

CONSUMERS' ASSESSMENT OF BEEF STEAKS OF VARYING HANGING METHODS AND AGEING TIMES

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I. INTRODUCTION

Tenderness is one of the most important components of beef eating quality identified by consumers. However, it often fails to satisfy them hence contributing to reduce beef meat consumption [1]. Positive effects of tenderstretching and ageing on tenderness have been known for a long time, even if their interaction has been less studied. Using a tightly controlled consumer panel, an experiment was conducted for a French meat company to quantify the effects of two hanging methods and two ageing times on beef eating quality.

II. MATERIALS AND METHODS

Nine Limousine cows of 5 to 14 years old were slaughtered in the commercial abattoir of Limoges. Carcass weights ranged from 404 to 455 kg. One side, selected randomly, from each carcass, was suspended from the Achilles tendon (AT) and the other side was tenderstretched (TS) until 48h *postmortem*, before normal chilling. The four investigated muscles (*longissimus thoracis*, *longissimus lumborum*, *gluteus medius*, and *semimembranosus*) were collected from each carcass side, cut in two parts and randomly allocated to either 10 or 20 days of ageing. Muscles were assessed as rare grilled steaks by 240 consumers according to the Meat Standards Australia protocol [2]. Beef samples were first scored for tenderness, juiciness, flavor liking and overall liking using a line scale (0 to 100) and then assigned to one of the four quality grades proposed. Statistical analysis was performed with 9.4 SAS software version (SAS Institute, USA). Analysis of variance (MIXED procedure) included animal number, consumer number and testing session as covariates plus fixed effects (carcass side, muscle, hanging method, ageing time and their interactions). It was previously checked that interactions between hanging method or ageing duration and muscle were non-significant.

III. RESULTS AND DISCUSSION

Both pelvic suspension and ageing extension up to 20 days significantly improved consumers' evaluations ($P < 0.05$ to $P < 0.001$ depending on the sensory criteria; Figure 1).

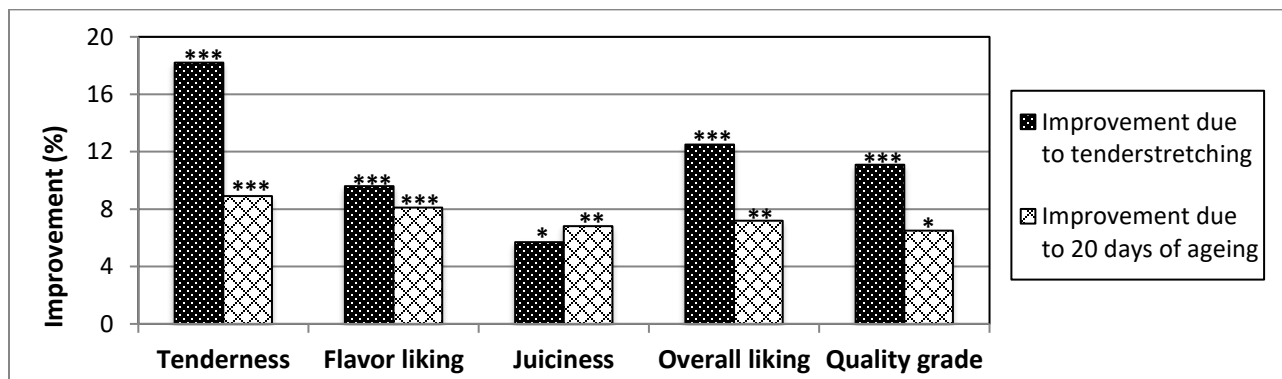


Figure 1. Improvements due to tenderstretching or 20 days of ageing across muscles (statistical significance of the improvement: * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$)

Similar results have been found previously by Bastien *et al.* [3] and Devlin *et al.* [4]. Tenderstretching effects on tenderness and overall liking were particularly important, but both *post mortem* treatments increased flavor liking and quality ranking too, as well as juiciness to a lesser extent. The effect of these treatments did not differ between muscles.

Across muscles, tenderstretching was globally more or as effective as extension of ageing except for juiciness (Figure 1). It was twice as efficient as 20 days of ageing for tenderness (18% improvement for all ageing durations vs 9% for all hanging methods; Table 1). The same result was found for overall liking and quality grade. Both treatments had effects of similar magnitude on flavor liking (10% vs 8%) or juiciness (6% vs 7%). Tenderstretching and 20 days of ageing had independent effects on tenderness and juiciness. However, this was not the case for flavor linking, overall liking and quality grade for which there was a significant interaction between the two processes ($P < 0.05$). Tenderstretching had a higher impact on beef aged 10 days than on beef aged 20 days: juiciness and flavor liking were not significantly improved at 20 days of ageing (Table 1). Across muscles, Tenderstretching coupled with 20 days of ageing generally gave the best results: it allowed to gain 30% of tenderness, 21% of overall liking, 19% of flavor liking and 13% of juiciness, compared to AT suspension and 10 days of ageing which generally had the lowest performances. If the company is willing to use the pelvic suspension, this will be its responsibility to choose the optimum ageing time which offers the best compromise between advantages and constraints [3].

Table 1 Improvements (%) of sensory traits due to tenderstretching (TS) and/or 20 days of ageing (20d) compared to Achilles tendon (AT) and 10 days (10d) of ageing. (statistical significance of the improvement: NS: non-significant; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$)

All muscles	Tenderness	Juiciness	Flavor liking	Overall liking	Quality grade
Improvement TS with 10d (vs AT with 10d)	23,0 (***)	8,1 (*)	16,0 (***)	18,0 (***)	19,0 (***)
Improvement TS with 20d (vs AT with 20d)	14,0 (***)	3,4 (NS)	4,3 (NS)	7,6 (**)	4,2 (*)
Mean improvement TS (vs TA)	18,2 (***)	5,7 (*)	9,7 (***)	12,5 (***)	11,1 (***)
Mean improvement 20d (vs 10d)	8,9 (***)	6,8 (**)	8,1 (***)	7,2 (**)	6,5 (*)

IV. CONCLUSION

This experiment enabled the French private meat company C.V. Plainemaison to assess the advantages and the constraints linked to the implementation of the pelvic suspension in its own facilities. The higher sensory scores obtained with tenderstretching using an untrained panel convinced the company. Accordingly, ageing and pelvic suspension were both introduced within the requirement specifications of its new premium beef brand “Or Rouge” launched at the beginning of 2017 (<http://www.orrouge.fr/>). As far as we know, this is the first time that a French meat plant routinely uses the pelvic suspension in a commercial context.

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