

Determination of the willingness-to-pay for traceability of meat by means of conjoint analysis

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Abstract:

Willingness-to-pay by German consumers for the credence characteristic traceability of pork and turkey is analysed by means of the conjoint analysis additive model. The results indicate a different WTP regarding traceability of pork and turkey for specific consumer groups. A majority considers meat traceability as important. However, the distinctive sensitivity to price exhibited is a result of the fact that traceability is only of secondary importance as an assessment criterion, after price. Food retailers should adjust their communication and price policies in order to take advantage of the consumers' higher WTP for traceable products according to the sort of meat.

Keywords: conjoint analysis, willingness-to-pay, traceability, consumer behaviour, meat

1. Objective of the study

The objective of this study is to determine the willingness-to-pay (WTP) for traceability of meat (pork and turkey) by German meat consumers. This study is the first using the conjoint analysis additive model and conducting a simulation of the direct buying situation.

The willingness to pay a price premium for traceability is analysed by using labelling on self-service meat packages. The consumers' associations concerning the term traceability are examined.

In addition to the intensified discussion over the documentation requirements for agricultural businesses and the food industry that are required to be implemented under the new regulation (EC) No.178/2002, in regard to traceability of food, three questions arise. Firstly, whether consumers are prepared to accept increases in price due to traceability of meat, and whether they are willing to absorb the increased costs of traceability to retailers. Secondly, whether traceability is in itself of value to consumers, and thirdly, whether any additional information is associated with traceability, where in cases it is provided it would in turn lead to increased coordination costs along the meat supply chain. The questions posed focus especially on the understanding of, and communication to consumers.

By means of the results of this study, it is possible to infer implications for the retailers' price and communication policy, with regard to traceable meat and meat products.

2. Theory

Traceability is a credence characteristic. Consumers can not recognise either before or after the purchase, whether there is a guarantee that the product is actually traceable, and therefore consumers have to trust the labelling information provided by the supplier or retailer. This may have an influence on the WTP for the credence characteristic traceability.

Despite a growing interest in traceability of agricultural products, research up until now has only relatively little examined how consumers understand the need for traceability.

2.1 The opinion of consumers regarding traceability of meat

Previous studies concerning the opinion of consumers regarding meat traceability draw divergent conclusions in different countries.

Due to their heterogeneity, consumers across Europe have divergent associations, perceptions and expectations with regard to traceability. Consumers understand traceability differently for different products (Chryssochoidis et al. 2006). Knowledge on and expectations towards traceability vary in different countries (Giraud et al. 2006b).

With respect to traceability characteristics, tracking meat products within the meat supply chain from producer to consumer, focuses on two types of characteristics: namely functional characteristics (such as organisational efficiency and meat chain monitoring) on the one hand, and process characteristics (such as origin and production methods) on the other. Functional characteristics are linked with the intrinsic opportunities of a traceability system. These characteristics can be regarded as the minimum requirements of a true 'traceability system'. Process characteristics deal with characteristics of the production process at different levels of the chain, i.e. they can be regarded as resulting from extensions of the minimum requirements. The tracking serves as a kind of peg for potential consumer benefits (Gellynck et al. 2001).

Consumers in Belgium differ in how strongly they value the necessity of meat traceability. Functional traceability characteristics, such as organisational efficiency, production chain and individual responsibility, are of high importance to Belgian consumers. These traceability characteristics obtain the highest scores on a 7-point scale, compared to process characteristics. Most important is the 'individual responsibility', as well as 'meat chain monitoring'. Organising the chain in a more efficient way is somewhat less important, but still more important than most of the process characteristics. The scores for all the functional characteristics are significantly higher than for the process characteristics. Extensions, with respect to process characteristics such as production methods, are less relevant to Belgian consumers and are only of interest to specific market segments, i.e. consumers with a more negative perception of meat quality and lower consumption levels. There will be a safety rather than a quality orientation (Gellynck et al. 2001).

Spanish consumers can be divided into three groups with regard to their opinion towards the legally mandated traceability and labelling system for beef. 21 % of the Spanish consumers have a positive opinion towards the European system and a great trust in beef safety. This group has a high beef consumption. 54 % of the Spanish consumers have mixed opinions. To them, the system offers advantages (increased trust in beef safety), but from their point of view also causes some disadvantages (higher production costs and prices). 25 % of the Spanish consumers have no opinion towards the traceability system, and this same group has the least trust in beef safety. Spanish consumers evaluate the advantages due to the traceability and labelling system for beef as very high, and evaluate the possible disadvantages as very low (Gracia et al. 2005).

In general, Dutch consumers have little knowledge on the subject of traceability (Gellynck et al. 2001; Giraud et al. 2003). Only a small proportion of the Dutch consumers have encountered the subject 'traceability of food' prior to the study. When formulating a definition of traceability, the majority of the Dutch consumers tend to focus on the land of origin of the product. The production process is rarely connected with traceability. The only benefit of a traceability system named by consumers is that the products could be specifically recalled in the case of safety problems. In their opinion, traceability does not lead to better product quality, and does not increase their trust in food safety. In general, Dutch consumers categorise information on food labels as incomplete and not trustworthy. Furthermore, the Dutch consumers are very critical of novel technologies for information transmission, such as RFID, because they are afraid that the rising costs may be forwarded to them. However,

people with food allergies disagree. For those with allergies, traceability of food means that they can more easily select food free from allergens. They evaluate a coupling of known allergens in products and customer cards from stores, in which the allergies of the customer can be recorded, as very favourable (van Rijswijk et al. 2006).

To the majority of consumers in France, Germany, Greece, Italy, Netherlands, Spain, Norway, Malta, Slovenia, Poland and Lithuania, traceability is a new topic, although the consumers state having heard of this term through the mass media. Consumers in these countries relatively often tend to confuse traceability and origin, and rarely consider safety or product recalls (Giraud et al. 2006b).

In some European countries labelling or a logo is sufficient as a guarantee for traceability. In other European countries, more information concerning the origin, the production chain, the ingredients, or the compliance with safety measures and regulations during the production process is demanded. Traceability of food products is perceived in each country heterogeneously (Giraud et al. 2006b).

In southern European countries (France, Italy, Malta, Slovenia and Spain), consumers are slightly more aware of the term 'traceability' than consumers in northern Europe. Southern Europeans consider traceability to be a buying and confidence criterion, whereas in the Netherlands and Germany it does not influence the participants' purchases. Consumers in France, Italy, Malta, Spain, Hungary and Norway relate the benefit of traceability to the concept of safety. In Greece and Lithuania, it is related to quality. In Poland traceability is associated with control and the withdrawal of infected batches (Giraud et al. 2006a).

One of the goals of the European Food Law is to restore consumer confidence in food quality and safety, and it is not yet understood whether the implementation of traceability systems can contribute to this goal. On the subject of how consumers perceive the role and potential impact of traceability within the supply chain, little is known up until now (van Rijswijk et al. 2006b).

2.2. Willingness-to-pay regarding traceability of meat

Previous studies concerning WTP for traceability of meat arrive at divergent conclusions in different countries with regard to the consumers' understanding of the term "traceability", as well as the acceptance of a price premium for the characteristic traceability. Differences exist, particularly if on the one hand consumers associate traceability simply with meat safety, or if on the other hand they associate it with further information concerning process characteristics and meat quality, thus influencing their WTP. Consequently, WTP for traceable meat depends on the consumers' perception.

Consumers in France, Germany, Greece, Italy, the Netherlands, Spain, Norway, Malta, Slovenia, Poland and Lithuania are not willing to pay a price premium for traceable products (Giraud et al. 2006).

Consumers in the Netherlands, in general, have little knowledge on traceability and primarily associate the benefit of traceability with food safety. The Dutch consumers have confidence that traceability systems in the Netherlands are well organised. While consumers are not satisfied with the information currently provided by product labels, they also report that the current labelling is overwhelming. Dutch consumers exhibit a low acceptance level for new systems offering traceability information. These results indicate that a format for information on food labels, being of direct use to the Dutch consumers, is required (van Rijswijk et al. 2006a). By consumers, traceability is primarily believed to be of importance in the case of product recalls. Traceability is not regarded to be a guarantee of the higher quality of products by Dutch consumers. They share the opinion that an effective tracing system for specific products (e.g. meat) should be standard, and that such a system should not cause an increase in product price. Dutch consumers indicate that information regarding traceability of a

product has no influence on their purchase choices and that they are not willing to pay for a tracing system (van Rijswijk et al. 2006a).

The WTP by Spanish consumers for beef labelled with a traceability certificate is a paradox in relation to their concerns with regard to food safety. Although Spanish consumers show increased concerns regarding food safety, they are not willing to pay a price premium for traceable beef. These consumers demand of the producers that food safety should be guaranteed without any additional charge (Angulo et al. 2005).

Issues related to food safety is of high importance to Spanish consumers, however the majority (72.5 %) of the consumers are not willing to pay an increased price for a certificate for traceability of beef (Angulo et al. 2005). There are three possible reasons for the reluctance to pay for the increased price: a) Consumers take the safety of the product for granted as a matter of course, and thus are not willing to pay a price premium for it; b) Consumers increasingly have concerns of food products, but not at the levels at which they would be willing to pay extra; and c) In the consumers' opinion, traceability is not sufficient to guarantee food safety. From the results one can conclude that Spanish consumers regard food safety as a basic obligation on behalf of the producers, and thus feel no obligation to pay a price premium for it (Angulo et al. 2005).

The WTP by consumers in the USA, Great Britain, Canada and Japan is higher for traceable meat than for non-traceable meat. The WTP rises further for traceability-provided characteristics (e.g. additional meat safety and humane animal treatment guarantees) (e.g., Dickinson et al. 2002; Hobbs et al. 2005).

For example, according to Dickinson and Bailey (2005), who employed Vickrey auctions to generate WTP data for red meat traceability and for related product characteristics, comparing experimental auctions in the United States, Canada, the UK, and Japan, consumers are willing to pay a nontrivial price premium for traceability (for pork: US 18 %, Canadian 7 %, Japanese 25 %, UK 19 %; for beef: US 7 %, Canadian 9 %). However, the same consumers show even higher WTP for the combined characteristics (traceability along with additional meat safety and the guarantee of humane animal treatment) (for pork: US 43 %, Canadian 21 %, Japanese 49 %, UK 34 %; for beef: US 35 %, Canadian 37 %). Consequently, WTP for traceability of meat is higher when coupled with these characteristics provided by traceability. Consumers in these four countries show different preferences, but these are similar in the USA and Canada, as well as in Great Britain and Japan. For red meat, the WTP by British and Japanese consumers for traceability is equal to their WTP for humane animal treatment or meat safety individually. However, the American and Canadian consumers value humane animal treatment and meat safety, individually, higher than traceability (Dickinson et al. 2005).

However, a significant proportion of consumers exist in all four countries which are neither willing to pay a price premium for traceability nor for characteristics that can only be verified by traceability systems. Dickinson and Bailey indicate that traceable products might warrant separate product lines rather than voluntarily implementing traceability on a general basis (Dickinson et al. 2005).

British consumers have different WTP for several characteristics. They have a higher WTP for meat products which are bundled with the three characteristics 'traceability', 'food safety' and 'transparent animal husbandry'. After this follow meat products with the characteristic traceability, followed by meat products with the characteristic food safety and then with the characteristic transparent animal husbandry. However, the difference between traceability and food safety is statistically insignificant. Consumers in the USA are also willing to pay the most for meat products bundled with all three characteristics. However, to them the characteristic food safety is the most important single characteristic of the three considered. After this follow the characteristics of traceability, and animal husbandry. Consumers in the USA and Great Britain would on average pay a price premium of about 20 % of the retail

value of a sandwich, in order to upgrade the meat in the sandwich to a similar meat with any of the enhanced individual characteristics, namely traceability, food safety or transparent animal husbandry (Dickinson et al. 2002).

Canadian consumers are willing to pay a price premium for traceable meat and quality assurance - however, for beef proportionally more than for pork. The WTP by Canadian consumers for beef with a quality assurance regarding food safety and on-farm production methods, is higher than for a simple traceability assurance. Consumers in Canada are more likely to place a higher value on quality verification systems where the provision of additional quality assurances is facilitated by traceability systems, than on traceability alone. Traceability, combined with quality assurance, appears to be of higher value to Canadian consumers. Given that traceability bundled with quality assurance has proved to be more significant and advantageous than traceability alone, the Canadian consumers' WTP for quality assurance bundled with meat traceability is higher (Hobbs et al. 2005).

3. Methodology

For product design, it is essential to know which contributions the different characteristics contribute to the total utility of a product. Through the alteration of a single characteristic, the total utility by consumers can be maximised, and thus increase the consumer demand for a product. In market research, conjoint analysis is used, based on the empirically collected total utility values, to measure the contribution of single characteristics to the total utility (e.g., Backhaus et al. 2006).

Conjoint analysis provides an analysis of the utility of products, with specific characteristics, resulting for the consumers. This method examines which contribution a specific characteristic, and accordingly the characteristic value of a product, makes to the total utility of the product to consumers. In other words, the use of a product by consumers is broken into the utility contributions of single product characteristics. With conjoint analysis, it is possible to identify the changes in consumer preferences due to the change of a single specific product characteristic (Homburg et al. 2006).

Conjoint analysis is used in the case of an indirect customer survey, where questions are posed as to the price related aspects in relation to performance characteristics of the product being studied. Thus, the price is no longer the central issue, rather it is one of several characteristics. In regard to indirect customer surveys, conjoint analysis is very close to reality, thus the survey requires an explicit balance between price and perceived utility (Homburg et al. 2006).

In this study, the WTP by consumers for traceability is analysed by means of the conjoint analysis additive model. The conjoint analysis additive model is based on the additive composition rule, where it is assumed that individuals just "add up" the values for each characteristic (i.e. the part-worths of the levels) to obtain the total value for a combination of characteristics. Thus, the total utility of any defined stimulus can be calculated as the sum of the parts. On basis of this initial hypothesis, it is possible to determine the relationship of the characteristic price in relation to other product characteristics, and thus deduct information for price policy (e.g., Hair et al. 2006, Backhaus et al. 2006).

By means of the results of conjoint analysis, marketing decisions can be supported in many fields, particularly in product and price policy. With regard to product policy, the use-of-potential analysis, conducted in the context of conjoint analysis, may determine which product characteristic values make a contribution to consumer benefit. Based on this, it comes to a decision about the product redesign as well as the revision of already existing products (Homburg et al. 2006). With regard to price policy, it is among other things possible by the means of conjoint analysis, to determine the WTP by consumers for a certain increased efficiency (e.g. by quality, service, design) (Homburg et al. 2006).

The data basis of this study is a consumer survey with a sample size of $n = 128$ in April 2007 in Munich/Germany. The consumer survey took place in a store of a food retailer, in order to represent a fairly realistic buying situation. For the survey, people were chosen who are responsible for the shopping for the household as well as shopping for the meat consumed in the household. The consumers have on average a fairly high level of education and high incomes. Only a small number of families were represented.

For this research, the meat products selected were pork and turkey. The reason behind choosing pork and turkey is that these meat products are in high demand from German consumers. As concerns over BSE could influence the survey and result in an over presentation, beef was not included in this analysis.

In the conjoint analysis, the private label "Birkenhof", the price, the German "QS label", and a symbol for traceability of packaged pieces of meat are considered as product characteristics. QS is the abbreviation for a quality assurance scheme, covering all stages of the meat supply chain. In the QS system, all companies active in it are working towards a common goal, within the association, of active consumer protection. The QS label and the private label Birkenhof which were used were copied from the actual symbols in use. The symbol for traceability of the presented pieces of meat is imaginary and was created by the author for this study.

In the fairly realistic buying situation, realistic meat packages, made available by the food retailer and labelled according to the food retailer's labelling pattern, were shown to the consumers.

The questionnaire is composed of four parts. The first part contains questions as to the frequency of the consumption of pork and turkey, as well as to preferred shopping venues. The use of two conjoint analyses with pork and turkey follows in the second part of the questionnaire. The third part of the questionnaire focuses on questions concerning traceability as well as the QS label, to determine the awareness of the surveyed consumers for these two properties in the case of meat. Socio-demographic data of the consumers are identified in the fourth part of the questionnaire.

For the characteristic 'price', there are three parameter values and for the characteristics 'private label', 'QS label' and 'traceability', there are in each case only two. The parameter values are combined to an orthogonal design of eight products for each meat sort (pork and turkey) (Backhaus et al. 2006).

According to the method of ranking order, the consumers were asked to sort each of the eight products for pork as well as each of the eight products for turkey according to their preference. The smaller the ranking score, the higher is the respondent's preference for the particular products (Backhaus et al. 2006).

4. Main findings

4.1 Results of conjoint analysis

The conjoint analysis indicates in the case of pork fillets ('Schweineschnitzel') and turkey fillets ('Putenschnitzel'), that the product with the highest total utility is that which is labelled as traceable, and has the QS label, on the packaging of the private label Birkenhof, that can be obtained for an inexpensive price. For turkey and pork fillets the price is ranked first, with 37 %. Second ranked is traceability, with approximately 27 %. The private label Birkenhof and the QS label play a lesser role (between 17 % and 18 %).

A comparison of the results of both conjoint analyses for pork and turkey fillets shows that the differences between the two sorts of meat are minimal. The rankings, with respect to the importance of the four characteristics price, traceability, the QS label, and private label, are the same for both sorts of meat. The consumers ranked price and the private label as slightly more important for turkey fillets, than as for pork fillets. In contrast, for pork fillets, the

property of traceability and the QS label were ranked as more important. However, the differences in the relative importance for the two sorts of meat were at the maximum one percentage point.

4.2 Willingness-to-pay of several subgroups of the respondents

In order to analyse the WTP of the various subgroups of the consumers in relation to the characteristic traceability, the consumers were divided based on respondent specific variables and separate conjoint analyses were done for these subgroups. Thus, in this manner the WTP by these consumer groups was determined and differences between the groups were identified.

Differentiation of demographic characteristics

The relationship between income, sex, education, age, profession, size of household and number of children of the consumers, and their WTP for traceability of meat was examined.

The following tables (Table 1-5) show the relative importance of the various characteristics private label, the QS label, traceability and price for the different subgroups.

Income

The comparison of the various income levels of the consumers shows that the characteristic traceability is of great importance, particularly to the income groups of 900 to 1,299 € and 2,600 to 4,499 €. In this case, the importance of this characteristic for the two sorts of meat is over 30 %. The income group of 2,600 to 4,499 € is characterised by a WTP for the characteristic traceability. From this income group, the characteristic traceability is ranked as more important than price, and is also placed before the other characteristics. Consumers with the lowest income level (< 500 €; 500-899 €) first consider price. For the income group 1,300 to 1,499 €, the private label Birkenhof is of great significance.

The following table (Table 1) shows the relative importance of the income per demographic subgroup.

Table 1: Relative importance of the income per demographic subgroup

Income	Pork [%]				Turkey [%]			
	Label	Seal	Tracea.	Price	Label	Seal	Tracea.	Price
< 500 €	19.58	21.26	13.23	45.93	17.99	20.07	14.02	47.92
500-899 €	13.16	16.60	12.95	57.23	12.03	16.74	15.23	56.00
900-1299 €	10.29	13.96	34.80	40.95	10.75	12.42	32.82	44.02
1300-1499 €	37.46	16.11	27.52	18.91	37.46	16.11	27.52	18.91
1500-1999 €	15.19	17.12	22.48	45.21	14.20	20.34	23.11	42.35
2000-2599 €	17.73	17.15	25.12	40.00	19.48	18.98	23.47	38.07
2600-4499 €	15.98	21.07	37.13*	25.81	.00	.00	64.71*	35.29
≥ 4500 €	19.26	16.23	32.17	32.34	21.77	18.24	29.11	30.88
n.a.	19.57	17.28	25.28	37.86	17.89	18.29	23.79	40.04

* Fields in bold identify the presence of a WTP of this specific subgroup for the characteristic traceability

Sex

The results also indicate that male consumers rank traceability of meat higher than female consumers do. For pork fillets, male consumers indicate a WTP for traceability of the meat. The characteristic traceability, in its relative importance, is ranked higher than other characteristics. Female consumers tend to be price oriented in their evaluation of the packages of meat, and evaluated the significance of price at almost 40 %.

The following table (Table 2) shows the relative importance of the sex per demographic subgroup.

Table 2: Relative importance of the sex per demographic subgroup

Sex	Pork [%]				Turkey [%]			
	Label	Seal	Tracea.	Price	Label	Seal	Tracea.	Price
Female	18.00	16.80	25.37	39.82	18.49	17.06	24.72	39.73
Male	15.34	20.83	32.11*	31.71	15.77	20.25	30.45	33.53

* Fields in bold identify the presence of a WTP of this specific subgroup for the characteristic traceability

Education

The subgroups with different educational levels barely differed in their evaluation of the characteristic traceability. The characteristic traceability of turkey fillets is ranked by all groups, with the exception of secondary school (Realschule) graduates, as the second most important criterion after the price. A WTP for traceability of meat, in relation to the level of education, could not be determined.

Age

The comparison of the different age groups results in that the characteristic traceability is of great importance to the survey subgroups of the age 46 - 55. This age group indicates that it is willing to pay for traceability of turkey fillets. Further, the age group of >65 indicates that it is willing to pay more for traceability of pork fillets. For the other age groups, price is rated to be of primary importance.

The following table (Table 3) shows the relative importance of the age per demographic subgroup.

Table 3: Relative importance of the age per demographic subgroup

Age (years)	Pork [%]				Turkey [%]			
	Label	Seal	Tracea.	Price	Label	Seal	Tracea.	Price
≤ 25	18.15	17.07	25.61	39.16	16.79	16.79	26.00	40.25
26-35	16.79	19.33	25.87	38.02	16.62	19.83	24.47	39.08
36-45	16.48	20.72	28.15	34.65	17.01	19.59	27.02	36.38
46-55	13.83	17.17	32.79	36.21	26.63	17.26	33.19*	33.18
56-65	11.84	15.78	24.53	47.85	14.72	14.90	22.25	48.13
> 65	25.13	17.72	29.72*	27.42	26.43	18.27	27.53	27.76

* Fields in bold identify the presence of a WTP of this specific subgroup for the characteristic traceability

Profession

In the various profession groups, the group 'retired' indicates a WTP for traceability of meat for both turkey and pork. In comparison, of all consumers, the group 'unemployed' values the characteristic traceability very little. In this group, the price is the most important factor in the evaluation choice. The other professional groups barely vary in the value placed on the characteristic traceability.

The following table (Table 4) shows the relative importance of the profession per demographic subgroup.

Table 4: Relative importance of the profession per demographic subgroup

Profession	Pork [%]				Turkey [%]			
	Label	Seal	Tracea.	Price	Label	Seal	Tracea.	Price
Apprenticeship	18.03	20.41	22.28	39.28	17.11	20.32	22.31	40.26
Worker	9.87	25.70	26.57	37.86	13.16	18.59	22.12	46.13
Employee	15.63	17.48	28.25	38.86	15.12	17.96	27.72	39.20
Self-employed	21.98	20.20	28.48	29.34	20.85	20.87	28.55	29.72
Retired	18.56	16.06	34.06*	31.33	29.17	15.82	33.12*	31.90
Homemaker	19.36	17.17	27.92	35.55	24.26	17.47	24.04	34.23
Seeking work	3.79	10.84	10.84	74.52	3.29	10.34	16.93	69.43

* Fields in bold identify the presence of a WTP of this specific subgroup for the characteristic traceability

Size of household

The comparison of the different household sizes shows that from all consumers, especially the four person household values traceability of meat; however the price is even a more significant factor for this group. Thus, a WTP for traceability of meat is not found. In addition, the other sizes of household groups also do not indicate a WTP for the characteristic traceability.

Number of children

The grouping of consumers by number of children shows that the characteristic traceability is of most importance in households with two children. This group also exhibits a WTP for traceability. The characteristic traceability, in its relative importance, is ranked higher than other characteristics. All other remaining groups place price the highest.

The following table (Table 5) shows the relative importance of the number of children per demographic subgroup.

Table 5: Relative importance of the number of children per demographic subgroup

Children	Pork [%]				Turkey [%]			
	Label	Seal	Tracea.	Price	Label	Seal	Tracea.	Price
none	16.29	18.40	27.09	38.22	16.76	18.63	25.56	39.05
1 child	16.07	19.33	28.80	35.81	17.05	17.63	29.76	35.56
2 children	25.72	16.39	32.82*	25.07	25.63	16.37	33.40*	24.61
3 children	14.10	.00	14.10	71.79	14.10	.00	14.10	71.79

* Fields in bold identify the presence of a WTP of this specific subgroup for the characteristic traceability

Consumption habits

The WTP for the characteristic traceability differ for turkey and pork fillets among the consumers, with the frequency of meat consumption.

Persons that consume pork fillets very frequently (4-7 times a week) rank traceability of meat higher than those that consume pork less often. The consumers that frequently consume meat rank price only slightly higher in its importance as traceability. The private label plays in this group only a minor roll. With very rare consumption of pork (<1 time a month), more value is placed on the price, however traceability of meat is given a relative importance of 28 %. A WTP for the characteristic traceability could not be established for any of the groups. The price is considered to be the primary evaluation criterion by all groups.

In the case of turkey, increased meat consumption leads to an increased orientation on the price. Consumers with a more frequent consumption of turkey meat consider the characteristic traceability to be of lesser importance, compared to those that consume turkey less often.

Consumers that consume turkey less than 1 time a week value the characteristic traceability the most highly of all the groups.

In conclusion, the expectation that consumers viewing traceability of meat as necessary are also willing to pay an increased price, is confirmed by this study for both sort of meat. These consumers are roughly 70 % of the sample size. Thus, the characteristic traceability is measured to be of great significance, and that is reflected in the WTP of several subgroups in the survey. In the evaluation of the relative importance of the characteristic traceability, it should be noted that there is a marked emphasis on price orientation for some consumers, therefore traceability in general is only the second most important criterion, after price.

4.3 Traceability as viewed by consumers

The associations held in relation to the term traceability by consumers were determined. In regard to the associations held about this characteristic, different subgroups of consumers were generated and their WTP was evaluated. In this manner the relationship between the associations about the characteristic traceability of the consumers, and the related WTP of consumers was clarified.

Associations with the term traceability

Approximately a fourth of the consumers have no concept about the term traceability. For the majority of the consumers (74.2 %), the term traceability is not unknown, and at least one response regarding it is made (n=95).

42.11 % of the consumers that offer an association to the term traceability, link traceability of meat specifically with the agricultural producer where the animals are raised. The majority of the consumers that respond regarding traceability also associate the source of the meat, but do not name only the agricultural producer, but also indicate multiple stages along the meat supply chain (agricultural producer, slaughterhouse, meat cutting plant). 20 % of the consumers respond more expansively to the term traceability, and include information on the country of origin and the region of origin. It is unclear if those consumers mean by this the agricultural producer, or if they mean a further point in the production of meat, such as the location of the slaughterhouse. Only 3.16 % of the consumers specifically mention the slaughterhouse.

22.11 % connect with the term traceability that information on animal husbandry practices should be made available at the time of the meat purchase. In this category is included, for example, information on the animal breed, feeding practices, or organic rearing methods. As this is frequently linked with the association with humane animal treatment (18.95 %), responses regarding species correct rearing practices fall into this specific special category. 24.21 % of consumers responding with associations to traceability link traceability with control and safety, in the case of food safety problems. Quality of meat is associated by 13.68 % of consumers with traceability. Only a few of the consumers (6.32 %) associate with the term traceability regional products, which are linked with shorter transport routes. Shorter transport routes are associated not only with a more environmentally friendly, but also a more animal friendly production chain.

Relationship between WTP and associations with meat traceability

The following presents the relationship between the associations of consumers with the term traceability and the WTP for the characteristic traceability.

The conjoint analysis of turkey fillets indicates that consumers who associate the term traceability with the ability to trace a product back along the meat supply chain, and accordingly, information on the breeding of the animal, or with species correct animal rearing

practices, rate traceability as the most important evaluation criterion. Traceability of meat is found to be more important than the price of the product, in other words, they are willing to pay an increased price. Consumers that associate traceability with regional foods and short transport routes also consider the characteristic traceability to be of higher relative importance than price. However, for this group of consumers, the private label Birkenhof is the most important evaluation criterion.

The results of the conjoint analysis confirm that in the case of pork fillets, for consumers that associate traceability with the ability to trace a product along the meat supply chain, and accordingly information on animal breeding, or species correct animal rearing methods, the characteristic traceability is the main evaluation criterion. In addition, consumers that associate traceability with the region view this as the most important characteristic for pork fillets. The private label is viewed by this group as the second most important evaluation criterion.

The consumers that associate with traceability the origin, safety, or quality, view the product price, for both pork and turkey fillets, to be the most important evaluation criterion.

Query on the target-actual value situation of traceability of meat

The address of the agricultural producer is of great interest for German consumers. The majority (55.5 %) assumes that by traceability, the retailer where they have chosen to shop can provide the address of the agricultural producer upon request. 36.7 % hold a contrary opinion. A total of 68.8 % of the consumers view this information on the traceability of meat as necessary.

52.3 % of the consumers assume that they can upon request obtain the address of the slaughterhouse from their retailer. For 58.6 % of the consumers, the availability of this address from the retailer is also viewed as necessary. 32 % of the consumers are of the opinion that the address of the slaughterhouse is not necessary information that must be known by the retailer.

As for the address of the meat cutting plants, only half of the consumers think that it is possible to obtain this information from the retailer, through traceability. The majority of the consumers by their own admission have for the first time encountered the term meat cutting plant in this survey. Nevertheless, only a very small amount of the consumers answers this question with “Do not know” (9.4 %). 55.5 % view the availability of the address of the meat cutting plant from the retailer as necessary. 35.2 % hold the opposite opinion.

Relationship between manifested interest in meat traceability and WTP for traceability

For consumers who value traceability as important, or respectively, unimportant, a separate conjoint analysis for both sorts of meat was conducted. Thus, the relationship between the consumers’ manifested interest in traceability of meat and the WTP for the characteristic traceability is determined, and gaps between their view and behaviour is portrayed.

In general, 60.9 % of the consumers consider the ability to trace products back as very important. Only 19.5 % of the consumers view traceability as unimportant. In addition, 19.5 % of the consumers answer this question with “Do not know”.

A comparison of responses of the consumers, in respect to the necessity of meat traceability, was conducted with the ranking of products by means of conjoint analysis for pork. Consumers that consider traceability of meat to be important also rank products with this information higher in the conjoint analysis than those consumers that consider traceability to be unimportant, or that answered the question with “Do not know”. The characteristic traceability is the most important evaluation criterion for consumers that consider traceability of meat to be important, and as a result they are willing to pay an additional amount for this characteristic.

Among consumers that consider traceability to be unimportant, an orientation on price predominates. For this group, price has a higher and traceability has a lower relative importance, as compared to consumers who consider traceability to be important. Despite the indicated low estimated value of meat traceability, the corresponding labelling is given a relative importance by this group of 21 % in the conjoint analysis. Thus, the importance of this characteristic is about equal to that of the private label Birkenhof, and is considered to be more important than the QS label.

The comparison of the answers from consumers with the ranking of the products through a conjoint analysis for turkey fillets also shows that consumers, who through their own admission consider traceability of meat to be important, also prefer the correspondingly labelled meat package in the conjoint analysis. This subgroup of consumers is also willing, in the case of turkey fillets, to pay more for the characteristic traceability.

Consumers that have no concept about the term traceability oriented their evaluation decisions, for both pork and turkey fillets, less on the characteristic traceability as compared to those that know the term and consider it to be unimportant. A gap between the consumers' view and behaviour exists therefore only for consumers that indicate that they consider traceability to be unimportant, yet in actual evaluation decisions attach a relatively high value of 21 % to it.

4.4 Perception of traceability along the meat supply chain

When questioned on the target-actual value comparison of traceability of meat, the responses of the German consumers indicate that they prefer rather that the address of the agricultural producer is available from the retailer than that of the slaughterhouse or meat cutting plant.

When consumers were questioned by an open question on their associations with traceability, the slaughterhouse and meat cutting plant are only rarely associated with the term. Most often consumers associate with traceability the agricultural producer. They expect that traceability of meat means that the address of the agricultural producer is made available from the retailer. In respect to the associations of the consumers on traceability of meat, it is determined that the address of the agricultural producer provides a sense of security to consumers that expect information on the breeding and species correct rearing practices. Additionally, the two characteristics 'quality' and 'region' could be brought into association with the address of the agricultural producer.

In contrast to the question about associations with the term traceability, the majority of consumers report no knowledge on the seal when questioned about the term QS label. Further, only a few of the consumers take the QS label into consideration as being necessary. Consumers rate a traceability label as more significant than the QS label.

5. Conclusion & management implications

The results show that German consumers relate traceability to more than only a labelling of origin. Those consumers which also associate traceability of meat with several production procedures and humane animal treatment are willing to pay a price premium for traceability of meat.

The results of this data collection provide evidence that specific consumer groups show a WTP for traceability of meat. Thus, male consumers, consumers at the age of 46 to 55, retired people, and consumers with an income of 2,600 to 4,499 €, as well as families with two children, are willing to pay a price premium for the characteristic traceability of pork and turkey. The characteristic traceability is valued more highly by these demographic subgroups than the product price and the other conjoint characteristics. The majority of interviewed consumers consider traceability of meat as necessary. However, the results of the conjoint analyses show in the case of pork, as well as in the case of turkey, that the price of meat is

still of great importance. The distinctive sensitivity to price exhibited by many of those interviewed is a result of the fact that for both sorts of meat, traceability is only of secondary importance as an assessment criterion after price, but before the criterion 'QS label', and the private label Birkenhof. The comparison of the results of both conjoint analyses for pork and turkey indicates that there is not much of a difference between both sorts of meat.

However, within the scope of this study, the issue of appropriate information as a conjoint characteristic is not addressed. It would be advisable to clarify if the integration of further information in the traceability system would result in a higher WTP from the remaining consumers, which currently do not associate traceability with this information. It is to be recommended that in further studies on the consumers' WTP additional information should be included in order to analyse their significance. Thus, food retailers could more effectively and more precisely modify their price and communication policy to maximise the WTP on the part of consumers.

In conclusion, German consumers have different associations concerning traceability, and that this has an impact on their WTP for traceable meat. The majority of interviewed consumers consider traceability of meat as necessary. However, the associations that consumers have in regard to traceability, and their information requirements, should also be considered when analysing the WTP by German consumers.

By means of the results of this empirical study, food retailers may adjust their communication and price policies, in order to take advantage of the consumers' higher WTP for traceable products, according to the sort of meat. Traceable products need to be labelled clearly so that consumers can accurately identify these products. Appropriate product labelling should clearly communicate traceability of the product, as well as clarify the definition of traceability.

Bibliography

Angulo, A.M.; J.M Gil and L. Tamburo, 2005. Food safety and consumers' willingness to pay for labelled beef in Spain. In: *J. Food Prod. Market.*, 11(3), 89-105.

Backhaus, K., B. Erichson and W. Plinke, 2006. *Multivariate Analysemethoden. Eine anwendungsorientierte Einführung*. 11th edition. Berlin: Springer (Springer-Lehrbuch), 831 pp.

Chrysochoidis, G.M., O.C. Kehagia and P.E. Chrysochou, 2006. Traceability: European consumers' perceptions regarding its definition, expectations and differences by product types and importance of label schemes. Paper presented at the 98th EAAE Seminar: Marketing Dynamics within the Global Trading System: New Perspectives. Crete, Greece. 29 June - 2 July, 2006.

Dickinson, D.L. and D.V. Bailey, 2002. A comparison between U.S. and European consumer attitudes and willingness to pay for traceability, transparency, and assurance for pork products. In: Trienekens, J.H. and S.W.F. Omta (editors), *Paradoxes in food chains and networks*. Proceedings of the 5th International Conference on Chain and Network Management in Agribusiness and the Food Industry. Noordwijk: Wageningen Academic Publishers, 229-237.

Dickinson, D.L. and D.V. Bailey, 2005. Experimental evidence on willingness-to-pay for red meat traceability in the United States, Canada, the United Kingdom, and Japan. In: *J. Agr. a. Appl. Econ.*, 37 (3), 537-548.

Gellynck, X. and W. Verbeke, 2001. Consumer perception of traceability in the meat chain. In: *Agrarwirtschaft*, 50(6), p. 368-374.

Giraud, G. and C. Amblard, 2003. What does traceability mean for beef meat consumer? In: *Food Science*, 23, p. 40-64.

- Giraud, G. and R. Halawany, 2006a. Consumers' perception of food traceability in Europe. Paper No. 1066: 16th Annual World Food & Agribusiness Forum and Symposium of the International Food & Agribusiness Management Association. World Food & Agribusiness Symposium. Buenos Aires, Argentina. 10-13 June, 2006. Available at http://www.ifama.org/conferences/2006Conference/SymposiumFinal/1066_Paper.pdf.
- Giraud, G., R. Halawany and C. Amblard, 2006b. Food traceability in Europe: Consumers' knowledge and perception. Paper presented at the 98th EAAE Seminar: Marketing Dynamics within the Global Trading System: New Perspectives. Crete, Greece. 29 June - 2 July, 2006.
- Gracia, A. and G. Zeballos, 2005. Attitudes of retailers and consumers toward the EU traceability and labeling system for beef. In: *J. Food Distr. Res.*, 36(3), 45-56.
- Heidecke, S.-J., 2007. Ermittlung der Zahlungsbereitschaft für die Rückverfolgbarkeit von Fleisch mit Hilfe der Conjoint-Analyse. University of Hohenheim. Master's thesis, 137 pp.
- Hair, J.F., B. Black, B. Babin, 2006. *Multivariate data analysis*. 6th edition. Upper Saddle River, NJ: Pearson/Prentice Hall, 928 pp.
- Hobbs, J.E., D.V. Bailey, D.L. Dickinson and M. Haghiri, 2005. Traceability in the Canadian red meat sector: Do consumers care? In: *Can. J. of Agr. Econ.*, 53(1), 47-65.
- Homburg, C. and H. Krohmer, 2006. *Marketingmanagement. Strategie, Instrumente, Umsetzung, Unternehmensführung*. 2nd edition. Wiesbaden: Gabler, 1375 pp.
- Van Rijswijk, W., J.R. Cornelisse-Vermaat and L.J. Frewer, 2006a. Can traceability improve consumers' confidence in food quality and safety? The importance of matching information with consumer needs. Paper presented at the 7th International Conference on Management in AgriFood Chains and Networks. Ede, The Netherlands. 31 May - 2 June, 2006.
- Van Rijswijk, W. and L.J. Frewer, 2006b. How consumers link traceability to food quality and safety: An international investigation. In: *Proceedings of the 98th seminar of the European Association of Agricultural Economists: Marketing Dynamics within the Global Trading System: New Perspectives*. Chania/Crete, Greece. 29 June - 2 July, 2006.