Procurement strategies of the German dairy sector: Empirical evidence on contract design between dairies and their agricultural suppliers

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Executive Summary

The aim of the following study is to examine the business relationship between the dairy industry and dairy farmers in North-Western Germany, particularly with respect to negotiating the conditions of milk supply (contracting parameters) after the quota expiry in 2015. Therefore, a farm survey with 161 personal interviews distinguishes two aspects: What are the attitudes of German dairy farmers towards contracting? What are farmers' preferences for the contract attributes pricing, volume regulation, contract duration, and intensity of the settlement? These questions are analyzed by means of uni- and bivarate statistics.

Although long-term and stable business relationships are typical in the industry, milk suppliers' have a preference for entrepreneurial freedom and independence. In general, dairy farmers prefer contracts without volume controls, i.e. flexibility concerning production volumes. The maximum length of contract terms is two years. Hence, current durations can be maintained in future contracts. Farmers strongly reject the cooperative price setting due to a perceived lack of control. They favor (frequent) price negotiations or the application of a reference price. Furthermore, there are relationships between farmers' attitudes and preferences for contract attributes. Dairy processors should consider their suppliers' attitudes, if they want to raise their acceptance for new contract systems. In addition, it is important that contracts between dairies and farmers match their respective goals. Moreover, contract systems should go well together with the dairies' supply management concept (Spiller 2009a).

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Abstract

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Key words: Procurement, Contract Design, Dairy Industry, Supplier Relations, Supply Chain Management

Introduction

The German dairy industry faces an outstanding challenge for the years to come: Currently, the volume of milk produced is limited by the so-called milk quota scheme, a quantitative ceiling that milk producers within the European Union (EU) are not allowed to exceed. Although certain lobby groups (e. g. the German Federal Dairy Farmers Association BDM) request the maintenance of the quota scheme, it is very likely to expire in 2015 (European Commission 2008; Fahlbusch et al. 2009).

Up to now, the quota system has granted a certain planning reliability for dairies and farmers alike, which will fall when the quota is abolished. The dairy industry thus needs to establish new contract systems in order to control the amount of supplied milk, which might increase considerably after 2015 (Isermeyer 2007; Isermeyer et al. 2006).

60-70 % of all German milk is purchased and processed by dairy cooperatives. The abolition of the quota would mean a notable change for them. Due to the cooperative law they are – in contrast to private dairies –contractually obliged to accept the whole amount of milk delivered by their members (Gyau, Spiller, and Wocken 2008). Nevertheless, the changes brought about by the liberalization of the milk market challenge the German dairy sector as a whole. Cooperatives as well as privately owned dairies are well advised to develop procurement strategies for the time after the quota exit at an early stage in order to assure their raw material supply (Buschendorf 2008).

So far, the business relationship between dairies and their agricultural suppliers has been characterized by multiannual contracts (Wocken and Spiller 2009). Nevertheless, a survey of the University Goettingen revealed already in the year 2006 that German dairy farmers assessed the relationship with their processors as “rather problematic” (Schulze, Wocken, and Spiller 2006). Current developments among a rising number of dairy farmers, e. g. the increasing willingness to join producer organizations, the frustration with their dairy cooperatives and particularly the milk strike in the summer of 2008, when thousands of farmers stopped delivering their milk for more than two weeks, emphasize the lack of confidence between the partners in the dairy supply chain (Spiller 2009a). However, trust is a decisive factor in business interactions between German dairies and their suppliers (Schulze, Wocken, and Spiller 2006). It further points to the importance of taking the opinion of agricultural suppliers into account whenever new sourcing strategies are discussed. Thus, enhancing the business relationship quality in the dairy sector

would be desirable, because it facilitates the establishment of new, sustainable contract systems in the industry.

The aim of the following study is to examine how the business relationship between the dairy industry and dairy farmers in North-Western Germany might develop after 2015, particularly with respect to negotiating the conditions of milk supply (contracting parameters) after the quota exit. Therefore, our farm survey distinguishes two aspects: What are the attitudes of German dairy farmers towards contracting? Do these attitudes influence farmers' preferences towards the contract attributes pricing, volume regulation, contract duration, and intensity of the settlement? These questions are analyzed by means of uni- and bivarate statistics. Hence, the study provides insights in agricultural contracting from the viewpoint of behavioral science. Furthermore, we provide farmers' opinions on important contract attributes. They can be used to negotiate future contracts at an early stage. Milk processors have the opportunity to design contracts that match their procurement strategies as well as their suppliers' wishes.

First of all, an overview of the European Dairy market is presented. After a brief introduction into the functioning of the European quota system, we provide information about the German dairy sector and the status quo of sourcing strategies in the industry. Next, an overview of the state of the art on agricultural contracting in general and in the dairy industry in particular will be given. Subsequently we present the methodology, sample and results of our farm survey. The paper concludes with some ideas on matching marketing contracts with dairies' sourcing strategies after the quota exit.

The Dairy market

The European milk quota

The common organization of the market (CMO) in milk and milk products was established in 1964. With the Agenda 2000-reform of the Common Agricultural Policy (CAP) in 1999, it was substituted by Regulation (EC) No 1255/1999. It comprises several specific market instruments for dairy products, such as the public intervention, private storage, export refunds, internal disposal aids, tariffs and the milk quota (European Commission 2002).

The European milk quota system was established in April 1984 (Downs 1991). Its latest legal foundation is Regulation (EC) No 1256/99 (Official Journal of the European Communities 1999).

The introduction of the quota system became necessary, because at the end of the 1970s the milk production in the European Union exceeded the demand for dairy products by far (European Commission 2002). Based on historic production volumes, quotas were set for each member state (Downs 1991). These production ceilings restricted the production of each member state to its national guaranteed quantity.

The production volume of a farm is limited to the sum of the milk quota assigned in 1984 (minus obligatory quota reductions) together with subsequent milk quota purchases. Expansion of the milk production is only possible by buying or leasing quota (Bergevoet 2005), i.e. growth of the dairy production is associated with relatively high costs for obtaining quota (Isermeyer 2007). Due to the introduction of milk quota exchanges in some member states, the tradability of quota became more flexible over time (Jongeneel and Tonini 2008). A decisive feature of the quota system was the super levy, a direct financial penalty on individual producers exceeding quotas (Downs 1991). Introducing the milk quota with the super levy system in 1984 implied that each producer got a farm specific quota (Jongeneel and Tonini 2008). Due to the high level of the super levy any production exceeding the admissible quota is unattractive for farmers (European Commission 2006; Jongeneel and Tonini 2008).

The initial total guaranteed quantity of the European Union added up to 103.7 million t in 1984, which exceeded domestic consumption (European Commission 2002). Therefore, the limited milk production was evaluated as unsuitable to solve the EU's surplus problems. That is why further quota reductions took place in the following years (Jongeneel and Tonini 2008). The ongoing liberalization of the markets led to adjustments in the common organization of the market in milk and milk products. With the 2003 reform, a number of changes made the dairy market regime more responsive to market signals, e.g. by reducing the intervention prices for butter and skimmed milk powder, by reducing the export refunds etc. (European Commission 2008; Isermeyer 2007). Finally, the European Commission has announced its will to abandon the milk quota system in 2015 (Jongeneel and Tonini 2008).

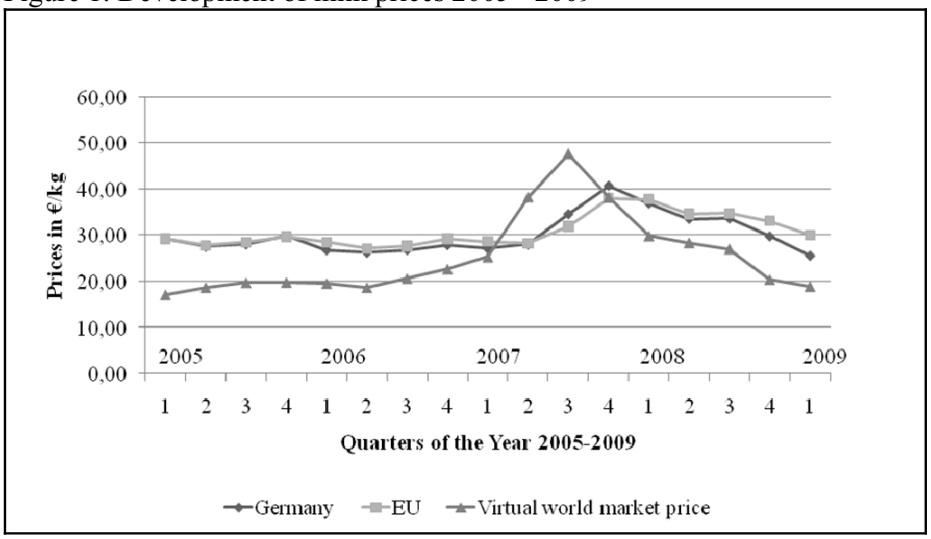
The liberalization of the dairy market, especially the expiry of the milk quotas, challenges the industry as a whole. Up to now, the fixed production volume imposed by the quota system has granted a certain planning reliability for dairies and farmers alike. With the expiry of the quota, the business relationships between the agricultural suppliers and their dairies need to be rearranged by establishing new contractual arrangements.

The German Dairy Industry

Germany is the most important milk producing country within the EU, accounting for nearly 20 % of total EU milk production (Schulze, Wocken, and Spiller 2008). Additionally, it is one of the largest sectors of the German food industry with a production volume of 27.3 million t milk and an annual turnover of about 22.3 billion euros in 2007 (Milchindustrieverband (MIV) 2008a; Zentrale Markt- und Preisberichtsstelle (ZMP) 2008).

Regarding developments at the farm level, the number of milk farmers has decreased by 64.2 % from 278.000 in 1990 to 99.431 in 2008. Nevertheless, the average number of cows per farm is only 42 (Statistisches Bundesamt 2008). This is quite small compared to other relevant EU-milk producing countries such as the UK which has an average herd size of 79 cows per farm (Schulze, Wocken, and Spiller 2006).

Figure 1: Development of milk prices 2005 - 2009



Source:(Spiller 2009b)

Due to the CAP, European respectively German milk prices are higher than the world market price (see Figure 1). However, the market liberalization in Europe leads to increasing price volatility and the alignment of domestic prices to the world market price. Thus, farmers face higher price risks (Berkum and Helming 2006). The world market development of the last two years is associated with strong price fluctuations. Since the peak in 2007, prices are falling.

Figure 1 illustrates that the German market developed accordingly: Prices were exceptionally high in 2007, but collapsed in the second half of the year 2008. The current price level in Germany is unprecedentedly low (Zentrale Markt- und Preisberichtsstelle (ZMP) 2009).

The processing level is facing considerable structural changes as well. The number of dairies in Germany decreased by 71.9 % from 360 in 1990 to 101 in 2006 (Milchindustrieverband (MIV) 2008b). One peculiarity of the German milk market is the fact that 60-70 % of all German milk is purchased and processed by dairy cooperatives (Gyau, Spiller, and Wocken 2008). Four out of the five biggest German processors regarding production volumes and dairy sales are organized as coops (see Table 1). About one quarter of all milk delivered is handled by the two largest German dairy companies, i. e. Nordmilch (4.500 million kg) and Humana Milchunion (2.500 million kg). The only noncooperative enterprise in the German top 5 dairy companies is the Müller Group (Milchindustrieverband (MIV) 2008b).

Table 1: Ranking of Germany's leading dairy companies by production volumes in 2007

	Company	**Dairy sales in billion EUR**
1	Nordmilch	2.3
2	Müller Group	2.2
3	Humana Milchunion	2.2
4	Hochwald	1.1
5	Hochland	1.0
6	Bayernland	0.950
7	Campina Germany	0.869
8	Zott	0.7
9	Ehrmann (incl. Saliter)	0.65
10	Meggle	0.65

Source: (Milchindustrieverband (MIV) 2008b)

Compared to international competitors, the number of processors is still high (Schulze, Wocken, and Spiller 2008). Looking at the World's Top 20 dairy companies, it is evident that even the leading German dairies are quite small (see Table 2), which is due to their low degree of internationalization (Schramm, Spiller, and Staack 2004).

Table 2: Ranking of the World's leading dairy companies by turnover in 2007

	Company	Country	Dairy sales in billion EUR
1	Nestlé	Switzerland	16.9
2	Danone	France	10.2
3	Lactalis	France	9.6
4	FrieslandCampina	Netherlands	8.8
5	Dairy Farmers of America	USA	8.1
6	Dean Foods	USA	7.6
7	Fonterra	New Zealand	7.6
8	Arla Foods	Denmark/Sweden	6.4
9	Kraft Foods	USA	4.7
10	Unilever	Netherlands/United Kingdom	4.4
…			
18	Nordmilch	Germany	2.3
20	Müller	Germany	2.2

Source: (Danish Dairy Board 2008)

On the selling side, dairies have to face a growing concentration in retailing. Retailer procurement is organized nationally and contracts for standard products such as private labels are negotiated for half a year. The German domestic market is segmented: Nearly 60 % of all consumers are price-oriented. Thus, the basic segment is characterized by standardized goods and a high importance of private labels. The remaining 40 % of buyers are quality-oriented: brands and product features are decisive for them (Fahlbusch et al. 2009). Important dairies in the premium market are national and international brand producers, local and organic dairies and producers of cheese specialties. In contrast, big German dairy cooperatives (Nordmilch, Humana Milchunion) are serving the basic market, because their level of brand orientation is quite low (Schramm, Spiller, and Staack 2004). They are facing high price competition, as the production of standardized goods and private labels leads to an unfavorable exchangeability of the dairies (Schulze, Wocken, and Spiller 2008).

All in all, developments such as market liberalization and concentration processes on all levels of the supply chain put dairies in a very challenging situation.

Status Quo: Procurement Strategies of Dairies

This section provides an overview on the current organization of the procurement of dairies: There is a multitude of farmer-suppliers all delivering the same product. Dairy processors have to deal with a high number of (small) suppliers, hindering the establishment of personal

relationships (Schulze, Wocken, and Spiller 2006). In contrast most agricultural sectors, which are characterized by spot market transactions (Spiller et al. 2005), the German dairy sector is dominated by long-term business relations. Recently, this has been questioned by dairy farmers. During the last decade, the formerly stable relationship between processors and farmers has degraded, because dairy farmers try to achieve higher prices by building countervailing power, which is not possible under (long-term) contracts (Schulze, Wocken, and Spiller 2008). Nordmilch, for example, had to face considerable supplier and shareholder losses (Nordmilch 2008; LZ 2007). However, a certain level of contracting seems to be necessary in this sector because of the high frequency of transactions and the related logistic planning (Schulze, Wocken, and Spiller 2008).

Contractual relationships of cooperatives are based on membership and bylaws, there are no specific contracts. The bylaw regulates for example (unlimited) intake obligations of the milk processing companies, whilst farmers are obliged to supply their dairy with their whole production volume. Additional regulations are not necessary, as production quantities are determined by the quota. Currently, processors are able to predict the planned quantity with a maximum variation of 1 % (Mischel 2008). Without new contractual systems this will no longer be possible after the quota expires in 2015. Noncooperative dairies are closing multiannual contracts with their agricultural suppliers as well. In Northern and Eastern Germany these are predominantly contracts between single (large) farms and the respective buyer. Many dairy suppliers in Southern Germany are organized in farmer associations, who bargain prices and quantities with the milk processing companies (Wocken and Spiller 2009).

The pricing between cooperatives and non-cooperatives differs: classical cooperative pricing means that the price paid to farmers is determined in a one-sided manner by the buyer, i. e. without negotiations with farmers. The price depends on the sales realized with the actual exploitation of the raw material (Weindlmaier 2000). Farmers influence prices via their agricultural representatives in the cooperatives' board of directors and the shareholder council. On the contrary, non-cooperatives (e.g. Müller, Danone) negotiate prices with farmer associations or – in case of large firms – directly with their agricultural suppliers (Wocken and Spiller 2009). Some private milk processors, for example Frischli, apply reference prices. In the case of Frischli, the reference price is the average price paid by other dairies in their region (Eastern Germany).

Although quality aspects are of increasing importance to the food industry in general, they are no major concern of contractual relations in the dairy industry. In principle, stipulations of quality for the delivered milk are not administered by the production contracts but by German law, with the regulations no. 12 ("Milchverordnung") and no. 13 ("Milch-Güteverordnung"). Usually, milk buyers do not demand quality requirements that exceed the legal specifications. Nevertheless, financial incentives regarding quality standards are set (Wocken and Spiller 2009).

Subsequently, the milk procurement strategies of the coops Fonterra (New Zealand) and FrieslandCampina (Netherlands) are introduced in order to evaluate alternatives to the German status quo. The liberalization of the milk market in New Zealand is more advanced than in the European Union, i.e. there is no quota system restricting the production of raw milk. Fonterra is New Zealand's largest dairy cooperative with a market share of 96 % (Evans and Meade 2005). It is organized as a cooperative with nearly 11,000 agricultural shareholders (Fonterra 2008). The volume regulation at Fonterra is administered via delivery rights, which are coupled with shareholders' funds of the cooperative. It means that every increase in a member's milk production is associated with the subscription of additional funds. If, for example, a supplier wishes to expand his production by 200,000 kg milk per year, he is obliged to buy shares amounting to about 60,000 euro. Growth in production is thus connected with costs for shareholders' funds. In contrast to the investment in quota, these delivery rights respectively shares yield interests and dividends (Deutscher Bauernverband (DBV) 2006).

The pricing mechanism of Fonterra is called fair-value share pricing. It is calculated independently of the company and controlled by the shareholder council (Evans 2004). All arrangements concerning the pricing mechanism are specified in the company's constitution (Fonterra 2009a). Fonterra's production, distribution and marketing are valued by an independent organization in order to "produce a valuation of the company from the point of entry of raw milk". The value calculated is annualized and allocated between retained earnings and dividend for farmers' investment in Fonterra. The price for raw milk supplied by farmers is then computed by subtracting the return per kg of milk solids (of raw milk) from total sales (Evans 2004). An application of Fonterra's pricing and volume regulation in Europe might be limited to dairy coops. Furthermore, it needs to be checked if these instruments comply with the requirements of the cooperative law in Germany (Deutscher Bauernverband (DBV) 2006).

The Dutch cooperative Campina is the world's 4th largest processor of dairy products after the merger with Friesland Foods in 2008 (Danish Dairy Board 2008). As it is based in Europe, its volume regulation depends predominantly on the EU quota. Additionally, farmers have to purchase so-called participation shares. Their volume is based on milk deliveries. In case of surplus distribution, coop members receive supplementary payments on these shares (Bekkum and Nilsson 2000). FrieslandCampina employs a reference price, the so-called guaranteed price. It is an average price for raw milk which is representative for the country concerned (Netherlands, Belgium, Denmark, and Germany). The guaranteed price is computed by weighting the respective reference prices with the volume processed in each country. It is publicized at the beginning of each month, so farmers know in advance what price they will receive for the next month. An annual "performance payment", depending on the companies' results, adds to the monthly guaranteed price (FrieslandCampina 2009).

The following section summarizes the state of the art on farmers' attitudes towards agricultural contracting. Furthermore, it focuses on the question of which contract attributes are relevant for future contracts in the dairy industry. Based on our empirical study, we examine whether there is a relationship between attitudes towards agricultural contracting and the preference for certain contract attributes.

Literature Review: Agricultural Contracting

Behavioral approaches towards contracting

In recent years, the question of vertical coordination of food supply chains has been one of the most controversial debates in agribusiness science and practice. Vertical coordination describes the way relationships are organized between producers and processors. In spot market exchanges only short-term contracts are negotiated (Schulze, Spiller, and Theuvsen 2007). The transactions are based on classical contract law (Williamson 1991). The main feature of vertically integrated production chains is joint ownership, farms are owned by processors et vice versa (Schulze, Spiller, and Theuvsen 2007). Yet, between spot market transactions and vertical integration exists a broad continuum of organizational forms (Enting and Zonderland 2006; MacDonald et al. 2004). As indicated above, the dairy industry is historically characterized by long-term business relationships governed by marketing contracts. These establish buying and selling obligations,

meaning dairy farmers have to sell their milk to their processor. In turn, the dairy agrees to purchase all milk supplied by the farmer (Schulze, Spiller, and Theuvsen 2007). The degree of coordination of marketing contracts lies halfway between spot market exchanges and vertical integration. As stated above, farmers have recently started to question long-term contracts. The organization in farmer associations to build countervailing power favors less vertical coordination. Thus, the question is in which direction the coordination of transactions will develop in the dairy industry.

There are manifold approaches to explain the organization of food supply chains. The economic theory as well as the management theory offer different – and not always compatible – explanations for varying governance structures (Schulze, Spiller, and Theuvsen 2007). Nevertheless, this paper focuses on analysis from behavioral sciences in order to explain the possible contract design in the dairy industry after the quota expiry.

Important behavioral factors for choosing a certain form of coordination are trust (Batt 2003; Hansen, Morrow Jr., and Batista 2002), attitudes towards contracting (Guo, Jolly, and Zhu 2005; Kularatna, Spriggs, and Storey 2001) or contract attributes (Furesi, Martino, and Pulina 2006; Roe, Sporleder, and Belleville 2004; Lajili et al. 1997) as well as farmers' contract motivations (Davis and Gillespie 2007; Drescher 1993) and their preferences for entrepreneurial freedom (Key and MacDonald 2006; Key 2005).

The analysis of these studies shows that contracts are a favorable option in developing countries to overcome market failure and badly functioning public institutions (Guo, Jolly, and Zhu 2005). Additionally, contracts reduce price risks (Schulze, Spiller, and Theuvsen 2007). Results from developed countries contradict these findings. Drescher (1993) showed that the fear of losing autonomy and to be at the mercy of one market partner hinders the establishment of contracts. Contrariwise, securing market access and the reduction of price risks are important arguments to conclude contracts. These findings, especially the fear of losing entrepreneurial freedom, are confirmed by other authors. Roe, Sporleder, and Belleville (2004) provide evidence that U.S. farmers have a preference for short-term contracts with minimum delivery requirements. They rather supply cooperatives than non-cooperatives. The same tendencies were shown by Furesi, Martino, and Pulina (2006) who investigated the contractual choice of Italian poultry farmers. Additionally, the status as independent entrepreneurs is a source of high immaterial benefit and pride to farmers (Key and MacDonald 2006). One last important factor influencing the

contracting decisions of farmers is trust. It is considered as the main force regarding the establishment of contractual as well as non-contractual cooperation in the relationship management literature (Morgan and Hunt 1994).

As Schulze, Spiller, and Theuvsen summarize: "[…] behavioral research demonstrates that farmers in developing and transformational countries prefer contracts to reduce market and political risks whereas the results for developed markets give the first impression that farmers in the majority have negative attitudes towards contracts and, at the same time, highly value their entrepreneurial freedom" (2007).

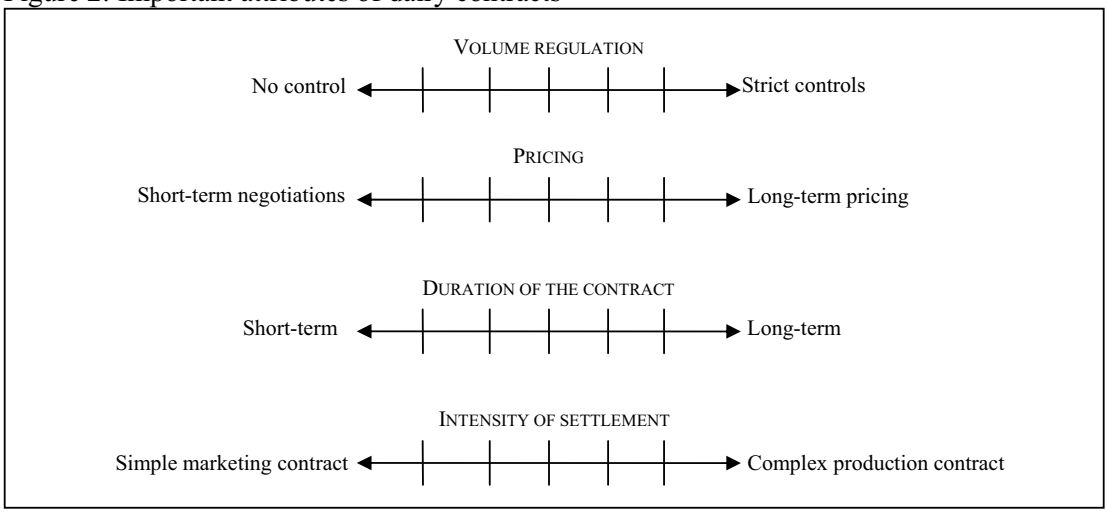
Attributes of future contracts in the dairy industry

As shown above, articles dealing with behavioral aspects of contracting tend to focus on the meat industry. Bijman et al. analyzed basic attitudes towards vertical coordination (2006). The provision of detailed suggestions on contract design is rare (Katchova and Miranda 2004; Boger 2001). While the former paper surveys cash crop contracts, the latter examines marketing arrangements for hogs.

Only few research papers investigate preferences for attributes of milk marketing contracts. The British Milk Development Council (MDC) provides a comprehensive publication about the re-design of raw milk contracts in the United Kingdom (2005). Other authors discuss only single contract attributes: The research network "European Dairy Farmers (EDF)" analyzed the possible duration of milk delivery contracts in European countries from the farmers' perspective (2008). Regarding contract duration, Schaper et al. (2008) showed that there is no clear tendency among German dairy farmers, as one third prefers long-term contracts, while one third votes for short-term arrangements. A comprehensive survey about the German dairy farmers does – to the best of our knowledge – not yet exist.

Wocken and Spiller (2009) offer first considerations how to draw up contract systems after quota expiry. Their conceptual approach rests upon management theory. Based on their results, the authors drafted a survey to question dairy farmers about their attitudes towards contracting and especially their preferences regarding contract attributes with their dairies. Four important aspects were identified, that should be considered with regard to the coordination of dairies and their farmers (see Figure 2).

Figure 2: Important attributes of dairy contracts



Source: (Wocken and Spiller 2009)

With the expiry of milk quotas, the volume regulation may possibly be the most decisive feature of new contracts. Regarding their intake obligation, this holds especially true for coops. There is a continuum of possible approaches regarding volume regulation, which range from no control to a strict control. On the one hand, strict volume controls imply that farmers willing to grow are obliged to re-negotiate their delivery quantities before every expansion of their milk production. On the other hand, processors have a higher planning reliability. No volume controls would be beneficial to farmers, because high flexibility concerning production quantities incentivizes growth. No volume regulation is associated with little planning reliability for dairies, though. Intake and delivery obligations for farmers and processors should be included in future contracts. It is not only advantageous from the viewpoint of logistic planning, but also considering risk reduction for both market partners (Spiller 2009a; Wocken and Spiller 2009). While the cooperative law already governs these buying and selling obligations, non-cooperatives might incorporate the respective stipulations in their procurement agreements.

The second aspect is the selection of one out of three possible pricing methods, i.e., the price can be set by the dairy board (classical cooperative price setting), a reference price can be chosen with a negotiated bonus/malus-system, or prices can be bargained frequently (e. g. quarterly, semiannual or yearly) between farmers and processors. It is still to be answered which pricing mechanism will be applied in the future. With the increasing price volatility and the alignment of

domestic prices to the world market price, more frequent price negotiations are expected in the future (Berkum and Helming 2006). The bargains might include milk payouts and (optional) price adjustment clauses as well as further conditions such as bonuses and ancillary services (ibid.).

The duration of contracts has to be defined on a continuum from short-term (e.g., one month) to long-term contracts for several years. In practice, durations between 3 months and 5 years can be observed. Due to the perishability of the product, milk hauling is required every (second) day on the farm level. As the merchandising risk for agricultural suppliers would be too high, the establishment of a spot market similar to the hog market is not very likely. From the processors' viewpoint, long-term relations are also favorable: although the spot market offers flexibility, the effort of reorganizing the milk collection system (including the logistic planning) would be too high. Hence, German dairies prefer contracts with a duration of at least one year (Spiller 2009a).

The last point of interest is the intensity of the settlement. This can include quality issues, duties of information exchange on both market sides, possibilities of participation, control rights or extension services offered by the processor. Classical marketing contracts govern supplied quantities and prices. Production contracts have a high degree of complexity, because they prescribe details of the production process (e. g. feed, breed or aspects of animal welfare). The degree of vertical coordination of contract farming is even higher. Although farmers remain legally autonomous, the contractor provides all critical resources (genetics, feed, managerial oversight) (Schulze, Spiller, and Theuvsen 2007; Mighell and Jones 1963). Currently, simple marketing contracts prevail in the dairy industry. Quality issues are addressed via legal regulations and a quality assurance system. It remains to be clarified if a higher degree of vertical coordination is necessary in the future. Up to now, dairy farmers had no problem fulfilling the quality expectations of their processors. Special clauses concerning quality issues or further production specifications (e. g. silage-free feed, GMO-free feed) are conceivable for manufacturers of specialties/premium products (Spiller 2009a).

Subsequently, the results from a recent survey of German dairy farmers concerning their attitudes towards contracts and their preferences for the contract attributes volume regulation, pricing, duration and intensity of settlement are presented.

Procedures and sample

The purpose of the survey was to gain first insights into farmers' attitudes towards contracts in the dairy industry and their preferences for attributes of contractual relations with their processors after the quota abolition. Graduate students in agricultural science, who were trained prior to their interviews, conducted face-to-face interviews with dairy farmers. A total of 161 respondents were surveyed by means of a standardized questionnaire. Interviews took place in November and December of 2008. Interviewees were chosen by the students on the basis of a snowball system. The majority of the farms were located in Northwestern Germany. Overall, the sample is a "convenience sample" and does not fulfill all criteria of representativeness. Thus, the study has to be characterized as explorative. Nevertheless, it allows first conclusions on the subject.

The questionnaire is based on the conceptual paper of Wocken and Spiller (Wocken and Spiller 2009). Additionally, constructs based on behavioral approaches towards vertical coordination and contracting (attitudes and trust) were included in the survey. It was structured as follows: firstly, the respondents were asked for their preferences for the contract attributes volume regulation, pricing, duration and intensity of settlement. At the beginning, an open question was employed to introduce interviewees to the quite unfamiliar topic. At the end of the first section, a simple choice experiment was carried out. Farmers had to pick their favorite contract out of four options. In the second part of the questionnaire, respondents answered questions about their attitudes towards contracts in general and contracting in the dairy industry in particular. In the last part of our survey, sociodemographic data and information on structural farm characteristics were collected.

To capture the latent variables, different measurement scales - predominantly 7-point Likert scales - were used. They range from "strongly disagree" (scale = -3) to "strongly agree" (scale = +3). To check for content validity, the questionnaire was refined through several pre-tests with students, doctoral students, and professors.

The majority of participants are from Northwestern Germany (Lower-Saxony, Hesse, Schleswig-Holstein), where 75.7 % of all interviews were conducted. The proportion of male interviewees is 95.5 %. With an average of 39 years of age, farmers in the sample are younger than the national average (Statistisches Bundesamt 2006). Only farm managers who are responsible for the business strategy were interviewed. 28.4 % of respondents are organized in producer groups.

71.2 % of all interviewed farmers are suppliers of a dairy cooperative, while the remainder delivers to non-cooperatives.

Table 3: Sample description

	Sample	**Germany**
Farm size (ha)	221,7	45,3
Herd size (cows per farm)	95	40
Milk yield per cow and year (kg)	8822	6944

Source: Authors‘ calculation, (Statistisches Bundesamt 2008)

Table 3 provides a description of the main characteristics of the sample. Farm and herd sizes are clearly above the German average. The milk yield is a decisive performance indicator in dairy production. The samples' milk yield per cow and year exceeds the German average by far. 62.1 % of all operations can be classified as mixed farms, whereas 35.3 % specialize in grassland farming. 76.4 % of the participants evaluate their enterprise as (far) more successful than other farms. Compared to the national population, a further characteristic of the sample is a high educational level. Thus, one may conclude that the sample consists of rather large and successful farms. It does not fulfill all criteria of representativeness. Nevertheless, the respondents are a suitable target group for questions on the development of a contract design after the year 2015, as a sustainable development of their farms in the future is very likely.

The remainder of the paper is organized as follows: The next section gives an overview of farmers' attitudes towards agricultural contracting in general, and in the dairy sector specifically. Next, agricultural suppliers' preferences for contract attributes in the dairy industry are reported. The last section analyzes relationships between attitudes and experiences and preferences for specific contract attributes as well as the results of a simple choice experiment.

Results and Discussion

Attitudes towards agricultural contracting

The statement "So far, my experiences with contractual agreements have been all positive" illustrates, that German dairy farmers' experiences with contractual relations are not only positive. Only one third of the milk producers (rather) agrees with this statement, while the rest is

not entirely sure or rejects it. The evaluation of planning security provided by contracts is more positive: two-thirds of the respondents confirm the statement "In the past, contracts provided me with planning security", i.e. their experiences with regard to the special aspect planning security are rather positive.

Experiences with contracting may influence the attitudes towards the topic. Table 4 summarizes dairy farmers' attitudes towards agricultural contracting in general. Although long-term contractual relations prevail in the dairy industry, entrepreneurial freedom is very important for the respondents. About 92 % agree with the respective statement. Additionally, 61 % of the dairy farmers fear becoming too dependent on their market partners. However, they confirm that contracts reduce the entrepreneurial risk. A proportion of nearly 75 % approves the risk-reducing function of contracts. Moreover, the statement "I could yield better prices without contractual arrangements" is rather rejected. The high standard deviation shows that farmers' opinions on the topic are split: 44.7 % of the dairy farmers do not believe that they could realize better prices without their contracts, whilst 40.3 % of them are not sure. A proportion of 15.1 % is convinced that short-term arrangements (e. g. spot market transactions) lead to better prices.

Table 4: Attitudes towards contracting in general

Statement	**M**	**SD**
So far, my experiences with contractual agreements have been all positive	0.03	1.176
In the past, contracts provided me with planning security	0.86	1.061
Entrepreneurial freedom is important to me.	1.82	0.901
With long-term contracts dependence on my market partner is too high.	0.89	1.256
I could realize better prices without contractual arrangements.	-0.42	1.160
Contracts reduce my entrepreneurial risk.	1.21	1.091

Source: Authors' calculation

M= mean (Scale ranging from "-3 = Strongly disagree" to "+3 = Strongly agree"); SD = standard deviation

All in all, our results confirm previous research on attitudes towards agricultural contracting. Although the coordination intensity in the dairy sector is in fact higher, milk producers show similar tendencies like – for example – hog farmers. This might be due to negative experiences with (long-term) contractual relationships. The importance of entrepreneurial freedom and the fear of dependence on a single market partner (Key and MacDonald 2006; Drescher 1993) are

important components of the general attitude towards agricultural contracting. All the same, dairy farmers acknowledge that long-term agreements reduce the entrepreneurial risk, e.g. by providing market access, as well as price risks (Schulze, Spiller, and Theuvsen 2007). The experience of planning security due to contracts might support the attitude.

As seen above, dairy farmers' evaluation of contractual relationships is not entirely positive. Table 5 illustrates their opinions on long-term agreements in the dairy industry. There is no clear tendency if long-term contracts between farmers and their processors are better: 39.1 % of respondents agree to the statement, 26.7 % are not sure and 34.2 % reject it. Contracts with no restrictions regarding volume control increase the willingness for arrangements with a long duration. The possibility of free production volumes is an incentive for nearly half of all respondents (47.2 %). Furthermore, German dairy farmers are rather averse to risk-taking. Two thirds (66.7 %) of the interviewees agree with the statement. Even without contracts, German dairy farmers are loyal: only 26.1 % of the respondents would switch their milk buyer more frequently if they had no long-term agreement. There is a differing of opinion on the question of whether only processors benefit from contractual arrangements. 42.4 % of all respondents have a neutral position. 32.9 % of the dairy farmers believe that close contractual relationships could also be beneficial for them. A further 24.7 % is, however, convinced that they receive no benefits from higher coordination intensity between producer and processor.

Table 5: Attitudes towards contracting in the dairy industry

Statement	**M**	**SD**
In my opinion it would be better if farmers engaged in long-term contracts with their dairy processors.	0.06	1.526
I am willing to close long-term contracts if I can deliver milk without volume restrictions.	0.31	1.455
I avoid taking risks in milk production.	0.88	1.234
Without the (long-term) contract I would switch my dairy more often.	-0.27	1.521
Contractual arrangements favor the dairy processors; farmers do not benefit from them at all.	-0.19	1.369

Source: Authors' calculation

M= mean (Scale ranging from "-3 = Strongly disagree" to "+3 = Strongly agree"); SD = standard deviation

Although dairy farmers' general attitudes towards contracting are rather critical, their attitudes towards contracting in the dairy sector help to explain why long-term arrangements prevail in the

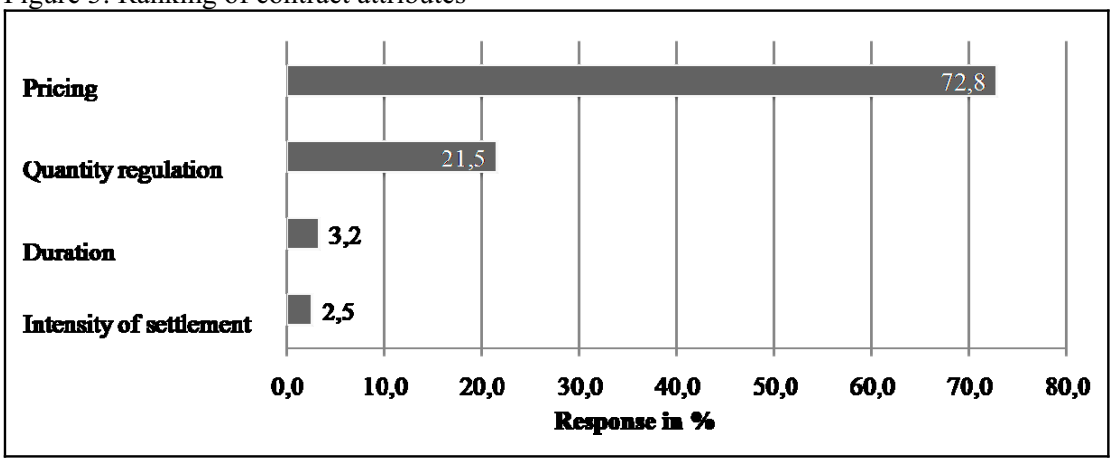
industry. Schulze, Spiller and Theuvsen (2007) showed that risk aversion is an important driver to close contracts. Due to the collapsing prices in the second half of the year 2008, farmers' willingness to cooperate might be even higher than it would have been in 2007, when prices were exceptionally high. The dropping milk prices raised farmers' awareness of price risks. Thus, risk reduction might be a significant contracting motivation for German milk producers, as the farmers in our sample are quite risk averse.

Additionally, means and high standard deviations of the other items show that there is no clear tendency among dairy farmers. On the one hand, producers support long-term relationships and intense contractual relations. On the other hand, a somewhat smaller proportion favors short-term arrangements and less contractual obligations.

Dairy farmers' preferences for contract attributes

We asked farmers to rank the contract attributes volume regulation, pricing, duration, and intensity of the settlement. 72.8 % of all respondents ranked the pricing as the most important attribute. Stipulations on volume regulation are the most important contract attribute for 21.1 % of the dairy farmers. Contract duration and the intensity of the settlement are less important for the majority of respondents (see Figure 3). The paramount importance of prices is not surprising, because the milk price determines the lion's share of revenues on specialized dairy farms. Sales of calves and slaughter cows provide relatively little income (Wocken and Spiller 2009). Hence, farmers evaluate the milk price as decisive source of profitability.

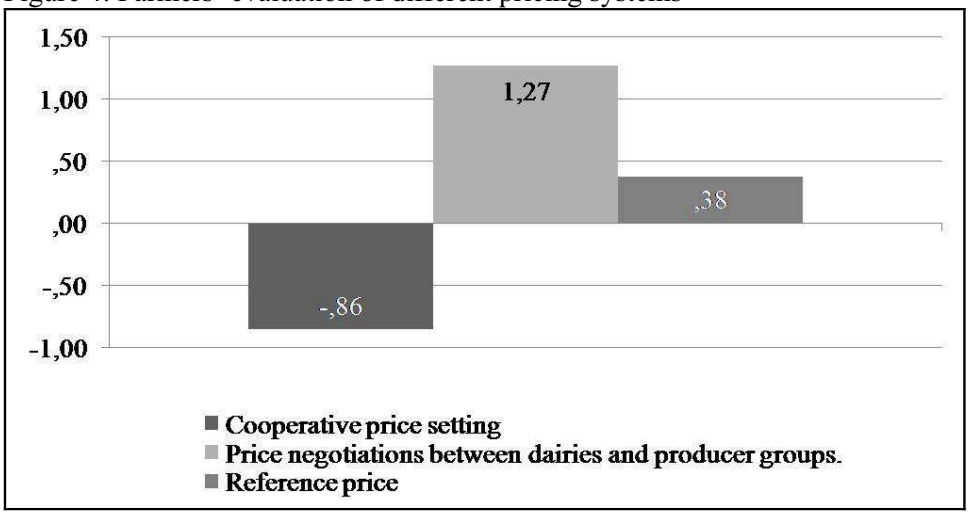
Figure 3: Ranking of contract attributes



Source: Authors' calculation

In the next step, respondents evaluated three different pricing systems (see Figure 4): the classical cooperative price setting, price negotiations between processors and producer groups and milk pricing via reference prices. They object to the classical pricing mechanism of coops (M=-0.86; SD=1.670). Only 21.3 % of all farmers have a positive attitude towards it. Price negotiations between the market partners obtain the highest acceptance among farmers (M=1.27; SD=1.404). 73.8 % of the respondents agree with it. Farmers judge the third pricing mechanism rather positively (M=0.38; SD=1.524). A proportion of 46.9 % approve the application of a reference price.

Figure 4: Farmers' evaluation of different pricing systems



Source: Authors' calculation

Farmers are dissatisfied with the predominant pricing method, because they feel a lack of control over the price setting. The perception that they are at the mercy of their processor causes reactance effects. This may be one explanation for the clear refusal of the classical cooperative price setting. From farmers' viewpoint, their influence on price negotiations might be higher. Thus, they evaluate bargaining processes between market partners quite positively.

Interviewees prefer rather short-term intervals of price setting. The majority of respondents vote for quarterly or half-yearly pricing intervals (each with about 38 %). Only 21.9 % favor annual price settings. The results reflect the current market developments. Farmers accept the necessity of shorter pricing intervals due to the increasing price volatility and the alignment of domestic

prices to the world market price caused by market liberalization (Berkum and Helming 2006). Nevertheless, 43.9 % of the respondents agree with the statement "My dairy has to balance out price fluctuations", showing that at least a proportion of the dairy farmers wishes to shift price risks towards the processor.

The volume regulation is a very important feature of future milk marketing contracts. For farmers, volume regulations are associated with planning reliability and the opportunity of growth. Hence, milk producers would prefer arrangements that guarantee unlimited delivery quantities. 59.7 % of all respondents agree to the statement. Farmers are prepared to forecast their production for the following year bindingly in return for free deliveries. Nevertheless, they are not prepared to accept fines if they do not supply the volumes contracted beforehand. More than two thirds (67.7 %) of the respondents would forecast their quantities supplied, but only little more than one third (38.5 %) of the producers accepts fines for excess or accordingly under deliveries (see Table 6).

66.5 % of the dairy farmers vote for the persistence of their selling obligations. In return, 70.2 % of all participants demand that milk processors retain their intake obligations in the future. The result is little surprising, because existing buying and selling obligations guarantee planning security for producers in particular. Nevertheless, especially farmers' selling obligations are also favorable for processors, as they provide them with planning reliability and contribute to securing the raw milk supply.

Table 6: Dairy farmers' preferences concerning volume regulation

Statement	**M**	**SD**
My future contract should not limit delivery quantities.	0.81	1.816
In order to guarantee planning reliability for my dairy, I would forecast my production volumes bindingly for the next year.	1.10	1.428
I accept milk price reductions if I cannot supply the contract volumes.	-0.29	1.882
Dairy farmers' selling obligation should persist.	1.00	1.605
Milk processors should retain the intake obligation in the future.	1.30	1.475

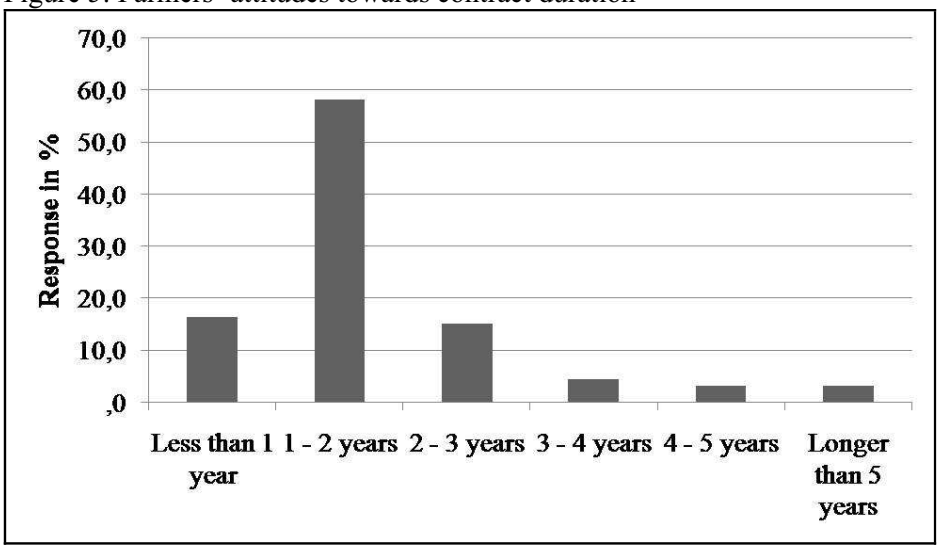
Source: Authors' calculation

M= mean (Scale ranging from "-3 = Strongly disagree" to "+3 = Strongly agree"); SD = standard deviation

Figure 5 illustrates that farmers' attitudes towards the contract duration are heterogeneous. In 58.1 % of all cases, they support contract periods from one to two years. Only 16.3 % of the

interviewees favor short-term contracts of less than one year, whilst one quarter (25.6 %) of the respondents is willing to close contracts for at least two years. All in all, the preferences for contract duration correspond with the status quo. Nevertheless, the willingness to close long-term agreements (e. g. for five years) is quite low.

Figure 5: Farmers' attitudes towards contract duration



Source: Authors' calculation

Table 7 gives an overview of preferences with regard to contract duration. 69.6 % of the respondents agree to the statement "The period of cancelation should be as short as possible". Furthermore, a proportion of 55.9 % want to be able to switch dairies quickly. The clear consent to short periods of cancellation as well as to switch quickly reflects farmers wish for flexibility. As shown above, German dairy producers are quite loyal, but the milk strike in 2008 and recent complaints in 2009 demonstrate growing switching tendencies.

The high relevance of the extraordinary notice of cancelation somewhat contradicts farmers' basic loyalty. 77.6 % of the respondents demand the maintenance of extraordinary cancelation clauses. Producers perceive that this stipulation is their only means to exert pressure on their processor. Due to the high perceived dependence, more than half of the dairy farmers (52.2 %) see it as a last resort to defend oneself in case they have problems with their dairies.

Table 7: Dairy farmers' preferences concerning contract duration

Statement	M	SD
The period of cancelation should be as short as possible.	1.11	1.564
I want to be able to switch dairies quickly.	0.73	1.631
Extraordinary cancelation clauses for farmers should be maintained.	1.41	1.292
Only with the extraordinary notice of cancelation I can exert pressure on my dairy.	0.50	1.621

Source: Authors' calculation
M= mean (Scale ranging from "-3 = Strongly disagree" to "+3 = Strongly agree"); SD = standard deviation

There is no clear tendency concerning the intensity of the coordination (see Table 8). The statement "In the dairy industry, it is sufficient to close simple marketing contracts governing quantities and prices" revealed that the preference for simple marketing contracts (43.5 %) nearly equals the demand for more complex production contracts (42.5 %). Farmers' supply chain orientation also diverges. It was parameterized with the exemplary statement "In order to improve the logistics of my dairy I would invest in further storage capacities." 41.5 % of all respondents are not willing to invest in storage capacities. Yet, in order to optimize the milk hauling process 37.7 % of the farmers are ready to invest. Otherwise, the importance of quality standards is beyond doubt: 94.4 % of all interviewees agree that contracts between farmers and milk processors should include arrangements concerning quality.

Table 8: Dairy farmers' preferences concerning the intensity of the settlement

Statement	M	SD
In the dairy industry, it is sufficient to close simple marketing contracts governing quantities and prices.	0.22	1.716
In order to improve the logistics of my dairy I would invest in further storage capacities.	-0.13	1.703
Contracts between farmers and milk processors should include arrangements concerning quality.	1.94	0.916

Source: Authors' calculation
M= mean (Scale ranging from "-3 = Strongly disagree" to "+3 = Strongly agree"); SD = standard deviation

Relationship between attitudes and contract attributes

Several authors highlight the importance of entrepreneurial freedom for farmers. Table 9 summarizes how the wish for autonomy influences the preferences. With increasing

entrepreneurial independence, farmers demand to shift price risks towards their processor. This is startling, as one may presume that independent entrepreneurs bear their risk on their own. It is unsurprising that the wish for flexibility and the importance of entrepreneurial freedom are positively correlated. The higher the importance of autonomy, the stronger the preference for simple marketing contracts.

Table 9: Relationship between general attitudes towards contracting and selected contract attributes

	My dairy has to balance out price fluctuations.	I want to be able to switch dairies quickly.	In the dairy industry, it is sufficient to close simple marketing contracts governing quantities and prices.
Entrepreneurial freedom is important to me.	0,180*	0,227**	0,157*

Source: Authors' calculation
** The correlation is significant at the 0.01-level
* The correlation is significant at the 0.05-level

Farmers with a positive attitude towards long-term contracts have a higher willingness to forecast production volumes bindingly. Thus, they guarantee a higher planning reliability for their milk processor. The long-term orientation favors the support of the classical cooperative price setting. Probably, satisfaction with the existing pricing mechanism has a positive influence on the willingness to cooperate more closely with the processor. Thus, contract attributes could also influence attitudes towards contracting. A positive attitude towards long-term contractual relations with dairies is positively correlated with the demand for the persistence of selling obligations. The long-term orientation reduces the wish for short cancelation periods (see Table 10).

Table 10: Relationship between attitudes towards contractual relations in the dairy industry and selected contract attributes

	In order to guarantee planning reliability for my dairy, I would forecast my production volumes bindingly for the next year.	Evaluation of the classical cooperative price setting	Dairy farmers' selling obligation should persist.	The period of cancelation should be as short as possible.
In my opinion it would be better if farmers engaged in long-term contracts with their dairy processors.	0,221**	0,299**	0,383**	-0,424**

Source: Authors' calculation

** The correlation is significant at the 0.01-level

* The correlation is significant at the 0.05-level

The results reveal relationships between attitudes towards contracting and preferences for selected contract attributes. Thus, behavioral approaches show that an important factor in choosing the right governance structure, i.e. the potential contract design, is farmers' acceptance (Schulze, Spiller, and Theuvsen 2007). However, further research should investigate the direction of causality between contract attributes and attitudes.

Results of a simple choice experiment

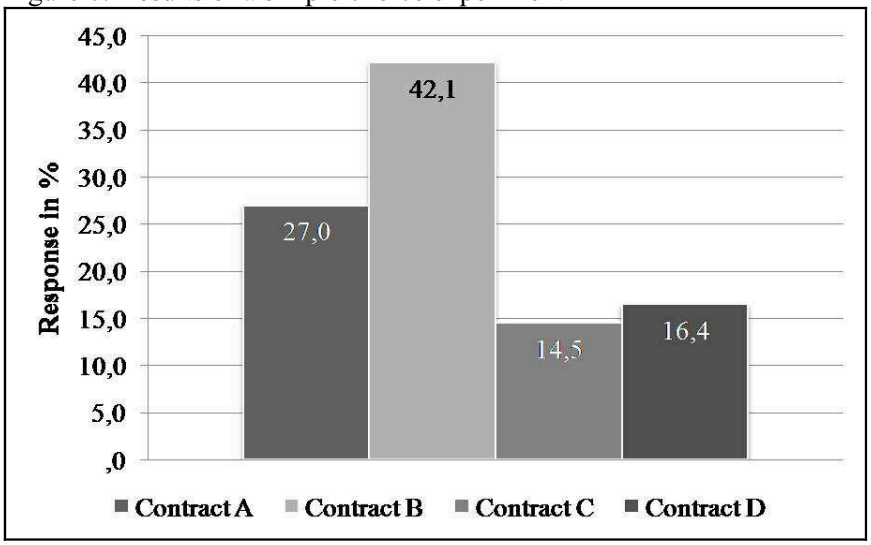
In order to receive a more realistic estimation of preferences for possible contracts, we conducted a simple choice experiment. Farmers had to choose their favorite contract out of four options, which were designed on the basis of expert interviews. The options combined all contract attributes. Thus, the decision situation was more lifelike than a simple evaluation of every single contract attribute. Additionally, the discrete choice of one contract was more realistic than ranking the four options as in conjoint analysis (Ashok, Dillon, and Yuan 2002; McFadden 1986).

Hence, we offered four contracting options: the duration of contract A is six months, during which prices and delivery quantities are fixed. Fines have to be paid for excess deliveries. Option

B is a two year contract. There are no quantity regulations, but farmers have to forecast their production for the following six months. The price is based on a reference price plus bonus. Contract C is also a two year contract. The delivery quantity is fixed and fines have to be paid for excess deliveries. The price is based on a reference price plus bonus. Due to fixed delivery quantities, the bonus is higher than in option B. Contract D is a five year contract with a classical (cooperative) price setting mechanism. Delivery quantities are not limited, but farmers have to forecast their production for the following six months.

42.1 % of the respondents chose contract B, i.e. contingent to unlimited deliveries farmers are willing to conclude long-term agreements. The comparison with option C (14.5 %) further highlights these results. Option A (27 %) shows that milk producers accept fixed prices for shorter periods of time (e.g. 6 months). The results for contract D (16.4 %) illustrate that only a small proportion of farmers accepts contractual arrangements lasting for more than two years.

Figure 6: Results of a simple choice experiment



Source: Authors' calculation

The four groups show no statistically significant differences regarding farm characteristics. Nevertheless, farm and herd size of suppliers preferring contract D are smaller, while larger farms tend to option A, i.e. are willing to sign short-term contracts. Hence, smaller farmers might be more risk averse.

Conclusions

This study investigated several questions with regard to contract design in the dairy industry after the quota expires in the year 2015. Firstly, we analyzed the attitudes of German dairy farmers towards contracting. Although long-term and stable business relationships are typical in the industry, milk suppliers' attitudes do not differ significantly from other agricultural producers (e.g. hog farmers). They have a similar preference for entrepreneurial freedom and independence. Due to the prevailing attitude among dairy producers, we may conclude that the establishment of stronger vertically coordinated arrangements in the dairy industry is not very likely. Another factor arguing against stronger vertical coordination is the high specific knowledge of dairy farmers. Its centralization would be quite challenging (Spiller 2009a).

Next, we addressed the question of agricultural suppliers' preferences towards the contract attributes pricing (mechanism), volume regulation, duration and intensity of the settlement. In general, dairy farmers prefer contracts without controls, i.e. flexibility concerning production volumes. The maximum length of contracts is two years. Hence, current durations can be maintained in future contracts. Farmers strongly reject the classical cooperative price setting due to a perceived lack of control. They favor (frequent) price negotiations or the application of a reference price, thus particularly coops have to reconsider their pricing mechanism. Nevertheless, tendencies among farmers are not always clear. High standard deviations indicate that preferences for contract attributes diverge in many cases. Thus, a further segmentation analysis to identify clusters of farmers based on their preferences and attitudes will be conducted in the next step of the research project.

Furthermore, there are correlations between farmers' attitudes and preferences for contract attributes. Dairy processors should consider their suppliers' attitudes, if they want to raise farmers' acceptance for new contract systems. For example, milk producers with a long-term orientation will accept longer cancelation periods. Additionally, their acceptance of the cooperative pricing mechanism is higher. These results may contribute to raise dairies' understanding of their agricultural suppliers and consequently facilitate the negotiation of contracts between the market partners. Thus, based on the knowledge of the relationship between suppliers' attitudes and their preferences for particular contract attributes, milk processors have the opportunity to design contracts that match their procurement strategies as well as their suppliers' wishes.

Our results display German dairy farmers' first assessment of the development of contracts in the industry. Dairy processors do not have to accept every request. They might use the results of our survey as a basis for further negotiations. Due to the expiry of the milk quota, volume regulations are of paramount importance for milk processors, because they need to secure their raw milk supply. Furthermore, their planning reliability increases with stricter volume regulations. However, restricted production quantities constrain growth' opportunities for farmers. Hence, there is a trade-off between dairies and farmer-suppliers. The establishment of forecasting systems might solve this problem, i.e. farmers have to notify their dairy of the volumes that they are going to produce during a fixed period of time (e.g. in the following six months). This solution might be advantageous for cooperatives in particular, as they face a high planning insecurity due to their legal intake obligation.

The optimal contract design for dairies is contingent upon their corporate strategy. The future supply management concept has to take into account quantity (and growth), costs, flexibility, quality exigencies, controls and finance (Large 2006). Firm-specific goals have to be set for supply management dependent on the market orientation and the strategic planning: for example, producers of brands and specialties need a relatively fixed amount of milk, since the quantities sold vary little in the short and medium term. It is therefore reasonable for them to assume long-term contracts with a fixed amount of milk. Other dairies (mainly coops) producing standard goods or private labels are highly dependent on periodic price negotiations with only few retailing customers. For them it will be beneficial to sign short-term contracts, i.e. to match the semiannual negotiations with retailers. Thus, they can rapidly react to market fluctuations on the demand side.

All in all we cannot identify a first best solution. Depending on the strategic orientation of both farmers and dairies, a multitude of possible contract designs might be established after the abolition of the quota (Isermeyer et al. 2006). Irrespective of the chosen strategy, the strategies pursued by the dairies have to match the development goals of their suppliers. Growing companies therefore should also encourage their suppliers to grow. All future contracts between dairies and farmers require a coherent mix of stipulations. Complex production contracts are – for instance – not compatible with short-term arrangements (Spiller 2009a).

Our study does not fulfill all criteria of representativeness. Thus, it has to be classified as exploratory. Nevertheless, it provides comprehensive evidence on the development of contractual

relations in the dairy industry from farmers' perspective. Due to the novelty of the topic, many respondents thought about the questions for the first time while answering our questionnaire. At some points, the response behavior indicates that they were not entirely sure about their answers. Thus, it might be advisable to repeat the survey in order to check the robustness of the responses. Furthermore, interviewees were limited to the region of Northwestern Germany; the size of most farms was far above the German average, as was the educational level of the interviewed farmers. Hence, we cannot extrapolate the results to all German or European dairy farmers.

Further research should concentrate on the practical implementation of contracts. Therefore, decision-theoretic models should complement the behavioral approach employed in our study.

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