

# Influence of the Order of Presentation of Meat Samples on Consumers' Sensory Perception of Tenderness

Letícia Zanichelli de Oliveira<sup>1\*</sup>, Leonardo Carvalho Pereira<sup>1</sup>, Giovana Fumes Ghantous<sup>1</sup>,  
Saulo da Luz e Silva<sup>1</sup>, Marco Antônio Trindade<sup>1</sup>

<sup>1</sup> Universidade de São Paulo 1 Faculdade de Zootecnia e Engenharia de Alimentos, Pirassununga, Brasil.

\*Corresponding author email: letszani@usp.br

## I. INTRODUCTION

Texture is an essential quality attribute of meat, playing a crucial role in consumer satisfaction and purchasing decisions. Previous studies have highlighted its importance, directly linking it to food texture and ease of chewing (OSÓRIO et al., 1998; MORTON et al., 2018). The ability to provide tender meat can significantly influence customer loyalty, as tenderness is often considered a determining factor in the choice of meat products. However, assessing tenderness is not without challenges; while objective methods based on physical and chemical tests are widely used, sensory analysis, though valuable, is susceptible to errors and subjective results. Individuals' willingness to judge samples may vary based on the sequence in which they are presented, highlighting the importance of considering and controlling this aspect in sensory study methodologies. (Jaeger, S. R., & Andrade, J. C., 2018).

This research aims to explore the influence of the order of presentation of meat samples on consumers' perception of tenderness. Specifically, we investigate whether the order in which samples are presented affects how consumers perceive the tenderness of the meat. This investigation is motivated by the need to better understand the factors that influence consumers' sensory perception regarding meat quality.

## II. MATERIALS AND METHODS

Two pieces of *Longissimus thoracis* and two pieces of *Biceps femoris*, from Nelore breed cattle, were submitted, with cuts made parallel and perpendicular to the grain. These samples underwent heat treatment in an oven at a temperature of 180°C until reaching 70°C at the geometric center, controlled by a thermocouple. After being removed from the oven, the pieces were cut into 2 cm x 2 cm parallelepipeds, wrapped in aluminum foil, and kept warm in an oven at 60°C until serving time. A total of 120 regular consumers of beef were recruited to participate in the study. An affective acceptance test was conducted using a 9-point hedonic scale (1 – disliked extremely, 9 - liked extremely). The consumers were divided into two groups, each composed of 60 individuals. Each group was presented with four meat samples: two from the *Longissimus thoracis* group and two from the *Biceps femoris* group. For the first 60 tasters, the two *Longissimus thoracis* samples were presented first, namely, Parallel *Longissimus thoracis* Sample and Perpendicular *Longissimus thoracis* Sample, in random order, individually. Then, the analysis continued with the presentation of the *Biceps femoris* samples cut parallel to the grain, Parallel *Biceps femoris* Sample, and *Biceps femoris* cut perpendicular to the grain, Perpendicular *Biceps femoris* Sample. The same procedure was repeated for the other 60 participants, alternating the order of presentation of the meat samples, with the *Biceps femoris* samples being served first. To evaluate the results, the grades 1 to 9 were divided in classes, as follows: grades 1-4 were considered “I didn't liked it”, grades 5-7 were considered “I liked it more or less” and grades 8-9 were considered “I really liked it”. The results were compared through an average test.

## III. RESULTS AND DISCUSSION

According to the order of presentation of the pieces, the scores regarding tenderness changed significantly, as shown in Table 1.

Table 1 - Test for comparison of proportions, considering p-value <0.05

Tasters	<i>Longissimus thoracis</i> Par			<i>Longissimus thoracis</i> Per			<i>Biceps femoris</i> Par			<i>Biceps femoris</i> Per		
	0-60	61-120	p value	0-60	61-120	p value	0-60	61-120	p value	0-60	61-120	p value
"I didn't like it" (1-4 grades)	20%	3.3%	0.0105	3.3%	0%	0.4758	28.3%	25.0%	0.8365	23.3%	21.7%	1.00
"I liked it more or less" (5-7 grades)	48.3%	36.7%	0.2679	41.7%	31.7%	0.3436	48.3%	50.0%	1.00	61.7%	50.0%	0.27
"I really liked it" (8-9 grades)	31.7%	60%	0.0034	55%	68.3%	0.1887	23.3%	25.0%	1.00	15.0%	28.3%	0.1209

The results of the present research clearly demonstrate the influence of the order of presentation of meat samples on consumers' perception of tenderness. For the initial participants (1-60), the *Longissimus thoracis* samples (Parallel *Longissimus thoracis* and Perpendicular *Longissimus thoracis*) presented first mainly received "I liked it more or less" ratings. However, when the subsequent participants (61-120) received the *Longissimus thoracis* samples last, there was a significant increase in "I really liked it" ratings, doubling in the Parallel *Longissimus thoracis* Sample from 31.7% to 60%, while proportionally decreasing the "I didn't like it" ratings from 20% to 3.3%. This increase can be attributed to direct comparison with the *Biceps femoris* samples, which were presented earlier and perceived as less tender.

Furthermore, we observed that the Perpendicular *Biceps femoris* samples, despite being naturally less tender, received more favorable evaluations when presented first to subsequent participants. This suggests that, in the absence of a direct comparison point, the samples were evaluated more positively. Under these conditions, the "liked extremely" ratings obtained higher values when presented first to participants 61-120, from 15% to 28.3%, which, although not significant by the comparison test, showed a notable increase.

#### IV. CONCLUSION

These results emphasize the importance of presentation order in consumers' sensory evaluation, highlighting the need for strategies to minimize comparison biases. The practical implications of these findings are significant for the industry, suggesting the importance of carefully planned presentation strategies to optimize consumers' perception of meat quality. Additionally, these results encourage further studies on how simple manipulations, such as presentation order, can influence the sensory evaluation of other food products.

#### ACKNOWLEDGEMENTS

The present work was carried out with the support of the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) through the Unified Scholarship Program of USP.

#### REFERENCES

##### Book:

1. Osório, J. C. S., Astiz, C. S., Osório, M. T. M., & Alfranca, I. S. (1998). Sheep meat production, an alternative for Rio Grande do Sul. Pelotas: Editora da Universidade Federal de Pelotas.

##### Papers:

2. Morton, J.D., Lee, H.Y.Y., Pearson, R.G., & Bickerstaffe, R. (2018). The physical and biochemical effects of pre-rigor high pressure processing of beef. *Meat Science*, 143, 129-136.
3. Jaeger, S. R., & Andrade, J. C. (2018). Consumer-driven product development: Insights from the food industry. *Trends in Food Science & Technology*, 71, 231-240.