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Networking in Meat Production Systems: The Influence of Cooperative Structures on Farmers' Participation

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ABSTRACT

Against the background of increasing competitive pressures and growing requirements with regard to food quality and safety, the significance of network-wide collaboration in food production has been pointed out in recent years. With this in mind, it is the objective of this paper to analyse pig farmers' network participation in general and to explore whether cooperative structures in food supply chains influence the type as well as the quality of farmers' network relations. Our results show that cooperative structures influence pig fattening farmers' network participation concerning relationship quality with slaughterhouses as well as farmers' choice of network partners for information exchange and consultancy. Furthermore, the results show that farmers delivering to cooperatively owned processors evaluate the relationship with their slaughterhouses significantly better than farmers dealing with private slaughterhouses. The results provide cooperatives with starting points for developing attractive services for farmers and improving their relationships with their suppliers.

Keywords: cooperatives, information exchange, meat production, network relationships, relationship quality

1 Introduction

Increasing competitive pressures as well as growing requirements with regard to quality and safety pose a continuous challenge for farmers in European agrifood netchains. Against this background, the significance of network-wide collaboration has been pointed out in recent years—especially for livestock farming (Trienekens et al., 2009). In the literature, it is generally agreed that participation in specialized networks can be beneficial to the competitiveness of individual farms and firms (Gellynck, Vermeire and Viaene, 2006).

Due to an agglomeration of potential interaction partners specialized in pork production, the northwestern part of Germany—known to be one of Europe's major centres of pig production—provides good structural preconditions for farms' and firms' comprehensive network participation. Nonetheless, empirical studies show that, despite these good preconditions, farmers' participation in networks is often limited. Spiller et al. (2005), for instance, found weaknesses with regard to relationship quality between pig fattening farmers and slaughterhouses. This might be due to power inequalities as well as manifold principal-agent relationships in food supply chains characterized by information asymmetries and utility-maximizing behaviour that limits cooperation between supply chain partners and reduces transparency in food supply chains (Theuvsen, 2004; Hingley, 2005; Deimel, Frentrup and Theuvsen, 2008).

In European food supply chains and especially in northwestern German pig production, cooperatives play a major role in the sectors of livestock trading and slaughtering (Hendrikse, 2006; Theuvsen and Franz, 2007). Joint ownership of farms and such entities as processors or traders aligns interests between supply chain partners and reduces principal-agent problems. Furthermore, cooperatives are characterized by

several specific economic principle, including the principles of self-help, self-administration, identity, personal responsibility, democracy and solidarity (Rhodes, 1983; Theuvsen, 2006). These characteristics should also contribute to a reduction in the incidence of clashes of interests, improved relationship quality between business partners and a greater potential for trustful collaboration. Therefore, it can be hypothesized that a farmer's participation in modern food networks depends, at least to a certain degree, on whether he or she has business relationships with cooperatives or private actors. There are also empirical results that indicate that even farmers who deliver to cooperatives without being members enjoy more trustful relationships with their processors (Schulze et al., 2006).

But whether relationships between cooperatives and their suppliers, who are in many cases also members, are really of a better quality in practice has to be checked continuously since cooperatives in the meat sector have to sustain their position under increasing market pressures. In recent years powerful, global customers, such as food retailers and discounters, have coerced cooperatives to pursue aggressive cost reduction strategies, often accompanied by a rapid growth of capacities as well as national and international mergers and acquisitions. The enormous growth and increased professionalization of many cooperatives may have enlarged the cultural distance between the members (in this case farmers) and the management of cooperatives; both trends may also often bypass members' interests in democratic control (Österberg and Nilsson, 2009; Schulze and Schlecht, 2009). This development may limit the potential for a higher relationship quality and more intensive interactions between supply chain partners in the cooperative sector.

Against this background, the objective of this paper is to analyse farmers' network participation in general and to explore in detail whether cooperative structures in food supply chains influence the type as well as the quality of farmers' network relations.

2 Network relations and cooperative structures in German pig production

Due to relative cost disadvantages in German pig production (Haxsen, 2008) and continuously increasing requirements regarding process as well as product quality, farms' and firms' access to information and knowledge is becoming more and more important (Stewart, 1998; Deimel, Theuvsen and Ebbeskotte, 2010). In the literature, it is generally agreed that participation in specialized networks can enhance firms' access to information and thus be beneficial to the competitiveness of individual firms (Gambardella, 1992; Nonaka, 1994; Gellynck, Vermeire and Viaene, 2006). In agri-food chains, some tasks, like ensuring compatibility between animal health and productivity in livestock farming, are complex and cannot be managed without cooperation with others. These situations often require the application of tacit knowledge, which can be achieved only through interactions with knowledgeable network partners (Granovetter, 2004). Farmers' participation in specialized networks and access to professional information and innovations may emerge as significant means of improving the competitiveness of farms in the future. This may result in an earlier implementation of innovations such as efficient new processes that will decrease production costs or enhance product quality.

Networks in the German pork production system are determined by the alternative channels for marketing farmers' fattened slaughter pigs. Especially in northwestern Germany, known to be a major centre of European pig production, slaughter pigs are processed in cooperatively owned slaughterhouses (such as Westfleisch eG) as well as in private companies (for instance, B. & C. Tönnies). Moreover, the marketing of slaughter animals is often organized as a two-tier system, with private or cooperatively owned livestock traders mediating the business relationships between agricultural producers and processors (Theuvsen and Franz, 2007). In particular, cooperative livestock traders can be classified into producer-owned livestock trading cooperatives (*Viehvermarktungsgenossenschaften*, or VVGs) and quasi-cooperative producing and marketing associations (*Erzeugergemeinschaften*, or EZGs).

Besides discussing the efficient vertical organisation of the entire food chain in German pig production, the current literature also highlights the topics of network-wide collaboration and communication (Breuer et al., 2008). Hofstede (2003) points out that in today's rapidly changing environment, effective information exchange is the key to improving value chain performance and competitiveness. In this context, Meemken and Blaha (2008) consider an active relationship between pig fattening farmers and slaughterhouses to be of vital importance concerning matters such as improving product quality and enhancing animal health and thus food safety. In particular, feedback information transmitted by the slaughterhouse in terms of carcass quality or veterinary organ findings is considered to be essential for farmers' process optimization in pig fattening (Plumeyer, Deimel and Theuvsen, 2008). Although these are mainly technical or organizational topics, efficient communication and collaboration require an adequate relationship quality between farmers and processors. Numerous studies deal with the topic "relationship quality", often discussing approaches for measuring it (e.g., Dwyer, Schurr and Oh, 1987; Crosby, Evans

and Cowles, 1990; Clare, Reid and Shadbolt, 2005). Spiller et al. (2005) and Schulze, Wocken and Spiller (2006) operationalise relationship quality between pig farmers and processors by referring to measurement constructs such as *satisfaction*, *trust*, *recommendation* and *commitment* as well as *processors' farmer-orientation* and *communication quality* and *intensity*. Based on these constructs, Spiller et al. (2005) identified significant differences with regard to the quality of farmers' relations with seven German slaughterhouses. The empirical results indicate that this might be due to different legal forms of cooperatively and privately owned processors.

The considerable presence of cooperatives in the northwestern German pork production system as well as differing economic principles according to which cooperatives and privately owned firms are organized allow one to take a closer look at whether cooperative structures influence farmers' network relations. The cooperative principle of self-help relates to a joint attainment of objectives by members of cooperatives (Großkopf et al., 2009). Consequently, in conjunction with the principle of identity, a cooperatively owned slaughterhouse has to improve both processing efficiency and producer returns (Sykuta and Cook, 2001). For the pork production system, this leads to the hypothesis that cooperative structures in farmer-to-slaughterhouse relationships may, at least to a certain degree, reduce power asymmetries as well as opportunistic behaviour and thus enhance relationship quality. Opportunistic behaviour has been defined as "self-interest seeking with guile" (Williamson, 1985, p. 47). Incentives to behave opportunistically are clearly reduced when two technically separable production stages—in this case pig fattening and slaughtering—are organized under joint ownership (Joskow, 2005). Furthermore, a farmer-owned and -managed cooperative also reduces the power asymmetry that typically exists between farmers and much larger and much more resourceful processors (Pfeffer and Salancik, 1978). Both aspects can be assumed to have positive effects on relationship quality in agribusiness.

Moreover, the principle of self administration is usually realized by active involvement of members, i.e., farmers, in the cooperatives' executive as well as supervisory boards. These interlocking directorates limit the cultural and cognitive distance between producers and processors (Van Dijk, Duysters and Beulens, 2003) and improve cooperatives' farmer orientation, the latter being a variable that positively influences relationship quality (Schulze, Wocken and Spiller, 2006). Therefore, compared to privately owned slaughterhouses, cooperatives may help their members (or, more generally, their suppliers) develop a more central position in business networks due to better business relationships that strongly support information exchange. Nonetheless, since cooperatives have been changing continuously with regard to such aspects as firm size and recruitment strategies for executive and supervisory boards, the advantages of the cooperatives described above are challenged. Therefore, the actual influence of farmers' business relationships with cooperatives on farmers' participation in professional networks and choice of network partners deserves thorough analysis.

Based on these considerations, the following hypotheses guide the present paper:

H1: Cooperative structures in modern food systems influence farmers' network relationships and the type of network partners farmers cooperate with.

H2: With regard to the relationship between farmers and their processors, differences in the relationship quality are due to the differing legal forms of cooperatively and privately owned processors.

H3: The specific economic principles of cooperatives contribute to an improved relationship quality and a greater potential for trustful collaboration between farmers and cooperatively owned processors.

Hence, the study seeks to take a closer look at farmers' networks in general. Moreover, it analyses the influence of cooperative structures on

- (a) the intensity and quality of farmers' network relationships and
- (b) the type of network partners farmers prefer.

Relationship intensity and quality (a) was investigated on the basis of the business relationships between pig fattening farmers and meat processors. In order to investigate the "relationship quality", the measurement constructs (cf. Schulze, Wocken and Spiller, 2006) "*recommendation*" of the processor by the farmers, "*trust*", "*processor's farmer-orientation*" and the "*communication intensity and quality*" were operationalised in questionnaire-based interviews. The type of network partners farmers prefer (b) was analysed by means of an egocentric network analysis. The core element of our analyses is an empirical comparison between farmers who deal mainly with cooperatives and those who operate predominantly with privately owned companies. In this way, the stated hypotheses are tested empirically.

3 Methodology and data collection

The theoretical considerations outlined above guided a large-scale empirical study. Between November and December 2008, 110 pig fattening farmers were surveyed in extensive face-to-face, questionnaire-based interviews. The survey was carried out in the German states of Lower Saxony and North Rhine-Westphalia, a pig production agglomeration area. Windhorst and Grabkowsky (2008) characterise in particular the western part of Lower Saxony as one of the most efficient agricultural areas worldwide. The focus region is also characterised by obvious agglomerations of abattoirs and meat processors, service providers and training institutions. Accordingly, nearly 30% of the pigs slaughtered in Germany were processed in Lower Saxony in 2007 (Bäurle, 2008).

In the first part of the survey, according to the methodology of egocentric social network analyses (SNA) (Gerich and Lehner, 2006; McCallister and Fischer, 1978), open-ended questions concerning farmers' main advisers with regard to feeding stuff purchase, piglet/gilt purchase, marketing of slaughter pigs and overall economic decision-making (each with only one answer allowed) were asked in order to reconstruct farmers' personal network of advisers in business-related questions. In the second part, respondents' intensity and quality of network relations were surveyed by means of questions and statements with response options provided.

The intensity of respondents' network relations was addressed through statements such as "How often do you exchange business-related information with your [e.g., piglet/gilt supplier]?" or "How would you estimate the importance of information exchange with [e.g., advisory salesmen] for your own competitiveness?". The quality of the relationships was analyzed using the measurement constructs for "relationship quality" presented in section 2. Whereas the first section of the survey was characterized by open questions for egocentric network analyses, the second part consisted, for the most part, of five-point Likert scales from "-2 = totally disagree" to "+2 = totally agree". Data analysis was carried out using SPSS 17.0 for Windows.

4 Empirical results

About 73% of the respondents were farm managers; another 24% were successors already working actively on the farm. Thus, nearly all the questionnaires were completed by respondents who take part in the farms' decision-making processes. The farmers interviewed are on average 39 years old, and most of the respondents have a high level of agrarian education. More than 43% have an advanced agrarian degree and 35.5% have a master craftsman's certificate; another 15.5% studied agricultural sciences at a university. Almost 93% of the respondents earn their living solely from their farms, with pig fattening generating, on average, 60% of their agricultural income. The farmers interviewed keep on average 1,745 pigs (median: 1,350), with a minimum of 250 and maximum of 12,000 pigs. Although the respondents already have above-average herd sizes, 60% of the farmers state that they are planning to expand their capacities in the near future (average expansion projected: 1,100 pigs). These figures indicate that mainly future-oriented farmers were interviewed. Concerning the sales channels of the slaughter pigs, 80 respondents deal mainly with privately owned slaughterhouses, whereas 27 deliver to cooperative processors such as Westfleisch eG.

Farmers' network relationships

The initial step of the network analysis was to identify which potential actors specializing in pork production are integrated into the personal business network of the pig farmers interviewed. Figure 1 shows the frequency of information exchange between farmers and their service providers as well as the importance for respondents' competitiveness attributed to the exchange of business-related information. It can be seen that respondents have various network relationships and, correspondingly, assess the communication with several network actors as being significant for business success in pig fattening. It is not surprising that, for instance, veterinarians are key actors in respondents' business networks. Thus, more than 84% of the farmers state that they communicate frequently or very frequently with their veterinarian and 93% perceive the information received from the veterinarians as being significant.

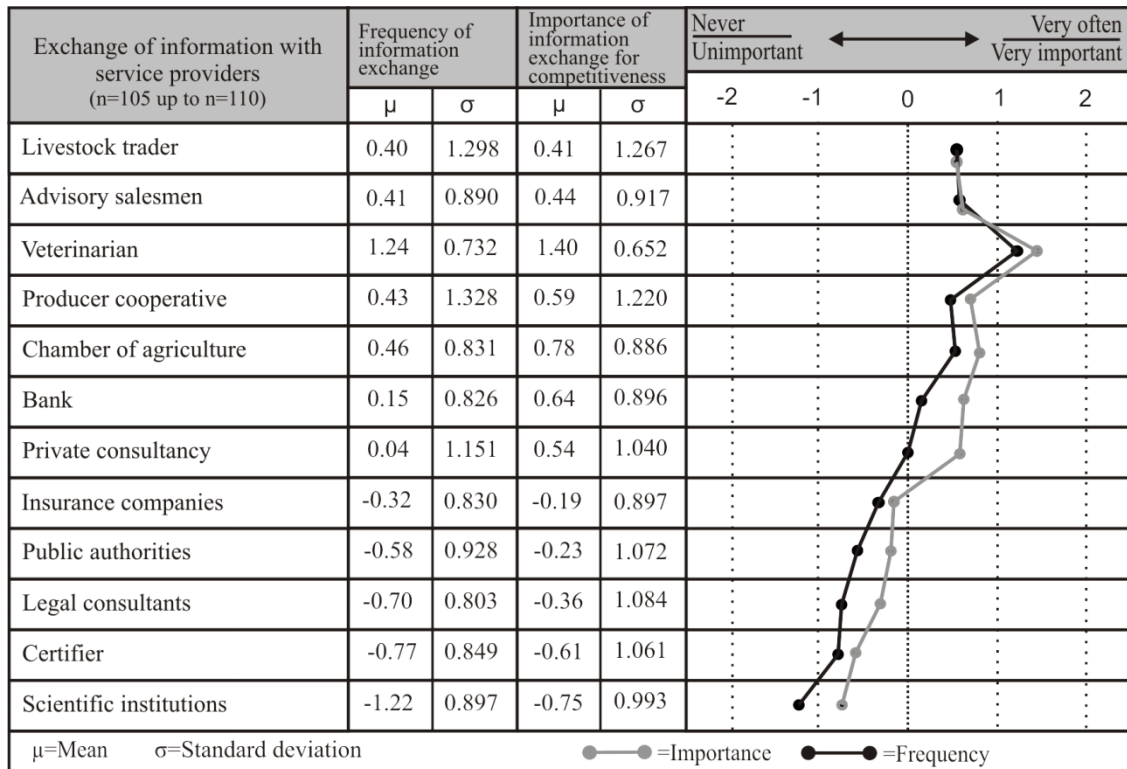


Figure 1. Farmers' exchange of information with service providers

Furthermore, descriptive findings show discrepancies between the stated relevance of information exchange with private consultants as well as banks and the actual intensity of communication with these network partners. It can be assumed that the relatively high importance of banks is due to increasing investment volumes in livestock housing construction, which increase the relevance of banks as financing partners. Furthermore, the debt ratios of livestock farmers with growth strategies have been increasing sharply in recent years. The empirical data also reveal which actors are of minor relevance in respondents' networks. Both intensity and importance of information exchange receive mostly negative ratings with regard to service providers such as insurance companies, public authorities, legal consultants, certification bodies and scientific institutions.

An analysis of the respondents' relations with potential suppliers and customers in the food chain indicates intensive interactions between farmers and feedingstuff companies (Figure 2). Business-related information stemming from feedingstuff companies are considered "important" or "very important" for the competitiveness of the farm by more than 86% of the respondents. Similarly, nearly 82% of the pig fattening farmers state that they "frequently" or "very frequently" exchange this information. More than 55% of the respondents have frequent contact with their piglet or gilt suppliers.

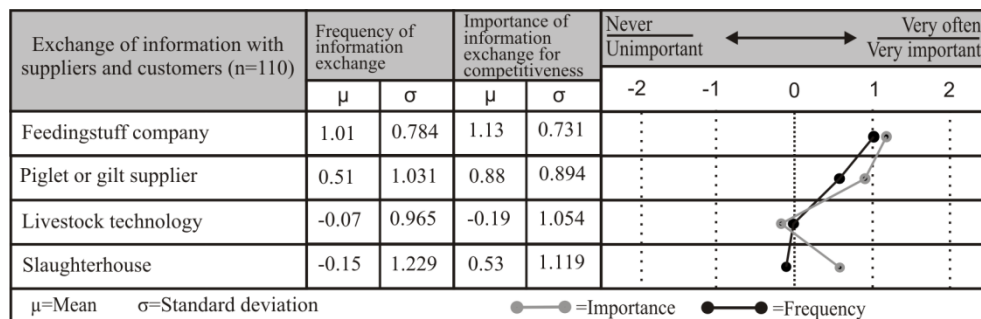


Figure 2. Farmers' exchange of information with suppliers and customers

Information exchange with livestock technology companies is less important, suggesting that information exchange with these partners takes place only in case of a technical investment but not in routine business processes. Although the above-mentioned literature considers the interactions between pig fattening farmers and slaughterhouses to be essential for chain performance, the exchange of business-related information between farmers and slaughterhouses takes place less frequently (Figure 2). Almost 38% of the farmers surveyed reveal that they "rarely" or "never" obtain business-related information

from their slaughterhouses. These initial findings indicate the need for further research since slaughterhouses are important partners in the routine business processes of pork production and, moreover, influence farmers' revenue in pig fattening through pig prices and payouts.

Relationship between farmers and slaughterhouses

Against this background, a closer look at this special relationship is needed, especially due to the fact that high standard deviations signal a heterogeneous level of communication. More than 33% of the farmers receive information frequently, but 28.7% report that they only communicate occasionally with their slaughterhouses in terms of the exchange of business-related information that goes beyond highly standardized transactional communication concerning issues such as slaughter weight or quantities supplied. Despite the relatively low frequency of communication, the majority of the farmers consider an exchange of information with slaughterhouses significant for the competitiveness of their pig fattening operations (Figure 2). However, even though farmers consider communication with their slaughterhouses crucial for their businesses, they perceive the amount of information received so far as insufficient.

Detailed bivariate analyses indicate that constraints in farmers' network participation regarding the relationship with their slaughterhouses may cause disadvantages at the farm level. By referring to the network theory, possible positive outcomes of farmers' active networking were operationalised in the survey through the following dimensions: i) *farmers' access to business-related information* (checked via three statements) and ii) *farmers' self assessment of business success in pig fattening* (checked via three statements and additional process data, including weight gain per day or mortality per rotation). The relationship quality was operationalised via dimensions such as trust, communication or recommendation of the business partner (cf. Gerlach et al., 2006). The results of correlation analyses displayed in Table 1 show significant links between the selected statements representing the outcomes of network participation (*level of information* as well as *business success*) and the statements used for operationalising the relationship quality between farmers and slaughterhouses. These findings confirm experts' opinions about the importance of good relationships between pig fattening farmers and their customers in terms of gaining business-related information (Meemken and Blaha, 2008; Plumeyer, Deimel and Theuvsen, 2008). Furthermore, the results show the relevance of good relationships with processors for farmers' business success.

Table 1.
Network participation and competitiveness

Correlations: Level of significance: p ≤ 0.05 *: p ≤ 0.01 **: p ≤ 0.001 *** n.s. = not significant		General extend of feeling informed about new developments in pig production	Perceived timeliness of the information received about developments in pig production	Farmers' self assessment of business success in pig fattening in the last three years
Recommendation	I can in good conscience recommend my slaughterhouse to other farmers	0.407 **	0.281 **	0.226 *
	My slaughterhouse always treats me fairly	0.321 **	0.209 *	n.s.
Trust	In general, I am sceptical of the information I receive from my slaughterhouse	-0.327 **	-0.261 **	-0.245 *
	I always choose the slaughterhouse which currently offers the best conditions	-0.255 **	-0.215 *	-0.245 *
Farmer orientation	The management of my slaughterhouse accounts for the interests of the farmers	0.268 **	0.217 *	0.221 *
Communication intensity & quality	The relationship between me and my slaughterhouse and is very impersonal	-0.291 **	-0.204 *	n.s.
	I am not in direct contact with my slaughterhouse	-0.223 *	n.s.	n.s.

The basic economic principles of cooperatives mentioned above lead to the assumption that there are differences with regard to farmer-to-slaughterhouse relationship quality depending on whether the respondent delivers to a private or a cooperatively owned slaughterhouse (*Hypothesis H2*). This is checked empirically by classifying the farmers surveyed into two groups and using mean comparison tests to identify significant differences between the two groups (Figure 3). The grouping was based on respondents' main sales channels for slaughter pigs—cooperatively or privately owned slaughterhouses. Suppliers of cooperatively owned slaughterhouses (Group 1) also include suppliers and members of cooperative or quasi-cooperative producing associations (EZGs) that run their own slaughterhouses. Of the 27 respondents in Group 1, 20 are members of a producing association (EZG) and eight farmers belong to a livestock marketing cooperative ("VVG") (multiple answers were possible).

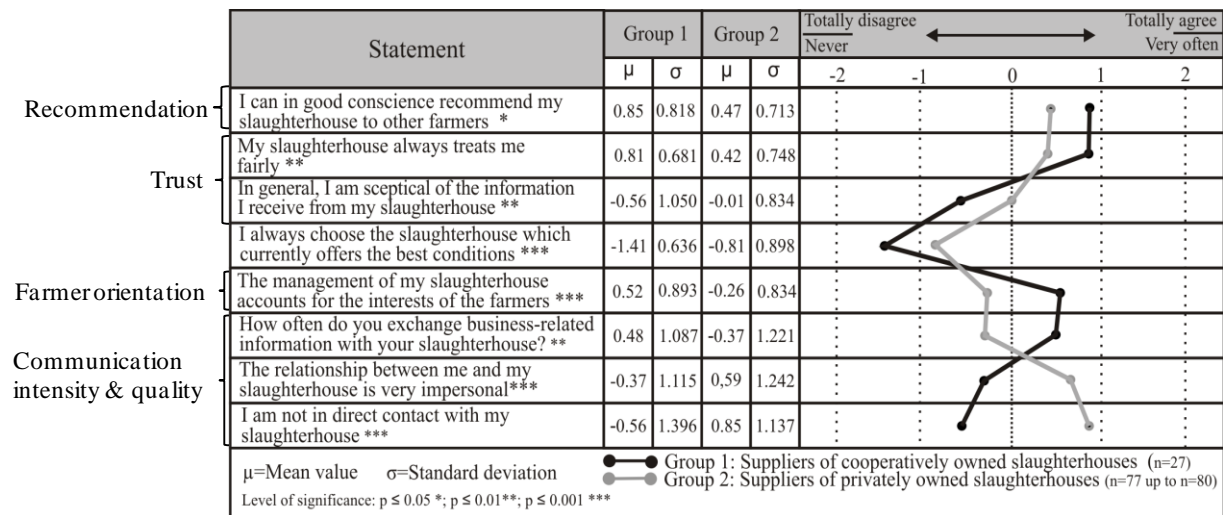


Figure 3. Information exchange with private processors and cooperatives

The results of the mean comparison tests indicate that farmers delivering to slaughterhouses characterized by cooperative structures rate all of the operationalised constructs of relationship quality significantly higher than farmers in the comparison group (*Hypothesis H3*). Particularly farmers delivering to cooperatively owned companies state they have a higher level of trust in, a greater degree of communication with and a more personal relationship with their slaughterhouse.

Farmers' network partners

Furthermore, the results of the survey show that farmers' network relations not only differ with regard to direct supply chain partners such as processors, but also concerning the kind of service providers chosen for collaboration in various business areas (*Hypothesis H1*). Significant differences in mean values can be found with regard to respondents' ratings of the general importance of collaboration with selected network actors (Figure 4). In contrast to respondents delivering to cooperatives, farmers dealing with privately owned slaughterhouses rate the importance of salesmen, company representatives and private livestock traders higher than the comparison group does.

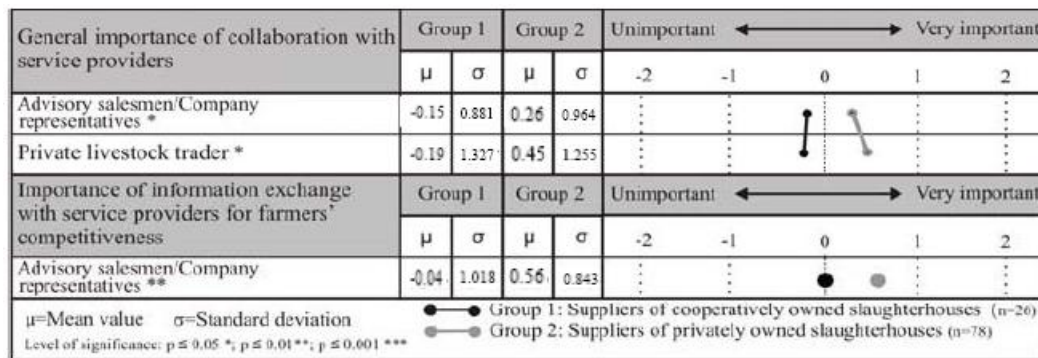


Figure 4. Farmers' network partners

Even at this point, these findings already lead to the assumption that farmers dealing with privately owned slaughterhouses collaborate more often with (private) firms in their specialized business network, whereas respondents having supply relationships with cooperatives (Group 1) tend to use different actors. In order to examine these differences in farmers' choice of network partners in greater detail, respondents had to answer open questions that are typically used in the above-mentioned egocentric social network analyses (egocentric SNA). The results shown in Figures 5 to 8 illustrate which actor or institution the respondents mentioned as their main adviser in the business areas of feedingstuff purchase, piglet/gilt purchase, marketing of slaughter pigs and overall economic decision-making (each with only one answer allowed).

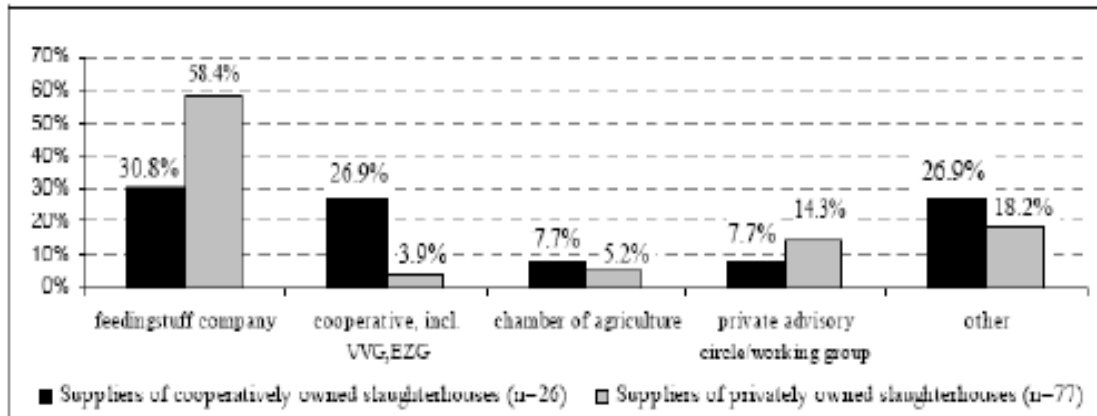


Figure 5. Main advisers of farmers in terms of feeding stuff purchase

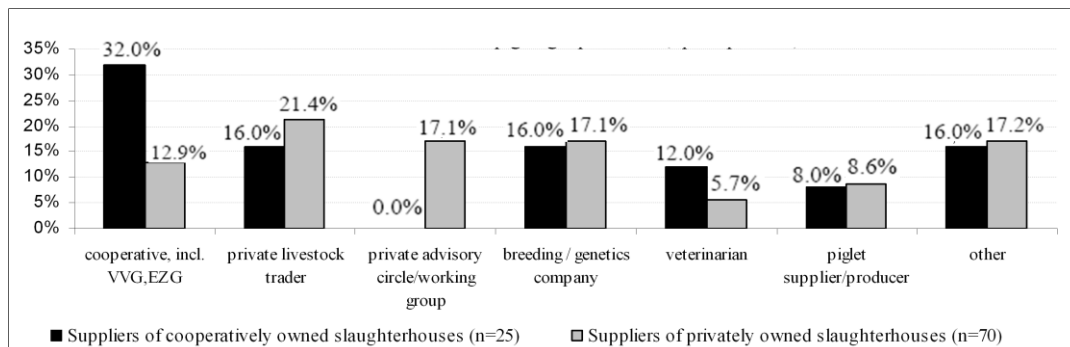


Figure 6. Main advisers of farmers in terms of piglet/gilt purchase

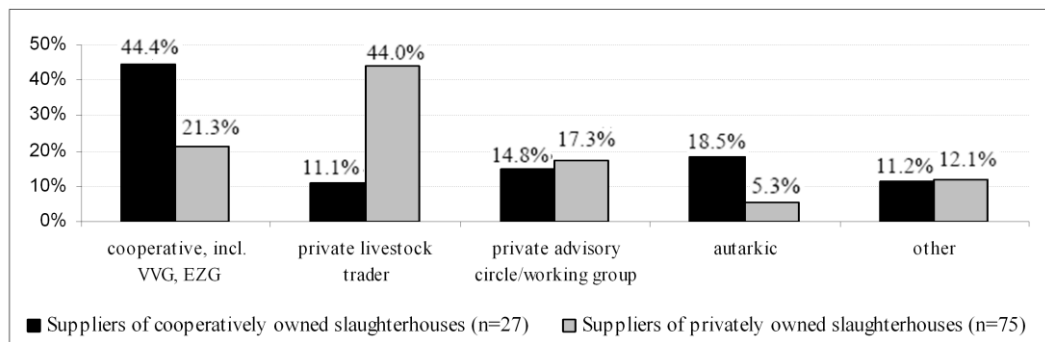


Figure 7. Main advisers of farmers in terms of marketing of slaughter pigs

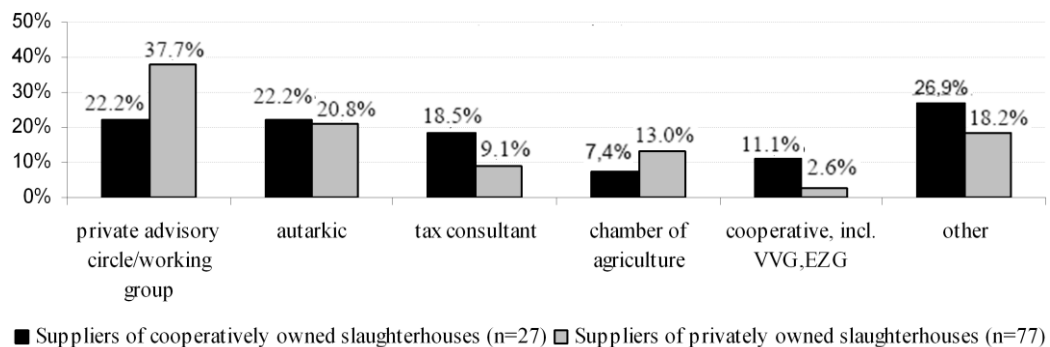


Figure 8. Main advisers of farmers in terms of economic decision making

Regarding feedingstuff purchase, the majority of the farmers use consultation provided by feedingstuff companies (Figure 5). But certain respondents, especially farmers dealing with cooperatively owned slaughterhouses (26.9%), refer to cooperative institutions like the livestock marketing cooperative ("VVG") or the quasi-cooperative producing association ("EZG") as their most important advisor. Cooperative structures are also of importance with regard to respondents' personal networks in terms of information and knowledge exchange regarding farmers' piglet or gilt purchases (Figure 6). Whereas, as hypothesized, private companies such as livestock traders (16% and 21.4%) or breeding/genetic companies (16% and 17.1%) are important communication partners in this field, cooperative institutions apparently also provide specific consultation services farmers make use of. Thus, nearly one-third of the farmers (32%) delivering to cooperatively owned slaughterhouses consider cooperatives their main advisor in terms of piglet or gilt purchases. Concerning farmers' main advisers in terms of marketing slaughter pigs (Figure 7), it is clear that (quasi-) cooperative institutions (including "EZG" and "VVG") as well as private livestock traders are of high importance, depending on whether respondents deliver to cooperatively or privately owned slaughterhouses.

Finally, when asked about respondents' overall main advisers regarding economic decision-making in pig production (Figure 8), farmers attach the highest importance to private advisory circles or working groups (22.2% and 37.7%). These are voluntary and mostly formal associations or consortiums of pig producing farmers with the objective of sharing knowledge and making use of continuous education as well as inter-farm benchmarking analyses. It is also interesting that more than 20% of the respondents do not name any network actor in the pork production system as their main adviser in terms of economic decision-making but mainly rely on themselves. In terms of economic questions, the farmers' answers display a heterogeneous weighting of the stated network actors who function as their overall main advisers. These findings reflect the multiplicity of business areas farmers often have to include into their general economic decision-making processes.

Regarding the open questions in the fields of piglet/gilt purchase as well as marketing of slaughter pigs, cooperative institutions are also considered the most important advisers by over 12% and 20%, respectively, of the respondents dealing with private slaughterhouses. The latter may be due to the fact that some of these respondents (35%) are members or suppliers of livestock marketing cooperatives ("VVG") that market and sell slaughter pigs on behalf of their associated farmers (Theuvsen and Franz, 2007). These livestock marketing cooperatives often also deliver slaughter pigs to private slaughterhouses, depending on the conditions on the spot market. As a consequence, such cooperatives are named as main advisers by some respondents in the group of farmers delivering to private slaughterhouses. On the one hand, this may to a certain degree limit the informative value of the present group comparisons. On the other hand, coefficients of contingency lead to the assumption that there are medium-to-strong links between respondents' classification into one of the two comparison groups and network actors chosen by farmers for giving advice. This holds true particularly with regard to farmers' main advisers regarding feedingstuff purchase (Cramer's $V = 0.543^{**}$) and the marketing of slaughter pigs (Cramer's $V = 0.427^{*}$).

In accordance with the indications based on the differences in the mean comparison tests, the results of the open questions by and large show that cooperative structures influence farmers' network participation in terms of the kind of network partners chosen. Whereas respondents dealing with privately owned slaughterhouses obviously prefer (private) firms and institutions (such as livestock traders, feedingstuff suppliers or breeding companies) as their main advisers and consultants, suppliers of cooperatively owned slaughterhouses distinctly prefer institutions characterized by cooperative structures, such as producing associations (EZG) or livestock marketing cooperatives (VVG). This can be explained by the fact that the majority of the farmers delivering to cooperatively owned slaughterhouses are members of EZGs (74.1%).

However, the findings presented in Figures 5 and 6 suggest that cooperative (and quasi-cooperative) institutions—especially EZGs and VVGs—have extended their primary core functions, such as bundling livestock, bargaining with abattoirs or organizing sale and transport of slaughter pigs. Moreover, by providing additional services, they have developed into focal network partners, especially for farmers who are already involved in cooperative structures. Besides the service of consultation regarding marketing and sales of livestock, farmers already involved in cooperative structures consider cooperatives to be central advisers, especially with regard to consultation regarding the selection of feedingstuff (Figure 5) as well as the purchase of piglets and gilts (Figure 6).

5 Discussion and conclusions

With regard to *hypothesis H1*, the findings of the present study reveal that cooperative structures in the meat production system influence pig fattening farmers' network participation concerning relationship quality with slaughterhouses as well as farmers' choice of network partners for information exchange and consultancy.

Regarding networking, there are differences in farmers' choice of network partners. In farmers' networks, cooperatives apparently take over the functions of private, specialized service providers by providing additional information and consulting services, for instance, concerning purchases of input factors and product sales. Accordingly, farmers dealing with cooperative customers predominantly make use of additional services provided by cooperatives such as producing associations (EZGs) or livestock marketing cooperatives (VVGs). These findings match evidence in the literature. Theuvsen and Franz (2007), for instance, determine with regard to cooperative livestock traders, that tailoring the service spectrum, and thus offering added value for the affiliated farmers, is a major source of competitive advantage. Similar findings were made in a more recent study of business models of German livestock traders (Voss and Theuvsen, 2009).

In contrast, the present findings show that the comparison groups delivering to private processors often rely on advice and information given by (private) firms and advisory salesmen (i.e., private livestock traders or feedingstuff companies), who are presumably consulting farmers at least somewhat under the guideline of earning money. They are therefore usually influenced, at least to a certain degree, by profit-seeking goals. In our study, the differences concerning preferred network partners are especially obvious with regard to the fields of feedingstuff purchase and, of course, the marketing of slaughter pigs.

This has two interesting *implications*. First, cooperatives should use their functions as important advisers within farmers' networks as starting points for developing more attractive services, such as the support of farmers' quality assurance activities (Theuvsen and Franz, 2007). The present network analysis indicates development potential in cooperatives' service spectra due to the fact that cooperatives are underrepresented in farmers' advisor networks concerning overall economic consultation (Figure 8).

Second, the added value of additional services has to be adequately communicated to cooperatives' suppliers and members, since farmers within cooperative structures often focus mainly on commercial prices brokered by the cooperative (Schulze and Schlecht, 2009). Nonetheless, especially for cooperative livestock traders, traditional core functions such as bargaining best prices for fattening farmers' slaughter pigs have remained yardsticks in farmers' perceptions of the performance of cooperatives. Cooperative livestock traders, who are often still led by unpaid voluntary or part-time managers, may especially consider professionalizing their management (Theuvsen and Franz, 2007) since the development of a balanced and customized mix of services requires additional organizational capacities and capabilities. In doing so, they may convince farmers of the advantages of joining a cooperative, be it a cooperatively owned slaughterhouse, a VVG or an EZG, and thus allow cooperatives to gain competitive advantages over alternative marketing channels, such as private livestock traders or privately owned slaughterhouses.

The results show that the pig fattening farmers interviewed use relationships with various actors in the specialized network when making decisions. But in the overall sample respondents' network participation is limited in the relationship quality between farmers and their slaughterhouses. However, the present findings confirm the theoretical consideration that this relationship is of particular relevance, since the present data analyses reveal a link between the quality of the farmer-to-slaughterhouse relationship and positive outcomes of network participation. This is underlined by the identified moderate, but significant correlations between the statements representing farmers' relationships with their slaughterhouses and farmers' perceived access to valuable business-related information as well as farmers' self assessment of their own business success.

Furthermore, with regard to *hypotheses H2* and *H3*, the results show that farmers delivering to cooperatively owned processors evaluate the relationship with their slaughterhouses significantly better than farmers dealing with private slaughterhouses. These findings agree with the evidence in the literature. James and Sykuta (2006) reveal that farmers trust cooperatives more than they do privately owned firms. Schulze, Wocken and Spiller (2006) show that cooperatively and quasi-cooperatively owned slaughterhouses (in that case, *Westfleisch eG* and *Boeseler Goldschmaus v.W.*) gain higher ratings in terms of German pig farmers' perceived relationship quality than privately owned processors.

The implication from these findings is that the good relationship quality with farms that we found in the present study provides a valuable basis for relationships with farmers and one that cooperative slaughterhouses should strengthen. A stable relationship may not only maintain suppliers' loyalty during

periods of low payouts like in 2008 but may also be valuable for a chain-wide implementation of new strategies in order to gain and sustain competitiveness in a highly competitive market. Innovative strategies often make high demands on chain-wide collaboration in terms of exchange of information concerning such issues as pioneering animal health systems (Breuer et al., 2008), risk-based post-mortem inspections (Mousing et al., 1995) and the implementation of higher quality standards to produce premium brand pork (den Ouden et al., 1996). With a strengthened relationship, cooperatives may be able to better motivate their suppliers to participate in such innovative projects even though farmers may face switching costs and higher prices. With regard to pork production in Germany, a rapidly developing net exporter, a more intensive relationship between farmers and their slaughterhouses may enhance chain flexibility. This is a valuable precondition for adjusting the production system in response to various customer demands in export markets, for instance, in terms of varying carcass characteristics (Makise, 2002) and continuously changing veterinary agreements (as with China) in terms of animal health and diseases.

We consider our study a first step toward acquiring more in-depth insights into farmers' networks and the influence of cooperative structures on farmers' participation. With regard to the evaluation of the relationships between farmers and the slaughterhouses they deliver to, there are at least two limitations in the present study from which future research foci can be derived. First, we used a rather simple measure of relationship quality. Future research should aim to extend operationalisation and, thus, improve measurement of "relationship quality". Second, there is a somewhat limited comparability between the groups of farmers delivering to cooperatively owned processors and farmers dealing with private slaughterhouses. Therefore, further research should examine the influence of the cooperatives' individual structural and formal marketing channel designs in greater detail. This concerns, in particular, the two-tier systems of marketing slaughter pigs with the mediating function of livestock traders, such as cooperative producing associations (EZGs) (Theuvsen and Franz, 2007), which are often structurally linked with cooperatively owned slaughterhouses. Moreover, further research should evaluate whether the different types of vertical coordination among cooperative processors, for instance, formal contracts or long-term informal relations, influence farmers' perceptions of the quality of their relationships with their customers.

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