the activity of some of the existing structures (cooperatives, group farms, firms) which could specialize in new functions such as environmental preservation, maintenance of farmland etc., and see their long-term sustainability increased(Key and Roberts 2006).

Forth, CAP will modernize farms structures through expanding the variety of contractual arrangements and organizational innovations in agrarian sector - specific sort of contracts, new type of producers associations, spreading vertically integrated modes etc. Moreover, special forms will gradually emerge allowing agrarian and rural agents to take advantage of the large public programs - specializing in project preparation, management, and execution; investing in “relations capital” or “negative” entrepreneurship; forming modes for lobbying and farmers’ representation; developing formal coalitions for complying with eligibility criteria for public support (e.g. minimum farm size for direct payments, membership requirements for producers organizations etc.).

CAP will also contribute to foster restructuring of commercial farms according to modern market, technological, and institutional standards. Farming will be increasingly characterized with domination of larger and highly effective (competitive) enterprises which will concentrate the activities in all major sub-sectors. At the same time the process of restructuring of the great part of Bulgarian farms will not be positively affected. Less effective small and subsistence (cooperative and individual) farms will continue to persist and even benefit from the public support.

Furthermore, prospects for changing “high sustainability” of small-scale and subsistence farming is mostly determined by the overall development of the economy, and increasing non-farm employment and income opportunities. However, it is less likely to have significant positive changes in that respect (unemployed rate is above 12% reaching in rural areas to 14.6%). At the same time this type of farming (especially miniature “domestic” livestock operations) will hardly be able to meet the EU quality, veterinary, phito-sanitary, environmental, animal welfare etc. standards. On the other hand, it will be practically impossible (costly or politically undesirable) for

[23] That is not necessarily bad as far as keeping the extensive and family character of farming is concerned.
[24] Envisaged for 2007-2009 is the amount of 733 million EUR plus resources from the EU Structural Funds (MAF).

the authority to enforce the official standards in that huge informal sector of the economy. Therefore, these less effective structures will continue to exist in years to come.

Fifth, costs for respecting requirements of the special agri-environmental programs by different farms (direct expenses, lost income etc.) will vary considerably and they will have unequal incentives to participate. Having in mind the voluntary character of most of the CAP support instruments we should expect that the biggest producers of negative agrarian externalities (large polluters and non-compliant with modern quality, agronomic, biodiversity, animal welfare etc. standards) will stay outside of these schemes. On the other hand, small contributors will like to join since their related costs would be insignificant comparing to receive net benefit(Kostov and Lingard 2004 -7).

Lastly, there will be “practical” difficulties for introducing CAP in public and private sector alike – information and technical deficiency, lack of staff and experience, enormous initial costs (registrations, paper work, formalizing relations with landlords, preparing project proposals etc.). Thus we are to expect some time lag until “full” implementation of the CAP depending on pace of building effective capacity as well as training of (acquiring learning by doing experience by) administrative staff, farmers, and other agrarian and rural agents.

3 Data availability and methodology of the analysis

This chapter covers the general principles and processes leading up to the results from the study. After the definition of the main research questions and hypotheses, follows the method and documentation of the model used in the study. Particular attention is given to the thesis general approach – the typical farm, its definition, selection and setting up, data sources.

The chapter ends with the description of the data used in the analysis – collection, sources, availability and quality.

3.1 Thesis methodology

3.1.1. Research Question

The thesis intends to determine the minimum dairy farm size that will be able to accomplish successful development strategies according to the current constraints and opportunities in Bulgaria. Furthermore to assess the optimal size for the **typical dairy farm** in the country, that will be most efficient and less risky for the farmers, with respect to the current and upcoming socio-economic framework.

Farm size could be measured in various ways like: size of utilized agriculture area, financial characteristics like “turnover”, “value of the assets” and “value of production”, number of animals, aggregated measures like European Size Unit equal to 1200 euro of assets and others. The dairy farm however is generally accepted to be represented by the size of its herd or that is the average annual number of dairy cows on the farm.

3.1.2. Methodology

The Agriculture Census-2003 and Farm Structure Survey-2005 provide the quantitative data for the description of the study area – the structure of a Bulgarian dairy farm. Descriptive statistical techniques are used to reveal the specifics and characteristics of the study area, as well as to point out the general problems.

The typical farm approach was chosen as basis for the analysis in this thesis. The typical farm for Bulgaria was build with the help of IFCN methodology and experience in working with world-wide typical farms.

The typical dairy farm in Bulgaria for 2006 was used as exit point for the strategy simulation and structure optimization conduct with TPICAL model of IFCN (see next sub-chapter). Combining

the quantitative data from the national statistic with economical outlooks from respectful research institutions a socioeconomic framework for 10 years was created in which to simulate variety of development strategies.

3.1.3. Hypotheses to Test

The current typical dairy farm (BG-34) can double its size and increase significantly its income while reducing the risk for the household while if the size is tripled, it will multiply the risk and make it even higher than it was.

The improvement of the financial and resource management is the key element necessary for the majority of dairy farms to step upon stable ground for future development.

3.2 IFCN method and documentation of the model TIPICAL

IFCN stands for International Farm Comparison Network. The IFCN is a world-wide association that is linking agriculture researchers, advisors and farmers, to create a better understanding of milk production world-wide (IFCN 2004)[25].

The aim of this sub-chapter is to introduce the IFCN method and TIPI-CAL model used in the thesis to analyse the Bulgarian typical dairy farms and project the development strategies for them. Typical farm models are established separately for each of the product lines within IFCN, e.g. for dairy, arable crops and beef. This does not mean that a typical farm can not be used for more than one IFCN product line, e.g. a typical dairy farm with fattening of its bull calves coming from the dairy herd.

A typical dairy farm represents a significant number of dairy farms in a region in terms of size, forage and crops grown, livestock systems, labor organization and production technology used, and has average management / performance ratio(Feuz and Skold 1991). The typical farm is “build” and “validated” based on panels (Farmers, advisors knowledge) and farm accounting statistics. Sustainable agricultural research is very holistic in nature and is not easily analyzed in a single component fashion. Case farms or typical farms are frequently used to analyze alternative farming practices on a whole-farm basis.

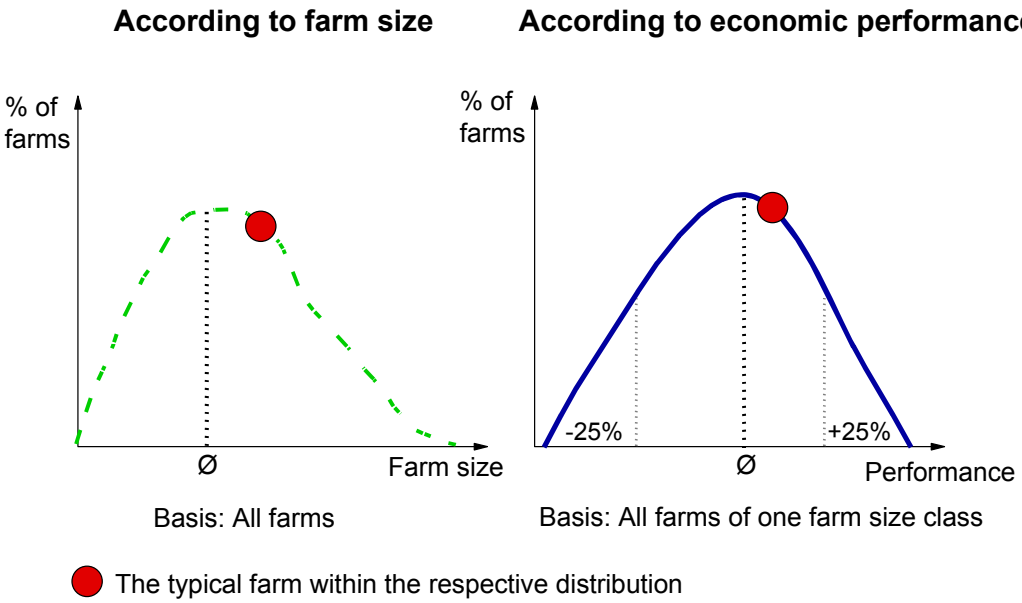
[25] In this sub-chapter where no other is stated the sours is IFCN handbook 2004

3.2.1. Setting up a 'typical' farm

3.2.1.1. Classifying the typical farms

IFCN does not aim to be representative in a statistical sense. However it is important to know which types of farms in a region are reflected in the typical farms. Therefore the size and the economic performance of each typical farm are confronted with the distribution of all farms in the region considered. This allows IFCN to show where the typical farms 'sit' on the distribution curve.

Figure 3-1: Classifying the typical farms according size and performance

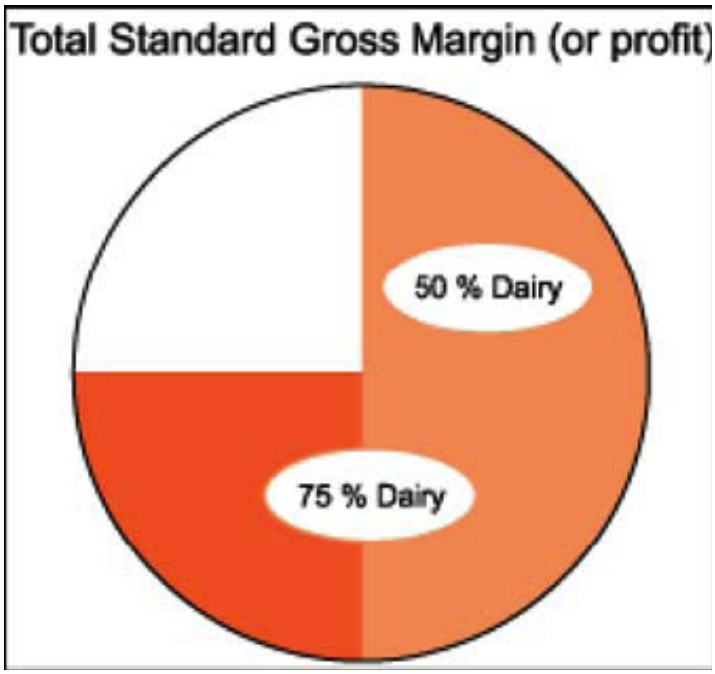


3.2.1.2. Selecting a 'typical' farm

Identification of regions for establishment of typical farms

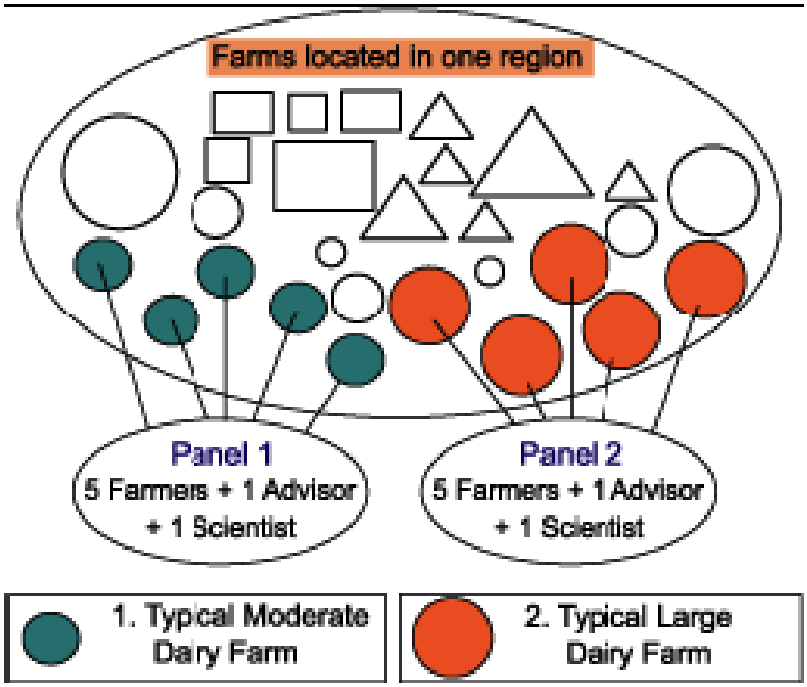
A typical dairy farm represents the dairy farms in a region in terms of size, crops grown, livestock systems, labour organisation and production technology used. For selection of typical farms, we first identify the region(s) in a country where milk production is most important in terms of volume of production and/or density of dairy cows.

Figure 3-2: Specialisation of a dairy farm



A dairy farm is defined as generating the majority of its income from selling milk, e.g. measured in percentage of total gross margin. The percentage of milk production in total gross margin should be at least 50%.

Figure 3-3: Selection of average and large farms



In each region and for each relevant farm type we intend to set up one average sized farm and one larger farm to represent

a) significant number of farms,

b) large amount of production in one area,

c) to capture economies of scale.

Size is the most important issue to characterise 'typical'. For dairy farms, it is measured in number of cows.

3.2.1.3. Data collection and validation

In the second step, experts with a solid knowledge of the local conditions are contacted, with access to regional accounting statistics and with good contacts to practical farming (e.g. technical advisors). With these experts the main structural characteristics of the typical farms to be established are discussed (e.g. type of farm, size of farm).

There are four ways of data collection and validation:

Panel approach

A panel (farmer, advisor and scientist) discuss the data, set up a 'typical' farm and agree on the results of the typical farm.

The creation of a panel starts with the search for farmers managing farms that are similar to the typical farm to be established. Once they have been identified, the farmers, the regional expert and the national IFCN co-ordinator, form the so-called 'panel'. The task of the panel is to establish the data base for the typical farm and to discuss farm level strategies for the projection of the farms (e.g. introduction of new technologies, adjustment to policy changes).

The concept of panels has proven successful in policy advice since the early 1980s in the USA. There, usually five farmers participate in a panel. In the early phase of IFCN, starting in 1995, this concept had been taken over exactly in order to use identical methods.

In the meantime, experience has shown that depending on the task of the analysis, panels of different sizes are more appropriate.

In most cases a 'pre-panel' is formed in the first step where the scientist, the regional expert and one farmer participate. The bases for the typical farm are the single farm data provided by the farmer and the advisor. These data are 'corrected' by particularities of individual years and other single-farm specific issues. The expert knowledge of the participants plays an important role in this procedure. This quick and low-cost approach is appropriate when a speedy collection of internationally harmonised data for many farms in many countries is in the focus of attention.

For in-depth analysis of typical farm adjustments to technological and political conditions, a full panel is formed in the second step, with participation by approximately five farmers. The full panel

has the advantage that the data, the options of farm level adjustments and the results of the scientific analysis can be discussed to a broad extent.

Statistical approach only

The data are taken mainly from accounting statistics and are discussed among dairy experts to create a typical farm.

Single farm approach only

The data are taken mainly from a single farm and are discussed among dairy experts to create a typical farm.

Single farm case

The data are taken from a single farm. The data represent this single case rather than a type of dairy farm in the region.

3.2.2. IFCN standard calculation methods

The description of the IFCN standard calculation methods will focus here on the following ones:

- Profit and loss account and entrepreneur's profit
- Cost allocation to the dairy enterprise
- Cost of milk production only

First the profit and loss account as well as the entrepreneur's profit is calculated for the whole farm. In a second step the returns and the costs will be allocated to the dairy enterprise so that it will be possible to calculate the same results just for the dairy enterprise. In a third step the returns and costs for the milk production only will be separated.

The returns and costs of the dairy enterprise as well as the costs of milk production only are the base for the cost comparison within the IFCN.

3.2.2.1. Profit and loss account and entrepreneur's profit

The profit and loss accounts as well as the entrepreneur's profit are calculated as follows:

1. Net Cash Farm Income	**2. NCFI to profits**
Total returns	= Net cash farm income
Crop and forage production	- Depreciation
Dairy returns	+/- Inventory changes
Returns from other enterprises	+/- Capital gains / losses
Subsidies	**= Farm Income**
Total expenditure	
Crop and forage variable expenses	- Opportunity costs
Dairy variable expenses	
Expenses for other enterprises	Calculated interest for own capital
Fixed expenses	Calculated costs for own land
Labour expenses	Calculated wages for family labour
Land expenses	
Interests paid	**= Entrepreneur's profit**
= Net Cash Farm Income (NCFI)	

3.2.2.2. Cost allocation to the dairy enterprise

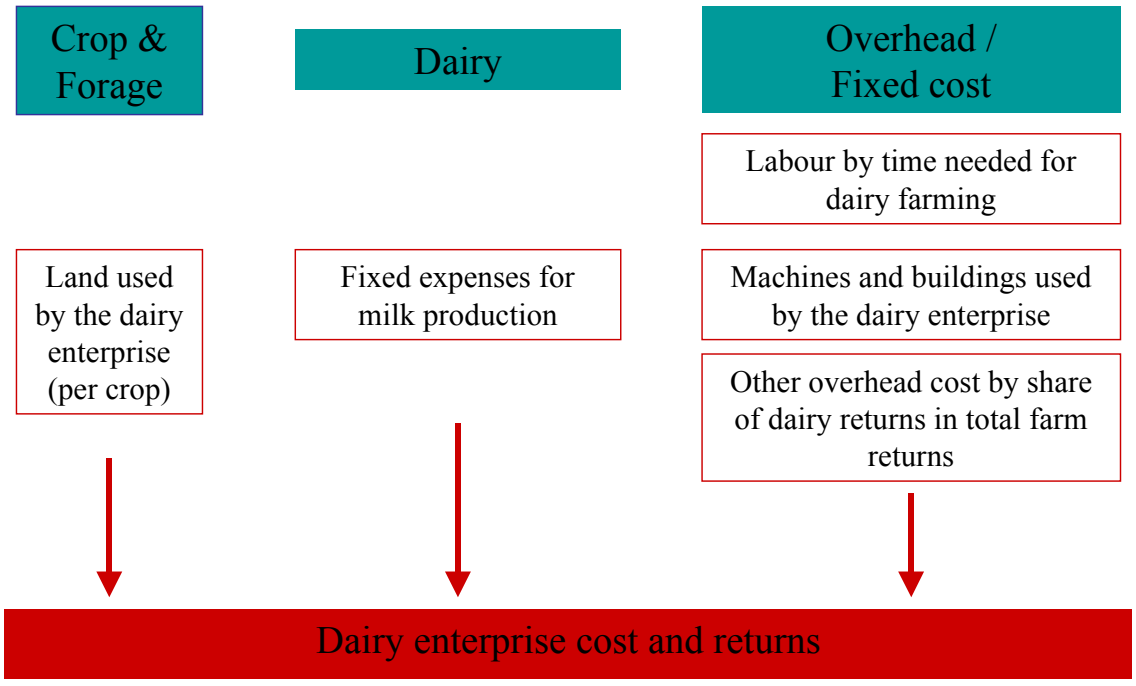
The aim of the cost allocation is to separate costs for the dairy enterprise from the whole farm to allow a comparison of milk production costs between farms and countries. The costs are expressed since 2003 on the basis of 100 kg ECM (energy corrected milk).

The cost allocation is based on the dairy enterprise that consists of the following elements:

- Milk production,
- Raising of replacement heifers,
- Forage production and feed purchased for dairy herd and its followers.

The procedure of the cost allocation from the whole farm to the dairy enterprise can be seen in the following figure

Figure 3-4: Allocation of whole farm data to the dairy enterprise



The costs which can not be directly allocated to the dairy herd have to be allocated with a specific factor. The forage production is allocated by the land used for the dairy enterprise. The machinery and buildings are also separated by their use. The labour is allocated by the time used for the dairy farming. The overhead costs whereas are associated by the share of dairy returns on whole farm returns.

The advantage of this approach is the relatively low input of time and work (done by the IFCN team Braunschweig). Open stays the question of accuracy in the allocation of costs as well as the problem that with increasing / decreasing returns also the cost of the dairy enterprise will do so.

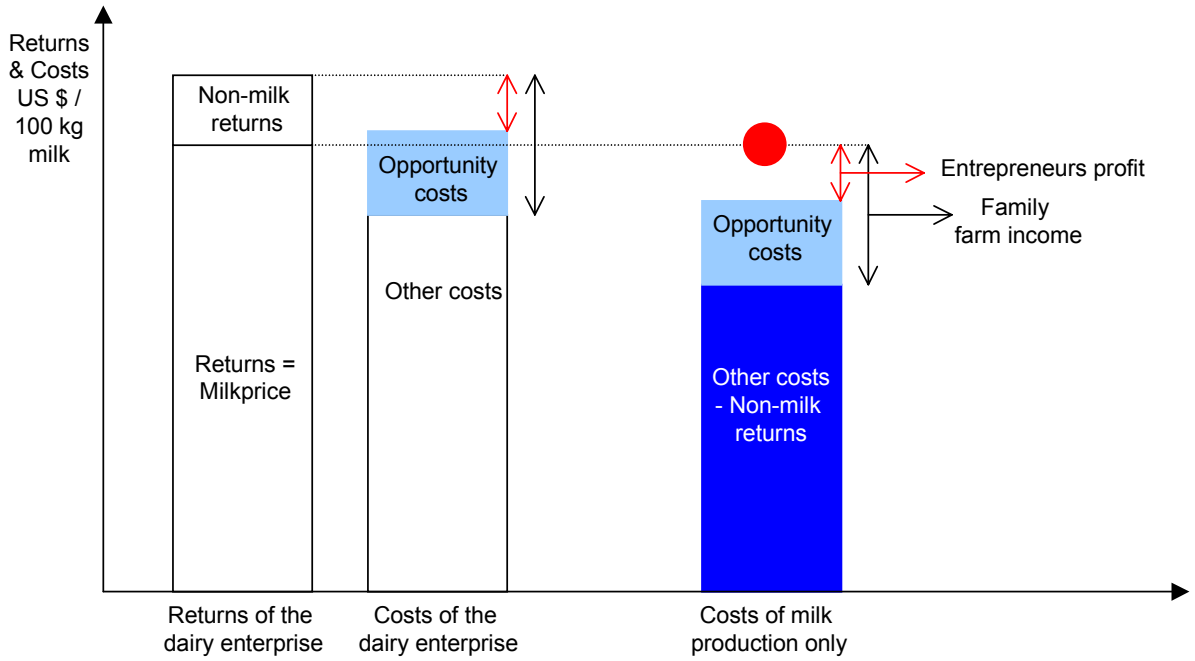
3.2.2.3. Cost of milk production only

The products of the dairy enterprise can be milk, breeding heifers and cull animals. So the costs of the dairy enterprise calculated till this point includes also the production of 'non-milk products' (heifers, cull animals). To make a world-wide comparison of the 'costs of milk production only' possible the following method has been developed.

Method used

The total costs of the dairy enterprise are related to the total returns of the dairy enter-prise including milk and non-milk returns (cattle returns and direct payments). Therefore the non-milk returns have to be subtracted from the total costs to show a cost bar that can be compared with the milk price. The method is based on the assumption that the non-milk returns equal the 'non-milk' costs. This figure explains the method.

Figure 3-5: The method for the calculation of costs of milk production only



3.2.3. Documentation of the model

TIPI-CAL is the abbreviation of **T**echnology **I**mpact and **P**olicy **I**mpact **C**alculations.

TIPI-CAL is a European further development of the FLIPSIM model (Farm Level Income Policy Simulation Model), operated by the Agriculture and Food Policy Centre AFPC, Texas A&M University, USA.

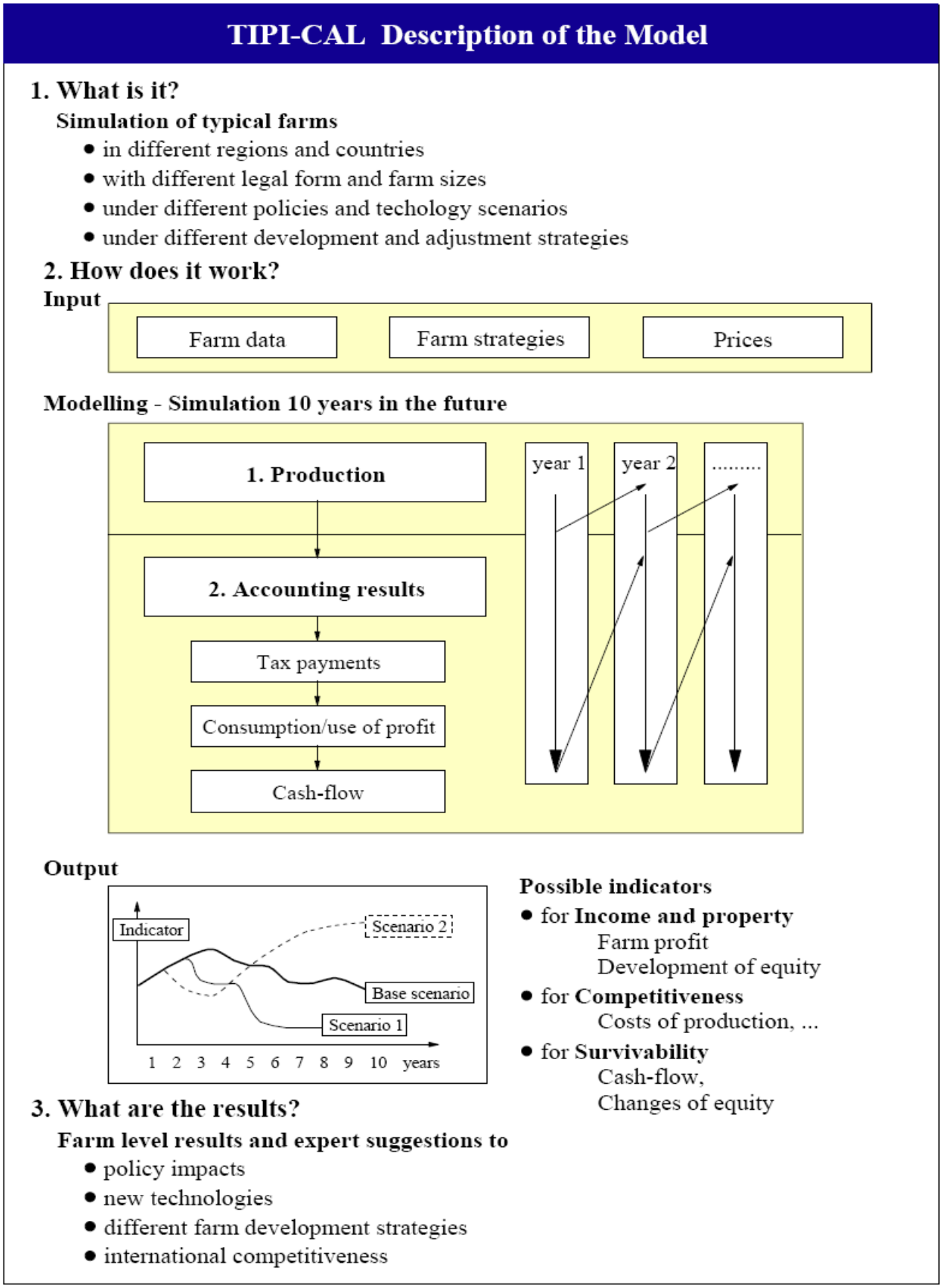
TIPI-CAL is a farm-level, 10-years, recursive production and accounting model. At present, the dairy enterprise including forage production as well as the arable enterprise and organic farming are covered by the model.

Differences between FLIPSIM and TIPI-CAL are:

TIPI-CAL	FLIPSIM
EXEL	FORTRAN
Deterministic - Multi-lingual	Stochastic - Mono-lingual
Focus on farm level strategies	Focus on policy analysis and baseline
At present dairy, arable, beef and hog	Dairy, arable, beef, pig, poultry
Double bookkeeping	
Cost of production modules	

With TIPI-CAL, in the first step of the modelling, the physical production activities of each enterprise are simulated. After that, a full account comprising a balance sheet, a profit and loss account and a cash flow statement is produced for each year of simulation. Based on the account taxes and the drawings from the agricultural enterprise are calculated. The final values of the present year represent the start values of the subsequent year (see Figure 3.6).

Figure 3-6: Simulation with TIPI-CAL



3.2.3.1. Option and applications of TIPI-CAL

TIPI-CAL has been created to be used as general farm-level simulation model. In the following it's options and possible adaptations are demonstrated as well as the combination of them used in the thesis.

General options

TIPI-CAL can be applied world-wide; in principle 230 languages can be used. Various legal forms (family farm, co-operation with 4 partners, co-operatives, stock companies and corporations) and farm types (arable farms/ forage farms, dairy farms with/without own replacement and beef production specialisation) could be simulated.

As a supplement of the four general enterprises support by the model a simulation of off-farm activities is possible:

- Simulation of non detailed enterprises such as horse keeping
- Simulation of off-farm activities such as rent of real estate - in case of Bulgarian typical 22 cow farm (BG22) for 2004 and 2005 it is milk collecting form the small farm nearby.
- Simulation of additional off-farm labour income of the farm owner – for BG22 it is used for the income of the farmers' wife works outside the farm for average annual salary
- Simulation fro additional tax free income such as payment for children - in case of BG typical farm it is retirement payment of the grant parents who are part of the family
- Simulation of capital outflow (e.g. Heritage payments to family members)
- Simulation of capital inflow (e.g. Heritage)

The method of calculating the private drawings and taxes are also determined in the general options. Private drawings could be calculated as fix amount or by function and can be adjusted (or not) to the inflation. There are various options to select a basis for private drawings (net cash income, profit, income before tax, income after tax) and for BG typical farms it is used the total farm income after tax while keeping in mind that the agriculture producer are not paying any income taxes.

VAT and sales tax could be set up as flat rate or opting, delimitation of farm and enterprise taxes as well as individual taxes for partners are available together with general tax module for individual tax functions.

Farm strategy options

Arable and forage production could be defined in up to 20 different crops and related production methods. The variable cost could be split in up to 8 positions per crop with possibility for adjustment of special intensities (cost, yields) per year. The land management (rent/purchase) strategy and yearly changing of the cropping pattern is achievable.

The milk production is described with the growth (increase of cow numbers, purchase/rent quota), percentage of replacement heifers and adjustment of variable cost and milk yield during the simulation. There are 14 positions for variable cost per cow and 5 per kilogram milk complement with 5 fix cost position for the dairy enterprise. Feeding is described with 4 rations for lactating cows, 2 for dry cows and 8 rations for young stock.

For machinery, buildings and quotas it is possible to set a replacement options at the end of the lifetime (sold and replaced, kept and not replaced, sold and not replaced) and/or make new investment during the simulation. Up to 100 machines, 20 buildings and 20 purchases of quota could be used in the model.

Fix or variable interest rate could be used for the Loans calculation. Up to 10 different existing loans with different periods and interest rates could be calculated together with simulation of one exogenously inserted new loan. The model endogenous uptake loans in case of capital deficit.

The model is using linear depreciation and balancing at purchase price or replacement value (with or without salvage value).

Policy options

Arable and forage production policy could be described with the help of different set-aside rates for 20 crops and penalty set-aside. Production quota and CAP-payments for each crop, compensation payments for agro-environmental schemes and less favoured areas and others could be used to define a policy. For the milk it is possible do set up different quota regulation, reductions and set-aside of quota. Direct payments could be given per: kg. milk, kg. quota, cow, kg. reduced quota, kg. set-aside quota, farm and limitation per farm.

3.2.3.2. Assumptions for the modelling

The following assumptions form the basis for farm simulation with TIPI-CAL.

1. Assumptions on the periods

- Production Year = Harvest Year = Sales-/ Feed Year
- Simplified definition of economic periods: no storage of inputs and outputs, no credits or liabilities on deliveries and services at the end of the accounting year.
- Investments for replacement are simulated in the middle of the year. Thus, they are used and depreciated at a full rate in the year of purchase.
- Liquidity is calculated at the beginning, middle and end of the year.

Financial or calendar year?

The temporal delimitation for the farms is the calendar year. That means the time period from January to December.

The financial year is not taken because the production period and therefore also the exchange rate used varies between countries. And therefore the comparison between countries becomes

more difficult or is even not realisable. The base for the INP data has to be and it is set to calendar data.

While most of the farm activities can be determined exogenously, the following are automatically simulated:

2. Investments in replacement of machinery and buildings

The purchase year, the lifetime, the current replacement value and the code of replacement (yes/no) are entered into the model. Based on this information, machinery and buildings are replaced. For this purpose, the replacement values are projected with the relevant machinery and buildings price index.

3. Balancing feed supply (forage and grain) and demand (livestock)

Feed supply and demand are balanced by purchase of feed in case of feed deficit and sale of feed in case of surplus.

4. Purchase and sale of heifers

Heifer deficit or surplus resulting from the herd simulation is balanced by purchasing or selling heifers.

5. Operating loans & interest for savings

Liquidity is calculated at begin, mid and end of the year. Between these, the model interpolates linearly and the time periods of positive and negative cash are calculated. Positive cash results in interest for savings whereas negative cash results in interest payments for circulating capital.

6. Raising of loans in case of cash deficits

In case of cash deficits at the end of the accounting year, the model automatically takes loans. First, long term loans are taken at the amount required for investments in long term assets (buildings, land). If there remains a cash deficit, a mid-term loan at the amount required for mid-term assets (machinery, quota) is taken. After that a short-term loan is taken. The classification of loans into long-, mid- and short-term can be done exogenously. A classification into 20 years (long-term), 8 years (mid-term) and 3 years (short-term) has proven to be appropriate.

7. Capital outflow/drawings

The capital outflow/ drawings are determined by the farm income situation and the function chosen for drawings[26].

8. Taxes

Tax payments are determined by the income situation, tax relief and the national tax functions.

[26] See **private drawings and taxes** in section 4.2.3.4 INCOME module: Income and Family Living

3.2.3.3. Model input

The model input consists of two parts: Part 1 comprises all farm level data (status quo and strategies for development); Part 2 holds projections of prices, yields and inflation rates for the 10-years simulation period. For each country and each policy a separate projection is prepared. This projection of the economic framework data is then applied to all farms in a country.

Part 1 Farm level data and strategies (INP)

The input section for farm level data and strategies is structured in a way that almost all variables can be modified in each year of simulation. This ensures a high degree of flexibility for simulation of policy changes and farm level adjustments. The input section has 12 columns and 3.100 lines comprising a total of ca. 20.000 exogenous variables. It is divided into 3 segments, changes and extension possible.

Structure of the input section – INP:

I Option and data
1. General Options
2. Accounting Options
3. Family Living - Options & Data
4. Off-Farm Activities
5. Tax Options & Data

II General Farm Data
1. Whole Farm Policy Data
2. Other Farm-Income
3. Land Data
4. Labour Data
5. Capital Data
6. Input Fixed Expenses
7. Input Machinery
8. Input Buildings
9. Input Other
10. Feed for All Enterprises

III Data for the enterprises
III-1 Crop Enterprise
1. Crop Policy Options, Links
2. Crop Policy Data and Options
3. CROP MIX - Planted ha
4. Crop Yield in Fresh Matter
5. Crop Output Prices
6. Crop Variable Costs per ha
7. Fertiliser Input and Prices
8. Value Field Inventory

III-2 Dairy Enterprise
1. Policy Options and Data
2. Herd
3. Yield Figures
4. Herd Management Data
5. Variable and Fixed Expenses
6. Prices
7. Livestock Valuation
8. Allocation figures for Dairy
9. Dairy Feed Input Data

III-6 Beef Fattening Enterprise
1. Policy Options and Data
2. Herd
3. Yield Figures
4. Herd Management Data
5. Variable and Fixed Expenses
6. Prices
7. Livestock Valuation
8. Allocation figures for Beef
9. Dairy Feed Input Data

In part I ‘option and data’ general calculating options for the model can be switched on or off. This includes for example the depreciation and tax. The adjustments are defined by the IFCN standard methods.

In part II ‘general farm data’ has to be inserted. That means whole farm relevant data like land, labour, capital, input machinery/buildings, fixed costs of the whole farm and other.

In part III ‘crop or dairy’ the variables belonging to the different enterprises have to be filled in.

The detailed list of the input variables and their values of all the farms analysed in this study is available on request, hire only some major cases will be discussed.

Governmental payments / Subsidies

All cash transfers from the government to the dairy farms such as acreage payments, payments per kg milk, payments per cow, fuel subsidy, social payments and special regional programs that are received by the farm are meant.

If a farm gets governmental payments or subsidies they will be divided in three categories:

- Whole farm payments - The payments which belong to the whole farm (e.g. less favoured area payments, fuel subsidy, beef payments for cull heifers).
- Crop related payments - The direct payments or other payments per crop in ha per year have to be filled in this category.
- Dairy related payments - In here the cow payments or milk payments have to be inserted.

When farmer gets investment aid, e.g. when he builds new barns, the total sum of the investment (investment done by the farmer + investment aid) will be inserted in the building list. The sum of the investment aid will also be inserted with a negative value into this list. With this method we still have the original cost of the investment but also deducted the investment aid in the depreciation.

Opportunity costs = Costs for using own production factors (land owned, family labour input, equity).

The estimation of the opportunity costs must be considered carefully because the potential income of own factors in alternative uses is difficult to determine. In the short run, the use of own production factors on a family farm can provide flexibility in the case of low returns when the family can chose to forgo income. However, in the long run opportunity costs must be considered because the potential successors of the farmer will, in most cases, make a decision on the alternative use of own production factors, in particular their own labour input, before taking over the farm. To indicate the effects of opportunity costs in the model, they are separated from the other costs in most of the figures.

Labour costs

For hired labour, cash labour costs currently incurred is used. For unpaid family labour, the average wage rate per hour for a qualified full-time worker in the respective region is used.

The volume of labour input is calculated in Annual work units (AWU). This indicator must not be considered identical to the number of employed in agriculture. According to the EU definition one AWU is equal to the hours work by a person employed on a full-time basis during the whole year.

Full time work in IFCN model is calculated as 2100 hours per year, which is equivalent of about 8 hours per day, 21 days per month and 12 months per year. Therefore "one labour unit" quotation from outputs of the TIPICAL, throughout the thesis, is the 2100 hours annual work time. While IFCN use 2100 hours as Labour Unit, in Bulgaria it is adopted that 1 AWU is equal to 1856 working hours during the year or 232 man-days.

Land costs

For rented land, rents currently paid by the farmers are used. Regional rent prices provided by the farmers are used for owned land[27].

Capital costs

Own capital is defined as assets, without land and quota, plus circulating capital. For borrowed funds, a real interest rate of 6 percent is used in all countries; for owner's capital, the real interest rate is assumed to be 3 percent. This reflects the method of »capital using costs« developed by Isermeyer 1989 (Produktionsstrukturen, Produktionskosten und Wettbewerbsstellung der Milchproduktion in Nordamerika, Neuseeland und der EG. Wissenschaftsverlag Vauk, Kiel).

Quota costs

Rent values are used for rented or leased quota. Opportunity costs for own quota (given and purchased) are calculated by multiplying the market value of the total own quota by 3 %.

Depreciation

Machinery and buildings are depreciated using a straight line schedule on purchase prices with a residual value of zero.

Adjustments of energy content

Since 2003 all cost components and forage requirements are established to produce ECM (energy corrected milk with 4.0 % fat, 3.3 % protein). Before it was used FCM (fat corrected milk with 4 % fat). By using ECM (energy corrected milk) the protein content will be deduct as well.

Adjustment of milk FCM (4 % fat)

The milk output per farm is adjusted to 4 % fat. Formula:

FCM milk = (milk production * fat in %*0.15) + (milk production*0.4).

Adjustments of milk ECM (4 % fat, 3.3 % protein)

The milk output per farm will be adjusted to the energy content. Formula:

ECM milk = (milk production*0.383* fat in % + milk production*0.242* protein in % + 0.7832* milk production) / 3.1138

[27] In those countries with limited rental markets (like NZ), the land market value is capitalised at 4 percent annual interest to obtain a theoretical rent price.

Adjustment of VAT

All cost components and returns are stated without value added tax (VAT).

Part 2 Projection of prices, yields and inflation rates

The input data of part 2 is country- and policy specific. The input section of this part is structured in a similar way as part 1 (12 columns, 1500 lines, 10.000 exogenous variables). It is structured as follows:

A Tax Data - Country Specific
Germany, USA, Netherland, Italy, France, United Kingdom, Austria, Denmark, Hungary, other countries foreseen.

B Whole-Farm Prices +Costs: Indices and Absolute Changes
1. General Inflation
2. Land Prices
3. Labour Prices
4. Capital Prices
5. Fixed Expenses Index
6. Machinery Prices (used +new)
7. Building Prices (old + new)
8. Feed Prices
9. Value Added Tax for section B

C Crop Enterprise
1. Crop Yields
2. Output Prices (Index + absolute)
3. Fertiliser Input Prices (Index + absolute)
4. Variable Production Costs / ha
5. Value Added Tax for section C

D Dairy Enterprise
1. Milk yields (Index + absolute)
2. Milk Prices (Index + absolute)
3. Quota Prices (Index + absolute)
4. Beef Prices (Index + absolute)
5. Livestock Prices (Index + absolute)
6. Variable Costs / cow / kg milk
7. Value Added Tax for section D

B Beef Fattening Enterprise
1. Beef yields (Index + absolute)
2. Beef Prices (Index + absolute)
3. Livestock Prices (Index + absolute)
4. Variable Costs / head / kg beef
5. Value Added Tax for section B

In this part the “national projection” is simulated (point B1 form the list above) where all the mentioned variables could be given with formulas, index or fixed (absolute) values, depending on the intensity of the analysis.

In the general case (and as it is used for this analysis) the national projection is calculated on the basis of the general inflation forecast[28]. Then assumption on the deviation of factor-output and factor-input towards the general inflation is made and with the help of this factor and index is calculated (see Table 3.1). This index is the “Percentage Change from Previous Year” used to simulate all the input and output variables which are not explicitly (with absolute values or other formulas) given.

Table 3-1 Nation Creator

		2006	2007	2008	2009	2010	>>	2015	
Inflation general	0,0x	**0,061**	**0,056**	**0,043**	0,027	0,027	>>	0,023	
	Index	100	106	110	113	116	>>	137	
								Factor-Output	
Inflation Output price	0,0x	0,00	0,053	0,041	0,025	0,025	>>	0,022	**0,946**
	Index	100	105	110	112	115	>>	135	
								Factor-Input	
Inflation Input price	0,0x	0,0	0,064	0,050	0,031	0,031	>>	0,027	**1,153**
	Index	100	106	112	115	119	>>	144	

For this analysis the factor 0,946 for the output price is used which gives and average increase of 3,9% per year for all the output prices (milk, calves, crops sells) and 1,153 factor input price which gives 4,9% average annual increase for all the input prices (labour, capital, land, services and other)[29].

The last point in each section a separated field for VAT is designated which gives the opportunity to work with individual VAT values for different variables.

[28] GDP Deflator Growth Projections (from FAPRI) - International Financial Statistics January 2006 and projections after 2005 are from Global Insight (formerly DRI-WEFA)

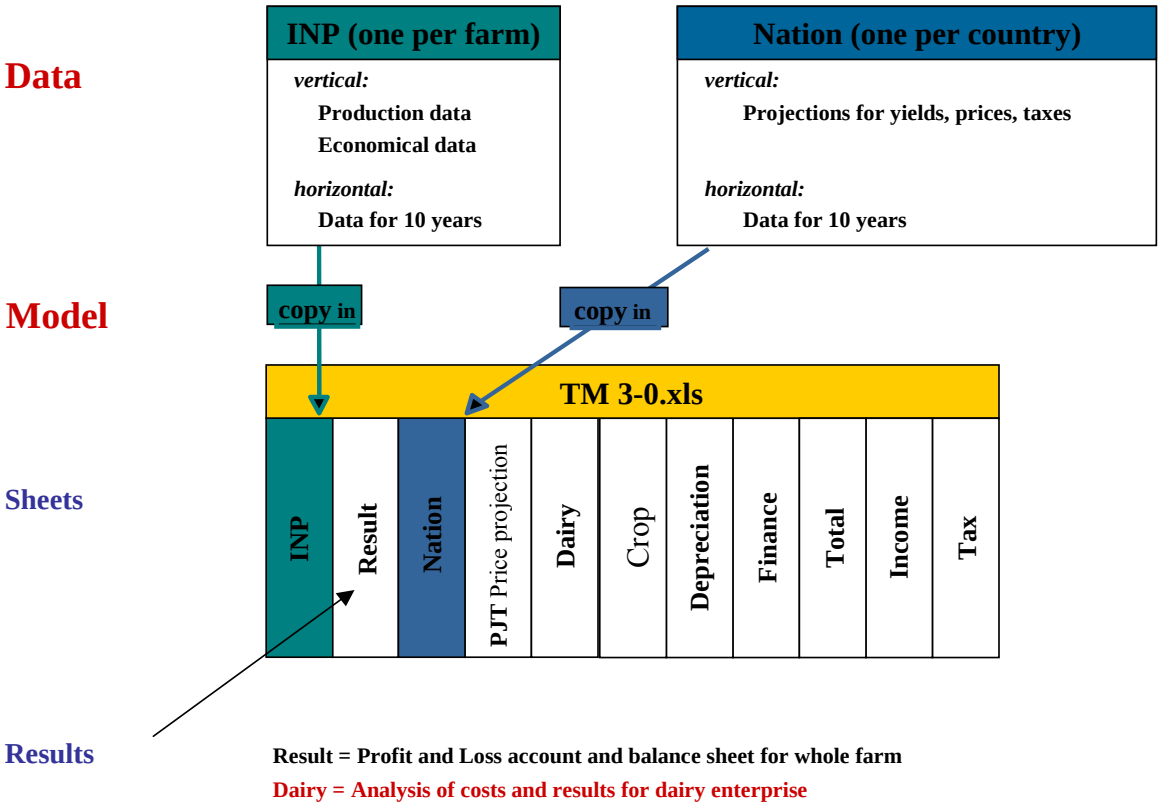
[29] See 5.3. Projection for more detailed on price projections assumptions

3.2.3.4. Steps for simulation of the farm data (modules)

The model has a modular structure: Calculation is done in several independent steps that build on each other. Every module is equivalent to one EXCEL sheet. A more detailed description of the calculation procedures can be obtained upon request from the author or IFCN headquarters.

The structure of the TIPI-CAL model is described in the following figure

Figure 3-7: Structure of TIPI-CAL



- P-PJT module: Farm level price, cost and yield projections for 10 years

Farm level prices, cost and yields are calculated according to the prevent changes of the national projections (% and absolute)[30].

There are three standard options to be used for projection called Projection code (1-3):

1= value first year * nation-projection,

2= use values year 2-10 * nation projection,

3= use values year 2-10 as specified in INP

where “national projections” is the percentage change from previous year (cumulative % change), calculated on the basis of the general inflation multiply by input/output factor.

[30] See **3.2.3.3 Model input** Part2

- D, C, B modules: The production methods (dairy, arable, and beef)

The simulation is done in the following steps:

- Policy impact on production (e.g. cropping pattern, purchase, no. of cow at quota system)
- Herd simulation[31] in livestock production (e.g. calves born alive, sale, purchase movement of livestock in the enterprise)
- Calculation of physical output and input (e.g. cereal production, milk production, beef production, feed requirements, no. of heifers)
- Calculation of returns and expenses (e.g. receipts for cereals, milk, beef, sale of livestock; expenses for seed, purchase of livestock)
- Valuation of the enterprise-specific assets and recognition of inventory changes (e.g. livestock)

- TRANS module: Transformation Feed

In this module the balance of home-grown feed is done. Therefore the "home-grown feed production - feed requirements of all livestock enterprises" is calculated. If the balance is negative additional feed has to be bought. If the balance is positive a surplus can be sold.

- DEP module: Machinery - Building – Quota

Assets are inserted and calculated separately (up to 100 machines, 20 buildings, 20 quotas):

- Depreciation
- Replacement and sale of written off assets at market prices at the end of their economic lifetime
- Calculation of capital gains and losses
- Valuation of assets at book and market values

Allocation figure for different groups of machinery is calculated (1=all enterprises, 2=crop and forage, 3=livestock general 4= Crops only, 5= Forage only, 6=Dairy only, etc). These figures will be generated out of the allocations code specified in the machinery and Building list.

- FIN module: Financing

[31] For more detailed information on herd simulation see Hemme at all 2000

Loans are simulated in terms of interest paid and principal. Both, annuity and repayment loans with fix or variable interest can be simulated. The requirements for circulating capital are calculated. According to the financial capacity of the farm, loans for circulating capital or interest for savings are calculated. In case of financial deficits at the end of the accounting year (e.g. due to large investments) new loans are calculated automatically.

The following types of loans can be calculated simultaneously:

- Up to 10 different old loans
- Exogenously inserted new loans during the simulation period (1 loan per year)
- Long term, midterm and short term, automatically calculated loans (3 loans per year)

The cash-flow situation of the farms has a strong impact on the financial calculations. For this reason, financing and cash-flow are calculated in the same module.

- TOTAL module: Receipts, expenses, assets valuation, opportunity costs, VAT Balance

Receipts and Expenses : In the first step wages, rent and overhead costs of the farm (melioration, insurances, general repairs and maintenance) are calculated. Furthermore, receipts and expenses of the enterprises as well as interest payments (taken from No. 4) and depreciation (taken from No. 3) is added. The result is a farm level profit and loss account.

Drawings, deposits, investments and principal: In another step a receipt and expense statement is produced covering drawings and deposits, investments and principal.

Other income sources: In addition to the farm enterprises, further income sources of the farm can be taken into account. Rental income, stocks, shares, off-farm income and other farm enterprises (e.g. alternative energy sources) are such income sources. For this purpose, gross margins, profit or income from these sources are inserted in the model.

Income calculation: Finally, the total income of the enterprise and the participating families/partners is calculated.

Assets valuation: In the first step, book values for assets, livestock and circulating capital are summarised, thus creating a balance sheet. After deduction of all liabilities one obtains the farm equity at book values.

Many policy changes have a direct influence on the pecuniary status of the farm.

- Removal of milk quotas – loss of quota assets
- Reduction of price support levels in crop farming – decrease of land values
- Reduction of beef price support – decrease of livestock values.

Changes of this kind are not reflected in a balance sheet at book values because, for the purpose of balance continuity, constant valuation is applied. Therefore, a balance sheet at market values is created in addition. After deduction of liabilities one obtains the equity at market values which can comprise so called „passive reserves“(difference between market values and book values).

The capital value of the cows is used for the calculation of assets as well as for the detection of changes in inventory. It is calculated as follows:

- Cows: 20 % heifer price + 80 % cull cow price
- Breeding bull: 80 % of breeding bull price (livestock)
- Calves 0 – x months: average price for female/male calves
- Heifers x – 12 months: 30 % > 24 month price
- Heifers 12 – 24 months: 70 % > 24 month price
- Heifers > 24 months: 80 % of heifer market price

Opportunity costs: For the whole farm the opportunity costs for labour, land, capital and quotas are calculated. These figures can be used for cost of production analysis. This calculation does not affect the internal simulation procedures.

VAT Balance: Farms that do not declare VAT receipts and expenses to tax department will have a VAT balance that can be positive or negative. This balance is calculated here.

- INCOME module: Income and Family Living

The family living expenditure is defined as the amount of money the family of the farmer needs for living (for its nutrition, clothes, housing, car for private use, etc). Additionally, private insurance and retirement payments for the parents (older generation on the farm) are also considered and are inserted as extra points.

Each farm operator/ owner draws funds for private living expenses out of the enterprise. Assessing the amounts of drawings is difficult. Therefore, the model provides different options for specifying private drawings:

- Using a fix figure for living expenses (exogenous)
- Using a function with a minimum level of living expenses (min-function)
- Using a function with a minimum and maximum level of living expenses (Min-Max function)

To reflect increases in living expenses, all functions can be inflated with the annual Consumer Price Index. The model can cope with co-operations of up to 4 partners. For each partner and his/her family drawings and taxes are calculated separately.

Fix Family Living = fix consumption1 year * (update code (0/1) *CPI change)

Minimum Family Living = min consumption year 1 * (Update code (0/1)*CPI)

Maximum Family Living = max Family Living year 1 * (Update code (0/1)*CPI)

where “update code (0/1)” defines adjustment or not to the CPI

Using a function for determining the amount of living expenses requires the choice of the indicator the function refers to. The following indicators are available in the model:

- Net cash farm income of the farm
- Profit of the farm
- Total income of the family/partners before tax
- Total income of the family/partners after tax

In this analysis the following option is used:

Basis for Family Living = (Total farm income - farm taxes)* % of profits + taxable income partner + non taxable income partner+ interest on accumulated off-farm capital)

where "% of profits" is the share of total farm profit used among the partners, when there is no partners (as in BG typical farms) it is not relevant

- TAX: Farm taxes and private taxes

In the first step the total income of the farm (co-operation) and the up to 4 partners is calculated for each year of simulation based on:

- Share of profit of the farm
- Share in other income of the farm
- Other income of the partners

Other income can be separated into tax exempt and taxable income. In the next step the farm taxes and/or private taxes are calculated. In order to reflect the possibilities of many farms to flatten out the profit over the years, the tax function can not only use the profit of one specific year but also a 3 years rolling average as a basis for tax calculation.

3.3 Data availability and data collection

Several sources of data are used in this study, from national statistic, from field data collecting and from panel with experts, farmers and scientist. The data collecting was carried out in summer of 2005 and validate in 2006 and 2007.

One of the problems during the transition period was also dramatic disturbance in supply with reliable data for agriculture sector at all. The reasons for that are many, from financial paralysis of the institutions to disagreement about the methodology for data collecting. In 2001-2002 at last, agreement between National Statistical Institute and Ministry of Agriculture, delegate the responsibility for acquiring data for the sector in the hands of MAF department Agro statistic. Unfortunately[32] it takes few more years till the data of so-called "national statistic" become once more reliable.

The last census on livestock was carried out by the 1st of January 1995[33]. The process of restoration of agricultural land property, achieved by the end of the year 2000, lead to important structural changes in Bulgarian agriculture. On the other hand the preparation of Bulgaria for joining the EU involved the harmonization of methods and practices in the field of agricultural statistics. The need of obtaining data on the number and structure of the agricultural holdings (size, type, production means used etc.) in Bulgaria comparable with the data of EU member states caused methodological changes of agricultural census which object became the agricultural holding.

The Food and Agriculture Organization (FAO) and the European Union recommended worldwide the agricultural censuses in the countries to be carried out in the year 2000. Bulgaria carried out a sample farm structure survey instead of a full census because by year 2000 the process of land reform was not accomplished yet.

During the second half of the year 2003, the Ministry of Agriculture and forestry carried out the first agricultural census in Bulgaria in compliance with the EU legislation – Council Regulation 571/88/EEC and its further amendments. The same characteristics were surveyed in Bulgaria and in the EU member states, which carried out sample farm structure surveys in 2003. This ensures a high level of data comparability between countries[34].

The aggregate result of the census was published in June 2005 in 9 bulletins of "Agrostatistics Directorate"[35] from №69 to №77.

The results from FSS 2003 are the base for the sample Farm Structure Survey conducted in the autumn of 2005. According to the EU legislation in 2007 another sample survey will be carried out and the next agricultural census is foreseen to be conducted in 2010.

[32] In 2000 three independent sources of data for agriculture sector were exist – NSI, Information system department of MAF and the predecessor of Agro statistic department of MAF – the former project BANCIK - area frame sampling survey about land cover and land use.
[33] The information is provided by the NSI
[34] Agricultural census in Bulgaria 2003 results, Sofia 2005, MAF Bulgaria
[35] It is all the same department Agro statistic of MFA of Bulgaria

40 000 out of 665 548 agricultural holdings surveyed in 2003 are included in the sample for the Farm Structure Survey in 2005. They were selected randomly. Detailed methodological information of the survey can be found in Methodological Explanation section of the MAF publication of the results from FSS-2005(MAF 2006).

Based on the act for registration of agricultural producers, a questionnaire is filled out each year when the pre-registration of it is made, on its base annual bulletins are published about number of animal, livestock and crop production, milk processing etc. by the “Agrostatistics Directorate” on MAF web page.

3.3.1 The process of data collection

The plan for data collecting was based by the three steps method of IFCN.

In the first step, the regions and locations which are most important for the product considered (e.g., milk, beef, wheat, cane, soybeans) are identified. As a rule these will be the main areas of production, but in some cases they may be the regions with a particularly high potential for the expansion of production.

In the second step, experts are contacted with a sound knowledge of the local conditions, with access to regional accounting statistics and with good contacts to practical farming (e.g., technical advisors). With these experts, the main structural characteristics of the typical farms to be established are discussed (e.g., type of farm, size of farm). It is aimed to establish both a moderate and a large farm for each region.

The third step starts with the search for farmers managing farms that are similar to the typical farm. Once they have been identified, the farmers, the regional expert and the national IFCN coordinator form the so-called ‘panel’. The task of the panel is to establish the data-base for the typical farm and to discuss farm level strategies for the projection of the farms (e.g., introduction of new technologies, adjustment to policy changes).

Considering that, the steps of this data collecting was made as follows:

- defining the region and target groups (per size class) of farms to be investigated;
- initializing a pre-panel with experts, farmers and scientists to define a typical farms;
- making a survey for detailed data for a farms similar to the appointed to be a typical;
- and full panel for finally building and agreement on a typical farms.

Why typical farm? The “copyright” expression from various IFCN papers, concerning the question “why typical farm” is in form of a joke: “Imagine a foreign visitor who is asking you to recommend a typical meal of your region ... and you recommending a (statistical) average of the meals in your region.” To illustrate the advantages and disadvantages of the possible farm data sources short descriptions is given in the following tables.

Source	Advantage	Disadvantage
Individual farm data	Very realistic picture of one particular farm	Results obtained can not be generalised Too specific
Averages from statistics or existing surveys	Representative	Technologies used and economic results can not be linked Very difficult to make comparable on international level
Averages from own surveys	Good overview on farm situation	See above Very high time input
Typical farm models	Realistic picture of farming Good relation between time input and data quality Represents a significant number of farms in a region	Not representative in a statistical sense.

Conclusion: For the purpose of international and regional comparisons, the concept of typical farms appears to be the most appropriate data source. As there is no such data base on international level, IFCN establishes its own data base

3.3.1.1 Selection of a 'typical' farm

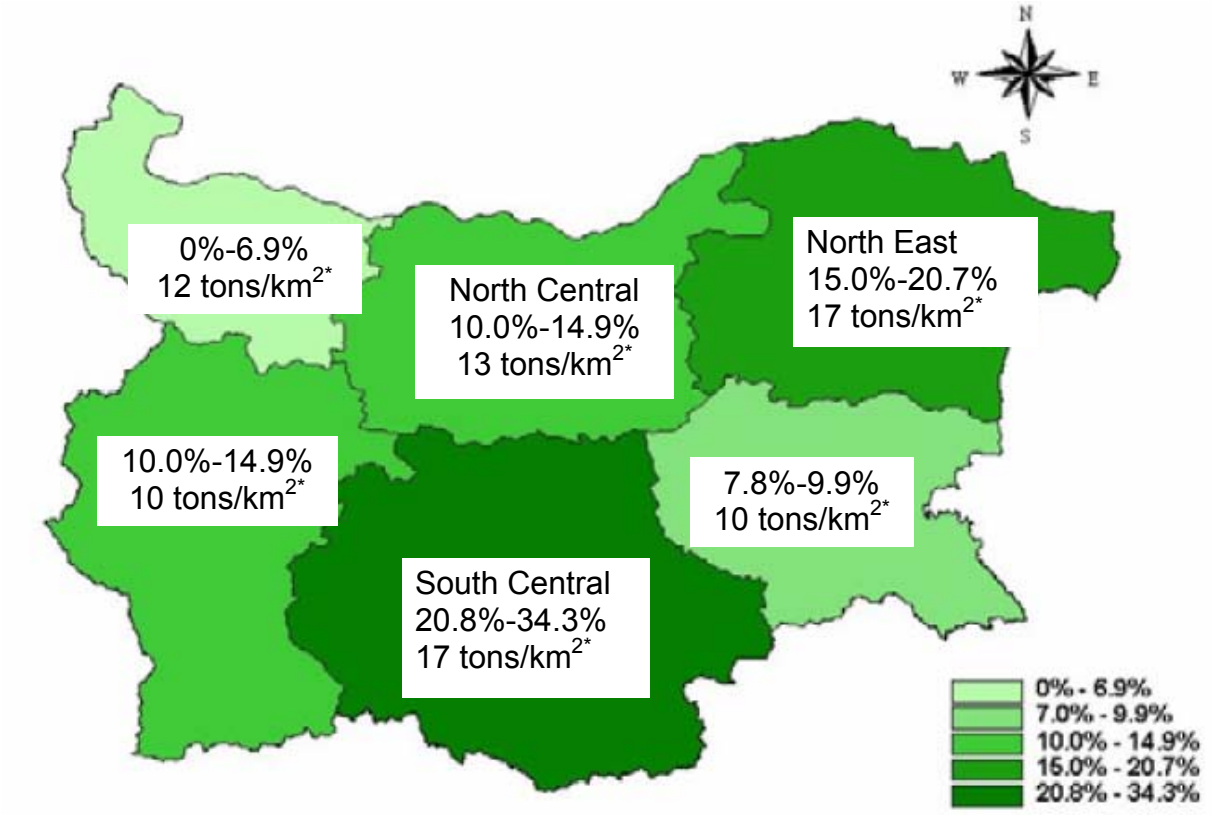
Identification of regions for establishment of typical farms

A typical dairy farm represents the dairy farms in a region in terms of size, crops grown, livestock systems, labour organisation and production technology used. For selection of typical farms, we first identify the region(s) in a country where milk production is most important in terms of volume of production and/or density of dairy cows. Below a discussion about region selection, is explaining a situation where the region with higher percentage of dairy cows is not the chosen one, because there is at least one more important agricultural production in it instead of dairy one.

With the "Low for rural development" from March 1999, the territory of the country is divided on 6 Planning regions.

A strongly developed agricultural sector in North East region is the region's major advantage, crop production in particular flourishing due to the favourable climate and the region's vast plains. Gross value added (GVA) from the region's agricultural sector to the national economy is second highest after the South-Central region (in 2002, it was equal to 21.8% of national GVA of the agricultural sector). Overall, the output from crop production has turned the region into the country's breadbasket.

Figure 3-8: Density of dairy cows in Bulgaria per planning regions



Source: MAF, Agrostatistics 2005

While the North-East region's climate is mainly influenced by the moderate continental belt, the climate in the region's eastern parts is mainly determined by the impact of the Black Sea. The low annual precipitation here, below 500 mm, has led to artificial irrigation of agricultural areas. The average annual temperature is around 11- 12(C, being higher along the Black Sea coast and in the areas close to the Danube River.

The region has limited water resources. As a result, a substantial part of the population in the Dobrudja plain and Ludogorie area are still subject to water rationing. Most of the region's water is supplied by the Kamchia, Batova and Danube Rivers. The Fishek, Ticha and Konevo artificial lakes, which are built on the Kamchia River, are very important for the regional economy. The rivers in Ludogorie and Dobrudja, used for household water supply, frequently dry up in the summer, but this shortage is compensated for by underground water deposits.

Black soil in the Ludogorie and Dobrudja plain is the most fertile soil in the region, and large quantities of crops are grown here. The region has the largest share of arable land amongst the six regions, accounting for 51,1% of its total area in 2002.

With its area of 27 516 km^2, or 24,8% of the country's total, the South Central region is the largest planning region in Bulgaria. The climate is transcontinental, but has a strong Mediterranean influence, especially along the valley of the Arda River and the Haskovo plain.

Over one-third of the country's total water supply comes from the Marica, Arda and Topolnica rivers here, meanwhile the arable land accounts for 21,7% of the region's area (in 2002), the second lowest share after the South-West region, which also form the basis of the regional economy.

While NE and SC regions are with the biggest milk production concentration, they possess some unique characteristics which determine this. Some of the largest dairy farms are situated in these regions mostly due to the favourable conditions for horizontal integration. In other words, most of the huge crop enterprises are supplementing their activities by maintaining dairy farms either to utilize the surplus of crop production, or to benefit from the advantage of cheap feed for the animal and good price of the milk (hypothetical). Such farms are extreme cases (outliers in the distribution histogram) and do not represent the typical dairy farming in the country.

The climate of North Central region is moderately continental in the north and centre of the region but becomes a typically mountain climate farther to the south. The Danube plain and the lower Balkans are wide open to the north and northeast, which accounts for the influx of cold air masses. The average annual temperatures are between 11.5ºC and 12ºC. The distribution of annual precipitation, which is between 500 mm in the Danube plain and 1000 mm in the mountainous south, is extremely favourable for agricultural development.

Limited water resources are provided by the Danube, Iantra and Rosica rivers. The water resources of the Al. Stamboliisky artificial lake on the Rosiotca River are used for irrigation and hydroelectric production.

Arable land accounts for 36.8% of the region's total area (in 2002). The fertile alluvial soils in the Danube plain are useful for agriculture, particularly for growing vegetables, crops, sunflower and sugar.

From the above we can conclude that North Central region possess in most of the cases the average values for all the agricultural parameters, and there is no extraordinary factors (on national level) to influence the agricultural sector in that region. Furthermore all of the unique characteristics observed in other regions could be find in NC but with moderate values – climate, soil and water, population and infrastructure, agricultural production etc., Table 3-2 and 3-3.

Table 3-2 Characteristic as share of the total for the first three (from six) regions

	North Central	South Central	North East
cereals	**22%**	15%	35%
industrial crops	**21%**	15%	38%
fresh vegetables	**10%**	46%	15%
permanent crops	**15%**	30%	19%
UAA	**18%**	14%	28%
dairy cows	**15%**	34%	21%
sheep's	**14%**	23%	26%
goats	**18%**	22%	20%
pigs	**24%**	18%	26%
population	**15%**	25%	17%

Table 3-3 Holdings by farm status and by planning regions

	total	Natural persons	Sole traders	Co-operatives	Companies	Civil associations
Bulgaria	654808	648274	2870	1973	1331	360
NW	65690	65087	275	183	114	31
NC	**99660**	**98481**	**496**	**396**	**230**	**57**
NE	*118335*	*116396*	*950*	*500*	*424*	*65*
SE	71256	70565	227	247	161	56
SC	*188349*	*186889*	*659*	*448*	*279*	*74*
SW	111518	110856	263	199	123	77

Specialisation of a dairy farm

A dairy farm is defined as generating the majority of its income from selling milk, e.g. measured in percentage of total gross margin. The percentage of milk production in total gross margin should be at least 50%.

In the case of Bulgaria dairy farm structure this criteria could mislead us. It is contradicted by the average farm size (by number of cows) and consequently the majority of milk production.

In short, the average farm size by number of cows (or average cows per farm) is 2,5 animals[36], this comes from 90% farms in the group with 1-3 cows per farm. This group produce around 40% of the milk. In the same time almost all of the farms in this group generate less then 50% of their income from selling milk. The specialisation is observed in farms in size class form 4 to 49 cows, and in bigger than this when the farm is organised in independent enterprise (the case where big crop production enterprise is maintaining a dairy farm).

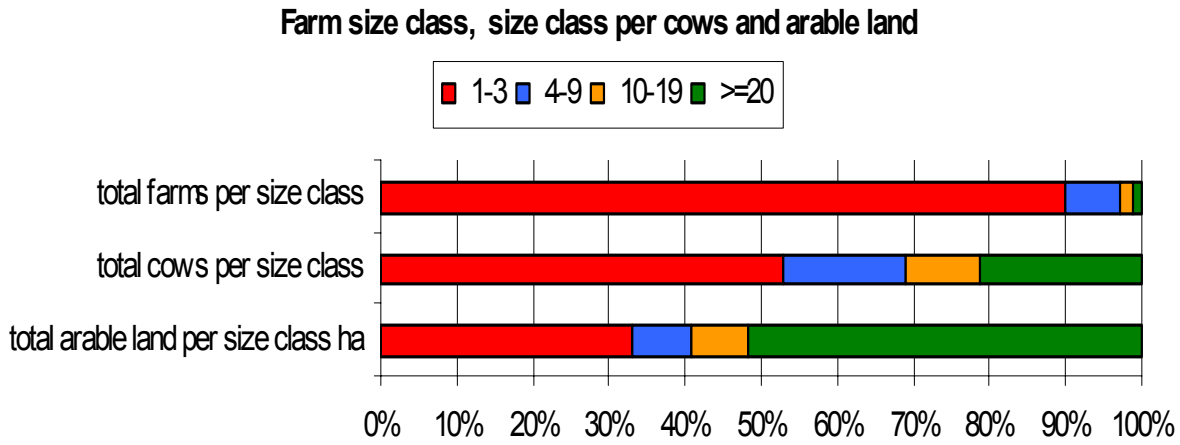
That makes the specialisation criterion not very relevant in current situation, but it gives us more weight to the middle size class from group with 4-19 cows because high level of specialisation observed among them.

[36] Publication Livestock May 2005 – bulletin 84 of Agrostatistics, MAF Bulgaria

Average farm size, farm size class per Utilised agricultural area and cows

The grouping form the last censuses was used for describing the current farm structure. The questions were: Where is the majority of the animals and milk production? To answer this question the following graph gives us the general situation.

Figure 3-9: Farm size class, size class per cows and arable land



Source: 2006 Agro statistic, MFA

This is based on the census from 2004-2005[37] and the red bar representing the farm size class from 1 to 3 cows, is dominating according the criteria number of farms and animals per farm size group. In short, 90% of the farms and 55% of dairy cows are in the group with 1 to 3 cows per farm. If we posses the row data from the census, we could make analysis including not only the dairy cows but pigs, poultry, goats and sheep[38]. Since we have more than 50% of the animals in that group, no special survey is necessary to find out the milk production from this group. According to the Annual report of marketing department of MAF, annual average yield from cow is 3593 litters. It is mentioned that the variation of the yield is very wide, from 3000 to 6000 litters, and this depending on the genetic potential and feeding. Usually higher yield is observed in the professional farms, as such are defined those with more than 20 cows, so the average yield is acceptable for calculating the annual production from the farms in size group 1-3 cows. That will give us production per group as follow:

farms size group	% of milk production
1-3	**53%**
4-9	16%
10-19	10%
>=20	21%

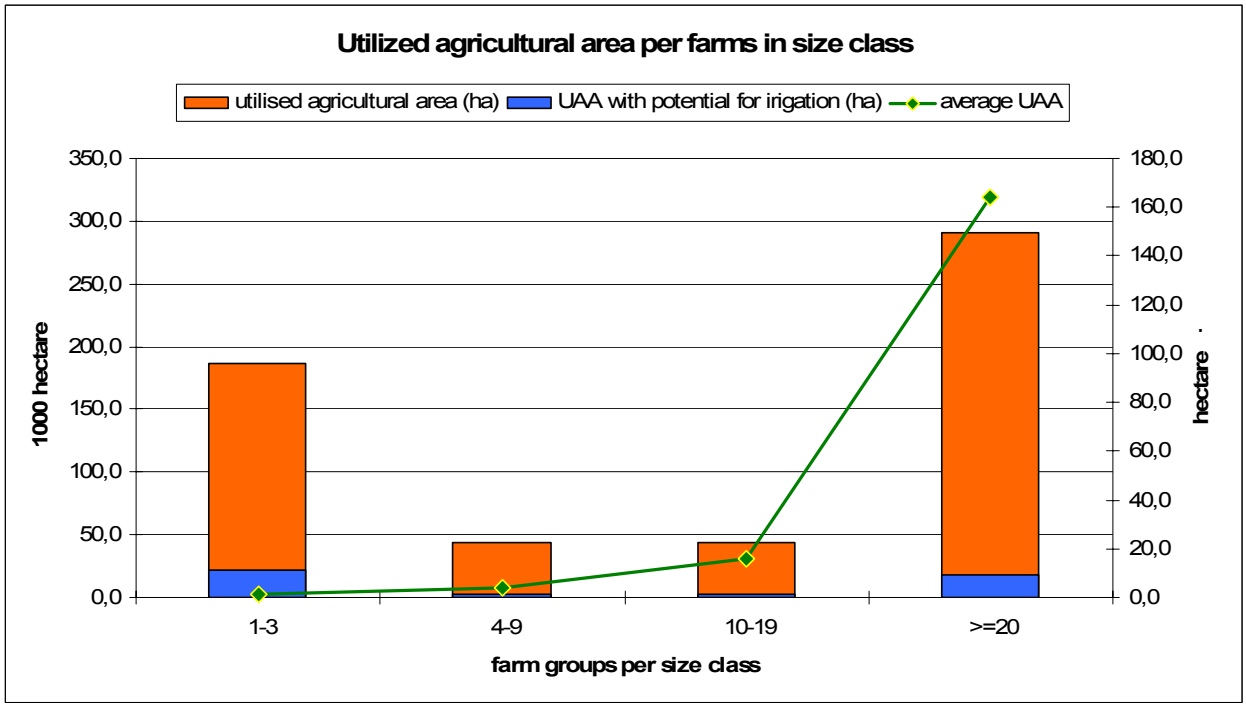
Source: 2006 Agro statistic, MFA; own calculations

[37] There were insignificant variances in results from 2003.
[38] Data become available at the end of 2007 and is used to validate this conclusions in Chapter 4

Summarizing the information above, a general conclusion was drawn – concerning dairy farming in Bulgaria the majority of the dairy cows and row milk production is found in the farms from size class 1-3 cows.

The next criterion is Utilized agricultural area per farms in size class.

Figure 3-10: Utilized Agricultural Area per size class



Source: 2006 Agro statistic, MFA

The two conclusions made on this graph are:

First of all, the professional farms (this with more than 20 cows) cultivate the significant amount of the UAA with average of 164 hectare per farm, and second;

It appears that this classification is handicapped while the middle group does not give us any valuable information, a new one should be considered by uniting the second and third groups in one and make the last one in tow so it will give us the following groups:

1-3; 4-19; 20-49 and >=50 **4.3.1 (1)**

3.3.1.2 Data collection and validation

The groupings in 4.3.1(1) are not statistically defended but emerge during the panel (common sense and educated guess) as it better represents the similar characteristics of the farms in groups. Based on that grouping a request for data was send to MAF and an agreement for future

data flow was made with them. It concerns the data from the national census and data form the new System for agricultural accountancy information, which supply the FADN[39] of EU.

While considering this and using the firs results from FADN in Bulgaria, the initial input forms of the typical farms were filled out. These forms are not very different from the short output from FADN of EU, and are summarizing the current situation of a particular farm or farm type. In the one we use (INP sheet of TIPICAL model), more data were included concerning the family and his members, properties and other activities which are usually not considered by the accountancy in general and especially for small family farms (See IFCN Method and documentation of the model TIPICAL Chapter 4.2). In most cases a 'pre-panel' is formed in the first step where the co-ordinator, the regional expert and one farmer participate. The bases for the typical farm are the single farm data provided by the farmer and the advisor. These data are 'corrected' by particularities of individual years and other single-farm specific issues. The expert knowledge of the participants plays an important role in this procedure(IFCN 2004).

The creation of a panel starts with the search for farmers managing farms which are similar to the typical farm to be established (in the pre-panel). Once they have been identified, the farmers, the regional expert and the scientist form the panel. The task of the panel is to establish the data base for the typical farm and to discuss farm level strategies for the projection of the farms (e.g. introduction of new technologies, adjustment to policy changes).

The concept of panels has proven successful in policy advice since the early 1980s in the USA. There, usually five farmers participate in a panel. In the early phase of IFCN, starting in 1995, this concept had been taken over exactly in order to use identical methods.

Initially three outputs[40] were produced for typical farms for the groups 1-3, 4-19 and 20-49. These outputs were used as a basis for discussion during the pre-panel. On this firs panel farmers from these three groups were invited, veterinarian expert form Centre for selection and reproduction, experts from state extension services agency, zoo-engineer and agricultural economist form the local office of the MAF and veterinarian form local office of NVMA (National veterinary-medical agency).

Why this people are able to give more precise picture on the dairy farm structure than the one that comes from the official statistical data? The national centre for selection and reproduction maintains a database of the elite breeds from all kinds of animals[41], and second the national veterinarian-medical centre is the institution which is responsible for animal marks – consequently it posses the precise data for the number of cows per farm. Their presence gives us the opportunities to fix some of the discrepancies that come from the national statistics data, as well as some helpful knowledge concerning animal health, productiveness and maintenance, which we need afterwards for the input form of the model. Second the experts from the office of MAF possessing good overview on the farms in the region, their structure, problems, advantages and disadvantages (in general and in particular). Last but not the least, the farmers themselves were there to confirm or reject the statements of the experts and the conclusions from the statistics.

[39] Farm Accountancy Data Network
[40] Coming out from running the data of input forms mentioned above, in to the TIPICAL model.
[41] This list is a basis for one of the subsidy for high yield cow breads – 30 leva/cow per year for testing the herd and 70 subsidies for high yield cows if it is proven.

In the next stage a survey was carried out with the directions and recommendations from the participants of the first panel, which covers three farms from each group defined. The results from the pre-panel were instruction for finding the farms that are closer to the typical one in each group. The idea was to supply the created typical farms with data from actually existing ones and give us better and more precise information about how they function and which are the specific characteristic of such a farm.

After developing the ability to communicate and predispose the farmers to give a reliable and detailed data, the interviewing process becomes more productive. Following the first week of work it was easy to discover in advance the presence or absence of extraordinary cases in the farms that made them unsuitable for the typical one. This saved a lot of time to inquire a farmer and find out at the end that (for example) the brother of the farmer is working in Spain and supports him with significant amount of money which he uses to purchase animals or machinery, or the farmer owns of the mill in the village (by restitution) which he rents, therefore he receives an amount of natural rent in form of feed, which he uses for his 2 cows. So these two examples were of farms which were looking like good candidates for inquire but possessed some particularities which made them singular cases.

During that survey a lot of important information was collected, information which usually is not included in any statistical census. For example it was very helpful to find out that in most of the cases, the farms from the middle size group are strongly supported (unofficially) by the local dairy processors. That was not only by row milk cooling equipment as it is usual, but free of interests short term loans for operational needs as well. Those loans are found out to be the key component of the capital structure of the middle range professional farms[42]. Another significant finding was the family structure of the farms, since the entire 1st and 2nd group farms are family farms, and most of the 3rd and some of the 4th too. It is about the tradition and customs of the family and farming traditions, which was observed in some groups. Especially for the small farms, the family status is determinative for the past, presents and future of the farm at all.

For in-depth analysis of typical farm adjustments to the technological and political conditions, full panel was formed, with participation of five farmers. The full panel has the advantage that the data, the options of farm level adjustments and the results of the scientific analysis can be discussed to a broad extent. The task of the full panel was to finally fill out the input form for all the typical farms and agree on it. That is to follow down all the input information for each farm, debate and change it, if it is necessary, and at the end to agree on the results. The process was similar to a situation when 10 people sits on a square table and everyone is cutting the corner till all together make that table completely round so nobody is sitting on a corner.

Unfortunately the final results were discussed only with the experts. That was necessary because the farmers show a tendency to misunderstand the general conclusions on their financial situation or activities, either the very negative results or very inefficient, that make them nervous and they start to “fight” or defend “strange” positions. This was a typical psychological reaction which gave us the very crucial conclusion – in practice the farmers do not realize the general picture of their activities, and consequently especially for the very small farms, the very high

[42] See the section with detailed analysis of the typical farm BG22

production costs and inefficiency. For example a farmer strongly disagreed with the fact, coming from the final calculations, that he actually supports his dairy cows with his retirement payment instead of receiving a profit from them. For the experts it was clear that in fact that is a situation concerning not the profit but the stable flow of small amount of cash, psychological security (the need of the farmer to be employed with something) and food supply security for the farmer household, while the farmer was not able to deal with such a matters especially when they concern him.

The closing of the panel marks the end of the data collection for 2005; in 2006 and 2007 it was validated using the special validation procedure of IFCN.

3.3.2 Other data sources used in the thesis

3.3.2.1. National statistics

At the end of 2007 eventually it was possible to negotiate and obtain the individual farm data (for all the farms with dairy cows) from National census of agriculture producers 2003 and the Farm structure survey of 2005. Those valuable data sets were used for analysing the dairy farm structure and afterwards the creation of the typical farm for the country. The data was used mainly to perform Exploratory Data Analysis which uses graphs and numerical summaries to describe the variables in a data set and the relationships among them (Moore 1995), (Chapter 4).

Since the data set comes from the official statistical institution (MAF office Agrostatistic) it has been validated by all the statistical methods. Nevertheless the data set is not a complete one but includes “only the holdings with dairy cows”, therefore it has to be prepared for future work by examine the variables, its distribution and in some cases to compute complimentary variables for the needs of other analysis or for better understanding.

While Farm Structure Survey 2005 is a sample survey meant complement the Farm Structure Census 2003, there are slight differences caused by some improvements in the methodology and administrative regulations. The analysis was done upon the data from FSS2003 primarily and only the final conclusions were confirmed with the data from FSS2005.

The dataset from FSS2003 includes about 100 variables from the questioner of the census (the full questioner could be obtained from the web side of the Ministry of agriculture). A short description of the most important variables is offered in Table 3-4.

Table 3-4 Short descriptions of the variables from FSS 2003

Name	Variable Label (from to)	Short description	Measure
V_1	Legal personality of the holding	Code for 5 different legal forms of agricultural holdings: Natural person Natural person – sole trader Co-operatives Trade act company Natural persons company or civil group under art. 357 of the Obligations and Contracts Act	Nominal
V_2	Regular account	The presents and type of accountancy the holding is applying – no, yes – check-up balance sheet, yes – by single entry, yes – by double entry	Nominal
V_3	Agricultural education of the manager	Consider if the **holding director** (manager) acquire any agricultural training and/or credentials	Ordinal
V_4	Own land	the size of own agricultural land	Scale
V_5	Lease land	the size of leased agricultural land	Scale
V_8	Permanent crops total	total hectare of permanent crops	Scale
V_9	Utilized AA total	total size of utilized agricultural area	Scale
V_10	V_15	Type of irrigation installation, irrigatable area and irrigated area for the crop year 2002/2003	Scale
V_16	V_22	Type (tractors by kW and combines by type) and number of agriculture machinery, own and rented	Scale
V_107	Dairy cows	Number of dairy cows in the holding	Scale
V_108	V_104	Other cows, heifers in different ages, calves.	Scale
V_115	V_119	Buffalos	Scale
V_127	V_136	Other animals (goats, sheep's, pigs, rabbits, poultry)	Scale
V_50	LU without dairy cows	Sum of all the other animals corrected in Livestock Units according to the coefficient for LSU form Concepts and Definitions Database of EUROSTAT[43]	Scale
V_146	V_147	Milking installation available, type	Nominal
V_149	V_147	Other Agro and non-agro services like tourism, handcrafts, wood processing etc.	Nominal
V_163	V_172	Unprocessed products produce on farm sells and type of sells (no, yes – only surpluses, direct sells, middleman, both)	Nominal
V_173	V_182	On farm Processed products for sells and type of sells (no, yes – only surpluses, direct sells, middleman, both)	Nominal
V_183	Part-time man-days	Part-time or seasonal workers used on farm in total man days for the crop year 2002/2003	Scale
V_184	V_189	Information on the farm manager: Family connection Sex Age group Farm work notability Worked time	Scale

[43] http://ec.europa.eu/eurostat/ramon as retrieved in September 2008

According to Concept and definition database of EUROSTAT, data on animals are converted into Livestock Unit (LSU) using the following coefficients:

Table 3-5 Livestock Unit (LSU) conversion coefficients FSS 2003

Equidae 0.8	*Pigs:*
Bovine animals:	Piglets having a live weight of under 20 kg per 100 head 2.7
Under one year old 0.4	Breeding sows weighing 50 kilograms and over 0.5
One year or over but under two years:	Other pigs 0.3
Male animals 0.7	*Poultry:*
Female animals 0.7	Broilers per 100 head 0.7
Two years old and over:	Laying hens per 100 head 1.4
Male animals 1.0	Other poultry (ducks, turkeys, geese, guinea-fowl) per 100 head 3.0
Heifers 0.8	Rabbits, breeding females per 100 head 2.0
Dairy cows 1.0	
Other cows 0.8	
Sheep (all ages) 0.1	
Goats (all ages) 0.1	

In order to estimate the notability of the specialization or other non-dairy on-farm activities, extra variable is compute in LSU (livestock units) to represent the aggregate size of other farm animals.

Data issues

There are some misunderstandings cleared out during the survey and one of them is the question concerning the unprocessed sales of agricultural products (variables 163 to 172). In general the question is valid but as it was ascertained in the panel, it is very difficult to be answered when it is up to a farm with 1-2 cows. The major question is “Does the farm sell unprocessed products produced on the farm?” with possible answers “yes/no”. The type of selling is required as supplementary question, which is coded with 5 digits, from 0 till 4 (Figure 3-11).

Figure 3-11: Question №42 from the FSS 2003

42. Does the farm sell unprocessed agricultural products produced on the farm? Yes =1, No =0
*If **Yes**, please fill in the type of* (only one type by product is possible).

Product		None (the products are consumed in the household)	Only the surpluses are sold	Regular sale		
Name	Code			Direct sale (to the consumer)	Through intermediaries	Both
		0	1	2	3	4
Milk	01	☐	☐	☐	☐	☐
Eggs for direct consumption	02	☐	☐	☐	☐	☐
Honey	03	☐	☐	☐	☐	☐
Bee wax	04	☐	☐	☐	☐	☐
Wool	05	☐	☐	☐	☐	☐
Grapes	06	☐	☐	☐	☐	☐
Fresh fruit	07	☐	☐	☐	☐	☐
Potatoes	08	☐	☐	☐	☐	☐
Fresh vegetables	09	☐	☐	☐	☐	☐

Source (MAF 2005)

In other conditions, one could conclude that columns 0 and 1 are defining whether a product is produced only for self consumption (0) and whether it satisfies the needs of the household or there is a regular surplus (1). The next columns consider products with market orientated production.

In situation where a farm is specialized in fresh fruit for example, and meanwhile has a dairy cow of which the milk is used mainly in the farm, then it is easy to answer such a question. For the fruits the answer is among the column 2 to 4, and for the milk is 0 or 1 according to the consumption level of the family. But in a situation where no product is considered as "market orientated" till the time when there are favourable conditions and available surplus to sell, the form of selling is not important. The correct answer should be always 1, which explains the amount of production the farmer desires to sell, or consume according to the marked conditions at the moment.

The experts of MAF admitted, during the negotiations for obtaining the individual data, that it was not possible to explain this question at the most of the inquirers as well as they didn't manage to explain the question to the farmers. It is a bit hard for a small-scale farmer to answer, whether he produced his grapes for his own use or for the market, since he would answer "if you give me good price for it, I will sell it all and I don't mind to live this year without having any grapes on my table (but will have a nice amount of cash I urgently need)". Or in short, there were many cases where farmers replied "I **regularly** sell my milk **surplus** through **middleman**" – which implies two marks per product and that is not possible (see the comment in the table). Similar situations are left on the inquirer's decision and since we can assume that they appear within 80% of the farm, we can't relay much on that information.

Therefore the only way to use those variables (one per each product) was to recode them with "0" for product is consumed on farm and "1" for any sales at all, while the missing values should be "there is no production of this product in the farm". That will give us the information for any production for self-consumption only, but not more detailed type of sales per product.

3.3.2.2. Data sources for projections and modelling

FAPRI prepares baseline projections each year for the U.S. agricultural sector and international commodity markets. The multi-year projections are published as FAPRI Outlooks, which provide a starting point for evaluating and comparing scenarios involving macroeconomic, policy, weather, and technology variables. These projections are intended for use by farmers, government agencies and officials, agribusinesses, and others who do medium-range and long-term planning. Those baseline projections are grounded in a series of assumptions about the general economy, agricultural policies, the weather, and technological change. The projections generally assume that current agricultural policies will remain in force in the United States and other trading nations during the projection period. The projections are also based on average weather conditions and historical rates of technological change.

In estimating the projections, FAPRI begins with a preliminary baseline that is first submitted to a review process before a panel of experts, including employees of several agencies of the U.S.

Department of Agriculture, experts from international organizations, individuals throughout the land grant and other university systems, as well as from general extension specialists and industry experts. Their comments and suggestions are taken into consideration in the final baseline, which is used for policy analysis throughout the rest of the year.

Global Insight provides the most comprehensive economic, financial, and political coverage of countries, regions, and industries available from any source—covering over 200 countries and spanning more than approximately 170 industries—using a unique combination of expertise, models, data, and software within a common analytical framework to support planning and decision making.

In addition to the baseline forecasts, Global Insight assists in risk management and regularly prepares and analyzes alternative scenarios. These scenarios consider the effects of policy changes or unexpected "shocks" on countries, industries, and financial markets.

4 Structure of Bulgarian agricultural holdings

In this chapter the structure of Bulgarian agriculture holdings is examined by analysing the distribution per different criterions. In the next step each major factor of production is observed respectively for the two types of farm – small-scale and medium and large.

According to the results from the 2005 Farm Structure Survey (FSS) in Bulgaria, there are 534631 agricultural holdings, which is 20% less than in 2003. In addition, there are numerous unaccounted subsistence farms in the country. The decrease is observed in all the legal forms of agricultural production.

During the 2004-2005 periods, about 57000 agricultural holdings quit agricultural production, 64000 dropped below the borders of observed agricultural holdings[44] and around 10000 are so-called "vacant holdings" which during the observed year had no activity but declared that they will resume it next year.

Table 4-1 Number of agricultural holdings in Bulgaria 2003-2005

Regions (NUTS2)	Number of holdings 2003	2005	Alteration 2005/2003
Bulgaria	**665 548**	**534 613**	**-20%**
North West	66 614	56 054	-16%
North Central	100 833	78 482	-22%
North East	119 642	99 062	-17%
South East	73 929	58 082	-21%
South Central	191 651	157 426	-18%
South West	112 879	85 506	-24%

Source: MAFS, "Agrostatistic"[45]

[44] "Agricultural holding" is defined as an independent farming business meeting one of the following criteria: manages 0.5 ha of utilized agricultural land; or 0.3 ha of arable land; or 0.2 of natural grassland; or 0.1 ha of vegetables, berries, orchards, vineyards, nurseries, tobacco, hops, seed and seedlings, flowers, essential oil crops and medicinal crops, mushrooms, etc.; or 0.05 ha crops under glass; or 1 cow; or 1 buffalo-cow; or 2 cattle; or 2 buffaloes; or 1 breeding sire; or 1 sow; or 5 pigs; or 5 ewes; or 2 she-goats; or 2 beasts of burden; or 50 laying hens; or 100 chicks for fattening; or 30 other poultry species; or 10 she-rabbits; or 10 bee families; or 1 000 quails or other species (MAF).

[45] Where no other is stated source is MAF (2006). Annual Agriculture Report. Sofia, Ministry of Agriculture and Forestry.

4.1 Structure by legal status and utilized agricultural area

The observed decrease of the number of agricultural holdings is accompanied by a decrease by some 6% of the total agricultural area utilised. According to the MAFS analysis (MAF 2006), this is provoked predominantly by the serious structural changes of the cooperatives in previous years, as they are the legal form with a bigger share in the agricultural area utilised (Table 4-2). In 2003, the cooperatives utilised more than 40% of the total agricultural area, while for 2005 its share is 33%. Their number during this period dropped by 23%, supplemented by 24% decrease of the total agricultural area utilised by them. On the contrary, in all other legal forms an increase in average UAA is observed but still that doesn't compensate the effect from the decrease in UAA by the cooperatives on the total UAA. Without significance to the decrease in total UAA is the fact that some of the holdings accounted in 2003, in 2005 fell below the border for considering them an agricultural holding, they utilised about 5510 ha UAA.

The number of holdings possessing UAA in 2005 was 520,5 thousand. The average UAA per holding was 5,2 ha, which was 0,8 ha more than the average in 2003.

Table 4-2 Number of holdings with Utilised Agricultural Area by legal status

Legal status	Number of holdings with UAA		UAA (ha)		Average UAA (ha)	
	2003	2005	2003	2005	2003	2005
Total	**654 808**	**520 529**	**2 904 480**	**2 729 390**	**4,4**	**5,2**
Physical persons	648 274	515 300	8 796 778	914 740	1,4	1,8
Sole traders	2 870	2 158	340 861	354 597	11 8,8	16 4,3
Cooperatives	*1 973*	*1 525*	*1 169 306*	*890 870*	*59 2,7*	*58 4,1*
Trade companies	1 331	1 312	469 197	522 559	35 2,5	39 8,4
Partnerships and others	360	234	45 434	46 625	12 6,2	19 9,3

Source: MAFS, "Agrostatistic"

The increase in the country average UAA for 2003-2005 periods was by 18%, with a bigger share in holding consolidation observed by the partnerships (57%), sole traders (39%) and physical persons (31%).

The alterations in the number and structure of agricultural holdings will continue while keeping the tendency of decreasing the share of holdings with less than a hectare UAA, especially after the introduction of direct payments per hectare of UAA (MAF 2006).

The holdings with less than 1ha of UAA in 2005 were about 74% and utilised narrowly 5% of the total UAA. At the same time, a significant share of the agricultural area (37%) was utilised by the holdings with more than 1000ha, despite the fact that they are only 0,1% of all the agricultural

holdings in Bulgaria. In the 2003 - 2005 period, an ascending tendency was observed within the group from 5 to 100ha of UAA (Table 4-3).

Table 4-3 Holdings per hectare of UAA 2003-2005

Groups per UAA (ha)	UAA (ha)			Number of holdings		
	2003	2005	deviation 2005/2003	2003	2005	deviation 2005/2003
0	0,00	0,00	0%	10 740	14 084	31%
<0,5	76 505,40	56 424,40	-25%	332 198	259 997	-22%
0,5-0,9	116 086,20	80 246,00	-31%	169 546	118 345	-30%
1,0-1,9	120 203,30	104 680,10	-13%	89 964	78 276	-13%
2,0-4,9	121 714,50	116 933,10	-4%	41 857	40 491	-3%
5,0-99,9	274 174,70	313 985,40	15%	17 364	19 604	13%
100,0-399,9	430 775,70	416 456,10	-3%	2 056	2 138	4%
400,0-999,9	784 255,20	693 026,30	-12%	1 238	1 121	-9%
>=1000	980 764,60	947 638,70	-3%	585	556	-5%
Total	**2 904 479,60**	**2 729 390,10**	**-6%**	**665 548**	**534 613**	**-20%**

Source: MAFS, “Agrostatistic”

Throughout the censuses until 1946 (Table 4-4), all of the holdings up to 10ha were classified into 10 groups with an equal interval width - 1 ha. Land economists making a study of this data are unanimous that this classification reveals in detail the special features of Bulgarian agriculture as well as of single holding groups. In censuses after 2000, groups have been used as a result of the incorporation of the European standards for the production of agro-statistical information. The number of groups and the interval width are in conformity with European agriculture and do not correspond to the present state of landed property in Bulgaria (Angelova 2007). Having in mind this circumstance, Angelova assumes that the groups from 1934 are appropriate for the formation of a standard classification in order to provide a comparison during the different periods of time.

For the whole period of study the classification is characterized by an extremely asymmetrical L-formed form, expressing a very important characteristic of Bulgarian agriculture – the predominant presence of small farm holdings with small differences in the size of managed land.

Table 4-4 Dynamics of agriculture holdings distribution per size of UAA in Bulgaria 1897-2005

groups per size of UAA in ha	1897	1908	1926	1934	1946	2001	2003	2005
till 1	257335	293750	89040	119627	154563	1210431	506305	385647
1 to 2	106357	131148	92895	119790	154728	136204	86666	73940
2 to 3	75089	86500	89837	116967	149814	49815	24412	22593
3 to 4	60056	68346	82592	107817	137586	24273	10776	9787
4 to 5	50220	57772	73155	94904	115729	12525	5701	6122
5 to 6	37010	42665	60753	72894	86829	8099	3725	4181
6 to 7	37010	42665	50222	56732	64702	4456	2318	1978
7 to 8	29803	34822	40301	43288	45849	2558	1547	1667
8 to 9	22596	26979	33229	33621	33503	1852	1125	1086
9 to 10	22596	26979	25936	25346	23977	1037	901	1099
10 to 15	55509	67610	70605	62488	51618	2876	2657	3162
15 to 20	22097	26718	24000	18745	12936	793	1217	1306
20 to 30	14913	17304	13346	9623	5740	620	1256	1463
30 to 40	4338	5017	3025	1927	978	306	697	751
40 to 50	1770	1933	857	539	250	139	469	586
above 50	2941	3159	820	561	270	622	5036	5165
total	799640	933367	750613	884869	1039072	1456606	654808	520533

Source: Statistics of land property in 1908, General statistic department, 1914; Census of agriculture holdings in Kingdom Bulgaria on 31 of December 1926, General statistic department, Sofia 1935; Census of agriculture holdings in 1934, General statistic department, Sofia 1942; Census of agriculture holdings in August 1946, Monthly bulletin of General statistic department, Sofia 1/1947; Census of population, housing and agriculture holdings in 2001, Volume 5 Agriculture holdings. National Statistical Institute, Sofia 2003; Agricultural Census `2003 and Structure of agricultural holdings in Bulgaria crop year 2004/2005 MAF, Agrostatistic department, Sofia 2005 and (Angelova 2007) from(Angelova 2007)

In 2005, 76% of the UAA was utilised under some form of rent, while only 24% (slightly increase toward 2003) was owned by the holdings. Still, among bigger holdings like cooperatives, the widespread practice was to let land for further cultivation to third parties, usually physical persons, for “their own consumption”. About 57 thousand hectares were distributed in that way in 2005 (92 thousand in 2003), 43% of them were planted with maize.

4.2 Structure of animal breading holdings

The number of animal breeding holdings decreased in 2005 by 20% (601 to 481 thousand), together with an increase in the average number of animals per holding, especially by hogs and buffaloes. In general, a decrease in the total number of all kind of animals was accounted and no particular explanation of it was stated. One assumption could be that the decrease in the number of farms was mainly at the expense of small scale ones. Hence, their share in the total decline will affect the statistical result for the average heads per holding but this definitely will not be an increase in size (**Table 4-5**).

On the other hand, a certain trend of increasing the herd size in dairy farms is observed provoked by the expected payments per head in the sector (Hemme 2007). This trend is restricted to the group of dairy specialized farms and is not observed in all the farms with dairy cows.

Table 4-5 Animal breading holdings in 2005

Animal category	Holdings		Average number of animals per holding	
	thousands	Deviation 2005/2003	Numbers	Deviation 2005/2003
Cattle – total	**167**	**-21,10%**	**3,6**	**11,60%**
Dairy cows	152	-21,70%	2,3	21,60%
Other cows	3	54,30%	4,1	9,00%
Buffalos total	**2**	**-22,60%**	**4,4**	**21,00%**
Dairy buffalos	1	-36,80%	3,3	46,50%
Sheep –total	**176**	**-25,90%**	**8,2**	**19,70%**
Breading sheep	172	-26,60%	7,6	16,60%
Goats – total	**163**	**-39,40%**	**3,1**	**-3,70%**
Breading female goats	159	-40,20%	2,8	-3,40%
Hogs – total	**191**	**-31,60%**	**4,9**	**6,50%**
Breading piglets over 50kg	20	-62,50%	5,3	39,90%
poultry – total	**381**	**-23,00%**	**52,0**	**17,80%**
Laying hens	369	-22,50%	25,7	36,50%
Equines – total	**150**	**-40,90%**	**1,1**	**4,80%**

Source: MAFS, “Agrostatistic”

4.3 Labour in agriculture

About 1 million people worked in agriculture in 2005, 254 thousand working full time. Agriculture labour follows a downward trend of the total number of holdings, in 2005 the number of persons for which farming is a major source of income declined by 20% with respect to 2003. A decline is observed in all age groups but mostly for those above 65 years (about 80 thousand people less in comparison with 2003) and below 35 years (55 thousand less).

The average age of farm managers was 59,5 years, while 2/3 of them were older than 55 years and only 14,5 were younger than 45 (Table 4-6). Agriculture was a source of income for 354,1 thousand people who also worked in other sectors of the economy (part-time farmers).

Table 4-6 Labour force in agriculture per age groups in 2005

Age groups	Total labour (1000 persons)	Family labour			Hired labour		
		Total	from which		Total	from which	
			Full time	Part time		Full time	Part time
Total	**1075,9**	**1018,4**	**209,0**	**808,4**	**57,5**	**45,0**	**12,5**
Up to 35	**101,5**	91,5	12,3	79,2	10,0	7,7	2,3
from 35 to 44	**147,6**	132,1	20,1	112,0	15,5	12,0	3,5
from 45 to 54	**223,7**	204,4	32,7	171,7	19,3	15,3	4,0
from 55 to 64	**269,6**	258,4	61,0	197,4	11,2	8,8	2,4
more than 65	**333,5**	332,0	82,9	249,1	1,5	1,2	0,3

Source: MAFS, “Agrostatistic”

In general, a quarter of the labourers involved in agriculture are aged persons (Table 2.11), followed by nearly/or retired (55-64 years old) persons, both working part-time, which implies that their work was mainly of a supplementary nature. While these persons are the majority of the family workforce, hired labour is dominated by the age groups between 35 and 54 years old.

Since the beginning of the transition it has been typical for the rural population to supplement its income with some agricultural activity, whence the huge number of part-time family labour comes from (Kostov and Lingard 2004 -5). The insufficient pensions and the lack of other opportunities drive the aged rural population to support its income by agriculture. Their activity is based not on a profit maximization function but on some “security optimisation”, that is to generate such a product mix that could save some cash, otherwise spent for vital necessity products, but at the same time, with the presence of certain conditions, to be marketed and to achieve some cash income (Kostov and Lingard 2004 -6). In another case that group would be significant for the sector but not when its share of total labour is almost 80%. That makes the application of agricultural labour policies pointless, since only 20% of the labour involved would respond to them. At the same time, other policies and instruments without any direct connection with agriculture or targeted to it could seriously disturb, and do disturb, the sector, affecting the majority of the labourers involved. This particularly makes studies on the agricultural sector very unreliable if only related agro-policies are considered.

4.4 Size of agricultural holdings

The Economic Size Unit (ESU)[46] shows the potential of the holding but not its financial results. The economic size helps the comparison between holdings of different farm types where physical size (average area, number of livestock etc.) does not provide enough information.

[46] In some sources European Size Units.

In Bulgaria, 92,2% of the agriculture holdings are from 1 to less than 8 ESU and at the same time 90% of them employ less than 3 AWU. The data in Table 2.12 is from a Farm Structure Survey in 2005 which includes only professional holdings and provides a brief but comprehensive insight into the farm structure in Bulgaria. Therefore, 92,2% of the **professional holdings** (out of 118,1 thousand considered) are with a size from 1 to less than 8 ESU and 21,1% of them make use of less than 1 AWU, while the majority (about 69%) are operated with 1 to 2 AWU. This points out to the general prevalence of small-scale operators despite the fact that in national statistics these are small- and middle-sized holdings.

Taking into account the legal personality of the holder correlated to the agricultural area and the LU, it can be concluded that owners of up to 50 hectares and of up to 50 LU are sole holders in their majority (about 98-99%). Less than half of the holders, with more than 50 hectares of agricultural area and 50 livestock units are legal personalities, while the majority of them are sole holders as well.

Table 4-7 Agriculture holdings by size (UAA and LU[47]/ legal personality; labour and economic size)

Size of the farms	Agricultural area (ha)				**All farms**	Livestock (LU)			
	< 5	5-<20	20-<50	50=<		0	0<-<5	5-<50	50=<
Total number of holdings (1000)	**96,1**	**13,7**	**2,9**	**5,3**	**118,1**	**13,2**	**73,5**	**30,0**	**1,3**
by legal personality of the holder (%)									
- sole holder	99,7	98,1	90,0	57,9	**97,4**	81,8	99,9	99,3	67,3
- legal person	0,3	1,9	10,1	42,1	**2,6**	18,2	0,1	0,7	32,6
- group holders	0,0	0,0	0,0	0,0	**0,0**	0,0	0,0	0,0	0,0
by employed labour force (%)									
- under 1 AWU[48]	21,5	25,4	17,8	6,6	**21,2**	27,7	23,0	14,9	1,2
- from 1 to less than 2 AWU	49,8	37,3	32,5	17,8	**46,5**	32,8	49,9	45,6	15,4
- from 2 to less than 3 AWU	23,1	22,5	22,9	15,3	**22,6**	13,9	22,2	28,2	9,7
- 3 AWU and over	5,6	14,8	26,8	60,3	**9,7**	25,7	5,0	11,3	73,7
by economic size (%)									
- from 1 to less than 8 ESU[49]	98,0	90,6	71,0	3,9	**92,2**	68,4	97,5	93,6	4,7
- from 8 to less than 16 ESU	1,3	6,9	18,4	22,3	**3,3**	8,2	1,5	4,6	21,9
- from 16 to less than 40 ESU	0,4	1,6	7,0	29,0	**2,0**	8,0	0,7	1,2	34,1
- from 40 to less than 100 ESU	0,2	0,5	2,6	23,3	**1,3**	8,5	0,2	0,3	13,5
- 100 ESU and over	0,1	0,4	1,1	21,4	**1,2**	6,9	0,1	0,2	25,9

Source (EUROSTAT 2005)

[47] LU – Livestock Unit is equal to a dairy cow. The number of animals (number of heads) is converted to LU using a set of coefficients reflecting the feed requirements of the different animal categories.

[48] AWU is equal to the hours work by a person employed on a full-time basis during the whole year. In Bulgaria it is adopted that 1 AWU is equal to 1 856 working hours during the year or 232 man-days.

[49] The economic size of the holding is determined by dividing the total Standard Gross Margin of the holding by 1 200 EUR. The coefficient obtained is called Economic Size Unit (ESU). One ESU is equal to 1 200 EUR.

4.5 Subsistence farming structure

The traditional backyards of many households are considered an agriculture holding for no other reason than the fact that they contribute with more than 50% to the relative family income and the significant share of the livestock in them (34,4%). While the huge number of small farm is not significant in terms of agricultural area cultivated (only 8,9% from the total), they hold 1/3 of the total livestock units in the country. That is, even more in terms of dairy cows and milk production.

Logically, out of 368 thousand holdings producing only for self consumption, 88,4% of them are below 1 ESU. It is interesting that, still, 153 thousand holdings below 1 ESU are using tractors – very aged and depreciated since they can't make it more than 1 ESU.

In general, 78% of agriculture holdings are below 1 ESU, they utilize only 9% of the agriculture area but it is done by 70% of the labour force in agriculture and 34% of LU. The decrease of subsistent farming during the last years is far from significant, as it was expected and they are still a major "paler" for the Bulgarian agricultural sector.

Table 4-8 Subsistence farming

		Absolute figures			% of total	
		Total	< 1 ESU	**>= 1 ESU**	< 1 ESU	>= 1 ESU
Regular labour force	(1000 persons)	1077,9	762,1	**315,8**	70,7	29,3
Regular labour force	(1000 AWU)	596,6	376	**220,7**	63	37
Holders		531,4	416,5	**115**	78,4	21,6
at least 65 years old		222,2	194,1	**28,1**	87,3	12,7
having another gainful activity		178,4	135,3	**43,1**	75,9	24,1
Number of holdings	**(1000nb)**	534,6	416,5	**118,1**	77,9	22,1
producing mainly for own consumption		367,9	325,1	**42,9**	88,4	11,6
producing mainly for direct sales		26,2	17,1	**9**	65,5	34,5
using a tractor		236,2	152,9	**83,3**	64,7	35,3
Standard Gross Margin (SGM)	(1000 ESU)	930,9	155,6	**775,3**	16,7	83,3
Agricultural area	**(1000 ha)**	2729,4	241,8	**2487,6**	8,9	91,1
owned farmed		663,2	206,3	**457**	31,1	68,9
Livestock	**(1000 LU)**	1327	455,9	**871,1**	34,4	65,6

Source (EUROSTAT 2005)

4.6 Characteristics of the typical dairy farms

The following characteristics are deduced from the knowledge obtained during the data-collecting and followed panel for creating the typical dairy farm in Bulgaria. The IFCN method of creating the typical farm was explained in Chapter 3.

The farms observed are divided into two groups as per the "perspectives for development" and the "management" criterion. Those criterions are defined as an educated guess based on personal experience and panel opinion.

The initial examination of distribution is done by the number of cows per farm. It is obvious that such distribution is greatly skewed and do not provide valuable information other than confirming the "extreme" duality of the dairy farms in the country. The extreme amount of farms with 1 cow make any distribution graph unreadable and suggests that data is not normally distributed[50], in order to examine the distribution we have to do it by groups per number of animals.

Let us, for the sake of convenience, adopt the following form of grouping according to the number of animals:

Table 4-9 Farms with dairy cows in 2003 grouped per herd size.

Herd size groups	number of farms		% from total
1cow	129231		66,72%
2cows	39929		20,62%
3 up to 9	21333	small-scale farms	11,01%
10 up to 49	2909	middle size farms	1,50%
50 up to 99	187	large size farms	0,10%
100more	95	extra-large size farms	0,05%
Total	193684		100,00%

Source: Own calculation of AC2003 individual farm data

Exploratory data analysis uses graphs and numerical summaries to describe the variables in a data set and the relationship among them (Moore 1995). Since the data set comes from the official statistical institution (MAF office Agrostatistic) it has been validated by all the methods of statistics. Nevertheless, the data set is not a complete one but includes "only the holdings with dairy cows", therefore it has to be prepared for future work by examining the variables, its distribution and in some cases computing complimentary variables for the needs of other analyses or for better understanding.

There are some methodological differences between the data set available form Agricultural Census 2003 (FSC2003) and Structure of agricultural holdings 2005 (FSS2005) which obstruct any attempt for parallel analysis or linkages. The analysis is done upon the data from FSC2003

[50] If the median differs greatly from the mean (Figure 5.3.2 table), this might indicate the presence of outliers (which affect the mean but not the median).In this situation all the cases with more than 3 cows are extreme outliers from the overall pattern

primarily and only the final conclusions are confirmed with the data from FSS2005 by excluding the missing variables. So, from the whole population of the farms with dairy cows, 67% are with 1 cow and 21% with 2 cows. That is only less than 13% of farms with more than 3 dairy cows. But the number of farms isn't as important as is the distribution of the cows among them, therefore milk production (Table 4-10).

Table 4-10 Farms with dairy cows and dairy cows in 2003, grouped per herd size.

herd size groups	number of farms	dairy cows per group		% of total dairy cows
1cow	129231	129231		35%
2cows	39929	79858		22%
3 up to 9	21333	86456	small-scale farms	23%
10 up to 49	2909	48025	middle size farms	13%
50 up to 99	187	12569	large size farms	3%
100more	95	14869	extra-large size farms	4%
total		371008		100%

Source: Own calculation of FSC2003 individual farm data

4.6.1. Small scale, subsistent and part-time dairy farms

In the case described with Table 4-10 one still conclude that since 57% of the cows are in farms with 1 and 2 animals, consequently 57% of the milk is produced by them. Now we are going to argue this by providing some evidence – as far as it is possible with the data we posses.

For that purpose, the following is assumed:

- It is estimated that the milk yield varies among the farms from 3000 up to 6000 litter per cow and year where the bigger yield is observed among professional farms, usually with more than 10 cows. Therefore, we shall calculate the relative yield of 3000 litres for all the farms with less than 10cows, 4500 litres for those from 10 up to 49 cows, and 6000 litres annual yield for the rest of the farms, those with more than 59 cows (Todorow 2003; MAF 2007).
- According to the data available concerning the sales of raw and processed production, we can exclude from the account those farms that do not sell raw milk or processed milk products. That will restrict the scope only to farms with 1 and 2 cows, in which it is logical for the whole production to be for their own consumption, in contrast to the larger ones where those several cases are probably due to mistakes in the introduction or in the understanding of the problem. Thus, among farms with 1 cow we have 50275, and among those with 2 cows 8374, that does not sell raw milk or processed milk products in any form (MAF 2005).
- And finally the logic suggests that the need for raw material for processing industry is covered "from top to bottom", i.e., it is the production of the large farmers that is

purchased first, and the production of the smallest ones is purchased last(MAF 2007). In this way the quantity of milk produced by farms with more than 3 cows is calculate first, and the difference up to the quantity of processed milk accounted for the year is taken from the farms with 1 and 2 cows.

- For the period 2003-2004, a total production of cow milk of 1,3 million tons is reported, and the quantity of processed milk is 790 thousand tons(MAF 2007).

All in all, firstly, the impact of the small farms is decreased on the basis of the lower yields, and, secondly, on the basis of the information about how many of these practically do not sell milk for processing. Ultimately (Table 4-3), the share of farms with less than 2 cows in milk for processing does not exceed 19%, which practically is 35% of the milk produced by them. Thus it turns out that, farms with less than 2 cows use for their own consumption and direct sales 2/3 of the their total milk production (65%).

Table 4-11 Cow's milk produced and processed, by farms in groups per size of the herd, in 2003.

groups	% of dairy cows in group	% of total milk production	% of milk delivery for processing	self consumption and direct sells
1	2	3	4	5
1cow	21%	22%	19%	65%
2cows	17%	18%		
3 up to 9	23%	24%	81%	
10 up to 49	13%	20%		
50 up to 99	3%	7%		
100more	4%	8%		
Total	82%[51]	100%		
Total milk production / processed 1000t		1300	790	

Source: Own calculation of AC2003 individual farm data

The data calculated in Table 4-11 prove that the backbone of milk production delivered for processing is concentrated in farms with herd from 3 up to 49 milk cows. Column 4 in particular strongly decreases initially because of the evidently huge significance of the farms with less than 3 cows. While the farms with less than 2 cows are appeared rather insignificant with respect to the milk for processing they have respectable share from the milk consumption in form of direct selling and self-consumption in the country.

The aim of the analysis of those farms is to determine how many of them are keeping cows as supplementary activity while they may have another main agricultural business.

The distribution of the farms with 1 and 2 cows per size of arable land reveals that only 36% (about 60000 farms) of them are cultivating less than 0,5 ha of land. That is not significant for

[51] 82% of the cows ensure the production needed by the processing sector.

breeding one or two cows unless the land is used for another agriculture activity like vegetables or herbs that eventually provide income for purchasing feed stuff.

The distribution analysis of the farms with 1 and 2 cows results in the following conclusions:

Number of farms	Variable in question
61502 (36%)	Don't sell fresh or processed milk
2935 (1,5%)	Have more than 3LU[52] of other animals
36261 (18,7%)	Have no other animals
6086 (3,1)	Sell some processed production
5063 (2,6%)	Provide services to other farmers
61 (0,03%)	Agro-tourism
 4517 2596 1106 20371 3424 1834 14818 6530	Some form of sells of: Poultry eggs Bee honey Bee wax Wool Grapes Fresh fruits Potatoes Fresh vegetables
57%	More than 55 years old
7%	Have farming as sole occupation
21%	Farming is subsidiary occupation

The farms with up to 10 cows are the members of the small scale group. There is a slight difference between farms with 1-3 cows and those with 4 up to 10 cows substantiate by the amount of marketed milk.

In general, the farms in this group have either no prospect or low prospects for development. Furthermore, it can be concluded that factors that determined the development of all the farms with less than 10 cows are outside the dairy and even the agriculture sector. The opposite implies that the dairy or agricultural policy has no or very little effect on those farms.

[52] Livestock Units

4.6.1.1. Land, building and machinery

Most farms usually have about 5 ha of arable land. The structure of use is usually the following: 1/3 leased out and 2/3 as a share in the local cooperative. While the leased land provides some cash income, the share in the cooperative usually is paid back in natural form - cooking oil, bread coupons or raw products (on the basis of the average yield per hectare).

These farms typically have small- dimensions machines (mowers or cutters) and, very rarely, professional agricultural equipment such as tractors, ploughs and trailers or combine harvesters. In those cases when the farm has its own cash crops, machine processing take place in the form of outside services, and the rest of the work is done manually. Usually these are not more than 2ha in total, including up to 0,5 ha of maize and 1 ha of wheat and/or barley. Some of the farms with more than 5 cows maintain up to 5 ha of lucerne.

The farm buildings are restricted to a self-made cowshed, usually in the back section of the house. Those are mainly pastoral system of animal breeding; hence the function of the cowsheds is only for the animals to spend the night. Milking usually is done on place using mobile aggregates with aluminium milk cans.

4.6.1.2. Labour force

The younger the farmer, the bigger the herd is. Or, in most cases, adult farmers (over 75 years of age) prevail in farms with less than 3 cows, while younger farmers prevail in farms with more than 5 cows. There are exceptions in the cases of farms with a different specialization, but in spite of this they breed one or two cows.

Usually the whole family is occupied in the farm but rarely full-time; hired labour is not used. Some of the members of the family are occupied outside the farm and/or receive pensions. Part-time farming or hobby farming is observed very often amongst the farms with less than 3 cows. Full-time occupation of the family workforce in the farm is observed for those who have a large variety of activities (growing vegetables, poultry or pig breeding, etc.), apart from dairy farming.

4.6.1.3. Management and marketing

There is no solid evidence of any kind of active management amongst these farms. The farmers usually have low and/or inappropriate education. Specialized agrarian training in any form is encountered very rarely. For this reason, as well as because of the small quantities of products, essential marketing strategies are not observed.

The management of these farms is often chaotic or, in the best cases, it is dominated by decisions minimizing the risk for the family. These are mainly cases of a wide diversification of agriculture activities and the prevailing ratio of self-consumption versus market sales. Most farms

in this group are essentially “personal (accessory) farms”, they are at the same time traditional and found by necessity. With the exception of farms over 45 cows, the rest (the majority) have no financial accounting. In recent years, on different occasions, state authorities have been trying to impose some forms of accountancy, associated with the quantities of milk produced and sold, or with the revenues of the household when concerning cases for social financial assistance. These sporadic (from the point of view of small farmers) forms of accountancy in most cases baffle the farmers and create difficulties for them. Because the lack of accountancy there is no way to determine whether the farm meets the requirements for financial support and what the size of that support ought to be. While for small farms this is inessential, for the larger ones it is frequently fatal as it is insurmountable obstacles to almost all forms of state aid. The analyses of typical farms[53] shows that for a farm with 10 milk cows the (potential) size of the state aid often reaches up to 30-40% of the total revenue, while for a farm with 3 milk cows it rarely exceeds 5%.

4.6.1.4. Income, expenses, financial sources

While farms with less than 3 cows receive a relatively insignificant income from milk, the rest of them with up to 10 cows have 95-100% of their milk marketed. All the farms are not eligible for SAPARD programs with respect to the herd size when it is less than 10 cows, which however not preventing them to apply and use resources from measures not related to the dairy and the number of dairy cows. It is common that most of the farms with at least 5 dairy cows managed to receive subsidies per kilogram of milk and some occasional payments from the government usually depending on special events like drought, floods, animal or plant diseases etc. But, as already mentioned in the preceding section, the administrative requirements are very often beyond the capacity of the farmers.

In almost all the farms, alternative activities are observed. While some are predominantly for self consumption, others are widely marketable – vegetables and fruits, eggs, sheep etc. With the income of the off-farm employment of some of the family members, pensions and rents all together are the main sources of investment and operational capital for these farms. The use of loans for agriculture is not regularly observed, neither the mortgage on properties, in so far as it is not related to any agricultural activities.

4.6.1.5. Prospects for development

Common sense implies that these farms have little or no prospects for future development. The main reason for this is mainly the age structure of the people occupied in these farms, as well as the lack of their own investment capital and/or the restricted access to sources of such capital. Nevertheless, personal experience accumulated in working on these farms shows that they will

[53] See Chapter 5.3 (or the relevant one) for an analysis of the financial state and the development of the typical milk farms in Bulgaria.

continue to exist as long as the people are there, and/or until some significant improvement of the social environment has a positive impact and stultifies subsistent farming.

While the above is valid for dairy farms with 1 up to 3 cows, as a basic activity of the farm, for those in which the basic activity is different the prospects are of a diverse nature. Dairy farming within these farms will develop up to the point when the basic activity entirely involves the family workforce in exchange for a stable and sufficient income. The presence of a good income from basic activity is the major factor that would exert an influence in the direction of a discontinuation of any dairy activity in these farms.

4.6.2. The middle and large professional and semi-professional farms

4.6.2.1. Land, building and machinery

Usually these farms are utilizing as much as possible arable land. While some farms have their own land (inherited, purchased), there are curtain groups of them who historically have very little own arable land. Many middle-sized dairy farms are owned by relatively young-aged families who migrated from the south-east of the country 20 years ago. These farms rely mainly on rent contracts. Typically, all of them are utilizing at least 1ha of arable land per dairy cow.

Typically the farms of this group are very active on the land market. Their contribution to the reallocation of the land is due to prevailing transactions with small fragmented plots, in contrast to the large players on the market who prefer to purchase huge plots that, in their turn, are a rarity. In many of the cases, more than half of the arable land is sown with lucerne or grass mixtures.

The farm buildings are usually professional, property of the former cooperatives or newly-built ones, the same being also valid for the technical equipment. Of course, most machines are old and technologically backward but, in contrast to the previous group, it is more frequent for this group to have new machines and technological equipment and to undertake the construction of new farm buildings.

The technical equipment usually consists of a tractor, soil processing machines (ploughs, harrows and clod crushers), trailers and different variants of machines for mowing and baling. Combine harvesters and other more complex machinery are not typical, and it is rare for some of the farms to possess more sophisticated technical equipment for milling and/or other types of forage processing.

Although logic would have it that are precisely the farms who should be the target group of programmes such as SAPARD, my personal experience while working with them shows that their applications are either most readily refused or prove to be unsuccessful eventually.

4.6.2.2. Labour force

Whereas the prevailing among the averagely sized farms is the family workforce, with the increase of the number of milk cows the use of hired labour also increases. It is interesting, however, that labour supply is very scarce and of low quality. The sector itself and payment in it are not particularly attractive, in spite of the fact that professional workers are an exceptional rarity there[54]. Farms of this group are very frequently forced to hire unqualified and "problematic" workers from the minorities that are very often the predominant young population in many rural regions. In the interviews, almost all farmers paid special attention to this, emphasizing the fact that in milk cattle breeding the good work practice, i.e., experience, is essential for the yield and the quality of milk. And this is something, all of them pointed out, it is impossible to achieve such standards with the workforce available for hiring. These farms very often use seasonal workforce.

Among farmers in this group, prevailing are those with some form of agrarian training, mainly agronomists and veterinarian, employees of the former cooperatives; experts with an agro-economic specialization are very rare.

The employees in this group are mainly middle-aged, in contrast to the previous group which contains the largest part of farmers over 75 years of age. This group also includes most of the youngest farmers, although, as a whole, their share is relatively small.

4.6.2.3. Management and marketing

In contrast to the previous group and thanks to the education and the size of the economic activities, the management of these farms is at a considerably higher level. In spite of this, as already noted, most of the educated farmers in this group are mainly veterinarians or agronomists, who received their education and practical experience during the time of planned economy. Some of the larger farms of this group can afford paid administrative services and/or supplementary training in the field of management organization, marketing, accounting, etc.

Some cases of producers union are usually encountered among farms of this group, but they are a rarity as a whole.

4.6.2.4. Income, expenses, financial sources

The major revenue of these farms is formed by milk sales, whereby until the beginning of 2006 many of them also performed purchasing milk from smaller producers. In many of the cases, these purchases contributed an almost 50% to the total farm revenue. After 2006, this practice was discontinued because of the quality requirements and the system of licensing the milk collecting

[54] It is supposed that if supply is restricted, payment and conditions ought to increase with the aim of attracting the necessary resources.

sides. This situation forced most farmers to produce by their own the quantities that they used to purchase until then, with the aim to keeping their contracts with the processor at the same level. In the typical case, these changes are equivalent to a 25-50% increase of milk cows.

Mechanization services to other farmers are another significant source of income, usually soil processing, mowing and baling.

In contrast to the previous group, milk production in this group is a leading activity for the farms but, nonetheless, many of them have large vegetable gardens, poultry, pigs and/or sheep and goats usually for own consumption.

Most farms mainly rely on their own financial sources – sales revenues, income from employment outside the farm, rents, revenue from external services. They resort to loans from banks and other financial institutions very rarely, every step for activity growth usually being at the expense of funds that would otherwise be used by the household.

The cost of the production is lower that that of the first group, but in spite of this it is comparatively high, mainly because of the weak management and the lack of qualified workforce.

4.6.2.5. Prospects for development

These farms appear to be the backbone of Bulgarian dairy farming, based on the criterion that dairy farming is a primary activity, a main source of income and a predominating share of marketable production from all the on-farm production. Beneath them (in matter of size) and above them we encounter extraordinary cases as subsistence or large scale farming who makes them unreliable for the sector both because they can easily quit dairy farming and do not respond to any dairy policy or their number is relatively small compared to the vast majority of the dairy farms.

They posses all the required characteristics in order to comply with the EU regulations and agenda, but still many obstacles hinder their way to a successful development. The relatively young age of the farm managers, proper education and qualification and good traditions are advantages common in this group. The lack of qualified personal, the high price for input materials as well as poor accesses to investment capital, are the general disadvantages faced by the farms on their way.

4.7 Conclusions

On the basis of personal experience and consultations made with experts in the field, milk farms in Bulgaria may be said to be classified into two categories from the point of view of the significance of milk production – both for the farms themselves and for the industrial sector as a whole. These are farms whose basic activity is milk production and farms that, in one way or another produce milk as an accessory activity.

The direct contact with farms of the different groups according to the number of milk cows led to the following general conclusion related to all farms with under 10 animals. The share of market milk varies from 20 to 50%, whereas in farms with more than 10 animals it is close to 100% of the total produced. In combination with the traditionally lower yields, this brings to the conclusion that the farms in the first group have a considerably lower share in the milk for processing than the average values show – given by national statistics and describing the milk sector in the national report of the development of the agrarian branch.

The national statistics for 2003 give an average yield of 3600 kg/year/cow on the basis of the total of milk produced (about 1,3 million tons) and the number of milk cows (about 370 thousand), which, in its turn, suggests the conclusion that almost 80% of the milk comes from farms with under 10 cows. For the same year, the data from the national statistics show that a quantity of almost 800 thousand tons of cow milk was processed, hence 500 thousand tons are defined as milk for own consumption and direct sales. Our experience, however, shows that none of the farms with 1 cow that were interviewed/filled in a questionnaire handed over milk for processing, while those with 2 and 3 cows handed over approximately 50% of their milk for processing and the rest of the farms with up to 10 cows state that they used the yield from 2 cows for their own use and for direct sales. On the basis of these conclusions, we infer that the share of farms with under 10 cows in the quantity of milk for processing is approximately 44%, 22% of these being at the expense of farms with 2 and 3 cows. The remaining 56% is distributed among farms with more than 10 cows, whereby only 13% of these is supplied by farms with over 90 animals.

In short, indeed almost 70% of the cow milk produced in 2003 comes from farms with less than 10 animals but in its greatest part it remains for own consumption and direct sales. What is more, the following observations of typical farms showed a clear tendency for an increase of the number of animals (most often doubling) among the farms in the group from 10 to 50 animals at the expense of those with 1 and 2 cows, and in some cases also of those with about 10 cows. This increase originated from the changes that occurred with respect to the requirements for the quality of raw milk, the requirements for purchasing raw milk and, last but not least, the requirements (restrictions) for subsidies and direct payment. Later on in this study, the two typical farms determined for Bulgaria in 2005, BG-2[55] and BG-22, led in 2007 to a replacement of the second one with BG-34, in which the increase of the herd with 12 milk cows in question was implemented.

The analysis made allows us to conclude that milk production in Bulgaria is represented by a vast number of small-scale subsistent farms, many small-scale semi-subsistent dairy farms, some

[55] BG-2 stands for Bulgarian typical dairy farm with 2 cows, BG-22 with 22 cows

middle-sized semi-subsistent dairy farms and few large-scale dairy farms. This conclusion emphasizes the division of small-scale mixed[56] farms from small-scale dairy farms, on the basis of the significance of milk production for the whole farm.

For this reason, from special significance for better understanding of this agricultural branch is the successful distinction of dairy farms from the population of farms with dairy cows. This division can only be made on the basis of the individual farm data from the census of agricultural producers breeding cows.

[56] Crop and animal breading farms, all kinds of agriculture activities

5 Farm level analysis

Specialized literature abounds in materials dealing with different aspects of agrarian policy in Bulgaria (analysis, assessment, recommendations) and, in particular, of the state and the development of dairy farming (Davidova 1991; Mathijs and Swinnen 1998; Frohberg 1999; Gow and Swinnen 1999; Panayotova and Adler 1999; Lerman 2000; Mishev and Kostov 2001; Kostov and Lingard 2004 -3; Bachev 2005; Janssen, Hlebarov et al. 2005). Using various approaches and methods, scholars are trying to determine the problems in the structure and the development, striving to find the impact of the different factors (markets, prices, political decision-making, investments, etc.) internal and external, and to assess the long-term effect of one or another policy. They all look upon the problems from above (top-down approach), working with aggregated data and/or average values. With them, the farm usually has a passive role, an object of the investigation, on which the impact of a number of external factors is “tested” and its reaction is analyzed.

So far, investigations, with respect of Bulgaria, have not been made such that the point of view of the farm is taken into account and extending “upwards” – bottom-up approach.

This study aims to show the situation from the point of view of the farm, how the current policies look like, what the possible choices are and how they can be combined in the particular state of affairs. This point of view very rarely reaches the height of any policy applied at the moment to the agrarian sector. For the owner of the typical dairy farm in Bulgaria, most of the opportunities offered by the governmental programmes and policies are, rather, pieces of news that happen to someone and somewhere but it is not possible for them to materialize here and now for him. For the common farmer, to carry out a SAPARD project for 100 000 EUR is madness as an idea and purely practically unrealizable. This farmer reasons following the principle about how something should come out of nothing, he does not rely on banks and support programmes because of the simple reason that he does not understand them, which, in its turn, means that every attempt for explanation will end up with the question “And what if something goes wrong?”. Question which addresses the lack of trust in institutions as a whole and bank institutions in particular.

The personal experience from dealing with Bulgarian farmers, showed that most small and middle-sized ones (among the few) that applied with projects on the SAPARD programme did this mainly with the help and under the influence of close relatives or friends whom they trust a lot. The other farmers, who used the services of specialized companies, if they were not misled and cheated, managed to realize the project but are in most cases currently dependent on their “benefactors” if not entirely at least to a large degree. What is more, it is about very few farms as a whole, and in principle with respect to the total number of agrarian farms in the country (say, among 600 000 farms in the country) the SAPARD projects that were approved and realized are about 2000 - 3000 along all the lines of financing.

Taking into consideration the information and the knowledge acquired in the work with these farmers, the typical BG-34 farm was created. In this analysis we consider 3 possible strategies for development, formed on the basis of the understanding of the “typical” farmer, combined with our

personal experience and consultations with local experts in the field of agriculture and stock breeding. These strategies are not the full combination of actions that can be initiated by such a farm, they, rather, possibly stand closest to the real opportunities and conceptions of the farmer according to his global understanding, helped to a certain degree by the expert opinion provided to him by the structures of the MAF in the region.

The opportunities offered by the IFCN methods and their TYPICAL model allow us to carry out this study and to observe and analyze "the whole farm" under different angles[57] and at different moments in time during which the strategies envisaged are effected. With the help of the model instruments we can find the weak spots in the strategy according to time and place, to optimize the use of resources and especially to answer the farmer's question "What if?" Because in the process of creating the typical farm it was established that it is not possible for a farm development strategy to be offered if you are not ready to answer a multitude of questions of the type "What if?" It turns out in practice that the number of "What if?" questions is proportional to the risk barrier of the farmer; the higher the number of positive answers provided, the lower the barrier falls and the larger the confidence of the farmer (Pannell 1996; Kostov and Lingard 2004 -6); and the successful effectuation of the strategy depends also on the confidence of the farmer. The presence of a large dose of uncertainty about the possible (sometimes hardly probable) developments practically paralyze the farmer's ability to think rationally, which in its turn hinders the implementation of any strategy to its end.

It should not be forgotten that the typical farmer rarely has a specialized agrarian training or basic knowledge in the management and organization of an agriculture enterprise. All the knowledge and skills are procured "externally" in the present situation, their acquisition by the farmer being not only a matter of time and expenses for his training but to a large degree of the confidence in their usefulness. Such confidence is acquired solely on the basis of the "successful practice example".

In the first part of the analysis the typical Bulgarian dairy farm is comparison with farms from the EU similar to it, with the aim of finding the similarities and differences with some leading and similar farms in the community. On the one hand, in order to assess the advantages of the Bulgarian farm, there are things that could be placed an emphasis on in the development to follow, on the other hand, this is in order to reveal the weaknesses that we can try to correct, eliminate or minimize. The improvement of the competitiveness of Bulgarian dairy farms is one of the major aims of almost all policies and programmes of the government focused on the sector, and using this comparison we are trying to determine the relative position of the Bulgarian farms among their European counterparts. At the same time, such a comparison can serve a good purpose at a later stage, as a measuring unit of the general agrarian policy of the country.

In the second part of the analysis, the development of the typical farm is studied in the 2006-2016 horizon, with the use of three alternative strategies. To illustrate the effect of each strategy, the results are compared and contrasted to the so-called "base line" of development, where a "lack of a concrete strategy" is used as a strategy, or a more detailed preservation of the number of milk

[57] Considering the point of view of the household – family objectives, in contrary with the farm efficiency indicators – production cost in general and in particular (labour, machinery and capital), local and EU competitiveness, financial ratios as measures of financial management, etc.

cows and a system of breeding and work in the farm. The development of the “base line” at the horizon of projection is the hypothetical future of the farm if no measures for development are taken. At the same time, the surrounding environment changes, this having various effects on the farm.

Thus the effect of the surrounding environment and the management decisions from the three strategies can be compared in the 10-year horizon of projection. On the basis of this information, a decision for a choice of a strategy can be made or for its improvement[58], or targets can be determined to be reached. The latter is especially useful when at the following stage a particular aim is set for reaching the projected horizon at a particular moment. This is the third part of the analysis in which we try to model the optimum typical farm for the country. On the basis of the whole experience accumulated so far, the information about the probable socio-economic development and an educated guess, we form the parameters of the farm according to the criteria that we adopted as optimal. A major aim of the optimal farm is the balance between income and risk from the point of view of the farmer and the family. For this reason the optimal farm in question is optimal for the household and not in some other common meaning having to do with the use of resources, a financial result or technical effectiveness, although each of these criteria conforms in one way or another under the common denominator of the input/output balance.

The approach in the modelling of the “optimal one” is more “cautious advance” (heuristic approach) rather than “direct hit the target” grounded. A suitable analogy of the strategy is the Latin proverb festina lente “hurry slowly” that generally underlies the idea for a gradual and stable development in contrast to the well (and painfully) known shock therapy. This strategy combines in itself the elements of “subsistence farming” and well-planned expansion and specialization of the milk farm. Basically the steps made are grounded in the improved management and planning, a fuller use of the measures and programmes for assistance and moderate steps for expansion, guaranteeing minimal damages in unforeseen circumstances rather than “probable maximal profits”.

[58] Considering the parameters for cost of milk production, family living expenses and generally accepted criteria for financial stability of the enterprise.

5.1 Description and comparisons of BG-34 typical farms

One should keep in mind that in this chapter a typical characteristics are used but they refer to the typical farm as to an existing one. This specification, apart from anything else, is aimed at exempting and freeing from the necessary permanent statement that "this is the typical case or that it is usually so" with farms of that type and size.

5.1.1. Description of BG-34 typical dairy farm of Bulgaria in 2006

The aim of the subchapter is to introduce comprehensive information on the nature of the particular object of the study: the BG-34 typical dairy farm.

The BG-34 is the second (the large one) typical farm of Bulgaria, built by the IFCN methodology[59] and updated for 2006. The farm is built by using a panel of farmers, local experts and scientists in 2007 data updating and collecting in the northern central region of Bulgaria.

The description of the main farm factors of production is organized in a way as they are summarized with the IFCN "OUT-3-short"[60] tools. The tools provide materials for a panel and advisor discussion during the data collection and typical farm building. It is a spreadsheet table which is setup to extract and summarize data from the main input form of the IFCN model TIPICAL[61].

5.1.1.1. Whole Farm Data

The whole farm data describe quantitative characteristics of the factor of production involved. One should keep in mind that the typical farm discussed is not a really existing farm but an expert estimation based on a sample of real farms(IFCN 2004)[62]. Therefore, the typical farm appears "perfect" in a sense, whereas in reality farms of that size have a much lower level of complexity in their structure and have no precise information about their own economic activities.

- *Overview*

The farmer is a registered agricultural producer (RAP), a legal form required in Bulgaria for any type of government support.

[59] See Chapter 3 Data availability and methodology of the analysis.
[60] Short output from the model usually used in the panel with experts and scientist when building the "typical farm"
[61] See Chapter 3.2. IFCN method and documentation of the model TIPICAL.
[62] See Chapter 3.2.1.1. Selecting a 'typical' farm

The farm operates with a total of 40 ha of agricultural area, of which 85% is rented, 12% arable land and 88% grasslands. It could be classified as a pasture-based cattle breading farm system according to the percentage of grassland but actually the pasture is done on the municipality owned grassland areas (not included in the total arable land of the farm) and the own grassland is usually used for hay or silage. The use of a common land for pasture is a costless advantage but it contributes very little to the overall feeding of the dairy cows, particularly compared with the distance to be covered by the animal and the energy used for this. It was observed during the data collection process (2005-2006) that farmers who are developing towards professional milk production decreasingly depend on that grassing, in general farms with more than 20 cows barely rely on common pasture if they use pasture at all.

On the other hand, the main source of feeding of small-scale farms is that kind of grassing. The common practice is that all the small-scale farms send their animals in to herds altogether for grassing, by sharing the cost for the cattleman (a shepherd or similar). The farmers rely on the shepherd to inform them for the period of the cows, protect them from any risks during the grassing etc. Actually many accidents occur during the grassing, including miscarrying of the calf, injuries during “social contacts”, etc. Altogether, the use of this common pasture could be more costly to the farmer than its benefits, mainly in the increase of the inter-calving period because of poor observation or injuries.

The code of the farm is BG-34, stated for the typical Bulgarian dairy farm with 34 cows. This is a constant number of animals assumed by taking into account the heifers that will become cows during the year, as well as the cows culled in the same period. Therefore, upon this number the percentages of death, culling and birth rate and payments are calculated.

It has to be mentioned that this farm is an ancestor of the 2005 BG-22 farm whose development was mostly driven by the milk quality policy regulation. The reasons and the process of development were described in “Evaluating the financial position and performance of a typical dairy farm in Bulgaria”(Vassilev 2007).

The labour force involved in the BG-34, measured in IFCN labour units[63] (LU), consists of the farm owner (farmer), his wife and one more family member, both of them on half a workday. In the panel it was assumed that the typical family in this farm size class consists of an average of five members. It is the farmer family (wife and two children) and one or two grandparents, who are retired and most of the time work on the farm as much as they can, driven by the tradition and the routine of their whole life.

[63] See 4.2.3.3 Model input, for Labour Unit description

Together with two hired labourers (milkman, common farm worker) and the shepherd, the farm has in total 3,3 LU, each of them yielding 2100 annual working hours of a qualified worker. On this basis, the amount of family labour involved is 0,8LU. In spite of this, the lack of qualified labour is an issue for the dairy sector in general. Very often farmers admit that they hired one or two gipsy families for working on the farm, and that is the best chose available in contradiction with the official high rate of unemployment in the rural areas.

- *Machinery and Equipment*

The machinery and equipment estimation is relative, as no certain data concerning prices is available. In most cases such a farm start its activities based upon a small household agriculture enterprise sustained by the older generation. After the restitution the family received its land and some property from the local TKZS (the labour-cooperative agriculture farm) and MTS (a machinery-tractor station) in the form of animals and some machinery. Skipping the process of founding the farm, the result is that (Table 5-1) the farm operates as labour intensive rather than a capital intensive one.

Table 5-1 Machinery list of the BG-34 typical farm in 2006

Machinery List	Year of purchase	Purchase price (BGN[64])	Replacement value
1 forage mill	2000	1 500	5 000
2 milking system	2003	6 000	7 000
3 Car	1991	2 800	25 000
4 Tools	1990	1 810	3 000
5 Tractor MTZ 80hp	1997	2 000	30 000
6 Trailer 1 – 6 tons	2003	500	2 500
7 Trailer 2 – 3 tons	2002	1 000	2 500
8 Mower for tractor	2002	800	3 500
9 Cultivator 2 (tiller)	2002	500	800
10 Tractor-driven plough	2002	900	1 300
11 Milk cooling equipment, tank	Provided by the Dairy processor		

Source: Own Data Collection, panel 2006

Most of the equipment is used for services to other farmers as well. The replacement value is the current market value of such machinery on the market (used one). It is common practice that the dairy operator is providing cooling equipment to his “bigger” suppliers as part of the program for improving the quality as well as to optimize the transport cost of collecting the milk.

[64] BGN (Bulgarian leva new) was introduced to distinguish from BG (abbreviator for Bulgarian leva) after the denomination of the currency in 1996.

- *Buildings and Facilities*

Table 5-2 List of Buildings and Facilities of the BG-34 typical farm in 2006

List of Buildings and Facilities	**Year of purchase**	**Purchase price** (BGN)
1 Cowshed	2007	8 000
2 Penthouse for calves	2001	3 000
3 Milk collecting centre	2001	1 500
4 Living building (apartment)		
5 Living building (house)		

Source: Own Data Collection, panel 2006

During the panel with experts and farmers, it was assumed and accepted that it is a typical case in this size class that the cowshed is rented form the local cooperative that is the legal owner of the building left by the former TKZS. The majority of the farmers representing this size class confirmed their intention to buy the building as soon as possible (some of them had already done this). This intention is driven by their plans for repairs and extensions of the building in order to improve the conditions and introduce new equipment and systems, such as a milking parlour and an automated cleaning system – in the future.

The living buildings are listed because they were used as mortgage for loans in the past. An important characteristic is that private property was, and still is, the best (sometimes the only available) source of investment capital farmers can use. During the last IFCN conference it was discussed and decided that it should not be included in the farm capital calculation.

- *Labour input and wages*

Although hired labour in LU is more than the family labour, the farm mainly depends on the latter. High fluctuation of personnel was confirmed by all the farmers in this size class.

Table 5-3 Labour used in the BG-34 typical farm in 2006

Hired Labour	Labour Units Number	Total working hours per year	Yearly Wage incl. Side Costs	Total wages
Farm workers – milkman and common worker	2	2 640	2 880	5 760
Shepherd	1	2 555	2 160	4 320

Source: Own Data Collection, panel 2006

- *Profit and Capital Structure*

The profit from the previous year is assumed to be 6000 leva[65]. This is an expert estimation and it is used only to balance the TM-3[66] model. Other such variables are the "Cash on Hand at start of the year" and the "Minimum Required Cash Balance", both of them with a value of 3000 BGN.

The farm receives its major revenue from the sales of milk (76712 BGN/year), a small share is represented by the income from the sales of young animals from the different groups, and only 9600 BGN/year of total revenue from subsidies and direct payments.

Apart from the revenue given in the table, added as external for the farm are revenues from the yearly payment of one member of the family, working outside the farm (3000 BGN/year taxable), and the pension of one grandparent (720 BGN/year).

In contrast to the previous version of the "large typical farm for Bulgaria" (BG-22) in which 50% of the revenues were due to milk collection from the smaller farmers in the settlement and mechanized services for these, in BG-34 there is a total absence of milk collection, and mechanized services are sporadic, usually on the basis of an exchange of services, i.e. they are not of a monetary nature.

Table 5-4 Output from the profit-and-loss account of the BG-34 typical farm in 2006

Income		2006
- Crop sales	BGN/year	0
- Milk sales	BGN/year	76712
- Sale of calves	BGN/year	1980
- Sale of breeding heifers	BGN/year	7650
- Sale of beef cattle	BGN/year	1496
- Direct payments, subsidies	BGN/year	9600
- Capital gains and losses	BGN/year	0
- Interest payments	BGN/year	86
- Total output	BGN/year	97524
Total output check	BGN/year	97524
Fixed expenses		2006
Land improvement	BGN/year	0
Maintenance machinery	BGN/year	2300
Maintenance buildings	BGN/year	500
Contract labour	BGN/year	0
Diesel for vehicles	BGN/year	2300
Diesel for heating/irrigation	BGN/year	1080
Gasoline	BGN/year	720
Electricity	BGN/year	1800
Water (fresh * waste water fees)	BGN/year	600
Farm insurance	BGN/year	0
Farm taxes and duties	BGN/year	800
Advisor costs	BGN/year	0
Accountant & legal fees	BGN/year	600
Phone & utilities	BGN/year	2100
Rent for the barn	BGN/year	1800
Total fixed expenses	BGN/year	14600

Source: Own Data Collection, panel 2006

[65] BGN = Bulgarian leva = 1.95€

[66] Short abbreviation for the TIPICAL model of IFCN version 3

The typically fixed expenses are strongly restricted to the payment of materials and services that the farmer cannot avoid: fuels, communications, various charges, spare parts, electricity, and rents. It is rare for farms in this class to have insurance on farm activities or property or (monetary) expenses for improving the quality of the land. Advice-giving in agriculture is in theory provided free of charge by the local structures of the Ministry of Agriculture, but in reality they are rarely of any practical value.

The major part of the maintenance of buildings and facilities is performed by the farmer, using materials at hand, the only monetary expenses are those for spare parts. In practice, the largest budget item in fixed costs is represented by fuels and energy.

- *Information on Farm-Ownership (Taxes, Consumption, Private drawings)*

According to law, agricultural producers do not pay income tax, and according to the accountancy laws they are obliged to calculate it, its value being re-invested. Again according to the agricultural producers' legislation, they are obliged to perform self-insurance (health and social insurance) on a fixed basis. In the particular case, not forgetting that one member of the family is employed outside the farm (and has been given the relevant health and social insurance by his employer) and the retired grandparent has no social and health deductions from his/her pension, there remains only one family member to be provided with an insurance.

The maintenance of a four-member family according to the statistics for the year 2006 amounts to a minimum of 185 leva per person per month. On the presumption that the typical farm to a large extent also means a typical household which, in its turn, has realistic expectations for the level of its income equal to the one average for the country, we form the three degrees of Family Living Expenditure:

Table 5-5 Family Living Expenditure in BG-34 typical farm in 2006

fix drawings – family living expenditure	minimum drawings	maximum drawings after taxes
C/year	C/year	C/year
18000	15000	27000

Source: Own Data Collection, panel 2006

What is specific about the values thus set is that they cover the expectations of the family for monetary expenses (for personal needs) during the year, and this, in its turn, strictly means cash expenses. It must not be forgotten that the farms of this class have a comparatively high level of satisfying the family needs of agrarian production (vegetables, fruits, milk, meat, vegetable oil, flour, potatoes, etc.), a subsistence which monetary equivalent can be roughly determined as at least 2000 leva per member per year.

5.1.1.2. Data on Crop and Forage Production

For the period under investigation, the farm restricts itself only to the production of a small part of the necessary fodder for the animals. This is to a large degree due to both the unfavourable climatic conditions in 2005/2006 and the fluctuation of the prices of fuel and services, not only because of the general state of affairs but also because of the approaching date of the country's accession to the EU.

- *Available Acreage and Prices*

As already pointed out, the farm has at its disposal 6 hectares of own arable land. The price of arable land of the second or third category largely varies within the country, and for a Northern central region for this period it is 1200 leva/hectare at the average. The arable land market is, however, underdeveloped, although for farms of this class this is often insignificance since they prefer to work many small pieces of land on a mutual agreement with the owners. Most of the real farms that were interviewed in connection with the updating of the information about BG-34 were in the process of buying arable land and pastures, and this will be pointed out again further on in this study.

As already mentioned, municipal pastures are used free of charge by all the farmers of the settlement. Our farm, although it relies on pastures less and less, "walks" its herd on about 34 hectares of meadows that are practically too far from the definition of meadows, as no care is taken for their maintenance or rehabilitation.

The rent for arable land is 50 leva/hectare/year at the average but the farms of this class rarely conclude contracts for rent; usually when they use other people's arable land, it is on the basis of a mutual agreement with the owners, and the payment is frequently effected in kind (production) or against services. Because of the strong fragmentation of the plots, it is often very difficult to hire a sufficiently large and compact plot of land that can be machine-processed.

- *Land use, Yields, Prices and direct payments*

For the reasons mentioned above, and also because of the absence of financial resources for growing corn cultures, for example, the farm mainly grows lucerne on its own land (4,8 hectares) and grass on arable land (1,2 hectares) is planted on the plots that are more difficult to process. Both lucerne hay bale and grass on arable land are mowed for hay bale.

The cost of a ton of lucerne is calculated at 166 leva which, given these yields, means an average of 996 leva of costs per hectare. For grass on arable land this is 99,6 leva per ton at 450 leva of costs per hectare, respectively. The calculation is made on the basis of the typical expenses of farms in this class and not on the basis of the current market price[67].

[67] Purchased on market prices are the other fodders, including the deficit of those produced in the farm, described in 5.1.1.3 - Prices for purchased feed.

In this case the farm receives no direct payments, as for 2006 payments were made only for corn, maize and barley, and direct payments are expected to start from 2007 onwards.

Table 5-6 Crops mix planted, yields and total production of BG-34 typical farm in 2006

	Lucerne old - hay bale	Grass on arable land, hay bale	state owned pasture land
hectare	4,8	1,2	34
yield t/ha	6	4,5	3,8
total production tone	28,8	5,4	129,2

Source: Own Data Collection, panel 2006

- *Mineral balance and fertilizer input*

The quantity of fertilizers used for the cultures grown has not been established, hence the yields given are from unfertilized areas.

5.1.1.3. Data for the Dairy Enterprise

- *Inventory and Performance data*

The farm has at its disposal 34 milk cows as a year's average. The structure of the herd used is on the basis of the schemata set for simulation in the TM3 model of IFCN, constituting, in practice, the necessary animals ratio aimed at preserving a constant number of milk cows through own reproduction (Table 5-7). In principle, this structure is especially important for farms with 10 and less cows, where own reproduction is extremely difficult, in our case there are prerequisites for a growth of the herd or for a better management – an increase of the yield per animal by decreasing the number of lactations.

Table 5-7 Dairy herd structure for herd simulation of BG-34 typical farm in 2006

No. dairy cows	no.	34
Milk consumed in the farm	t/year	12
% of cows are dry	0,0x	21%
No. of breeding bulls	no.	0
Weaning female dairy calves at beginning	no.	3
Other weaning calves at beginning	no.	3
Heifers (x-12 months) at beginning	no.	9
Heifers (12-24 months) at beginning	no.	12
Heifers (>24 months) at beginning	no.	5

Source: Own Data Collection, panel 2006

Or, for ensuring the own reproduction and the maintenance of a herd of 34 milk cows, the farm (at the beginning of the year) has at its disposal 5 heifers (>24 months) ready to join the herd in the current year, 12 heifers (12-24 months) for insemination in the current year and a total of 15 other calves for replenishing the groups above and/or for feeding and sales according to the particular situation during the year.

The yield reported per cow/year is 5600 kg at the average, with a fat content of 3,4% and a protein content of 3,2%. In addition, two other indicators related to the “Dairy Yield Figures” are calculated:

- Calves alive after one day (per cow) – 75%
- Share of marketable milk from the milk used on the farm – 91%

The latter is extremely important in the cases of a high level of milk consumption in the farms (feeding calves, own consumption from the household, etc.). Listed in the following table are the rest of the major indicators for the milk herd as a whole:

Table 5-8 Indicator for the dairy herd structure of BG-34 typical farm in 2006

Strategy		**2006**
Weaning period (months)	months	3
Age of first calving	months	29
% insemination with a beef bull	0,0X	0,1
Sale weights		
Cull cows	kg/animal	550
Cull breeding bull	kg/animal	600
Cull heifers (x-12 months)	kg/animal	300
Cull heifers (12-24 months)	kg/animal	450
Cull heifers (>24 months)	kg/animal	0
Sale of animals		
Cull breeding bull	no.	0
% of cows culled / year	0,0X	6%
% female dairy calves (2 weeks old) sold	0,0X	0
% male dairy calves (2 weeks old) sold	0,0X	100%
% male & female beef calves (2 weeks old) sold	0,0X	0
% heifers (x-12) culled	0,0X	0
% heifers (x-12) sold for breeding	0,0X	0
% heifers (12-24) culled	0,0X	
% heifers (12-24) sold for breeding	0,0X	0
% heifers (>24) culled	0,0X	0
% heifers (>24) sold for breeding	0,0X	0
Surplus heifers sold for breeding	no.	0
Death rates		
% cows die	0,0X	2%
% calves (0-x) die	0,0X	2%
% heifers (x-12) die	0,0X	0
% heifers (12-24) die	0,0X	0
% heifers (>24) die	0,0X	0

Source: Own Data Collection, panel 2006

The herd strategy could be defined as relatively good, usually in well-managed farms. The “age of first calving” is closer to 27 months. What is specific here, however, is that “% of cows culled / year”, that is extremely low, in high-productivity herds it is usually close to 30%, and experts recommend an average of about 25% of repair per year. In this case, however, the farm is being prepared for the forthcoming direct payments and a distribution of the milk quota at the beginning of 2007. As in all farms, here, too, the aim is the increase of arable land and of the number of animals, for which direct payments are expected. This understanding has an abrupt effect on the average yield per animal and is reflected on the cost of a litre of milk, hence on the general effectiveness of the farm.

But, as already stated, practically the farm is capable of maintaining itself even at a 20% of repair per year; however, we are currently discussing the state of affairs at the time interval of one year, without involving possible actions related to a possible development of the farm.

The death rate of cows and calves is within the norm and the sale weight of the different groups of animals is within the average for the country.

- *Prices received in the Dairy Enterprise*

The average annual milk price the farmer receives (mailbox price) for the fat/protein content specified below is 0,43 BGN and milk quality at sale:

Bacterial cell count 100000

Somatic cell count 400000

The farm receives subsidies per litter of first-grade milk handed over for processing and per cow that answers the requirements for a high yield (over 5000kg/year). For 2006, 0,05 leva per kg of milk and a net of 20 leva per milk cow per year were paid.

There follow the current prices of beef (used in sales for slaughter) and the different groups of animals (in sales for fattening or insemination):

Table 5-9 Beef and Livestock prices received by BG-34 typical farm in 2006

Beef prices		
Cull cows	BGN/kg	1,36
Cull breeding bull	BGN/kg	1,33
Cull heifers (x-12 months)	BGN/kg	1,93
Cull heifers (12-24 months)	BGN/kg	1,83
Cull heifers (>24 months)	BGN/kg	1,80
continue		
Livestock prices		
Buy breeding bull	BGN /head	1300
Female dairy calf	BGN /head	250
Male dairy calf	BGN /head	180
Female crossbreed calf	BGN /head	190
Male crossbreed calve	BGN /head	180
Heifers (x-12) for breeding	BGN /head	540
Heifers (12-24) for breeding	BGN /head	810
Heifers (>24) sold for breeding	BGN /head	850
Heifers (>24) purchased for breeding	BGN /head	900

Source: Own Data Collection, panel 2006

- *Data on Milk-Quota*

In 2006, experimental quotas for milk were handed out that will enter into force in 2007, the quotas are free of charge.

- *Variable and Fix Costs of the Dairy Enterprise*

Table 5-10 Variable expenses per cow of BG-34 typical farm in 2006

Vet. & medicine	BGN/cow	25
Breeding costs	BGN/cow	30
Milk supplies	BGN/cow	0
Herd testing	BGN/cow	15

Source: Own Data Collection, panel 2006

Variable expenditures for milk cows in this case are the most concrete ones – for insemination and veterinary medical services. Also not given is the payment for a veterinary doctor on the obligatory contracts for observation entering into force as of 2006; it has been relatively registered as expenditure with the total fixed costs.

The other expenditures are registered in the total fixed costs of the farm (electricity, water, fuels, etc.). Milk supplies are usually provided by the dairy farm (chemicals, rubber parts, filter, and maintenance milk machine). Herd testing is necessary for receiving the right to a subsidy per cow, pointed out in the previous section, at an amount of 35 leva. Fixed costs related solely to milk production were not determined.

- *Rations for Dairy Cows*

The rations are divided into seasonal ones, where the winter one is 165 days and the summer one is 200 days. What is specific with lactating cows is the use of pasture and concentrated fodder in the summer period that are replaced by maize silage in the winter period. In the other groups, maize silage is used in the winter period and in the summer period half of it is replaced by spirits by-products.

Table 5-11 Dairy Feed Input Data (Rations kg/day) of BG-34 typical farm in 2006

	2006								
	Lactating cows		Dry cows	Heifers					
	I	II	I	I (x-12 months)	II (x-12 months)	I (12-24 months)	II (12-24 months)	I (>24 months)	II (>24 months)
Days of the year ration is fed	165	200	365	165	200	165	200	165	200
	kg per cow and day								
Home grown feed									
Lucerne old - hay bale	6		4		2		2		2
Grass on arable land, hay bale	4		4	3		3		3	
state owned pasture land		18			5		5		5
Bought-in feedstuffs									
Maize silage	20	2	5	10	5	10	5	10	5
straw	2	2	2		2		2		2
peas-oats blend, bale	4								
spirits by-products	12	12			4		4		4
Concentrate fodder		6	2	2		2		2	

Source: Own Data Collection, panel 2006

The use of spirits by-products (beer products and various nutrition sub-products from the nearby factories of the food industry) turns out to be a very profitable source of the necessary substances for milk cows, and these are systematically used by small- and middle-sized farms instead of concentrated fodders that are extremely expensive for them.

- *Prices for purchased feed*

While the farm is producing only lucerne and grass hay, the rest of the feed stuff is purchased from the market (Table 5-12). The “spirits by-products” (beer by-products) are commonly used as substitution for the silage mostly for the winter rations. Few of the farmers are able to store silage at all, while the “sub-products” from the processing industry could be obtained all around the year. During the data collecting it was find out that together with the spirits and beer sub-products some farmers use as well residual form variety of food processing (wafer, corn products etc.) and some were feeding even yogurt.

It can be concluded that one of the reasons for the low productivity of the small farms is due to the variation of the feed rations. The bigger the herd is the bigger the chances are that the farmer is able to provide well planed and dosage rations.

Table 5-12 Bought-in feed stuff items (description and the related price per metric t fresh matter) for BG-34 typical farm in 2006

Maize silage	BGN/t	34
Maize grain	BGN/t	148
Barley	BGN/t	144
Wheat	BGN/t	137
Sunflower cake (groats)	BGN/t	120
grassblend hay	BGN/t	100
Lucerne hay bale	BGN/t	125
straw	BGN/t	22
peas-oats blend, bale	BGN/t	83
Primext (microelements)	BGN/t	760
Salt	BGN/t	180
spirits by-products	BGN/t	90
Concentrate fodder	BGN/t	360

Source: Own Data Collection, panel 2006

5.1.1.4. Conclusions

With the available machinery and equipment and the luck of the storage facilities the farm is producing about 1/3 of the feed required. As it can be seen in Table 5-13, the majored input costs are those for purchased feed (44151 BGN).

Table 5-13 Profit and loss account of BG-34 typical farm for 2006

1. Output from the profit and loss account		2006
- Crop sales	BGN/year	0
- Milk sales		76712
- Sale of calves		1980
- Sale of breeding heifers		7650
- Sale of milking cows		0
- Sale of beef cattle		1496
- Direct payments, subsidies		9600
- Other farm returns		0
- Capital gains and losses		0
- Interest payments		49
- Total output		97487
Total output check		**97487**

2. Input from the profit and loss account		2006
Animal purchases	BGN/year	0
Purchase feed		44151
Seeds		0
Pesticides		0
Fertilizer		0
Land improvement		0
Vet & medicine		850
Insemination		1020
Wages		8240
Contract labour		0
Fuel, energy, lubricants, water		4100
Depreciation machinery		1200
Maintenance machinery		2300
Depreciation buildings		350
Maintenance buildings		500
Farm insurance		0
Farm taxes and duties		0
Quota rent or lease		0
Depreciation quota		0
Land rents paid		0
Interest paid		668,6
Other inputs dairy enterprise		493
Other general farm inputs		11840
Total farm input check		**75713**

3. Farm Profits		2006
Net Income	**BGN/year**	**21774**

Source: Own Data Collection, panel 2006, TM-3 of IFCN

In brief, few machinery, only basic buildings, low maintenance expenses, height labour input and inconsistency of the feed rations and feed used[68]. It is a curtain typical behaviour of the farmers to avoid involving themselves in a serious investment in buildings and machinery which could threaten the family if the business goes wrong due to limited liquidity of such assets. That implies that the farmers are not curtain that the dairy farming can be long term reliable source of income for the family. From the other side the farm income is insufficient for investment as it is barely enough to cover the family withdrawals and among the assets of the farm nothing is currently accepted as mortgage for borrowing by the banks.

5.1.2. Comparison of typical farms from Bulgaria, Poland and Germany

A similar study, comparing production costs and aimed at an analysis of the competitiveness of Bulgarian farms, was made by Adler (1999). He used the IFCN method as well as their database of typical farms to compare the selected Bulgarian ones with German, American, Argentine and Hungarian farms. Unfortunately, Adler did not manage to build a typical farm for Bulgaria following the IFCN method because of a lack of sufficient information – out of the 250 questionnaires sent out, only 85 of the farms sent back the questionnaires completely filled in. Due to the large differences in the quality of information received from these questionnaires (especially those from small private farms), Adler eventually chose cooperative farms only for an analysis of production costs. In the long run, only 6 out of the 21 questionnaires from cooperatives turned out full and sufficiently detailed for the analysis of production costs (Adler 1999). The data he worked with is from 1996, when cooperatives were still functioning in Bulgaria and dominated most of the agrarian production in the country.

Because of regional and yearly differences in the farms' results, as well as for an evaluation of the Adler's study, future analysis and comparisons of farms' production costs and their international competitiveness is of special importance, especially considering the lack of data experienced by Adler and the tremendous changes in the Bulgarian dairy farm structure.

The establishment of standardized networks like IFCN can help policy-makers, scientists, advisors and farmers to obtain the necessary and comparable information about the results of enterprises; to carry out international comparisons of the results for analyzing competitiveness advantages and disadvantages, as well as to simulate the future development of the farms' results in the event of policy and technology changes (Adler 1999).

5.1.2.1. Introduction

In this subchapter, a comparison of the typical farm selected in Poland, Germany, French and the Czech Republic with a Bulgarian one is made and the results are analyzed. The aim of the

[68] A precise feed rations and height quality feeds, all around the year, is a majored preposition for sustaining a height yield form a dairy cow (Todorow, N. (2003). Feeding and breeding dairy cows, Земиздат (Zemizdat).

comparison is to estimate the competitiveness of the Bulgarian farms in 2006 with respect to some European typical dairy farms from the same year (the time-horizon of the data is one year). The competitiveness is measured by the "Strong/Weak points" (SW) analysis, with a Bulgarian typical farm compared to the typical farms from the countries selected.

Table 5-14 Description of the typical dairy farms analysed

Typical farm DR2006	BG-34	PL-66	DE-85BW
Region	Central North; V. Tarnovo	Central-Eastern; Mazowieckie	Baden-Wurttemberg; Ostalb
Kind of farm	Family farm	Family farm	Family farm
No/ of dairy cows	34	65	85
Farm description			
Total agriculture land[69] (ha)	40	100	120
Land used for dairy enterprise[70]	100%	87%	86%
Stocking[71] rate on total ha	0.85	0.65	0,71
Total labour input[72] (labour unit)	3,4	4,7	3,2
Family labour input (% of total labour)	25%	41%	82%
Other enterprises[73]	--		Contract labour, forestry, Steers
Dairy specific data			
Milk yield (kg ECM[74]/cow)	5114	7302	8216
Milk production (t ECM)	174	475	698
Replacement rate (%)	8%	22%	37%
Age of firs calving (months)	29	23	27

Source: (IFCN Dairy Report Hemme 2007)

The aim is to assess the competitiveness of Bulgarian dairy farms on a European-wide scale by calculating production costs. Analysing some of the reasons for the cost differences will help us identify the weak points of the typical Bulgarian dairy farm. Given in Table 5-14 are the basic descriptions of the farms compared.

In principle, in the Dairy Report of IFCN each country is presented by at least two farms, where the first one is closer to the size of the statistical average and the second one represents the large farm size. The management levels on the typical farms are average to slightly-above-average compared to the other farms in the country(Hemme 2006). Since there can be huge deviations form region to region in one country, there is a case where several farms per country are presented. Therefore, for a better comparison, all the typical farms form the three countries are listed in the graphs with the single variables.

[69] Without forest and other land.
[70] Including set-aside.
[71] No. cows/total agricultural land.
[72] Hired and family labour input for the whole farm (1 unit = 2100 hours).
[73] Other than crop and dairy.
[74] ECM= Energy corrected milk (4%far and 3,3% protein).

Table 5-15 Typical farms from Germany, Poland and Bulgaria in Dairy Report 2007[75]

Country	Typical farms			
Germany	DE-30BW	DE-55BW	**DE-85BW**	DE-120BW
France		FR-38		
Poland	PL-29	PL-50	**PL-65**	PL-147
Bulgaria	BG-2		**BG-34**	---
Czech republic			**CZ-67**	

Source: (IFCN Dairy Report Hemme 2007)

The analysis is concentrated on the third column of typical farms, which are the German ones with 85 cows, the Polish ones with 65 cows, the Czech ones with 67 cows and the Bulgarian ones with 34 cows. The rest of the farms are not commented on, they only serve to supplement the global picture.

5.1.2.2. Basis for comparison

First of all, these are family farms, all of them representing the second group: the middle-size group of the country. Among the conditions for similarities are the system of breeding, feeding and management. The BG-34 is described as a “stanchion-barn” type of farm but it is in a transition period as the majority of the cows are not used to be “free” and only the new cows and heifers are at the free stall conditions. There are also some differences between the data collection procedures used for the selected farms, as follows:

German farms are a combination of the “panel approach” and the “statistical approach”;

Polish farms are a combination of the “single farm approach” and the “panel approach”;

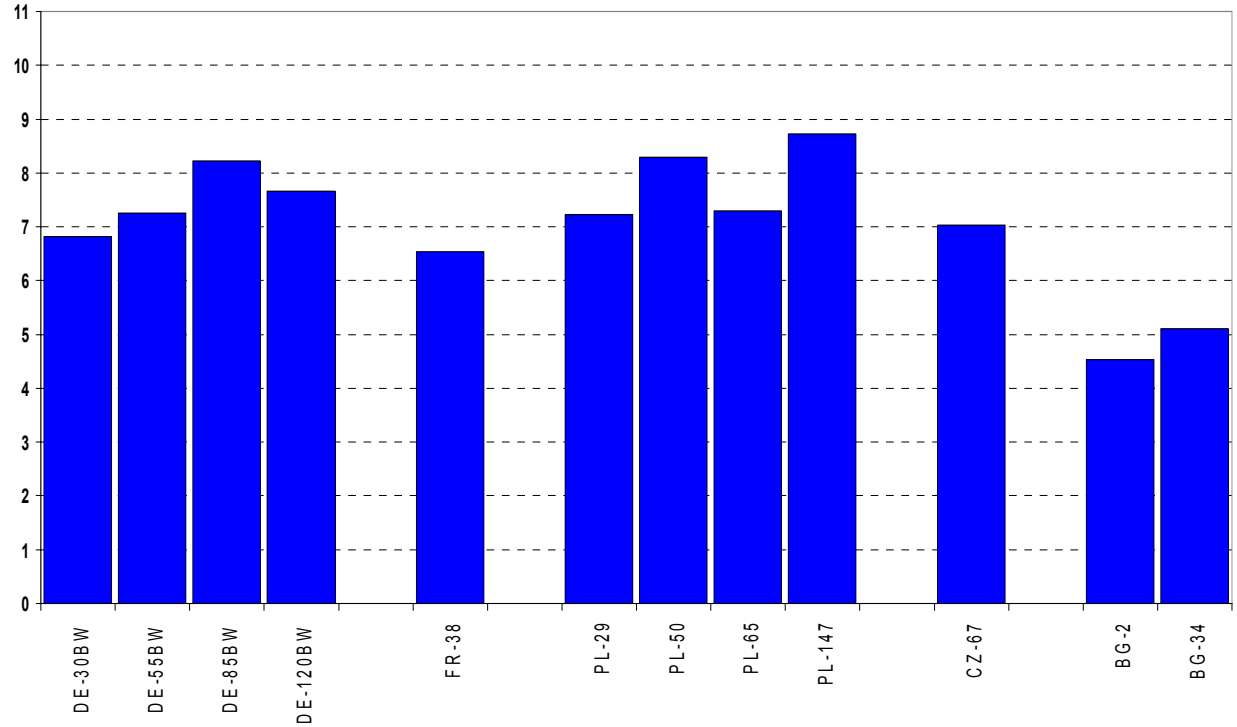
The Czech farm is a “single farm approach” only;

The French farm is a combination of the “statistical approach” and the “single farm approach”;

and the Bulgarian farms are according to the “panel approach” but it is an “updated (updatable) panel”, initially started with a combination of approaches in the following order: “statistical approach”, “single farm approach” and finalized with the “panel approach”.

[75] The description of the rest of the farms is at the end of this section

Figure 5-1: Average milk yield in selected farms from Dairy report 2006 (1,000 kg milk (ECM) / cow / year)



Source: (IFCN Dairy Report Hemme 2007)

In DR07 of IFCN, the milk yields of the farms worldwide range from 450-10800 kg per cow and year. These differences can be explained either by the dairy production system or the genetic and management potentials on the farms. In the farms considered, milk yield is from 4500 up to 8500 kg ECM per cow and year (Figure 5-1). While it can be assumed that the farms have the same breed cows, the higher milk yield of the German farms is based on the intensive herd management with about a 38% replacement rate compared with the 22% for the Polish farm and only 8% for the Bulgarian farm. It is accepted that a 25% replacement rate is an average for good herd management, the 38% implies a strategy of a height-yield herd in the German farm. That is, all the cows are used until they reach their peak in lactating (usually until the 3rd or 4th lactation). The case with the extremely low replacement rate of the Bulgarian farm is explained by the desire of farmers to sustain and increase the herd size since it is becoming relevant for the subsidy and milk quota distribution. This strategy highly affects the yield figures but was partly compensated by the rapid increase in buying new animals from the market (mostly good cows from smaller farms that either went bankrupt or gave up farming due to the presence of alternative activities)[76]. In spite of this, it is considered a typical strategy, albeit a temporary phenomenon and not the major intention of the farmers.

The major limitations are the different factor and product prices, therefore the figures are more representative as a percentage of the cost/income/profit per 100 kg ECM. Nevertheless, the picture of the bars moving right or left illustrate which are the key strengths and weaknesses of each farm.

[76] See subsection 5.1.1.3. Data for the Dairy Enterprise

Method

The cost calculations are based on dairy enterprises that consist of the following elements:

- milk production;
- raising of replacement heifers;
- forage production.

The analysis results in a comparison of returns and total costs per 100 kilogram of milk (Figure 5.2). Total costs consist of expenses from the profit and loss account (cash costs, depreciation, etc.), and opportunity costs for farm-owned factors of production (family labour, own land, own capital).

The estimation of these opportunity costs must be considered carefully because the potential income of farm-owned factors of production in alternative uses is difficult to determine. In the short run, the use of own production factors on a family farm can provide flexibility in the case of low returns when the family can choose to forgo income.

However, in the long run opportunity costs must be considered because the potential successors of the farmer will, in most cases, make a decision on the alternative use of own production factors, in particular their own labour input, before taking over the farm. To indicate the effects of opportunity costs we have them separated from the other costs in most of the figures.

For the estimations and calculations the following assumptions were made:

Labour costs – for hired labour, cash labour costs currently incurred were used. For unpaid family labour, the average wage rate per hour for a qualified full-time worker in the respective region was used.

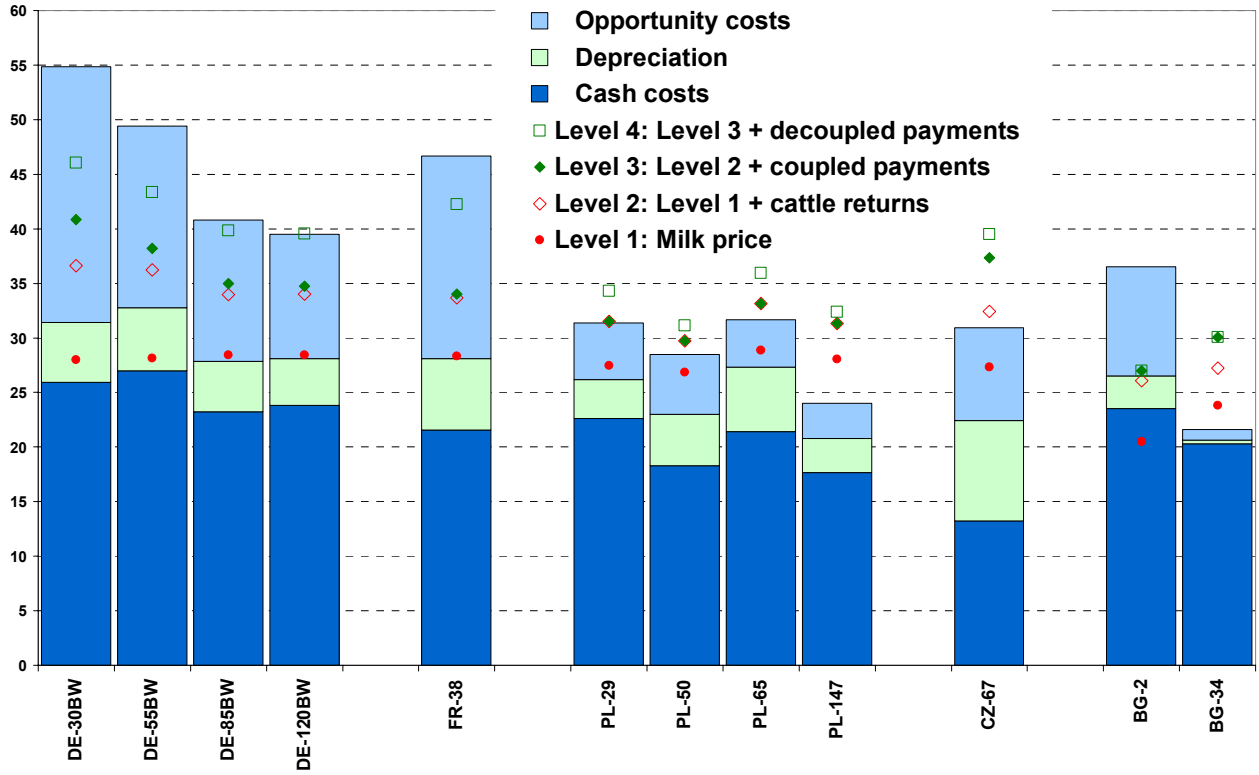
Land costs – for rented land, rents currently paid by the farmers were used. Regional rent prices provided by the farmers were used for owned land. In those countries with limited rental markets (like NZ), the land market value was capitalised with a 4 per cent annual interest to obtain a theoretical rent price.

Capital costs – own capital is defined as assets, without land and quota, plus circulating capital. For borrowed funds, a real interest rate of 6 per cent was used in all countries; for owners' capital, the real interest rate was assumed to be 3 per cent.

Quota costs – rent values were used for rented or leased quota. Opportunity costs for quota are calculated based on the total quota value * 3% interest rate. Depreciation of quota based on the national depreciation scheme is deducted to calculate farm income.

Adjustment of milk ECM – the milk output per farm is adjusted to 4 % fat, 3.3% protein. Formula: ECM milk = (milk production * ((0,383 * % fat + 0,242 * % protein + 0,7832) / 3,1138)

Figure 5-2: Total cost and returns of the dairy enterprise[77] (EUR/100kg milk (ECM))



Source: (IFCN Dairy Report Hemme 2007)

The graph in Figure 5-2 shows the total costs of the dairy enterprise per 100 kg milk compared with four different return levels. To see how dependent the farms are on the different side returns, the graph shows the following four return levels: 1) milk price only, 2) milk price plus cull cows, cattle and other returns, 3) the total returns including the coupled direct payments and 4) the total returns including all direct payments (coupled and decoupled). While all the farms have already decoupled most of the direct payments (the difference between Level3 and Level4 returns), the Bulgarian farms Level 4 returns has the same value as Level 3. The direct payments are not yet introduces for them and the value of Level 3 returns is due to some irregular (per kilogram of milk) subsidies.

[77] See the Appendix 4 for the Graphs data tables

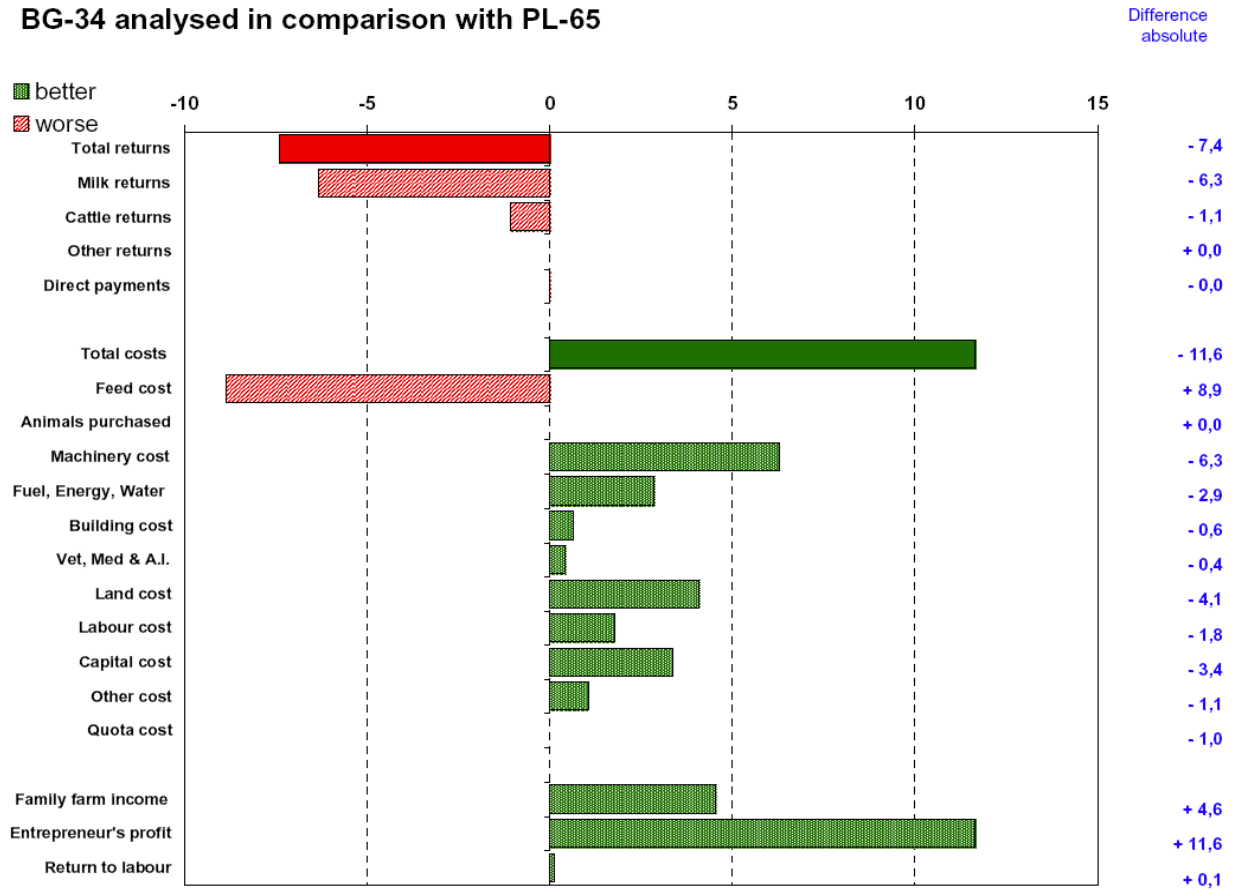
5.1.2.3. Results

A similar pattern of the comparison graph can be observed in both cases and shows "better" costs and "worse" returns of the Bulgarian farm. That is, less cost for production of 100 kg ECM[78] and less (which is actually worst) returns form this 100 kg milk. For simplicity, let us call this the "general pattern" of the comparison results.

Figure 5-3: Farm to farm comparison, BG34 analysed in comparison with PL65

Comparison of IFCN Dairy Farms in US-$

Farm No.		PL-65	BG-34	
Year/Dairy Report		DR-2007	DR-2007	
Structure, Productivity and Results				
		Base farm	Farm 1- analysed	Difference Base farm - Farm 1- analysed
Cow number	no.	65	34	-48%
Milk yield	kg/cow	7 302	5 114	-30%
Land productivity	t milk/ha forage area	5 487	4 347	-21%
Labour productivity	kg milk/h	52	28	-47%
Cost of milk production only	per / 100 kg ECM	33	19	-42%
Entrepreneur's profit	per / 100 kg ECM	-38,7	-27,1	-30%



Worse: Returns are becoming lower, cost higher, profits lower
Better: Returns are becoming higher, costs lower, profits higher,

[78] Energy Corrected Milk

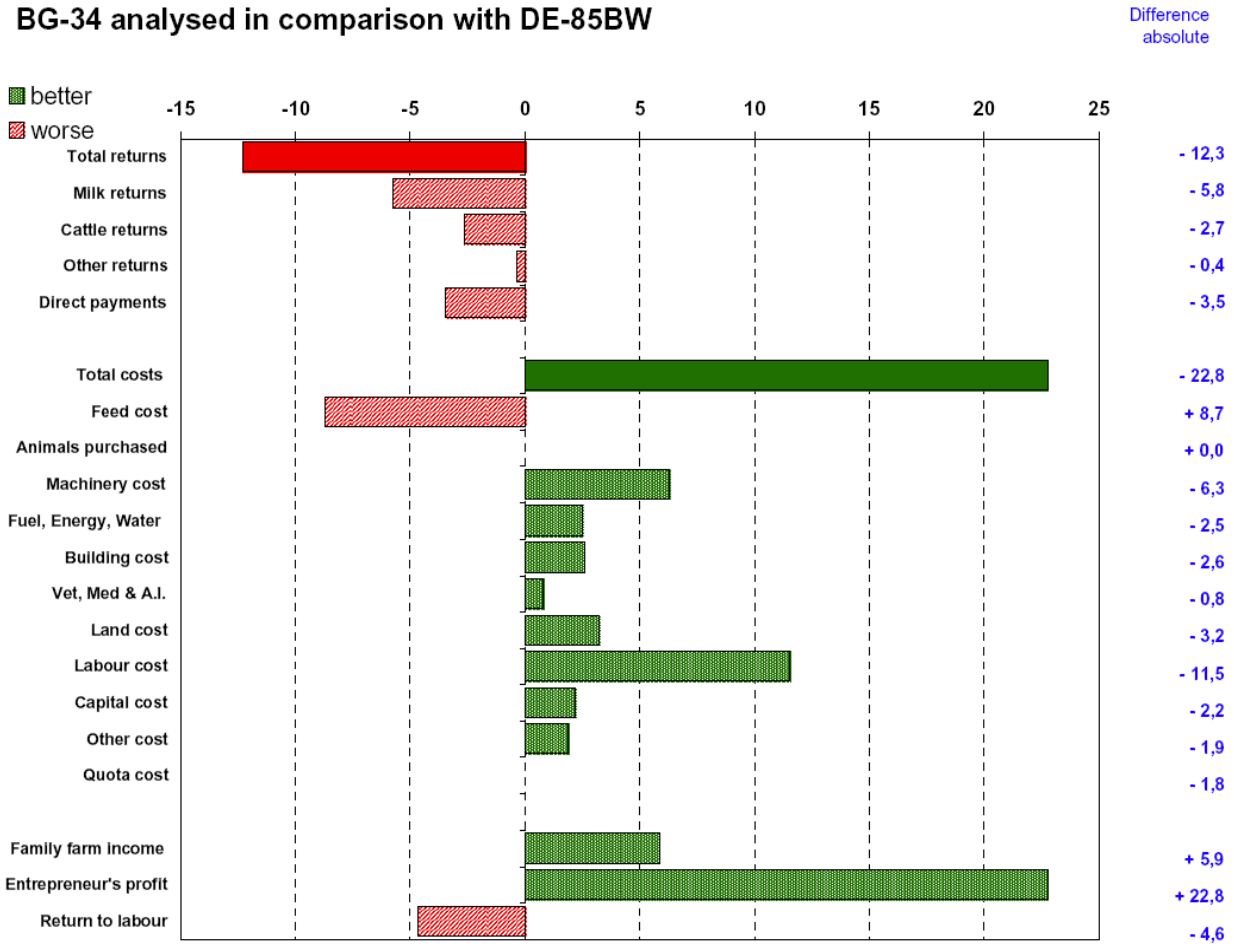
Figure 5-4: Farm to farm comparison, BG34 analysed in comparison with DE85

Comparison of IFCN Dairy Farms in US-$

Farm No.		DE-85BW	BG-34
Year/Dairy Report		DR-2007	DR-2007
Structure, Productivity and Results		Base farm	Farm 1- analysed
Cow number	no.	85	34
Milk yield	kg/cow	8 216	5 114
Land productivity	t milk/ha forage area	6 788	4 347
Labour productivity	kg milk/h	108	28
Cost of milk production only	per / 100 kg ECM	41	19
Entrepreneur's profit	per / 100 kg ECM	-49,9	-27,1

Difference	
Base farm - Farm 1- analysed	
-60%	
-38%	
-36%	
-74%	
-53%	
-46%	

BG-34 analysed in comparison with DE-85BW



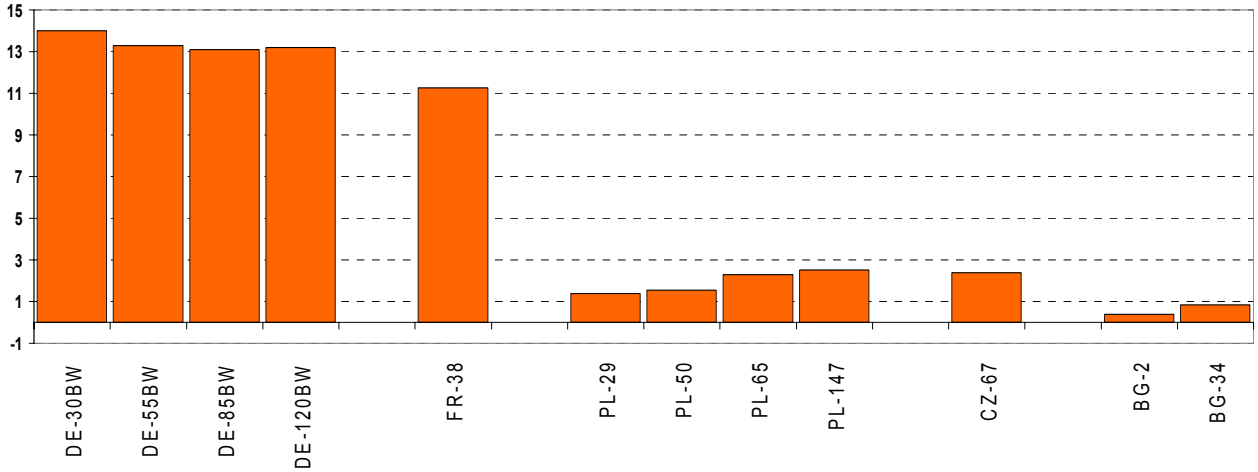
Worse: Returns are becoming lower, cost higher, profits lower
Better: Returns are becoming higher, costs lower, profits higher,

Source: (IFCN Dairy Report Hemme 2007)

This “general pattern” could be interpreted as that the Bulgarian farm pays less for most of the factors of production since it actually uses few of them, and at the same time it pays a lot for the feed stuff. The “feed costs” are the sum of the “total cost for home grown feed and costs for bought-in feedstuffs” for all the animals and a “deficit of home grown feed”. While the “deficit of

home grown feed" is calculated with production costs, the bought-in feedstuffs are with a market price. In return for his higher cost for machinery, fuel and capital, the Polish and German farms possess better and more feedstuff than the Bulgarian one (Figure 5-3 and 5-4 Land productivity: t milk/ha forage area), which has to buy this feedstuff at a market price. Considering that BG-34 has little machinery and the labour price in the country is comparatively lower than in any other in the EU (Kostov and Lingard 2004 -1), the better machinery and energy cost means intensive use of the cheap labour force (Figure 5-5). Vice versa, for the German and French farm, as well as to a smaller extent for the Polish and Czech farms, the expensive labour cost (Figure 6.4) is substituted by a high level of mechanization.

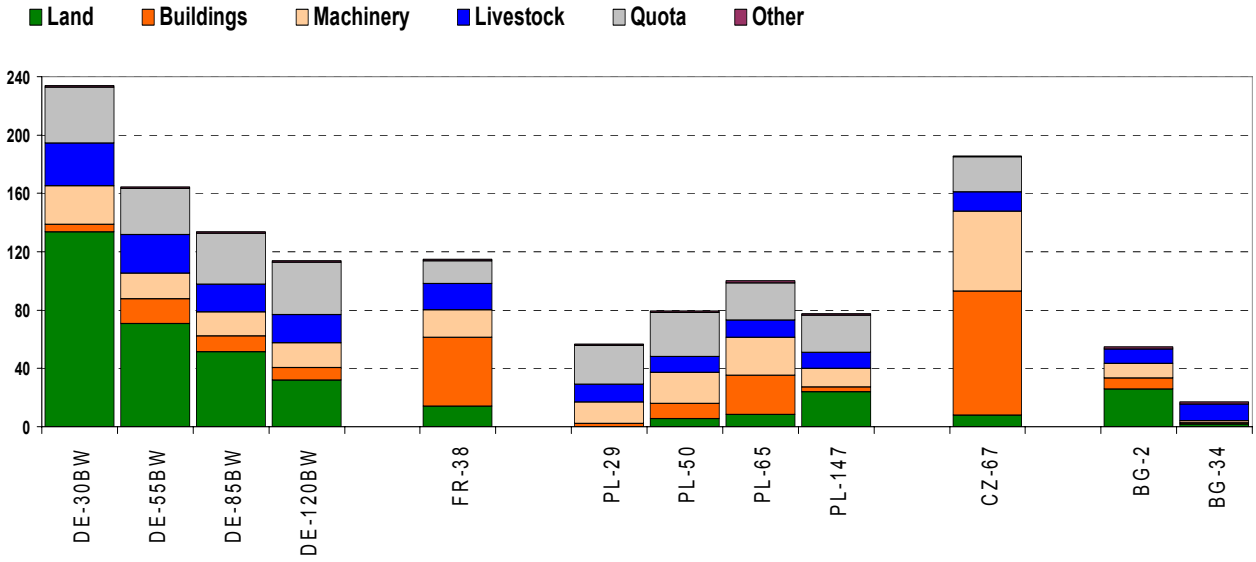
Figure 5-5: Average wages in selected farms from Dairy Report 2007 (€/hour)



Source: (IFCN Dairy Report Hemme 2007)

The assets structure reveals some peculiarities of the current state of the farms compared. It can be noted that the quota in the Polish and Czech farm takes approximately the same size as with farms that have been working for a long time with it, for 2006 the quota in Bulgaria is still experimental. In the four German farms under investigation the "economy of scale" is clearly manifest as far the share of assets structure of "buildings and machines" is concerned – with the increase of the milk herd the value of "buildings and machines" per 100 kg of milk decreases. A specific case with the German farms is the value of land, its extremely high share is due to its price (which is high because of the thirst for space felt by the industry and the infrastructure, i.e. not for/because of agrarian purposes). The smallest German farm has at its disposal a large quantity of own land, having invested only in machines in the near past, whereas the other three farms invested considerably also in buildings, necessary for the larger herds. The price of animals shrinks accordingly with the increase of the herd.

Figure 5-6: Assets structure (real - €/100 kg milk (ECM)) of selected farm form Dairy report 2007



Source: (IFCN Dairy Report Hemme 2007)

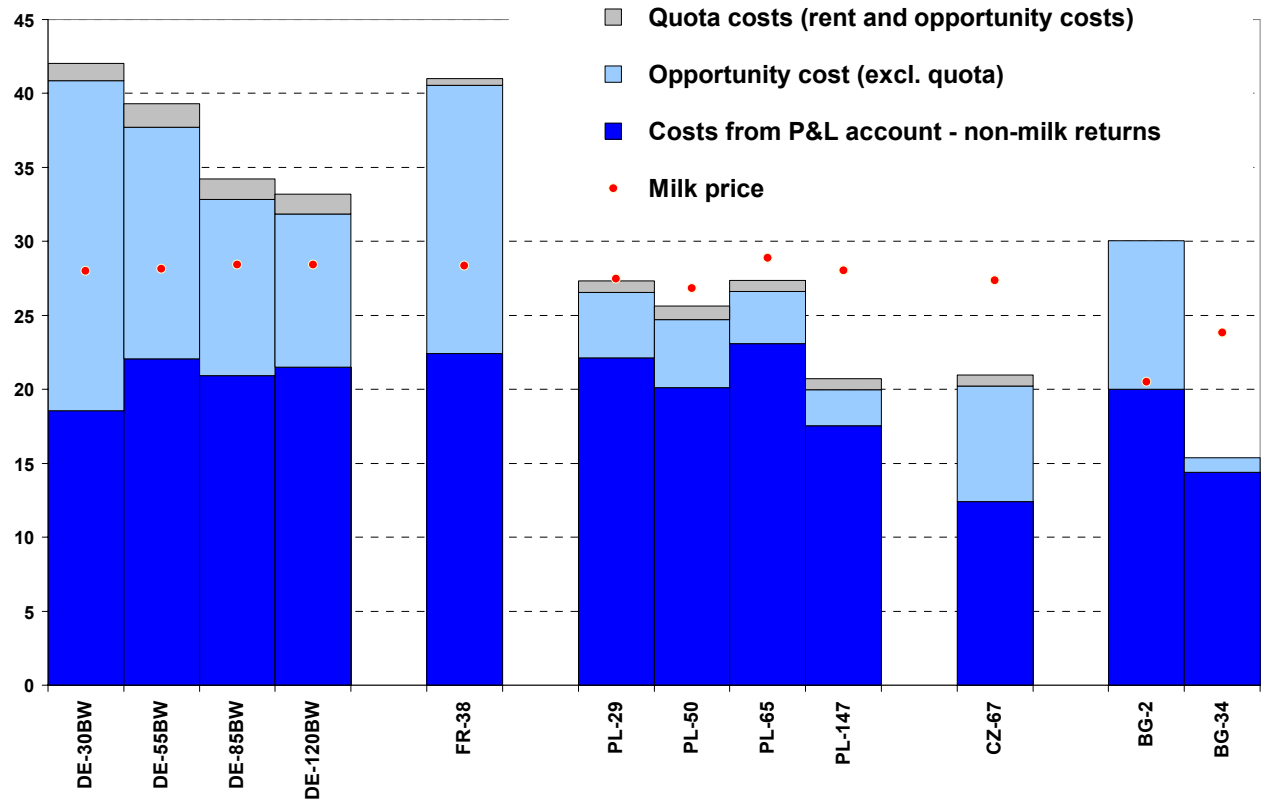
What is striking in the case of Polish farms is the extremely high value of the quota that is at first sight equal to buildings and machines taken together. At the IFCN conference in 2007, the Polish colleagues shared their experience that the interest of Western farmers towards a quota and/or a start of milk production in the country led to a strong activation of the market of this production and to a considerable increase of its prices. While with PL-50 and PL-65 the size of buildings and machines is comparatively high and showing "fresh" investments in buildings, machines and equipment, PL-147 has skipped that stage and pours investments in arable land. The large assets weight of buildings and machines in the Czech farm under scrutiny presupposes a completely freshly made investment in them, probably aimed at the expansion of the activity.

The large share of land with BG-2 should not mislead, it is due to the small quantity of milk produced, on which the farm assets are distributed. Both for it and for BG-34, the real value of assets (see the Appendix 4 with the data for the charts) is extremely low in comparison with the other farms. This can be described with the help of the hypothetical "way of development" that can be outlined on the basis of farms from Germany, Poland and Bulgaria. If we take German farms as "having arrived", the Polish ones are situated midway and the Bulgarian ones at the beginning of the trip distance, having as their aim the provision of the necessary quality of production and the effectiveness of production. Figure 5-6 and the real value of the assets explain the low costs for the factors of production shown with their green bars in Figures 5-2 and 5-3.

In general, the total costs of the dairy enterprise are related to the total returns of the dairy enterprise, including milk and non-milk returns (cattle returns and coupled direct payments) (Hemme 2007). In Figure 5-7, the non-milk returns are subtracted[79] in order to form a bat to be compared with the milk price.

[79] See Chapter 3 , IFCN method, Figure 3.5 Method used.

Figure 5-7: Cost of milk production only (€/100 kg of milk (ECM)) of selected farms from Dairy Report 2006

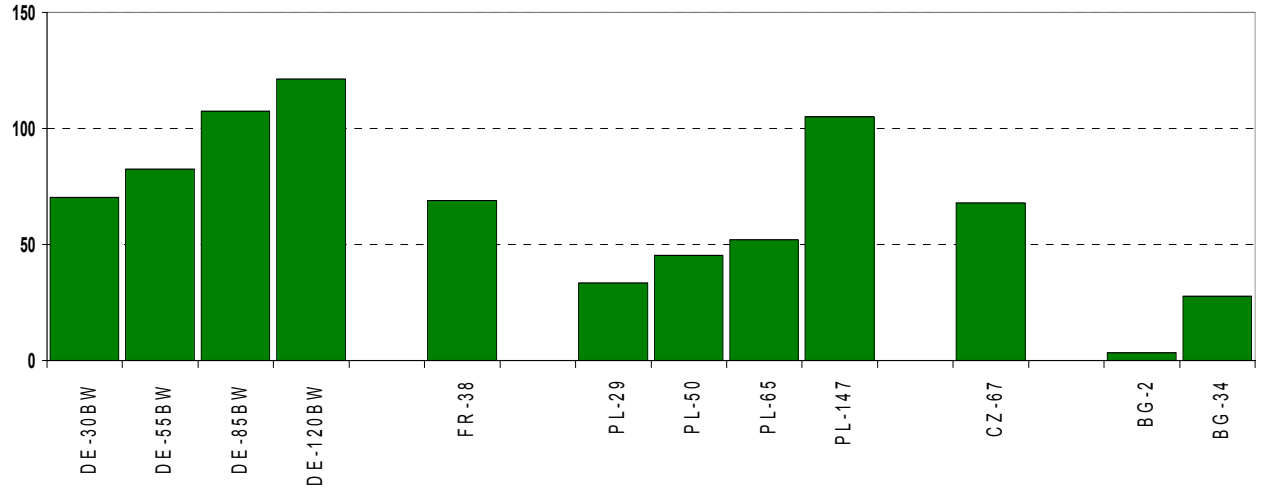


Source: (IFCN Dairy Report Hemme 2007)

The costs are significantly higher for the German and French farms due to the decoupling of the direct payments which has altered the non-milk returns of the dairy enterprise. On the other side, the costs for Poland and Czech farms are high as well, but due to investment and the intensification of the production system (Figure 5-7), as shown by the assets structure above.

In DE-85, labour productivity is 4 times larger and in PL-65 it is two times larger than that of BG-34, as a result of not only the economy of scale but also the better management in the herd, expressed in the higher milk yield per cow (Figure 5-8). While the economy of scale is clearly seen in the 5 German and Polish farms (an increase of the herd leads to more milk per hour), a better management is observed in DE-30 and FR-35, that have between 2 and 3 times higher productivity compared to BG-34 with the same herd.

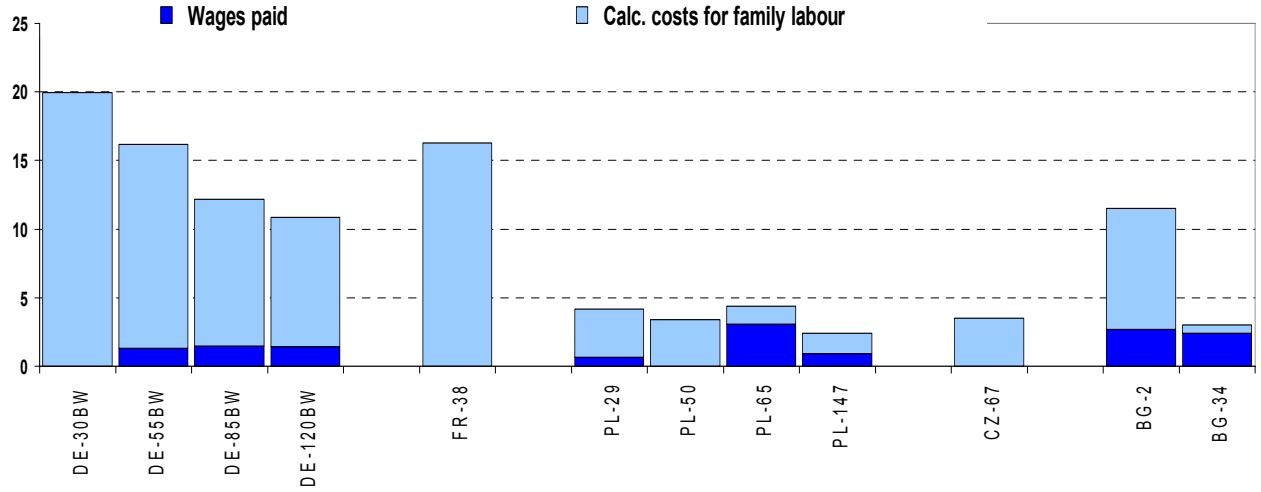
Figure 5-8: Labour productivity (kg milk (ECM) / hour**) in selected farms from Dairy report 2007**



Source: (IFCN Dairy Report Hemme 2007)

The substitution between factors of production is dependent upon their relative prices. In other words, mechanisation is nothing more than a reflection of the underlying increase in real wages, that is in the relative price of labour (Kostov and Lingard 2004 -1). Figure 5-9 shows the price of hired labour with respect to labour invested by the family, whereby in this case the more expensive labour in Germany leads to more intensive mechanization and a predominant use of family labour, whereas the Polish and the Bulgarian farms take advantage of the still cheap hired labour. It is interesting to make the association between the lack of hired labour in the Czech farm and the especially high investments in buildings and machines that we saw in Figure 5-6. Both the French and the Czech farm have a considerable share of machines in the structure of their assets and rely entirely on the family workforce, hence author has the opinion that in their case the need of hired labour is completely replaced by intensive mechanization.

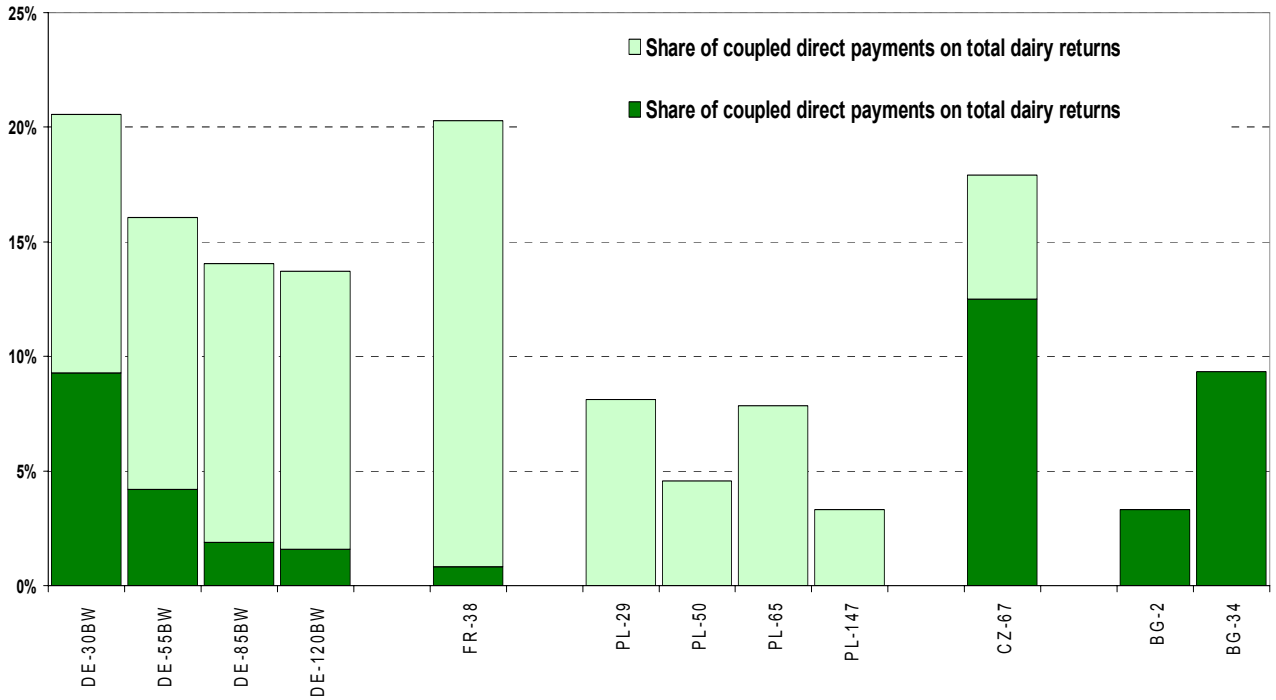
Figure 5-9: Labour cost (EUR/100 kg milk (ECM)) in selected farms from Dairy report 2007



Source: (IFCN Dairy Report Hemme 2007)

The Luxemburg agreement of 2003 triggered serious changes in the policy for 2004-2007 and envisaged for the EU countries a payment of 3,55 EUR per 100 kg of milk from the quota, in order to compensate for the expected drop in its price. These payments must become decoupled until 2007 through the use of various systems. Until then the EU countries will decide for themselves whether the payments should be linked or not. For the new ten member states of the Union, an opportunity was given to distribute their direct payments provided by Brussels together with the payments from the national budget in the form of general payment(Gorton and Davidova 2004). In the Czech Republic this constitutes 71 EUR per hectare of arable land and, as an addition to it, a top-up payment of 67 EUR/cattle unit. In Poland in 2006 there are no more coupled payments (as well as in Italy) and these aggregated payments are approximately 105 EUR/hectare of arable land (they vary from 71 to 151 EUR/hectare). For the period under investigation, the Bulgarian farms do not yet receive “decoupled direct payments”, on the one hand, and, on the other, the introduction of these payments will take place gradually until reaching the level of direct payments for the countries of EU-15. For 2006 in Bulgaria target payments were made from the national budget in connection with sowing, harvesting or compensations for natural disasters in some regions.

Figure 5-10: Direct payments on total returns for selected farms from Dairy report 2007



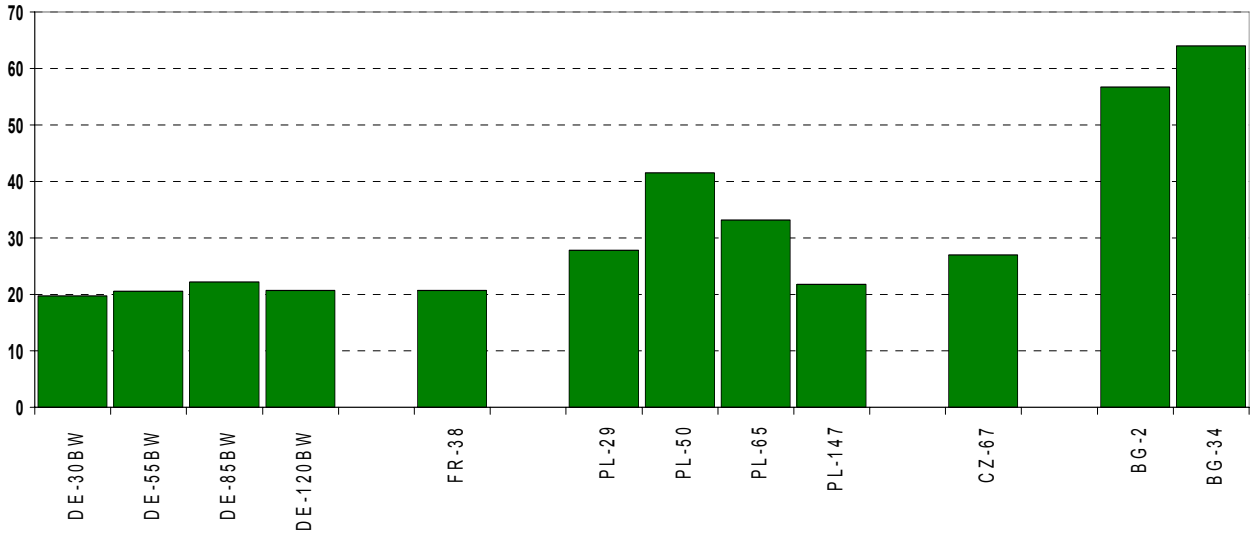
Source: (IFCN Dairy Report Hemme 2007)

In addition, there are national, regional and farm type specific support programs to contribute as some kinds of payment to the total farm returns, but in the farms under investigation (apart from

the French one which receives a less favoured area subsidy as decoupled payments) there are no such cases.

Life time production per cow demonstrates the intensiveness of milk production in German farms. In the particular case, as explained earlier, the low percentage of herd repair in Bulgarian farms (8%) also means a longer lifetime production period. In German farms 20000 litres per cow is approximately equal to 3 lactations (4-5 years), something which is targeted by the Polish and the Czech farm. Such a lifetime production is also expected for BG-34 when the desired size of the herd is reached and after the introduction of direct payments.

Figure 5-11: Life time production (1,000 kg milk (ECM)/cow) per cow in selected farms from Dairy Report 2007



Source: (IFCN Dairy Report Hemme 2007)

5.1.2.4. Conclusions

The Polish farms show to the largest degree what ought to be expected from the development of the Bulgarian farmers after the accession of the country into the EU. In most general terms, the negative aspect of its high share of assets per unit of production is the liability generated by the large quantity of investments made in one go. One would suppose that as the SAPARD programme has been functioning in the country since 2000, until 2006/07, when Bulgaria officially became a member of the EU, this effect ought to have been avoided and for the Bulgarian farms to be, if not equal, at least very close to their colleagues, and even more competitive than those from the countries accepted in 2004.

However, the analysis shows that BG-34 has a serious disadvantage in the field of material assets – machines and equipment. This leads to lower costs that are shown as positive aspects in Figures 5.2 and 5.3, but also, respectively, to a much lower labour productivity (Figure 5-8). The other effect of the lack of machines is the high feed costs. Here we must explain that in the

analysis of 2005 the feed costs were also lower but the typical farm was then determined as a Grazing type – a farm which is based on grazing with a small supplementary feeding of concentrates. After the introduction of the requirements for the quality of the milk for processing, accompanied by strict requirements with respect to the milk-collection sites, the BG-22 typical farm for Bulgaria in 2005 transformed into BG-34(Vassilev 2007).

The difficulties encountered by BG-34 in its process of transformation are clearly distinguishable in the charts given above and can boil down to one problem: **the lack of investment capital for acquiring the necessary material assets without which the farm cannot reach a competitive level of effectiveness and the corresponding price of the raw production.** In particular, it is not the lack of capital but the presence of serious obstacles to the access to it. In the previous chapters special attention was paid to the vast quantities of funds available on different programmes, national and European, for the development of the sector. Therefore the policy makers should try to overcome these obstacles and assist the farmers to access those programs.

In practice, the charts show that the policies made and the instruments used did not lead to the desired result on the eve of the country's acceptance into the Union[80]. In their majority, the Bulgarian farms remained at the same level of development as they were at the beginning of the pre-accession process(Gorton and Davidova 2003).

It is obvious that an urgent investment in equipment is required in order to increase the labour productivity as well as the overall productivity. But such an investment would overload the production cost with significant liabilities and will "eat" the advantage of the cheep labour force. Therefore the milk yield, which is currently far below the one of its EU counterparts, is the production factor that should be manipulate in order to compensate the debt weight. That is a total renovation of the herd and double its size in order to increase the milk returns and reduce the cost per unit of production.

Indeed the use of the support programs would help the farmers overcome the height liability burden for a twice shorter period as it would be without them but that wouldn't be the only problem to solve. Although the machinery and building are purchased/build and immediately put in use, the "upgrade" of the herd is complicated and risky process that can't be done at once. Nevertheless it is from great importance if not obligatory, to have desired competitive level.

[80] See Chapter 4.2

5.2 A strategy projection of the BG34 typical dairy farm for 2006-2015

Dairy farming in Bulgaria is, and will be, highly affected by the accession to the European Union in 2007 with the introduction of direct payments, quota regime, market regulation etc. After the accession, support programs were available with the aim to encourage the transformation of farming systems into more efficient and professional ones. The analysis of the state of the typical Bulgarian farm shows, however, that it is not fully prepared for the forthcoming changes. What is more, personal experience shows that the farmers are frightened rather than elated by the widely proclaimed opportunities that are to open up for them after the accession to the Union.

Here are some of the reasons for this, extensively discussed in the media "intrigues" about the pre-accession SAPARD programme:

" A SAPARD-iade[81] for farmers with neckties"

.. The mass media are flooded by complaints of farmers whose projects were not approved, although their consultant stated he had connections in the Agriculture Fund.

.. according to Brussels' rules, when the farmer prepares the project by himself with all the documents to it, he does not receive any EUR-subsidy for his labour. SAPARD provides money only to consultant companies that did this work for him"

.. SAPARD is a generous programme and its rules in the whole EU do not exclude the possibility for projects to be carried out by members of the parliament and other people with power, as well as by a businessman who would be able to receive subsidies with different firms owned by him" (Nikolov 2008 web-version newspaper Sega).

The above quotations confirm the conclusions of (Janssen, Hlebarov et al. 2005) regarding the problems of small farmers and the access to the SAPARD programme in general. The largest target group (as far as milk animal breeding is concerned), farmers owning from 10 to 30 milk cows, remains beyond the competition for money on the SAPARD programme for no other reason than their "too modest demands" that do not attract a single consultant because of the negligible commission. The other variant in which the farmers apply on their own is doomed in advance because of the fact that they have more information heaped on them about how they **cannot** do it than about how they should do it. Such rumours for absurd situations reach the people faster and in a more profound way than the official media announcement for "unbelievable millions" provided by the EU on the programme, as it were, for them.

The problems amounts to the lack of an example about how such a farm could possibly take advantage of the possibilities opening up, an example that is not a case of "going into extremes" and an example that should have as its starting point one that is possibly closest to the majority of milk producers at the moment. As already described earlier, the majority of the examples of successful projects in SAPARD are practically inapplicable for most farmers in the country. The aim of this subsection is to demonstrate, with the help of general farm-level simulation model (TIPICAL of IFCN), the real opportunities of the typical farm under the conditions of CAP of EU.

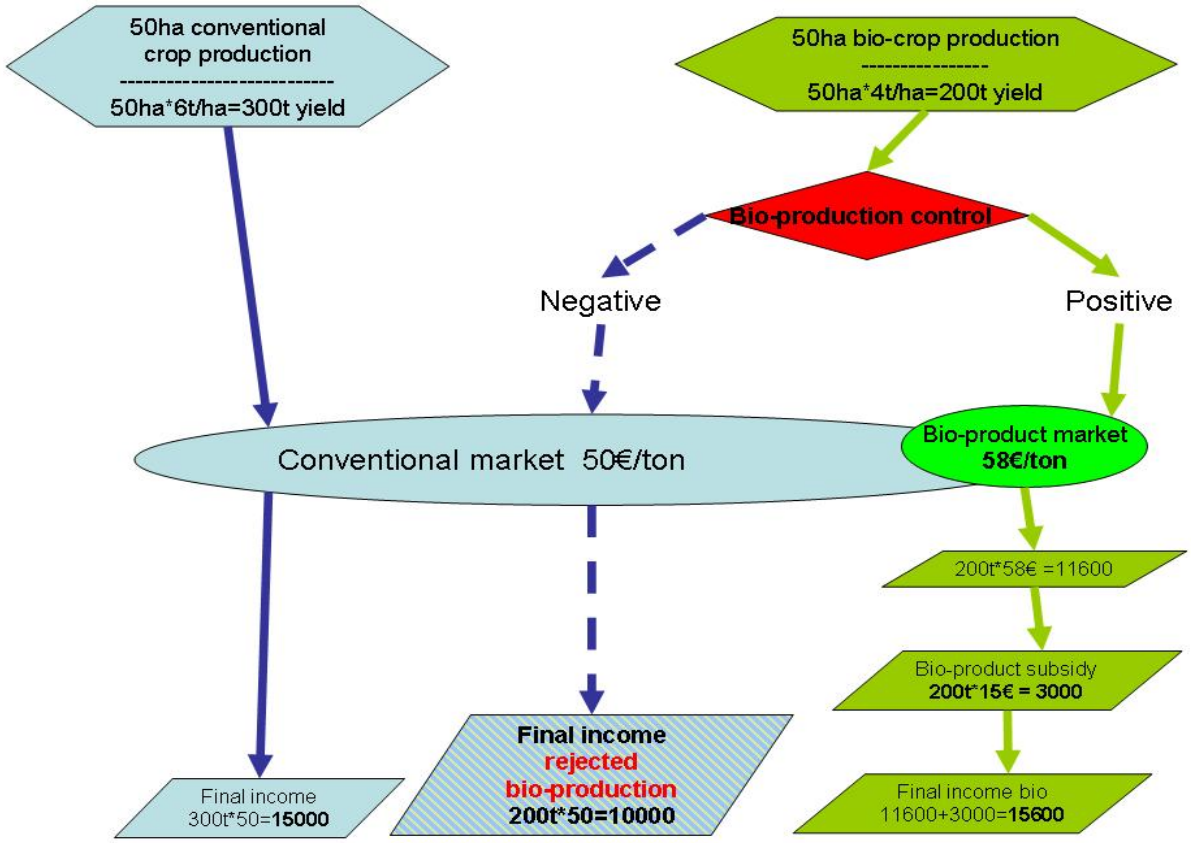
[81] Read it like "Olympiad"

According to the IFCN database, the size of family farms in the EU varies from 30 to 80 milk cows, most of them relying on the family workforce only and at the same time technically equipped very well. In many of the analyses these farms prove more effective than the large ones and the super large “industrial” or cooperative farms. On the basis of this it is assumed that the size of the increase of the typical farm should not exceed twice the present size measured by the number of milk cows. The last assumption is an educated guess of the management capacity of the typical farmer, his capability to sustain control over the whole farm simultaneously with the advancing of his management skills. In the particular case, with the typical farm BG-34 as a base, the strategies will be aimed at an increase of the herd to 60 milk cows.

After a series of experiments[82], for the present analysis we chose three strategies that aim in farm structural changes toward higher competitiveness. In addition to the increase of the herd, two of the strategies put side by side biological and conventional crop production, whereby one of the most widely discussed issues whose solution requires serious preparation and long-time planning. The lack of simulation of biological agriculture in the **scale of the typical milk farm** for Bulgaria leads to a serious mistake in its adoption as an idea and the understanding of this system of production. Usually the farmers report only those amounts that they will receive in exchange for conforming to certain rules in the growing of the cultures, but they do not take into account the seriousness of the consequences. And it is precisely the low yields and control on the ready product that, if it does not meet the criteria, will lead to the discontinuation of the payments in biological production (Figure 5-12). This is an irreversible process in agriculture.

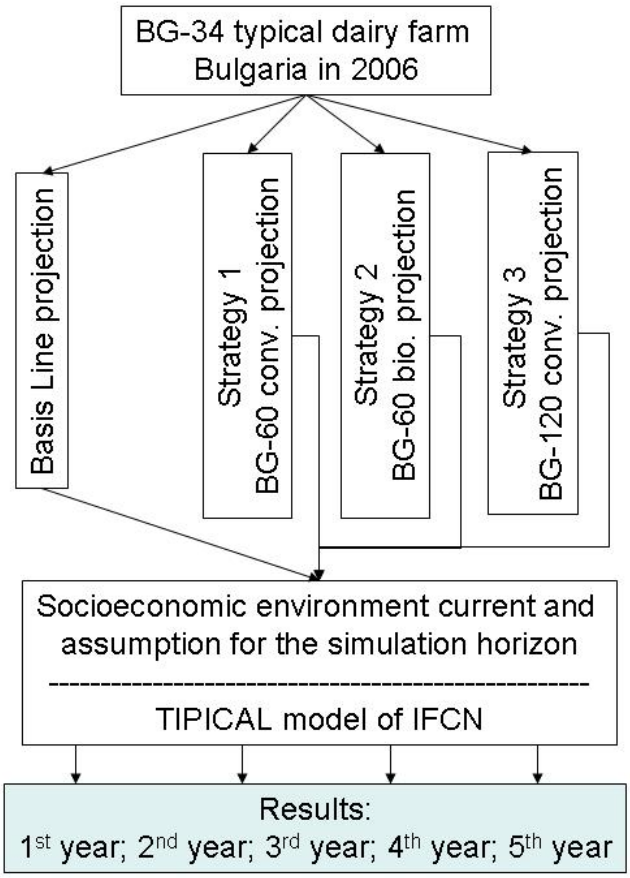
[82] The panel of experts and farmers with the help of the scientist (2006/07 in Bulgaria, data collecting and updating the typical farm) laid down several development strategies. Those strategies are tested with the farm-level simulation model TIPICAL and results are discussed on the panel. The discussion is aiming to shape the strategies that can illustrate to the utmost degree the opportunities opening up before the farmers with the country’s accession to the EU.

Figure 5-12: An exemplary schema of the hypothetical plan for development and calculation of the results of biological v/s conventional crop production



The values used in Figure 5-12 are hypothetical and are aimed at demonstrating the risk that is not taken into account by the typical farmer in his decision to start bio-production, attracted by the higher market prices and the subsidies for bio-products. In practice, according to an example from the Internet site of the Agrarian Ministry, assistance for bio-production are calculated to compensate the lower yields and to equalize the income of bio-farmers with that of conventional ones. Unfortunately, according to another investigation, the access to this example is possible for only some 30% of the population of the country, whereby probably it is hardly more than 1% of those who are farmers. In other words, a characteristic train in the thinking of small farmers is the accounting of the income section only and ignoring the expenditure section and the risk factor.

Figure 5-13: A schema of the analysis of the strategies for development[83]



While the first two strategies emphasize the differences between the uses of biological or conventional agriculture (a difference expressed in the yields from cultures planted and the compensatory payments for biological production, management and labour), the third strategy illustrates the risks of excessively steep development (from 34 to 120 milk cows).

The three strategies studied (Figure 5-13) are the final result of tens of experiments on variants for development of the typical farm, different in size and approach. For the sake of simplicity, similarly to the coding of the typical farms, a coding of the three strategies investigated is set as follow, namely BG-60conv – herd size growth with a conventional crop; BG-60bio – herd size growth with bio-crop production, and BG-120jump – herd size growth with conventional crop production.

5.2.1. General economic situation – assumption for projection

Before proceeding to the description of each separate strategy, we need to present the assumptions made for the purposes of simulation. These are mainly related to the socio-economic situation both at the moment and in the horizon simulated.

[83] For a detailed model of simulation, see Chapter 3 and Figure 3.2.4: Simulation with TIPI-CAL

In general concerning the Agricultural policy in the dairy sector, with the accession Bulgaria and Romania will immediately align external import tariff levels to EU levels. As for direct payments, farmers in Bulgaria and Romania will start to receive 25% of EU levels in 2007, increasing gradually each year until they reach the same level as in the EU in 2016. The milk marketing quota is set at 979 tmt (thousand metric tons) for Bulgaria and at 3,057 tmt for Romania. The milk price for farmers is assumed to have a three-year phase-in period and will be the same as the EU price in 2009 (FAPRI 2007).

Assumptions for the baseline and all strategies:

Input price:

- A 6% annual increase for all input prices (concentrates, veterinary expenses, labour, land, capital, energy) – national projection input price[84].
- 2011-12 entering EUR zone: Assumption: The general inflation rate increases by another 3%.
- Milk price: Milk price increases by 4% annually; in 2015 59 lv/100 kg (30 EUR/100 kg). Differences in milk quality are not considered. Annual increase by 4% for all output prices – national projection output price.
- Culling rate: In 2006 the culling rate was very low as this was the reference year for the milk quota. It is assumed to increase from 5% to 30% in 2009, afterward stabilising at 25%.

Policy assumption: Direct payments per ha about 79 EUR in 2007 (25% from direct payments in EU15 and up to 100% in 2016). Milk subsidy – 35% from EU15 in 2007 and up to 100% in 2016 (for 2015 = 0.06 EUR/kg milk).

Farm strategy assumptions: Quota is given to the BG-60 from the national reserve, for BG-120 the eventual price is neglected.

Land: For the growth strategies, the farm is buying land and produces most of the feed used on the farm. After the growth, pastureland is only used for dry cows. Wheat and barley are grown and sold in exchange for concentrate feed.

Labour: BG-60 releases the employee who was involved with grassing of the herd. BG-120 releases the employee and takes 2 more farm workers and one field worker.

Investment: Initially a loan is taken for the investment in buildings and machinery (automatically calculated by the model). A year after the investment a subsidy of about 60% of the costs is received. Advisors specialising in the extension of farms help the farmer to meet the requirements needed to get the investment aids (book-keeping, correspondence with the relevant institutions, investment planning). For this the farmer has to pay 3,000 up to 6,000 BGL per year, starting at 2007.

Management: Better management means better herd management, better feeding and a better milking system. That is: the milk yield at the last year of projection + 700 kg, the age of first calving from 29 to 27 months. Shifting from grassing to on farm feeding with concentrates is a

[84] See Chapter 3 point 3.2.3.2 Assumptions for the modelling, Part 2

prerequisite for more precise grouping in the herd. That is done by feed rations according to the milk yield of the cow which is better measured in the new milking centre.

Source for farm data: National statistics, farm census 2003 and 2005; Interviews with a panel of farmers in 2005, 2006 and 2007 - Basis for the creation of the BG-34 typical farm 2006.

Source for price and yield assumptions: the Bulgarian National Institute of Statistics – the consumer price index, Eurostat, the European commission; **General inflation rate:** FAPRI Economical Outlook 2006 (sub source - International Financial Statistics January 2006 and projections after 2005 are from Global Insight) for 2006-2015.

Table 5-16 GDP Deflator Growth Projections[85]:

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0,061	0,056	0,043	0,027	0,027	0,022	0,022	0,022	0,023	0,023

An assumed 3% increase in 2011-2013 by entering the EUR currency zone:

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0,061	0,056	0,043	0,027	0,027	**0,052**	**0,042**	**0,032**	0,023	0,023

Source: see the text above

On this basis the national projection for input and output price is calculated as with the index:

Table 5-17 Index of all Output price, 4% annual increase:

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
100	104	107	109	111	115	119	121	123	125

Source: see the text above

Table 5-18 Index of all Input price, 6% annual increase:

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
100	107	113	117	121	129	137	142	146	151

Source: see the text above

Exchange rate used from 2006-2015: 1 EUR = 1.95 BGL.

[85] For detailed explanations see Chapter 3.2.3.2 Assumption for the modelling, Part 2 – Projection of prices, yields and inflation rates.

5.2.2. Farm strategy analysis for BG34 typical dairy farm in 2006-2016

In the first four parts of this subsection, the basic line and the three strategies are discussed, one by one. For each of them attention is paid to the net revenue, illustrated together with the two major parts forming them – the monetary revenue from the activity of the farm and the government payments. In the last section, the results according to the major indicators of the three strategies and the basic line are illustrated together, showing the major differences between them in the horizon investigated.

The preparation for the execution of the strategies runs during the basic (zero) year of simulation 2006, hence we call 2007 the first year of simulation, 2008 the second year of simulation, etc. The Table 5-19 summarise the general descriptions of the chosen scenarios as well as some major assumptions on the simulation.

Table 5-19 General descriptions of the Base Line and the scenarios

		Scenarios status at 2010		
Characteristic	Base Line	BG-60conv	BG-60bio	BG-120jump
Number of cows	constant 34	up to 60	up to 60	up to 120
herd management	constant 8%	advanced 25%	advanced 25%	advanced 25%
Milk yield per cow and year	5600	6080	6080	5780
Land (ha)	6	47	47	84
Sum NETO investment 2006-2010 (BGN)	0	67473	67473	147428
Number of Employ	3	2	2	5
Advisor costs annually (BGN)	0	3000	3000	6000
Annual amount of Direct payments (BGN)	14310	32384	43878	61809

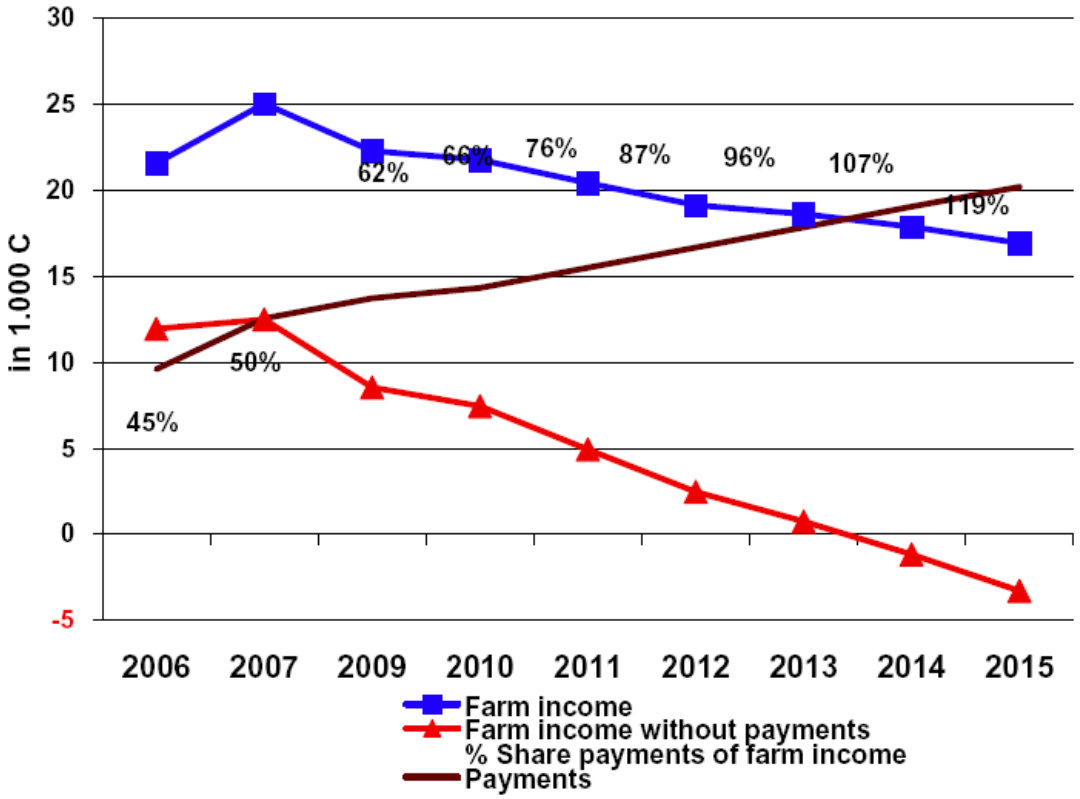
Source: Own calculation with TIPICAL model of IFCN

5.2.2.1. BG-34 Baseline

Keeps number of cows constant until 2015, no investment to be made, average management as before. Feeding is done via grazing on community land, which is free. One employed person is working full time to lead the cows to the grassland and water places. These, in short, are the parameters of the basis line to which we will compare the strategies for development chosen.

At the same time the environment follows the assumption for the projected period. In reality such a situation is not possible, but it helps to visualize the answer to the question “What if nothing changes?”

Figure 5-14: Farm income including subsidies / without, in 1000 BGN



The first figure (Farm income including subsidies) illustrates the downward grade of the income triggered by the predicted increase of the input prices. The distance between the blue and the red line is the so-called zone “for family living withdrawals” that within the 10-year period does not change much, with the exception of the fact that its lower border passes the axis and enters the negative side. The explanation is that the real farm income (red line – Farm income without payments) drops sharply and only the increasing subsidies (brown line – Payments) are slowing the general trend, whereby as early as after the second year the share of the payments in total farm income becomes over 50%.

The farm income in the baseline increases in 2007 due to the milk subsidy and direct payments per hectare, but then decreases mainly due to the rise in input and labour prices. The cost in 2015 reaches 48 BGL/100 kg of milk (24.6 EUR) (Figure 5-16).

The bright green and the dark green fields of Figure 5-15 are the old loans described earlier, whose term expires in 2007. Their aim was, as already mentioned, to increase the herd with a view to compensating the loss of revenue from the collection of milk from the smaller producers.

Figure 5-15: Farm income + Equity

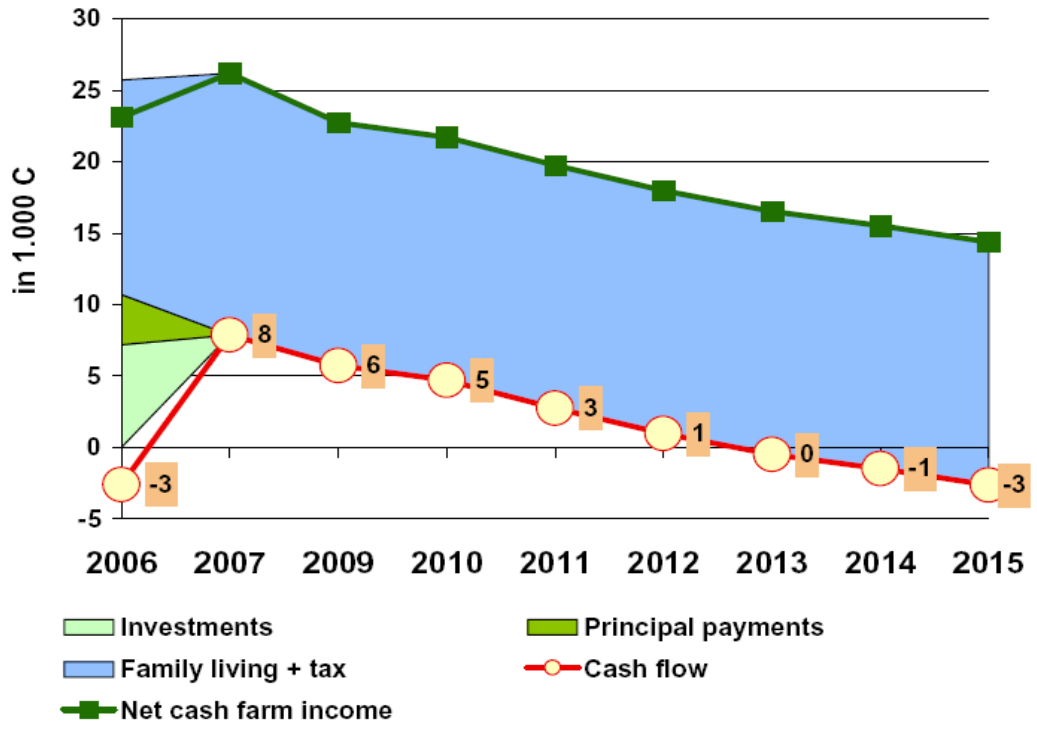
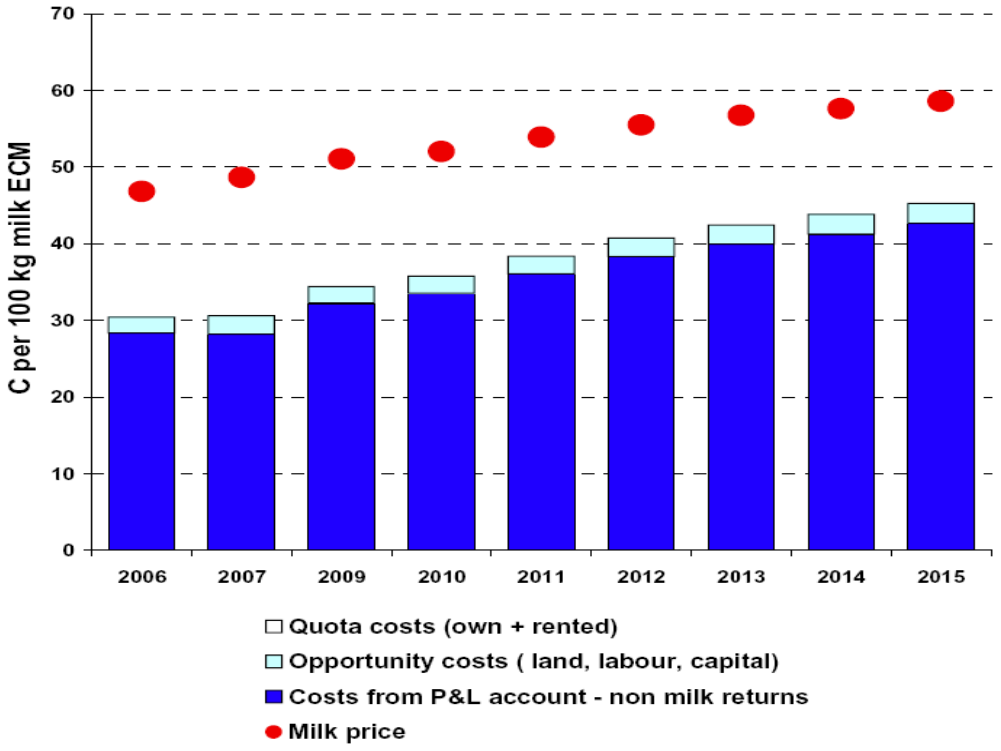


Figure 5-16: Production costs BGN/100kg milk ECM (- non milk returns)



5.2.2.2. BG-60 conv

Increase to 60 cows in 2007 by purchasing 10 high quality breed cows, improve herd management, apply conventional crop production, and invest in new buildings and machinery with the help of investment subsidies.

The increase of the herd to 60 milk cows in fact takes place in some stages, adapted to the possibilities for the reproduction of the initial herd. That is, in the typical farm with 34 milk cows there are other animals, about 30, at different ages (in different groups). In the strategy for growth up to 60 milk cows we set that this should happen in the second year of the simulation, i.e. the third one in a row. Starting from 34 in 2006, 50 in 2007 and 60 in 2008, where the real number of the animals purchased was calculated from the model on the basis of how many own animals pass from one group to another. In the particular case, in order to have 50 milk cows at the end of 2007, the purchase of 9 young cows is necessary, as this is the value of the deficit (Table 5-20). Calculation is made in the following manner: 16 milk cows are necessary for us to obtain the desired number of the herd, during the year 5 cows are eliminated and 1 dies, or a total of 22 milk cows are necessary. During the year from the own herd 13 milk cows will be obtained, which gives a deficit of 9 in order to reach the number at the end of the year. During the following year the larger herd has an even higher reproduction and a larger replacement, therefore the deficit this time is 6 milk cows with which we fulfil the plan for a herd of 60 milk cows at the end of the second year of simulation.

Table 5-20 Cows and Replacement, BG-60conv

	2006	2007	2008	2009	2010	2011	2012
Average No. = No. cows at the beginning	34	34	50	60	60	60	60
No. cull cows	2	5	9	18	15	15	15
No. cows died	1	1	1	1	1	1	1
Heifer requirement for increase / decrease herd size	0	16	10	0	0	0	0
Total heifer requirement	3	22	20	19	16	16	16
Heifer supply from the farm	12	13	14	16	19	19	20
Balance heifer surplus / deficit	9	**-9**	**-6**	**-3**	3	3	4
No. deficit purchase	0	9	6	3	0	0	0
Sell milking cows	0	0	0	0	0	0	0
No. surplus sell	9	0	0	0	3	3	4
No. cows at year end	**34**	**50**	**60**	**60**	**60**	**60**	**60**
% of cows culled / year	6%	**9%**	**15%**	**30%**	**25%**	25%	25%

Source: Own calculation with TIPICAL model of IFCN

As already pointed out in the description of BG-34, the replacement rate of the herd for 2006 is only 6%[86], at the same time a large part of the "better management" in fact falls to the

[86] In some of the parameters such as the replacement rate, the basic line has some small differences from the description of the typical farm with the aim of "balancing" the model, in this case the basic farm has a 6% replacement rate of the herd, and not 5% as it is in the typical one.

management of the herd. This part of the strategy is set as a gradual rise, the replacement rate of the herd aimed at reaching the values characteristic of the maintenance of herd with highly productive milk cows. Thus, during the fourth year we already have a surplus of young cows that are sold at market prices and figure as "non-milk returns" in the Profit & Loss accounts calculation.

Here a further specification is necessary, the expert assessment[87] was for 10 highly productive milk cows, and in practice we have just shown that in the strategy a total of 18 animals are purchased. Practice shows that the import of highly productive animals is a very risky business, related both to enormous bureaucracy and serious costs for ensuring the necessary conditions for adaptation and protection of the new animals and the local ones against infection. Usually the import of highly productive animals is made by large farms having at their disposal the necessary professionals, the base and the resources for this purpose. For the size of the farm under investigation, the costs and the risk are too high, and benefits too small. In other words, why invest 12 000 EUR for 10 young cows with a genetic productivity of 8-9 tons of milk per year, when the average productivity in the farm is only 5,6 tons, hence there is no possibility for the provision of conditions in which these new animals can achieve their full capacity. On the other hand, the introduction of 5-7 similar animals is enough for a real increase of the average yield in the farm for a period of 5 years from 5,6 to 6,1 tons. For this reason we leave it to the model to simulate the increase of the herd and we hypothetically assume that the import of 10 highly productive animals[88] was made, without specifying how many of those 18 purchased are highly productive and how many are an "ordinary" local breed.

As it would not be possible to report a "better management" apart from the improvements in the management of the herd already described, we undertake to express this abstract notion by a monetary value. For this purpose, from the first year of simulation (2007) in the fixed costs box we add a constant amount of "advisor cost" of 3 000 BGN, till the end of the simulation horizon. This amount is then multiplied each year by the national projection to indicate the general increase of the input costs.

The next step of the strategy is to simulate the investment in buildings and machinery necessary for the projected herd size growth[89]. Since it will be in several steps, it is important and wise not to invest at once on everything the farm may need but only for the one which is needed first, and then postpone the rest of the investments for the following years, parallel with the herd growth. An exception is the land, as the land market is a bit complicated because of the segmentation of the arable land but, on the other hand, that is a small advantage – but still an advantage – for a farm such as BG-34, considering its restricted investment capacity. In other words, the farm policy about land purchase is to do it in a small portion but regularly (Table 5-21)

[87] A panel of experts, scientist and farmers 2007, update the typical dairy farm in Bulgaria and have a discussion on the future one.

[88] For 2006, the average price of a young cow with a productivity of 10 tons is about 1 200 EUR, and we assume that the young cows of "lower quality" on the same market vary between 600 and 800 EUR, set in the model is the average price of a pregnant heifer in Bulgaria for 2006 of 450 EUR, which in practice yields the same final result (10x 700 ≈ 18x450)

[89] The assumption for the investment subsidies is "idealised" but nevertheless it is an available instrument for the farmers to be used, no mater what the obstacles. At the projection we assumed that the project is approved and the subsidy is paid (at about 60% of the cost) the year after the investment, therefore is a huge jump in Cash Flow (Figure 5.2.2.2.1) in 2009.

and as much as it is possible. The target is at least 1 hectare per dairy cow, but actually the amounts of land purchased in the simulations are adjusted to the food requirements along the projected horizon.

The most urgent investments considering the growth of the herd is to provide a modern milking installation. That, on the one hand, is also related to the regulation for the quality of raw milk and the subsidies for it. Then it is an important factor for preserving the contracts as a supplier and, last but not least, this is a precondition for the good health of the animals. For that reason an investment is set up for modern milking parlour equipment from DeLaval, with a minimum price for 2x6 herringbone 30`, of 40000 BGN. Together with the equipment, reconstruction and extension of the existing milking centre for 10000 BGN is envisioned, plus the building of a new silage storage for 8000 BGN, as a place for the extra silage is urgently required. That is a total amount of 65022 for 2007 (Table 5-21), including 7022 BGN for purchasing land.

Table 5-21 Investment activity for BG-60 conventional strategy

Investments activities		**2006**	**2007**	**2008**	**2009**	**2010**
Investments land	BGN/year	7200	7022	6033	4145	4272
Investments buildings	BGN/year	0	18000	25000	-25800	0
Investments machinery	BGN/year	0	40000	-10000	-8400	0
Investments quota	BGN/year	0	0	0	0	0
Total farm investments	**BGN/year**	**7200**	**65022**	**21033**	**-30055**	**4272**
Buy arable land	Ha	5	4	3	2	3
Buy pastureland	Ha	2	3	3	2	0

Source: Own calculation with TIPICAL model of IFCN

While at the beginning the new animals are separated (if they are imported) and the young ones are to be transferred to the dairy herd as well, at the second year the farm will need more space and conditions. That is the time chosen to extend and modernize the existing barn (one which was rented before and purchased just before the current simulation).

Once again we should keep in mind that here we are projecting the most possible strategy for development and not the perfect one, in other words for the farmers representing the BG-34 typical farm, the most possible is the most cheap one. Hence we follow the example of many German farmers who decided to use the opportunities to set up a dairy farm in some of the 10 new member states[90]. Instead of building brand new barns, just renovate the available construction in the cheapest way to achieve maximum efficiency for minimum investment. For that 25 000 BGN are set up to prepare the barn for 60 dairy cows and for complementing the herd animals (calves and heifers sections, medicine/delivery section, insulator etc.).

In the same year, an investment for a new self-propelled hill mowing machine is set up (14 000 BGN), aimed to utilize the cheapest land – abandoned rolling areas – also available for renting and purchasing. The decision for this investment has the major aim of simplifying the simulation, as the inclusion of a complex sowing turnover and the growing of various cultures would seriously

[90] Dairy farm visits during the IFCN annual conference in Szczecin, Poland 2006 and the IFCN annual conference in Kiel, Germany 2007

increase the number of “guesses” and hence the truthfulness of the analysis. In spite of this, an account of the cultures grown was made (Table 5-22), weighed according to the newly purchased plots and the need for fodder in the farm. It is, however, striking that wheat and barley grain is not included in the food rations but are sold (in practice exchanged), thus compensating for the costs for concentrated fodder or sub products of the food industry.

Table 5-22 Crop mix planted in hectares (own and rented pastured and arable land)[91], BG-60conv

CROP MIX - Planted ha		2006	2007	2008	2009	2010	2011	2012
Wheat grain	ha		4,62	6,38	8,36	9,68	10,34	10,34
Barley grain	ha		4,62	6,38	8,36	9,68	10,34	10,34
Maize silage	ha		5,88	8,12	10,64	12,32	13,16	13,16
Lucerne old - hay bale	ha	4,8	5,46	7,54	9,88	11,44	12,22	12,22
Grass on arable land, hay bale	ha	1,2	0,42	0,58	0,76	0,88	0,94	0,94
state owned pasture land	ha	34	39	42	44	44	44	44
Straw[92]	ha	0	9,24	12,76	16,72	19,36	20,68	20,68
total arable land (own and rented)		6	21	29	38	44	47	47

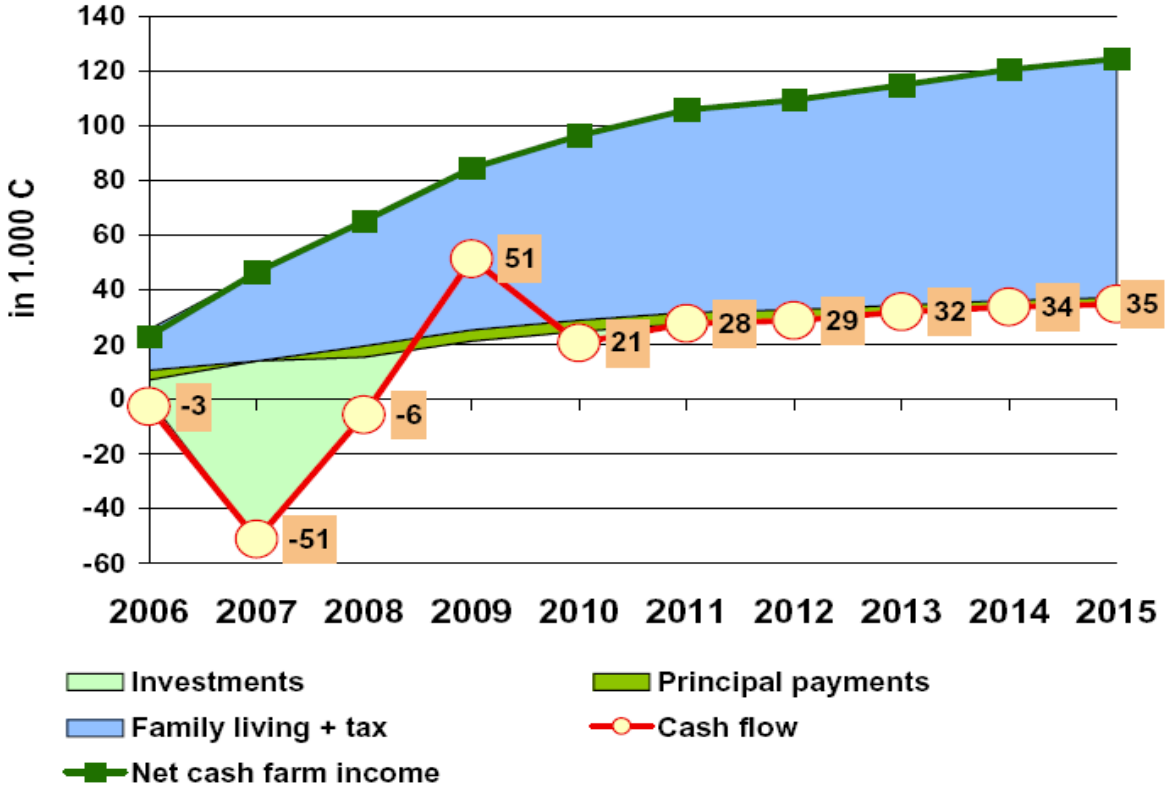
Source: Own calculation with TIPICAL model of IFCN

So, for 2008 the total size of investments is 45033 BGN, whereby during the same year investment subsidies for milking parlour equipment ought to be received, amounting to 60% of their value, or 24 000 BGN. Investment subsidies in the model are represented in several ways, and in the particular case we have chosen to represent them as investments with a minus sign. In the table for 2008 we have only -10000 BGN because milking parlour equipment is in the group of machines, hence what obtains there is +14000 per mowing machine – 24000 per milking parlour equipment.

[91] Form 2012 till the end of the simulation the mix is the same

[92] As a sub-product from wheat and barley, its size is the equal to the sum of the wheat and barley planted

Figure 5-17: Farm income + Equity, BG-60conv



Source: Own calculation with TIPICAL model of IFCN

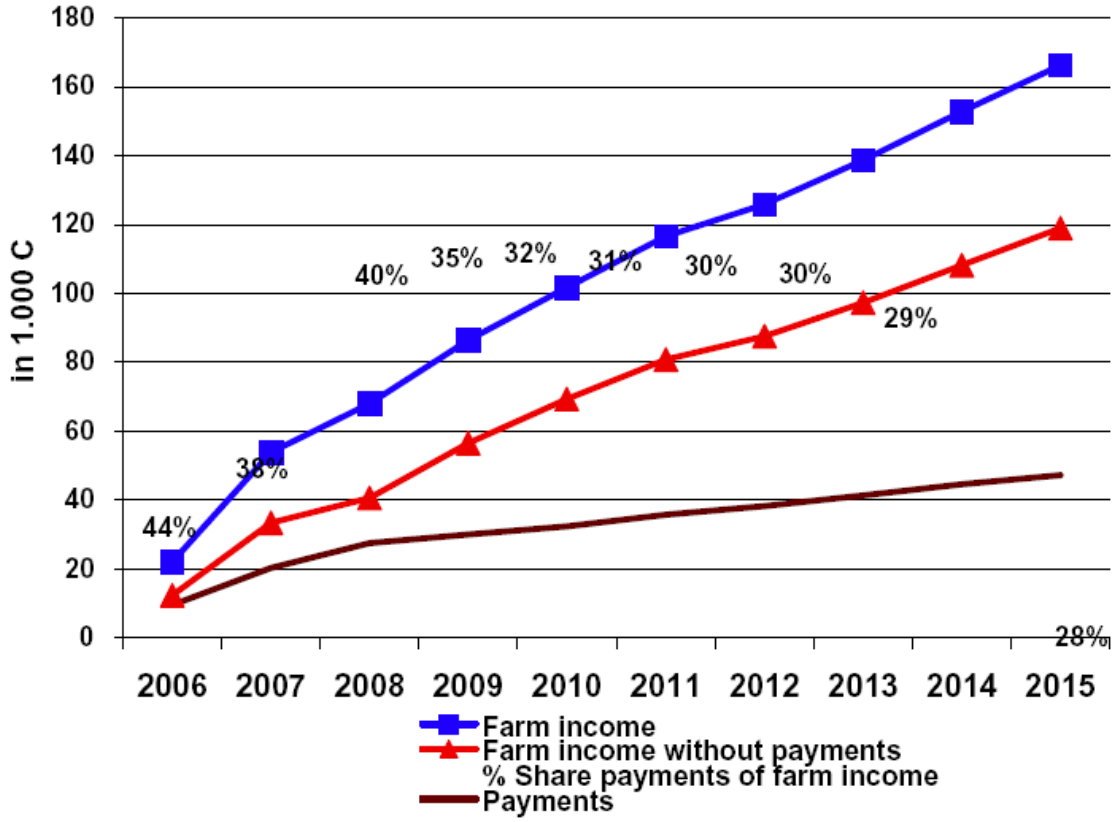
In 2009, an investment is made only in land and investment subsidies are received for a mowing machine (-8400 BGN) and as a total for the buildings in the farm (milking centre, silage storage and renovated barn) amounting to 60% of 43 000 BGN, or -25800 BGN (Table 5-21).

Figure 5-17 illustrates in brief the result from the strategy described. During the first year of simulation (2007) investments (65 thousand BGN) and Family Living Withdrawals + Tax (32,6 thousand BGN) form a negative cash flow of -51 thousand BGN. The area in light green represents the investment made for the period, and the light blue area represents the borders from which the family living can be withdrawn. The model of family living withdrawn was explained in detail in Chapter 3.

The increased Net Cash Farm Income for the third year of simulation (for 2008 it is three times higher than the one of the initial year of simulation, amounting to a total of 65,2 thousand BGN) compensate the investment for the same and result in only -6000 BGN of cash flow. In 2009 all the actions of the strategy are applied and the Net Cash Farm Income jump for the last time with the obtaining of the investment subsidy for the buildings.

Afterwards the cash flow follows a moderate rate mainly influenced by the increasing amount of family living withdrawals which aims to cover the expected rising in the cost of living after the accession to the EU.

Figure 5-18: Farm income including subsidies / without, BG-60conv



Source: Own calculation with TIPICAL model of IFCN

The next important point to be analyzed from the results of the strategy applied is the share of the government payments into the total income (Figure 5-18). One of the aims of the strategy creation was to avoid a strong dependence on payments, as that would create a “weak farm” which would rely on them for its competitiveness. Therefore, the target was not to exceed 30% of them in total payments in the long run (for the simulation) which is actually to make the farm efficient as much as possible at the time when farmers in Bulgaria are going to receive 100% of the payments given to farmers in EU-25 (that is approximately 2014 when it is supposed to be 80%). In other words, the logical path is to have a sustainable increase of the net farm income without the government payments and keep it that way so in the worst case (no government payments) it can cover the current family living withdrawals.

5.2.2.3. BG-60 bio

In practice, this strategy is absolutely the same as the previous one, referring to investments in buildings and machinery, the increase of the herd, the better management of the farm as a whole and of the milk herd. For this reason, we will skip the detailed description of the strategy and will pay more attention only to those aspects that distinguish it from BG-60conv.

Starting with the crops mix planted, which is slightly different from BG-60conv, it is due to the standard procedure of balancing the model concerning the feed requirements. This is to avoid misleading income from selling farm grown crops at the same time with purchasing a deficit from other farm grown crops. In other words, the different crops mix is actually equalizing the crop sales from both strategies – conventional and bio, since the idea is to compare as much as possible the pure effect from bio-production versus the conventional one.

Table 5-23 Crops mix planted for BG-60bio and BG-60conv comparison

	3. CROP MIX - Planted ha	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
1	Wheat grain		3,82	5,28	6,91	8,00	8,55	8,55	8,55	8,55	8,55	bio
1	Wheat grain		4,62	6,38	8,36	9,68	10,34	10,34	10,34	10,34	10,34	conv
2	Barley grain		3,82	5,28	6,91	8,00	8,55	8,55	8,55	8,55	8,55	bio
2	Barley grain		4,62	6,38	8,36	9,68	10,34	10,34	10,34	10,34	10,34	conv
3	Maize silage		7,64	10,55	13,82	16,01	17,10	17,10	17,10	17,10	17,10	bio
3	Maize silage		5,88	8,12	10,64	12,32	13,16	13,16	13,16	13,16	13,16	conv
4	Lucerne old - hay bale	4,80	5,09	7,03	9,21	10,67	11,39	11,39	11,39	11,39	11,39	bio
4	Lucerne old - hay bale	4,80	5,46	7,54	9,88	11,44	12,22	12,22	12,22	12,22	12,22	conv
5	Grass on arable land, hay bale	1,20	0,63	0,87	1,14	1,32	1,41	1,41	1,41	1,41	1,41	bio
5	Grass on arable land, hay bale	1,20	0,42	0,58	0,76	0,88	0,94	0,94	0,94	0,94	0,94	conv

Source: Own calculation with TIPICAL model of IFCN

Now the differences start with the crop yield per hectare, which are based on the example of the bio-production plan from the Ministry of Agriculture of Bulgaria. The yields are given in actual values which afterward are multiplied in the model with national projection according to the increase of fertilizer input and land improving activities both introduced in the first year after the accession (2008) but expressed only as a value but not in quantities. Therefore, the initial amount as price for fertilizers and pesticide inputs, from the MA example, are indexed by the national price projection and so represent the cost of both type of production.

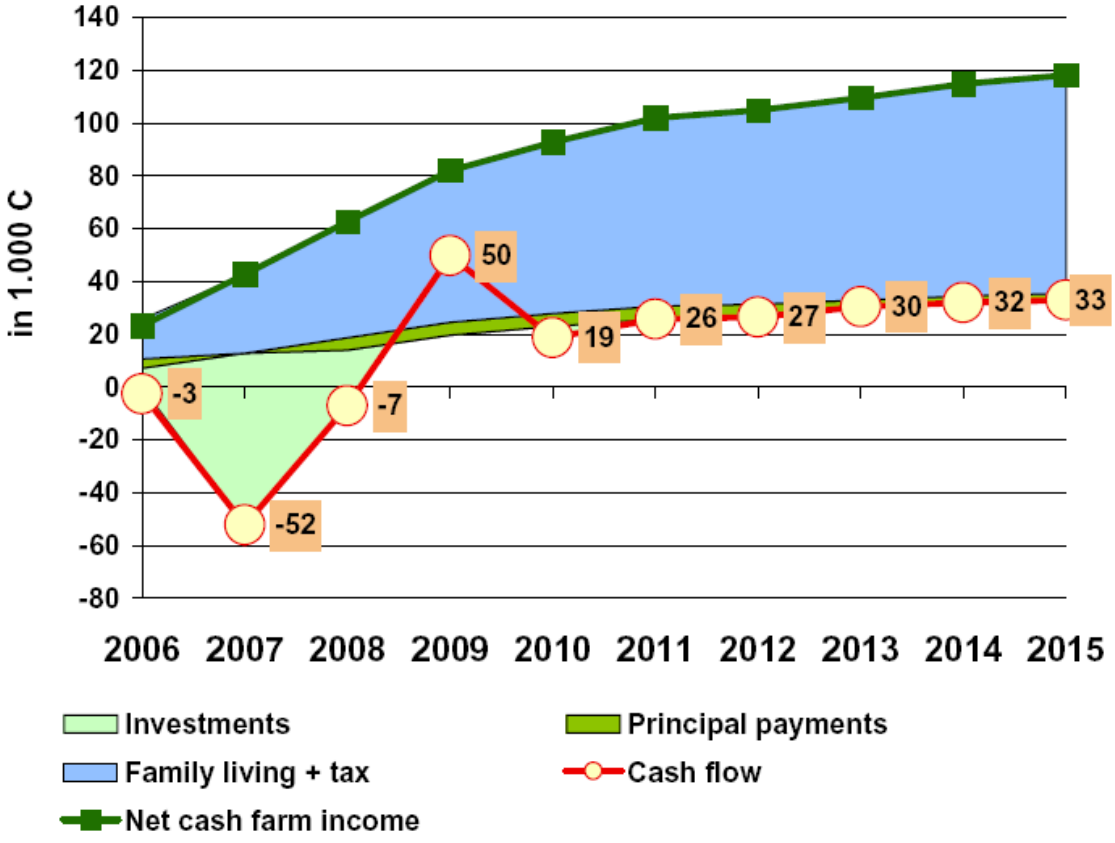
Table 5-24 Crop yield in fresh matter, tons per hectare for bio-production and conventional production

4. Crop Yield in Fresh Matter		t/ha
	2008	
Wheat grain	3,20	bio
Wheat grain	4,00	conv
Barley grain	2,80	bio
Barley grain	3,60	conv
Maize silage	30,00	bio
Maize silage	38,00	conv

Source: Own calculation with TIPICAL model of IFCN

The cash flow for the BG-60bio strategy is differed form the BG-60conv due to the slightly lower net cash income (Figure 5-19), which affects the family living withdrawals as well. After 2009, when the strategy will be applied, we observe the same trend as with BG-60conv of sustainable increase of the cash flow, therefore the “area” for family withdrawals, which in other ways could be considered as a potential source for future investment capital depending on the family objectives afterward.

Figure 5-19: Farm income + Equity BG-60bio

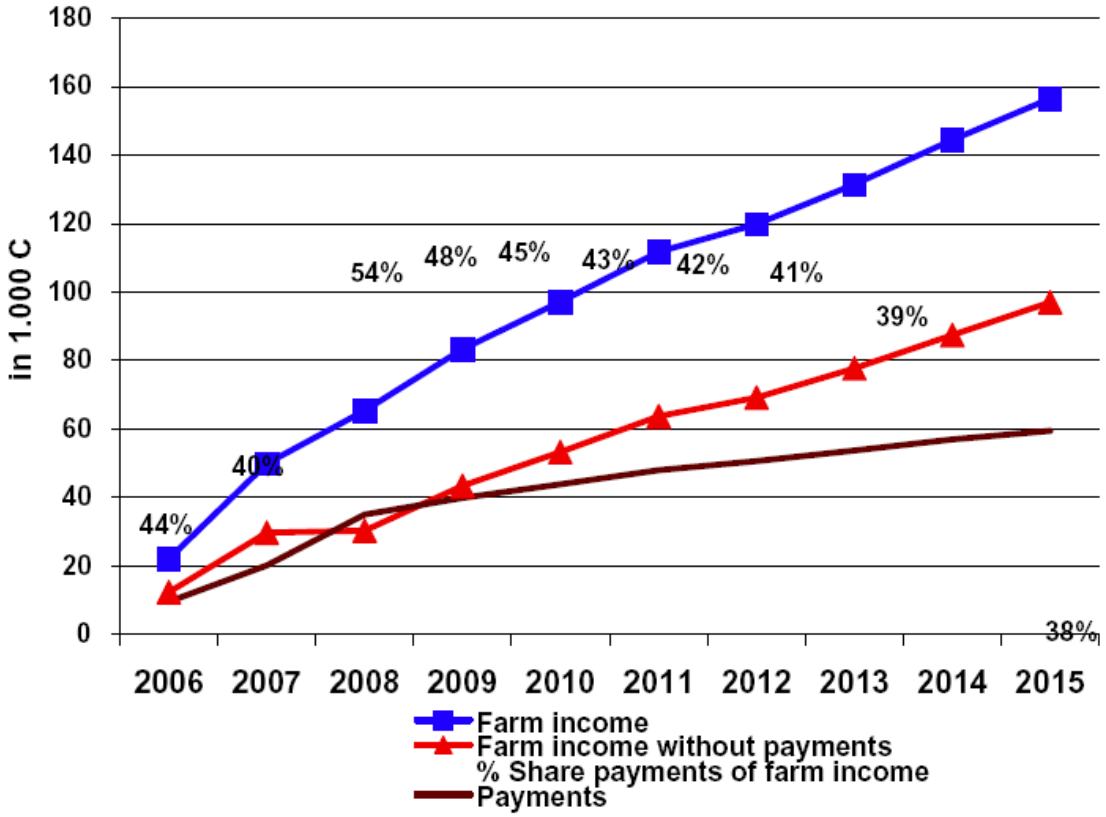


Source: Own calculation with TIPICAL model of IFCN

Due to the higher subsidy for bio-production, the share of the government payments on total farm income is a bit higher from the one we observe in BG-60conv, but the strategy still managed to make it decreasing in log run after it crosses the border of 50% in 2008.

The first visual evidence of the effect of bio-crop production we find in Figure 5-20, where the lines of "farm income without payments" is constant for 2007-2008, but the line of "payments" cross it and continue above to compensate the lower yield. As mentioned, the calculations are targeting the "blue" line of total farm income to be close if not the same with the farm in the equal conditions but using a conventional system of production. The bottom line of this deliberate equilibrium is that in fact the market shall decide who is going to gain more, unfortunately there is no strong evidence of a well-developed bio-product market in Bulgaria[93] to fairly reward the efforts of the bio farmers.

Figure 5-20: Farm income including subsidies / without BG-60bio



Source: Own calculation with TIPICAL model of IFCN

Nevertheless, in practice the bio-crop production is characterised as – more field work, more paper work, higher risk involved (among all, the chance that finally the production could not be approved as bio) for the same income as the one from the conventional production. That fact makes it not very popular among the farmers. On the other hand, it has the great potential if a future strategy for development includes small scale dairy processing and introduction of an own bio-dairy-product brand on the market., as one of the ways to increase the farmers income by introducing value added products, produced on the farm.

[93] Remember that we are talking about bio-production of wheat, barley and maze silage, in quantities which can't pay back the efforts to self sell them on the EU bio-product markets

5.2.2.4. BG-120 jump

The general strategy points are the increase to 120 cows at the end of 2008 by purchasing 60 local breed cows with an average yield, keep an average farm management and apply conventional crop production, invest in buildings and machinery considering the needs of the bigger herd, bigger feed storage place and amount of land to be cultivated.

Here we are starting with the herd simulation by applying similar arguments as for BG-60conv, with the difference that the animals would be local (and not imported high yield breeds). Due to the increase of the replacement rate, the actual number of cows to be purchased is 110 for the 4-year period. Again we could apply a straightforward increase of the herd by purchasing 60 cows and the rest to provide from the farm, but that would overload the farm financial balance with the sum of necessary investment for handling the bigger herd at once. In fact the evaluation of the BG-22 financial position which brought the creation of BG-34 as a typical farm for 2006 onward(Vassilev 2007), prove that in the conditions of the Bulgarian socioeconomic environment it is not realistic for such a (middle size family) farm to grow more than double at one step. In other words the farm would have strong and positive solvency marks which would allow it to take credits, as long as its amount does not exceed the current assets value of the farm, calculated on market prices. Consistently the preliminary calculations suggest the same stepwise strategy for the investment (growth) as the one applied in the BG-60 strategy.

Table 5-25 Cows and Replacement BG-120jump

6. Cows and Replacement	2006	2007	2008	2009	2010	2011
Average No. = No. cows at the beginning	34	34	60	120	120	120
No. cull cows	2	5	18	36	30	30
No. cows died	1	1	2	5	4	2
Heifer requirement for increase / decrease herd size	0	26	60	0	0	0
Total heifer requirement	3	32	80	41	34	32
Heifer supply from the farm	12	13	14	19	31	38
Balance heifer surplus / deficit	9	**-19**	**-66**	**-22**	**-3**	6
No. deficit purchase	0	19	66	22	3	0
Sell milking cows	0	0	0	0	0	0
No. surplus sell	9	0	0	0	0	6
No. cows at year end	34	60	**120**	120	120	120
% of cows culled / year	6%	**9%**	**15%**	**30%**	25%	25%

Source: Own calculation with TIPICAL model of IFCN

Although the biggest growth of the herd is realised in 2008, we have a doubling of the herd as early as in 2007, therefore the cowshed (barn) and the milking installation (as it was explained for BG-60conv) have to be ready at the end of 2007. Now the size of both the barn and the milking parlour are twice as big as the one done for the BG-60 strategies. That is, the reconstruction of the barn is estimated for 45 000 BGN and the milk collecting centre for 35 000 BGN. Together with the

necessary milking equipment for 55 000 BGN (DeLaval minimum price for 2x12 herringbone 30`), the milking centre is called “milking parlour”. That forms the total investment of 147 130 BGN for 2007, including investment in purchasing arable land as well. It has to be mentioned, as one can see, that the eventual price for purchasing milk quota is neglected since we do not posses reliable data for how the milk quota market will develop. We assume that together with purchasing cows from smaller farmers the attendant amount of quota will be included as well. As one can see, the arable and pasture land purchased is more, and again it aims to end up with at least a hectare per dairy cow. Furthermore, in order to have a better basis for comparison we keep the same feed rations as the one of the BG-60 strategies which consequently requires more land to be cultivated.

While at the beginning of 2008 the farm is ready to accommodate the bigger herd and to carry out its milking, it also possesses the entire technical and physical premise to do it according to the standards for animal welfare and quality of the raw milk, which are applied at that time already. This is very important for the assumption that the farm will receive all the possible subsidies as well as investment subsidies, since requirements for the quality are included in all the dairy support programs.

Table 5-26 Investment activity for BG-120jump[94]

4.3. Investments activities		**2006**	**2007**	**2008**	**2009**	**2010**
Investments land	C/year	7200	12130	18100	11054	8544
Investments buildings	C/year	0	80000	-16000	-19200	0
Investments machinery	C/year	0	55000	20000	-29400	0
Investments quota	C/year	0	0	0	0	0
Total farm investments	**C/year**	**7200**	**147130**	**22100**	**-37546**	**8544**
Buy arable land	ha	5	9	10	8	6
Buy pastureland	ha	2	1	7	0	0

Source: Own calculation with TIPICAL model of IFCN

In 2008, the investments are targeting to supply the machinery for land cultivation and feed storage facilities. The same mowing machine as it was purchased in the BG-60 strategy for 14000 BGN together with a tractor and some basic inventory for land cultivation for 35000 BGN, are assumed as a minimum required to provide the field work and feed supply for the farm. At the same time a Hayloft for bale (14000BGN) and a Silage store (18 000 BGN) are prepared to accommodate the harvest from the current year onward.

With a negative sign for 2008, the farm receives the investment subsidy for the buildings from 2007 in a total amount of 48 000 BGN (60% of the total investment in building in 2007). This results in a total farm investment for 2008 of 22100 BGN, including land purchasing (18 100 BGN). In 2009, real investment is done only for land purchasing, and investment subsidies are received for the tractor, mowing machine and store buildings (48600BGN). The negative “total farm investment” value is actually cash income for the farm (Figure 5-21).

[94] The prices of all the investments are based on the current market price corrected by the local experts, the prices for milking equipment are based on the minimum possible price of DeLaval equipment with the respective size and capacity (DeLaval (2007). Stallplanungsdaten. Z. Vassilev. Stuttgart.

Figure 5-21: Farm income + Equity BG-120jump in 1000 BGN

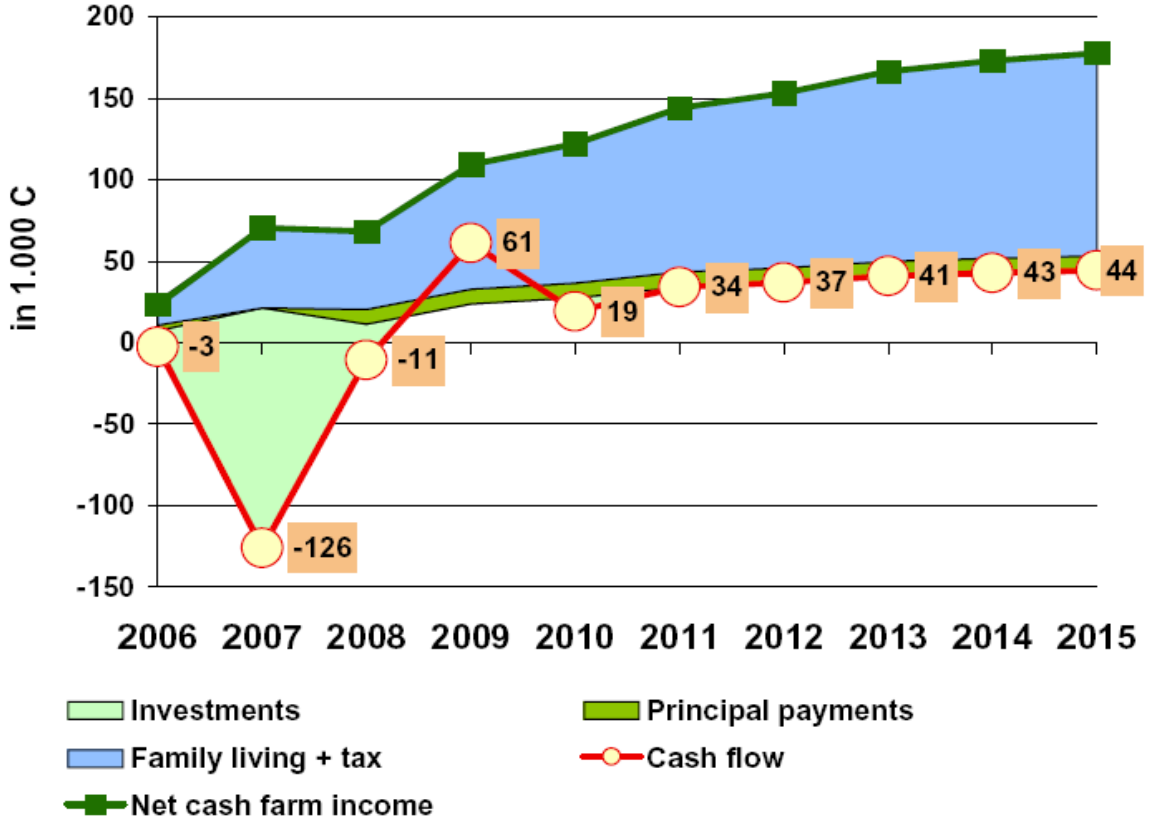
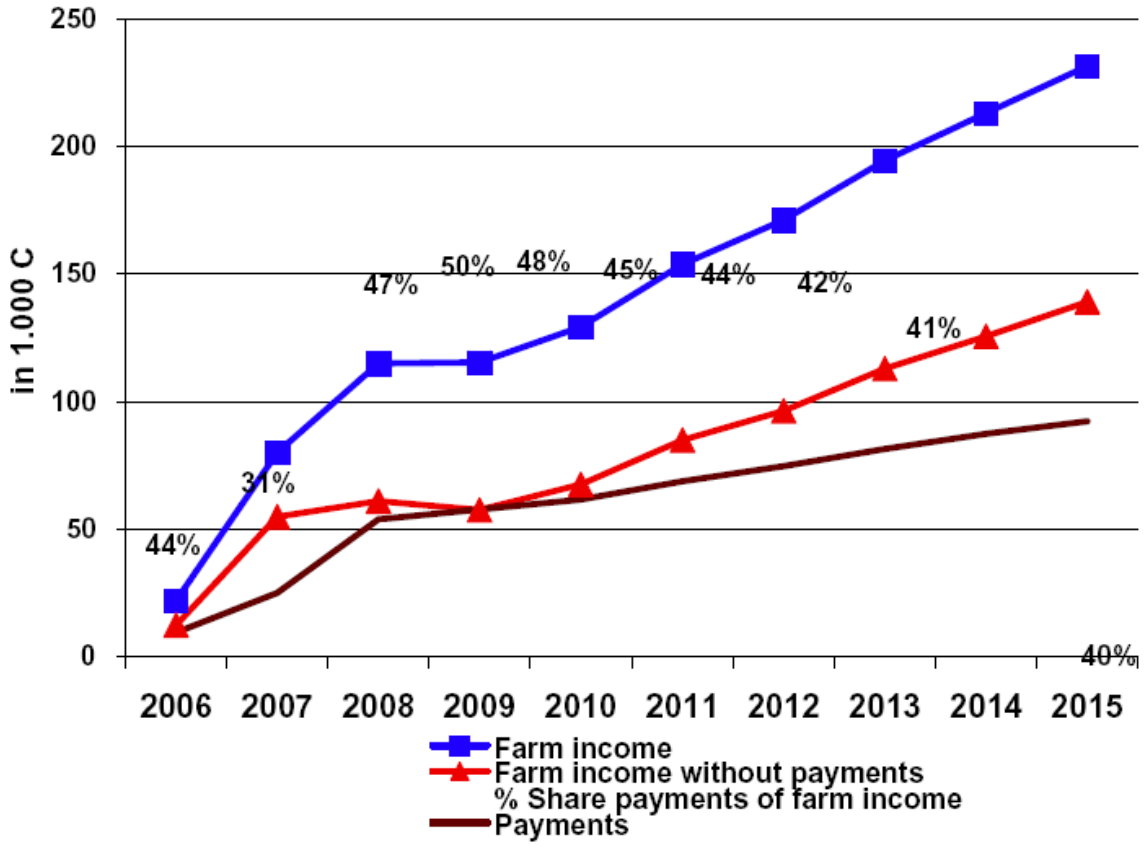


Figure 5-22: Farm income including subsidies / without BG-120jump



Source: Own calculation with TIPICAL model of IFCN

At first sight, the overall pattern is similar to the one of the BG-60 strategies, but with double values. Like with BG-60bio, the payments exceed the farm income for a while (2009 in Figure 5-22) and keep a generally significant share in the total income.

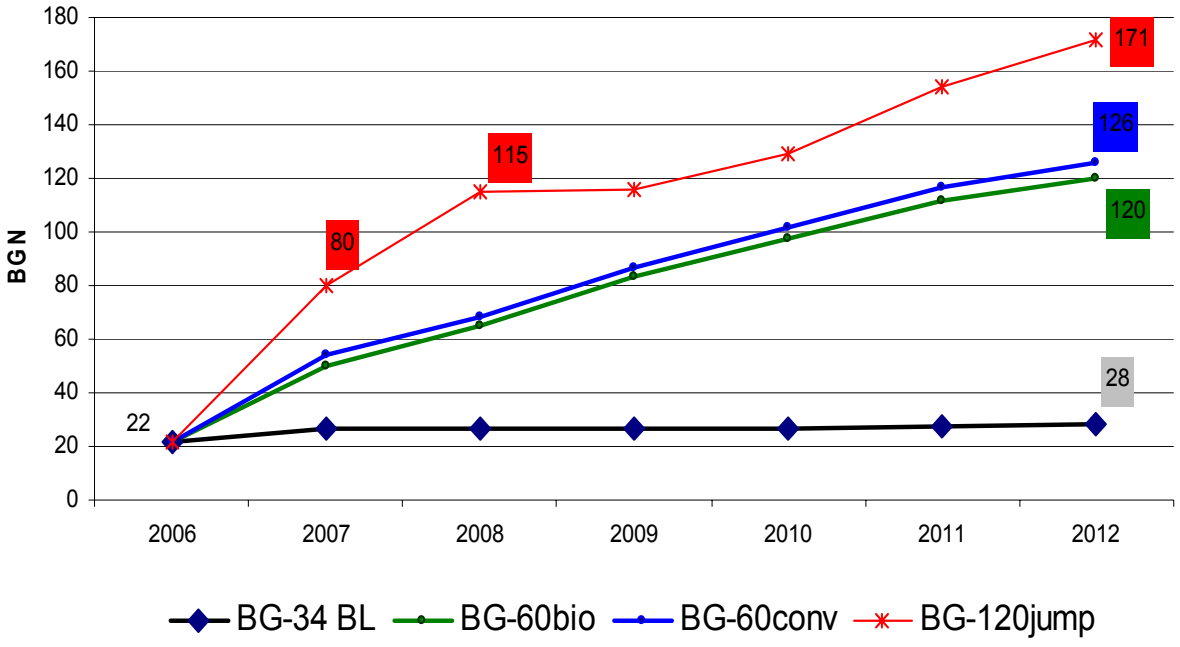
But among everything mentioned so far, a general difference towards BG-60 strategies is the increased amount of hired labour to be used as well as a much bigger amount for advisor cost which, we assumed, has to be paid in order to prepare the great amount of paper work for the investments and the management of the farm itself.

In short, the BG-120jump strategy illustrates the situation in which the available opportunities for investment support are used 100% but the capacity of the initial farm (BG34) is overestimated with respect to the management (farmer management skills as well), cash flows (positive but still a very low level of net worth, therefore a low borrowing capacity and yet too much investment at the same time, consequently the investment faces a high risk) and risk aversion of the farmer himself.

5.2.3. Comparison of the projected scenarios and conclusions

Increasing the herd size to 60 cows and improving the management leads to a farm income in 2015 that is considerably better than in the baseline (120 000 BGL/year vs. 22 000 BGL/year). Switching to organic production hasn't seemed to have a positive effect in the long run. A higher income can be created by increasing to 120 cows, but the cost of milk production is also higher due to the necessary investments and the assumption that the management will not improve because of the difficulties related to the rapid increase in activities.

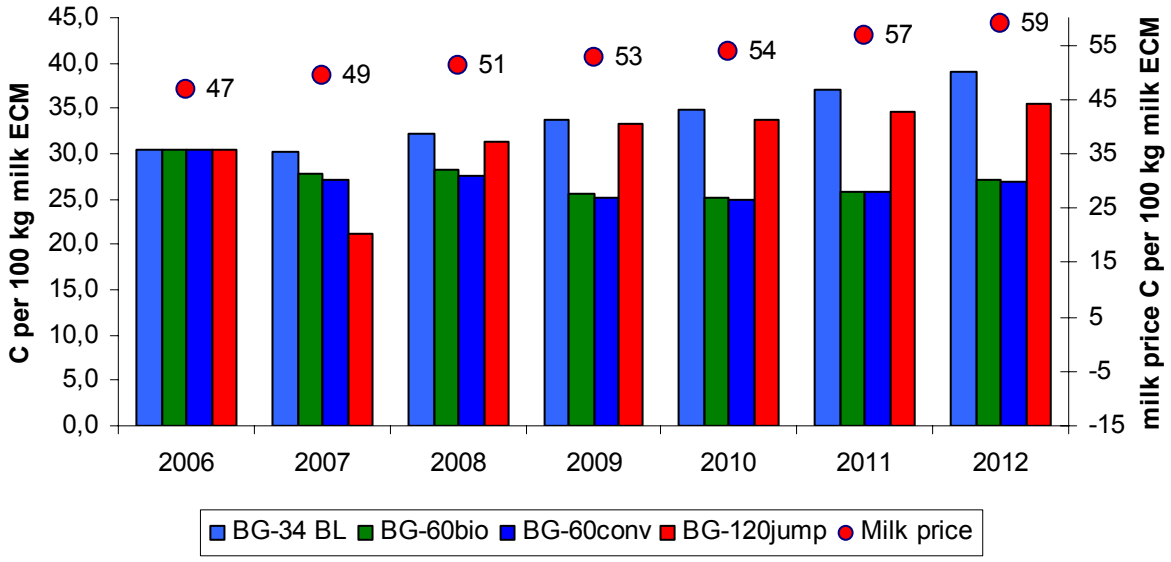
Figure 5-23: Income from the Base line and all the strategies



Source: Own calculation with TIPICAL model of IFCN

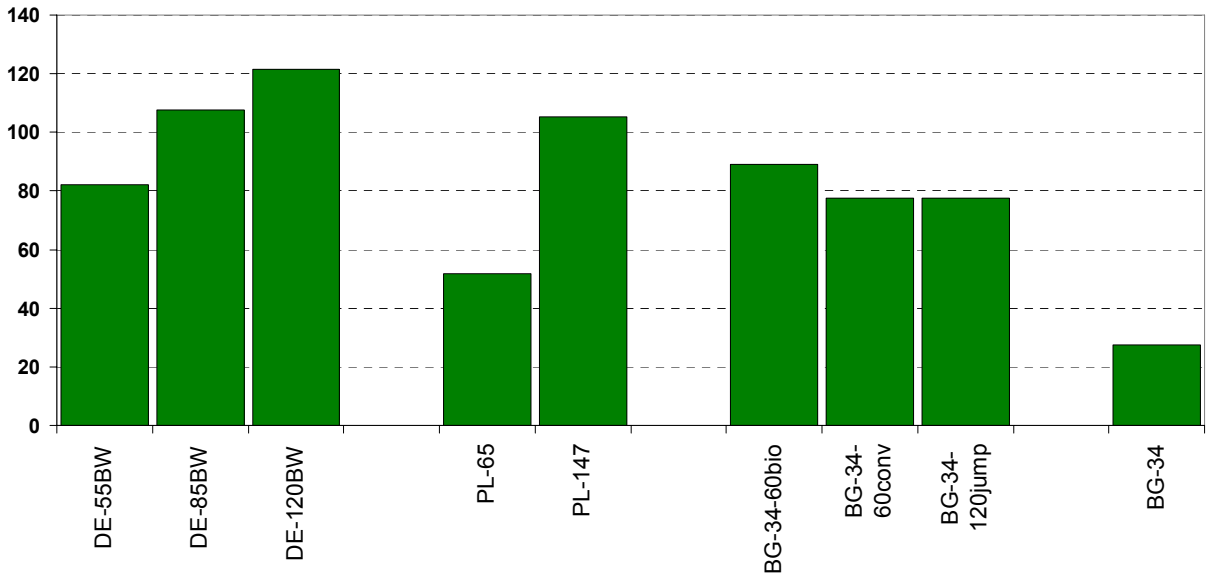
In general, all strategies lead to better income results than those that can be achieved in the baseline. With a maximum cost of 21 EUR/100 kg milk (Figure 5-24), all strategies analysed seem to be very competitive in the European context and present a good position, even if the quota system is eliminated by 2015. BG-120jump costs of milk production only, decrease immediately due to bigger herd and more milk production. After then the costs for all the strategies slowly rise following the “Index of Output price” (Table 5-16).

Figure 5-24: Production Costs (- non milk returns) + Opportunity Costs (land, labour, capital) for the Baseline and all the strategies (BGN/100kg milk)



Source: Own calculation with TIPICAL model of IFCN

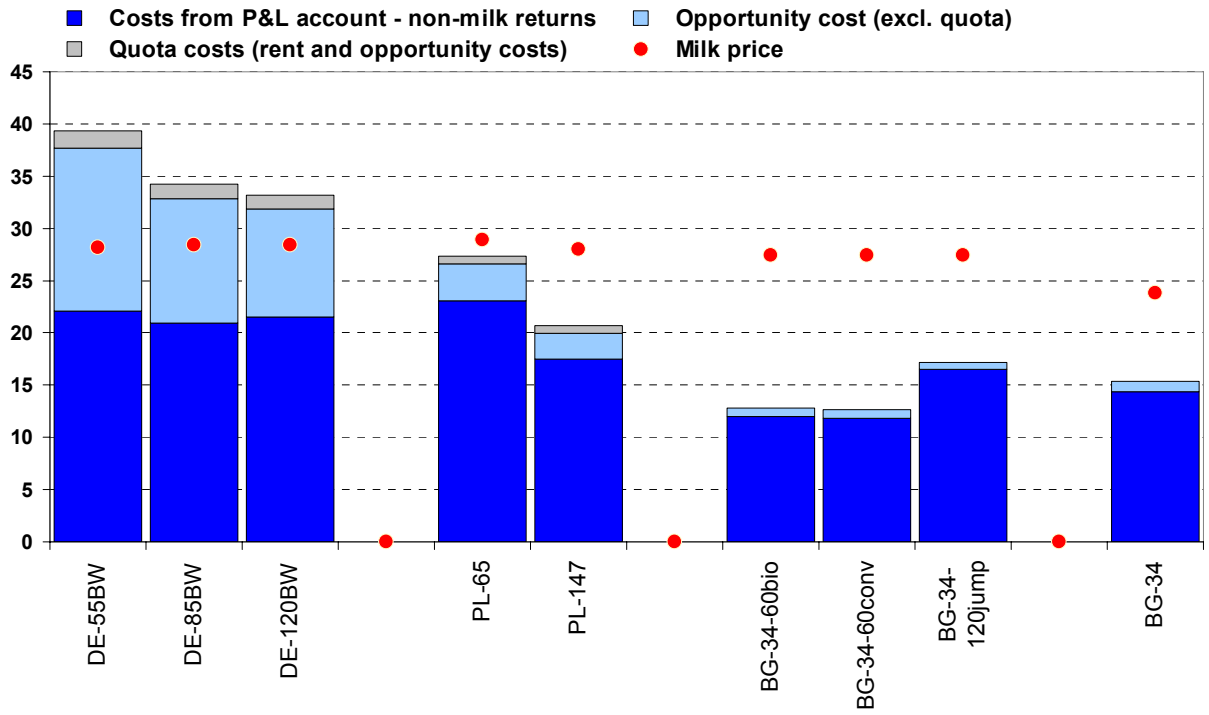
Figure 5-25: Labour productivity (kg milk (ECM)/hour), selected farms from DR-2007 and the strategies in simulation at 2010.



Source: Own calculation and (IFCN Dairy Report Hemme 2007)

Although that comparison of the "cost of milk production" is between the results from strategy projection at 2010 versus the cost of milk production in 2007 (Figure 5-8), the first part of the general objective of the study is fulfilled[95]. That is to increase the labour productivity (Figure 5-8 vs. Figure 5-24) while sustaining the cost of production (Figure 5-7 vs. Figure 5-25) and as a consequence increases the net worth of the farm about 5 times.

Figure 5-26: Cost of milk production only (EUR/100kg milk (ECM)), selected farms from DR-2007 and the strategies in simulation at 2010.



Source: Own calculation and (IFCN Dairy Report Hemme 2007)

All the strategies are utilised till the end of 2010, due to increase of the Net Worth after 2010 it can be assumed that a new action should be considered: close the long term debts, new investment, growth etc (Table 5-27).

Though in year 2010 of the simulation all the strategies achieve "Farm debt-to-asset ration" lower than 10%, the way of reaching that value differed. The extent to which the farm's assets are financed by debt capital versus equity capital was proven (during the data collecting and validation) to be one of the most sensitive rations to the farmers. With respect to the BG-120jump strategy, despite that from financial point the "debt-to-asset" ratio of 36,8% in 2007 (Appendix 5) is accepted as a "strong value"-below 43%(Olson 2003), the farmers don't share that "optimism". Even though significant increase of the assets (from 85 to 248 thousand), double the equity due to investment subsidy (form 85 to 157 thousand) what scare them most is the amount of the liabilities at the end of the second year (91 thousand). Taking into consideration the low speed of liquidity of most

[95] See Chapter 1.3 Objective of the study

assets in agriculture, the farmers are not willing to end up with debt that is more than their equity form the last year. In case of unfavourable events that would cost them not only the business but twill threaten the wellbeing of the family. That refers to the second part of the study general objective, overestimate growth in size endanger the family objectives and security.

Table 5-27: Capital structure and solvency measures for the Baseline and all the strategies at 2010 in 1000 BGN[96]

2010	BG-34BL	BG-60conv	BG-60bio	BG-120jump
Total market value farm assets	127	410	398	681
Equity	127	389	375	617
Liabilities	0	21	22	64
Farm equity-to-asset ratio	0%	95%	94%	91%
Farm debt-to-asset ratio	0%	5%	6%	9%
Total Profit	31	105	101	133
Private consumption	23	28	28	28
Net worth of the company	7	78	73	106
Return on investments	31%	64%	61%	42%

Source: Own calculation with TIPICAL model of IFCN

[96] The data for "capital structure" from entire projection - Appendix 5

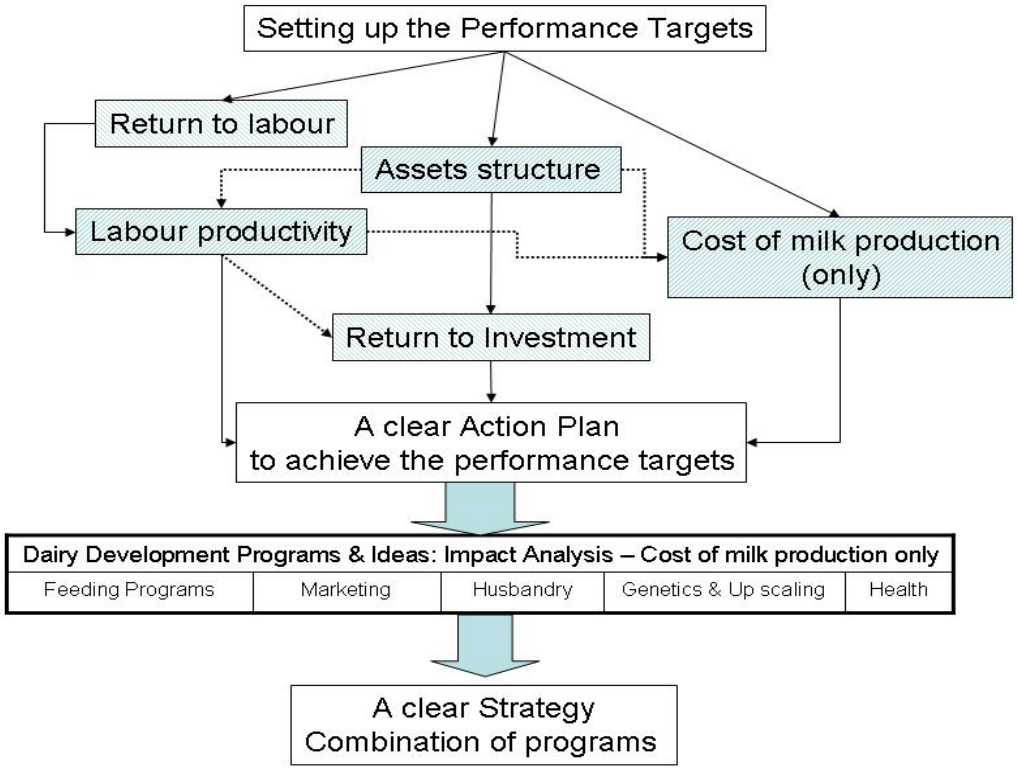
5.3 Modelling the future BG typical dairy farm in 2006-2016

5.3.1. Introduction

In today's rapidly changing dairy sectors, farmers need strategies grounded in competitive moves and business approaches that result in successful performance(Gloy, Hyde et al. 2002). At its most basic level, long-term farm profitability is dependent upon both the amount of the factors of production employed and the methods by which these factors are combined. The amount of the factors the manager will employ is subject to many considerations, including initial resource endowments, factor prices observed by the manager, factor availability, expectations regarding the productivity of the factors, and risk preferences. The ability to productively combine the factors of production is also critical.

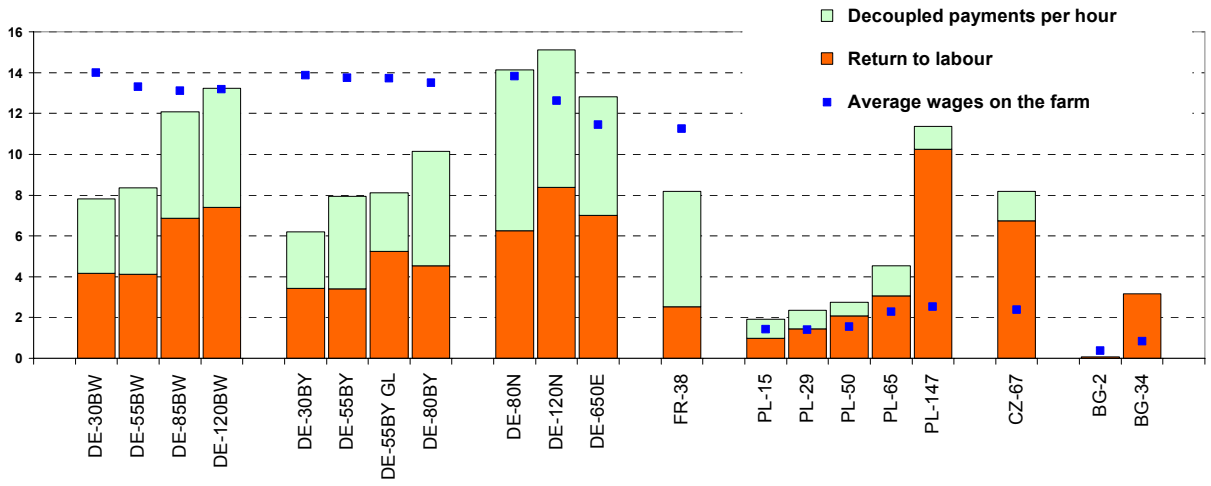
Developing such strategies brings into play the critical managerial tasks of setting business performance targets (the ends) and action plans to achieve them (the means) (Figure 5.26). The major challenge here is that most dairy farmers do not have the knowledge of their own dairy sector/trend and market-driven entrepreneurial skills to either set adequate targets or design the action plan to achieve them. This study is therefore about developing a methodology to assist local dairy farmers to set realistic business targets and a stepwise approach to hit them (Garcia, Saha et al. 2006).

Figure 5-27: Approach to craft a dairy development strategy for a future typical dairy farm in Bulgaria



Based on the conclusions from the comparisons in Subsection 5.1.2 among all economic results, return to labour, assets structure and the cost of milk production (indicators of dairy profitability and competitiveness) were selected to guide the farm development strategy.

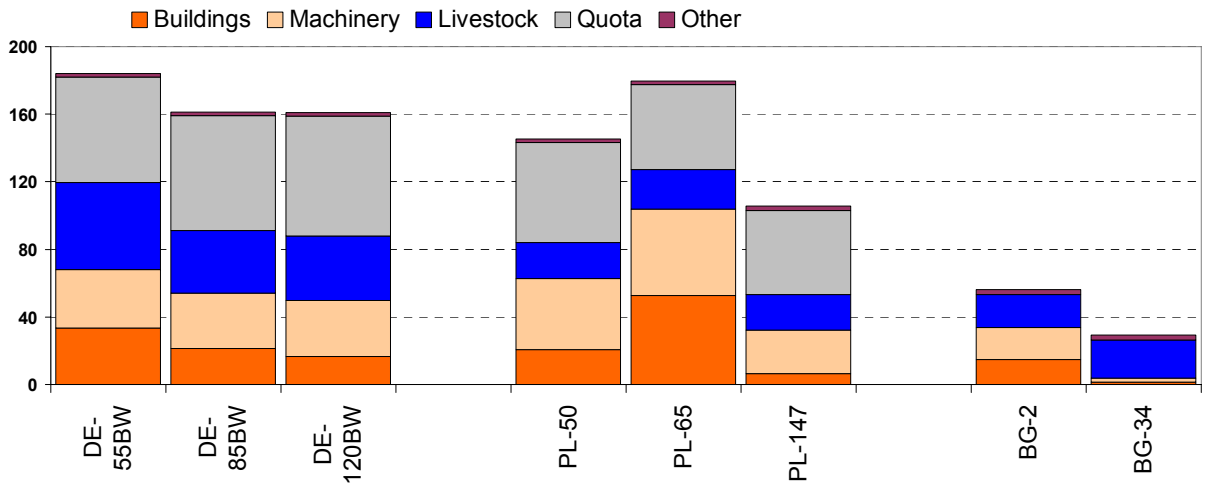
Figure 5-28: Return to labour in selected farm form DR 2007 (EUR/Hour)



Source: (IFCN Dairy Report Hemme 2007)

As we see in Figure 5-28, the return to labour of the BG-34 typical farm is a one Euro less than the one of DE-30 and DE-55, the same as PL-65 but far below the marks of DE-85 and CZ-67. Unfortunately, this is not much, as meanwhile BG-34 labour productivity is the lowest one (Figure 5-8) among all the farms (except for BG-2, which we do not consider here). Therefore, we shall consider improving the “labour productivity” in our strategy and to do so we have to improve the assets structure – provide the labour force with technical equipment in order to become more efficient. In Figure 5-29 we can observe the assets structure of the selected farm, without the land (while the land price varies much across the countries).

Figure 5-29: Asset structure of the dairy enterprise, without land (EUR/100 kg of milk (ECM)) of selected farms from DR2007 of IFCN and



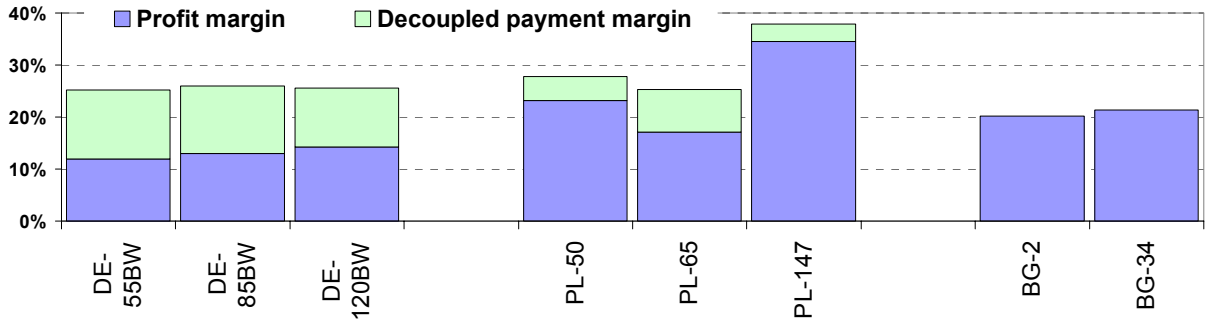
Source: (IFCN Dairy Report Hemme 2007)

It can be seen that the weight of the different assets on 100 kg of milk follows a similar pattern for all the other farms. It decreases with the increase of the herd size. Except that this figure implies an economy of scale (the costs for the assets are fixed costs to be distributed over the production – more production, less share of fixed cost per unit). So indeed the BG-34 needs more machinery, better buildings and modern equipment in general, but we should keep an eye on the value of the Return on Investment marker by making it as fast as possible. At the same time we are considering the weight of the investment and the assets not to boost the cost of production onto the level that makes it less competitive on the EU market.

The new assets actually represent new technology to be adopted and technological changes are typically capital-intensive and not size-neutral, so that adopters of the technology must farm additional acres (or animals) to achieve the cost efficiency gains afforded by the technology (Miller, Coble et al. 2003).

While the profit margin of 20% is not so bad (Figure 5-30), we will try to cross the 30% border and keep it that way as a warranty against any unpredicted events that may occur in the near future[97].

Figure 5-30: Profit margin of the whole farm (share of farm income on total returns) of selected farms from DR2007 of IFCN.



Source: (IFCN Dairy Report Hemme 2007)

In a sequential approach, the BG-34 typical dairy farm was heuristically manipulated by applying all the major dairy support programs and development opportunities, in the same way as the strategy projection was made in the previous subchapter. Efficiency Considerations: Direct payment schemes such as SAPS[98] can provide some level of income stability, and help mitigate farmers' exposure to income risk by guaranteeing a minimum income from farming(Key and Roberts 2006). Direct support schemes, however, cannot substitute for the need to raise the productivity and improve the competitiveness of Bulgarian agriculture. Productivity growth and improved competitiveness remain the only sustainable solution to agricultural income problems(Key and Roberts 2007). Agricultural support schemes targeting specific sectoral adjustment needs, such as farm consolidation, productivity or competitiveness-enhancing farm-level investments, and diversification to off-farm activities is the way forward. These can be tailored

[97] At present, while finalising this thesis (July 2008), Bulgaria is threatened to lose much of the EU support for the agriculture due to unsolved corruption of its utilisation. This means for us to have a profit margin closer to the other farms even without all of the payments given to them.

[98] Single Area Payment Scheme.

to the specific needs of the different regions, and it can all be done under CAP Pillar 2 - measures aimed at supporting rural communities to develop and diversify (World Bank 2006).

The results were then presented and discussed on the panel with local experts and farmers representing the typical farm to combine them and improve the BG-34 (action plan). These steps produced both **realistic performance targets and a clear strategy to achieve them**.

In short, considering the revealed potential of BG-34 to BG-60conv (from the herd simulation in Chapter 5.2.2.2) to grow in the range from 50 to 80 dairy cows, estimate the required assets to be built or purchased – track the "return on investment" and the "cost of production", we try to increase labour productivity, decrease production costs and make the farm ready to compete with the typical farms in EU. Despite all this, the major target is the sustainable increase of the family farm income, as it is the "prize of all the efforts we made".

There are, however, some obstacles, yet very important, that we can't manipulate in our plan, which comes from the misled common sense of the local farmer, historical events or lack of reliable administrative bodies. Epitomized from the Panel of creating the typical farm, here are some of them as examples:

- the majority of the farms which are or soon will be specialised in dairy, continued to avoid such a size of activity which would include them under the rules of the VAT Act. This is a certain level of turnover which, as a coincidence, according to the approximate calculations, is equal to the one of a dairy farm with a herd size of 50 cows;
- the lack of education of the manager to do the proper bookkeeping and therefore to have adequate information over the farm operation prevents any possibility to plan growth with investment or apply for a credit by himself, simultaneously with this many farmers are extremely suspicious and mistrustful to anyone offering them help and asking them questions about their "most secret" agricultural activities;
- many farmers who decided to increase the yield and the quality of the milk, do not have their own equipment to produce high quality feeds stuff, and at the same time there is no reliable system (institution or practice) to ensure the quality of the feedstuff from the market (when it is up to silage, concentrates etc, high energy food).

Furthermore, it has been argued that an inverse relationship exists between farm size and productivity. The validity of this claim and the factors causing it has been thoroughly researched. However, the empirical literature has failed to reach a consensus. The relationship between farm size and productivity appears to depend on a number of factors including the difference in the intensity of land use, land fertility, and managerial factors. The viability of small-farm production is now being questioned with the ongoing process of trade liberalization, which places small farms in a disadvantaged position (Fan and Chan-Kang 2005).

On the other hand, Boussemart and Butault conclude that it is "essentially family run medium sized farm although availing of waged labour as a support, which performs best" (Boussemart, Butault et al. 2006). They explain the better performance of medium sized farms with more flexibility in the use of production factors, labour particularly.

We shall consider the same assumption for projection as in the previous subchapter[99], in view of the fact that "a farm agent, bases all planning decisions on expected prices because actual prices are only determined at the end of a production period as a result of farm activity" (Happe 2004).

5.3.2. General assumptions and Action plan

In principle the same general assumption for projection described at Chapter 5.2.2 are used in this simulation as well. The Action plan (Figure 5.30) illustrates the system of setting up the variables in question during the deliberate panel with local experts, farmers representing the typical farm and the scientist. Every question in debate ends up with input values for the TIPICAL model. Once running the model with the new values, the business targets are checked and the next question is debated.

Questions:

- What herd size would provide desirable income to meet the family objectives?
- What for and how much investment is necessary to facilitate that herd size – type and characteristic of machinery, buildings and equipment?

Intermediate Control – if "yes" continue; if "no" star over (checking up the intermediate business targets like labour productivity, debt level – financial rations, effectiveness etc.)

Questions:

- What work force is required to facilitate the farm business?

Intermediate Control – if "yes" continue; if "no" star over

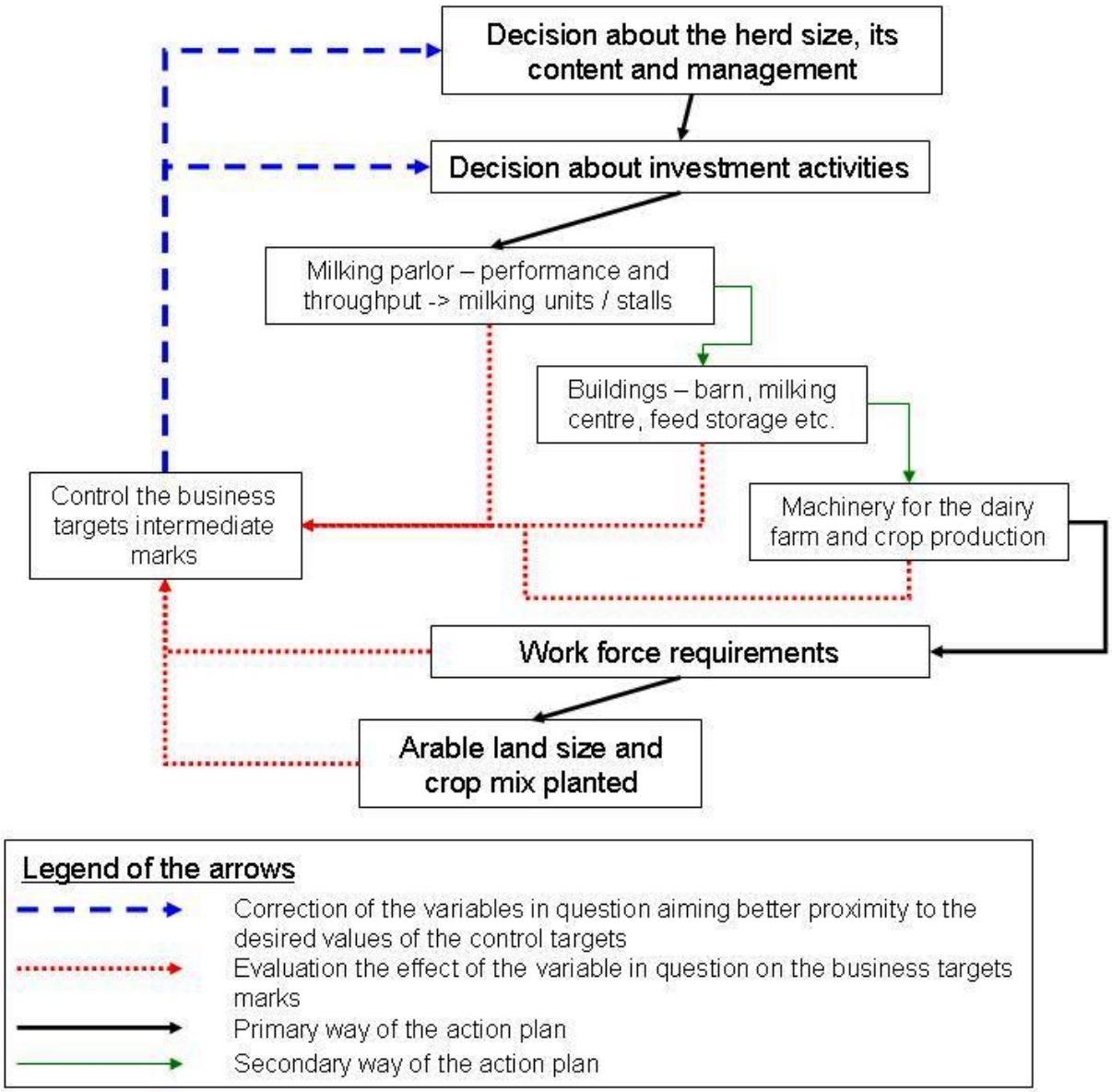
- What sources of feed shall be used, own land and production or market?
- Land requirements, crop mix?

Intermediate Control – if "yes" continue; if "no" star over

The initial input upon which the Action plan was applied is the finding form the previous projection, in particular the BG-60conv strategy.

[99] See 5.2.1 General economic situation – assumption for projection

Figure 5-31: Schematic of the Action Plan for building the strategy for the development of the future typical dairy farm



5.3.2.1. Herd size and herd management

According to the action plan, the model of the future typical dairy farm starts with the estimation of the available capacities and potentials for herd size, compliance the current and upcoming situations. While the previous subchapter estimates that a realistic growth could be between 60 and 120 cows, the action plan suggest first to aiming the selected targets with a “strategy for upgrading the herd from average local to high yield imported breeds”. While the assumption for BG-60conv was to buy 10 new high quality (yield) breed cows, and therefore slightly increase the average milk yield of the herd in 5-6 years, in this case it is planed to replace the whole herd with a new breed. That can’t be done at once for many reasons, among which the fact that the new cows

need an adaptation period (including quarantine when they are imported) until they achieve their maximum potential, or if it is a case of pregnant heifers, they will be milked approximately after 6 months. Consequently, by doing the upgrade at once there will be unacceptable long period without any income form milk. In the case of BG-60conv, the model simulate the herd and decide how many and when to buy the cows, which results in buying 9 cows (the imported one) in the first year of simulation, rather than 6 local breeds in the second year, and finally 3 more local breeds in the third year, while the last two were to fulfil the aim of increasing the herd, the first batch aimed mainly to improve the average yield of it. After the three batches are made, the BG-60conv will actually have approximately 16 cows from the new breed, or 3 years after the purchase their number will be doubled (an optimistic scenario).

But in order to replace the whole herd and meanwhile to double or triple its size, it is necessary to manually input in the model (TIPICAL) the purchase of this high yield animals. The test with the program for "improving the dairy genetic fond of the country[100]" provides the alternatives to replace the herd in a 4-year period with the purchase of a total of 40 animals in three batches (20 in 2006, 10 in 2007 and another 10 in 2008). This is illustrated in Table 5.26 which is the essence of the herd simulation in the TIPICAL model dairy sheet for the "future farm projection" which is coded for simplicity "BG-60future".

Table 5-28 Herd simulation of the BG-60future dairy farm

6. Cows and Replacement	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Average No. = No. cows at the beginning	34	34	50	60	65	65	66
No. cull cows	5	10	15	16	20	20	20
No. cows died	1	1	1	1	1	1	1
Heifer requirement for increase / decrease herd size	0	16	10	5	0	1	1
Total heifer requirement	6	27	26	22	21	22	22
Heifer supply from the farm	12	27	28	27	24	23	24
Balance heifer surplus / deficit	6	0	2	5	3	1	2
No. deficit purchase	0	0	0	0	0	0	0
Sell milking cows	0	0	0	0	0	0	0
No. surplus sell	*6*	*0*	*2*	*5*	*3*	*1*	*2*
No. cows at year end	**34**	**50**	**60**	**65**	**65**	**66**	**67**
% of cows culled / year	15%	20%	25%	25%	30%	30%	30%

Source: own calculations

In order to accelerate the replacement, operation is initiated from the null[101] year of simulation 2006, combined with the increase of the herd replacement rate to 15% in 2006 and up to 30% with a 5% step per year. The replacement rate in compliance with the strategy and precise herd management would gradually sell the animals from the local breed till 2010, which is a total of 57 (culled cows and surplus sell) while annually add in to the herd 26 heifers in average (Table 5.28,

[100] In reality (2006-2007) the program, which gives a subsidy for importing new high yield breeds, didn't go very well because of the complicated procedure for applying and the ongoing restriction on the import of dairy heifer due to disease and infections.

[101] Manually purchased animals are taken into account in the next year of simulation, therefore the input of 29 cows in 2006.

row “Heifer supply from the farm”). For 2007 those are supplied from the firs batch of 20 heifers purchased in 2006 plus reproduction form the local breed. For 2008/09 the next two batches provide each 10 new heifers to cows plus the reproduction from the herd new height breed cows.

Now, considering the heifers supplied form the farm after 2009, one can see the opportunity to continue with the herd increase by 1-2 cows per year as an alternative to the even higher replacement rate. Since the outcome from this herd simulation can’t be predict it has to be assumed that either the targeted average herd yield will be achieved till 2010 or, if not, the farmer shall compensate that by including a few more cows to the herd instead of selling the surplus. The other constraint that would predetermine whether to sell, increase the replacement rate or the herd size, is the situation with the milk quota in 2009-2010.

Due to luck of space the herd simulation for 2013 up to 2015 is not included. The average number of cows in 2015 reaches 70 owing to in-farm reproduction.

5.3.2.2. Investment activities

Following the action plan, after setting up the herd size issue and have a detailed herd simulation, we continue with the question of the Milking Parlour. Once again we shall explain that the milking parlour implies several components, and often outside of the specific terminology could be referred to as a milking centre. The components we divide in a way that we calculate their price as well as according to their nature. The source for the components and their price was provided by DeLaval – after a personal request made by me and a colleague from the University of Hohenheim.

Milking Parlour

The Milking Parlour is a combination of the building itself (or a premises in/or connected to the barn), the Parlour System[102] and the Milking Equipment. When it is up to the building the important things to be considered are the potential costs to keep it hygienic, the distance the cows have to cover, and the level of working comfort that can be provided.

There are many parlour systems developed so far (among them most common ones are herringbone, parallel or carousel – named after the position and the orientation of the milking stall), each one having certain advantages and disadvantages, but in general the development of one is targeting a particular system and size of farming. Therefore, the choice of a parlour system is of great importance for the future performance and efficiency of the farm and not only because of its considerable price. Here we are going to consider only the Herringbone parlour system 30° (the degree is the orientation of the stall against the channel) as it is generally considered the best fit for the size and system of farm we are developing. From the data provided by DeLaval, for each component we have an average price and a high-end price (High-Tech systems Price) for

[102] That is the special construction and mechanical equipment, depending on the system chosen, inside the premises such as the channel, the entrance/exit path doors and enclosure, the stall doors and mechanics etc.

comparison, but we are going to use the average one. The approximate price range for the average Parlour system from 8000 up to 18000 (2*8stalls) depending on the number of stalls, while for the same 2*8 stalls herringbone parlour system, but a high-tech one, the price range is from 50000 up to 70000 EUR.

The Milking Equipment (Table 5-29) is the most complicated one, includes many parts, devices, measurement instruments, power units etc. The combination into a complete system of equipment is a complicated task, usually performed by experts and advisors from the company producing the equipment. For current purpose, a consultation with such experts was made and ends up with the minimal and average combination of components corresponding to the farm size and system in developing.

Of course a milking parlour needs all the components in Table 5-29, but each of them has several models and options that depend on the level of advanced technologies inside it. For example, the vacuum pump models have a price range from 2000 up to 8000 EUR; the Control box could include a combination of elements and devices up to 10000 EUR, some components we need only once, others we need as many as the milking units we have.

Table 5-29 Common Milking equipment components

Components	Price range (EUR)
Vacuum Pump	2000-8000
Vacuum regulator	300-700
Control box:	
Milk receiver closed pit	3000-5000
Milking unit	1000-2000 *number of stalls or 1/2
Cluster	300-500 *number of units
Pulsator	200-400 * number of units
Cleaning	2000-7000

Source: (DeLaval 2007)

In order to estimate the size of the milking parlour for the farm, the general development strategy and particularly the herd management one has to be considered. Meanwhile it may not need all the advanced components immediately – or at all. With respect to the last one, the following arguments are taken into account:

- total replacement of the herd with high yield cows;
- average lactating cows (to be milked) for all the projected horizon – 47;
- evidence for opportunity of a future increase of the herd size up to 120 cows;
- current labour force available and intention to rely predominantly on family labour.

In short, the task of replacing the herd and sustain a high yield one, requires more (than usual) precise information on the cow performance and health – this is a plus for including high-tech equipment. The possibility of a future increase of the herd is available in, approximately, the 5th year of projection and, if it is profitable and possible, such a decision may be taken. Therefore, by planning to spend a lot of money in a milking parlour anyway, the option should be considered, if it is necessary and when the time comes, to rearrange (upgrade) it in order to double its capacity

(throughput and performance), through minimum expenses. Finally the available labour force to work on the farm has to be considered, therefore the level of mechanization of the parlour.

The procedures of planning the size of the milking parlour are explained in Appendix 6. Following them, it is calculate that in order to satisfy the arguments listed above, invest in a milking parlour with 6 milking units on 12 milking stalls is the optimal choice. That size of a parlour, much bigger that what the farm will need in the first 3 years, will be effectively loaded at the time when the herd size becomes larger than 60 cows, which are approximately 47 lactating cows to be milked at the same time. While the performance of the parlour (assuming we have the work routine time on which such a performance is calculated) is between 50 and 60 cows per hour[103], and we expect to milk about 47 cows, that will allocate the use of only one worker for the job, one hour per milking, twice per day.

On the other hand, while having the construction (the parlour) two lines with 6 stalls, but using only 6 milking units, it is possible to handle twice or even three times more cows if install 6 more milking units (one per each stall) or increase the milking time from one to two hours.

Finally, the Milking Parlour to be invested in has the following dimension, size and price:

- Herringbone parlour system 30° - allocated as an investment in building for a total of 20000BGN[i];
- Milking equipment for the parlour system – allocated as an investment in machinery for a total of 50000 BGN;

Both investments are done in 2007, and a 50% investment subsidy for both of them are calculated in 2008 (for the machinery) and 2009 (for all the buildings together).

Buildings investment

While the “milk collecting centre” (the building and the construction inside it) was explained and included in the *Milking Parlour*, here we shall concentrate on the barn itself and the other complementary buildings in the farm.

The barn of the typical farm was rented from the former cooperative and recently purchased. Before the purchasing, the farmer invested neither for repairs nor for the maintenance of the barn. Nevertheless, in the model for 2006 the amount of 500BGN is included for building maintenance. Some more information has to be included about this particular type of barns, constructed during the last years of the “planed economy” as the “most modern” type of Stanchion barns for dairy farming. It is made of concrete elements including the roof, the floor, the bedstead of the cows and the “feeding-trough”[104]. The major difference from today’s barns systems is that the walking area is behind the bed and the feeding area is in front – that is the cow must be inside a stall (bed) when she eats. That is comfortable and is still used in some farms in Western Europe when the milking is made with milk and a vacuum pipe line all around the stall inside the barn and not in a separated premises (as it is with the milking parlour). The personal experience from IFCN conference in Poland gives us evidence (“dairy farm rush”) that the investors are looking for exactly such kind of constructions because they are easier and cheapest to be reconstructed for a “Free Stall Barn”.

[103] Depending on the average milk per cow and milking, for the calculation it is estimated to be 14liters.
[104] Concrete channels near the beds of the cows, where the feedstuff are spilled.

There are some different approaches in the reconstruction, depending on many factors, but commonly distinguished according to whether there are individual stalls for the cows or not. While the individual stall is an expensive decision, especially if a special bed mattress is included[105], the open "living space covered with straw" is the cheapest one. The best decision is in the middle, so it covers both absolute options. The barn is reconstructed by shifting the place of the stall with the walking area, and the stalls themselves have "straw mattress[106]". That was estimated to be done for 25000 BGN, invested in 2008.

Prior to this, the farm urgently needs a place to store the feedstuff and, according to the ecological regulations, each farm has to possess its own manure storage. As it was explained previously, the farm bought a barn from the former cooperative, which is actually part of the huge dairy complex and as such has all the other installations – a silage and manure storages as well as a hayloft and a granary. In this case an investment is planed for the repair and the reconstruction of the silage and the manure storages but not a purchase price, as they have no value. The total expenses for making both storages operational are estimated at about 12000 BGN, an investment made in 2007. The total investment subsidy for the building is paid in 2009 as 50% of the assets input price, or 28500 BGN (Table 5-30).

Table 5-30 Investment activities for BG future typical dairy farm 2006-2016

4.3. Investments activities		2006	2007	2008	2009	2010
Investments land	C/year	7200	7022	6033	4145	4272
Investments buildings	C/year	0	32000	25000	-28500	0
Investments machinery	C/year	0	50000	-16000	26600	-15000
Investments quota	C/year	0	0	0	0	0
Total farm investments	C/year	7200	89022	15033	2245	-10728
Buy arable land	ha	5	4	3	2	3
Buy pastureland	ha	2	3	3	2	0

Source: own calculations

The panel discussion suggests one more investment to be done after the herd becomes bigger than 50 cows. As one can see, the tractor of the farm is extremely old, but still operational and very cheep for maintenance, still this type of tractors are not very comfortable for working inside barns, but more for field works. Therefore a new tractor is planed for purchase in 2009, middle size one, with dimensions to allows him easily to manoeuvre inside the barn and yet still powerful enough to do most of the field work. The price of such tractor is estimated to be about 30000 BGN, and a subsidy of 50% is calculated in 2010.

As it was explained before the land market underdevelopment is preventing us to plane any significant operations of buying arable land. Therefore by the same schema as BG-60conv, the purchase of land is done year by year with small parts (Table 5-30), till it total size is at least equal to 1 hectare/dairy cow. The crop mix planted as well, follows the same pattern as BG-60, aiming

[105] A special bed for the stall place, made by some kind of plastic or other kind of material, very comfortable for the cows and easy for cleaning.
[106] The stall is spread out with straw which is less hygienic form the previous one but several times cheaper, the straw has to be changed regularly but not so often since the feeding area is not next to the stall any more.

simplicity of the model (Table 5-31). The farm shell produce as much as possible maize silage on his arable land, but still that has to be no more than two times the land with grain crops.

Table 5-31 Crops mix planted for BG typical future farm

3. CROP MIX - Planted ha		2006	2007	2008	2009	2010	2011	2012
Wheat grain	ha		4,62	6,38	8,36	9,68	10,34	10,34
Barley grain	ha		4,62	6,38	8,36	9,68	10,34	10,34
Maize silage	***ha***		***5,88***	***8,12***	***10,64***	***12,32***	***13,16***	***13,16***
Lucerne old - hay bale	ha	4,8	5,46	7,54	9,88	11,44	12,22	12,22
Grass on arable land, hay bale	ha	1,2	0,42	0,58	0,76	0,88	0,94	0,94
state owned pasture land	ha	34	39	42	44	44	44	44
Straw	ha	0	9,24	12,76	16,72	19,36	20,68	20,68

Source: own calculations

It is a question still, shell the farm increase forage production or convert it for cash crops and relay more on Bought-in Feedstuffs. While the production of high-quality feedstuff would require more machinery and equipment, it will be better to delay such a decision until the current investment is utilized. Such opportunity will is available after the 5th year of projection when the financial position is appears to be stable enough. Nonetheless such decision will highly depend on the situation of the forage market and infrastructure at the vicinity of the farm after 5 years.

5.3.2.3. Workforce requirements

While carefully analysing the workforce requirements given the changes made so far in the action plan, it was estimated that after the firs steps of the plan, the second family member who previously contribute only part time work on farm will drop his off-farm employment and will contribute as full-time farm worker. Therefore the farm dismiss one of the hired labour in 2009, at the same time it is assumed that the necessity of part-time labour will increases (up to 300 h/year) in order to compensate the needs for some field work. The type 2 employ is the shepherd who is dismissed in 2007 while the farm no longer uses grazing as significant source of feeding.

From the other side, the qualification and reliability requirements for the one hired employ are much higher than before, his work time will be better scheduled and better paid. The increase of the salary starts in advance (Table 5-32, row Type I Salary per year) which indicates the difficulties in finding suitable candidates. Form 2010 onwards the salary for the hired employ is set up to be times attractive than the average in the area (rural and urban) in order to motivate for long term contract a high qualified worker[107].

[107] The precise situation described in the panel was to that farmer will hire the best small farmer in the area at 2007-2008, who has a children in a proper age for high school, then as a bonus to the contract with the father, he will send the child in a special veterinarian or agricultural gymnasium with a scholarship and guaranty a work place and salary after graduation in 2010. The scenario is defiantly realistic and could give the farmer access to other EU programs related to the rural development and professional education.

Table 5-32 Labour input and labour price for BG future typical farm 2006-2016

4.1. Labour input		2006	2007	2008	2009	2010	2011	2012
Hired labour								
Type I Employees (number)	no.	2	2	2	**1**	1	1	1
Total hours per year	h/year	2640	2640	2640	**2100**	2100	2100	2100
Type II Employees (number)	no.	1	1					
Total hours per year	h/year	2555	2555					
Part-time labour input	h/year	200	200	200	**300**	300	300	300
No. of family members	No.	1,5	1,5	1,5	**2**	2	2	2
Full-time family labour	h/year	1800	1800	1800	**4000**	4000	4000	4000

4.2. Labour prices						Projection code (1-3)[108]			
Type I Salary per year	C/year	2880	7200	8000	**9000**	10000	10000	10000	2
Type II Salary per year	C/year	2160	2800						
Costs part-time employee	C/h	1,6	1,6	1,6	**1,6**	1,6	1,6	1,6	2
Opportunity costs family labour	C/h	2,2	4	4	**4**	4	4	4	2

Source: own calculations

Finally after 2009 the farm will be operated with 2 family members and 1 hired employ, which as it is estimated will (both according to the level of mechanization and the type of activities on farm) sustain a work schedule for all of them similar to the one of a industrial worker. That is the annual holidays, social payments on a high basis, regular work day for the hired employ etc. The work schedule created during the panel was too approximate to be included hire, but the opinion of all the participants was that the work can be easily done by the three full time labours without using too much extra hours work (double paid) and seldom use of irregular work shifts during the year.

5.3.3. Strategy for development the future typical dairy farm

The outcome of the Action Plan could be summarised in the following strategic actions:

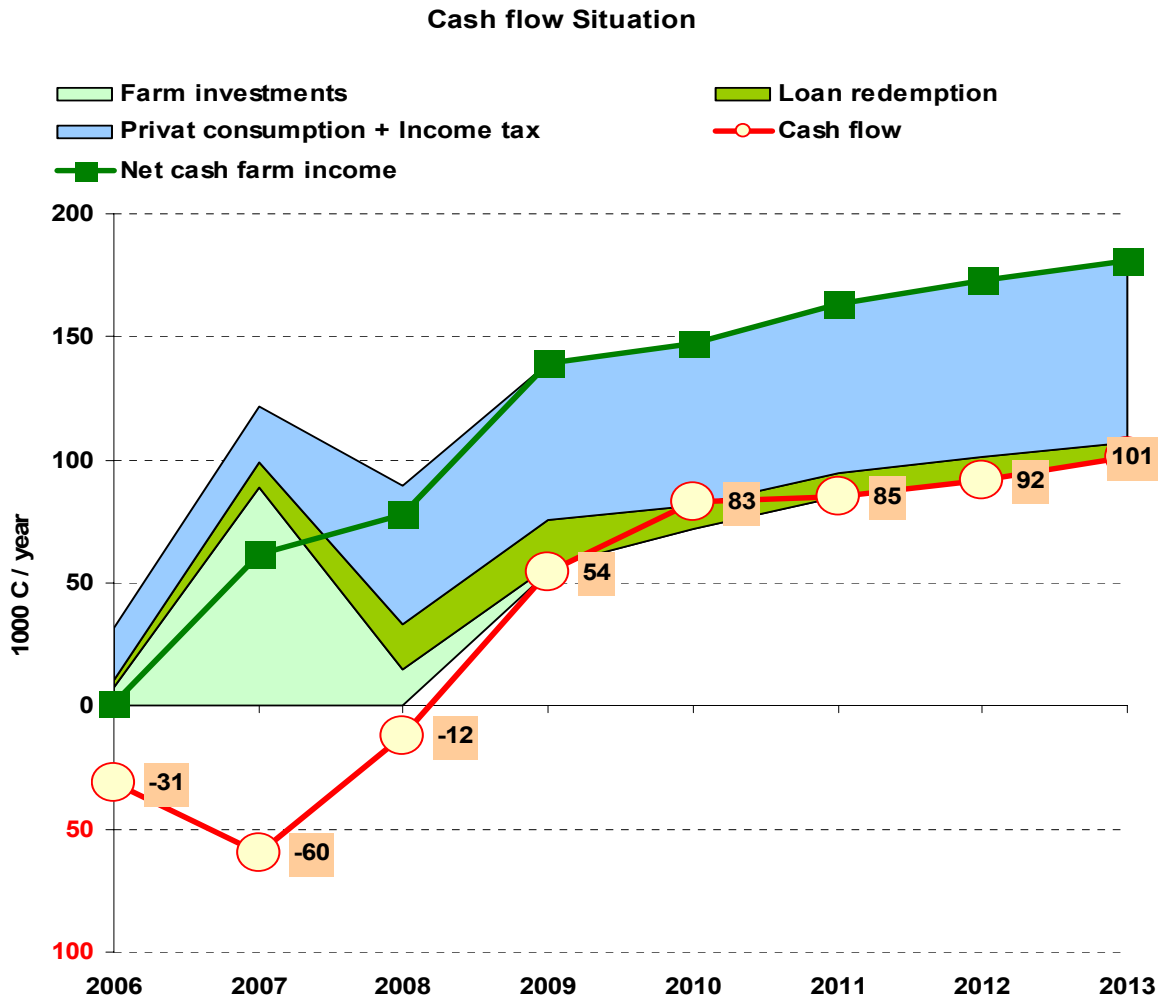
- Increasing the herd size and simultaneously replacing it with the new high yield breeds
- Invest stepwise in the necessary technical equipment in order to increase labour productivity, milk quality and allow high level of herd management
- Invest stepwise in modernise the available buildings in order to accommodate the bigger herd and the new equipment
- Rearrange the labour force, attract high qualified farm worker and make use of all the family labour force
- Conform the size and the price of all the above actions with the business targets set before in order to sustain the high level of competitiveness of the farm

[108] Projection code (1-3): 1= value first year * nation-projection, 2= Use values year 2-10 * nation projection, 3= Use values year 2-10 as specified in INP

The causalities from those actions are very well illustrated by the cash flow situation in Figure 5.31. The negative Cash flow in the first three years or in total of 102773 BGN marks the cash deficit for produced by the investments (light green area – Farm investments).

The increase of the herd is in effect at the end of the second year therefore all the equipment for it has to be introduced until then. That is the total investment for the milking equipment in 2007 (Table 5-30) together with the reconstruction of the storage facilities and the milking parlour to facilitate the equipment. Those concentrate the bigger amount of investment in 2007 which create the 60000 BGN cash deficits (Figure 5-32). The deficit is covered by automatic calculated long term loan of 39022 BGN and medium term loan of 21076 BGN. The extends to which the model distribute the loans to long and medium term depends on the nature of the investment, for buildings and land is used long term and for machinery medium term loan.

Figure 5-32: Cash flow simulation of the BG-60future (1000 BGN/year) for 2006-2013



Source: Own calculation with TIPICAL model of IFCN

While at 2008 follows the next investment in building, the reconstruction of the barn, the investment subsidies for the previous investment are received as well. Those calculate the total farm investment (neto) of 15033 BGN for 2008 while the “bruto” investment is about 30000 and investment subsidy of 16000 BGN.

At 2009 the last step in investment is initiated, the purchase of a new tractor, meanwhile the gradual purchase of land result in total of 38 hectare of arable land (Table 5-31).

While the labour productivity in kilogram of milk per hour riches his highest value in 2008 due to replacement of the herd, the introduction of the new equipment and applying the new labour schema result in significant decrease of the wages paid per 100kg of milk (Figure 5-33). The difference between 2008 and 2009 bars of the Labour cost in Figure 5-33, represent the shift form 2 hired and 1,5 family labour to 1 hired and 2 family labour. At the same time the expected increase of the labour cost after accession in the EU affect the farmer opportunity cost as well.

Figure 5-33: Labour productivity (kg milk/hour) and cost (BGN /100kg milk (ECM)) for BG-60future 2006-2013

Source: Own calculation with TIPICAL model of IFCN

The financial stability of the farm is at most “vulnerable” position in 2007/08 year of the simulation due to height value of the debts in the assets, respectively the equity of the farm.

Nevertheless the speed of decreasing of the “debt-to-equity” ration is more than enough evident that the risk taken is justified (Table 5-33).

The growth of the real net worth faster than the CPI is another positive marker that benefits the family objectives as well as proves the healthy financial position of the farm.

Table 5-33: Net Worth and Economic rations (market values) for the first 6 years of projection of BG-60future farm

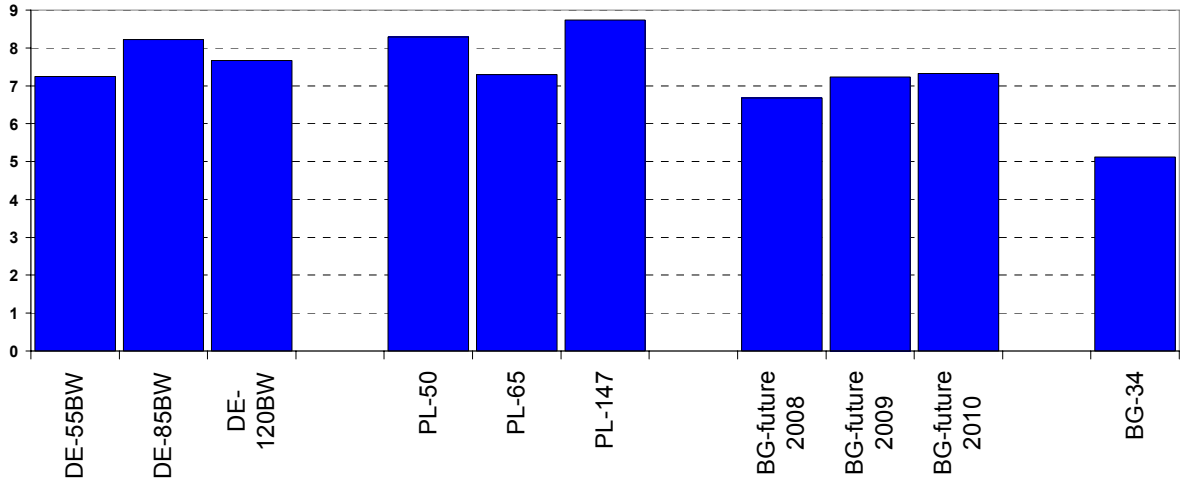
5.2. Real net worth in 1000		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
% Consumer Price Index (CPI)	index	100	105,55	110,13	113,06	116,06	122,11	127,25
Net worth real in 1000	C	59	108	154	255	336	410	490
Change to previous year in 1000	C	-106	52	51	104	88	91	96
Change to previous year in %	%	-178%	48%	33%	41%	26%	22%	20%
6.1. Profitability		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Net income / turn over	%	6%	29%	28%	41%	43%	45%	46%
6.2. Stability		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Debt to asset ration	%	37%	43%	31%	17%	11%	7%	4%
Equity to asset ration	%	63%	57%	69%	83%	89%	93%	96%
Debt to equity ratio	%	59%	75%	45%	20%	12%	7%	4%

Source: Own calculation with TIPICAL model of IFCN

The full “Balance Sheet” and “Profit and Lost accounts” are presented in Appendix 7 as well up to 2012 due to space limitations, it is assumed that the general idea is represented with the data from 2006 until 2012/13.

The strategy is relying much but not entirely on the investment subsidy for animals, machinery and buildings to decrease the huge amount of the investment made in the firs three years of the projection. Considering 50% for each of them, the financial situation of the farm is stabilised quick enough and create opportunities for future development in direction higher mechanization or future increase of the activities just after the fifth year of the projection (2011) when debt to asset ration drop below 10% (Table 5-33).

Figure 5-34: Milk yield (1000kg/cow/year) of selected farms from DR2007 of IFCN and BG-future for 2008-2010

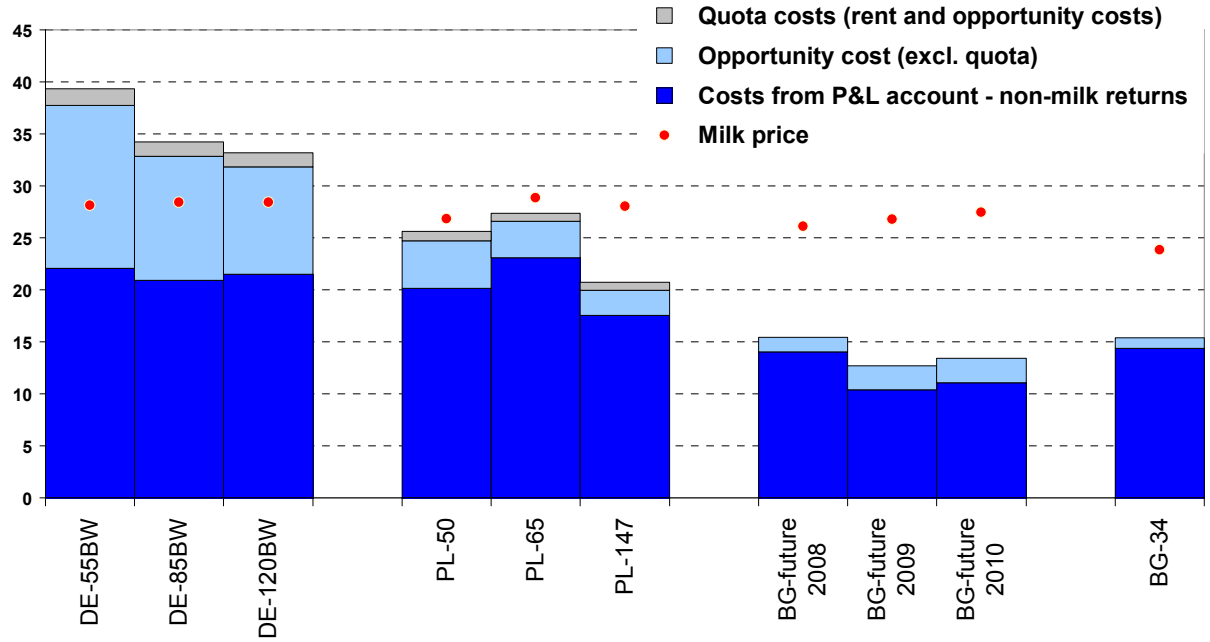


Source: (IFCN Dairy Report Hemme 2007) and own calculation

The strategy is characterised with relatively fast increase of the Assets (similar to the farms from the 10 new EU members, particularly those used for comparison in the previous chapter), build initially by short term liabilities when the farm has week borrowing capacity and gradually pass to long term ones. (Appendix 7, Table A.7.1. Liabilities Year End).

With the rapid upgrade of the herd combined with appropriate replacement rate insure the stable high milk yield of the farm form 2010 onward (Figure 5-34) compared with the one of the German farms in 2007. Further increase is less likely due to specific climate conditions and underdeveloped animal feed infrastructure in Bulgaria.

Figure 5-35: Cost of milk production only (EUR/100kg milk (ECM)) of selected farms from DR2007 of IFCN and BG-future for 2008-2010

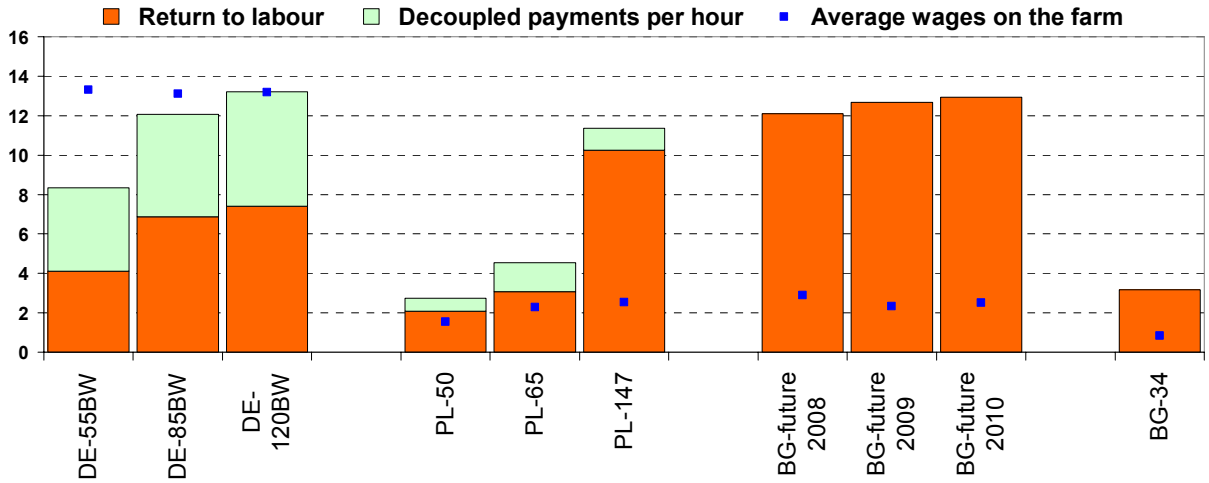


Source: (IFCN Dairy Report Hemme 2007) and own calculation

The comparatively low costs of milk production only (Figure 5-35) provide evidence for high level of efficiency and competitiveness at 2010, which is successfully established balance “investment/increase of production to sustain the initial advantage of the farm.

The achieved return to labour is a preposition for attracting and sustain high qualifies labour force as well as to reduce the own labour opportunity cost in the future.

Figure 5-36: Return to labour (EUR/hour) of selected farms from DR2007 of IFCN and BG-future for 2008-2010



Source: (IFCN Dairy Report Hemme 2007) and own calculation

5.3.4. Conclusions

In conclusion the simulations proved that with the currently existing support programs a successful farm restructuring is viable in a short period of time if the farmer possesses the necessary skills, knowledge and information to adopt the strategy. The time span available for realization of the strategy is very "narrow" with respect to the financial support provided by the programs available and the moment when the strong competitiveness towards EU dairy farmers will be essential.

The simulation reveals a great potential of the farm as soon as the major investments are utilised. The amount of the Net Worth generated and absence of liabilities after the 4th year of simulation, gives the farm position of low investment risk and high price or credit bargain power. Well, the farm should continue to invest in machinery and equipment after the initial one set in the strategy but that will depend upon the decision whether to produce own feed stuff ore increase the cash crop production. On the other hand, the wage rate development could direct the choice towards more and high-tech dairy equipment to further increase labour productivity and increase the dependence from the bought in feed stuff. In any case the stabile financial situation of the farm would allow it to face any of these situations with low level of risk involved.

The new farm structure achieved with the strategy not only improve the performance targets but create a sustainable enterprise fully capable to provide high level of standard for a typical family as it is meant to be a family farm. As a future type of typical (family) dairy farm it has the chance to form the core of the Bulgarian milk production as well as to contribute in the rural development and poverty reduction in rural areas.

6 Summary and Conclusions

6.1 Summary

During the burdensome years of transition the agriculture in Bulgaria plays the role of a social buffer and a sector providing some, although insufficient, income and employment. Although employment in agriculture is a source of income, self consumption of its products can save income that could be spend on something else. The differences between market and self-sufficiency oriented farmers diminish due to income instability, that consequently contribute to agricultural decommercialization. A major characteristic of small-scale subsistent farming is the diversification of production activities that usually lead to diseconomy of scale effects. At the same time small-scale subsistent farms use labour intensive systems of production as a substitution for the scarcity of capital and machinery.

Subsistence farming uses resources which could be used elsewhere in market-oriented farming and other sectors and its existence may cause a loss of overall production efficiency. Notwithstanding this loss of efficiency at the aggregate level, subsistence farmers may be efficient with regard to their own utility functions. Consequently, from a conventional economics point of view, small-scale farmers are unlikely to react to government policies in a normal, "rational" way. However, when they dominate the production of some products, predictions based on “normal” economic models may be unreliable

Many national programs and policies in Bulgaria aim to attract labour from small-scale and semi-subsistent farms through giving up farming and providing investment capital for the remaining farms that would be able to use it in order to become more efficient – therefore competitive. Nevertheless, in spite of the resources available, the overall impact on farm structure has been insignificant up to now. Still, some 80% of the dairy farms in Bulgaria with 36% of the cows are small-scale semi-subsistent ones. In order to become sustainable and competitive under the new conditions, a farmer has to use all the available resources provided by a variety of support programs, investment subsidies and direct payments. This thesis intends to provide decision makers and farmers an analytical framework to base decisions on shape, size and direction of structural development. For the majority of farmers this is an extremely complicated system of actions, activities and decisions, all bound together and influencing one another in an intricate way.

Among the objectives of this study is to analyze the current Bulgarian dairy farm structure, to investigate changes in the political framework brought by CAP, draw and analyze different farm level development strategies and to project optimal future dairy farm structure.

The scope of the study is to cover the agriculture holdings with dairy cows according to the national statistic and moreover to argue that not all of them can be defined as dairy farms.

The general hypothesis of this thesis states that the current typical dairy farm can double its size and increase significantly its income while reducing the risk for the household. On the contrary

if it is growing more than a double that would have the opposite effect due to overestimated management capacity and unacceptable size of liabilities.

The method used in this thesis is based on the concept of a typical dairy farm through bottom-up approach. A typical dairy farm represents a significant number of dairy farms in a region in terms of size, forage and crops grown, livestock systems, labour organization and production technology used, and show an average management / performance ratio. The typical farm is "built" and "validated" based on panels (farmers, advisors' knowledge and local experts) and farm accounting statistics.

The Bulgarian typical dairy farm created is based on the IFCN (International Farm Comparison Network) approach is the major unit in the thesis. The "typical farm" approach has been proved by IFCN in the last decade as reliable when it comes to agricultural policy evaluation, world wide farm comparisons and strategy simulations. Among the foremost characteristics of the "standard calculation method" of IFCN is the use of the "opportunity cost" and "cost allocation" principles. The aim of the cost allocation is to separate special costs for the dairy enterprise from the whole farm and to allow a comparison of milk production costs between farms and countries. While it is difficult to determine the potential income from own factors in alternative uses, the "opportunity costs" are separated from the other costs as well.

As a result from the Bulgarian dairy farm structure analysis for the period 2003-2005, it was proven that the majority of raw milk production is concentrated to 44% (36% of the cows) among the farms with 3 up to 49 dairy cows. Nevertheless, inside that group the subgroup of the farm with 3 to 9 cows has 52% of the milk produced, comparable with the 48% of the farm with 10 to 49 cows. It was also determined that despite the big number of farms with 1 or 2 dairy cows, their role in the dairy sector was highly overestimated, both with respect to the number of cows and milk produced due to its low productivity and milk quality, as well as its small share of marketed production.

Using the IFCN method of building a country typical dairy farm and data from the national statistic and own data collection, a Bulgarian typical dairy farm was created to represent the dairy farming in the country and be used as a study object in the thesis. For 2006 the typical Bulgarian farm created has the initial BG-34, which stands for Bulgarian typical dairy farm with 34 cows. That typical farm is updated each year by the author and its code always represents the number of cows in it.

Based on the conceptual framework of factors and linkages influencing dairy farm size and growth prospects, minimum dairy farm size estimation was established at about 40 dairy cows. The simulation of the BG-34 with the TIPICAL model of IFCN confirms that it should have at least 40 dairy cows (annual average) to accomplish successful development strategies according to the current constraints and opportunities. The generally low labour productivity of BG-34, however, makes it even less competitive with respect to its counterparts in the EU. The comparison of the BG-34 with German and Polish typical dairy farms provide valuable information on the weak points in their structure, mainly the small share of the machinery and buildings in the total assets structure, as a reason for the low labour productivity. While the investment in machinery and buildings is a prerequisite for higher production quality, in combination with the improved labour

productivity it contributes to the general progress of the technical efficiency of the farm. On the other hand, the amount of the investment is a significant burden to the financial stability of the farm.

The simulation of three development strategies conducted with the TIPICAL model of IFCN, managed to prove the general hypothesis. The optimal dairy farm size assessed at about 60 dairy cows (from 34) gives the most satisfying results with respect to profitability, financial stability and competitiveness. Therefore, such a farm structure is most efficient and less risky for the farmer (family objectives such as reaching the desired live standard), with respect to the socio-economic framework in Bulgaria as a candidate and as a member state of the EU.

The simulations in this thesis proved that with the currently existing support programs a successful farm restructuring is viable in a short period of time if the farmer possesses the necessary skills, knowledge and information to adopt a strategy to successfully face the changing market conditions. While the suggested structural changes could be successfully implemented in order to provide a significant improvement of the management, the time span available for them is very “narrow” with respect to the financial support provided by the programs available. The general assumption of the government policy was that the “Producer Union” (PU) should play a leading role in the process of structural reforms in agriculture. Unfortunately that assumption didn’t justify itself, consequently the provision of high qualified management services (as a major benefit from the membership in the PU) to the farmers is not utilised by them.

6.2 Conclusions and Policy recommendations

The country’s accession to the EU and the implementation of CAP will give new opportunities for Bulgarian farms. EU funding for agriculture from 2007 on alone will be 5 times higher than the overall level of the present support to farming. More specifically, short-term CAP impact on farm structure is to be expected in the following directions: it will introduce and enforce a “new order” (regulations, quality and safety standards, protection against market instability, export support etc.) which will eventually intensify agrarian transactions and increase their efficiency. Further integration and opening up of markets will enhance competition and will require from Bulgarian farms to exaggerate any comparative advantages they may possess(low costs, high quality, specific character of produces; innovation potential etc.).

Secondly, a significant part of farms will start receiving direct payments. During 2007-2009 all farms will get a single payments according to amount of utilized agricultural land. Depending on the Government decision for the minimum size of UAA for supporting a farm the direct payments will be somewhere between 69 - 74.2 EUR per ha in 2007, 82.8 - 89.1 EUR per ha in 2008, and 96.8-104.1 EUR per ha in 2009. Besides, farms may get additional payments from the national budget, consequently more farms will be eligible for direct payments.

Having in mind the current state of support (low or none) the direct payments will augment the level of farm sustainability through increasing general (net) income or preventing its possible reduction. Moreover, direct payments will improve environmental performance of farms since they

will be coupled with mandatory requirements for “keeping farmland in good agricultural and environmental condition”. Direct payments could even induce usage of some less-productive and presently abandoned lands, and provide new income in certain less favourable and mountainous regions of the country.

The significant funds for rural development from the EU will let more and relatively smaller farms to get access to public support scheme and invest in modernization of their enterprises. Furthermore, new important activities will be effectively financed such as diversification of farming; commercialization of local products; renovation of villages and infrastructural development; agro-environment protection and animal welfare; support for less favoured areas and regions with environmental restrictions; afforestation of farmland; restructuring of semi-market holdings; Community standards; food quality; producers' organizations etc. All that will let carrying out essential for agriculture and rural areas activities - commercialization and diversification of farming, introduction of organic farming, maintaining productivity of and biodiversity on currently abandoned farmland, revitalizing mountainous agriculture etc. That will bring additional income for farmers, and create new employments in rural area, and enhance overall performance and sustainability of individual farms. Besides, it will extend the activity of some of the existing structures (cooperatives, group farms, firms) which could specialize in new functions such as environmental preservation, maintenance of farmland etc., and see their long-term sustainability increased.

Nevertheless, if actual system of governance (prioritizing, management, control, and assessment) of public programs does not change the funds will continue to benefit exclusively the largest structures and the richest regions of the country; and more abuses will likely take place; and CAP support will not reach majority of farmers and contribute to diminishing socio-economic divergence between regions. In addition, some of the terms of specific contracts for environment and biodiversity preservation, respecting animal welfare, keeping tradition etc., all they are very difficult and expensive to enforce and dispute. In Bulgarian conditions the rate of compliance with these standards will be even lower because of the lack of readiness and awareness, insufficient control, ineffective court system, low transparency, domination of “personal” relations and bribes etc. Respectively it could be expected that more farmers, than otherwise would enrol, will wish to participate in such scheme (including the biggest polluters and offenders). Subsequently, the outcome of implementation of that sort of instruments would be less than the desirable level. In order to avoid probable misuse of funds more efforts is to be invested in increasing farmers and publics understanding, and in assisting voluntary actions of producers and interest groups.

Furthermore, prospects for changing “high sustainability” of small-scale and subsistence farming is mostly determined by the overall development of the economy, and increasing non-farm employment and income opportunities. However, it is less likely to have significant positive changes in that respect (unemployed rate is above 12% reaching in rural areas to 14.6%). At the same time this type of farming will hardly be able to meet the EU quality, veterinary, phito-sanitary, environmental, animal welfare etc. standards. On the other hand, it will be practically impossible (costly or politically undesirable) for the authority to enforce the official standards in that huge informal sector of the economy. Therefore, these less effective structures will continue to exist in years to come.

Research on likely and actual impact of the CAP on farm structures in new member countries is to continue applying advanced methodologies including achievements of the institutional analysis (Gorton, Kova?cs et al. 2003). Assessment framework should include multi-disciplinary efforts in order to identify the specific economic, institutional, behavioural, cultural, historical etc. factors affecting sustainability of different farms. Furthermore, intersectional approach is to be incorporated into analysis, and net impact on farm, and household and rural economy evaluated.

Research on governing modes of agrarian and rural sustainability in the specific East-European conditions is to be extended as well. That will let identify the critical factors in each country and suggest directions for improving the structural development as well as the programs and forms of public intervention. It will also help design appropriate support policies for prospective market, private and hybrid modes, and thus accelerate the overall restructuring of the economy.

6.3 Zysammenfassung

Während der beschwerlichen Jahre der politischen Wende kam der Landwirtschaft in Bulgarien die Rolle eines sozialen Puffers zu, welcher der Bevölkerung, allerdings in unzureichendem Maße, Einkommen und Arbeit bot. Die Beschäftigung in der Landwirtschaft stellt eine Einkommensquelle dar, gleichwohl kann durch den Eigenkonsum der Erzeugnisse Einkommen gespart werden, welches für andere Zwecke verwendet werden kann. Instabilitäten im Einkommen führen zu einer Verringerung der Unterschiede zwischen marktorientierten und selbstversorgungsorientierten Bauern, was zur Dekommerzalisierung der Landwirtschaft beiträgt. Ein Hauptcharakteristikum kleiner Subsidenzbetriebe ist die diversifizierte Produktion, die üblicherweise der Erzielung positiver Skaleneffekte gegenüber steht. Gleichzeitig herrscht in kleinen Subsistentbetrieben, als Substitut für die knappen Ressourcen Kapital und Arbeitsmaschinen, ein arbeitsintensives Produktionssystem vor.

Das Ziel mehrerer nationaler Programme und politischer Initiativen in Bulgarien ist es, Anreize zur Aufgabe kleiner und selbstversorgungsorientierter Betriebe zu setzen und durch die Bereitstellung von Investitionskapital die verbleibenden Betriebe effizienter und damit wettbewerbsfähiger zu machen. Trotz der verfügbaren Ressourcen haben diese Bestrebungen bisher keine signifikanten Auswirkungen auf die Struktur der Betriebe gezeigt. Die Milchvierhaltung wird immer noch zu ca. 80 % von kleinen Semi-Subsistenzbetrieben dominiert, auf welche 36 % des Kuhbestands entfallen. Um ein nachhaltiges und wettbewerbsfähiges Wirtschaften unter den veränderten Rahmenbedingungen zu erreichen, ist ein Zurückgreifen der Milchviehhalter auf sämtliche Investitionssubventionen, Förderprogramme und Direkthilfen notwendig. Das Ziel dieser Arbeit ist es, Entscheidungsträgern sowie Landwirten ein analytisches Rahmenwerk für Entscheidungen über Form, Ausmaß und Richtung der weiteren strukturellen Entwicklung zu bieten. Für die meisten Landwirte stellt dies ein äußerst komplexes System interdependenter Aktivitäten und Entscheidungen dar, welche sich nur in schwer zu durchschauender Weise gegenseitig beeinflussen.

Weitere Ziele der Arbeit stellen die Analyse der gegenwärtigen Struktur der Betriebe in der bulgarischen Milchviehwirtschaft, die Analyse und Darstellung von Veränderungen im politischen Rahmenkonzept durch die CAP, die Analyse verschiedener Entwicklungsstrategien auf Betriebsebene und die Entwicklung optimaler zukünftiger Strukturen der Milchviehbetriebe dar. Die Studie umfasst die Landwirtschaftsbetriebe mit Milchviehhaltung gemäß der nationalen Statistik, wobei argumentiert wird, dass nicht alle davon als Milchviehbetriebe definiert werden können.

Die Hauptthese der Arbeit besagt, dass der typische derzeitige Milchviehbetrieb in der Größe verdoppelt und das daraus erzielbare Einkommen signifikant erhöht werden kann, bei gleichzeitig verringertem Risiko für den jeweiligen Haushalt. Würde der Betrieb dagegen um mehr als das Doppelte wachsen, ergäbe sich ein gegenteiliger Effekt aufgrund überschätzter Managementkapazitäten und einer inakzeptablen Verschuldungshöhe.

Die Methodik der Arbeit basiert auf dem Konzept eines typischen Milchviehbetriebs. Ein typischer Milchviehbetrieb repräsentiert eine signifikante Anzahl an Milchviehbetrieben einer

Region in Hinsicht auf die Größe, die Struktur von Futterbau und Feldfrüchten, die Haltungssysteme in der Tierproduktion, die Arbeitsorganisation und die verwendete Technologie und weist ein durchschnittliches Managment / Performance Verhältnis auf. Der typische Betrieb wird „konstruiert“ und „validiert“ basierend auf Panels (Landwirte, Expertise von Beratern und lokalen Experten) und landwirtschaftlichen Rechnungslegungsstatistiken.

Der typische bulgarische Milchviehbetrieb wurde auf Basis des IFCN (International Farm Comparison Network) Ansatzes erstellt und stellt den Hauptbetrachtungsgegenstand der Arbeit dar. Der „typical farm“ Ansatz wurde im letzten Jahrzehnt vom IFCN als verlässlich befunden, um agrarpolitische Evaluationen, weltweite Betriebsvergleiche und Strategiesimulationen durchzuführen. Einige der prominentesten Merkmale der „standard calculation method“ des IFCN ist die Anwendung der „opportunity cost“ und „cost allocation“ Prinzipien. Das Ziel der Kostenallokation (cost allocation) ist es, eine Separation der spezifischen Kosten der Milchviehhaltung von dem Gesamtbetrieb zu erreichen und einen Vergleich von Milchproduktionskosten zwischen Betrieben und Ländern zu ermöglichen. Trotz der Schwierigkeit, das potentielle Einkommen eigener Produktionsfaktoren in alternativen Verwendungen zu bestimmen, werden auch die Opportunitätskosten (opportunity costs) von den sonstigen Kosten separiert.

Ausgehend von der Analyse der Struktur der bulgarischen Milchviehbetriebe über den Zeitraum 2003-2005 konnte gezeigt werden, dass der Hauptteil der Rohmilchproduktion auf 44 % der Betriebe mit 3 bis 49 Kühen (d. h. 36 % des Kuhbestands) konzentriert ist. Innerhalb dieser Gruppe gingen 52 % der produzierten Milch auf Betriebe mit 3 bis 9 Kühen zurück, 48 % auf die Betriebe mit 10 bis 49 Kühen. Es wurde außerdem festgestellt, dass trotz der großen Menge an Betrieben mit 1 bis 2 Kühen deren Rolle für den Milchviehsektor in Hinsicht auf die Anzahl an Kühen und die Milchproduktion stark überschätzt wurde. Zurückzuführen ist dies auf deren geringe Produktivität, die niedrige Qualität der produzierten Milch als auch den kleinen Anteil an marktgerichteter Produktion.

Unter Verwendung der IFCN Methodik, einen landestypischen Milchviehbetrieb zu konstruieren, und unter Hinzuziehung der Daten nationaler Statistiken und eigener Recherchen wurde ein typischer bulgarischer Milchviehbetrieb, als Repräsentant der Milchviehwirtschaft des Landes, konstruiert und als Untersuchungsobjekt der Arbeit zugrunde gelegt. Für das Jahr 2006 hat der typische bulgarische Betrieb das Kürzel BG-34, der einen typischen bulgarischen Milchviehbetrieb mit 34 Kühen kennzeichnet. Der typische Betrieb wurde für 2007 und 2008 durch den Autor aktualisiert. Das Kürzel repräsentiert dabei jeweils die Anzahl an Kühen des Betriebs.

Auf Basis des Rahmenkonzepts der Faktoren und Interdependenzen, durch welche die Betriebsgröße und die Wachstumsaussichten beeinflusst werden, wurde eine geschätzte Mindestgröße eines Milchviehbetriebs von ca. 40 Kühen festgelegt. Die Simulation des BG-34 mit der TIPICAL-Methode des IFCN bestätigt die Mindestgröße von 40 Kühen (im Jahresdurchschnitt), um, unter Berücksichtigung der vorherrschenden Beschränkungen und Chancen, erfolgreiche Entwicklungsstrategien umzusetzen. Die generell niedrige Arbeitsproduktivität lässt den BG-34 sogar noch weniger wettbewerbsfähig in der Gegenüberstellung mit Vergleichsbetrieben der EU erscheinen. Der Vergleich mit typischen deutschen und polnischen Betrieben bietet wertvolle Hinweise auf die Schwachpunkte der Struktur, welche hauptsächlich in dem geringen Anteil an

maschineller Ausrüstung und Gebäuden in der Gesamtanlagenstruktur als Grund für die niedrige Arbeitsproduktivität liegen. Während Investitionen in Maschinen und Gebäude eine Voraussetzung für eine höhere Qualität der Produktion sind, tragen sie in der Kombination mit der erhöhten Arbeitsproduktivität zu dem generellen Fortschritt in der technischen Effizienz des Betriebs bei. Auf der anderen Seite stellt der Umfang der Investitionen eine signifikante Belastung für die finanzielle Stabilität des Betriebs dar.

Die Simulation der drei Entwicklungsstrategien unter Anwendung des TIPICAL Models des IFCN konnte die Hauptthese bestätigen. Eine optimale Betriebsgröße bei ca. 60 Milchkühen (im Gegensatz zu 34) ergab die zufriedenstellendsten Ergebnisse im Bezug auf die Profitabilität, die finanzielle Stabilität und die Wettbewerbsfähigkeit. Hinsichtlich der sozio-ökonomischen Rahmenbedingungen in Bulgarien als Kandidat und Mitglied der EU, stellt dies die effizienteste Betriebsstruktur dar, welche mit einem geringeren Risiko für den Landwirt verbunden ist.

Zusammenfassend haben die Simulationen in dieser Arbeit gezeigt, dass unter den derzeit existierenden Förderprogrammen eine erfolgreiche Restrukturierung der Betriebe in einem kurzen Zeithorizont möglich ist, sofern die Landwirte die notwendigen Kenntnisse und Informationen besitzen, um eine Strategie zum erfolgreichen Bewältigen der sich ändernden Marktverhältnisse zu verfolgen. Während die vorgeschlagenen strukturellen Änderungen, um eine signifikante Verbesserung des Managements zu gewährleisten, erfolgreich implementiert werden könnten, ist die dafür verfügbare Zeitspanne hinsichtlich der finanziellen Unterstützung, die die Programme bieten, sehr begrenzt. Die generelle Annahme der Politik war, dass die Genossenschaften eine führende Rolle im Prozess der strukturellen Reform der Landwirtschaft spielen sollten. Unglücklicherweise hat sich diese Annahme nicht bestätigt, wodurch das Angebot an hochqualifizierten Management-Services für die Landwirte (als einer der Hauptvorteile einer Mitgliedschaft in der PU) ausblieb.

Aus den Ergebnissen lassen sich die folgenden Empfehlungen ableiten:

Die Politik muss sich auf die effektive Finanzierung zukünftiger Management-Trainings und Dienstleistungen durch Experten für die Landwirte konzentrieren, wenn diese in der EU wettbewerbsfähig werden sollen. Theoretisch sollte dies die Aufgabe der Genossenschaften sein, jedoch haben sich die Regelungen bezüglich deren Finanzierung und Funktion bis heute als ineffizient erwiesen, womit die Entwicklung eines neuen Ansatzes notwendig ist.

Effektive und flexible Bankdienstleistungen sollten angeboten werden, um die Landwirte davor zu schützen, aufgrund von Irregularitäten in ihrem Cashflow in externe Abhängigkeit zu geraten.

Eine gut entwickelte Investitionsstrategie mit präzisen Cashflow-Berechnungen würde den Landwirten helfen, offene Kreditlinien mit Banken auszuhandeln, um jährliche Cash-Defizite zu decken und auch langfristige Verbindlichkeiten für Investitionen zu rechtfertigen, indem detaillierte Informationen über ihr Einkommen und ihre Ausgaben bereitgestellt werden.

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Appendix

Appendix 1

Appendix 2

Appendix 3

Appendix 4

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Appendix 5

Table A.5.1 Capital structure and solvency measures for the Baseline and all the strategies 2006-2015 in 1000 BGN

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BG-60conv Capital Structure										
Total market value farm assets	85	164	233	332	410	504	605	719	844	983
Equity	85	130	204	307	389	488	593	709	837	978
Liabilities	0	33	29	25	21	17	13	10	8	5
Farm equity-to-asset ratio	100%	80%	88%	93%	95%	97%	98%	99%	99%	99%
Farm debt-to-asset ratio	0,0%	20,2%	12,4%	7,5%	5,1%	3,3%	2,1%	1,4%	0,9%	0,5%
BG-60bio Capital Structure										
Total market value farm assets	85	164	230	324	398	486	580	686	804	932
Equity	85	127	198	297	375	469	568	676	796	927
Liabilities	0	37	32	27	22	17	13	10	8	5
Farm equity-to-asset ratio	100%	77%	86%	92%	94%	96%	98%	99%	99%	99%
Farm debt-to-asset ratio	0,0%	22,6%	13,9%	8,4%	5,6%	3,6%	2,2%	1,5%	0,9%	0,5%
BG-120jump Capital Structure										
Total market value farm assets	85	248	431	574	681	815	963	1132	1316	1519
Equity	85	157	348	501	617	760	918	1095	1289	1500
Liabilities	0	91	82	73	64	55	46	37	27	18
Farm equity-to-asset ratio	100%	63%	81%	87%	91%	93%	95%	97%	98%	99%
Farm debt-to-asset ratio	0,0%	36,8%	19,1%	12,7%	9,4%	6,7%	4,7%	3,2%	2,1%	1,2%
BG-34BL Capital Structure										
Total market value farm assets	82	97	108	117	127	138	148	158	167	176
Equity	82	97	108	117	127	138	148	158	167	176
Liabilities	0	0	0	0	0	0	0	0	0	0

Source: Own calculation with TIPICAL model of IFCN (Hemme 2004; Hemme 2005)

Appendix 6

Table A.6.1 Relationships work routine for the number of units/required performance

Number of units (N)	Unit Time (UT) (min)	Performance (P) (cows/hour)	Work Routine Time (WRT) (min/cow)
2	6	20	3
4	6	40	1.5
8	6	80	0.75

Table A.6.2 Standard Work Routine Times Element

Element	mins/cow	**Element**	mins/cow
Let in cow	0.2	Let in cow	0.1
Foremilk	0.1	In-line filter	-
Wash & dry udder	0.2	Wash & dry udder	0.2
Attach cluster	0.2	Attach cluster	0.2
Remove cluster	0.1	Automatic cluster removal	.
Disinfect teats	0.1	Automatic teat disinfection	.
Let out cow	0.2	Let out cow	0.1
Miscellaneous	0.1	Miscellaneous	0.1
Total	**1.2**	**Total**	**0.7**

Table A.6.3 Plan parlour selection in a methodical way

		EXAMPLES	
		Herd X	Herd Y
A.	Estimate the maximum number of cows that will be in milk	75	225
B.	Decide on the maximum duration of milking (hours)	1½	1½
C.	Calculate the required throughput A-B (cows/hour)	50	150
D.	Decide on the number of operators to be used	1	2
E.	Calculate the required performance C-D (cows/manhour)	50	75
F.	Estimate the maximum peak milk yield at a milking (kg or litres/cow)	20	14
G.	Determine (from E and F) the required parlour type and size (units and stalls) per operator	14/14 or 8/16	12/12 or 7/14
H.	Determine the available work routine time 60-E (mins/cow) and decide on the content of the work routine (from standard times) and the degree of automation required	1.2	0.8

Table A.6.4 Milking performance / work routine / milking parlour capacity

P cows per hour	WRT min per cow	STATIC HERRINGBONES (units/stalls)				
		8/8	10/10	12/12	14/14	16/16
		5/10	6/12	7/14	8/16	10/20
		Mean milk yield (kg/cow) up to which maximum performance is possible[109]				
50	1.2	14	16	18	20	24
60	1.0	11	14	16	18	22
75	0.8	9	11	14	16	20

Source of all the tables by (Akam, Dodd et al. 1989).

[109] Over these yields the milking-out times are too long for the performance to be achieved.

Appendix 7

Table A.7.1 Balance Sheet Market Values (in 1000 BGN) for the first 6 years of projection

C. Balance Sheet Market Values (1000)								
1. Fix Assets Year End in 1000		Null	First	Second	Third	Forth	Fifth	Sixth
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Land	*7*	14	22	29	35	40	42	44
Buildings	*22*	10	41	59	59	59	59	59
Machinery	*94*[110]	10	60	74	109	109	109	109
2. Livestock Assets								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Livestock (2. dairy)	42	53	69	79	84	84	89	93
3. Operating Assets								
cash on hand	3	7	7	4	58	145	239	346
Total market values	*169*	95	199	246	345	437	539	652
4. Liabilities Year End								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Long term liabilities	2	7	46	50	44	39	33	28
Medium term liabilities	2	0	21	17	13	8	4	0
Short term liabilities	0	28	19	9	0	0	0	0
Total liabilities	4	35	85	76	57	47	38	28

Source: Own calculation with TIPICAL model of IFCN

[110] That is not a real value but a balance one, comes from the investment we put in the null year of projection, usually that has to be avoid, unfortunately we didn't have option to do so.

Table A.7.2 Profit and loss account for the first 6 years of projection

I. Profit and loss account for advisors

1. Output from the profit and loss account		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
- Crop sales	C/year	0	8500	12220	16509	21429	24584	24886
- Milk sales	C/year	76712	143017	197891	239327	248551	271822	287086
- Sale of calves	C/year	1980	3221	4339	4650	4974	5220	5428
- Sale of breeding heifers	C/year	5100	0	1863	4774	2936	1027	2136
- Sale of milking cows	C/year	0	0	0	0	0	0	0
- Sale of beef cattle	C/year	3740	7480	11220	11968	14960	14960	14960
- Direct payments, subsidies	C/year	9600	43400	43356	51406	44341	50160	54774
- Other farm returns	C/year	0	0	0	0	0	0	0
- Capital gains and losses	C/year	0	-800	-3000	0	0	0	0
- Interest payments	C/year	3	20	10	491	3632	9128	15772
- Total output	C/year	97135	204838	267899	329125	340824	376900	405041
Total output check	C/year	107215	217865	275970	331576	340392	378399	405820

2. Input from the profit and loss account		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Animal purchases	C/year	16200	8525	8876	0	0	0	0
Purchase feed	C/year	48205	73651	98282	100434	97477	103518	111139
Seeds	C/year	0	2963	3334	4502	5373	6084	6380
Pesticides	C/year	0	0	4140	5591	6672	7555	7922
Fertilizer	C/year	0	0	8518	11502	13726	15543	16298
Land improvement	C/year	0	0	0	0	0	0	0
Vet & medicine	C/year	850	2128	2681	2994	3085	3321	3535
Insemination	C/year	1020	1596	2011	2245	2314	2491	2651
Wages	C/year	8240	18462	18234	10916	12436	13184	13824
Contract labour	C/year	0	0	0	0	0	0	0
Fuel, energy, lubricants, water	C/year	4100	4362	4581	4721	4865	5158	5408
Depreciation machinery	C/year	600	5380	2980	4473	2823	2823	2633
Maintenance machinery	C/year	2300	2447	2570	2648	2729	2893	3034
Depreciation buildings	C/year	490	1473	2040	1090	1090	790	790
Maintenance buildings	C/year	500	532	559	576	593	629	660
Land rents paid	C/year	0	319	469	691	854	906	950
Interest paid	C/year	2701	7161	10289	7833	4458	3665	2872
Other inputs dairy enterprise	C/year	4248	8587	11731	14031	14614	16070	17113
Other general farm inputs	C/year	11840	14028	16841	19563	21677	23783	24938
Total farm input	C/year	101295	151616	198136	193811	194788	208413	220148
Total farm input check	C/year	101295	154616	199136	195811	194788	208413	220148

3. Farm Profits		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Net Income	C/year	5921	63249	76834	135765	145604	169986	185671

Source: Own calculation with TIPICAL model of IFCN

[i] Compare with the one for BG-60 which was only 10000 BG, both are based on the average price of DeLaval – 7500 EUR (DeLaval (2007). Stallplanungsdaten. Z. Vassilev. Stuttgart.