A PRACTICAL EXPERIENCE OF AFFECTIVE TESTING IN BEEF

BARGE M.T., DESTEFANIS G. and BRUGIAPAGLIA A.

Dipartimento di Scienze zootecniche, Facoltà di Agraria, Torino, Italy

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SUMMARY

In a research on meat quality from young bulls belonging to 4 ethnic groups, besides the sensorial analytical analysis, a preference test was made. Using the *longissimus thoracis* relating to 8-11 animals for each group, 67 comparison tests were prepared: in each of them 2 steaks, packed under vacuum one by one, were handed over personally together with a scorecard to an inexperienced consumer. He tested meat at home, under actual use conditions, generally sharing it with another one or two persons, each of whom indicated if they preferred A or B or if they had no preference. The cooperation rate was good: 62 scorecards were given back, with the opinions of 157 people (87 females, 9_82 years old and 70 males, 12_72 years old). Only 1 out of 6 single paired preference tests showed a significant result. In many cases (27/59), consumers who tested the same 2 steaks, didn't choose the same option. As the consumers were allowed to write the reason for their preference, we can observe that a different choice doesn't mean that a product was differently perceived, but rather that they gave a different value to the attributes of meat. In fact for someone, many women for instance, tenderness is the most important parameter, whereas others, young men especially, prefer meat on the basis of the taste, even though they noticed it was less tender. Therefore, not only does the variability of meat samples within each ethnic group, the random pairing in each comparison, but also the unbalance for sex and or age within each type of comparison can affect the results.

Introduction

Traditionally, sensory methods of evaluation are divided into analytical and affective methods. The first ones try to use people as machines to describe products in an accurate and repeatable manner or to discriminate among real differences in products. Affective methods try to measure the evaluative component of consumers' responses and, therefore, they are maximally effective when ultimate consumers are used (Meiselman, 1988). The relationship between expert judgements and consumer judgements is not well understood and sensory specialists have yet to produce methods which will relate sensory properties of products to human response in the real word (Meiselman, 1993).

When talking about meat products, Munoz and Chambers IV (1993) point out that consumer data are among the more important pieces of information that a researcher collects and that is particularly true for hedonic data, because consumers are the only people who can reliably indicate the degree of liking or preference for a product.

In practice, of the two ways of intending quality (Dumont,1981) -"all the attributes which make a food what it is" and " what consumers like best"- the latter is less frequently studied in the case of meat. This happens because specific problems, such as the high heterogeneity of meat, are added to the problems intrinsic to all studies with consumers.

Having recognized the importance of consumers' tests, in our department 2 trials were conducted (Bosticco and Destefanis, 1988; Tartari et al., 1990); so, we found out, among other things : a) the faulty domestic preparation practices, that are partly responsible for some problems of current consumer perception of beef (Geesink, 1993). In our case, when having the freedom to choose how to cook the product, some people used the longissimus to prepare boiled meat. b) that one consumer may not interpret the meaning of terms in the same way as other consumers do (Chambers IV and Bowers, 1993). In our case, some people interpreted the word "juiciness" as the easiness of loosing juice at cooking.

Practical reasons, like the difficulty to prepare a convenient and attractive area as testing environment, prevent us from adopting a " in-house laboratory test", that has the advantage of keeping under control many variables, but the

disadvantage of not being carried out where people normally eat.
On the basis of our previous experience, we carried out a study on the quality of meat from young bulls belonging to different ethnic groups, using a "home testing",i.e. a system in which the consumer is placed in a real eating environment.

Materials and Methods

After 7 days of chilling, the *Longissimus thoracis et lumborum* was taken from the right side of carcasses of young bulls belonging to 4 different ethnic groups (H: hypertrophied Piemontese; N: normal Piemontese; H x F: hypertrophied Piemontese x Friesian; F: Friesian), reared in uniform conditions and slaughtered at about 470 kg of live weight. A part of muscle was used for instrumental and sensory analyses, the rest (longissimus thoracis) was cut into some steaks, which were then packed under vacuum one by one. Two steaks of different group, coded A and B, were put into an envelope with a scorecard. Each envelope was distributed hand-to-hand by Department staff to an unexperienced consumer (University students, acquaintances, neighbours) for the meat evaluation at home.

Among the various possibilities we choose the paired comparison test, because it is rather easy to organize and to implement as there are only two presentation orders (A-B and B-A) and generally the subjects only evaluate a couple of products in a test without any replication (Stone and Sidel, 1985). In our case, the consumer had to choose among three answers: I prefer A, I prefer B, no preference. After this, if he wanted, the consumer could add some comment about his choice.
The scorecard specified that one or more persons could do the test, writing their age, sex and their independent judgement. Considering that the preparation of meat has a notable influence on the eating quality, we specified on the scorecard that the meat had to be cooked as a steak and salted at the end of the cooking.
In order to estimate significance in paired-preference tests , we used the tables of B.S.I. (1982) for two-sided test, subtracting the number of "no preference" from the total number of replies.

Results and discussion

Of the 67 comparison tests prepared, 62 scorecards were returned. This satisfactory cooperation (around 93% of retrieval rate) was due to the fact that the delivery was carried out with the system of person-to-person contact.

As 57 out of 62 tests were done by two or three persons, a total of 157 people took part in the trial. Among these, 87 were females between the age of 9 and 82, whereas 70 were males between the age of 12 and 72. The distribution according to sex and age is reported in table 1: it should be noted that males under the age of 50 were less numerous and this may be due to the fact that more often they are not at home around meal-time.
Table 2 includes all data. The first column reports the 6 possible types of comparison: for each one, every ethnic group was alternatively coded A or B. The number of tests for each type of comparison varied from 7 to 12. This different number depended on some interacting causes, i.e.:
a) an ethnic group was less numerous than the others (10 young bulls in M vs 12 in the other 3 groups); b) in each of the 4 runs of slaughtering, the number of animals for ethnic group was not identical and, as the meat was delivered fresh, it was impossible to counterbalance the number between one session and the other (as a consequence, we used the *longissimus* taken from 8 to 11 animals for group); c) the number of steaks obtained from each animal was not always the same.

As a consequence, the number of consumers was different: around 30 for 4 of the 6 comparisons and less than 20 for the other two. Considering these 2 last ones, the number of assessors resulted inadequate as, according to the B.S.I.(1982), the minimum number for tests of preference is 30, in the case of untrained persons.

As an average, women represented 55.4% of the subjects, but their percentage varied from 43% in C vs F to 68% in M vs F. The range of age for each sex varied between each type of comparison, but it was sufficiently wide, if we consider the fact it was not possible to know *a priori* who, in the family, was going to take part in the test. Only in two cases the distribution of age seemed unsatisfactory: in C vs N only 2 males out of 12 are younger than 43 , in N vs F 6 out of 7 men are between the age of 52 and 64.

Table 2 reports also the number (both total and according to sex) of people who chose a certain ethnic group. The "no preference" reply represented, on the average, 10% of the answers and in almost 70% of the cases was chosen by women.

The results obtained allow us to find out only one significant comparison ($P < 0.05$), i.e. C vs N where 20 out

of 28 assessors preferred N. Because of the small sample sizes, there is no statistical basis for determining subgroups; howewer, the detailed examination of questionnaires allows us to notice some tendencies. Let us consider, for instance, the comparison C vs F: the global result is that consumers did not show any particular preference, but if we consider the answers of males and females separately, we find out that most women prefer C, i.e. the meat of hypertrophied young bulls, that had the lowest value of shear force and resulted the most tender when judged by experts (Destefanis et al., 1993). Among men, all young subjects (between 16 and 31 years old) chose F, whereas the others gave different answers (3 C, 3 F, 2 no preference). In the comparison M vs N, women's preferences do not seem to be related to their age for males 6 out of 7 young men (21-28 years old) prefer N and 5 out of 6 men (50-69 years old) prefer M. Generally speaking, when commenting their reply, women use more frequently (or put in the first position) the adjective "tender"; on the contrary young men use " tasty".

Chambers IV and Bowers (1993) pointed out that flavour characteristic are difficult to measure with consumers, but this fact does not mean that flavour is unimportant in muscle food. In a study of residence hall food service, they found that over 60 % of students used a condiment on beef steaks, partly because these steaks were perceived to be bland without sauce. The importance of this attribute can be observed also in our investigation: the flavour was generally indicated by the consumers as the reason for the preference of N group meat

Tenderness is believed to be the most important attribute for the evaluation of meat quality. Now, the percept of tenderness has the property of being volatile, i.e. memory is hardly able to remember the magnitude of this quality even for a short time (Broekhuijsen and van Willigen, 1990). We could think that women had a better memory for tenderness, but probably the problem is more complex. In fact, when more than one person assessed the same test samples, in 27 cases out of 59, the replies were different. Often, when expressing an opinion on the same two steaks, one person choses A for its tenderness and another choses B, because " it is more tasty, although it is less tender (or less juicy)". Therefore, a different reply does not mean that the product was perceived in a different way, but that people give a different value to the attributes of meat.

Conclusions

The distribution of meat to the consumers for a home testing makes it possible to evaluate the product in a real eating environment, but presents several problems. On one hand there are a lot of sources of variability - not only time and temperature of cooking, but also the post-cooking sample temperature affect the sensory evaluation (Caporaso et al., 1978)-; on the other hand it is difficult to have a sufficently large number of samples in experiments with cattle.

The results depend also on the composition of consumer panel (sex and/or age), which is unpredictable when meat is tested at home.

Another point should be stressed: as a consequence of the variability existing within each group, the random pairing of samples and the fact that the comparison test provides no direct measure of the magnitude of the preference, the best group can be underestimated, unless the difference between groups is very large.

Moreover, comparison test, which provides only one response for each pair of products, is less efficient than a scoring method that yields one response per product (Stone and Sidel, 1985). Probably the use of a 9-point hedonic scale would allow to overcome some of the problems related to an affective testing in beef.

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