MAIN LECTURE

Meat liking, animal welfare and consumer willingness to pay

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ABSTRACT - Three products (beef, lamb and chicken) were used to assess the effect of information about animal welfare on meat liking. Each experiment was planned in three tests. In the first test the consumers were offered the product, and asked to taste it and rate their liking receiving no information (perceived liking). In the second test the subjects received the information concerning farming conditions and their effects on animal welfare. They were asked to read the information and give their liking expectation for that product (expected liking). In the third test consumers were given the product along with the information sheet. They were instructed to read the information before tasting the sample and express their liking score (actual liking). Consumers rated the products on a nine-point hedonic scale. Only for beef, a second-price sealed-bid auction was used to assess consumer willingness to pay (WTP) according to the level of welfare of the animals used in the production process. Results from the three experiments showed that expectations induced by the information on animal welfare affected quality perception. Thus, if expectations were negatively disconfirmed (the product was worse than expected), the assimilation model was generally applicable, which means that hedonic ratings moved towards the expectations when external information on animal welfare was given compared to tasting without information. In addition, consumers showed a WTP for beef paired with information higher than its actual commercial value ($P<0.001$). In conclusion, information about animal welfare can be a major determinant of animal-based food liking and consumer WTP.

Key words: Meat liking, Information, Expectancy, Animal welfare, Willingness to pay.

Introduction - Meat quality attributes can be classified in two categories: those experienced before or during consumption (experience quality attributes: e.g. price and sensory properties) and those not experienced directly, such as healthiness, naturalness, ethical aspects, etc.. The latter should be communicated to be perceived as they are credence characteristics that can not be confirmed either before or after purchase (Grunert *et al.*, 2004). Ethical concerns are becoming increasingly important in the hierarchy of reasons to purchase meat. Although tangible aspects can markedly affect most purchasing decisions, independently from the knowledge and awareness of the consumer, intangible attributes are important for high-involvement consumers possessing enough beliefs and attitudes (McEachern and Schroder, 2002). In the last decade several studies reported an increasing interest of consumers in ethical aspects concerning meat production systems. In 1991, Harrington observed that meat consumption was considered a normal dietetic habit by the majority of consumers, who showed little interest in production systems and their effects on animal welfare. However, the same author noted that in the minority an increasing number of people was concerned about farming practices and production processes. Issanchou (1996) stated that, although animal

welfare was not a prominent aspect affecting meat choice, it would have acquired more importance in the near future, and Verbeke and Viane (1999) noted that animal welfare was likely to become a key issue in orienting consumer preference. More recently, Blokhuis *et al.* (2003) stated that the perception of food quality is determined, along with the overall nature and safety of the end product, also by the welfare of the animals producing that food. Therefore, the provision of information about the farming system may increase meat liking, consumer awareness and willingness to buy animal welfare friendly products.

Previous studies have been conducted on the effect of information about healthiness, nutritional properties, origin of the product and manufacturing process (e.g. Caporale and Monteleone, 2004) on food liking. These experiments have shown that expectations induced by the information can affect the quality perception. Thus, if expectations are either positively (the liking score of the product tasted without external information is higher than expected) or negatively disconfirmed (the product is worse than expected), the assimilation model is generally applicable, which means that hedonic ratings move towards the expectations when an external information is given compared to tasting without external information (Cardello and Sawyer, 1992).

The effect of information about animal welfare on three fresh meat products is reported. In addition, consumer willingness to pay (WTP) the extra costs associated with increased animal welfare standards is assessed.

Beef liking - This experiment aimed to assess the effect of information about animal welfare on beef liking. Products were obtained from the muscle *Longissimus dorsi*. Meat samples (10 x 10 x 1 cm) were grilled at 300°C to an internal temperature of 75°C. The study was planned in three tests involving 41 consumers. In the first test the consumers were offered beef from Podolian young bulls (PB) slaughtered at 18 months. They were asked to taste the meat and rate their liking receiving no information on the products (perceived liking). In the second test the subjects received only a sheet with the information concerning the Podolian farming system giving particular emphasis to the level of animal welfare. They were asked to read carefully the information and give their liking expectation for that product (expected liking). In the third test the consumers were given PB paired with the information sheet. They were instructed to read the information before tasting the sample and then express their liking score (actual liking). Consumers rated their liking on a 9-point hedonic scale labelled at the left end with "extremely unpleasant", at the right end with "extremely pleasant" and at the central point with "neither pleasant nor unpleasant" (Kähkönen *et al.*, 1996).

Table 1. Ratings (±S.E.) given to beef from Podolian young bulls (PB) during the three hedonic tests.

Type of rating	PB
Perceived liking (P)	6.34 ± 0.23
Expected liking (E)	7.22 ± 0.15
Actual liking (A)	6.78 ± 0.15
P-E	-0.88***
	Negative disconfirmation
A-P	0.44*
	Assimilation
A-E	-0.44*
	Incomplete

*=P<0.05; ***=P<0.001.

Results are reported in Table 1. The expected liking was significantly dif-

ferent from the liking expressed in blind conditions (P<0.001), thus indicating that a disconfirmation occurred. In particular, the consumers found the meat from Podolian young bulls worse than expected (negative disconfirmation). A significant difference between perceived and actual liking was observed with higher values for the latter scores (P<0.05).

In this case, the effect of information can be explained on the basis of the assimilation model, which can be observed when the actual liking of the product moves in the direction of the expectations. However, the assimilation was incomplete, as the difference between actual and expected liking was significant (P<0.05). The incomplete assimilation observed for this product was likely to be due to the important role played by the sensory properties of beef in the determination of actual liking (Napolitano *et al.*, 2007a).

Lamb liking - This trial was conducted to assess the preference for two products, meat from ewe-reared (ERL) *vs.* artificially reared lambs (ARL) slaughtered at 49 d of age, and verify the effect of information about the animal welfare on lamb acceptability. Products were obtained from the muscle *Longissimus dorsi*. Meat samples (3x3x2cm) were grilled at 300°C to an internal temperature of 75°C. The experiment was planned in three tests as described for beef and involved 84 consumers. The information given to the consumers concerned feeding (ewe *vs.* reconstituted milk paired with ERL and ARL, respectively) and rearing systems (with *vs.* without mother paired with ERL and ARL, respectively).

Results are summarised in Table 2. For both products the expected acceptability was significantly different from the liking expressed in blind conditions (P<0.001), thus indicating that a disconfirmation occurred. In particular, the consumers found the meat from ewe reared animals worse than expected (negative disconfirmation), whereas the meat from artificially reared lambs was considered better than expected (positive disconfirmation). These results indicate that information about rearing conditions and the related animal welfare can have a marked impact on consumer expectancy with high animal welfare standards associated with high expected product quality and low animal welfare standards associated with low expected product quality. No significant difference between perceived and actual liking was observed for ERL, whereas for ARL actual liking was lower than perceived liking (P<0.001). Therefore, for the former product no assimilation towards the expectations could be detected, as expectancy did not affect the actual liking of the product.

Table 2. Ratings (±S.E.) given to lamb from artificially (ARL) and ewe-reared animals (ERL) during the three hedonic tests.

Type of rating	ARL	ERL
Perceived liking (P)	7.21± 0.11 a	6.79± 0.15 b
Expected liking (E)	4.90±0.19 c	7.43±0.10 d
Actual liking (A)	6.43±0.15 a	7.00±0.14 b
P-E	2.31***	-0.64***
	Positive disconfirmation	Negative disconfirmation
A-P	-0.78***	0.21
	Assimilation	-
A-E	1.52***	-
	Incomplete	-

*a, b=P<0.05; c, d=P<0.001; ***=P<0.001.*

The information given about artificial rearing of lambs was able to affect the actual acceptability of their

meat. As observed for beef, the effect of information can be explained on the basis of the assimilation model, which can be observed when the actual liking of the product moves in the direction of the expectations. In particular, the information concerning the use of farming techniques characterised by low welfare standards had a negative impact on actual liking. However, consumers did not completely assimilate their liking in the direction of expectations, as indicated by the fact that expectancy was significantly lower than actual liking ($P<0.001$). Conversely, the lack of any assimilation for the meat produced by ER lambs may be attributed to the fact that consumers were unaware of artificial rearing practices and considered normal a farming technique based on a stable ewe-lamb relationship. As a consequence, the information concerning ER lambs was able to affect the expectancy about the product, whereas in the determination of actual liking the effect of sensory properties prevailed on the effect of information, which described a system considered as the common one (Napolitano *et al.*, 2007b). Consumers rated both products at scores well above the central point (5=neither pleasant nor unpleasant) and close to 7 (pleasant) for perceived liking. These results indicate that the meat from both artificially and ewe reared lambs was characterised by a good eating quality. However, mean scores of perceived liking were higher for the meat produced by artificially reared animals as compared to ewe reared lambs ($P<0.05$). This result may be attributed to the lower levels of hardness of the former product (results not shown), as texture is deemed one of the main factors involved in orienting consumer preference after purchasing (Grunert, 1997). Conversely, expected and actual liking scores were higher for ERL than for ARL ($P<0.001$ and $P<0.05$, respectively).

Chicken liking - The experiment was planned to assess the effect of information about animal welfare and organic production system on chicken liking.

Three products were used: conventional chicken (CC), organic chicken from a slow growing breed (OSG), organic chicken from a fast growing breed (OFG). Breast samples (10x10x0.8 cm) were grilled at 300°C to an internal temperature of 72°C. The experiment involving 50 consumers was planned in three tests as described for beef. However, in the third test (actual liking) the consumers were only given the two organic products paired with the same information sheet concerning the organic production system. The information given to consumers was mainly related to animal welfare (level of welfare in conventional *vs.* organic systems) but also included indications on environmental pollution and food safety.

Results are summarised in Table 3. Consumers rated the three products at scores above the central point (5 = neither pleasant nor unpleasant) for perceived liking. These results indicate that all the products, either from organically or conventionally reared broilers, were characterised by a good eating quality. No significant differences were observed between the three products ($P>0.05$). Expected liking scores were higher for organic than for conventional products ($P<0.001$). These results indicate that consumers are aware of the possible positive effects of organic farming on product quality and safety (Braghieri and Napolitano, 2009). No differences were observed between the two organic products even when they were offered to the consumers in informed conditions (actual liking). For both OFG and OSG the expected liking was significantly different from the perceived liking expressed in blind conditions ($P<0.001$), thus indicating that a disconfirmation occurred. In particular, the consumers found these products worse than expected (negative disconfirmation). These results indicate that information about farming practice can have a marked im-

pact on consumer expectancy with organic standards associated with high expected product quality. Conversely, a positive disconfirmation occurred for CC as this product was found better than expected by consumers ($P<0.001$). A significant difference between perceived and actual liking was observed for OFB and OSG, with higher values for the former scores ($P<0.001$ and $P<0.01$, respectively). In this case, the effect of information can be explained on the basis of the assimilation model, which can be observed when the actual liking of the product moves in the direction of the expectations. However, for both organic products the assimilation was incomplete, as the differences between actual and expected likings were significant ($P<0.001$).

Table 3. Ratings (±S.E.) given to conventional (CC), organic fast-growing (OFG) and organic slow-growing chicken (OSG) during the three hedonic tests.

Type of rating	CC	OFG	OSG
Perceived (P)	6.5 ± 0.2	6.1 ± 0.2	6.4 ± 0.2
Expected (E)	4.9 ± 0.2 a	7.9 ± 0.2 b	
Actual (A)	NR	7.1 ± 0.2	6.7 ± 0.2
P-E	1.6***	-1.7***	-1.4***
	Positive disconfirmation	Negative disconfirmation	Negative disconfirmation
A-P		1.0***	0.3**
		Assimilation	Assimilation
A-E		-0.7**	-1.1***
		Incomplete	Incomplete

*a, b=P<0.001; ***=P<0.001.*

Results showed that consumers, without information, were not able to detect differences between conventional and organic products. However, they were influenced by information about animal welfare and moved their actual acceptability in the direction of expected liking. This result was possibly due to consumers' awareness of the ethical value of the product.

Consumer willingness to pay - Intensive systems allow obtaining animal products at relatively low prices. They represent the main production system in Europe and North America, and are acquiring most of the market in the developing countries. As a consequence, the welfare of farmed animals is markedly and progressively decreasing (Verhoog *et al.*, 2004). In a study done by the European Commission in 2007 consumers rated the importance of farm animal protection towards the high end of the scale. In response to this public endorsement an increasing number of regulations have been issued on the welfare of farm animals by the European Union. Despite the public drive towards increased farm animal welfare standards, many farmers, practitioners and academics are concerned about the extra-costs linked to increased levels of animal welfare. They claim that such increased costs may lead to a reduced competitiveness of farm animal enterprises. From a strict economic point of view, the values of animal welfare are negative,

inducing unmitigated costs to producers and consumers (Tweeten, 1991). In recent years, while retail costs to consumers for animal products have steadily increased, payments to farmers have either not increased or even decreased, thus indicating that farmers have little control over the margins that can be obtained from the food market (Fraser *et al.*, 2001). According to Appleby (2005) and McInerney (2004), marked improvements in farm animal welfare could be achieved with only minor increments of food prices (less than 1%), whereas Bornett *et al.* (2003) noted that moving from fully slatted floors to Freedom Food standards for pigs determines a 4% increment in pork production costs. Previous studies indicated that consumer intent to pay, measured through a questionnaire, was higher for products obtained using animal friendly raising techniques. In particular, people appeared to be prepared to pay an average 5% extra for pork from outdoor raised pigs, with one-fifth of consumers declaring to be willing to pay 20% extra (Dransfield *et al.*, 2005). In another study conducted on consumers from the 25 EU member states, the majority of respondents (57%) stated that they were prepared to pay up to 25% more for eggs from animal welfare friendly production systems (European Commission, 2005). Similar results were obtained by Napolitano *et al.* (2008) on yogurt.

The present study aimed to verify whether consumers (150) confirmed their WTP extra costs for higher animal welfare standards in a situation where a potential purchase performed by consumers, such as the Vickrey auction, was included (Vickrey, 1961). The participant submitting the highest price (winner) had to buy the product, not at the submitted price, but at the second highest price (i.e. the second highest submitted bid). In case of more consumers offering the same highest bid only one participant, randomly chosen by another consumer, would be selected as winner. This procedure allowed one of the participants to buy organic beef at a price lower than or equal to the price they would normally accept to pay. The information given to consumers was mainly related to animal welfare (level of welfare in organic beef cattle farms) but also included indications on environmental pollution and food safety. Consumers submitted the bids after the display of a 100 g slice of raw organic beef (OB).

Consumers showed a WTP for OB higher than the suggested price ($P<0.001$), the latter corresponding to the commercial value for organic beef (Table 4). As the main limit to purchasing organic meat remains price, due to high production costs, which are affected by organic rules (higher space allowance, origin of feedstuffs, etc.) and small-scale production systems, one strategy to overcome this problem may be the induction of increased WTP by constant and reliable quality signalling systems capable to provide an ethical value to the product, which may become even higher if associated to traditional farming systems and typical meat productions. A significant correlation was observed between consumer WTP and expected liking for OB ($P<0.05$), whereas OB actual liking was not significantly correlated to WTP ($P>0.05$). These results suggest that WTP is more dependent on information than on product sensory properties. Lange *et al.* (2002) observed that hedonic measures may be more appropriate for the assessment of the sensory value attributed by consumers to the product, whereas WTP may be more sensitive for the evaluation of the perceived value of a product tested in presence of external information.

Table 4. Mean ratings (±S.E.) of willingness to pay (WTP).

	WTP
Suggested price	2.07 ± 0.12 a
Consumer bid	3.10 ± 0.13 b

a, b=P<0.001.

Conclusions - Results from the present experiments show that consumers were influenced by information about the standards of animal welfare and moved their actual acceptability in the direction of expected liking. However, the hedonic discrepancy was not totally assimilated indicating that actual liking was also evaluated in relation to the sensory properties of meat. Therefore, the information about organic farming, if given to the consumers, can be a major determinant of meat liking, thus providing a potential tool for meat differentiation to traditional farms where husbandry is based on extensive rearing systems and high animal welfare standards. Accordingly, consumers showed a willingness to pay for beef paired with information higher than its actual commercial value, thus indicating that reliable information about the farming system may contribute in covering the extra-costs linked to increased levels of animal welfare.

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