

Consumer choice and suggested price for pork as influenced by its appearance, taste and information concerning country of origin and organic pig production

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Abstract

Reactions of consumers to the appearance and taste of pork with and without information concerning outdoor production of pigs were tested in France, Denmark, Sweden and UK. Consumers in all four countries focussed on colour and fatness rather than marbling and drip to make their choice. Almost half of the British and Danish preferred the paler and the French the darker pork. Most people preferred the leaner pork. When information was provided in the form of labels, the vast majority of consumers preferred the pork labelled as originating from their own country as opposed to 'imported' and that labelled as pork from pigs 'raised outside' as opposed to 'inside'. There was no difference in the taste of grilled pork from indoor and outdoor production systems but pork labelled 'home produced' or 'outdoor' were more appreciated. Consumers' willingness to pay varied widely and was higher for those consumers who found more of the characteristics they sought. Consumers offered about 5% more for 'home country' and 'raised outside' labels.

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1. Introduction

Today's intensive meat production systems provide meat at a reasonable price and quality but some consumers are concerned about safety, animal welfare and environmental pollution. In pork production, attempts have been made over the past decade to find ways to redress these concerns, to improve animal welfare and to reduce environmental pollution within an overall framework embracing the economic and social aspects of agri-

cultural production. The organic sector is responding to these concerns but, despite being boosted by subsidies, still occupies only a fraction of the market. Questions have been raised about the long-term financial benefits of 'organic farming' and whether or not organic products will ever occupy more than "niche" markets. What will decide the success and size of the organic pork market will be the image of consumers, the quality of the products and, above all, that consumer perceptions will give a willingness to pay at least some of the extra production costs.

Over a decade ago, consumers had positive attitudes towards organic foods, in general, perceiving them as healthier than conventional alternatives (Beharrel &

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MacFie, 1991). More recently, they cited wholesomeness, absence of chemicals, environmentally-friendliness and better taste as the primary reasons for buying these foods (Schifferstein & Oude Ophius, 1998). Yet, today's European consumers express concerns about those qualities and animal production (Verbeke & Viaene, 2000) even though, for pork, these doubts may not relate to consumption (Ngapo et al., 2003).

At the point of sale, selection will be dependent on the perceived pork quality both in terms of its physical appearance (Bredahl, Grunert, & Fertin, 1998), place of purchase (Glitsch, 2000) and any information provided as to the origin and production methods, although some consumers appear confused about, and may mistrust, the information (Ngapo et al., 2003).

The aims of this work were therefore to determine the influence of appearance, the eating quality and, for the first time, the price that consumers are willing to pay for pork labelled with information concerning the system and origin of pig production. The study was conducted in four countries to try to derive any common aspects which could form the basis of a European marketing strategy.

2. Materials and methods

2.1. Pork appearance

The method and chop characteristics are described in detail by Ngapo, Martin, and Dransfield (2004). Briefly, digital photographs of 16 commercial pork chops were each computer-modified to give two levels (choice options) of each of 4 characteristics: fat cover, colour, marbling and drip. The resulting 256 ($16 \times 2 \times 2 \times 2 \times 2$) images have been published as a book (Dransfield, Martin, Miramont, & Ngapo, 2001) with the complete set of all 256 images presented on 16 double pages. The book opens to show, on each double-page (two, A4 sizes), 16 different chops, each having one level (option) of each of the 4 appearance characteristics, for example, one chop being lean, dark, marbled, no-drip. Thus every double page shows all 16 combinations of characteristics with each different combination on one of the 16 different chop originals.

2.2. Pork appearance with information

The same images were employed to determine consumer choice with added information but, in this case, only the images with no drip and marbling were used. In addition, a label was added for the characteristics: production system at 2 levels: 'indoor' or 'outdoor' and production origin also at 2 levels: the home country (British, French, Danish or Swedish) or 'imported'. This created 256 images that were printed in a similar book to

that used for the determining preferences without information (see above).

2.3. Consistency of choice

From the first page, each person chose his/her preferred chop and gave a figure for the maximum price, relative to a given price. The same procedure is repeated on the next 7 double-pages. From those 8 choices, chosen from images of half the total 256 images, the total number of times the same level of each characteristic had been chosen was calculated. These totals were then classed as: 'inconsistent' when equal to 3, 4 or 5 and 'consistent' when totalling 6 or more for any one level.

2.4. Conducting the appearance and choice tests

Tests were performed similarly in Britain, France, Denmark and Sweden.

In Britain, tests were performed at the Division of Farm Animal Science, Langford, Bristol. Appearance tests were done after the tasting tests (see below) but, as more people were required for the appearance test, additional people were recruited. Tests with the 4 characteristics were completed by 290 people in June 2003 and those for 2 characteristics with information by 82 people in February 2004.

In France, tests were conducted during public open days at INRA, Theix in May 2003. From approximately 10,000 visitors, 200 completed appearance tests with 4 characteristics and 213 different people completed the tests with 2 characteristics and information.

In Denmark, the tests were conducted in 2 shopping centres in suburban Aarhus in the spring and early autumn of 2003. The respondents were approached at random by 2 two business student interviewers of both sexes and asked people to complete the tests. Two hundred people completed the appearance tests without and a further 200 with information.

In Sweden, the tests were performed in shopping centres in Uppsala. The appearance tests with 4 characteristics were completed by 200 people in May and those for 2 characteristics and information by a further 200 people in December 2003 at the same sites and at the University of Uppsala.

2.5. Pork used in the tasting trials

Two batches of pigs were grown in spring and summer of 2002. Littermates at the average weight of 35 kg, from a total of 120 synthetic line \times (Large White \times Landrace) pigs (castrated males and females), all free of the n and RN^{-} alleles, were allocated to either a conventional system with a totally slatted floor, at $0.65 \text{ m}^2/\text{pig}$, controlled ambient temperature at $22 \text{ }^\circ\text{C}$ considered as 'indoor' or to an 'outdoor' system using sawdust-

shave bedding (1.3 m²/pig) with fluctuating ambient temperature, and with free access for the pigs to an outdoor area (concrete floor, 1.1 m²/pig). Pigs were fed ad libitum and had free access to water. At the average live weight of 110 kg, pigs were slaughtered at an INRA experimental slaughterhouse. For each slaughter date, 10 pigs were fasted overnight, transported for 2 h, kept in lairage for 3 h (with indoor and outdoor pigs kept separately), and slaughtered by electrical stunning and exsanguination. A random sample of 6 pigs from each of the four groups (indoor, outdoor, female and male) in a batch, totalling 48 pigs was taken for tasting tests. Loins were removed the day after slaughter and kept at 4 °C for 4 days, then packed under vacuum, frozen and stored at –20 °C. The frozen loins were transported to Theix, where each loin was cut into chops, alternate chops were placed in different plastic bags, vacuum packed and stored at –20 °C. One pack of each loin was used for the French tasting trials and the other transported frozen to Langford for similar tests in Britain.

2.6. Tasting trials

These were performed in a similar way in both Britain and France. In Britain, the pork was thawed, deboned and then cooked on one of 4 contact grills to an internal muscle temperature of 72 °C. In France the whole chop was thawed and grilled in a double contact grill at 280 °C for 6 min.

Each hot cooked eye muscle was removed and cut into 3, approximately equal sized and shaped, pieces. Each consumer was presented with the 3 pieces and asked to taste them in a given order. They then tasted 3 other similar pieces from a different chop from the same animal. Chops from each animal were tasted by 3 consumers. The triple samples were presented as 2 sets, presented randomly across consumers: either labelled 'outdoor', 'indoor' or with no label; or labelled 'country', 'imported' or with no label. All 6 orders of presentation for each set were equally represented in a balanced design.

For all tastings, each consumer assessed the 'overall appreciation' on a non-structured line scale marked at the ends 'poor' and 'good'. Assessments were subsequently scored from 0 to 10.

2.7. Consumers taking part in the tasting trials

Those in France were from the Clermont Ferrand region. Consumers responded to local press announcements and appointments made accordingly. Tests were conducted by 144 consumers from March to May 2003 in booths under artificial daylight at a sensory evaluation suite. In Britain, tasting was performed as 4 sessions, 2 at each of 2 sites (see above), in June 2003 at 2

sites: the Institute of Grasslands and Environmental Research, Aberystwyth and at the Division of Farm Animal Science, Langford, Bristol. Consumers were pre-recruited from each of the local sites and tasted the samples at a table partitioned by cardboard screens or in separate booths so that they could not see each other. The tests were completed over 5 days and each consumer was given a food voucher (€4.00) for participating.

2.8. Willingness to pay

After assessing each sample, in both appearance and tasting trials, each person gave a figure for what he considered the maximum worth of the sample. The figure was entered on a questionnaire on which was written a figure indicating the average price for such pork. For any one person, all figures were given on the same questionnaire.

2.9. Statistical analyses

Analyses of the tasting results was done by ANOVA with factors production and label. Comparisons of choices for appearance, with and without information, were done separately by chi-square on the frequencies of choices for each appearance characteristic.

3. Results

3.1. Appearance without information

Choices of the 4 appearance characteristics, separated into the levels and inconsistent choices, are given in Table 1. There were significant differences between countries for colour (chi-square, 45), fat cover (chi-square, 17) and marbling (chi-square, 25). More Swedish than other consumers gave inconsistent choices for colour, fatness and marbling (52%, 52% and 76%, respectively). In all 4 countries, the choice concerning 'drip' was chosen inconsistently by two-thirds of the people.

For the consistent choices for colour, slightly more French chose the darker rather than the paler option whilst the strongest preference for the paler option was given by the Danish people. Consistent choices for fatness showed similar preferences for leanness in all countries although more British than others chose the fatter option.

There was a tendency for more French to choose the marbled rather than the non-marbled pork whilst the British and Danes tended to choose the non-marbled option. The Swedes had low numbers choosing equally the marbled and the non-marbled pork.

There were no significant differences (chi-square=1.9) between countries for choice of drip/non-drip

Table 1
Choices (% of consumers) of the 4 appearance characteristics with and without information from 4 countries

Characteristic	Level	Consumers (%)			
		British	French	Danish	Swedish
<i>Four appearance characteristics</i>					
Colour	Pale	41	27	49	19
	Dark	31	47	15	29
	Inconsistent	28	26	36	52
Fatness	Lean	43	54	53	40
	Fat	21	8	11	8
	Inconsistent	36	38	36	52
Marbling	No marbling	28	19	27	14
	Marbled	13	22	9	10
	Inconsistent	59	59	64	76
Drip	No drip	25	27	23	26
	Drip	10	6	10	7
	Inconsistent	65	67	67	67
<i>Two appearance characteristics and information</i>					
Colour	Pale	20	17	26	19
	Dark	33	49	29	35
	Inconsistent	47	34	45	46
Fatness	Lean	37	50	33	49
	Fat	17	5	13	6
	Inconsistent	46	45	54	45
System Label	Outdoor	36	59	45	44
	Indoor	7	8	8	10
	Inconsistent	57	34	47	46
Origin Label	Country	47	77	63	71
	Imported	3	1	4	3
	Inconsistent	50	22	33	26

options. Drip was the least consistent choice overall and the majority of the consistent choices from all 4 countries was for the no-drip option.

The number of people giving inconsistent choices for the 4 systematic characteristics was low and averaged 4% across all 4 countries (Table 2). Most people (90%) used consistently 1, 2 or 3 characteristics in giving their choice, with the greatest number (on average, 43%) of people using 2 characteristics. Almost 6% of the people used all 4 characteristics to make their choice.

3.2. Appearance with information

When the least important characteristics of marbling and drip were replaced with information concerning systems and origin of production, significant differences among countries were found for 'origin' (chi-square, 24), 'fat cover' (chi-square, 16), 'system of production' (chi-square, 12) but not for 'colour' (chi-square, 10, $p=0.09$).

For 'origin of production', half the British while less than a quarter of French gave inconsistent choices

(Table 1). For all countries, over 90% of those choosing consistently preferred their own country's origin.

Similarly, although less consistently chosen than 'origin of production', the 'outdoor' system of production was strongly preferred over 'indoor' by people from all 4 countries (Table 1). Again, the British were the least consistent in choosing for system of production and the order of consistency was French > Swedish > Denmark > British and similar to that for 'system of production'.

Choices for fat cover were largely unaffected by the production information. Although fat cover became less important than without information, the consistent choices for the lean option were still observed across all countries. Choice of colour was more inconsistent in the presence of information than without (Table 1) except for Swedish people. The Danish and British preferences for the paler red pork without information was less in the presence of information when more people chose the darker option.

Replacing marbling and drip with production information affected the number of characteristics used in

Table 2

Price (€/kg), relative to a given price (5.01, 5.64, 13.42, 4.86 €/kg for the British, French, Danish and Swedish tests, respectively), offered related to the number of characteristics (from 0 to 4) used consistently in selection

	Number of characteristics									
	0		1		2		3		4	
	%	€	%	€	%	€	%	€	%	€
<i>Four appearance characteristics</i>										
British	1.2	5.0	20.1	5.1	48.8	5.0	23.8	5.1	6.1	5.1
French	3.8	6.3	18.8	5.6	46.5	5.9	25.4	5.8	5.6	5.8
Danish	6.0	9.9	26.0	11.4	38.0	11.2	26.0	11.6	4.0	11.5
Swedish	5.0	4.5	33.0	5.0	38.5	5.0	17.0	5.0	6.5	5.4
Means	4.0	6.4	24.5	6.8	43.0	6.8	23.1	6.9	5.6	6.9
<i>Two appearance characteristics with information</i>										
British	7.2	5.1	26.8	5.3	34.2	5.3	22.0	5.2	9.8	5.2
French	2.0	6.2	7.5	5.8	29.1	6.1	44.2	6.2	17.1	6.0
Danish	2.5	10.5	17.0	10.6	47.0	10.8	25.0	11.6	8.5	10.8
Swedish	4.0	4.2	15.0	5.0	34.0	5.4	33.5	5.4	13.5	5.4
Means	4.0	6.5	16.6	6.7	36.1	6.9	31.2	7.1	12.2	6.9

choosing pork (Table 2). Although the majority (84%) still used 1, 2 or 3 characteristics, there was a tendency for people to use more characteristics when information was available. The number of people using 3 characteristics increased from 23% without information to 31% with information and those people using all 4 characteristics doubled from an average of 6% with no information to 12% with information (Table 2).

3.3. Choice and price

Calculations were performed for the overall average price offered based on appearance with and without information for the 4 countries (Table 3). Information had the effect of increasing the price offered, on average, by 3%. The Danish people offered slightly less with information but this may have been due to a high given price. French, British and Swedish all gave higher prices (averaging 4.9%) for the pork with information than without information.

The price offered for the preferred pork was analysed in relation to the consistency of choice.

Table 3

The average price offered with and without information and the increase in price based on appearance and information concerning system and origin of pig production

	Without information	With information	Increase (%)
British	5.05	5.25	4.04
French	5.83	6.11	4.78
Danish	11.29	10.96	-2.94
Swedish	5.00	5.29	5.82
Means	6.79	6.90	2.93

As the number of characteristics used consistently increased, the price offered tended also to increase for both pork with and without information (Table 2). The price offered increased, on average for all 4 countries, from 6.4 to 6.9 €/kg without information and from 6.5 to 6.9 €/kg with information as the number characteristics increased from 0 to 4. The largest increase in average price offered occurred from 0 to 1 characteristic without information and from 0 to 3 characteristics with information. However only the Swedes showed a consistent trend in offering more as they used more characteristics in selection.

The price offered was also analysed with respect to consistency of choice for each of the appearance characteristics separately (Table 4). Thus, of those British choosing the darker option 8 times out of 8 (choice '0', Table 4), their average price offered was equivalent to €5.19 and for those other people choosing the paler option 8 times out of 8 (choice '8'), it was €5.09 (Table 4). Similarly, for those choosing the darker option 6 or 7 times out of 8, the average price offered was 5.16 compared to 5.02 when the paler option was chosen twice or once by the same people. Those people therefore offered more for their generally preferred colour option. The prices offered by the Danes for colour and marbling showed similar trends as did the offers from Sweden for fat cover. However the prices offered for the other characteristics by each country did not show such trends.

Similar calculations were made for the choices of 2 appearance characteristics with information (results not shown). The average prices offered were not related to the number of times an option was chosen for any of the characteristics including origin and system of production.

Table 4
Willingness to pay related to choice of each of the 4 quality attributes individually

Choice	Colour		Fatness		Marbling		Drip	
	Pale	Dark	Lean	Fat	None	Marbled	None	With drip
<i>British given price €5.01</i>								
0		5.19		5.01		5.39		5.27
1 or 2	5.02	5.16	5.00	5.07	5.19	5.09	4.94	4.95
3, 4 or 5	5.06	5.03	5.15	5.10	5.03	5.04	5.07	5.06
6 or 7	4.98	4.95	5.06	4.94	5.10	5.09	5.12	5.16
8	5.09		5.07		5.01		5.10	
<i>French given price €5.64</i>								
0		5.70		5.64		5.70		–
1 or 2	5.87	5.90	5.88	5.89	5.89	5.98	5.68	5.95
3, 4 or 5	5.73	5.82	5.86	5.76	5.73	5.72	5.83	5.84
6 or 7	5.85	5.86	5.74	5.68	5.88	6.03	5.66	5.64
8	5.58		5.81		4.13		5.70	
<i>Danish given price €13.42</i>								
0		13.89		10.33		–		14.09
1 or 2	11.14	11.54	10.74	10.87	10.74	11.01	11.14	11.14
3, 4 or 5	11.28	11.14	11.28	11.14	11.28	11.28	11.14	11.14
6 or 7	11.28	11.14	11.41	11.41	11.68	11.41	11.68	11.95
8	11.41		11.41		11.47		11.54	
<i>Swedish given price €4.86</i>								
0		4.98		5.43		6.69		–
1 or 2	5.09	5.02	4.82	4.90	5.97	5.26	4.79	4.83
3, 4 or 5	5.04	5.03	5.03	4.95	4.93	4.94	5.01	4.97
6 or 7	5.06	4.94	4.99	4.98	5.08	5.04	5.27	5.30
8	4.86		5.14		5.33		4.71	

3.4. Eating quality and price

The overall appreciation (on scales from 0 to 10) of the cooked pork was about 5.9 for the British and 6.4 for the French consumers (Table 5). When comparing the actual production variables of sex and system of production, no differences were found in overall appreciation of the pork from pigs raised indoor and outdoor systems (ANOVA, F -ratios=0.04 for French and 0.3 for British) or between castrate and female pigs (F -ratios=0.87 for British and 0.18 for French). There was no significant interaction (F -ratios=2.42 for British and 0.60 for French) between sex and system of production on consumer appreciation.

Table 5
Effect of system of production on the perceived overall eating quality given by British and French consumers

System	Sex	British		French	
		Score	Price	Score	Price
Indoor	Castrate	5.9±1.3	4.8±0.8	6.4±1.1	5.5±1.2
	Female	5.9±1.2	4.7±0.8	6.4±1.1	5.5±1.3
Outdoor	Castrate	5.8±1.4	4.8±0.7	6.4±1.0	5.5±1.3
	Female	6.0±1.0	4.8±0.7	6.3±1.1	5.5±1.5

Similarly, no effects were found of system of production (F -ratios=0.34 for British and 0.01 for French) or sex (F -ratios=0.51 for British and 0.00 for French) on the price offered by the consumers for the cooked pork and no significant interactions (F -ratios=0.023 for British and 0.24 for French) between sex and production system (Table 5). The British gave an average price of 4.8 Euros per kilogram, which is 4% lower than their given price (€5.01/kg) whilst the French gave an average price of 5.5 Euros/kg which is 3% lower than their given price (€5.64/kg).

When the cooked pork was presented with labels concerning system and origin of production, the labels had a significant effect on both appreciation (ANOVA, F -ratios=10.5 for the French and 9.6 for the British consumers) and the price (ANOVA, F -ratios=11.9 for the French and 8.1 for the British consumers) offered (Table 6).

For the British consumers, the label 'British' had the effect of increasing the scores for appreciation by 9% and the price by 5% compared to that labelled 'imported' and by 7% and 3% respectively compared to a non-labelled sample. The label 'outdoor' increased the appreciation by, on average, 7% and the price by 5% compared to the label 'indoor' and by 3% and 5% respectively compared to the non-labelled sample.

Table 6

Effect (mean \pm 1 standard deviation) of information on the perceived eating quality (on a scale of 0–10) and price (% increase over the given price) given by British and French consumers

Information	British		French	
	Score	Price	Score	Price
Outdoor	6.2 \pm 1.2	-2 \pm 15	6.7 \pm 0.8	+4 \pm 21
Indoor	5.8 \pm 1.4	-6 \pm 16	6.3 \pm 1.1	-7 \pm 22
No label	6.0 \pm 1.2	-5 \pm 15	6.3 \pm 0.9	-4 \pm 24
British/French	6.1 \pm 1.4	-2 \pm 15	6.8 \pm 1.0	+4 \pm 24
Imported	5.6 \pm 1.1	-7 \pm 13	6.2 \pm 1.3	-6 \pm 23
No label	5.7 \pm 1.1	-7 \pm 16	6.2 \pm 1.6	-6 \pm 25

However, the prices offered varied widely among people. The pork with the label 'imported' was the least appreciated (Table 6).

For the French consumers (Table 6), the label 'French' had the effect of increasing the average score for appreciation by 9% and the price by 11% compared to the label 'imported' and by 9% and 8% respectively compared to the non-labelled sample. The label 'outdoor' increased the appreciation by, on average, 6% and the price by 11% compared to the label 'indoor' and by 6% and 8% respectively compared to the non-labelled. Although the French gave wider variations in price, they appeared willing to pay more on average than the British (Table 6).

The average price for all consumers for each of the 6 labels increased in proportion to the equivalent means of the scores for overall appreciation (Fig. 1), although the French differentiated 2 extreme groups (outdoor, French and the others) whilst the British gave progressive price/quality increases from imported to British/outdoor.

In terms of prices offered, the percentages of consumers were calculated as 3 classes (Table 7): those offering less than 95% of the given price, those offering between 95% and 105% and those offering more than 105%. In Britain, almost 60% of consumers offered no more (between 95% and 105%) for the pork irrespective of the label. Sixteen percent of them offered more (>105%) for the pork with labels 'British' and 'outdoor' and less of them for the 'indoor' and 'imported' with, on average, 8% of consumers offering more for the non-labelled pork. In France, 20–25% of the consumers offered no more for the pork irrespective of the label. About half of them offered more for 'French' and 'outdoor' labels and about one-third offered more for each of the other labels. So twice as many French as British offered more for 'own country' and 'outdoor' than the other labels.

4. Discussion

The success of any new production system will depend on its acceptance by the consumer. Consumers will

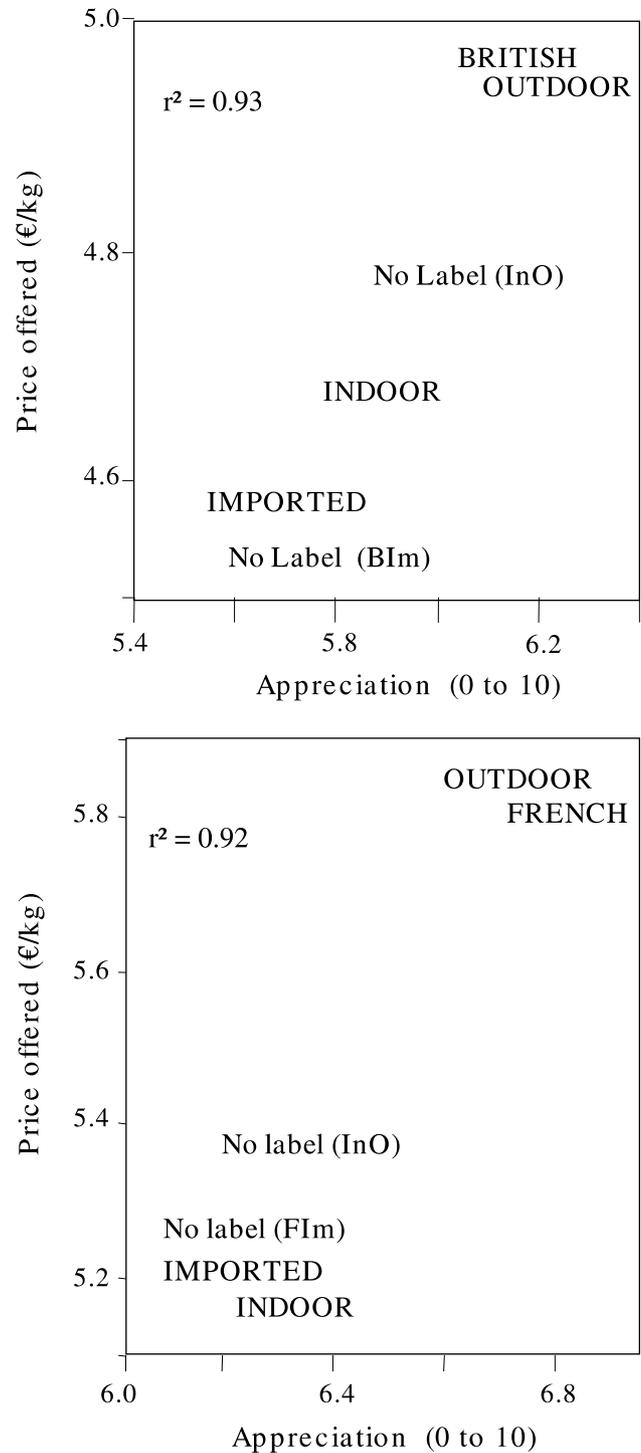


Fig. 1. The influence of label information on origin (French, British) and system (Indoor, outdoor or non-labelled) of production on consumers assessments of eating quality and their willingness to pay.

vary widely in their appreciation depending on their personal views and how they see the importance of agricultural production and perceive the quality and the price of the product. Agricultural production is generally seen in a holistic way, with environmental, welfare and social aspects intertwined (Dransfield, Morrot, Martin, &

Table 7
Distribution of prices offered by British and French consumers after tasting pork with different labels concerning the origin and system of production

Production	Label	Price offered relative to the given price		
		<95%	95–105%	>105%
<i>Percentage of British consumers</i>				
Origin	British	27	58	15
	Imported	39	54	7
	No label	31	58	11
System	Outdoor	26	58	16
	Indoor	39	57	4
	No label	39	56	5
<i>Percentage of French consumers</i>				
Origin	French	25	25	50
	Imported	49	20	31
	No label	44	26	30
System	Outdoor	27	19	54
	Indoor	43	22	35
	No label	40	23	37

Ngapo, 2004). European consumers generally have positive attitudes to pork production that may or may not (Ngapo et al., 2003) be linked to higher consumption of pork. Pork is seen as suitable for different dishes although not a meat for special occasions (Bryhni et al., 2002) and may be perceived by some as being relatively fatty and unhealthy compared to beef and poultry (Verbeke, van Oeckel, Warnants, Viaene, & Boucque, 1999). Appearance criteria are therefore important in choosing pork but there are no comparisons to determine the importance of appearance criteria across countries. In the four countries involved in this study, fatness and colour were the most important of the four criteria under study. Across countries, consumers preferred strongly chops without drip which lends support to the finding that consumers associate drip with a lack of freshness (Steenkamp & Van Trijp, 1996). Anecdotally, some of those choosing drip thought that such meat may be more juicy.

Using our unique approach, in which people gave replicate choices, without being conscious of it, we showed that people chose mostly on 2 chop characteristics without and even 3 characteristics with information concerning the origin and system of production. So, at least for pork, most consumers appear not to rely on a single product property (information chunk) as has been suggested for other foods (von Alvensleben, 1998). For pork therefore, the industry should try to optimise all appearance characteristics, including information, with emphasis on information and leanness. Preferences differed across countries with the French and Danish having the strongest preferences for leanness. In all

countries, colour was most consistently chosen attribute, suggesting that it is the most important characteristic. However, different consumers had preferences for the lighter and for the darker pork and no overall recommendations for pork colour can be made. Preference for colour differed significantly among the four countries with a preference for lighter pork in Denmark and darker pork in France. Darker pork was preferred by the Canadians (Jeremiah, 1994).

In terms of production of pork, the fatness and colour will depend on the genotype, feed, age and on the post-slaughter conditions. In previous trials on organic pig production, few differences were found in appearance. There was no difference in colour of meat from intensive and outside paddock systems (Warriss, Kestin, & Robinson, 1983), in chemical composition (Gandemer et al., 1990) or in intramuscular fat (Sather, Jones, Schaefer, Colyn, & Robertson, 1997; Van der Wal et al., 1993) due to different rearing systems. A trend towards very pale (PSE) pork from outdoor compared to confined rearing (Sather et al., 1997) was not confirmed in these studies. In the present studies, pork from the outdoor pigs was slightly leaner (back fat thickness 64 mm as opposed to 66 mm for the indoor) and had a little more marbling (1.68% intramuscular fat compared to 1.44% for the indoor-raised pigs). There appear no reasons therefore why less intensive production systems should not produce acceptable appearance.

It has been known for many years that appearance is poorly related to taste because their structural and compositional origins are different. In re-purchase, associations with taste may dominate over appearance which has been demonstrated in an experimental auction situation (Melton, Huffman, Shogren, & Fox, 1996). Tasting trials were therefore conducted both by experienced panellists and by consumers in hall (central location) tests.

The eating quality of meat from outdoor production was similar to that from indoor production. There were no differences in consumer appreciation and trained taste panellists found little difference in tenderness (scored 5.5 and 5.4 on a 0–10 scale), juiciness (3.7, 3.4), odour (5.5, 5.4) or flavour (5.8, 5.7) between pork from the outdoor and indoor production systems used in this work, respectively. This confirms findings from other systems of production conducted in different countries. Studying 4 genotypes raised indoors (0.9 m²/pig) and outdoors (50 m²/pig) showed (Gandemer et al., 1990) that rearing had much less influence on sensory quality than genotype. There were no differences in off-odour, tenderness, meat taste and off-taste, although pork from outdoor pigs was judged less juicy and more crumbly than that from the conventional indoor system. Different Swedish studies have shown that pork from outdoor pigs may be more juicy, or less tender and dryer (Enfält, Lundström, Hansson, Johansson, & Nyström,

1997) whilst earlier studies in The Netherlands (Van der Wal et al., 1993) had shown no differences in tenderness between pork from indoor and that from conventional pigs. Recent studies found that pork from pigs raised with an access to the an outside area had a poorer eating quality than conventional pork (Scholderer, Nielsen, Bredahl, Claudi-Magnussen, & Lindahl, 2004). Thus, the inconsistent effect of raising system on eating quality could not be used to marketing advantage.

With little or no advantage in appearance and eating quality, attitudes, expectations and price of organic pork will be crucial in determining the size of its market share. Information, with the product or in forming attitudes, will play an important role in this. Any information will have to be clear and meaningful to consumers as a lack of information or misinformation may seriously weaken the image (von Alvensleben, 1998). In the meat industry, labels or trade marks differ between countries. However, they are usually symbolic and give little guidance as to the essential elements expected by consumers. One piece of information which most Europeans stress is the 'own country' label as origin (Ngapo et al., 2003) which is easily understood and appears to reassure people of the safety and quality.

The term 'organic' is often used but was avoided in the present study as having different emphases to different people (Ngapo et al., 2003). To some it recalls artificial chemicals and pollution, whilst for others the raising conditions and well-being of the animals. The essence is that the pigs have the opportunity to stay outdoors (Jonsäll et al., 2002) and therefore this much less ambiguous label was chosen. So in this work, 2 single word alternatives were used: 'home country/imported' and 'indoor/outdoor' and compared to non-labelled pork.

In all 4 countries studied, the labels influenced preferences for the fresh pork and in Britain and France also increased the perceived eating quality of the cooked pork. For appearance, differences were found among the 4 countries, with more British than the other consumers paying less attention to the labels. 'Origin' was found to be more consistently chosen than 'outdoor' when choosing pork by its appearance and was equally important when giving appreciations of the eating quality.

The marked effect of labelling on taste in this work, is in contrast to other studies. Oude Ophius (1994) found no effect of the labels 'regular' or 'free-range' for pork, although those consumers who had had prior experience of free-range production thought that the pork labelled 'free-range' had a better quality than that labelled 'regular'. So, although the 2 studies are not directly comparable, the different findings would be reconciled if there has been, over the past decade, an increase in the number of consumers with experience of outdoor or free-range production. There was also a

relatively small effect on consumer preference of labelling beef with the name 'Charolais' (Dransfield, Zamora, & Bayle, 1998) compared to that of wide variations in eating quality (tenderness). It could be that with only minor differences in objective qualities in pork, labelling has a greater influence on perception. Even so, a socio-physiological basis is lacking as to why people prefer 'outdoor' to 'indoor' or 'home produced' as opposed to 'imported'.

In a free market, the price that people are willing to pay will determine the market share of organic pork. Although intent to (would or would not) purchase will depend upon the interactions of quality attributes such as a wet or dry appearance and colour (Brewer & McKeith, 1999), we found a more consistent effect of labelling than appearance characteristics on the price offered. People appeared to be prepared to pay, on average, only about 3% extra even when all characteristics of appearance and labelling were available. After tasting labelled pork, consumers were prepared to pay between 4 and 10% extra for the labelled pork. These are lower figures than found in other studies. Tasting pork with commercial symbols, Danish consumers gave a 12% premium to the information, although the authors (Scholderer et al., 2004) thought that this was an over-estimate of the likely market premium. Using questionnaires on organic foods in Spain, consumers appeared to be prepared to pay about 12% more for organic red meats and a similar premium for organically-produced vegetables, cereals and chicken (Gil, Gracia, & Sánchez, 2000). In France and The Netherlands, questionnaire responses suggested (Carpentier & Meuwissen, 2004) that almost half of consumers would pay 20% more for pork from pigs raised outdoors. Our results suggest that all those studies over-estimate the premiums consumers would be willing to pay. Our estimates are about half of those, around 5% extra, with about one-fifth of consumers willing to pay 20% extra. Even so, this would represent a significant market substitution if all the pork could be marketed at that premium.

However, the pork used here was tasty and the photographs used showed all appearance characteristics, so people could find their preferred appearance and that the label 'home produced' gave similar increased willingness to pay as did 'outdoor'. So consumers may not specifically pay for 'outdoor' and other, so far untested, labels might be equally attractive.

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