

# SENSORY CHARACTERISTICS OF VEAL BICEPS FEMORIS AT DIFFERENT AGEING TIME

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**Abstract** – Tenderness is one of the main factors affecting meat consumers purchase choice and, considering the young slaughter age, they expect veal very tender. Biceps femoris (BF) was identified as the less tender beef hind cut, so it couldn't meet this expectation. It is well recognized that ageing improves tenderness and, to evaluate the effect of ageing on veal sensory profile, eight veal BF were collected and subsampled, each assigned to 2, 4, 8, 10, and 16 days of ageing. Ageing didn't affect aroma, taste and flavor, while tenderness increased from 2 and 4 to 8 days ( $P < 0.001$ ) and from 8 to 16 days of ageing ( $P < 0.05$ ). Juiciness improved from 2 to 8 days of ageing ( $P < 0.10$ ). Fibrousness was reduced from 2 to 8 days ( $P < 0.01$ ) and from 8 to 16 days ( $P < 0.01$ ), astringent sensation decreased from 2 to 4 days ( $P < 0.05$ ) and from 4 to 10 days of ageing ( $P < 0.05$ ). Overall preference increased from 2 to 4 days ( $P < 0.05$ ) from 4 to 8 days ( $P < 0.05$ ) and from 8 to 16 days ( $P < 0.10$ ) of ageing. Ageing veal BF between 10 to 16 days seems to ameliorate tenderness, related sensory traits and overall preference without affecting flavor and taste.

**Key Words** – Biceps femoris, Meat quality, Veal calves

## • INTRODUCTION

Tenderness is one of the main factors that affect consumers meat purchase choice [1], and, about veal, it's easy to suppose that a high tenderness is expected by the consumers, considering that in EU calves are slaughtered no more than 8 months old [2]. Furthermore, it is well recognized that ageing is able to improve beef and veal tenderness [3, 4]. Nowadays meat cuts are extensively stored vacuum packaged, and in veal this practice does not significantly affect odor, color, appearance, flavor and texture traits compared to traditional bone-in carcass ageing [4].

Considering also the different tenderness and tenderization rate among muscles [5], vacuum packaging could allow to differentiate ageing time of different meat cuts, based on muscle characteristics, to maximize their tenderization. This is a crucial aspect for meat industry, because consumers seem willing to pay more for tender meat [6, 7, 8]. Biceps femoris has been recognized as the highest in collagen content [5] and the less tender beef hind cut at the sensory evaluation with dry heat cooking [9], so it is possible that it couldn't meet consumers' expectation regarding tenderness. Objective of this study was to evaluate the effect of ageing time on veal BF sensory profile, in order to assess if prolonged ageing could ameliorate its tenderness without impairing flavor and taste, as in some cases has been reported in beef [10].

## • MATERIALS AND METHODS

Two days after slaughter, *biceps femoris* (BF) muscles were collected from eight male Holstein veal calves, coming from the same farm, fed with the same diet, slaughtered at the same day and homogeneous for age ( $231 \pm 16$  days), cold carcass weight ( $163.50 \pm 15$  kg), conformation, fatness and serum lactate ( $54.52 \pm 1.32$  mg/dL). Muscles were cut in subsamples, each vacuum packaged and assigned to one of the different ageing treatments: 2, 4, 8, 10 and 16 days. It was done ensuring that each portion was equally represented in each ageing time, as described by Mandell et al. [11]. At the end of the established ageing period, samples were frozen at  $-20^{\circ}\text{C}$

and then thawed for 24 hours at 4°C.

Sensory evaluation was performed in five replications by an expert and trained ten-members panel. Two of these have been used as preliminary sessions, aimed to allow judges first to find and then to familiarize with the sensory descriptors relative to veal aroma, taste, flavor and texture (Tab. 1). Descriptors includes the main beef sensory parameters and some of the flavor and taste defect that could affect vacuum packaged aged meat [12]. Samples were cooked on a sandwich plated grill for 60 seconds and cut into 1.50 cm<sup>3</sup> cubes. At each member was asked to express a numerical judgment for every term in a scale from 1 (no perception of sensation) to 9 (high perception of sensation).

Data were analyzed by analysis of variance (ANOVA), using SAS 9.3 GLM procedure [13].

Table 1 Descriptor used for veal sensory evaluation

Descriptors	Scale
Aroma	
Typical	1 (no veal aroma) – 9 (high veal aroma)
Metallic	1 (no metallic) – 9 (high metallic)
Off flavour	1 (no off flavour) – 9 (low off flavour)
Taste	
Sweet	1 (no sweet) – 9 (sweet)
Salty	1 (no salty) – 9 (salty)
Flavour	
Typical	1 (no veal taste) – 9 (high veal taste)
Metallic	1 (no metallic) – 9 (high metallic)
Off flavour	1 (high off flavour) – 9 (no off flavour)
Texture	
Tenderness	1 (less tender) – 9 (more tender)
Juiciness	1 (less juicy) – 9 (more juicy)
Stringy	1 (less astringent) – 9 (more astringent)
Fibrousness	1 (less fibrous) – 9 (more fibrous)
Overall preference	1 (bad) – 9 (good)

## • RESULTS AND DISCUSSION

Results from sensory evaluation (Tab. 2) pointed out an increasing in perceived tenderness comparing 2 and 4 with 8 days ( $P<0.01$ ), but also from 8 to 16 days of ageing ( $P<0.05$ ), with an intermediate value recorded at 10 days, that did not differ from both. Juiciness has been improved from 2 to 8 days of ageing ( $P<0.10$ ), but not further, while at 4 days it had an intermediate value, equal to both. Fibrousness was reduced from 2 to 8 days ( $P<0.01$ ) and from 8 to 16 days ( $P<0.01$ ), with intermediate values at 4 and 10 days of ageing. Astringent sensation decreased from 2 to 4 days ( $P<0.05$ ) and from 4 to 10 days of ageing ( $P<0.05$ ), but not further. Overall preference benefited of these ameliorating effects of ageing, and increased significantly from 2 to 4 days of ageing ( $P<0.05$ ), from 4 to 8 days ( $P<0.05$ ) and also from 8 to 16 days ( $P<0.01$ ), with intermediate value for 10 days. The other sensory parameters, as flavor and aroma, were not impaired by ageing, consistent to what reported by Ngapo & Gariépy in their review on veal quality [4].

Table 2 Sensory profile of veal BF at different ageing time

Descriptors	2 d	4 d	8 d	10 d	16 d
Aroma					
Typical	6.69	6.60	6.80	7.04	6.93
Metallic	4.15	4.43	4.31	3.81	3.71
Off flavour	2.31	2.40	2.42	2.35	2.26

Taste					
Sweet	5.00	5.12	5.34	5.41	5.31
Salty	3.73	3.84	4.33	3.88	4.33
Flavour					
Typical	6.38	6.48	6.67	6.94	6.52
Metallic	4.04	4.78	4.44	4.25	4.36
Off flavour	3.04	3.00	2.58	3.27	2.29
Texture					
Tenderness	3.80 a	4.52 a	5.65 b	6.38 b,c	6.64 c
Juiciness	4.27 a	4.57 a,b	5.13 b,c	5.80 c	5.80 c
Stringy	6.58 a	5.34 b	4.78 b,c	4.15 c,d	3.76 d
Fibrousness	6.64 a	5.81 a,b	5.00 b,c	4.41 c	3.39 d
Overall preference	4.00 a	4.97 b	5.84 c	5.90 c,d	6.57 d

a,b,c,d different letters means different values on the raw ( $P < 0.10$ ).

At the present condition, that is boneless anoxic vacuum ageing, obtained data suggest that ensure from 10 to 16 days of ageing for veal BF ameliorate its tenderness, related sensory traits and overall preference, probably due to the increasing in collagen breakdown, that happen mainly after ten days in beef [14]. Furthermore, ageing didn't impaired the other sensory traits, indeed, at every ageing time, low levels of undesirable flavor and aroma (off and metallic) and by a quite high typical aroma and flavor were found.

## • CONCLUSION

Results from this study suggested that vacuum ageing could improve veal tenderness and related sensory traits without causing undesirable tastes and aromas. Moreover, in order to meet consumer demand, is advisable to undergo veal Biceps femoris, mainly cooked at dry heat and high temperature, at an ageing time between 10 to 16 days.

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