

**THE EFFECT OF PRODUCTION SYSTEM INFORMATION ON CONSUMER EXPECTATION AND ACCEPTABILITY OF LECCESE LAMB MEAT**G. Maiorano<sup>1</sup>, B. Kowaliszyn<sup>2</sup>, A. G. D'Alessandro<sup>3</sup> and G. Martemucci<sup>3</sup><sup>1</sup>Dipartimento di Scienze Animali, Vegetali e dell'Ambiente, Università degli Studi del Molise. Via F. De Sanctis, snc 86100 Campobasso, Italy<sup>2</sup>Department of Genetics and General Animal Breeding, University of Technology and Life Sciences, Mazowiecka Street 28, 85-084 Bydgoszcz, Poland<sup>3</sup>Dipartimento di Progettazione e Gestione dei Sistemi Agro-Zootecnici e Forestali Università degli Studi di Bari. Via G. Amendola, 165/A - 70126 Bari, Italy**Abstract**

Twenty lamb meat's habitual consumers (eight females and twelve males, from 25 to 62 yrs of age) took part in a central location test, organised to assess consumers' expectations generated by information on animal feeding system, lambs fed with maternal milk from mothers reared on grass (T1) versus lambs fed with maternal milk from mothers reared on stall (T2), and to assess the effect of this knowledge on the hedonic ratings of lamb meat from the Leccese breed. Using a none-point hedonic scale, first blind and then informed scores were collected on two types of Leccese meat. The blind test provided information which was different from informed test; in fact, T2 meat receiving higher hedonic scores than T1 meat. On the contrary, with the label information on animal feeding system, meat from T1 lambs was liked more than meat from T2 lambs. The lamb meat's habitual consumers showed a higher interest in extrinsic quality attributes which referred to the origin or production system.

Keywords: Lamb meat, production system, labelling information, consumers' expectations, acceptability

**1. INTRODUCTION**

In general, Mediterranean countries produce lamb with lower carcass weights, reared on milk and/or concentrate. In Italy, and in particular in the south, the production of ovine meat derives from both suckling and light lambs produced mostly from specialized flocks of selected milk sheep breeds [1]. Lambs, fed mostly with maternal milk, are slaughtered under the age of 65 days, with carcasses weighing less than 13 kg [2], being mostly much lighter lamb: 6–10 kg [3], and classified as very lean, fat class 1 and 2, with their shape almost irrelevant.

At least three factors are involved in maintaining such a low slaughter age: market demand for light carcasses from young animals, precocity of lambs obtained from dairy sheep, which makes lamb rearing uneconomic beyond that age, and the need for farmers to obtain high amounts of milk for cheese making [4].

Lamb production is variable and depends on the characteristics of the production system (breed, nutrition, sex, slaughter weight and age, infrastructures, etc) [5]. Both the intrinsic composition and the sensory properties of the lamb are linked to the production system to

varying degrees according to different studies [6, 7, 8, 9], and may in some way affect consumer acceptance. In fact, consumers' opinion could be a good guide to the improvement of meat quality.

However, in recent years the needs of consumers in respect of lamb have changed radically. There has been a drop in consumption due to the high cost of meat accompanied by greater attention to a set of quality requirements, meaning that sanitation and nutrition are no less important than taste. The latter requirement, as assessed by sensory analysis (or an affective or analytical test), refers to the sensory perception of a sample through the sense organs [8].

The acceptability of lamb meat has been evaluated in some consumer studies [9, 10], although it depends on the type of lamb evaluated, preparation of samples, the kind of study carried out, as well as cultural aspects or meat consumption habits of consumers. However, research has shown that the information on the animal production system, in particular animal feeding, is highly relevant for many European consumers of lamb meat [9, 11].

The aim of this study was to assess consumers' expectations generated by information on animal feeding system (lambs fed with maternal milk from mothers reared on grass *versus* lambs fed with maternal milk from mothers reared on stall), and to assess the effect of this knowledge on the hedonic ratings of lamb meat from the Leccese breed.

## 2. MATERIALS AND METHODS

### Animals

The trial was carried out on 18 light (slaughtered at 45 days of age) Leccese suckling male lambs, born as singles in mid October. Eight lambs were fed from mothers reared on grass (T1) and eight lambs were fed from mothers reared on stall with concentrate (T2). All lambs were kept with their dams from 5 p.m. to 8 a.m.

After the refrigeration period (24 h at 2–4 °C), from the right side of each carcass ( $6.56 \pm 0.13$  and  $6.45 \pm 0.11$  kg carcass weight for T1 and T2, respectively;  $P > 0.05$ ), the pelvic limb were removed [12], vacuum packaged and aged at 4 °C for 5 days. Afterwards, all pelvic limbs were cut into 1.5 cm thick slices. The meat from each pelvic limb was divided into equal parts (B1 and B2), vacuum packaged, coded (T1B1, T1B2, T2B1, T2B2), placed into different bags, and stored frozen (–20 °C) until the day before the consumer test.

### Consumer test

The panel for the sensory analysis consisted of twenty lamb meat habitual consumers (eight females and twelve males, from 25 to 62 yrs of age). They assembled together in one place-refectory equipped for cooking and contemporary administration of meat.

Lamb samples were cooked and sensory evaluated in two different times (the meat T1B1 and T2B1 was cooked and analyzed first and the meat T1B2 and T2B2 seven days later). The day prior to the consumer test, meat was thawed at 4 °C for 24 h. Subsequently, lamb samples were cooked in a contact grill, pre-heated to 200 °C until the internal temperature of the muscle reached 72 °C, which was measured using a thermometer with a handheld probe

(Koch, Kansas City Missouri), and inserted into the approximate centre of the muscle. Meat samples were served immediately to each consumer, who evaluated tenderness acceptability, flavour acceptability, juiciness acceptability, and overall acceptability according to an unstructured line scale ranging from 1 ("dislike extremely") to 9 ("like extremely").

In the first evaluation, each person was asked to score his/her liking for two samples of meat, which were presented in a blind test. The two samples, one for each type of lamb (T1B1 or T2B1 meat), were served and consumed on the same plate. Then, the respondents were asked to taste them in a pre-ordinate order, indicated on the ballot and provided to allow a balanced design (half of the consumers started with the first type; the other with the second). Before tasting each sample, consumers were required to eat some unsalted toasted bread and then rinse their mouths out with water.

Immediately after the first evaluation, the consumers were requested to score their liking expectation for lamb meat (the evaluators did not have a real product) when given the following information on animal production processes: i) meat from Leccese suckling male lambs (slaughtered at 45 days of age) fed from mothers reared on grass (G); ii) meat from Leccese suckling male lambs (slaughtered at 45 days of age) fed from mothers reared on stall with concentrate (S).

In the third assessment (7 days later), respondents were asked to score their actual liking for T1 and T2 meat, served on the same plate, marked by a code (T1B2 and T2B2), and accompanied by the label information on animal feeding system used in the second evaluation. As in blind-tasting, the consumers were asked to test the two samples in a balanced pre-ordinate order, indicated on the ballot.

### Statistical analyses

The meat quality (tenderness acceptability, flavour acceptability, juiciness acceptability, and overall acceptability) was assessed on the 1-9 scale. Moreover, for both of the meat types, total scores were estimated. The normality of

the distribution of all the traits was not confirmed (Shapiro-Wilk test,  $P \leq 0.05$ ). The central tendency was represented by the median, and the lower and upper quartiles. For pairwise comparisons, Wilcoxon's signed rank test was used (Figures 1-5). Differences between the sexes were tested by Mann-Witney U test. Database management and statistical analyses were performed using Statistica 8.0 [13].

### 3. RESULTS AND DISCUSSION

The blind overall acceptability of the two types of meat differed, T2B1 meat receiving higher hedonic scores than T1B1 meat (on average 7.1 *versus* 5.6, respectively;  $P < 0.001$ ) (Figure 1). Furthermore, meat from T2 lambs also showed higher scores for flavour ( $P < 0.01$ ), tenderness ( $P < 0.01$ ), and juiciness ( $P < 0.001$ ) (Figures 2, 3 and 4).

On the other hand, higher expectations were generated by meat from lambs fed by mothers reared on grass (G) than meat from lambs fed by mothers reared on stall with concentrate (S) (on average 7.2 *versus* 5.8, respectively;  $P < 0.01$ ) (Figure 5). The scores of expected liking were probably generated by association between grass production system and extrinsic attributes of meat.

In real-life conditions (third assessment), with the label information on animal feeding system, meat from lambs fed by mothers reared on grass (T1) was liked more than meat from lambs fed by mothers reared on stall (T2) (on average 7.5 *versus* 6.4, respectively;  $P < 0.001$ ) (Figure 1).

Except in the case of tenderness score - higher ( $P < 0.01$ ) in T2 lambs than in T1 (Figure 3) - the scores of flavour and juiciness were higher ( $P < 0.001$ ) for meat from lambs fed by mothers reared on grass as compared to meat from T2 lambs (Figures 2 and 4).

Habitual consumers of lamb meat showed a higher interest in extrinsic quality attributes, which were associated with origin or production system (animal feeding, environmental friendliness, welfare implications etc.), suggesting an increase of their importance in perception of red meat quality by consumers [11]. In fact, providing information on animal feeding system positively affected the

acceptability of meat from lambs fed by mothers reared on grass.

There were no significant differences in the scores showed by male and female consumers for any sensorial parameter evaluated (data not shown).

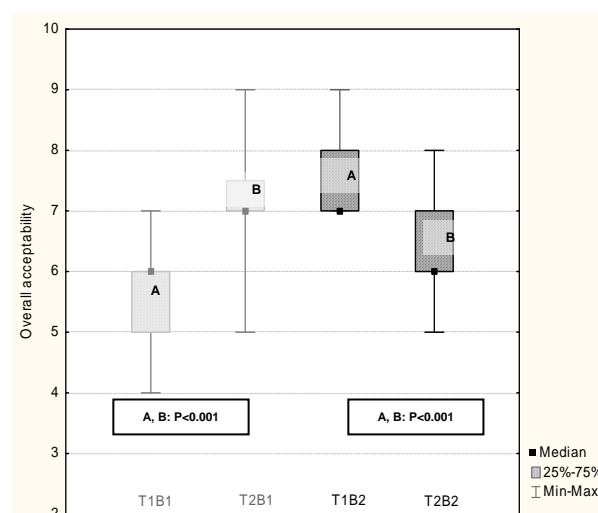


Figure 1. Medians and quartiles for overall acceptability for two types of lamb meat (T1 and T2), evaluated at two different times (B1 and B2).

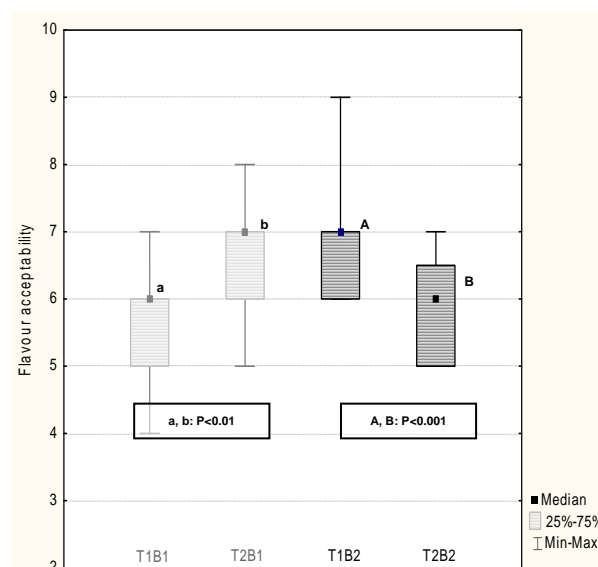
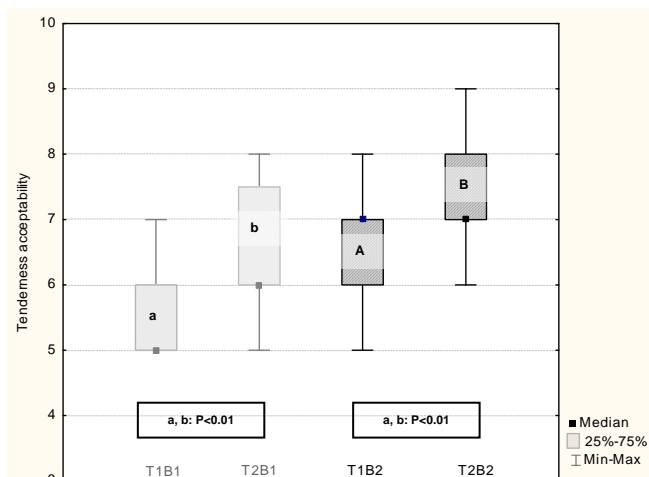
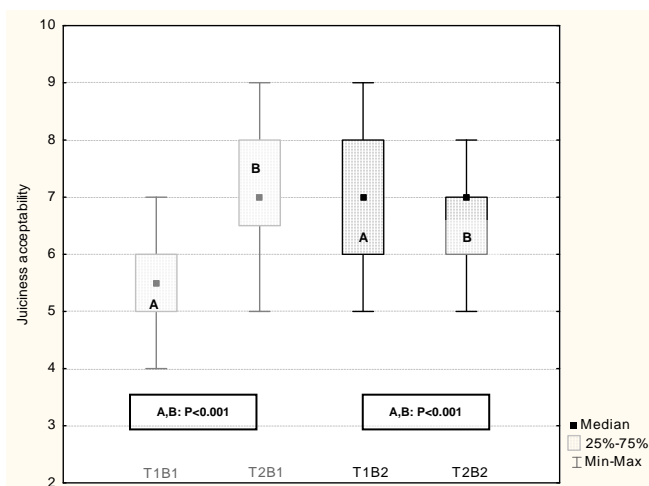


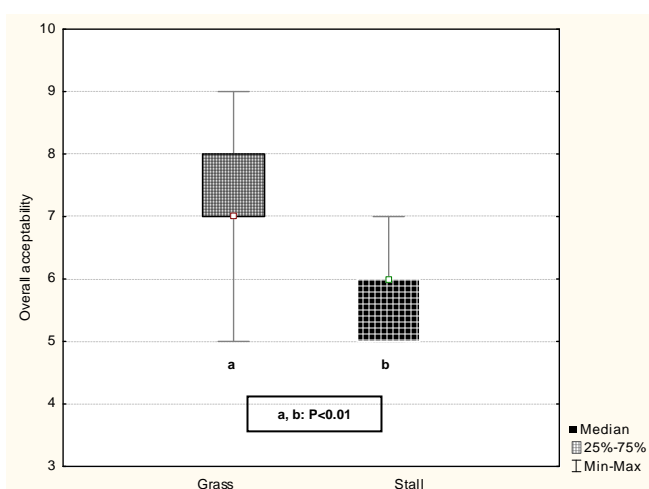
Figure 2. Medians and quartiles for flavour acceptability for two types of lamb meat (T1 and T2), evaluated at two different times (B1 and B2).



**Figure 3. Medians and quartiles for tenderness acceptability for two types of lamb meat (T1 and T2), evaluated at two different times (B1 and B2).**



**Figure 4. Medians and quartiles for juiciness acceptability for two types of lamb meat (T1 and T2), evaluated at two different times (B1 and B2).**



**Figure 5. Medians and quartiles for overall acceptability expected when given the production system information.**

#### 4. CONCLUSION

The blind test provided different information from the informed test. Consumers from whom information had been withheld preferred meat from lambs fed by mothers reared on stall with concentrate. At the same time, providing information on animal feeding system positively affected the acceptability of meat from lambs fed by mothers reared on grass. In the light of the above, we can conclude that extensive livestock systems have a favorable image and are associated with positive attributes of lamb meat, while the intensive systems create negative expectations. However, information must be carefully managed, because the negative image of the intensive systems may penalize the qualitative assessment of meat. In fact, positive expectations have to be confirmed during tasting.

#### 5. ACKNOWLEDGMENTS

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