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Risk Governance in Agriculture

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Abstract

This paper identifies and assesses the efficiency of major modes for risk governance in agriculture on the base of Bulgarian dairy farming. Firstly, the New Institutional and Transaction Costs Economics is incorporated and a framework for analysis of the governance of natural, market, private, and social (institutional) risks presented. Next, the pace and challenges of the dairy farming development during the post-communist transition and EU integration is outlined. Third, major types of risks faced by the dairy farms are specified, and the dominant market, private, public and hybrid modes of risk governance assessed. Finally, principal forms of risks caused by the dairy farms are identified, and efficiency and impacts of governing structure assessed.

Development of Bulgarian dairy farming has been associated with quite specific risk structures facing by and causing from this important sector of agriculture. The huge market and institutional instability and uncertainty, and the high transaction costs, have blocked evolution of effective market and collective modes for risk protection. A great variety of private modes (internal organization, vertical integration, interlinking etc.) has emerged to deal with the significant natural, market, private, and social risks faced by the dairy farms and other affected agents. Nevertheless, diverse risks associated with the dairy farming have not been effectively governed and persist during the transition now. That has been a consequence of ineffective public (Government, international assistance) intervention to correct market and private sector failures in risk governance. The later has had considerable negative impacts on evolution of size, productivity, and sustainability of farms, development of markets, structure of production and consumption, state of environment etc. What is more, certain risks related to the dairy sector have "disappeared" due to the lack of effective risk governance and declining dairy farming. That would lead to further deformation in development of dairy and related sectors unless effective public (regulations, assistance, control etc.) measures are taken to mitigate the existing problems and risks.

Key words: natural, market, private, and institutional risk management; dairy farming; governance; transition; CAP implementation; new institutional economics, Bulgaria

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Introduction

There has been a fundamental transformation of Bulgarian agriculture since 1989 when country made unprecedented transition from a centrally planed to a modern market economy and joint the EU (January 1, 2007). The transition has been associated with a significant change in the risk structure in which farmers, business entrepreneurs, and consumers have got to operate. There are a number of publications on governance response of farmers and other agrarian agents to evolving market and institutional environment (Bachev and Tsuji, 2001; Bachev and Kagatsume, 2002; Bachev, 2006). However, with a very few exceptions (Bachev and Naseki, 2008) there has been no study on risk governance in transitional Bulgarian farming.

In this paper we identify and assess the efficiency of major modes for risk governance in dairy farms in Bulgaria. We incorporate the new developing interdisciplinary New Institutional and Transaction Costs Economics based on the contributions of Coase (1937), Furuboth and Richter (1998), North (1990), and Williamson (1996). *Firstly,* we present a framework for analyzing risks associated with the dairy farms, and for assessing efficiency and impacts of different modes of governance. *Next,* we specify major kind of natural, market, private and institutional risks faced by the dairy farms, and evaluate the efficiency of dominant modes of governance. *Finally,* we identify principal forms of risks caused by the dairy farms, and analyze efficiency and impact of various governing modes employed to deal with these risks. In addition to the official data, a large amount of original data is used collected by the different type livestock farms in the country and dairy farms from Plovdiv region.

1. Framework of analysis

In this paper *risk* related to dairy farms is understood as *any current or future hazard (event) with a significant negative impact(s).* It could be a result of nature (e.g. extreme weather, disaster) or human activities (e.g. mismanagement, opportunistic behavior), or a combination of both. Furthermore, the risk could be faced by a dairy farm (risk *on* farm) or it could be caused by a dairy farm (risk *from* farm). There are four generic types of risks confronted by and/or originated from dairy farming – *natural, market, private,* and *social* (Figure 1).

Principally, a risk is big when there is a great likelihood of a risky event to occur and that is combined with substantial possible losses (negative impacts). When risk is considerable it would likely be associated with significant costs in different forms (recovery expenses, yield and income reduction, lost investments and business opportunities, transforming or terminating activities). In some cases, the negative consequences could hardly be expressed in economic (monetary) terms – environmental pollution and degradation, lost biodiversity, affect on human health and life etc. Therefore, for the rational agents seeking maximization of their own welfare there will be strong incentives to invest in risk prevention and risk reduction (precaution, assurance, minimization, and elimination of possibility and negative impacts of risks).

Figure 1: Generic kinds of risks faced and caused by dairy farming

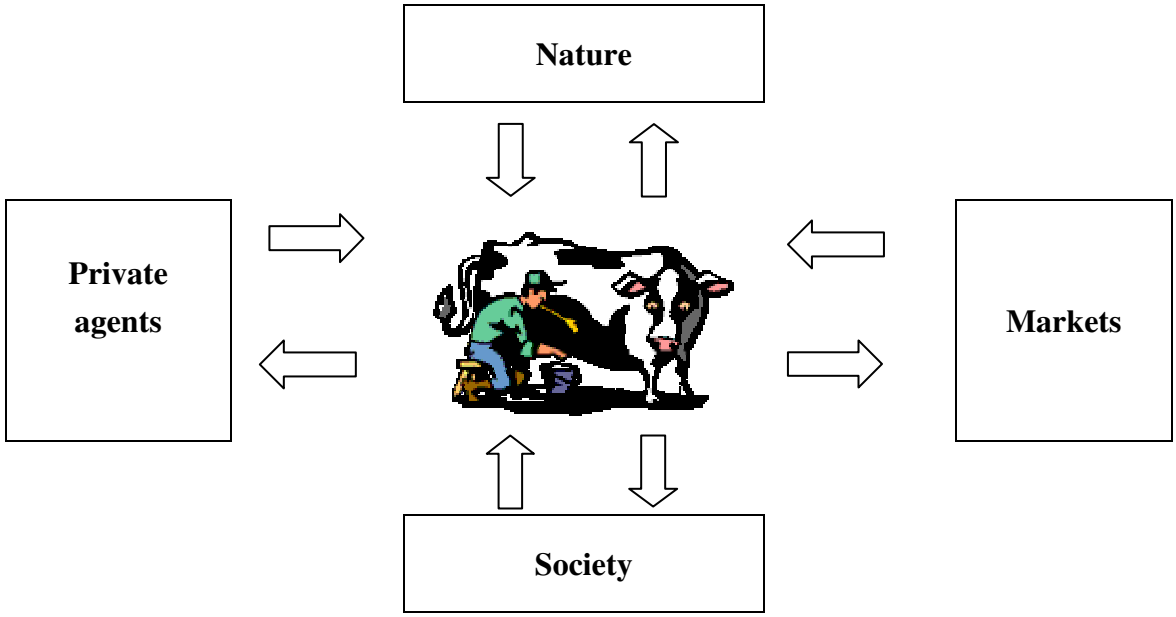
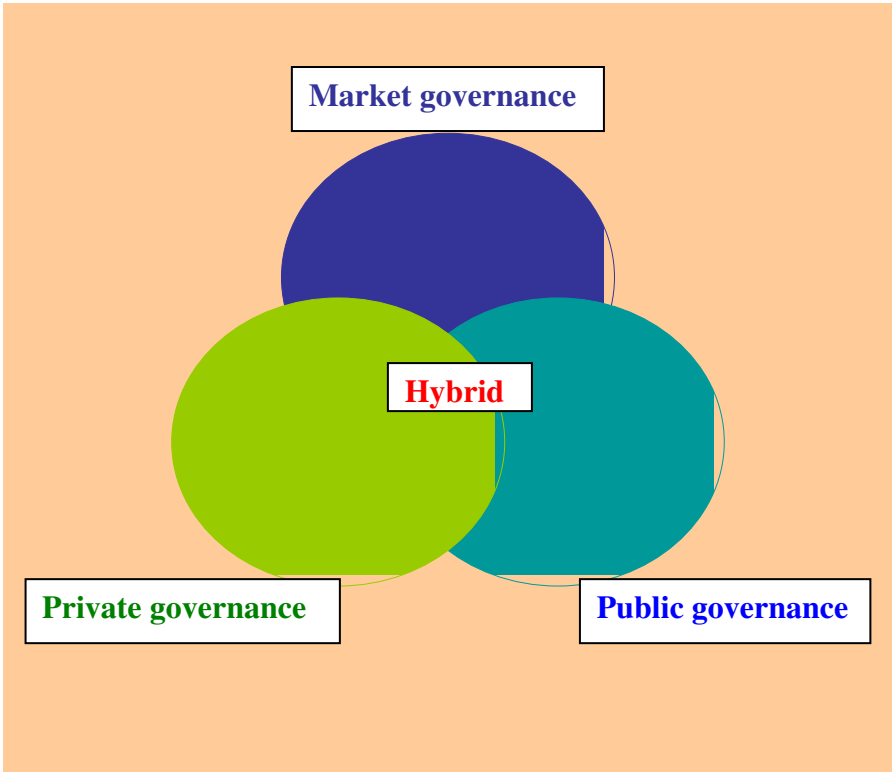


Figure 2: Goneric modes of risk governance



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Risk governance comprises action(s) directed to reducing or eliminating particular kind of risk and its negative consequences. Sometimes, it could be done through improving *production management* – e.g. control and security enhancement, appropriate technology, structure of production, varieties of animals and crops, diversification, dislocation etc. Very often, risk management requires an effective *governance of relations* with other agents – exchange of rights, coalition of resources, collective actions etc. Accordingly, a risk could be governed through a *market mode* (e.g. purchase of insurance), a *private mode* (contractual or literal integration, cooperation), a *public form* (state regulation, guarantee, compensation), or a *hybrid* combination of other forms (Figure 2).

Individual modes of risk governance are with *unequal* efficiency since they have dissimilar *potential* to reduce likelihood and impact of risk, and command different *costs* (Bachev, 2004). Principally, market or collective governance has bigger advantages over internal mode (own protection) since they allow exploration of economies of scale/scope in risk prevention and bearing negative consequences. However, the risk trading and/or sharing is often associated with significant (transaction) costs for finding best partners, prices, formulating and disputing terms of exchange, safeguarding against new risk from opportunistic behavior etc. Thus "governance matters" and applying a proper structure of risk governance is an important part of the overall process of optimization (effective allocation) of resources.

If *property rights* were *well-defined* and *transaction costs* were *zero* then all risks would be managed in the most efficient (socially optimal) way independent of the specific mode of governance[2]. Then individual agents would either sell out their risk to a specialized market agent, or safeguard against the risk through terms of a private contract, or join a risk-sharing organization of interested parties. The risk-taking would be distributed (exchanged, shared by) agents according to their will while total costs for risk prevention, assurance, reduction, and recovery minimized. The rational choice for an individual agent would be to get rid of a significant risk altogether – to sell the risk out to a specialized market agent (risk taker). Such market governance would optimize the risk-taking and minimize "technological costs" for risk assurance and recovery exploring the entire potential for economies of scale and scope.

However, when property rights are not well defined or enforced and transaction costs[3] are high then the *type of governance* is essential for the extend of risk protection. For instance, an internal (ownership) mode is often preferred because of the comparative protective and costs advantages for "standard" natural or behavioral risk governance over the outside (market or contract) modes. What is more, frequently enormous transaction costs could even block the development of insurance market or the emergence of mutually beneficial (collective) risk-sharing organization. Furthermore, formal and informal institutional restrictions could make some risk governance modes impossible - e.g. risk assuring monopolies and/or cartel arrangements are illegal in many countries while most entrepreneurial risk-taking is endorsed ("low risk-low profit" principle). Thus, not all modes of risk governance are constantly feasible. Last but not least important, individual agents differ significantly in their capacity to recognize, take, pay for prevention, and manage a risk. Hence, depending on the personal characteristics of the individuals (risk-aversion,

[2] In such a world some kind of risks would not even exist or be of no importance - e.g. risks related to adverse human behavior.

[3] Transaction costs are "costs associated with protection and exchange of property rights".

managerial ability), and the specific natural, market and institutional environment, there will be *different (most) efficient* forms of governing a particular kind of risk. Consequently, some *governance mix* will always exist to deal with divers risks associated with the dairy farming

In many cases, an effective risk management leads to a considerable reduction or removal of a particular type of risk. However, often a complete risk elimination is either very costly or practically impossible (uncertainty associated with future events is enormous and transaction costs are positive)[4]. Therefore, an effective risk management is always connected with needs for some *trade-off* between the benefits from reducing a particular risk (saved costs, minimized impacts) and the related costs for risk governance[5]. Furthermore, an individual mode of governance could offer an effective protection from different (multiple) risks. Besides, an effective management of one type of risk might be associated with exposure to new type of risk/costs[6]. Moreover, the level of (overall) risk exposure is typically determined by the "critical" (most important) risk and the integral risk is rarely a sum of the individual risks. Therefore, a *comparative analysis* is to be employed to select among (feasible) alternatives the most efficient one – that which would reduce overall risk to "*acceptable"* level, and require minimum *total* (risk assurance *and* risk governance) costs.

Most of the elements of the efficiency of risk governance are hardly to quantify - individuals' characteristics, amount of risk, level of costs associated with each mode etc. That is why a *qualitative (discrete structural) analysis* is to be used. The later matches the *features of a risk* to be managed (probability, significance, acceptance level, needs for collective action) with the *comparative advantages* (effective potential) of the *alternative modes* to overcome, reduce, control, share, dispute, and minimize overall costs of that risk.

Risk management is only a *part* of the overall governance of divers (production, consumption, and transaction) activities of agents (Bachev, 2004). That is why the total efficiency (advantages, disadvantages, costs saving and risk minimization potential) of various modes are to be taken into account[7]. Since minimization of transaction costs is essential for the improvement of any governance a special attention is to be given to identification of their *"critical factors"*:

- *institutional* – structure of formal and informal rights and system(s) of their enforcement;

- *behavioral* – agents bounded rationality, tendency for opportunisms, risk aversion etc.;

- *dimensional* - uncertainty, frequency, assets specificity, and appropriability of transactions;

- *technological* – mechanization, standardization; development of information, forecasting, monitoring, and controlling technologies etc.

According to the specific natural and market environment, and property rights and institutional arrangements, and behavioral characteristics of individuals, and social preferences, various *structure of risk governance* could evolve in different sub-sectors,

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[4] Certain natural risk will always exist. Besides, it is practically impossible to write a compete contract for insurance supply (trading risk) including all probable future contingencies, and subsequent rights and obligations of each party.

[5] Thus some "uncovered" risk would normally remain.

[6] For instance, the vertical integration eliminates the "market risk" but creates a risk from opportunisms of partners.

[7] Frequently minimization of the risk related costs is associated with an increase in production and/or transaction costs, and vice versa.

industries, societies (Bachev, 2007a). In one extreme, the system of risk management would work well and only the "normal" (e.g. entrepreneurial) risk would be left "ungoverned". In some cases, market (free-market prices, competition) would fail to provide adequate risk governance but a variety of effective private modes would emerge to fill the gap - special contractual and organizational arrangements, vertical integration, cooperation. Often, both market and private governance may fail but an effective public involvement (regulation, assistance, support, partnerships) could cure the problem. Nevertheless, there are situations when specific institutional and transaction costs structure would lead to failures of market and private modes as well as needed public (Government, local authority etc.) intervention in risk governance[8]. Consequently, a whole range of risks would be left unmanaged which would have adverse effect on farms size and sustainability, markets development, evolution of production and consumption, state of environment, and social welfare.

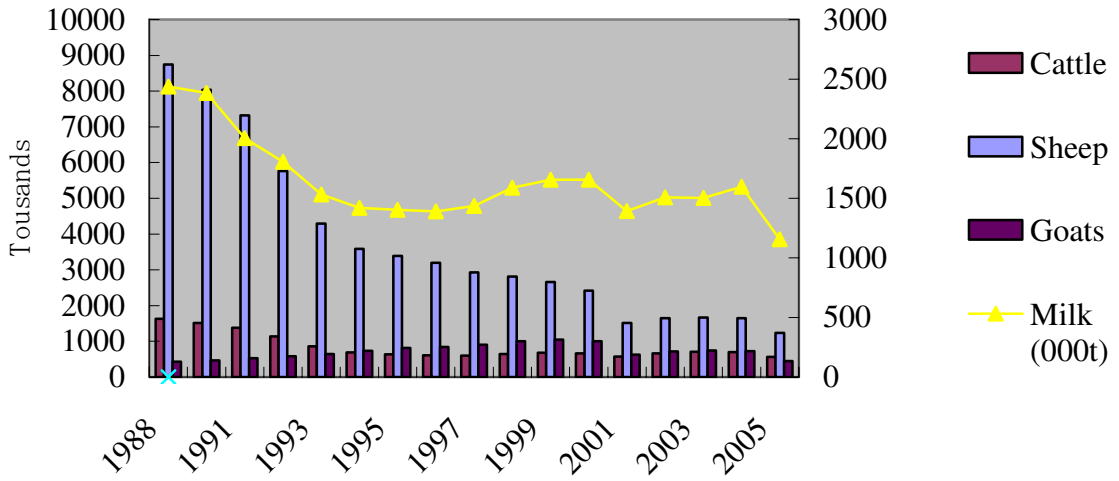
Following the above framework, we will *firstly* have to identify the major type of risks faced and caused by the Bulgarian dairy farms. *Next* we are to specify dominating modes for management of various risks assessing their efficiency and critical factors of development (failure). *Finally*, we could determine prospects of evolution of risk governance in Bulgarian conditions, and detect likely cases of (market, private, public) deficiencies, and project implications for sustainable development of dairy farming and related industries.

2. Evolution of dairy sector in Bulgaria

The post-communist transition in Bulgaria has affected profoundly the dairy production (Bachev and Manolov, 2007). Large public farms were liquidated and all farmland, livestock, and material assets transferred into new emerging private structures. There has been a considerable decrease in livestock number and milk production (Figure 3). Comparing to the pre-reform level the amount of cows now represent only 61%, dairy buffalos 41%, and ewes 27% (National Statistical Institute). The greatest part of dairy animals has been reared in small-scale (subsistence, "unprofessional") farms accounting for the biggest portion of livestock holdings (Table 1). Almost all livestock farms are unregistered individual, family or group holdings ("physical persons") concentrating the majority of the dairy heads in the country (Table 2).

[8] Principally, when market and private modes fail there is a string need for a public intervention in agriculture (Bachev, 2004)

Figure 3: Dynamics of livestock number and milk production



Source: National Statistical Institute

Table 1: Number and size of dairy holdings in Bulgaria

Type	Share		Share		Share		Share		Total (000)		Average
	farms	heads	farms	heads	farms	heads	farms	heads	farms	heads	heads
	1 -2*		***3 - 9***		***10 – 19***		***20 and more***				
Cows	87,3	56,4	11,0	23,3	1,1	6,9	0,6	13,5	193,7	371	1,92
Buffalos	85,7	47,5	11,5	20,6	1,6	8,8	1,2	23,1	2	4,6	2,26
	1 - 9		***10 -49***		***50 -99***		***100 and more***				
Sheep	89,3	56,7	9,6	26,0	0,7	7,8	0,4	9,5	233	1365,8	5,86
	1 - 9		***10 - 19***		***20 – 49***		***50 and more***				
Goats	98,2	86,8	1,3	5,8	0,4	4,4	0,1	3,0	263,2	683,6	2,60

Source: Agricultural Census 2003 **number of heads in farms*

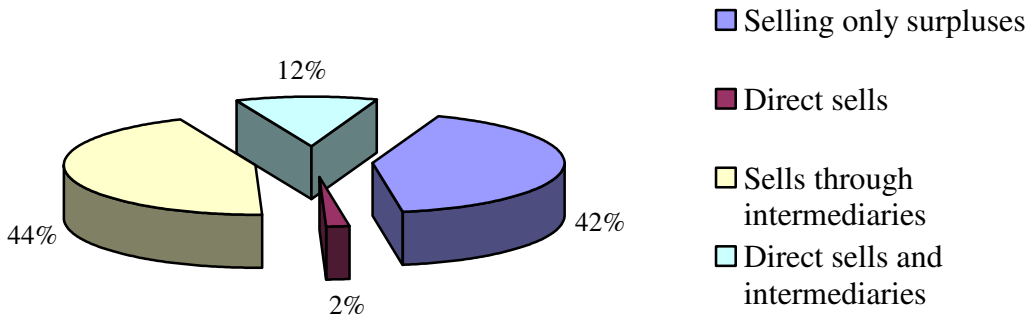
Primitive technologies, low productivity, and no compliance with modern safety, environmental etc. standards dominate. A significant portion of produced milk is consumed by households, and surpluses are sold to processors, (informal) "street" market or delivered to friends and permanent customers. As much as 42% of the dairy farms declare they sell "only surpluses of produced milk" (Figure 4).

Table 2: Share of different type farms in livestock holdings and dairy animals (%)

Type of dairy	Unregistered		Cooperatives		Agro-firms	
	farms	heads	farms	heads	farms	heads
Cows	99.5	91.4	0.1	4.6	0.4	4.0
Buffalos	98.6	85.6	0.7	7.2	0.7	7.2
Sheep	99.7	96.2	0.0	1.4	0.3	2.4
Goats	99.8	99.5	0.0	0.0	0.2	0.5

Source: Agricultural Census 2003

Figure 4: Share of farms using different ways of milk marketing



Source: Agricultural Census 2003

There have been significant problems for dairy farms to sell milk (competition, price fluctuation, monopoly position) and adapt to increasing consumers, industry and public demand for quality and safety (Bachev and Manolov, 2007). Collective marketing (processing) organizations have not emerged because of the diversified interests of farmers; the mismanagement in new cooperatives; and the huge transaction costs for initiation (Bachev, 2006). Furthermore, agriculture has got a little public support and only a tiny proportion of the farms (mostly large afro-firms and cooperatives) had access to the public programs (Bachev and Kagatsume, 2006). As a result, the number of livestock farms constantly decreases and they diminished by more than 20% for 2003-2005 (MAF).

After 1990 a great number of new dairy processors emerged making up an industry of around 840 enterprises. Most of them have not been able to adapt to the modern market and institutional requirements, and 45% of the industrial and 77% of the small-scale dairies ceased to exist since 2000 (Kovacheva et al., 2007). Currently, there are 216 milk processors and merely 22 among them have a license to export products to EU.

3. Modes and efficiency of governing risks for dairy farms

3.1. Governing natural risks

The major natural risks which are faced by the dairy farms are:

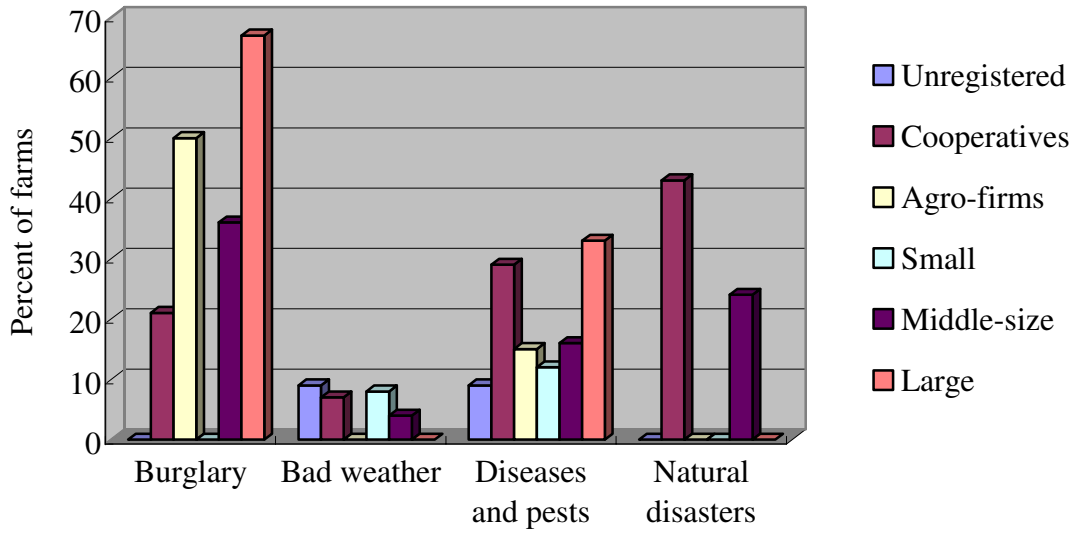
- incidental and epidemic diseases for livestock, crops, and labor;
- attacks from wide animals (wolfs, bears) on livestock;
- bad meteorological conditions (extreme temperatures, hail, frost);
- pests damages;
- natural disasters such as floods, mudslides, fires, strokes by lightening etc.

A good part of the dairy farms use traditional methods to protect from the natural hazards such as: small farm size, local more sustainable breeds of animals and crop varieties, appropriate structure of animals (more goats and sheep, few cows), private dogs and guards, diversification of production, remoteness of farming plots, keeping internal "emergency fund" etc.

During much of the transition Bulgarian farms had no access to specialized insurance products since they were either unavailable or too expensive (Bachev and Tsuji, 2001). Agrarian insurance market has been developing in the last few years but it is still not widely used by farms (Figure 5). The larger farms have stronger incentives to sell the risk because they are highly specialized operators, and in the case of a hazardous event damages are significant. Besides, they possess bigger financial means to insure animals and farm assets. In some cases, big enterprises are in position to negotiate more favorable insurance terms because of the greater contracting power, possibilities to explore scale/scope economies, availability of on-farm experts etc. Moreover, a "purchase of insurance" is usually explicitly requested by banks and/or public agencies for participating in diverse commercial and public support programs. Big commercial farms have been the main recipients of such loans and grants, and often unwillingly pay a supplementary price (for insurance supply) to obtain "interlinked" outside funding. In this case, the risk is carried by a specialized market supplier (rather than the bank or public agency) and farms are charged with extra costs to assure needed bank loan or public support.

However, the majority of farms can not afford to purchase a risk insurance because of the high costs, unfavorable contractual terms (not tailored to particular conditions of individual farm), and low satisfaction from the services of commercial insurance providers (frequent disputes about the terms of contracts and extend of the harms, lengthy delay for payment of damages etc.). On the other hand, insurance companies are reluctant to sell insurance to small farms because of the miniature size (high transacting costs, low profit), and the high possibilities for pre-contractual ("adverse-selection") and post-contractual ("moral hazard") opportunisms. Consequently, a great part of farming resources, activities, and labor is not assured, and the bulk of farms bear the entire risk of natural hazards.

Figure 5: Type of purchased insurance by Bulgarian dairy farms



Source: interviews with farm managers

Despite the potential efficiency of the collective modes for farm insurance (economies of scale and scope, non-for-profit organization, members orientation, tailoring products to farms needs) they have not evolved in the country (Bachev, 2006). Here the high transaction costs for initiation and development ("free riding" problem), and the conflicting interests of different farms impedes that process. Moreover, an effective public intervention has not been undertaken to assist (initiate, support, legislate) farmers in organization of "quasi-public" or "quasi-private" mode for collective supply of agrarian insurance. Neither badly needed guarantee and/or compensation fund for natural disasters has been launched.

In recent years, the public veterinary, technology etc. control and emergency assistance to livestock holdings (e.g. isolation and distortion of endangered animals, compensation of farms) has been enhanced. These measures aim at protecting against significant industry and/or public risk(s) from certain animal diseases and epidemics. They have been driven by the public concern for potentially huge economic losses for farms, dairy industry, and export, and/or human health hazards[9]. Furthermore, some farms have got public aid to cover losses (recover) from recent natural disasters – floods, rainstorms, mudslides, and extreme droughts. The later modes have been incidental and affected mostly larger operators having incentives and capacity to deal with complicated bureaucratic procedures.

Subsequently, a good amount of farms do not have proper outside (market, collective, public) insurance against natural risks and face constantly hazards and damages. Most of the affected smaller and middle-size farms (having little internal capacity to bear yield failures and property damages) experience severe looses, and see their assets, scale of operations, and welfare further decreased.

[9] Mad cow disease, foot and mouth disease, avian influenza are good examples in that respect.

3.2. Governing market risks

Market risk in dairy farming is mostly associated with:

- high market uncertainty in terms of demand for milk, quality requirements, supply of critical inputs etc.;
- huge competition and price fluctuation;
- monopoly and/or semi-monopoly conditions in inputs supply and marketing;
- missing markets situation.

Unlike the natural risk, the whole market related risk can not be assured by purchase of insurance. A special governance is to be put is place to safeguard farmers' investments.

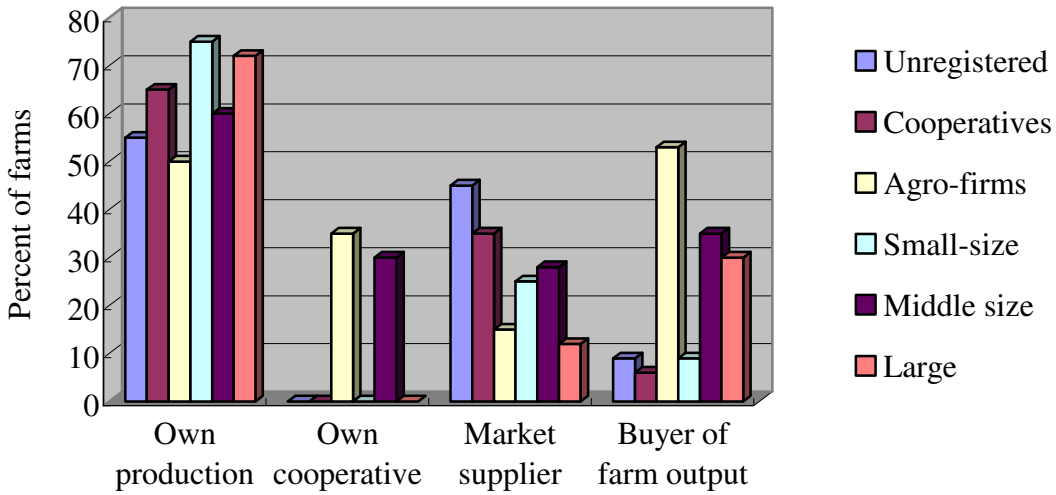
We have already proved that emergence and persistence of a vast subsistence and part-time farming has been an effective mode to protect household farmland, livestock, labor, and savings in conditions of great institutional, market, and economic uncertainty (Bachev, 2006). During much of the transition, market and contract trade of owned capital (land, labor) was either impossible or very expensive due to the "missing" markets, high uncertainty, risk, asymmetry of information, opportunism in time of hardship, little job opportunities and security. Low payoff from the outside trade (high inflation; non- or delayed payment of pensions, wages, rents) was combined with an increased share of households' food costs. There has been also a great uncertainty associated with the market supply of basic foods in terms of costs, stability, safety, and quality. Therefore, an internal family or (small) groups production has been the most effective way of protecting and getting a return on resources (productively use livestock and farmland, provide occupation for family members etc.).

Similarly, a missing market situation for critical for farms inputs and services has been one of the major reasons for the development and sustainability of production cooperatives (Bachev, 2006). Big interdependence and complementarities of assets, "not-for-profit" character, and membership (rather than market) orientation attracted many small-scale farms. Coops have evolved as an effective (cheap, stable) form of supplying highly specific to farms forage, mechanization service, essential inputs, storage, processing etc.

Larger farms usually integrate entirely forage supply exploring economies of scale and scope. In that way, they safeguard against likely risk associated with price, quality, time of delivery, behavioral etc. uncertainty of outside (market) procurement of essential feed for animals. Our survey has demonstrated that all commercial farms secure a significant portion of needed forage for their livestock though own production (Bachev, 2006). Likewise, they own (rather than rent) dairy animals, and all critical assets are either owned or protected through a long-lease contact (e.g. milking equipment, barns, storages, machineries). Furthermore, a private form to govern bilateral trade between bigger farms and a processor has been increasingly employed which interlinks the supply of critical inputs (forage, cooling tanks) with the marketing of output (Figure 6). The later diminishes considerably the risk from market inputs supply and marketing of output of dairy farms, and increases incentives for productive investments.

The significant risks from a market supply of critical labor and services are typically governed through a special private mode. In dairy farming much of the managerial and technological knowledge and even "relationships" with individual animals are highly farm-specific and extremely important for the overall productivity. Therefore, all critical activities are secured by the family labor and permanent employment (management, everyday care for animals) or service supply contracts (veterinarian).

Figure 6: Modes of forage supply in Bulgarian livestock farms



Source: interviews with farm managers

Most dairy farms report facing significant risks in marketing of milk (Bachev, 2006). *Firstly,* price and quality competition have been increasing all the time including a cheap import of powder milk for processing and consumers goods. Our survey has found out that all commercial farms want to see the milk price augmented in order to allow a modern production[10]. Moreover, in summer milk prices are very low (decreased demand) and many dairy farms can hardly break-even production costs.

Secondly, in some regions dairy farmers face monopoly or semi-monopoly situation experiencing price discrimination, delayed payments (reaching up to several months), or not fulfillment of contracted terms. Individual producers can not store fresh milk and/or transport it to a long distance. Therefore, the potential market is geographically limited - low market appropriability of rights, high cite and freshness dependency of dairy farm. Moreover, incentives to cooperate between competing milk producers and neutralize the regional monopolies have been low (high transaction costs, opportunism of free-rider type).

Third, many smaller-scale dairy farms have been entirely ignored by the dominating large processors since they are not able to meet quantity and quality requirements, and command high transportation, training, and transaction costs. Therefore, small farms have often available a very restricted local fresh milk market with insignificant demand from minor processors, "street market" or direct delivery to individual customers.

Finally, farmers in some milk producing but remote areas (mountains, border regions) have been experiencing a complete missing market situation since there have been no effective demand for milk (no consumers, no processors).

[10] In Plovdiv region, 10% of farms consider up to 50% price increase enough to allow an effective adjustment to new market and formal requirements for dairy farms. The rest of the farms wish much higher augmentation of the milk price averaging 125% and reaching 275%.

A number of effective private modes have emerged to deal with marketing risks. When a high symmetrical capacity, quality, time of delivery, origin etc. dependency with a particular buyer (middlemen, processors) is in place then there are strong bilateral incentives for integration. Consequently, diverse modes for marketing arrangements have been increasingly applied such as long-term delivery contacts, price guarantees and premiums, interlinks etc. There are also few good examples for collective (group) organizations of marketing with effective negotiating and enforcing relationships with downstream partners. Another prospective mode for the protection of highly specialized and specific investments of dairy farms is organic (eco) production. The later is in the beginning stage of development and comprises merely 5 farms with 722 animals (MAF, 2006).

There are two professional associations of the dairy producers in the country. However, they have not attracted many farmers because of the inefficiency in protecting producers' interests in negotiating with processors and lobbying for public support. Nor few sporadic attempts for "collective" actions of milk producers (protests, milk poring in cities, blocking highways) have given any positive results. As a result of all these, there has been huge income variation for different farms, regions, and various years, and constant reduction in number of dairy farms since 1994.

In 2006 production quotas for cow milk was firstly experimented and they are applied for all farms from 2007 in line with the EU CAP implementation. This public mode aims to control the milk output and diminish the risk from income instability of dairy farms. However, allocated individual quotas already exceed the nationwide (with 10%) and hardly would eliminate market risks. Thus, further diversification of dairy farms into cheep, goat, and buffalo productions (where no milk quantity restrictions exists) is to be expected.

3.3. Governing risks caused by individuals and private agents

Dairy farms experience following major risks coming from individuals and private agents:

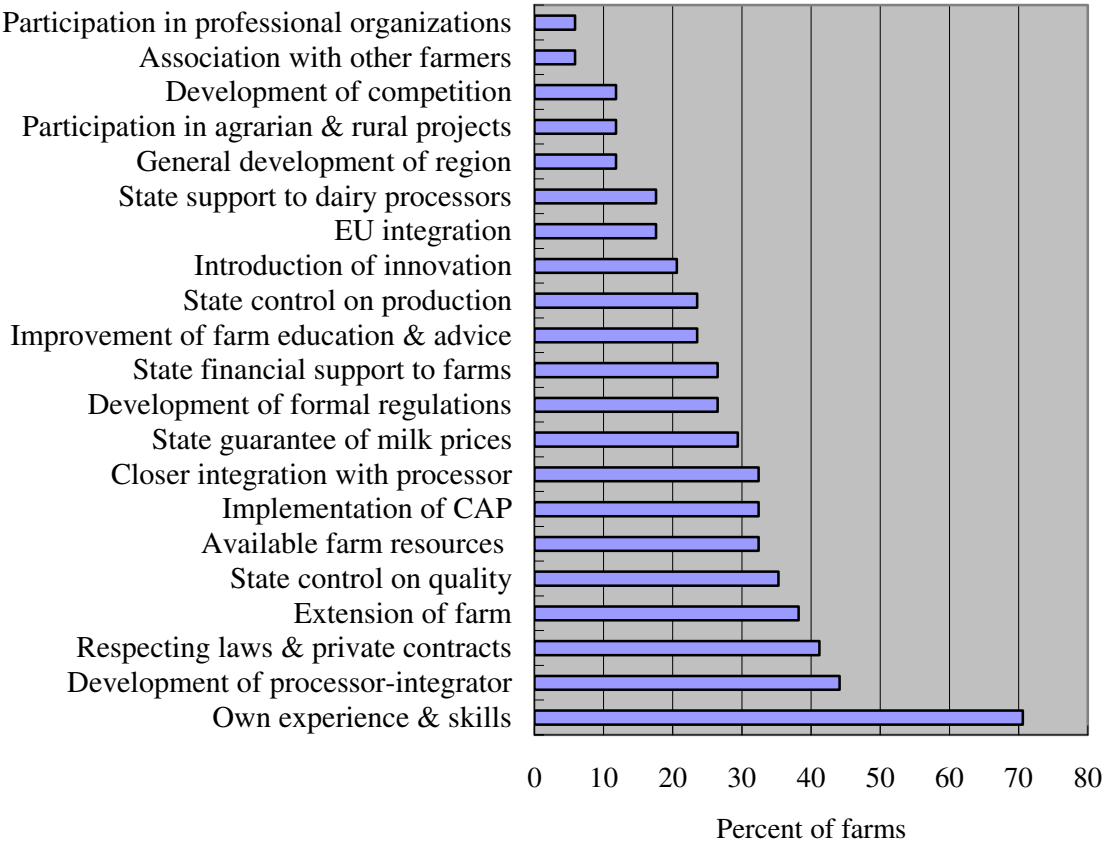
- burglaries and other infrusions on farm livestock, yields, propety and financial assests;
- opprtunistic behavior(s) in contractual relations with hired labor, inputs and service suppliers, buyers of farm output, and cooalition members in partnerships, cooperatives and associations;
- farming, industrial or another activity adversely affected dairy holdings (pollution of soils, water, air; unwanted "security services" etc.).

In Bulgaria there is not an effective public system (police, municipal guards, court) for protection and recovery of ownership ("absolute rights") and punishment of offenders. Farmers have been among the most vulnerable for individual thieves and organized crimes since much of the farm output and property is "in the open", and dispersed in wide areas and many locations. The permanent risk for agrarian property is widely assured by private modes. Our survey has found out that "costs for protection" for all type of farms are significant in terms of time and resources spent, hired security guards and services, and "payments for property protection and restoration". Moreover, insurance coverage against burglary is the most widely used market assurance of bigger producers – agro-firms and cooperatives (Figure 5).

High transitional uncertainty and insecurity (reputation is not of importance, difficulties to formulate and dispute contracts), little contractual experience of farmers (difficulties to

protect own interests in a contract), impossibility to write a complete (labor, service) contract in farming and dispute most contractual terms, and high cost for contract enforcement through the formal court system (inefficiency, corruption), all they have been responsible for a considerable risk for contractual failure[11] in Bulgarian agriculture. On the other hand, most farm managers consider "respecting laws and private contracts" as one of the most important factors for development of the dairy farms (Figure 7).

Figure 7: Most significant factors for development of dairy farms



Source: Survey data from Plovdiv region

In order to mitigate the risk from pre- and/or post-contractual opportunistic behavior a range of special private modes have been broadly employed. Since possibilities for opportunisms are great in farming (high asymmetry of information, uncertainty, costs for supervision and direction) it is typical to use self-enforced own and family labor for all critical operations (Bachev, 2006). Actually, the size of operation in majority of dairy farms is predominately determined by the available household labor. Furthermore, small partnerships are practiced exclusively between relatives and close friends where costs for coordination, decision-making and motivation is not high (mutual goals and trust govern effectively relations). In large business holdings, the additional core labor is hired on a

[11] Similarly to the market related risk no insurance for protection from "contractual risks" could be bought on market.

permanent basis and output-based compensation, interlinking (housing, services), social disbursements, paid holidays etc. are further used to enhance motivation. Similarly, high dependency from a particular buyer is effectively governed through reciprocal (rather than classical) contracts interlinking inputs and/or credit and/or extension supply against marketing of milk.

Large collective (livestock production, inputs supply, marketing, processing) modes have been rare because of the diversified interests of farmers (different age of farmers, unlike size and type of livestock operations, distinct extend of diversification and market orientation, specific political and ethnic ties); bad perception associated with new "collective" forms (living memory for communist period; massive mismanagement and misused of power in newly established cooperatives and associations); huge transaction costs for initiation and development; and lack of appropriate legislative framework and proper incentives for association until recently.

Finally, there are situations where dairy farms are badly affected by the harmful activities of other farms and/or industries causing pollution or other damages on farm resources. In addition, there are cases of strong conflicts of interests over limited natural resources between farmers and other agents. Usually farmers have no means to defend against all these hazards since either appropriate legislation is not in place (farmers rights are not guaranteed) or it is very difficult (costly) to protect and dispute assigned rights though existing (private, collective, public) forms. Consequently, farmers suffer considerable damages (on yields, quality of produce, animal welfare), and/or perform bellow official safety and quality standards, and reduce or cease livestock activities (lost demand for "risky" milk, closure by the authority, overtaking by other private interests).

3.4. Governing institutional risks

Dairy farms have been confronting significant social risks mostly related to:

- fundamental institutional transformation and associated high uncertainty and instability in public order;
- changing local community's tolerance to livestock farming and increasing pressure to comply with new norms or restrict (bring to end) activity;
- introduction of novel EU standards concerning quality, hygiene, food safety, environmental performance, animal welfare etc.

Post-communist transition has been associated with unprecedented changes in property rights and institutional structure. There has been huge uncertainty about the directions and kind of changes, and enormous instability (dynamics, constant amendments, controversies) in structure of rights, legislation, regulations, taxation, public organizations, responsibility of authorities etc. Furthermore, newly evolving public administration has been ineffective, incompetent, unpredictable, and corrupted. Carrying out farming and business activity in such an environment has been associated with significant risks and costs (efforts, payments of fees, tax, bribes) for studying out, complying with, and safeguarding from the formal regulations and the "informal rules" of bureaucracy.

A great part of livestock operation has been carried out by a great number of small-scale and primitive holdings often located within village and town borders. They contribute significantly to pollution of air, water and soils, and discomfort of local population (unpleasant noise and odor, dirty roads, poor manure management). Frequent conflicts between farm operators and neighborhoods are common in recent years and bring about

strong community demand (formal and informal pressure) to limit or relocate activities. Carrying livestock activity in these conditions has been quite risky because of the great frictions with community and uncertainty about potential needs and costs for adaptation[12]. That particular risk has been responsible for low (investment) incentives for modernization which additionally contributed to a greater exposure to natural, market, and other type of institutional risks.

A considerable risk for majority of dairy farms has come from uncertainty (at present "certainty") surrounding modes of introduction of EU CAP. Form 2007 the tough EU standards have been in force for quality, hygiene, veterinary, phito-sanitary, environment, animal welfare etc. According to the Association of Milk Producers there are only 900 farms with 50000 cows meeting EU raw milk quality standards. They account for merely 0,5% of the cow farms and around 13% of the cows in the country. Furthermore, 81% of the holdings with milking cows have no milking installations and only 0.1% of dairy farms are with safe manure pile cites (MAF, 2006). There is a transition period until the end of 2009 for milk producers to adapt to new (quality, safety, building, manure management etc.) requirements in the dairy sector. Besides, special public measures are being envisaged from 2007 on to support modernization of dairy farms as well as market orientation of so called "semi-market" farms.

Our survey of the commercial dairy farms has found out that different type farms have unequal capacity for adaptation to new EU requirements. A great number of holdings have no sufficient potential for adjustment to new institutional requirements (Table 3). That is particularly truth for the small-scale unregistered producers which dominate the sector. Furthermore, only a third of dairy farms believe their production capacity corresponds to the modern requirements of competition, productivity, eco-performance and animal welfare. Merely one-seventh of dairy farms have potential (internal capacity, access to outside sources) to fund necessary investment associated with the adaptation to new EU norms and standards. Therefore, a great portion of dairy farms are effectively at risk to cease the legal commercial activity by 2009.

On the other hand, a market orientation of huge (semi) subsistence farming is not feasible because of the high costs for farm enlargement and adjustment to new market and institutional environment (no entrepreneurial capital available, low investment and training capability of aged managers etc.). Moreover, there will be practically (technically, politically) impossible to enforce the official standards in enormous informal sector of the economy. That is why there is no immediate institutional risk for (semi)subsistence farms and they will dominate in years to come.

[12] Farmer's costs range from losing reputation, to losing income for modernization, diversification, limitation, reallocation, or ceasing livestock activity.

Table 3: Share of farms with big and good capacity for adaptation to new EU requirements for dairy sector (per cent)

Farms capacity	Unregistered	Firms	Coops	Total
Extend of knowledge on new requirements	22.7	63.6	100	38.2
Available skills and knowledge for adaptation	22.7	54.5	100	35.3
Available production capacity	27.3	45.4		32.3
Improvement of quality and hygiene standards	36.4	72.7	100	50
Improving animal welfare	31.8	72.7		44.1
Improving environmental performance	31.8	54.5		38.2
Finding necessary investment	9.1	27.3		14.7

Source: survey data from Plovdiv region

4. Modes of governing risks from dairy farms

4.1. Risk to nature

The major risks to environment from dairy farms is mostly associated with:

- pollution of soils and waters;
- unsustianable use of farmland and graslands;
- contribution to greenhouse gas emmisions.

Since 1989 there has been unsificient compensation of untakes of major nutritient elements from farmlands and usage of the livestock manure for fertilisation contributed positively to the soil fertility (Bachev, 2007b). However, most livestock farms have no effective manure storage capacities - only 0.1% possess safe manure-pile sites, around 81% use primitive dunghills, and 116 thousands have no facilities at all (MAF, 2003). That contaminates soils in farms locations and contributes considerably to water pollution. Around a quarter of the riverlength does not meet the normal standards for good water quality (MAF, 2006). In 45% of samples of the water for irrigation the nitrates concentration exceeds the contamination limit value by 2 to 20 folds. Nitrates are also the most common polluter of underground water – for the last 5 years with a slight excess over the ecological limit (EEA, 2006). Not surprisingly Nitrate Vulnerable Zones cover 60% of the territory of the country.

Furthermore, new private farming has been responsible for unsustainable use (over-grazing) of many state, municipal, and private pastures (Bachev, 2007b).

Finally, agricultural has been a major ammonia and methane source accounting for two-third and a quarter of the national greenhouse gas emissions accordingly (Vassilev *et al.*, 2006). In recent years most CH_4 comes from fermentation from domestic livestock (72.5%) and manure management (24.2%) while manure management comprises a good portion of NO_2 emissions (13.2%).

Until recently voluntary initiatives, private organizations, market driven modes (e.g. organic farming), and public intervention, all have had no significant importance for the protection of environment and governing eco-risks from the dairy farming (Bachev, 2007b). However, in 2007 a broad range of public environmental measures have been introduced as a part of the EU CAP implementation – eco-conditionality, eco-standards, eco-regulations, eco-education, financial support to eco-activities, organic farming, zones with environmental difficulties, market orientation and diversification of farms etc.[13] Furthermore, respecting minimum eco- and biodiversity standards have been made a part of compulsory (cross-compliance) requirement for receiving any public support by farms. For instance, there is a condition to "keep farmland in a good agricultural and environmental status" in order to receive direct payments; Good Agricultural Practices (setting up progressive eco, animal welfare etc. norms) are to be applied to participate in other support program etc.

4.2. Risk to public

Livestock farming has been a significant risk to public which is mostly associated with:

- quality, authenticity, and safety of livestock products;
- livestock diseases causing a considerable treat to human health;
- new public, ethical etc. concerns about environment preservation and improvement, animal health and welfare etc.

Food quality and safety is a high priority in EU and strict food standards are introduces and enforced. Furthermore, some animal diseases with serious human health hazards (mad cow disease, bird flu etc.) have caused rigorous public control and prevention measures. Finally, new public concerns about global climate change, sustainable use of natural resources, animal welfare, preservation of traditional products and technologies bring to life appropriate policies, regulations and support measures. Consequently, a full traceability of the origin of farm products back to the individual farms and animals has been put in place.

Accordingly, there has been increasing pressure, control, and sanctions on dairy farms both by the processors and the state authorities for complying with the new requirements (Table 4). Besides, most of the dairy farms had to make and/or are being undertaking significant changes related to the novel institutional requirements for hygiene of production, quality of milk, animal welfare, environmental care, formal registration etc. in order to be able to sell milk in new conditions (Figure 8). Presently, dairy processors are categorized in four groups and are given a transition period to adapt completely the EU standards for the dairy sector (including requirements for the "quality of milk" purchased from farms). In the First group there are 15 companies (7.2% of all) processing exclusively milk corresponding to the EU standards. In the Second group there are 69 companies (33.2%) processing with separate technological lines for "EU" and "non EU milk". The Third group comprises 121 dairy (58.2%) processing only milk according to Bulgarian standards. And Forth group of 3 processors work only with non-cow milk.

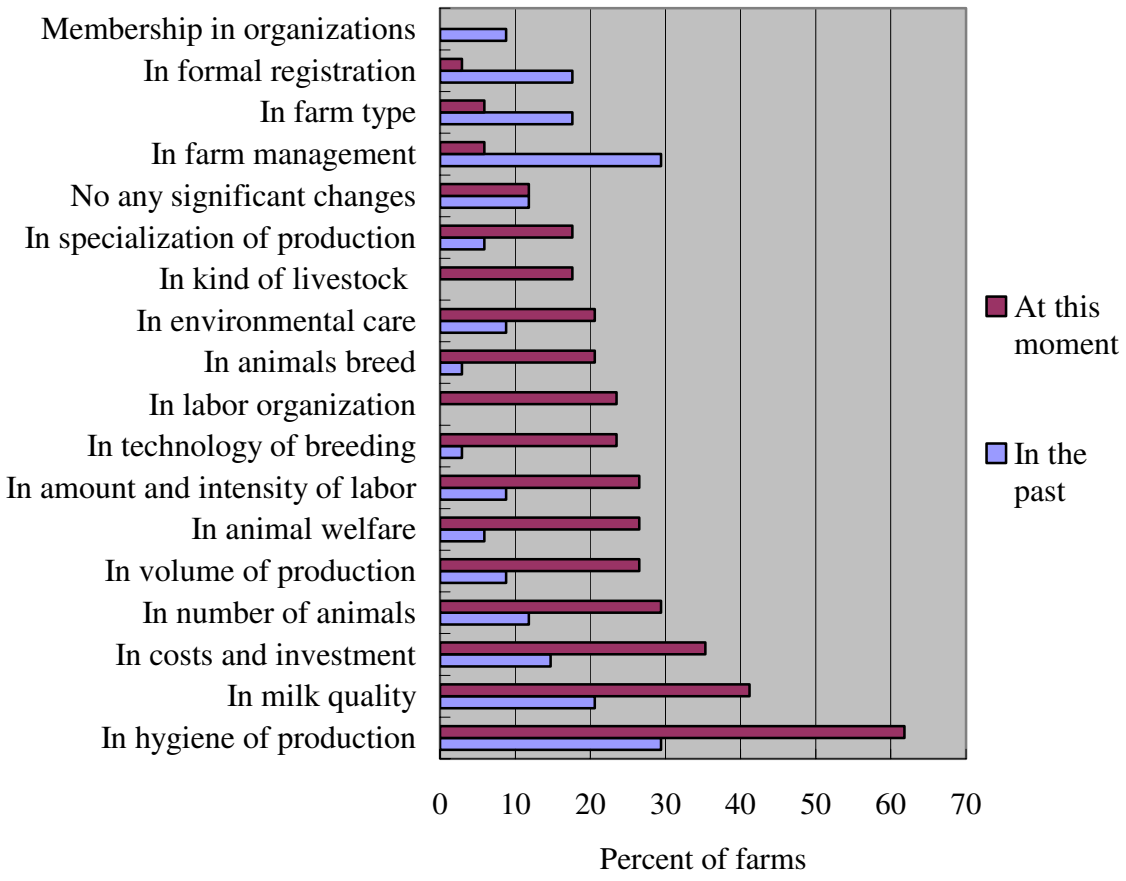
[13] National Strategy Plan for Rural Development for 2007-2013 allocates € 623.3 million for "preservation of national resources and improvement of countryside" amounting 27.1% of the total budget (MAF, 2006).

Table 4: Control from "Dimitar Madzarov" LTD and state on farms (% of farms)

Control on:	"Dimitar Madzarov" LTD	State body
Milk quality	94.1	52.9
Milk safety	47.1	17.6
Hygiene of production	58.8	44.1
Animal health	20.6	55.9
Forage for animals	11.8	35.3
Care for animals	8.8	35.3
Care for environment	8.8	41.2
Control is permanent	2.9	20.6
Sanctions and punishments are applied	38.2	8.8

Source: survey data from Plovdiv region

Figure 8: Changes to be made to sell milk to "Dimitar Madzarov"LTD



Source: survey data from Plovdiv region

All surveys show that many of the specific new EU regulations are not well known by the implementing authorities and the majority of farmers (Bachev, 2008). The lack of readiness and experiences would require some time lag until the "full" implementation of the CAP in Bulgarian conditions. The later will depend on the pace of building an effective public and private capacity, and training of (acquiring learning by doing experience by) bureaucrats, farmers, and other agrarian agents. Besides, most of the farm managers have no adequate training and managerial capability, and are old in age with a small learning and adaptation potential. Therefore, there will be significant inequalities in application (enforcement) of new laws and standards in diverse sectors of agriculture, and farms of different type and size, and various regions of the country.

4.3. Risk to individuals and private agents

Dairy farms pose considerable risks to other farms, individuals, and private agents comprising:

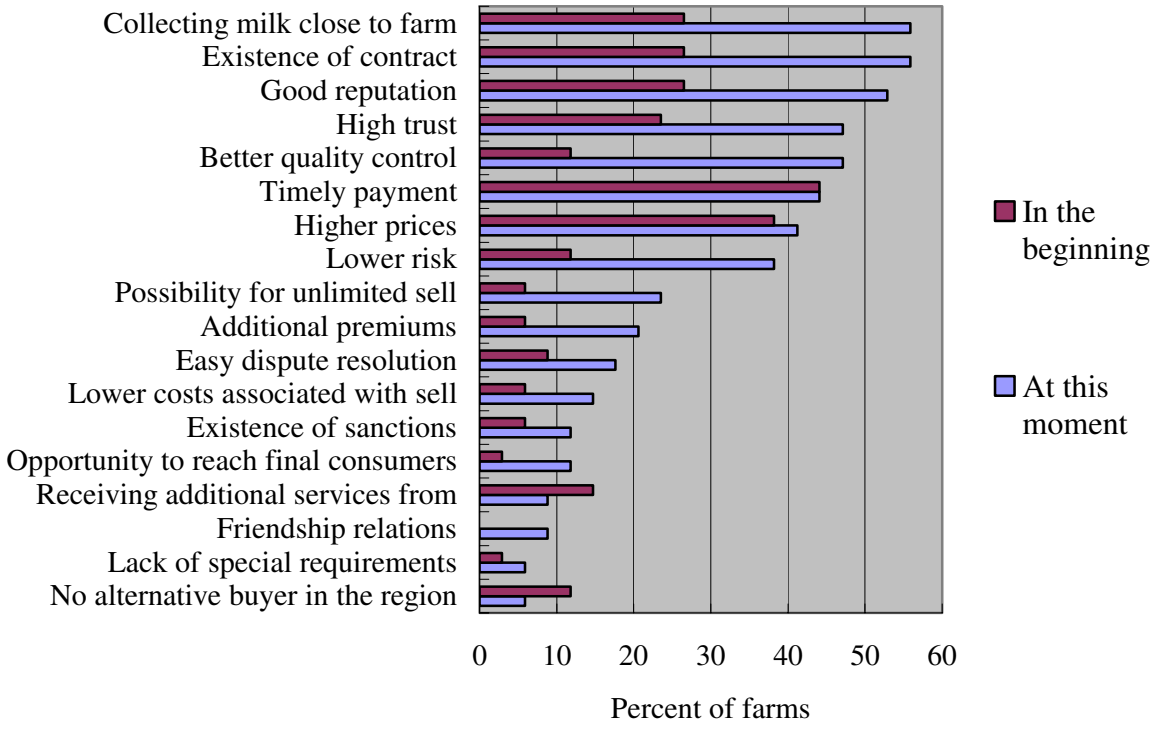
- not-allowed usage and/or damages of land, yields, and property;
- land, water, air, noise pollution affecting adversely businesses and/or lifestyle of others;
- low contractual reliability.

There are many incidences for using others grasslands and crop yields, or otherwise damaging the land or property by the dairy farmers. Some dairy holdings pose a serious risk for comport of individuals and others businesses (such as organic farms, recreation and tourism operators, water suppliers). All these risks are mitigated privately by affected individuals and businesses through negotiating, monitoring, employing guards, or by illegitimate (forceful) means.

Small-scale and semi-subsistence farms have been major milk suppliers to dairy processors putting them in a big (capacity, cite, quality, origin, safety) dependency. Divers private modes have been broadly used by processors to deal with that kind of risks. We have identified an effective system for the governing risk in relations of "Dimitar Madzarov" LTD with more than 1000 small-scale milk suppliers from Plovdiv region. In last 10 years this dairy processing company has developed a comprehensive system for protection of interests and coordination, stimulation, controlling, and conflict resolution with farmers. The later includes: building a good reputation and trust, constant communications, regular group discussions of problems, training of farmers in new industry and institutional requirements, using written delivery contracts, significant relation specific on-farm investments (in milk collecting. Cooling, and controlling facilities and staff), permanent verification of quality and registration of delivered milk by each farm, punishment for offenders (e.g. for treatment with antibiotics), effective and regular payment mode, differential prices stimulating the enlargement of farms and increasing milk supply, interlinking an interest-free crediting (advance payment) against marketing of milk, providing assistance to farmers in construction and preparation of public support projects, encouraging grouping of farms.

Namely this special governance employed by the "Dimitar Madzarov" LTD has contributed considerably for tighter integration with the dairy farms, increasing efficiency of bilateral relations, enhancing farms relation investments, and their adaptation to company's requirements for milk quality and quantity (Figure 9). On the other hand, involved farms consider the development of the "Dimitar Madzarov" LTD as one of the most important factors for their own farm development (Figure 7).

Figure 9: Main reasons for selling milk to "Dimitar Madzarov"LTD



Source: Survey data from Plovdiv region

4.4. Risk to market

Dairy farming has been responsible for great risks to markets during the transition now. The later is mostly associated with:

- shortages of quantity of milks of different type, and related instability in the consumer prices of dairy products;
- deficiency in quality, safety, and origin of milk.

There was a deficiency in quantity of different type of milks during market adjustments in the first years of the transition. There were a number of ineffective attempts for government intervention through price and trade control measures (Bachev and Tsuji, 2001). Nevertheless, the risks of insufficient supply and price volatility were successfully overcome by the market governance - opening up markets (including liberalization of the international trade), development of market competition and demand etc. However, up-to-date the risk for consumers which is associated with the authentic quality, safety, and origin of milk and dairy products has been a serious issue.

What is more, introduction of the high EU standards for milk production and trade is causing a new risk for insufficient supply of local milk. The biggest dairy processors have been trying to overcome the problem of shortages of quality milk in local market(s) through processing imported powder milk from other countries. However, these processors are increasingly facing another problem (risk) of low consumer demand for dairy products based of non-fresh (imported powder) milk. In order to deal with that capacity and quality

deficiency risk some processors have been introducing specific modes for risk governance such as origin and quality guarantee, brand names, traditional and eco-products etc. The later has brought to a life a variety of private modes for governing vertical relations backwards with the supplying farmers, and upwards with the food chains, retailers, and importers (Bachev, 2006).

On the other hand, a significant public intervention has been undertaken in line with CAP implementation aiming at modernizing and commercializing dairy farms, and stimulating production of local and eco-products. The later consists of introduction and protection of rights of special traditional, organic etc. products, enormous subsidies for modernization of farms and adaptation to EU quality and safety standards, support for market orientation of subsistence farms, public training and advisory services to farmers etc.

Conclusions

Our analysis of the post-communist development of the dairy farming has identified quite specific risk structures facing by and causing from this important sector of Bulgarian agriculture. The huge market and institutional instability and uncertainty, and the high transaction costs, have blocked evolution of effective market and collective modes for risk protection. A great variety of private modes (internal organization, vertical integration, interlinking etc.) has emerged to deal with the significant natural, market, private, and institutional risks faced by the dairy farms and other affected agents. Nevertheless, diverse risks associated with the dairy farming have not been effectively governed and persist during the transition now. That has been a consequence of ineffective public (Government, international assistance) intervention to correct market and private sector failures in risk governance. The later has had considerable negative impacts on evolution of (size, productivity, sustainability of) farms, and development of markets, and structure of production and consumption, and state of environment etc. What is more, certain risks related to the dairy sector have "disappeared" due to the lack of effective risk governance and declining dairy farming. That would lead to further deformation in development of dairy and related sectors unless effective public (regulations, assistance, control etc.) measures are taken to mitigate the existing problems (risks).

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