71st ICoMST
GIRONA - CATALONIA - SPAIN
3rd-8th August - 2025

FRENCH CONSUMERS' ACCEPTANCE OF MEATS WITH VARYING DEGREES OF MARBLING ACCORDING TO THE INTERPROFESSIONAL GRID

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I. INTRODUCTION

It has been shown that consumers prefer the taste of meats that they are not ready to buy because they consider them too fatty and, conversely, they buy meats that they enjoy the least in the mouth because they are too lean (Normand *et al.*, 2017). In this study, 3 levels of marbling were tested: low/intermediate/high. They did not refer to the French interprofessional marbling grading scale introduced in 2023 (Nicolazo de Barmon *et al.*, 2024a), which comprises 6 classes, from 1 for lean meat to 6 for extremely marbled meat, based on the 5th rib notation. This grid is compulsory for French manufacturers wishing to assess the marbling of cattle aged 8 months or more. The French industry wanted to know how consumers perceive the different marbling classes in the interprofessional grid. From which marbling class onwards is an added organoleptic value perceived in the mouth? Visually, from which class onwards, does marbling penalize the act of purchase?
Thus, the aims of this study were:
- To establish a specific link between the marbling classes defined in the interprofessional grading grid and consumer satisfaction levels, both at the time of purchase and during tasting, in two different regions of France in terms of consumption habits;
- To provide references for the total intramuscular lipids content of the *longissimus dorsi* for each class of marbled meat.

II. MATERIALS AND METHODS

This study aims to be representative of French beef consumption, both in terms of the product, which is mainly composed of dairy and suckler cull cows, and in terms of regional consumption habits. Two independent and similar sensory tests were therefore carried out with panels of 60 consumers each: one in Villers-Bocage in the French region of Normandy, on meat from 54 dairy cows, and the other in Lille, in the north of France on meat from 52 suckler cows.
In order to have enough *longissimus dorsi* for the tests, half-striploin per cow, from the 11th rib, representative of the different marbling classes of the interprofessional grading scale (figure 1) were sampled and aged for 13 days.
Consumers first tasted the cooked products (overall satisfaction, tenderness, juiciness, and intention to repurchase), and then evaluated raw products presented in neutral trays (overall satisfaction, purchase intention). Due to technical constraints, only visual tests were carried out on the extreme classes 1 and 6.

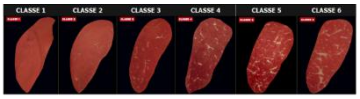


Figure 1: The French grid of beef marbling scoring in 6 classes

The total intramuscular lipid content of the samples (*longissimus dorsi*, on the 11th rib) was determined according to the NF V 04 402 standard.

III. RESULTS AND DISCUSSION

Regarding the visual appreciation of products, a previous study showed a clear consumer preference for purchasing lean ribeyes (Normand *et al.*, 2017). In the present sensory tests, the marbled classes with the greatest consensus for purchase were classes 2 and 3. Conversely, class 6, with the highest marbling level, attracted the fewest consumers, with only 33 and 20% purchase intentions, depending on the test (table 1).
However, a difference in visual appreciation of the products marbling level was observed between the two tests. In the first one, testing meat from dairy cows in Normandy, the same level of purchase intentions (61% to 67%) was found for marbling classes 2, 3, 4 and 5. In the second test in Lille, with meat from suckler cows, the preferences of consumers were for striploin steak in the leaner classes: 1, 2 and 3, with purchase intentions ranging around 68-69%. The hypothesis of a regional and/or location effect (urban/rural population) could explain this difference in appreciation of marbled meat at the time of purchase. The first scheme was carried out in Villers-Bocage, a rural

commune in Normandy, with consumers more used to buying marbled meats because of their proximity to the Normande breed, known for its marbled meat. The second test was carried out in an urban area, in Lille, in a region more used to lean meats

On tasting, the two tests gave consistent results for the different marbling classes of the sirloin steaks. Class 2 was the most disappointing in the mouth, with only 52% and 58% intending to eat it again. Classes 3 and 4 were well appreciated, with reconsumption intentions ranging from 62 to 70%. Finally, class 5 was the best guaranteed tasting, with the highest levels of intention to reconsume, at 75% and 78%.

Table 1 – Results of consumer tests (composed by 60 consumers in each test).

	Marbling class	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Numbers of cows	*Dairy cow test*	*3*	*12*	*12*	*12*	*12*	*3*
	Suckler cow test	*3*	*12*	*12*	*12*	*11*	*2*
Purchase intentions (%)	Dairy cow test	54	61	64	63	**67**	**33**
	Suckler cow test	**69**	**68**	**68**	60	45	**20**
Reconsumption intentions (%)	Dairy cow test		52	**65**	62	**78**	
	Suckler cow test		58	68	70	**75**	

New references for the total lipid content of the 11th rib of the *longissimus dorsi* muscle according to the French interprofessional evaluation grid for marbling were obtained in this study (table 2). Finally, up to marbling class 4, the meats studied remain lean with total lipid contents of 6% or less. According to Nicolazo de Barmon *et al.* (2024b), marbling grades 2, 3 and 4 evaluated on the 5th ribs account for most grades awarded to the cow category on the French market: they represent respectively around 27%, 33% and 20% of grades attributed to cows of all racial types in France.

Table 2 – Results of intramuscular fat (n= 124).

Marbling class	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Average total lipid content of *longissimus dorsi* muscle (%)	1,7 ±0,5	2,3±0,8	3,5±1,1	5,5±1,1	9,3±2,2	15,2±1,6

IV. CONCLUSION

The aims of this work were to assess the sensory qualities of beef (54 dairy cows and 52 suckler cows) from different marbling classes, both when purchased and when tasted by French consumers. To gain a better understanding of the French consumer habits, the tests were carried out in two different regions. Finally, according to the results on raw and cooked products in both contexts studied, it seems possible to conclude that:

- Classes 1 and 2 are disappointing for consumers when they taste them, even if they may be preferable to buying;
- Classes 3 and 4 offer the best compromise between visual appreciation and satisfaction for tasting;
- Classes 5 and 6 offer the best guarantees of consumer satisfaction when tasted, even though they may be poorly perceived when purchased.

This study provides beef industry professionals with consumer satisfaction levels, both at the time of purchase and when tasted, for meats from the different classes of the interprofessional marbling grading scale. In addition, the average intramuscular lipid content is now available for each of these classes. This information will be used to guide operators in the industry to make the most of the French marbling grading system, particularly when it comes to incorporating it into quality specifications.

ACKNOWLEDGEMENTS

This study received financial support from Interbev.

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