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MARKET LINKAGES IN THE SLOVAK AGRI-FOOD SECTOR

The World Bank

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EXECUTIVE SUMMARY

General conclusions

Vertical coordination has become an important phenomenon in the Slovak agri-food chain. As in other countries in Central and Eastern Europe vertical coordination between farms and agribusiness companies has grown strongly in recent years.

Government policy reforms introduced in Slovakia since 1999 have made the investment climate more attractive to foreign investors and had an important positive impact on the inflow of foreign direct investment. For example, foreign investment in the dairy industry has grown strongly since 2000. In 2003, international dairy companies (partially) owned 14 out of the 22 main dairy processing companies in Slovakia. These foreign owned companies processed 77% of milk purchased in Slovakia. This process has partially stimulated vertical coordination and contributed to improving the quality and productivity of Slovakia's agri-food chain.

The growth of vertical coordination and contracting between Slovak farms and the agribusiness companies is illustrated in this report by the brewery-malting-barley chain and the dairy chain. Both chains differ strongly in product and processing characteristics. Yet, *in both chains almost the whole sector is based on supply contracts including (elements of) farm assistance*.

The process of vertical coordination in Slovakia and its effects differ from many other European countries because of the size of the farm structure and the processing sector. With an average size of 349 ha per farm, Slovak agriculture is more large-scale than in many other countries. Co-operatives and commercial companies are 20% of all farms, using 80% of the agricultural land. Even the average size of family farms (39 ha) is large compared to the average EU-15 farm size.

In contrast, the food industry in Slovakia is still relatively fragmented, although a concentration process is going on in some sectors, such as in dairy, meat, sugar, and beverages. The input market is also rather fragmented, although some companies operate as local monopolies.

In combination, *the relatively large size structure of the farms and the relatively more fragmented processing sector makes that the farms have a relatively strong bargaining power in Slovakia vis-à-vis the processing sector, compared to other European countries*.

However, this conclusion may differ substantially between commodity chains. For example, the dairy chain is characterized by mostly large scale dairy farms and a fragmented dairy processing sector (the top three dairy processors have less than 30% of the market). In contrast, in the barley-malt-brewery (BMB) chain, malt barley farms are relatively small (by Slovak standards) while the processing sector is highly concentrated: the top three companies in both the malt and the beer market have more than 80% of the market.

In both chains processing companies assist farms, but the extent differs importantly. In the dairy chain, with large farms and smaller processing companies, farm assistance is limited and concentrated mostly on quality improvements by farms. In the BMB chain, with smaller farms and larger processors, there is more assistance provided to the farms, under the form of support for production and storage, quality enhancement, but also credit support for high quality input purchasing and pre-financing of inputs.

The level of assistance is limited compared to some other countries of similar income levels. This may be due to the fact that Slovak farms are generally large and have well established technological bases from which to start (eg milking equipment and know-how and machinery for barley production) compared to other countries where a more radical reorganization of the supply system or collapse of the supporting institutions has caused greater problems in responding to high quality requirements by processors.

In both sectors, Slovak farms have been quite successful in addressing the quality demands by processors.

Still the effects of supply chain development and vertical coordination appear to be positive in this respect. Investments in new processing technologies, improved hygiene conditions at factory and farm level, etc. have further improved the quality of Slovak milk deliveries. Milk yields per cow have shown a rather quick increase since 1993. Vertical coordination has contributed to these positive developments, while the inflow of FDI into the dairy processing sector has brought in the necessary capital for restructuring and modernisation. Also in the barley-malting- brewery chain, there are indications that farm assistance programs result in higher (than average) yields. For farms with limited access to credits, contracts in which pre-financing of input use and payment-in-advance are included are considered important ways of providing malt barley farmers easier access to credit.

Implications for public policy actions

First, *the most important policy implication of this study is the recognition of this phenomenon* and the *need to explicitly integrate supply chain developments into policy thinking and program strategies.*

Second, *continuing and reinforcing the macro-economic and regulatory policy environment which stimulates investment and restructuring.* These conditions are important for supplier assistance programs or chain-based finance. This is somewhat less of an issue in today's Slovakia since Slovak policies have been very successful in this area over the past years. Still, it is important to keep this in mind. Since vertical coordination is importantly a financial activity, instability or regulatory insecurity may undermine contract enforcement.

Third, *enforcing competition* is crucial for efficiency and for a fair distribution of rents between farms and processors. In some sectors, such as the malting and brewing sectors some companies have dominant market positions and influence the contract terms. Competition induces better contract terms for suppliers (or buyers who face monopolistic suppliers) and constrains rent extraction.

Fourth, *empowering farms* dealing with highly concentrated processors or retailers can be done through a variety of policies. Policies include stimulating farmers associations, investing in institutions for (independent) quality and safety control and certification, competition and trade policy, institutions to assist farms with contract negotiations and dispute settlements, encourage alternatives in input and output markets.

Fifth, *rethinking the role of the government and policy-making* includes the following issues:

- *Policy analysis and information gathering.* Policy analysis is complicated by the emergence of vertical coordination. Traditional instruments of information collection do not include information on vertical coordination.

- *Rethinking traditional public investments.* Traditional areas of public investment such as research and extension, market information systems, quality control, veterinary services and animal surveillance programs need to take into account the role, which vertical coordination plays in these areas.

- *Public–private partnerships: consider supply chains part of the solution, not the problem.* Focus on collaborations between public authorities, non-governmental organizations, and private companies. For example, in some European countries public support to supply chain development is through targeted programs, in which the public knowledge system and the agrifood sector cooperate on issues as organization and management of supply chain networks.

1. INTRODUCTION

As a new member of the EU, the competitiveness of Slovak agriculture is a key concern. Studies indicate that certain sub-sectors, such as dairy and grain, could have a comparative advantage in EU markets. However important bottlenecks up- and downstream from the farms still constrain the potentials of the agricultural sector. In particular, the functioning and operation of input and output markets for agriculture, as well as horizontal and vertical linkages among farms and other components of agricultural markets, are critically important elements in improving the competitiveness of Slovak agriculture.

This study focuses on the supply chain as a whole. It analyzes general developments and studies vertical linkages in two selected sectors in greater detail: the dairy sector and the brewery-malt-barley (BMB) sector. These sectors were selected for several reasons: (a) they are important sectors in Slovak agriculture, (b) studies indicate that Slovakia may have a comparative advantage in these sectors, and (c) there has been significant foreign investment in the supply chains of these sectors.

The study identifies specific conclusions, draws more general lessons and presents a series of recommendations for policy makers.

The paper starts with a brief description of the structure of the Slovak agri-food supply chain as a whole. In section 3 and 4, we present the components of the malt barley and dairy sectors and their associated product flows. Next in these sections, emerging vertical relations are described based on interviews with farms and processing companies in the two sectors. The interviews focus on the types of and conditions for vertical coordination between farms and processors. Further, the consequences of vertical coordination for various agents in the chain are analyzed. The paper concludes with a number of recommendations for key policy actions aiming at promoting the beneficial effects of increased vertical coordination and avoiding or mitigating possible negative effects, from the perspective of both equity and efficiency.

2. STRUCTURAL FEATURES OF THE AGRI-FOOD SUPPLY CHAIN

2.1 Industry structure at primary level

Slovak agriculture has a farm structure, which differs strongly from that in the EU-15 and from most new EU member states (NEMS). Based on the Farm Census 2001, the number of registered farms in Slovakia was 6 995 with an average size of 349 ha (see Table 2.1). In the EU-15 and most NEMS, average sizes of agricultural holdings are much smaller. There are three types of farms. Legal persons (co-operatives and private commercial farms) account for 77% of the agricultural land. These farms are particularly large, with areas between 1000 and 1500 ha. Individual farms are generally much smaller - 39 ha on average – yet these are also much larger than the average size of individual farms in the EU-15. Individual farms account for only 9% of the agricultural land. The third category of farms is the group of not-registered (very) small and subsistence farms. The latter group uses around 14% of all agricultural land.

Table 2.1 Slovak farm structure (2001)

	Number of farms	Agricultural land in 1000 ha	Average size in ha	Share of total agricultural land
Co-operatives	715	1131	1582	46.4
Private commercial companies, total	722	723	1002	29.6
Of which: Limited liability companies	627	550	877	22.5
Of which: Share holder companies	94	173	1842	7.1
Corporate Farms in total	1522	1890	1241	77.4
Individual farmers	5473	215	39.2	8.8
Other land *		335		13.7
Total	6995	2439	349	100

* - includes not registered small farmers, subsistence farms, household plots, gardens.

Sources: Structural census of farms SR 2001

Corporate farms rent most of their land in Slovakia, either from the state or from individuals, both rural residents and urban absentee landowners.[1] Selling and buying of land is much less common (see also Csaki et al., 2002; Swinnen and Vranken, 2005).[2] Structural change is occurring mostly through the land rental market. After a period in which new individual farms had been founded, their number decreased, by 30% between 1994 and 2001 (EC, 2002:8, Table 4)[3]. In recent years, land markets have developed more rapidly and the process of EU accession has contributed to this process.

2.2 Structure of and concentration in the upstream industry

The input market is rather fragmented. Still, in some cases suppliers may operate like local monopolies. Over 50 companies operate in the fertilizers market, of which 8 companies with more than 20 employees (UKSUP). Four enterprises produce pesticides while 65 traders have registered licenses to sell to the wholesale and 8 to the retail market. Feed concentrates are produced and imported by around 1000 companies. According to EU regulation N^0 95/69 of March 1, 2003, all feed mixture production and its origin has to be registered. In 2004, 240 feed producers and intermediaries and 360 feed mixture producers were registered. A significant share (roughly 25%) of crop inputs such as pesticides, fertilizers and seeds is distributed by processors (of the agricultural commodity). That was typically for oilseeds, sugar beet and malt barley. Nevertheless, the majority of inputs was distributed through input suppliers.

2.3 The structure of and concentration in the food industry

The food industry accounted for 4.1% of national GDP (1999 figure) in the Slovak Republic and its share has further decreased to 2.9% (2000 figure) and to 2.4% in the year 2001. Its share in national employment declined from 2.4% in 1997 to 2.2% in 2000. Beverages, meat, dairy processing, and "other foods" are the dominant sectors (see Table 2.2).

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[1] The process of privatization of agricultural land formally ended in 2001. However, the recognition of land property rights has still not been completed, because of unsettled claims on land. This agricultural land with unidentified ownership -- a substantial area -- remains in the State Land Fund.

[2] Csaba Csaki, Antonio Nucifora, Zvi Lerman, Thomas Herzfeld and Gejza Blaas, *Food and Agriculture in the Slovak Republic: The Challenges of EU Accession*, World Bank study, 2002
Swinnen, J. and L. Vranken, 2005, *The Development of Land Rental Markets in Europe and Central Asia*, Report for the World Bank, ECSSD.

[3] European Commission, Directorate-General for Agriculture, *Agricultural Situation in Candidate Countries. Country Report on the Slovak Republic*. Brussels, July 2002.

Privatization of the food industry has been fully completed in the Slovak Republic. The privatization took three forms: (a) direct sale by tender, which was the most important method, accounting for 74% of the total by accountancy value, (b) sale of share-holdings, and (c) voucher privatization.

On average, the food industry attracted less foreign investment than other sectors of the economy in the 1990s: the food industry received less than 1% of total FDI in any recent year. However, there are some exceptions. Sectors with relatively more foreign investment are the sugar, dairy and beverage industry, and the retail industry.[4] Moreover, foreign investment has increased rapidly in recent years, in particular after 1999 with a change in government policies which improved the investment climate.

Table 2.2 Shares of food industry sectors on employment, output and value added (%, 2000)

	Employment	Output	Share of Gross Value Added in the food industry
Meat	20.5	20.1	14.9
Fish	2.0	1.5	1.6
Fruit & Vegetables	2.8	1.7	2.0
Oils	2.5	5.4	5.3
Dairy	9.5	15.6	9.6
Grain mill	5.0	6.2	7.4
Animal feeds	4.7	6.8	6.0
Other foods	34.4	22.4	29.6
Beverages	18.5	20.4	23.7
Tobacco	n.a.	n.a.	Not included
Total Food	100.0	100.0	

Source: IAMO (Network of Independent Agricultural Experts in the CEE Candidate Countries), Key developments in the agri-food chain and on restructuring and privatisation in the CEE candidate countries. February 2003.

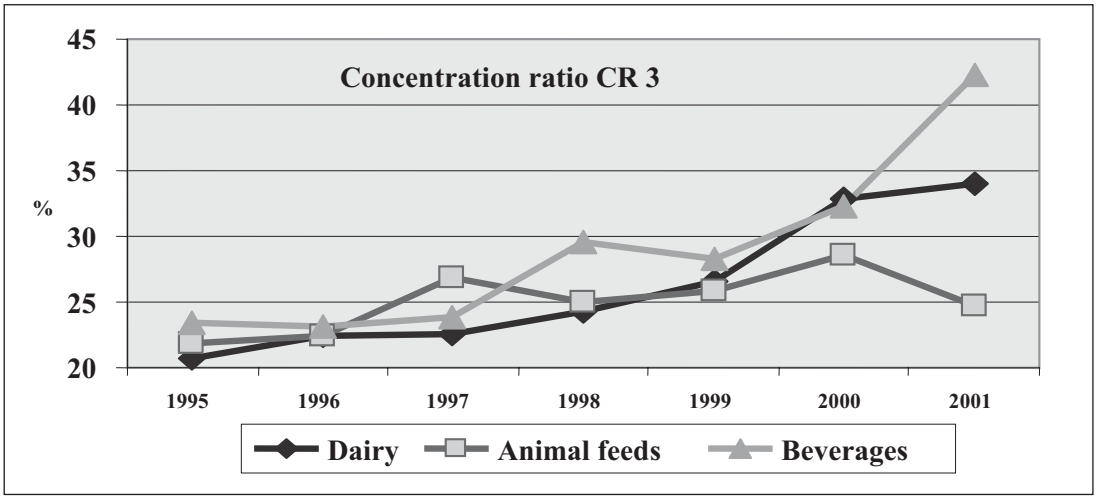
The concentration in the food industry is mixed. Several sectors have a relatively fragmented structure. Others, such as vegetable oil refining, the tobacco industry, the sugar and the starch industry, are more concentrated. However, overall, there is a concentration process going on. This is illustrated by the evolutions in figure 2.1: concentration ratios have increased since the mid 1990s in industry branches such as

[4] Bozik, M., Michalek, J., (2001). Development in the Agri-Food Chain and Restructuring and Privatisation in the Slovak Republic, Issue Paper no. 6, Network of Independent Agricultural Experts in the CEE Candidate Countries of the European Commission, DG VI, Bratislava, Kiel

dairy, animal feed, and the beverage industry. For example, the share of sales of the three largest dairy enterprises in total dairy sales has increased from 20% in 1995 to 34% in 2001 (see figure 2.1). The three largest beverage companies increased their share from 23% to 42% over the same period. The most concentrated food industry branches are vegetable oils and fats, fish processing and canning factories where the 3 largest companies have, respectively, 100%, 65% and 51% of total sales in their branch. In 2001, ten beverage-producing enterprises owned 67% of the market share, while 10 dairies owned 70% of the market share.

To get a better understanding of the structure and relationships in these chains we will now analyze in greater detail two supply chains with quite different structures and commodity characteristics: the barley-malt-brewery chain and the dairy chain. As explained in the introduction, these sectors were selected for several reasons. These are important sectors in Slovak agriculture and studies indicate that Slovakia may have a comparative advantage in these sectors. Possibly related to this, there has been significant foreign investment in the supply chains of these sectors.

Figure 2.1 Concentration in some selected food industries



3. THE BARLEY – MALT – BREWERY CHAIN

Slovakia has a long tradition in malt and beer production. Former Czechoslovakia used to produce top quality malt because of its suitable soil and climatic conditions. Slovakia is among the countries considered to produce the best barley in the world. This was one of the reasons why this sector attracted foreign direct investment relatively early and relatively much.

Foreign investment in the Slovak brewery sector began with Dutch Heineken, which bought the Zlatý bažant brewery in Hurbanovo in 1995 and later, step-by-step, Corgoň in Nitra, Martiner in Martin and Gemer in Rimavská Sobota. In 1997 SAB (a South African company) bought the Šariš brewery in Veľký Šariš. Nowadays the share of foreign capital in the basic capital in the brewery – malt industry has reached almost 90% (Source: Potrav (MoA SR) 1-02.) The main purpose of foreign capital entry was to increase market share and the creation of a production base for the regional market and export. Brewery companies dominated by foreign capital have achieved all relevant quality standards and are ISO 9001/2000 certificated, which allows them to export to EU and other foreign markets.

3.1 Basic structure of the chain

In 2004 there were 12 companies active in malting and/or brewing in Slovakia. Four of these companies were only malting, four only brewing, and four were integrated companies which were both malting and brewing. The companies, and their market share, are presented in table 3.1 and 3.2.

Both the malting and the brewing industries have a high concentration. The Dutch company Heineken is by far the largest company producing malt and beer in Slovakia, and takes a dominant position in both markets. It produces slightly less than half of all beer and more than half of all the malt in Slovakia. The three largest companies together have 80% of the malt market and 86% of the beer market.

Table 3.1 Shares of beer producers in Slovakia in 2004 (%)

Company	% of production
Heineken Slovensko, Nitra	46.6
Pivovar Šariš, Veľký Šariš	26.0
Topvar Topoľčany	13.5
Eduard Rada Steiger Vyhne	4.1
Pivovar Stein Bratislava	3.3
Pivovar Tatran Poprad	2.4
Pivovar Popper Bytča	2.3
Pivovar Urpín B. Bystrica	1.8

Source: Slovak association of producers of beer and malt

Table 3.2 Shares of malt producers in Slovakia in 2004 (%)

Company	% of production
Heineken Slovensko Sladovňa Nitra	56.0
Lycos – Trnavské sladovne Trnava	13.4
Sladovňa Michalovce	11.0
Pivovar Veľký Šariš	8.8
Topvar Topoľčany	5.8
Pivovar Tatran Poprad	3.4
Sladovňa Sessler	1.1
Sladovňa Levice	0.5

Source: Slovak association of producers of beer and malt

While farms in Slovakia are large in international comparison, barley production is much less concentrated than the processing sector. Most malt barley producers are in the lower size category of the arable farms and produce malt barley on average areas of 60 ha (see table 3.3). Barley accounts for around 20% of total cereal production, and around one third of the barley production is malt barley.

Table 3.3 Structure of barley and malt barley producers in Slovakia

	Barley producers			Malt barley producers		
Category of sown areas	Number of farms	Total acreage in 000 ha	Number of farms	Total acreage in 000 ha	Average ha per farm	Acreage in % of total
0,1 - 200	2907	109	1005	60	60	46.7
201 - 300	190	47	101	26	255	20.0
301 - 500	144	55	71	28	392	21.6
501 - 700	48	29	15	9	618	7.2
> 701	35	32	6	6	957	4.5
Total	3324	272	1198	129	107	100.0

Source: Survey executed by RIAFE Bratislava and RIAFE Central Database

Figure 3.1 presents an overview of the commodity flows in the barley-malt-brewery chain for 2003. Malt barley production in Slovakia has been fluctuating between 265 000 tons and 463 000 tons in recent years (see figure 3.2). In 2003, 270 000 tons malt barley has been produced (see Flow chart below). Due to relatively high stocks at the beginning of the year, supplemented with some imports but reduced by other domestic consumption (implying a reclassification of malt barley into feed barley), 310 000 tons malt barley has been available for the malt industry for processing. Based on this domestic supply, the stocks and some imports, the malt industry processed 323 000 tons of malt in 2003. More than 50% has been exported, while 100 000 tons of malt has been sold to the beer industry. Beer production from domestically produced malt barley and malt practically equals domestic beer consumption. Only some imports occur. Exports of beer have been less than 3% of the Slovak beer production in 2003.

Malt barley vertical flow in Slovakia 2003

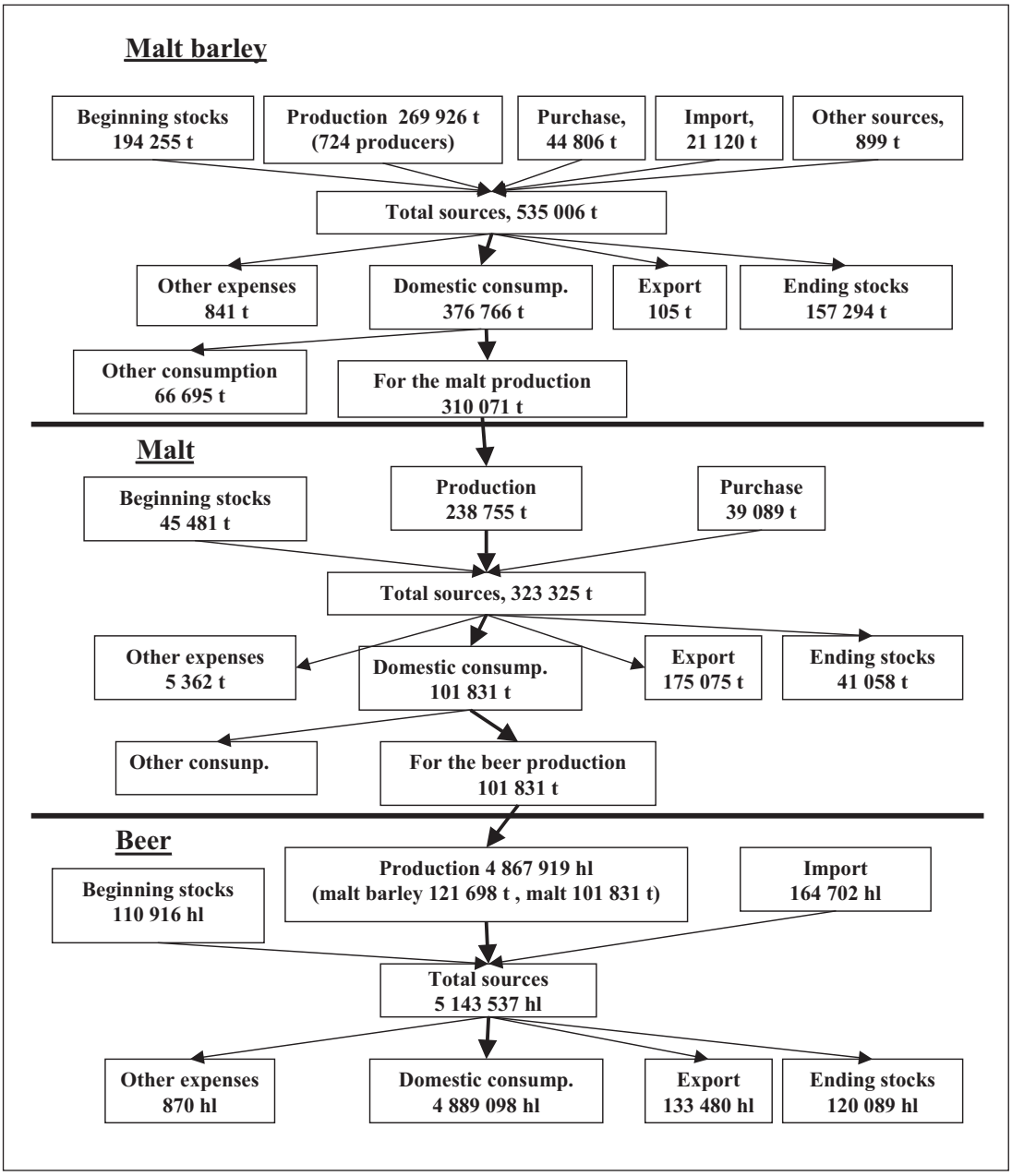


Figure 3.1 Overview of malt barley flows in 2003

3.2 Vertical coordination in the chain.

3.2.1 Evidence from farm interviews

- *Sample characteristics*

In 2003, 1198 farms produced malt barley. A sample of 12 farms was taken to investigate the relations in the malt barley vertical chain at the farm level. The sample consists of farms of different sizes, with (almost) each size category represented (see table 3.4). However, the larger farms (i.e. above 500 ha) are overrepresented in the sample. From the questionnaires it follows that the larger farms produce a higher percentage of barley as feed barley, mainly for their own cattle. The smaller farms seem to be more specifically oriented at the production of malt barley.

Generally speaking, the farmers are pretty well capable to produce the volumes and quality of barley intended for its usage (feed, food, malt barley) by using the appropriate seeds, fertilizers, plant protection material, etc. It was rarely seen that, despite sawn areas aimed in advance at particular targets, the sawn malt barley area was harvested as feed barley because it did not meet the quality criteria.

Table 3.4 Characteristics of the sample of malt barley farms

Malt barley								
Category of sown areas	Slovakia		Sample		Average ha per farm		Acreage in %	
	Nº of farms	000 ha	Nº of farms	ha	SR	Sample	SR	Sample
0.1 - 200	1005	60	4	625	60	156	46.7	10.4
201 - 300	101	26	0	0	255		20.0	0.0
301 - 500	71	28	3	1220	392	407	21.6	20.3
501 - 700	15	9	3	1838	618	613	7.2	30.6
> 701	6	6	2	2317	957	1159	4.5	38.6
Total	1198	129	12	6000	107	500	100.0	100.0

Source: Survey executed by RIAFE Bratislava and RIAFE Central Database

- *Contract partners, terms and main contract arrangements*

Malt barley producers' planting activities are generally based on contracts with malt industries and breweries. Contracts are mainly signed prior to the sowing period. The interviews show that all but one malt barley producer had a contract with a large processor to deliver a certain volume. The larger farmers typically had more than one buyer: most of them sold their harvest to more than one processor, yet some farmers also have contracts with traders and – in one occasion in the sample – with a large co-

operative farm. This indicates that farmers spread their marketing risks by searching for more than one contract partner.

Farmers give several reasons that play a role for drafting contracts with processors and traders as they did. Farmers appreciate contracts with counterparts they know already for quite some time. They traditionally sell part of their harvest to their regular costumers, in which they have trust and confidence. Other reasons for deals mentioned in the sample are the good offers by purchasers (in one third of the cases) and the vicinity of processors (in two occasions).

The interviews indicate that all business contracts with purchasers are negotiated and set up prior to the sowing period. Although farmers indicate that they appreciate long-term relations with processors, farmers usually set up contracts only for one year. In some cases, farmers are part of longer-term contracts, up to 3 years. Contracts typically include the quality criteria set by the processor or trader. The prices agreed in the contracts are related to the quality delivered: farmers are offered a basic price for a basic quality and receive premium for higher than basic quality levels. The purchaser does the product quality control, so for farmers it is a matter of trust that this is done properly and honestly. In case of conflict, the Central Control and Testing Institute (UKSUP) can be requested for an independent contra-expertise.

One third of the farmers in the sample have been requested by their purchaser to use a certain malt barley planting technology. The requests mainly refer to the use of specific seeds and varieties, as well as to use certain amounts of fertilizer and plant protection material. Often, the farmers are guided through extension provided by staff of the malt barley processing company during the season. In 5 out of the 12 cases, the purchaser of the malt barley indicated to the farmer from whom he had to buy his inputs. The reason for this system is to secure the supply of the volume and quality negotiated in the contract.

- *Support to primary producers*

Farmers in the sample have received support from the processors with which they had a contract to supply them with malt barley. The support is being provided in several forms (see Table 3.5 below) that can be summarized as follows:

  - Almost 60% of the farms received support for production and storage (post-harvest) of barley.

  - More than 40% of the farms received information, advice and extension to keep farmers updated with (the latest) developments in the malt barley

planting and cultivation techniques, as well as with respect to input use to improve the quality of the malt barley.

- More than 40% also got assistance in the purchasing of farm inputs. This is typically a form of (indirect) credit assistance. This can be done by directly delivering inputs such as seeds, pesticides and fertilizers to farms.

- Another form of credit assistance is through payments-in-advance, after the contract has been signed and the agreement on the quantity to be of delivered has been made. This occurred for 25% of the farms included in the sample.

Table 3.5 Farm assistance received by malt barley producing farms (sample of 12 farms)

Elements of a Farm Assistance Program	Share of farms receiving assistance (%)
Support concerning production and storage	58
Support concerning improving quality	42
Support concerning management	0
Provide credit	25
Support in receiving bank loans	0
Advice concerning investments	0
Support concerning purchase of farm inputs	42

Source: Survey executed by RIAFE Bratislava

The survey results indicate that according to farmers interviewed the processors do not seem to have explicitly formulated rules with respect to eligibility for support. Most important seems to be that there is a long-term relation between farm and processor and that the farm has shown to be a credible supplier in the past. The latter includes regular and high quality supply from the farm and correct contractual fulfillment in the past. The farms interviewed indicate that processors prefer to support the bigger suppliers with credits and pre-financing, as they have the most (secure) collateral. In addition, processors prefer their most well known suppliers above new ones.

3.2.2 Evidence from interviews with the malting and brewing industry

- *Sample characteristics*

The total number of breweries and malt processors in Slovak Republic is 12. The analysis here is based on interviews with 5 companies (almost half of the total) of which two are malt processors and 3 are breweries. Two of the breweries are among the largest breweries in Slovakia and have also own malt barley processing units.

The sample of processors is characterized by the data in table 3.6 below. The companies differ in size as well as in number of suppliers. One smaller company contracts only 81 farms, while a larger malting company works with 300 farms. The small malt processor produces 32 000 tons yearly, which is 13% of the total 2003 production. The large company in the sample produces more than half (160 000 tons) of the country's malt production.

Table 3.6 Sample of malting companies

Average of years 2001-03	Average	Min	Max
Number of malt barley suppliers*	176	81	300
Number of malt barley suppliers**	21	2	42

* to malt undertakings
** to breweries

Source: Survey executed by RIAFE Bratislava and RIAFE Central Database

The smallest malting/brewery company included in the sample supplies malting barley from only 2 farms. The largest beer producer in the sample, on the other hand, has a supply base of over 40 farmers. This brewery produces around one quarter (1.1 million hectoliter) of all Slovak beer.

- *Malt industry survey results*

Contract partners of the malt industry are individual farmers, corporate farms, malt traders, and also farm associations. Malt processors prefer to buy the raw material from farms who are relatively close to their processing unit. Furthermore, they prefer a wide range of supply (table 3.7).

Table 3.7 Contract partners of Slovak malt processors and breweries

Contracts partners	Malt company 1	Malt company 2	Brewery 1	Brewery 2	Brewery 3
Small farmers,	1		1		1
Large farmers	1	1	1		1
Corporate farms	2	1	2	1	2
Producer association	0	1	0	0	2
Intermediate traders	2	1	0	1	2

Source: Survey executed by RIAFE Bratislava

All contracts stressed the importance of the quality of supply and the production process, both controlled mostly by the purchaser (the malt processor). Farmers may check the results from that quality control process, if they want. Quality control takes place during the season (based on sampling of plants, soil, nutrition) and after harvest. Also

during storage at the farm and when the commodity is delivered at the processing unit, quality checks are taken in (see Table 3.8). If the farmer is not satisfied with the result of purchaser's control or for its own need want to have a quality check of his supply, an independent control body – the Central Control and Testing Institution, UKSUP – can become involved. Quality criteria are based on HACCP and enforced by the Food Law. Quality requirements may differ between companies but these differences are small. For delivered barley Slovak technical norms are used to measure the quality. Yet, some malt producers use stricter norms. The interviewed malt processors confirm the outcome of the farmers' survey that business contracts were negotiated (on quantity, quality requirements and price) before the planting season starts and that contracts were concluded mostly on a one-year basis. Usually the agreement is that the producer (farmer) is responsible for the transport of the raw material (barley) from farm to the processing unit. Malt undertakings requested planting discipline (such as the appropriate timing of the application of plant protection material and fertilizers, cultivation method, etcetera) and concrete inputs (pesticides, seeds, fertilizers).

The breweries indicated that their contract partners included bigger and smaller malt enterprises, corporate farms but also individually farmers (some of them also produce malt). Breweries did not report precise reasons for the choice of contract partner, yet they consider the quality and price of the raw material offered as most important. Generally, breweries indicated to have no specific requests related to input use.

Business contracts include agreements regarding the quality of the product delivered and the production process. Raw material control was carried out in line with contracts. The usual term of the contract was one year. Transport of malt barley or malt was provided by independent conveyors and by supplier facilities, too.

In cases of purchase or trading with barley, the general quality standards regulated by STN 46 1100-5 (and the Commission Regulation No. 824/2000 annex I) were anchored in commercial contracts between supplier and purchaser. Farmers must keep agronomic cards where used agrochemical substances (fertilizers and pesticides) are specified.

Table 3.8 Quality issues in contractual agreements

	Malt processor 1	Malt processor 2	Brewery 1	Brewery 2	Brewery 3
Explicit contractual agreement on quality	Yes	Yes	Yes	Yes	Yes
Public versus company specific quality standards	CSQS	CSQS	CSQS	CSQS	CSQS
Quality control point	1. at farm level, after harvest, before purchase, 2. external warehouse, at the time of holding, 3.the gateway to the processing company	1. at farm level, after harvest, before purchase, 2. external warehouse, at the time of holding, 3.the gateway to the processing company	1. at farm level, after harvest, before purchase, 2. external warehouse, at the time of holding, 3.the gateway to the processing company	1. at farm level, after harvest, before purchase, 2. external warehouse, at the time of holding, 3.the gateway to the processing company	1. at farm level, after harvest, before purchase, 2. external warehouse, at the time of holding, 3.the gateway to the processing company
Quality determined by processor	Yes	Yes	Yes	Yes	Yes
Quality determined by product or by production process	Both	Both	Both	both	Both
Involvement of public inspection (UKSUP)	Yes	Yes	Yes	Yes	Yes

Source: Survey executed by RIAFE Bratislava

- *Support to barley farms by malt processors and breweries*

Malt plants in Slovakia realize that the state of primary production is the key to the maintenance or increase of production of high quality malting barley and therefore stress long-term good relationships with primary producers. Part of that relationship is the offering of support to farmers. The elements of a farm assistance program applied by malt processors and breweries as indicated in the interviews are presented in table 3.9 below.

Table 3.9 Elements of Farm Assistance Programs offered by malt processors and breweries

Elements of a Farm Assistance Program	Malt processor 1	Malt processor 2	Brewery 1	Brewery 2	Brewery 3
Support to production and storage	X	X	X		
Support to improving quality	X	X	X		X
Support to management	X				
Credit provision	X	X	X		
Support in receiving bank loans (e.g. guarantee by the company)					
Advice on investments	X				
Support on purchase of farm inputs	X	X			

Note: 'X' means 'yes' or 'applicable to'

Source: Survey executed by RIAFE Bratislava

The findings, as summarized in table 3.9, are largely consistent with the conclusions from interviews with the barley farms.

- The most common assistance programs are to improve quality and to increase the volume of production and the quality of storage.

- Next in line are assistance programs to remove constraints of the farms in accessing quality inputs and credit.

The largest malt producer in Slovakia increasingly focuses on large suppliers and now excludes small producers of barley: only farmers that can deliver more than 100 metric tons of barley are allowed, because it is too costly to deal with many small suppliers. Currently around 200 farms deliver to the company with an average delivery of 1 000 – 1 500 metric tons of barley. The number of individual farms has been declining over time. Currently individual family farms form only 5% of all farms that deliver to them, 30% are joint stock or limited liability companies and around 65% are cooperatives.

3.3 Effects of vertical coordination

The impacts of vertical coordination on quality of the produce, production levels, yields and access to inputs are difficult to assess. The survey was limited to a small, rather ad random sample and may be not representative for the whole sector. The questions in the interviews were largely focused on how the present business relations were organized rather than on developments and consequences over time. However,

the preceding analysis may offer a number of conclusions on possible and plausible effects of the contractual relations.

3.3.1 Impact on quality and production

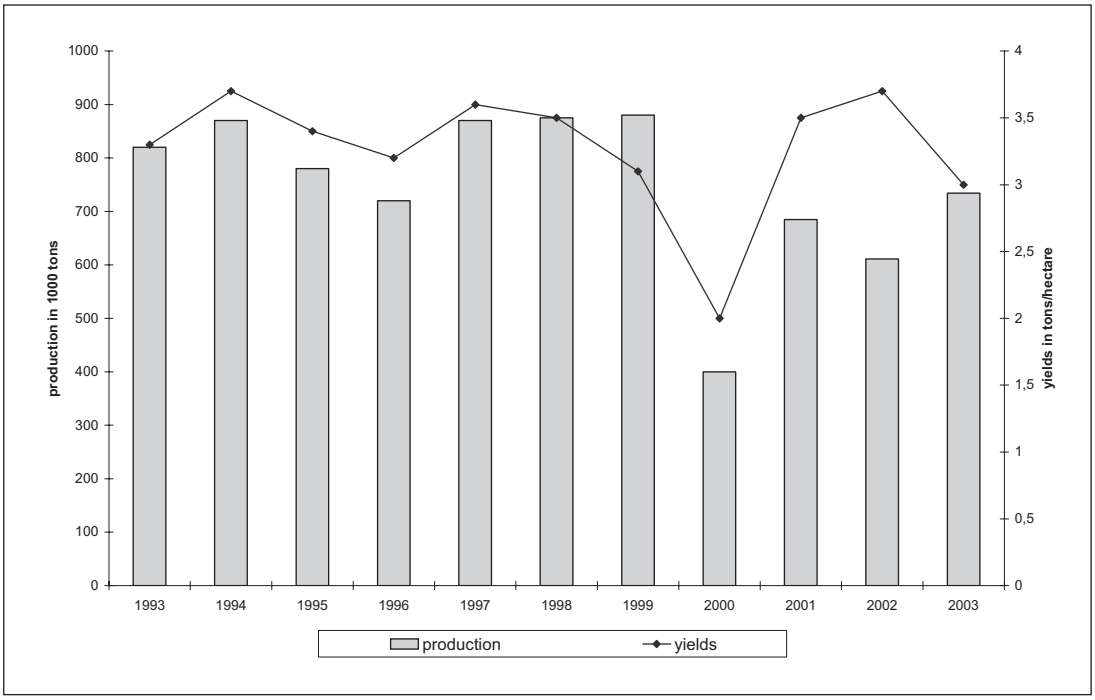
Nearly all malt barley production and trade is subject to contracts. Contracts typically include quality criteria set by traders and/or processors. Prices are related to the quality delivered: farmers are offered a basic price for a basic quality level and receive a premium for higher quality levels. This system has a positive impact on the general level of the quality supplied as it encourages the production of quality barley.

Malt barley has to comply with rather high and strict quality criteria, if the barley wants to be used for the production of beer. In fact, the quality levels with respect to barley are defined by the quality levels of beer. As a supplier of the raw material for that product the farming community has to comply with the quality conditions set by the breweries. The production of high quality beer has a rather long tradition in the Slovak Republic; Czechoslovakia used to produce top quality malt because of its suitable soil and climatic conditions. Due to the economic transition and restructuring the ownership of most breweries has changed as well as their markets. However, no significant changes in quality requirements have occurred since the restructuring of the industry and the inflow of FDI. Yet, there has been a move towards the use of foreign seeds of barley (Czech, Dutch), which was the result of requests by breweries and traders. Traders (67% of malt is exported) require malt from specific cultivars and thus decide which barley seeds a farmer should use if he wants to sell his produce for this purpose. There is still reliance on the Slovak and the Czech seeds but also a trend towards the use of international cultivars.

If the barley does not reach the quality needed for beer production, barley will be used as feed barley. In recent years, the beer industry showed an increasing demand for malt barley. The farming sector has been able to respond to that: despite the rather unfavourable climatic conditions (mainly drought) the production of good quality malt barley increased and the share of malt barley in the total cereals production increased from 8% in 2001 to 10.8% in 2003 or around 750 000 tons (see figure 3.2). Survey outcomes show that the 12 farms in the sample have been able to comply with the high quality criteria set by the breweries: the farms sold on average almost 90% of their barley production as malt barley in the period 2001-2003. This percentage has been rather constant over those years.

Yields and production are however subject to weather conditions through which their levels fluctuate from year to year. This also obscures the link between vertical coordination and production levels.

Figure 3.2 Barley (malt barley and feed) production and yields per ha, 1993-2003



However, some of the largest companies, such as Heineken, stated that primary producers who have contractual relationship with the company have higher barley yields than the Slovak average. This is illustrated by table 3.10. Partly it is due the fact that Heineken selects relatively better producers from the most productive regions but the company also argues that this is also partly due to the farm assistance applied by Heineken. This refers to the company's support and advice offered to it's supplying farmers in selecting the barley seed variety, plant nutrition and protection, advising in cultivation and harvest methods as well as in post-harvest treatment and storage.

Table 3.10 Comparison of average Slovak yields and average yields of primary producers delivering to Heineken Slovakia

Year	Yields in Slovakia	Yields in Heineken
1998	3.51	4.21
1999	3.06	4.13
2000	1.99	2.77
2001	3.49	4.88
2002	3.72	4.58
2003	3.02	3.67

Source: Heineken Slovensko Sladovne, a.s.

3.3.2 Impact on access to input markets

Barley farms and malt processors/breweries negotiate business contracts on quantity and price before the planting season starts.

Some of the farms are paid partly in advance for their supply. This provides them with liquid assets for buying seeds and other inputs. Credit provision through payments in advance can be an important service if own financial sources are scarce. For farms with limited access to loans or own liquidity, they would not be able to buy the inputs necessary to produce a high quality agricultural commodity. In that case the share of feed barley in the total quantity of barley produced would increase and share of malt barley would decrease. Contract farming thus seems to be providing easier access to credit for some malt barley farmers.

Processors provide technical advice to farmers. The reason for this support is that the processors have an interest in buying high quality raw material. Through guiding and advising farmers in aspects that influence the quality of the harvest, processors want to be assured of appropriate quality supplied. In offering their services, processors do not indicate that the public extension service falls short; it is more that the processors want to be sure that their quality requirements are met.

Processors state that farmers' eligibility to support is not subject to any explicit and/or generally formulated rule. The farmer has to show to be able to supply high quality malt barley on a regular basis. Correct contractual fulfillment adds to the credibility of the farmer and to the willingness of the processor to provide credits, payments in advance, inputs and other services to that farmer. The interviewees indicate to prefer bigger and well-known suppliers above small and new ones, but do not exclude the latter from any of their farm assistance program beforehand.

4. THE DAIRY CHAIN

4.1 Basic structure of the chain

The Slovak dairy sector consists of 1200 farms and more than 30 dairy processing companies.

A major feature of the Slovak dairy sector is that primary production takes place on large corporate farms (both joint stock and cooperatives): over 90% of milk production in Slovakia is produced on these large farms while individual farmers account for only a small proportion. Almost half of all dairy farms have a herd size between 100 and 500 cows. The national average of a dairy farm is 183 cows (see table 4.1).

The total dairy herd in Slovakia accounts for 220 500 dairy cows. This figure is around half of the number of cows at the start of transition. After an initial sharp decline in the first years after 1989, milk yields have turned around since 1991 and are above their pre-reform level since 1997. In 2003, yields are almost 50% higher than in 1989. However, Slovak milk yields are still about 18% below EU-15 average milk yields. In 2002, the average annual milk yield in Slovakia was 5010 kg/cow, compared to 6150 kg/cow/year in the EU15.

Table 4.1 Size structure of dairy farms in Slovakia in 2003

	No. of farms	No. of dairy cows	Average dairy cows per farm	% Dairy cows in category	Average yield per cow (kg/ year)
0-10	257	749	3	0.3	3563
11-30	91	1711	19	0.8	4553
31-50	51	2035	40	0.9	4161
51-100	159	12095	76	5.5	4098
101-500	547	129852	237	58.9	4962
>500	102	74097	726	33.6	5280
Total	1207	220540	183	100.0	5010

Source: Survey executed by RIAFE Bratislava and RIAFE Central Database

The majority of milk production in Slovakia is taking place on large-scale farms (co-operatives or enterprises). A 1999 representative survey (ACE) shows that only 10% of family farms have dairy cows and more than half of the milk produced in these farms is used for self-consumption. On the other hand, 81% of farming enterprises have dairy cows and 100% of this milk production is sold (of which, 87% directly to a dairy processing company).

Table 4.2 Structure of the Slovak dairy-processing sector, 2003

Company Name	Majority owner	FDI since	Market share*
Mliekospol, a.s.	95% Sole, Italy	2002	8%
Tamilk, a.s.	100% Sole, Italy	2001	4%
Sole Slovakia, a.s.	99% Sole, Italy	2001	4%
Rajo, a.s.	51% Meggle, Germany	1993	13%
Liptovska Mliekaren, a.s.	97% Bongrain, France	2000	6%
Zvolenska Mliekaren, a.s.	100% Bongrain, France	2001	4%
Milex Nové Mesto nad Vahom, a.s.	51% Co-operative (49% Bongrain, France)	2001	4%
Zempmilk, a.s.	91% Fromageries Bel, France	2000	7%
Prievidzska Mliekaren, a.s.	95% Artax, Austria	2000	4%
Milsy, a.s.	95% Artax, Austria	2001	4%
Nutricia Dairy, s.r.o.	100% Friesland, Netherlands	2000	4%
Laktis, a.s.	(9% Friesland, Netherlands)	2002	5%
Milex Galanta, a.s.	100% Amine Aour Middle Foods, Lebanon	2002	3%
Danone, s.r.o.	100% Danone, France	2000	1%
Senicka Mliekaren, a.s.	67% Co-operative		4%
Levicka Mliekaren, a.s.	Domestic		4%
Milkagro, s.r.o.	Domestic		4%
AGW Milk, a.s.	Domestic		3%
Humenska Mliekaren, a.s.	Domestic		4%
Gemerska Mliekaren, s.r.o.	Domestic		1%
Tatranska Mliekaren, a.s.	Domestic		2%
Tvrdosinska Mliekaren, s.r.o.	???		4%
Other			3%

* Estimate. Note: a.s. = corporation; s.r.o. = Limited Liability Company

Source: Dries and Noev, 2006 [5]

[5] Dries, L. and N. Noev, 2006, "A comparative analysis of vertical coordination in dairy chains in Poland, Slovakia and Bulgaria", in Swinnen, J. (ed.) *Case Studies on Vertical Coordination in Agri-Food Chains in Eastern Europe and Central Asia*, ECSSD Working Paper no. 42, The World Bank

The dairy processing sector is much less concentrated than the malting or brewery sector. Table 4.2 above lists the 22 main dairy processing companies in Slovakia, which together held about 97% market share in the beginning of 2003. The top three companies combined produce less than 30% of the total market.

There is considerable foreign investment in the dairy sector: eight different international dairy companies are present in the Slovak market: Sole, Italy; Meggle, Germany; Bongrain, Danone and Fromageries Bel, France; Artax, Austria; Friesland Coberco, Netherlands; and Amine Aour, Lebanon. A 2003 report of the Slovak Dairy Union showed that 77% of milk purchased in Slovakia was processed by foreign owned dairy companies (Agra Europe, April 2003).

Table 4.2 also shows that most of the foreign investments, with the exception of the entry of Meggle in 1993, have taken place since 2000. Compared to Poland and other CEECs, this is relatively late. The sudden attractiveness of Slovakia can at least partly be attributed to a shift in the political environment in the previous years, when after the 1998 elections the new government moved quickly to implement key reforms, creating a more attractive investment climate.

Figure 4.1 provides an overview of flows in the dairy sector. In 2003 dairy production was 1.1 million ton. Compared to other EU countries, Slovakia is a small dairy producer: its level of production is almost twice the Greek production, but significantly less than the production level in Portugal, while the EU (15) had a total milk production of 122.6 million ton in 2002. According to the statistics, 85% of all milk produces is sold for processing at 34 dairies in the country. Farm usage and direct sales account for almost 3% of the production, most of which is processed on the farm. Farm animal feed accounts for 5%. The rest (approximately 7%) of the milk production is distributed between other usage and waste and losses.

Imports of dairy products add up to less than 10% of total domestic production (in milk equivalents). Slovakia is a net-exporter of dairy products. Its export of around 300 000 ton of milk equals 25-30% of the domestic milk production. The milk is processed into various dairy products. The share of fluid milk products, butter and milk powder is, however, substantial, indicating that the domestic industry is processing mainly relative simple products.

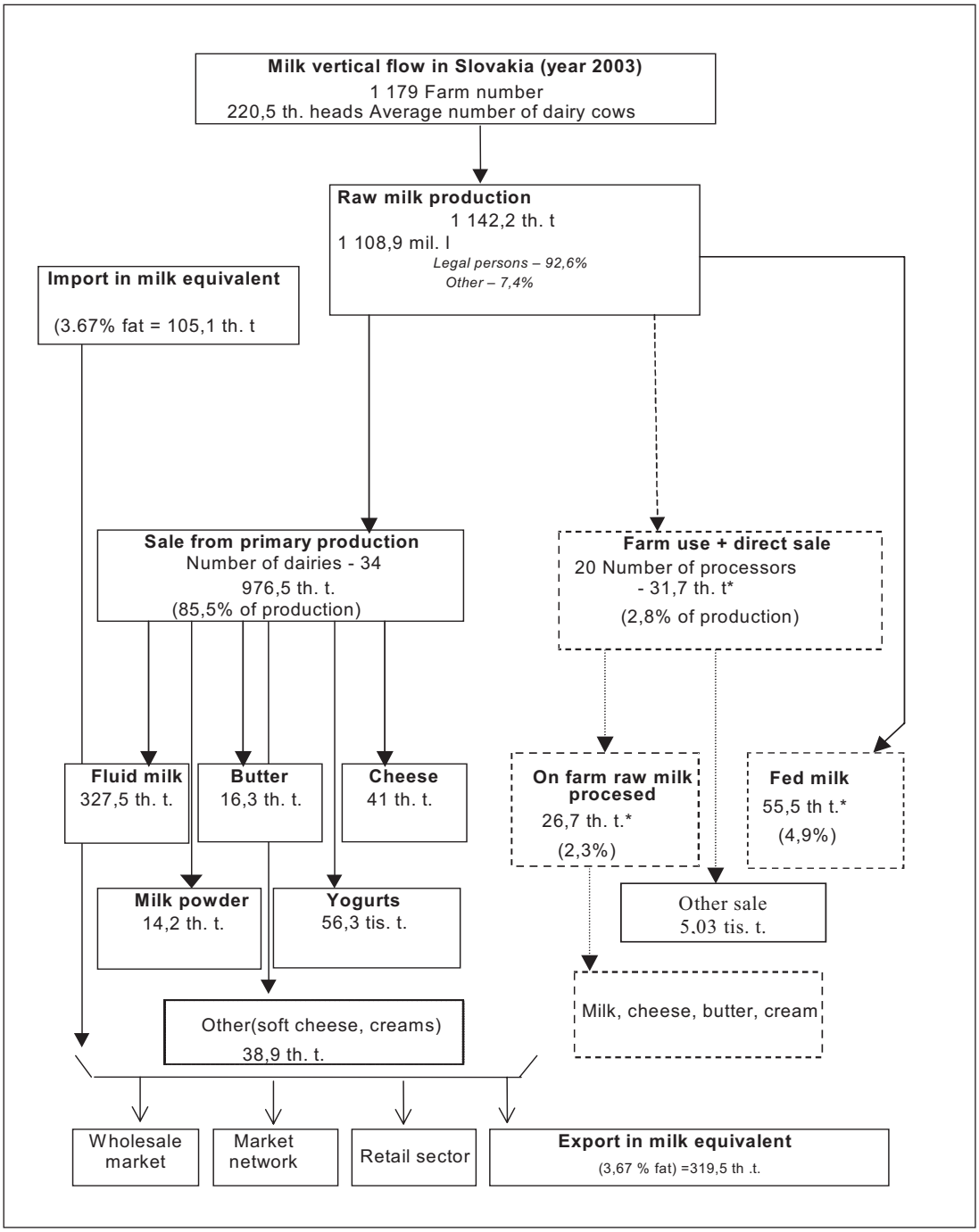


Figure 4.1 Overview of the Slovak milk sector and milk flows

4.2 Vertical coordination in the dairy chain

4.2.1 Evidence from farm interviews

- *Sample characteristics*

Vertical coordination within the milk vertical chain was investigated at the farm level, taking a sample of 9 farms. The table 4.3 below shows the features of the whole Slovak dairy farm sector and the sample. The 400 smaller dairy farms are not represented in our sample. These smaller farms - 25% of all farms - account for only 2% of the dairy cowherd. The sample consists of dairy farms with more than 50 dairy cows, in particular those with more than 500 cows. 14% of all dairy farms fit into the latter category.

Table 4.3 Structure of milk producers in Slovakia and survey sample

	N° of farms		N° of dairy cows		Average dairy cows per farm		% Dairy cows in category		Average yield per cow in l/year	
	SR	Sam-ple	SR	Sam-ple	SR	Sam-ple	SR	Sam-ple	SR	Sam-ple
0-10	257	0	749	0	3		0.3	0.0	3563	
11-30	91	0	1711	0	19		0.8	0.0	4553	
31-50	51	0	2035	0	40		0.9	0.0	4161	
51-100	159	1	12095	64	76	64	5.5	1.0	4098	6044
101-500	547	1	129852	369	237	369	58.9	5.8	4962	6860
>500	102	7	74097	5903	726	843	33.6	93.2	5280	5603
Total	1207	9	220540	6337	183	704	100.0	100.0	5010	5680

Source: Survey executed by RIAFE Bratislava and RIAFE Central Database

There were no individual farms in the survey. The sampled farms were co-operative farms (7 out of 9) and limited liability companies (2). The smallest dairy farm had 64 cows and 28 employees (or 2.3 cow/employee), while the largest farm recorded 1619 dairy cows and 295 employees (5.7 cow/employee). Compared to West-European standards dairy farming is relative labour intensive in Slovak. Average yields per cow on the farms interviewed ranged between 4270 and 7020 kg/cow/year. For comparison: the average yield in EU-15 is 6150 kg/cow/year, with some countries having a national average of more than 7500 kg/cow/year.

Annual milk production in the sample varied widely from 290 000 liters to 11.1 million litres per farm, while sales to dairies varied from 250 000 liters to 10.2 million liters

per farm. The difference between production and sales figures are largely due to feed consumption on the own farm. Direct sales were negligible in all cases.

Dairy farms normally deliver their milk to one dairy processor. However, in our sample one dairy farm sold the milk to two purchasers.

After the period of decline, investments have increased, especially since 2001. Investments were largely due to farms' preparations for EU membership as they were related to issue aimed at improving the hygienic situation at farms and were responding to veterinary and phytosanitary requests, following the implementation of the Acquis.

Farms have been assisted in these investments through the SAPARD Fund of the EU. Survey responses indicate that the average dairy farm investments accounted for approximately 776 000 Euro in 2003 (using the exchange rate 41.5 SKK/€), with the larger farms investing up to 4 million Euro. Based on these figures the average investment per cow would be 4240 Euro, what is very high number in the Slovak context. Again, one has to note that the farms in the sample include are largely in the category of the largest dairy farms in the country, so these figures should be interpreted carefully.

- *Contracts and contract partners*

All interviewed farms have contracts to deliver raw milk to dairies. The contracts were all in written form. Contracts were mostly (7 farms) enclosed with processors. In the sample, only one farm sold milk through a trader. All farms are satisfied with the chosen form of their contract as they consider having a good collaboration with the dairies and negotiated appropriate terms of payment. Contracts normally last for one year and are not renewed automatically. Contracts are renegotiated for every prolongation.

All farms in the sample have explicitly defined agreements on the quality of raw milk (Based on the Standard STN 570529). General quality standards are applied to all farms in the sample, with reference to fat and protein content. The quality control system is important. The processors and the farmers control quality of the milk (half-and-half). The results can be checked also by independent third parties as the State Veterinary Institute or the Central Testing Laboratory Milex Progress a.s. The quality control is generally tested on the farm as a sampling (7 cases) and only in 2 cases at the processor plants. In addition, in 7 cases the processing process is determined by quality agreements and only 2 farms expressed that clients of the company set the requirements.

In 2 farms, quality requirements refer only to raw material. However, the prevailing number of farms also had to comply with quality standards with respect to the production process and quality controlled according to HACCP rules.

The quota regime is valid for all Slovak dairy farms; all dairy farms have a production quota. In addition, 8 responders have explicit agreements on the delivery volumes in the contracts with the processor. One farm reported that he has no agreement of this kind, but also has a milk quota, which is fully accepted by the dairy. There are also explicit agreements on delivery prices in contracts. One farm has pricing implied by the actual quality on delivery. Other farms have no specification for the price regarding to the milk quality explicitly in the contract, but they also receive premium when they deliver higher than the basic milk quality level.

- *Support of primary production*

The dairies provide for logistical support, collecting the milk. One case in our sample indicates that the farm and the processor share the responsibility for the transport of the milk from the farm to the processing unit.

From the farm survey it appeared that most dairy farms did not receive support from the dairy processor. In fact, only two farms received any support program (see table 4.4 below).

Table 4.4 Elements of a Farm Assistance Program

	Share of farms receiving assistance (%)
Support concerning production and storage	11
Support concerning improving quality	22
Provide credit by your company	11
Support concerning purchase of farm inputs	11

Source: Survey executed by RIAFE Bratislava

While half of the number of farms interviewed expressed that dairies call for requirements with respect to the use of certain inputs, such as compound feed, only one farm stated that input purchases was being pre-financed by the dairy. That was a large farm with over 1000 dairy cows, the highest yield per cow of all farms included in the sample and the highest milk delivery to dairies.

The other support elements were also offered to the farm with the highest yield per cow (7020 kg/year) and to the farm with the highest number of dairy cows, which had second highest delivery to the dairy (1619 heads and 6.7 million liters per year) in the sample. The latter farm had the lowest yield per cow and was investing in dairy cows.

Dairy companies offering this support indicate that they do not apply specific conditions to farmers in offering their assistance program.[6]

4.2.2 Evidence from dairy company interviews

The sample of dairies consists of 9 companies. These dairy companies represent 30% of all high capacity dairies.

Table 4.5 Characteristics of the sample of dairies

Indicator	2001	2002	2003	Min. 2003	max. 2003
Turnover in mil. SKK	776	831	895	835	1170
Number of employees	182	211	225	103	402
Milk processed (million litres)	46	49	42	16	82
Processing capacity (million litres)	57	57	58	21	110
Number of suppliers	31	34	41	7	91

Source: Survey executed by RIAFE Bratislava

Dairies in the sample differ considerably in size, but all companies interviewed belong to the larger dairies in the country. The overall average processing capacity of the dairies in the sample was 58 million liters in 2003 (see table 4.5) while the average capacity in Slovakia was 48.7 million liters. Milk processed by the dairies in the sample was 42 million liters on average in 2003, where the national level was 29.5 million liters per dairy. The sample records an average capacity utilization of 72%, against an overall capacity utilization of 61% in the Slovak dairy companies.

- *Contracts and contract partners*

Out of the 9 dairies in our sample, 6 had drafted contracts with individual farmers in combination with corporate farms. Contracts are in written form. Different from what came out of the interviews with dairy farms, dairies indicated that 50% of their contracts had a long-term validity (4–5 years), while the other half considered of 1-year contracts. This is somewhat different from the findings of the farm survey and may suggest that larger dairies may use longer term contracts.

Regarding the farm size, dairies show a preference for the larger farms. The preference is based on the idea that large suppliers are more reliable as a regular supplier than small dairy farms. Furthermore, the larger farms are considered stronger economic

[6] Important to note here is that the dairy sector survey consists of two independent samples: one contains 9 farms and the second 9 dairies. The basic idea was to follow the way of milk from farms to dairies, but that appeared to be impossible due to a lack of cooperation with dairies. It means that on the basis of this survey we are not able to answer the question which dairy provided assistance to the two farms included in the table above.

units, having property (land, dairy cows, buildings) while their size assures lower transaction costs due to relatively high volumes that can be loaded at once.

It is important to note that one dairy started collaboration with a producer association. This association represent a group of small suppliers. Membership in a producer association is important for small individual farmers to become attractive to dairies.

Other agreements in the contract mainly refer to quality. All dairies in the sample exactly defined raw milk quality requirements in the agreements (see table 4.6). The majority of them (90%) applied general (public) quality standards (e.g. casein proteins, anaerobic bacterium – SAP). Quality control is important and is controlled by dairies while a third independent party may check the results. Quality control is generally tested on the farm as a sampling (3 cases) and in combination with the control at the gate of the dairy plant (5 cases). Usually the processor determines the quality criteria and sets the agreement on this issue. Only 1 dairy answered that clients of the company set the requirements.

In four dairies, quality requirements refer only to the raw material, while in the 5 other dairies in the sample quality requirements were also set with respect to the production process of raw milk. Quality in dairy processing is guarded by the HACCP system, by daily intra-operational controls and prevention measures. Supervision of the quality control of milk and dairy products at the farm and processor level is carried out by the SVFA (State Veterinary and Food Administration) SR (branch office in respective region) and in a case of processors - the Central Testing Laboratory (in Žilina) and the dairies' own laboratories. These institutions carry out inspections randomly and in the own laboratories almost daily.

The contracts consist of explicit agreements on the volumes of delivery (1 dairy was not willing to answer). Agreements on pricing are explicitly expressed in contracts, but eventual payment depends on the actual quality upon delivery while prices are negotiated regularly, sometimes weekly. In seven cases processors provided logistics. One dairy shares the logistics responsibilities with the farm. An independent carrier was used in some cases.

Generally, when contracts expire they are not renewed automatically (with the exception of only one dairy) and new negotiations take place.

Only one dairy indicated that it calls for requirements with respect to the use of inputs. This dairy recommends his supplying farmers to purchase certified inputs. The dairy offers to pre-finance these inputs in exchange of raw milk delivery.

Table 4.6 Quality issues in contractual agreements

	Dairy 1	Dairy 2	Dairy 3	Dairy 4	Dairy 5	Dairy 6	Dairy 7	Dairy 8	Dairy 9
Explicit contractual agreement on quality	YES	YES	YES	YES	YES	YES	YES	YES	YES
Public versus company specific quality standards	Public	public	public	Public	public	public	public	public	public
Who controls the quality	Processor	Independent laboratory, and processor,	supplier and processsor, independent labora-tory	Independent laboratory, and processor	Processor	Independent laboratory and processor	Processor	Processor	Independent laboratory and processor
Quality control point	on farm take off and pro-cessor's laboratory analysis	on farm take off and processor's laboratory analysis, twice a month reference laboratory results	on farm take off, procesor's labora-tory analysis, twice a month reference laboratory results	on farm take off and processor's laboratory analysis, reference labora-tory results	on farm take off and processor's laboratory analysis	on farm take off and processor's laboratory analysis, twice a month reference laboratory results	On farm take off and processor's laboratory analysis	on farm take off and processor's laboratory analysis	on farm take off and processor's laboratory analysis, reference labora-tory results
Quality determined by processor/client	Pro-cessor	Pro-cessor	Pro-cessor	Pro-cessor	client	Client	Pro-cessor	Pro-cessor	Pro-cessor
Quality determined by product or by production process	Pro-duc-tion pro-cess	prod-uct	Both	Both	both	Prod-uct	Both	both	Both
Involvement of public inspection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Survey executed by RIAFE Bratislava

- *Support to dairy farms*

The majority of dairies in the sample apply some form of assistance to their suppliers (see table 4.7). Two dairies support farm investments (technology, quality control, milking and cooling equipment) with a maximum limit per farm. Other dairies provide assistance programs to farmers including the pre-financing of inputs purchased or bank loan guarantees. These programs are applied selectively to their large suppliers delivering high quality milk, In competition for milk some dairies offer shorter payment periods and quality price premiums to their best suppliers. One dairy (of which the size is above the sample average) answered positive to all the questions on support as an expression of high interest in its suppliers and their economic viability. The owners of the dairy were legal but also individual persons.

Table 4.7 Elements of the Farm Assistance Program

	Share of dairies in the sample offering the assistance (%)
Support concerning production and storage	22
Support concerning improving quality	78
Support concerning management	44
Provide credit by your company	44
Support in receiving bank loans (e.g. guarantee by your company)	22
Advice concerning investments	22
Support concerning purchase of farm inputs	22

Source: Survey executed by RIAFE Bratislava

The type of support most frequently offered relates to quality improvements (see table 4.7). Dairies expressed no specific condition to which farm they offer such support.

4.3 Effects of vertical coordination

As argued in the case of malt barley, the impacts of vertical coordination are difficult to assess as the survey was limited and focused on the present relations rather than on developments over time. Yet, there are developments in the dairy supply chain that indicate to plausible effects of vertical relations.

Impact on quality, production and yields

There are indications that the quality of milk produced by Slovak farms has improved in recent years. For instance, the share of milk in the highest quality classes (class Q

and class I. – according to Slovak quality standard) has increased from an already satisfactory level in the late 1990s up to 95% of all milk delivered belonging to Class Q and I (see Table 4.8). Milk of that quality is of acceptable quality according to EU standards.

Quality of milk is not considered a major problem in the milk sector anymore, although there is still scope for improvement.[7] In recent years, dairies invested a lot in new technologies to improve their production efficiency as well as to improve their production facilities in order to comply with EU quality standards and market distribution requirements. This had major results. Following a Spring 2004 investigation by the EU and Slovak Veterinary and Food Inspection in dairies on requirements and standards fulfillment all high capacity dairies are certified to export into the EU market. These larger companies have a production capacity of 1.5 million ton. Low capacity dairies (with less than 2 million litres/year production capacity), however, can release their product only on the domestic market, and are assumed to be leave the business soon as they are not expected to be able to invest in facilities to meet the hygienic and quality criteria necessary to serve foreign nor domestic markets in the near future.

[7] For instance, according to results of controls conducted by the SVFA in 2003, 6.7% of milk samples and dairy products did not meet the quality requirements, mostly in microbiological indicators.

Table 4.8 Quality of milk deliveries to the six Slovak dairy companies

		Q-class	1st class	2nd class	3rd class	Unstd.
Liptovska	1995	-	-	-	-	-
	1997	75%	25%	-	-	-
	2000	80%	20%	-	-	-
	2003	80%	20%	-	-	-
Mliekospol	1995	-	-	-	-	-
	1997	50%	43%	-	-	7%
	2000	55%	48%	-	-	2%
	2003	55%	48%	-	-	2%
Rajo	1995	-	-	-	-	-
	1997	-	-	-	-	-
	2000	-	-	-	-	-
	2003	98%				2%
Levicka	1995	96-98%				2-4%
	1997	96-98%				2-4%
	2000	96-98%				2-4%
	2003	98%				2%
Tatranska	1995	20.4	28.7	38.6		12.3
	1997	-	-	-	-	-
	2000	59.7	28.2	6.4		5.7
	2003	55	42			4
Nutricia Dairy	1995	-	-	-	-	-
	1997	-	-	-	-	-
	2000	70%	28%	-	-	2%
	2003	70%	28%	-	-	2%

Remarks: Tatranska used the 2nd / 3rd quality classification system until 2002. Other dairies stopped reporting these quality classes since they obtained an EU export license. Milk of lower quality than Q or 1st class is classified as unstandardised milk. Q and 1st quality milk is of acceptable quality according to EU standards.

Source: Dries and Swinnen, 2004

Milk production in Slovakia has decreased by around 15% over the period 1993-2001 (see figure 4.2). This is mainly due to the strong decline in the number of animals at farms, which is in 2003 only 40% of the 1989 herd. However, yields have increased significantly already since 1993, indicating that farms have been investing in yield-increasing measures (better feed, better genetics, etc.) already soon after the economic transition started off.

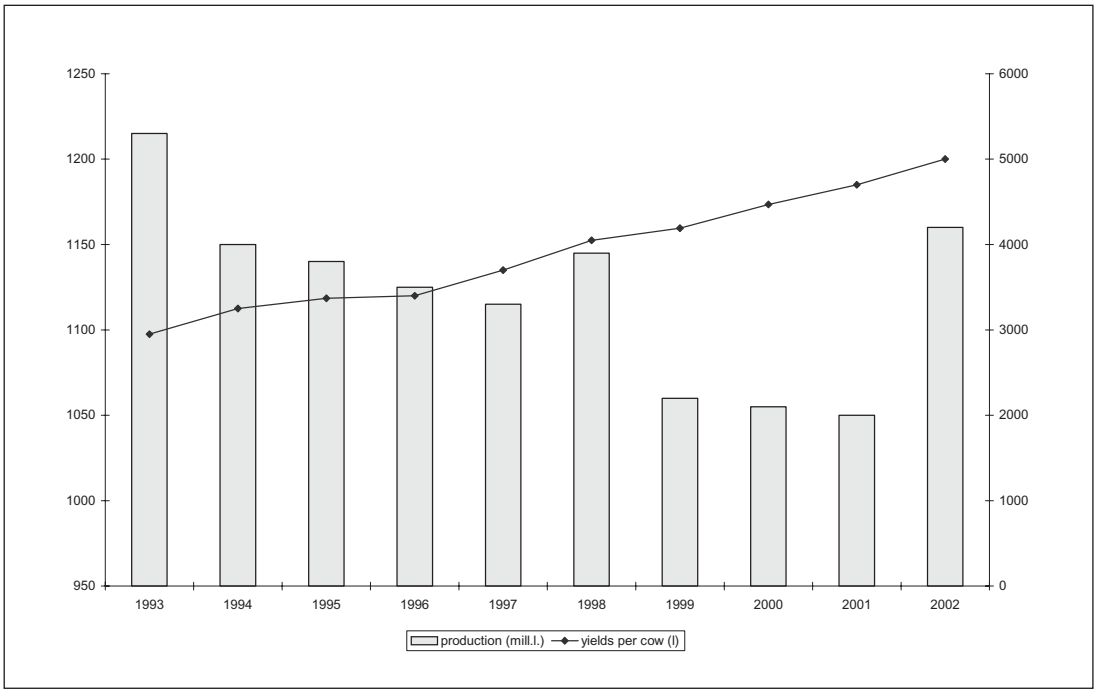


Figure 4.2 Dairy production and yields developments, 1993-2002

Access to input and output markets

Few dairy farmers receive credits or pre-payments to finance input purchases. Farms usually buy these inputs from their own sources. In our sample only one farm reported that he used this form of assistance. So it seems that access to inputs is not hindered by a lack of financial means. However, the dairy farms included in this survey are large farms, which may affect this outcome.

Processors provide technical advice to farmers. Processors do not indicate that the public extension service falls short. Their interest in providing this service by themselves to their suppliers is to assure that farmers provide them with raw material that complies with the quality requirements they have set.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

Based on the results of the survey and the analyses of the interviews a number of general conclusions can be drawn. Following these conclusions, a number of government policy recommendations are formulated

5.1 General conclusions

Vertical coordination has become an important phenomenon in the Slovak agri-food chain. As in other countries in Central and Eastern Europe vertical coordination between farms and agribusiness companies has grown strongly in recent years. The growth of vertical coordination and contracting between Slovak farms and the agribusiness companies is illustrated in this report by the brewery-malting-barley chain and the dairy chain. Both chains differ strongly in product and processing characteristics. Yet, *in both chains almost the whole sector is based on supply contracts including (elements of) farm assistance.*

The process of vertical coordination in Slovakia and its effects differ from many other European countries because of the size of the farm structure and the processing sector. With an average size of 349 ha per farm, Slovak agriculture is more large-scale than in many other countries. Co-operatives and commercial companies are 20% of all farms, using 80% of the agricultural land. Even the average size of family farms (39 ha) is large compared to the average EU-15 farm size. In contrast, the food industry in Slovakia is still relatively fragmented, although a concentration process is going on in some sectors, such as in dairy, meat and beverages. The input market is also rather fragmented, although some companies operate as local monopolies.

In combination, *the relatively large size structure of the farms and the relatively more fragmented processing sector makes that the farms have a relatively strong bargaining power in Slovakia vis-à-vis the processing sector, compared to other European countries*, although this conclusion may differ substantially between commodity chains. For example, the bargaining relationship in the dairy chain appears much stronger for the farms than in the barley-malt-brewery chain.

Effects of vertical coordination have been positive. Investments in new processing technologies, improved hygiene conditions at factory and farm level, etc. have further improved the quality of Slovak milk deliveries. Milk yields per cow have shown a rather quick increase since 1993. Vertical coordination has contributed to these positive developments, while the inflow of FDI into the dairy processing sector has brought in the necessary capital for restructuring and modernisation. Also in the barley-malting-brewery chain, there are indications that farm assistance programs result in higher

(than average) yields. For farms with limited access to credits, contracts in which pre-financing of input use and payment-in-advance are included are considered important ways of providing malt barley farmers easier access to credit.

5.2 Implications for public policy actions

A series of key messages and policy implications that come out of our report and which seem most relevant for Slovakia are addressed below.

First, *the most important policy implication of this study is the recognition of this phenomenon* and the *need to explicitly integrate supply chain developments into policy thinking and program strategies.* One of the key findings of another World Bank study on vertical coordination in the whole transition region is that vertical coordination is much more important and widespread than generally recognized. This conclusion is consistent with the findings of this study on Slovakia. Policies in Slovakia, as in many other East European countries, have in general not integrated this structural development so far.

Second, *continuing and reinforcing the macro-economic and regulatory policy environment, which stimulates investment and restructuring.* These conditions are important for supplier assistance programs or chain-based finance. This is less of an issue in Slovakia today since Slovak policies have been very successful in this area over the past years and part of these policies are now imbedded in EU policies. However, it was an important constraint in Slovakia before 2000 and it is important to keep this in mind. Since vertical coordination is importantly a financial activity, macro-economic and regulatory instability may undermine contract enforcement.

Third, *enforcing competition* is crucial for efficiency and for a fair distribution of rents between farms and processors. In some sectors, such as the malting and brewing sector some companies have dominant market positions and influence the contract terms. Competition induces better contract terms for suppliers (or buyers who face monopolistic suppliers) and constrains rent extraction.

Fourth, *empowering farms* dealing with highly concentrated processors or retailers can be done through a variety of policies. Policies include stimulating farmers associations, investing in institutions for (independent) quality and safety control and certification, competition and trade policy, institutions to assist farms with contract negotiations and dispute settlements, encourage alternatives in input and output markets.

Fifth, *rethinking the role of the government and policy-making* includes the following issues:

- *Policy analysis and information gathering.* Policy analysis is complicated by the emergence of vertical coordination. Traditional instruments of information collection do not include information on vertical coordination.

- *Rethinking traditional public investments.* Traditional areas of public investment such as research and extension, market information systems, quality control, veterinary services and animal surveillance programs need to take into account the role, which vertical coordination plays in these areas.

- *Public–private partnerships: consider supply chains part of the solution, not the problem*. Focus on collaborations between public authorities, non-governmental organizations, and private companies. For example, in some EU countries, public support to supply chain development is through targeted programs, in which the public knowledge system and the agri-food sector cooperate on issues as organization and management of supply chain networks. See Box 1 for a specific example from the Netherlands on how the government has organized such activities.

Box 1: The Agri-chain Competence Centre (ACC)
How Dutch government policies enhance competitiveness of the agri-food chain[8]

Saturated food markets and increased vertical coordination between partners in the food chain led to important changes in Dutch government policies to stimulate agricultural development in the 1990s. The new policies are much more focused on facilitating investments in quality and new market perspectives, with a shift in policy focus from the primary sector towards other actors in the agri-food supply chain.

Government actions mainly concentrate on the development and transfer of innovative knowledge, both 'hard' technological knowledge, and 'soft' knowledge about organisation and managing supply chain networks.

An important instrument is the **Agri-chain Competence Centre (ACC),** which stimulates public-private partnerships between agribusiness, research institutes and public organizations. The ACC is a joint venture between the Ministry of Agriculture, Nature Management and Fisheries, the Wageningen Agricultural University and members of the Dutch agribusiness community. The ACC mission is to identify and disseminate best agri-food chain development practices and provide opportunities for the Dutch agribusiness community to realise cooperation among each other, share knowledge and encourage market-oriented initiatives of partners in the agri-food supply chain.[9]

The main focus of Centre is to stimulate the development and utilisation of supply chain knowledge among all partners in the agri-food chain. Agri-businesses, knowledge institutions and public organizations collaborate and share knowledge through the ACC about possible strategic alliances and benefits of cooperation and of building supply chain networks.

The ACC organizes the financing for projects that comply with the objectives and disseminates experience and knowledge. The public-private alliances works with contracts in which the partners agree to cooperate for a common objective. Contributions and risks are shared via co-financing. Government involvement is partly through the allocation of risk capital and through the public knowledge system.

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8 Source: Van Berkum, S., 2005, "How Dutch government policies enhance competitiveness of the agri-food sector", *Economics of Agriculture*, special issue on Vertical Coordination in the Slovak Agriculture, Autumn 2005

9 See the ACC website for more details on their programs and projects: www.akk.nl. For international activities ACC see www.ak-acc.org.

The public research institutes contribute by developing and testing new technologies, tools, models, and instruments to improve the performance of the supply chain. The private firms gets enhanced access to this knowledge.
Since the start in 1994 many projects have been executed. Its five-year programs are budgeted at 100 million euro, of which 60 million euro is public money and 40 million is co-financed by businesses. Between 1999 and 2004 special attention was given to the link between chain development, logistics and ICT. The current focus of ACC activities are on themes as sustainable agri-food chains, organic supply chains, international competitiveness, food safety and internationalization.