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Research Report

Hedonism as a predictor of attitudes of young French women towards meat

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Abstract

Iron-deficient young women who are at risk of anaemia should be advised to eat red meat, a good food source of iron. However, red meat is known to elicit negative attitudes among young women, which could lead to low meat consumption. Several factors can contribute to meat attitudes. We therefore hypothesised that a good predictor of attitudes towards meat could be a positive affective component, for example, the pleasure of eating meat. In our study, 77 women with a mean age of 30.5 were surveyed. They were first asked about four hedonism variables (overall, eating, red meat and white meat hedonism) and ethical and nutritional concerns. Secondly, they were asked to express their attitudes of like/dislike towards meat by way of meat pictures, odours and taste. Red meat hedonism was first highly correlated with a liking of raw red and white meat pictures ($0.41 \leq r \leq 0.68$), followed by a liking of cooked red and white meat pictures ($0.27 \leq r \leq 0.62$). To a lesser extent, red meat hedonism was correlated with a liking of meat odours ($0.29 \leq r \leq 0.38$) and beef taste ($r = 0.32$). Finally, red meat hedonism was the best predictor for most of the likings for red and white meat images. Thus, red meat images were pleasant for people who already like meat and did not encourage meat consumption among low meat-eating women.

Introduction

Meat, and particularly red meat, is a major source of metabolisable iron (haeminic iron) and is known to improve non-haeminic iron assimilation (Coudray & Hercberg, 2001). Iron plays a necessary role in the synthesis of haemoglobin, myoglobin and several enzymatic systems. Moreover, young women who lose a good deal of iron through menstruation need to consume more iron than men. The recommended dietary allowances are 16 and 10 mg of iron per day in women and men, respectively. The SU.VI.MAX study (1994) showed that 25% of young French women were iron-deficient. An adequate control of food consumption could help women to have the correct iron intake. However, young women limit their food intake in order not to get fat. Moreover, meat and meat

products are considered as fatty and unhealthy (Worsley & Skrzypiec, 1998), which leads to a reduced meat and offal consumption in women (Rigaud, 2000). In such a situation, iron intake is often insufficient. A better understanding of attitudes towards meat and particularly red meat might be relevant to the prevention of iron deficiency. The interest of studying attitudes is to understand and to predict behaviour (Fazio, 1990; Fishbein & Ajzen, 1975; Shavitt & Fazio, 1991).

The attitude concept seems to be crucial in the history of social psychology (Allport, 1935; Eagly & Chaiken, 1993). Measuring an attitude gives an evaluative response about specific objects, generally ranked from 'I like it very much' to 'I really dislike it'. As regards meat and food consumption, several attitudes seem to be predictive of meat consumption. Despite its traditionally high status, meat has a negative image partly due to its link to the living animal, slaughter, blood (Guzman & Kjaernes, 1998), aggression and violence (Lupton, 1996). Reduction in meat consumption may also be motivated by several factors linked to religion and ideology (Dwyer, 1991; Sims, 1978). These traditional beliefs or limits such as ecological and health concerns are not the main reasons that

young Norwegian females gave for avoiding flesh foods (Kubberød, Uelan, Rødbotten, Westad, & Risvisk, 2002). Kubberød et al. (2002) and Worsley and Skrzypiec (1997) found that the relevant reasons were mainly concerns about blood and raw meat, difficulties in separating the meat concept from the living animal, which frequently appeared as potential factors leading to the reduction of meat consumption. In this case, the sensory characteristics of food such as appearance, taste, odour or texture may be important sources of rejection and negative reaction towards meat. This sensory disgust or negative emotion could be developed from the idea that the presence of blood can be associated with slaughterhouses and the death of animals (Twigg, 1979). Thus, this reaction of disgust seems to be related to meat characteristics and to attitudes towards these characteristics (Rozin & Fallon, 1987). A qualitative study by Kubberød et al. (2002) showed that young women's dislike and disgust were due to blood and raw meat, chewy texture and fattiness. The question of the origin of this disgust or this negative evaluation could be found in a specific component of attitude.

Traditionally, attitude is conceptualised as a cognition possessing three components (Eagly & Chaiken, 1993; Katz & Stotland, 1959; Rosenberg & Hovland, 1960). The affective component refers to feelings, moods and emotions caused by a specific object and notably by its sensory characteristics. The cognitive component refers to beliefs and knowledge about attitude objects, and the conative component to the behavioural intention or past behaviour towards this object. As seen above, the impact of ethical and nutritional considerations on attitudes towards meat has already been studied (Guzman & Kjaernes, 1998; Ryan, 1997; Worsley & Skrzypiec, 1997). In our study, we focused on the affective component towards red meat. Our purpose was to better understand the determinants of attitudes towards red meat by construing a specific scale to measure affective reactions. We chose to measure hedonism as a general affective dimension, because hedonism is conceptualised as the ability to experience pleasure in life (Chapman, Chapman, & Raulin, 1976). Anhedonia (the lack of hedonism), previously studied in relation to mental illness (Chapman et al., 1976) was also related to depressive affects or displeasure (Hardy, Jouvent, Lancrenon, Roumengous, & Féline, 1986). Thus, we conceptualised hedonism towards food and particularly red meat as the ability to experience pleasure in food or red meat consumption. If people experience pleasure in food or red meat consumption, they will develop positive attitudes towards food or red meat. Conversely, people with low food hedonism will produce less positive attitudes towards meat sensory characteristics.

The aim of the present study was to examine to what extent attitudes towards meat sensory stimuli (liking to look at, smell and eat meat) would be related to expected stated hedonism. We considered not only overall hedonism (experiencing pleasure in life) but also more specific forms of hedonism such as eating hedonism (the ability to experience pleasure in food consumption), and white and red meat hedonism (the ability to experience pleasure in white or red meat consumption). We expected that the more specific hedonism was, the

more predictive attitudes would be. For example, we thought that the strongest correlations would be observed between red meat hedonism and a liking for red meat stimuli and between white meat hedonism and a liking for white meat stimuli. To confirm the results of other studies showing that ethical and nutritional concerns are related to attitudes towards red meat (Guzman & Kjaernes, 1998; Ryan, 1997; Worsley & Skrzypiec, 1997), we introduced two other scales for measuring ethical and nutritional considerations.

Materials and methods

Subjects

The sample was composed of 77 women of mean age of 30.5 years (SD = 6.7). All the subjects were recruited locally by advertising in local newspapers, on radio and on television in January 2002. The advertisements invited women between 20 and 40 years of age to phone in order to participate in a survey about their opinion on food. All potential subjects were screened for age and composed a relevant sample of participants. All participated on a volunteer basis and were rewarded with a gift of €20 at the end of the experiment. The response rate, i.e. the percentage of subjects who actually participated in the hedonism survey and meat tasting, was 55%. The main reasons that applicants were not accepted were either because they were too old, too busy, not motivated to leave home, pregnant or ill. The participants were first asked for personal information, including age, professional group, height and weight. Anthropometric data (weight and height) were provided by the participants themselves. Two young female researchers collected the hedonism data, each interviewing half of the participants by phone. Standardised interviews were conducted using a 37-item questionnaire.

Anthropometric data

The mean height of the women was 1.60 m (SD = 0.1). Their mean weight was 56.8 kg (SD = 8.7). The body mass index (BMI) was normal for the majority of the participants: 21.2 kg/m^2 (SD = 2.7). However, 10% of the young women were overweight (BMI > 25 kg/m^2). Twelve percent of the younger women were underweight (BMI < 18.5 kg/m^2). These mean anthropometric data were similar to those of other studies performed with French women of the same mean age.

Occupations

Forty-one percent of the participants had no professional activity: they were either students (20%), unemployed (17%), on maternity leave (1%) or housewives (3%). The other women were technicians (26%), office workers or business employees (25%), manual workers (3%), managers (3%) and artisans (1%).

Scales construction

On the basis of preliminary unpublished studies, four hedonism scales were constructed: overall hedonism (OH) as the individual tendency to experience pleasure in life, eating hedonism (EH) as the individual tendency to experience pleasure in eating food, white meat hedonism (WMH) and red meat hedonism (RMH) as the specific tendency to experience pleasure in eating white and red meat. Besides hedonism scales, ethical concerns (EC) that deal with meat liking limitations and nutritional concern (NC), that is, the belief that meat consumption is healthy, were assessed. These first four scales assessed hedonism in relation to an increasingly specific object: red meat. In a previous study, we asked 157 students from Montluçon and Paris (85 men and 69 women) about five items for overall hedonism (OH), six items for eating hedonism (EH), 11 items for red and white meat hedonism (RMH, WMH), six items of nutritional concern (NC) and eight items of ethical concern (EC). This preliminary survey was useful for selecting the items within each scale that assess the same psychological construct (evaluated using the Chronbach coefficient α). At the end of this study, three items for OH, five items for EH, nine items for RMH and WMH, five items for NC and six items for EC were retained. The α-values were 0.74, 0.69, 0.78, 0.71, 0.75 and 0.48 for the selected items of OH, EH, RMH, WMH, NC and EC, respectively.

For the present study, we asked the participants to assess the best items selected in the preliminary study: overall hedonism (OH), eating hedonism (EH) and red and white meat hedonism, as well as two other scales dealing with nutritional and ethical concerns (Table 1). For all the items, participants responded by phone on a seven-point scale ranging from 1, 'completely disagree', to 7, 'completely agree'. Reversed items were recoded and then averaged together.

Procedure for the sensory stimuli evaluation

After the hedonism and concern survey, participants were invited to the laboratory between 11 am–1 pm and 6 pm–8 pm (French meal times). Participants were asked not to eat before the sessions.

In the first session, participants were first asked to randomly and successively evaluate 10 pictures and then to randomly smell the three meat odours (described below). Participants scored the liking of each picture and odour on a seven-point scale from 1, 'I don't like it at all', to 7, 'I like it a lot'. Subjects entered their score directly into a computer. For the odours, participants were not informed about the nature of the odours and were not asked to identify them.

During the second session (at least 1 week later), participants were successively given two cooked meats and their reactions to the taste of cooked beefsteak and turkey fillet were randomly assessed on a seven-point scale, as described above.

Table 1
Items of the different scales used in the present study

Overall hedonism
   Q1. Life is made for pleasure
   Q2. You must live for the present
   Q3. I make the most of life
Eating hedonism
   Q1. Above all, eating is enjoyable
   Q2. I like the conviviality of eating
   Q3. I have difficulty enjoying mealtimes[a]
   Q4. I like eating too much to skip meals
   Q5. In general, I dislike cooking odours[a]
Red meat hedonism
   Q1. I get pleasure from eating red meat
   Q2. I get pleasure from eating red meat, even if I am alone
   Q3. Eating red meat with friends is a pleasant experience
   Q4. I like the odour of cooked red meat and I like to eat it too
   Q5. I like the appearance of raw red meat and I like to eat it too
   Q6. For me, the best time to enjoy red meat is during meals with family or with friends
   Q7. The odour of red cooked meat is very unpleasant to me[a]
   Q8. I dislike the appearance of red meat[a]
   Q9. I don't like to imagine the consistency of red meat[a]
White meat hedonism
   Q1. I get pleasure from eating white meat
   Q2. I get pleasure from eating white meat, even if I am alone
   Q3. Eating white meat with friends is a pleasant experience
   Q4. I like the odour of cooked white meat and I like to eat it too
   Q5. I like the appearance of raw white meat and I like to eat it too
   Q6. For me, the best time to enjoy white meat is during meals with family or with friends
   Q7. The odour of white cooked meat is very unpleasant to me[a]
   Q8. I dislike the appearance of white meat[a]
   Q9. I don't like to imagine the consistency of white meat[a]
Nutritional concerns
   Q1. In my opinion, red meat is an essential component of a balanced diet
   Q2. Eating red meat is part of a balanced diet
   Q3. I eat meat to maintain my health
   Q4. In my opinion, white meat is an essential component of a balanced diet
   Q5. Eating white meat is part of a balanced diet
Ethical concerns/meat liking limitations
   Q1. It is necessary to kill to eat[a]
   Q2. My ethical beliefs prevent me from eating white meat
   Q3. Animal breeding conditions are acceptable[a]
   Q4. The way animals are bred does not harm the environment[a]
   Q5. Slaughter conditions do not respect animal rights
   Q6. My ethical beliefs prevent me from eating red meat

[a]These items were reversed so that they were all positive within the same scale.

Sensory stimuli

Meat pictures

Ten digitised colour pictures of either raw or cooked red and white meats were displayed on a computer screen using the Psyscope system (V1,2,5 PPC). Pictures were displayed in four categories: raw red meat (roast beef, leg of lamb, minced beef and pork chop), cooked red meat (a type of flank steak known as 'bavette' in French, leg of lamb, minced beef and pork chop), raw white meat (chicken) and cooked white meat (chicken).

Cooked meat odours

Three odours were tested from beef, pork and hot lamb juice. A preliminary test carried out with subjects who were not

involved in this study showed no significant difference between the intensity of these three odours. Odours were delivered from an olfactometer (modified version of the one used (Rousset, Young, and Berdagué, 1997)). Compressed air that was purified by passing through filters was fed into the flasks containing odours, which were delivered near the subject's nostril.

Meat tasting

Hundred and twenty-gram slices of turkey fillet and beef (*Longissimus dorsi*) were stored under vacuum at −20 °C until tasting. Meat was defrosted at 4 °C, 3 h before the beginning of the session. Meat, packed in aluminium foil, was grilled for 2 min at 250 °C.

Statistical analyses

The internal reliability of the various scales was calculated using the Chronbach coefficient, α. The higher the Chronbach coefficient, the better the adequacy. When the coefficient is higher than 0.7, it indicates a high degree of reliability between items.

Relationships between liking and hedonism were then examined by correlations (Pearson's r). Thus, the four hedonism scales and the nutritional and ethical concern scales were correlated with the liking for all meat stimuli (picture, odour, taste). Coefficient correlations after Fisher's transformation were compared (Student t-test; Guilford, 1965).

Finally, a series of median-splits was performed on hedonism variables, on the two concern variables (ethical and nutritional concerns) and on liking variables (liking of pictures, odours and taste) in order to assign participants to the low- or high-level group for each variable. When participants' scores were equal to the median values, they were deleted. χ^2 tests then determined if there were significant measures of association between high scores of hedonism or nutritional or ethical concerns, and high or low scores for the liking of meat sensory stimuli.

Results

Reliability and validity of scales

First of all, we determined the internal reliability (the Chronbach coefficient, α) with the scores of the present sample of subjects. Overall hedonism was not a totally accurate measure because the value of α was lower than 0.70 ($\alpha = 0.61$). The other scales were more reliable. Thus, eating hedonism ($\alpha = 0.68$), white meat hedonism ($\alpha = 0.65$) and especially red meat hedonism ($\alpha = 0.87$) were more satisfactory. The scale assessing nutritional considerations was also reliable ($\alpha = 0.80$), but the measure of ethical considerations was not very good ($\alpha = 0.44$). Despite a lack of reliability, this measure was included in the analysis and in the presentation of the results.

Correlations between the four hedonism scales

In order to show the relationship between specific and overall hedonism (OH), correlation coefficients were computed. Only eating hedonism was significantly correlated with OH ($r = 0.31$, $p < 0.006$). Thus, eating hedonism (EH) was a specific measure of hedonism applied to food consumption. The other two measures were not correlated with OH because they deal with an overly specific domain. Eating hedonism should be related to white and red meat hedonism. Thus, eating hedonism was correlated with white and red meat hedonism ($r = 0.32$, $p < 0.005$ and $r = 0.35$, $p < 0.003$, respectively). Moreover, these two specific measures were highly correlated ($r = 0.50$, $p < 0.0001$).

Correlations between the four hedonism scales and the two other concern scales

First of all, red meat hedonism (RMH) and ethical considerations (EC) were negatively correlated ($r = -0.44$, $p < 0.0001$). Conversely, RMH and nutritional considerations (NC) were positively correlated ($r = 0.38$, $p < 0.0006$). A positive correlation was also observed between white meat hedonism (WMH) and NC ($r = 0.37$, $p < 0.0003$), and a negative correlation between WMH and EC ($r = -0.29$, $p < 0.005$). EH appeared to be negatively and marginally correlated with EC ($r = -0.22$, $p < 0.06$). Between overall hedonism and the other scales, only one positive correlation coefficient showed a marginally significant relationship between OH and NC ($r = 0.21$, $p < 0.06$).

Thus, both specific scales (WMH and RMH) and EH were positively correlated with NC. Otherwise, both specific scales (WMH and RMH) and eating hedonism were marginally negatively correlated with ethical considerations.

Relations between hedonism and actual liking for meat stimuli

Correlation between hedonism, concerns and the liking of meat pictures

Results showed that a liking of all meat pictures was positively correlated with RMH. The higher both meat hedonisms were (RMH, WMH), the better the liking of meat pictures. Thus, strong correlation coefficients were obtained between RMH and the liking of pictures of raw beef ($r = 0.68$, $p < 0.0001$), raw leg of lamb ($r = 0.67$, $p < 0.0001$), cooked leg of lamb ($r = 0.62$, $p < 0.0001$), raw minced red meat ($r = 0.58$, $p < 0.0001$) and raw pork ($r = 0.57$, $p < 0.0001$). Furthermore, other correlation coefficients were significant between RMH and the liking of pictures of raw chicken ($r = 0.41$, $p < 0.0002$), cooked pork chop ($r = 0.37$, $p < 0.0007$), cooked minced red meat ($r = 0.31$, $p < 0.005$) and cooked chicken ($r = 0.27$, $p < 0.02$). The correlation coefficient between RMH and cooked steak was only marginally significant ($r = 0.21$, $p < 0.07$). The correlation coefficients between WMH and meat pictures were also significant but lower than those relating RMH and meat pictures. Thus, WMH was significantly and positively correlated with the liking of pictures of raw roast beef ($r = 0.38$, $p < 0.0005$), cooked pork ($r = 0.35$, $p < 0.002$), cooked chicken ($r = 0.29$, $p < 0.01$), raw leg of lamb ($r = 0.28$, $p < 0.02$), cooked steak ($r = 0.27$, $p < 0.02$), raw chicken ($r = 0.25$, $p < 0.03$), cooked leg of lamb ($r = 0.24$, $p < 0.04$) and cooked minced red meat ($r = 0.22$, $p < 0.05$). The correlation

coefficients between WMH and the liking of pictures of raw minced red meat and raw pork were only marginally significant ($r=0.21$, $p<0.07$ and $r=0.20$, $p<0.08$, respectively).

Eating hedonism was only correlated with the liking of two meat pictures. Thus, EH was correlated with the liking of pictures of raw leg of lamb ($r=0.42$, $p<0.0001$) and raw steak ($r=0.30$, $p<0.007$). A lower correlation coefficient was found between EH and the liking of pictures of raw minced red meat ($r=0.21$, $p<0.06$). Only one significant correlation coefficient appeared between OH and the liking of pictures of cooked minced red meat ($r=0.31$, $p<0.006$).

There were several significant and negative correlation coefficients between EC and liking of pictures (raw roast beef, raw and cooked leg of lamb, raw minced meat, raw pork chop, raw chicken, cooked minced meat and cooked steak). Conversely, correlation coefficients were positive between NC and liking pictures (Table 2).

Correlation between hedonism, concerns and the liking of meat odours

The results showed that RMH was positively and significantly correlated with the liking of odours of pork, beef and lamb ($r=0.38$, $p<0.001$; $r=0.33$, $p<0.003$ and $r=0.29$, $p<0.01$, respectively). Furthermore, WMH was only correlated with the liking of the odours of pork ($r=0.28$, $p<0.02$) and lamb ($r=0.26$, $p<0.02$). No correlation was significant between odour liking and OH or EH. Beef odour and EC were inversely related (-0.31, $p<0.01$), while NC was positively correlated with lamb liking (0.26, $p<0.05$, Table 2).

Correlation between hedonism, concerns and the liking of beef and turkey taste

The four hedonism measures were positively and significantly correlated with the liking of the taste of beef (EH: $r=0.33$, $p<0.005$; RMH: $r=0.32$, $p<0.005$; WMH: $r=0.32$, $p<0.006$; and OH: $r=0.28$, $p<0.02$), while ethical concerns were negatively correlated (-0.28, $p<0.05$). However, no correlation was significant for the liking of the taste of turkey (Table 2).

Comparison of RMH and EC correlation coefficients for each stimulus

The most frequent significant correlations were found between the liking of sensory stimuli and RMH or EC (Table 2). The absolute values of both correlation coefficients were compared for each stimulus (Table 3). Correlation coefficients were different and higher between RMH and the liking of four pictures (raw roast beef, raw leg of lamb, cooked leg of lamb and raw minced meat) than between EC and the liking of the same pictures. For the other stimuli, no differences between correlation coefficients were observed. Therefore, we can estimate meat stimuli liking by knowing RMH and EC scores. However, we needed to know which of these two variables was the most predictable of meat stimuli liking for the highest number of participants. To answer this question, we carried out χ^2 tests to compare the breakdown of high and low RHM and EC groups in high and low meat stimuli liking groups.

Breakdown of red meat hedonism and ethical concern groups between high and low meat sensory stimuli liking groups

χ^2 tests showed that high scores of red meat hedonism were more frequently given by participants who liked meat pictures (cooked leg of lamb, raw roast beef, raw pork chop, raw leg of lamb, raw poultry and raw minced meat) than those that disliked meat pictures (Table 4). Conversely, low scores of red meat hedonism were more frequently given by participants who disliked meat pictures than those that liked meat pictures.

Table 2
Relationships between hedonism and liking of meat pictures

	RMH	WMH	EH	OH	EC	NC
Picture						
Raw roast beef	0.68***	0.38***	0.31**	−0.03	−0.43***	0.27*
Raw leg of lamb	0.68***	0.28*	0.42***	0.16	−0.44***	0.32**
Cooked leg of lamb	0.62***	0.24*	0.12	0.10	−0.24*	0.18
Raw minced beef	0.59***	0.20°	0.21°	0.18	−0.31**	0.26*
Raw pork chop	0.57***	0.20°	0.18	−0.02	−0.43***	0.22°
Raw chicken	0.41***	0.25*	0.06	0.03	−0.36**	0.23*
Cooked pork chop	0.38***	0.36**	0.03	0.10	−0.11	0.19°
Cooked minced beef	0.31**	0.22*	0.17	0.31**	−0.24*	0.31**
Cooked chicken	0.27*	0.29**	−0.04	0.14	−0.13	0.23*
Cooked steak	0.21°	0.27*	0.07	0.15	−0.42***	0.23*
Odour						
Lamb	0.29**	0.26*	0.05	0.12	−0.15	0.26*
Beef	0.33**	0.20°	0.15	0.10	−.031**	0.15
Pork	0.38***	0.28*	0.13	−0.01	−0.16	0.20°
Taste						
Beef	0.32**	0.32**	0.33**	0.28*	−0.28*	0.04
Turkey	−0.09	0.19°	−0.18	0.07	−0.05	0.11

° $p<0.1$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$. OH, overall hedonism; EH, eating hedonism; WMH, white meat hedonism; RMH, red meat hedonism; EC, ethical concern/meat liking limitations; NC, nutritional concern.

Table 3
Comparison of the absolute values of RMH and EC correlation coefficients for each stimulus

	Correlation coefficients		t
	RMH	EC	
Picture			
Raw roast beef	0.68	0.43	2.2*
Raw leg of lamb	0.68	0.44	2.2*
Cooked leg of lamb	0.62	0.24	2.9**
Raw minced beef	0.59	0.31	2.2*
Raw pork chop	0.57	0.43	1.1
Raw chicken	0.41	0.36	0.4
Cooked pork chop	0.38	0.11	1.8
Cooked minced beef	0.31	0.24	0.5
Cooked chicken	0.27	0.13	0.9
Cooked steak	0.21	0.42	1.4
Odour			
Lamb	0.29	0.15	1.4
Beef	0.33	0.31	0.1
Pork	0.38	0.16	0.9
Taste			
Beef	0.32	0.28	0.3
Turkey	−0.09	0.05	0.9

* $p < 0.05$; ** $p < 0.01$; RMH: red meat hedonism; EC: ethical concern/meat liking limitations.

Low and high scores of red meat hedonism were more frequently given by participants who, respectively, disliked and liked pork odour (Table 4). To the contrary of RMH, the highest scores for ethical concerns were given by more participants who disliked than liked meat pictures (raw roast beef, raw pork chop, for raw leg of lamb, raw poultry and cooked steak). Participants who liked and disliked meat stimuli were more often found, respectively, in the low and high categories of RMH (seven times significantly and twice tendentiously) rather than in the low and high categories of EC (five times significantly and once tendentiously).

Discussion

In order to assess the relationship between attitudes towards meat and affective reactions towards meat, we developed four hedonism scales (OH, EH, RMH, WMH). Results of a preliminary study showed that we constructed reliable and valid scales measuring different types of hedonism ($\alpha = 0.74$, 0.69, 0.78 and 0.71 for OH, EH, RMH and WMH, respectively). However, in the present study, only three dimensions of hedonism (EH, RMH and WMH) provided good internal reliability, and red meat hedonism, in particular. Furthermore, the fact that eating, red meat and white meat hedonisms were negatively related to ethical considerations could support the hypothesis that ethical considerations were limitations to food and meat consumption, as found in other studies (Guzman & Kjaernes, 1998; Worsley & Skrzypiec, 1997). However, the lack of reliability of EC could suggest that it concerned not only ethical considerations but also other concepts that constituted meat-liking limitations. We therefore gave more importance to meat-liking limitations than to ethical considerations for this measure. Otherwise, both specific scales (RMH and WMH) were positively correlated with nutritional considerations that should facilitate food and meat consumption.

In the present study, RMH appeared to be the principal determinant of the liking of meat stimuli. More precisely, RMH and WMH were related to an attitude towards red or white meat pictures. According to our hypothesis, this result was unexpected, but the strong correlation between both measures ($r = 0.50$) suggested that people who experienced pleasure with meat, experienced it as much with red as with white meat. These strong correlations between RMH and positive attitudes towards meat pictures were confirmed by the measures of association (χ^2 tests). Thus, there were a significantly higher number of participants who gave high scores for RMH and high scores rather than low scores for the liking of meat pictures.

For meat odours, the relationships between liking and hedonism scales were lower than between the liking of meat pictures and hedonism. Only RMH was correlated with the three meat odours and WMH was only correlated with the liking of the odours of pork and lamb. The general impact of RMH on meat attitude appeared here too. Taking pleasure in red meat consumption is related to a positive attitude towards beef, pork and lamb odours. However, neither OH nor EH were correlated with meat odour liking. Results concerning the taste of meat were not as clear as those concerning odours and pictures. Only beef taste liking was correlated with hedonism scales. Moreover, participants who liked beef taste were only tendentiously ranked in the category of high RMH (χ^2). This result shows that 'eating' is a different situation from one where meat is evaluated without tasting. It is likely that in a 'non-eating' situation, the affective reaction was anticipated, and that this anticipated pleasure corresponded more to a purchase or advertising situation. In this case, expected or anticipated pleasure should be a stronger potential determinant of purchase behaviour than eating behaviour.

Previous studies showed that beliefs could influence the stated consumption of red meat, and that pleasure more than nutritional considerations predicted the frequency of meat consumption in young participants (Lea & Worsley, 2001; Worsley & Skrzypiec, 1998). Furthermore, ethical and nutritional considerations, as well as disgust, had an impact on attitudes towards meat (Guzman & Kjaernes, 1998; Ryan, 1997; Worsley & Skrzypiec, 1997). In the present study, we suggest that the positive affects expressed by hedonism could be related to positive meat attitudes such as a liking of different meat sensory stimuli. The present study provides evidence that hedonism is related to the liking of meat stimuli. Thus, RMH was surprisingly highly correlated with the liking for either red or white meat stimuli. Furthermore, WMH was more highly correlated with the liking for red meat stimuli than for white meat stimuli. Both RMH and WMH scales more accurately predicted the liking for red meat stimuli than for white meat

Table 4

Breakdown of the liking of meat sensory stimuli and red meat hedonism or ethical concerns

		RMH			EC		
		Number of participants			Number of participants		
		Low	High	χ^2	Low	High	χ^2
Picture							
Raw roast beef	Low	23	8	18.8***	11	20	6.9**
	High	8	29		25	12	
Raw leg of lamb	Low	21	6	19.1***	9	18	10.8**
	High	7	26		25	8	
Cooked leg of lamb	Low	22	5	17.2***	12	15	n.s.
	High	7	25		20	12	
Raw minced beef	Low	18	11	8.5**	13	16	n.s.
	High	8	24		20	12	
Raw pork chop	Low	21	9	13.7***	10	20	8.4**
	High	6	22		20	8	
Raw chicken	Low	18	7	13.6***	8	17	9.8**
	High	6	22		21	7	
Cooked pork chop	Low	15	12	n.s.	12	15	n.s.
	High	12	14		14	12	
Cooked minced beef	Low	19	16	n.s.	17	18	n.s.
	High	9	12		14	7	
Cooked chicken	Low	14	8	n.s.	11	11	n.s.
	High	13	15		15	13	
Cooked steak	Low	17	17	n.s.	12	22	9.7**
	High	13	15		21	7	
Odours							
Lamb	Low	14	8	n.s.	10	12	n.s.
	High	16	22		20	18	
Beef	Low	14	10	2.9°	10	14	2.8°
	High	13	23		23	13	
Pork	Low	26	12	6.7**	17	21	ns
	High	7	14		13	8	
Taste							
Beef	Low	20	18	2.9°	23	15	n.s.
	High	4	11		11	4	
Turkey	Low	9	15	n.s.	14	10	n.s.
	High	19	13		16	16	

° $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. RMH, red meat hedonism; EC, ethical concern/meat liking limitations. Results of χ^2 tests.

stimuli. Thus, there is no clear correspondence between white meat hedonism and the liking for white meat stimuli, on the one hand, and red meat hedonism and the liking for red meat stimuli, on the other. It appears as if red meat hedonism items referred to meat in general (and perhaps to red meat implicitly). As shown in Berrier's study (2000), the word that was most commonly associated with the meat concept was 'beef', a word which refers to an animal that provides red meat. Furthermore, red meat, and especially beef, is granted the highest status in the meat hierarchy by people who love meat (Kubberød et al., 2002; Twigg, 1979). The limitation concerning meat-eating refers primarily to red meat characteristics (Guzman & Kjaernes, 1998; Kubberød et al., 2002; Ryan, 1997; Worsley & Skrzypiec, 1997) and, in the same way, in all the vegetarian diets that exclude meat and fish consumption, red meat is usually the first meat to be eliminated (Gregory, 1997). Thus, the RMH scale may be better adapted to a general meat concept than the white meat hedonism scale. Indeed, WMH and RMH are strongly correlated ($r = 0.50$). As a result, when a stimulus is correlated with one of the scales of meat hedonism, it is correlated with the other scale as well. Therefore, the liking of

white meat pictures was better correlated with RMH because RMH may be better adapted to the meat concept than WMH.

The strong relationship between taking pleasure in red meat consumption (RMH) and positive attitudes towards meat pictures was present not only for beef meat but also for lamb, pork and chicken. Furthermore, this relationship existed not only with cooked meat pictures, but also with raw meat pictures. The correlation coefficients were even higher for raw meats. It appeared that RMH fit better not only with the meat concept but also with the raw meat concept, and WMH with the cooked meat concept. Thus, RMH was a more accurate predictor of the liking of raw meat pictures and WMH was a more accurate predictor of the liking of cooked meat pictures. In other words, taking pleasure in red meat consumption was a powerful determinant of meat picture attitude in general and not just for cooked red meat pictures. We supposed that meat-eating hedonism, such as experiencing pleasure in meat consumption, was more closely related to the expected pleasure of meat consumption (raw meat) than to the immediate pleasure of consumption (cooked meat being eaten). Several studies have shown that the flavour (taste and odour) of food in

general determines food acceptability more than appearance and texture (Schutz & Walh, 1981), and the results are similar for meat and fish (Touraille, 1992). As reported by Chambers IV and Bowers (1993), sensory characteristics of meat are used by consumers as a basis for a wide variety of decisions and they emphasize the importance of desirable sensory properties in eating behaviours. If sensory characteristics are a powerful determinant of meat liking or attitudes in testing situations, the determinant of buying behaviours would be even more complex. Many other factors must be taken into account for meat attitude formation and consumer behaviour (Bonin, 2003; Chambers IV & Bowers, 1993; Issanchou, 1996). In this study, the strong relationship between RMH and the liking of meat pictures suggests that a powerful determinant of consumer behaviour is related to actually seeing the product, such as in a purchase or advertising situation. Therefore, if tenderness or flavour is important in meat tasting, other criteria are important in a purchase situation. At this time, people evaluate 'liking' on the basis of factors such as appearance and colour (Issanchou, 1996). Seeing meat should be associated with positive or negative feelings (Kenyon & Barker, 1998; Kubberød et al., 2002), such as an expected pleasure or disgust.

The results of the present survey showed that hedonism could be an important determinant or predictor of attitudes towards meat. The relationship between RMH and the liking of meats differed in strength depending on the type of stimulus. Relationships were very strong between RMH and the liking of meat pictures, but they were not as strong in relation to odours, and even less so in relation to taste. Since relationships change according to the type of stimulus, we must ask ourselves which stimulus will best predict meat consumption behaviour. If the attitude determining behaviour towards meat was based on the attitude towards meat pictures, RMH could predict consumer behaviour. Further studies are required to address this issue.

Finally, it would be interesting to study the assessment of the four hedonism scales, the two concern scales and the visual, odour and taste meat stimuli in a higher number of female participants to carry out multiple regressions and to explain the liking for meat stimuli (picture, odour and taste). It would be also interesting to study other population samples such as elderly people, certain of whom are at risk of protein deficiency. Elderly people often believe that they have to reduce food consumption, regardless of food nutrient intake, because their physical activity is reduced. Moreover, since sensory capacities decrease with age, it may be possible that liking to look at meat, smelling it and eating it (particularly smelling it) decrease as well. This phenomenon deserves further study.

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