Evaluation of the perception of the quality of yellow pigmented broilers by French consumers - the place of colour

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Summary
In April 2004, the CEREOPA conducted a survey on the perception of pigmented broiler quality by French consumers. 356 interviews were carried out simultaneously in two supermarkets located in two different areas (Bois d'Arcy near Paris and Ibos near Tarbes). The people surveyed were considered as fairly representative of the French population in terms of age group and educational level. However, the consumers in Bois d'Arcy were more highly educated and lived in urban areas, whereas the consumers in Ibos lived in a predominantly rural area. With regards to purchasing habits, a huge majority said they purchased whole broilers from the supermarket. In Bois d'Arcy, the main criteria when buying a broiler were the price, the "label rouge", the "poulet fermier" and the weight. In Ibos, these criteria were the "poulet fermier", the "label rouge" and the feed. Regarding the colour, yellow was mentioned in fifth position as choice criteria (17% of the answers) in Bois d'Arcy and in sixth position in Ibos (11%). The colour white was hardly mentioned at all. During the interview, a test was carried out on the people being surveyed using four ready-to-cook broilers of various colours (T1 white broiler, T2 straw-coloured, T3 yellow and T4 dark yellow). During the first stage, consumers had to rank the broilers in order of preference. In the second step they had to give each broiler a grade between 0 (low quality) and 10 (excellent quality). White broilers were less highly rated than the yellow broilers in the ranking test, both in Ibos and Bois d'Arcy. A marked preference for the T2 and T4 over the white broiler was revealed in Bois d'Arcy. A marked preference for the T3 and T4 over both the white and light broiler was revealed in Ibos. These results confirm the regional South-West preference for more pigmented broilers. To conclude, a large majority of people mentioned terms with a positive connotation for the colour yellow, whereas the colour white was mostly associated with terms with a negative connotation.

Introduction
A study carried out in 2000 in a Barcelona supermarket, where yellow broilers are prevalent, revealed that 61% of the people questioned preferred to purchase yellow broilers. The preference test revealed the preference increased in relation to the level of pigmentation. Well-pigmented broilers were considered to be of better quality, fresher and healthier (unpublished results).

In view of the significant increase in the production of so-called ‘yellow’ broilers in comparison to ‘white’ broilers, DSM Nutritional Products, who produce pigments for animal feed, would like to obtain a clearer idea of the criteria motivating French consumers to purchase pigmented broilers. Due to possible regional differences, the investigation was carried out in two geographically different populations: the southwest, a traditional region for yellow broilers, and the Paris region.
**Equipment and method**

**THE QUESTIONNAIRE**
A document relating to a similar study carried out in 2000 was used to devise the questionnaire, though adapted to a French context.

**INTERVIEW PROCEDURE**
A team of two interviewers interviewed supermarket customers at the checkout in Ibos and at the poultry department in Bois d'Arcy. The interviews lasted for around ten minutes and took place at different times of the day and on different days of the week in order to obtain a diversity of consumer profiles. The questionnaire used open-ended questions requiring spontaneous answers. Predetermined choices were not supplied.

**PRODUCTION OF BROILERS**
The broilers used during the preference test were produced by the Tours INRA centre. Four batches were raised simultaneously under similar conditions (a white strain, JA 957, for the batch of white broilers and a yellow strain, JA 757, for the three batches of yellow broilers). They received an identical feed, except for the pigmented section. Four batches of twenty broilers (one batch of white broilers, three batches yellow broilers of increasing intensity) were then sorted after slaughter for homogenisation. Special care was taken to obtain broilers that were as similar as possible in terms of weight, appearance and colour. Approximately 1 broiler out of every 3 was eliminated as being too far outside the average population. The colour was measured using two methods: a colorimeter and the DSM colour scale used for broilers.

**PROCEDURE OF THE PREFERENCE TESTS**
The test was carried out in two parts, both using four PAC broilers of different colour (T1: white broiler, T2: slightly yellow broiler, T3: yellow broiler and T4: dark yellow broiler).
First of all, the people interviewed had to rank by order of preference the four broilers (1 for the broiler they would choose first for their personal consumption; 4 for the one they would choose last).
After this, we requested them to grade the quality of each of the broilers between 0 (poor quality) and 10 (excellent quality).
After each test, the position of the broilers on the presentation table was changed (Latin square balanced over 24 people).

**STATISTICS**
The results of the classification tests were processed statistically using the Friedman Test and by comparing the ranking totals.
The results of the quality notation test were processed statistically by a variance analysis (ANOVA) and by calculating the smallest significant difference.

**Results**

**COLOUR**
Table 1 shows the average data and average deviations of the colour measurements of each group of broilers.
SOCIO-PROFESSIONAL PROFILE OF THE PEOPLE INTERVIEWED

In Bois d’Arcy, 192 people were interviewed (141 women and 51 men) with an average age of 47.

In Ibos, 164 people were interviewed (113 women and 15 men) with an average age of 44.

The population interviewed was representative of the French population, though with a higher level of education (especially in Bois d’Arcy). In Bois d’Arcy the population was more urban than in Ibos.

CONSUMPTION HABITS

In the two areas, a significant majority of people indicated they purchased whole broilers in large and medium-sized commercial outlets (86% in Bois d’Arcy and 61% in Ibos). In Ibos, significant numbers (40%) purchased whole broilers directly from the farm.

PLACE OF THE COLOUR IN PURCHASING HABITS

When questioned about the main criteria for choosing a broiler, in Bois d’Arcy, people spontaneously placed the price in first position, in front of the words ‘red label’ and free-range chicken.

The colour yellow appears in fifth position (17% of replies) as a choice criterion. The term ‘colour’, without differentiating between white and yellow, was mentioned in 6% of replies. Finally, the colour white was mentioned as a choice criterion in 3% of the people interviewed.

The customers of the Ibos supermarket spontaneously placed the free-range (29%) and red label (24%) broilers in first and second position. The feed (15%) and the origin and the weight of the broiler (13%) were placed in third and fourth position.

For 11% of customers, the colour yellow appears in sixth position as a choice criterion. The term ‘colour’, without differentiating between the colour white and yellow, was mentioned in 9% of replies.

Overall, when the ‘free-range’ and ‘red label’ broiler replies were grouped together in the category of ‘quality signs’, and the ‘yellow’, ‘colour’ and ‘white’ replies in the ‘colour’ category, the first three criteria for choosing a broiler were the quality, the price and the colour (Figure 1).

**Table 1** Characteristics of the weight and colours of the T1, T2, T3 and T4 broilers.

<table>
<thead>
<tr>
<th>Types of broilers</th>
<th>Weight (g)</th>
<th>Measurements of the Minolta colorimeter</th>
<th>DSM scale</th>
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<td>T1</td>
<td>2159</td>
<td>166</td>
<td>77.8</td>
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<tr>
<td>T2</td>
<td>2104</td>
<td>139</td>
<td>75.1</td>
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<tr>
<td>T3</td>
<td>2053</td>
<td>164</td>
<td>74.2</td>
</tr>
<tr>
<td>T4</td>
<td>2047</td>
<td>153</td>
<td>74.1</td>
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</table>
With regards to the customers of the Bois D'Arcy supermarket, the ranking test revealed a significant preference ($\alpha=5\%$) for slightly yellow broilers (T2) over white broilers. With a 7% risk threshold, the T4 dark yellow broilers were also significantly better ranked than the T1 white broilers.

The quality rating did not vary significantly ($\alpha=5\%$) between the four broilers.

In Ibos, the ranking test revealed a marked preference ($\alpha=5\%$) for the yellow broilers (T2, T3 and T4) over the white broiler (T1). Furthermore, the most yellow broilers (T3 and T4) were markedly preferred to the least yellow one (T2).

Regarding the perceived quality rating, customers significantly ($\alpha=5\%$) rated the T2, T3 and T4 broilers higher than the T1 broiler. The T4 broiler was also significantly ($\alpha=5\%$) ranked higher than the T2 broiler.
Figure 3  Quality ranking test of the broilers according to a decreasing order of preference by the customers of the two supermarkets - Ibos and Bois D’Arcy.

IMPORTANCE OF THE YELLOW COLOUR

To the question: “what does the colour yellow evoke for you?” most of the answers in Bois d’Arcy and Ibos related to the feed of the broilers (mentioned corn or cereal-based feed). The notion of taste was placed in second position in Bois d’Arcy, followed by a series of connotations linked to an image of ‘traditional’ farming (free-range broilers, open air…). In Ibos, the notion of open-air farming was placed in second position, followed by the idea of quality and farm produce.

Very few customers mentioned any negative connotations in relation to the yellow colour of the broiler. The negative connotations related to: excessive use of corn, non-traditional farming methods (colouring, battery farming…), a product with an unappealing taste (unpleasant taste, not appetising) or unhealthy (not fresh, diseased).

Figure 4  Connotations of the colour yellow.

IMPORTANCE OF THE WHITE COLOUR

To the question: “What does the white colour of the broiler mean to you?” the number of positive connotations was fewer than for the yellow colour. The connotations mainly related to the usualness and naturalness of this colour for broilers. In Bois d’Arcy, these connotations were placed in front of notions of freshness or origin and, in Ibos, in front of notions of type of feed and quality.

The number of negative connotations was, however, higher than for the colour yellow. These negative connotations were linked to non-traditional farming methods (battery and industrial farming, cooped up, force feeding, flour-based or composite feed), or a product with an unappealing taste (bland or unpleasant taste, not very appetising or poor quality) or unhealthy (diseased, pale).
Figure 5 Connotations of the white colour.

Conclusions
This investigation confirmed a preference for the most highly coloured broilers by consumers of the south-western region (ranking tests and perceived quality) and also by consumers in Bois d'Arcy (straw coloured and dark yellow broilers) in the ranking test. The study also revealed that in the two regions white broilers were not appreciated as highly and had worst connotations. In Ibos, they were not appreciated as highly in terms of perceived quality.

The colour yellow benefits from an overwhelmingly positive image, contrary to the image of industrial feed and farming attached to the colour white.

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