BEEF ENHANCEMENT WITH PROTEIN HYDROLYSATE IMPROVES TENDERNESS AND REDUCES THAW-LOSS

Rune Rødbotten[1*], Josefine Skaret[1], Øydis Ueland[1], Anne Rieder[1], Gard Karlsnes[1] and Paula Varela[1]

[1]Nofima AS, Norwegian Institute of Food, Fisheries and Aquaculture Research, NO-1433 Ås, Norway

*Corresponding author email: rune.rodbotten@nofima.no

I. INTRODUCTION

People worldwide are living longer. In 2050 the number of persons reaching the age of 80 years will be 3 times higher than today. Some consequences of ageing are that both muscle and bone mass are reduced with age. Currently, recommended daily protein intake is at least 0.8 g/kg body weight, for older adults 15-20 E% about 1.2 g/kg body weight [1]. Red meat is a rich source of bioavailable protein, iron and vitamins, which makes it a valuable foodstuff especially for elderly consumers. However, traditional steaks and roasts may sometimes for elderly people be difficult to chew due to the compact fibre structure of the muscles. Lower saliva production and oral health problems may cause problems with chewing and swallowing [2]. By mechanical tenderisation it is possible to improve tenderness significantly [3]. Protein hydrolysates made from side-streams of meat production have recently gained interest as ingredients in new food products. In this study we aimed at investigating how blade tenderization combined with injection of protein hydrolysate affect beef quality, and if it could improve consumers' ability to still consume whole meat in older age.

II. MATERIALS AND METHODS

Bovine *M. Semimembranosus* from 11 young bulls were obtained 2 days *post mortem* (p.m) and vacuum packed before ageing at 1°C until 7 days p.m. Then the muscles were randomly allocated into 4 groups, A-D, given different treatments before freezing and cooking. Sample A was control, with no further treatment, B was blade-tenderised, and C was blade-tenderised and injected to 110% weight with brine containing 0.3% NaCl and 0.3% $Na_5P_3O_{10}$. While D was blade-tenderised and injected to 110% weight with brine containing 0.3% NaCl, 0.3% $Na_5P_3O_{10}$ and 30% protein hydrolysate. To allow the injected solutions to settle all muscles were further stored for 3 days before the samples were cut into 2.5 cm thick slices. All samples were blast-frozen and kept at -40°C until evaluation. After thawing the samples were cooked to a core temperature of 66°C and served to a panel of 10 trained sensory assessors, which evaluated the samples for 22 different attributes into score-values between 1 (low) and 9 (high). The data were analysed by analysis of variance using the GLM procedure of Minitab ver.19. For differences between groups Tukey's test was used.

III. RESULTS AND DISCUSSION

As shown in Tabel 1 Tenderness was significantly increased by all three treatments B, C and D, compared with the control sample A, but no substantial difference was detected between these three treatments. However, when considering Hardness, treatment D where both blade-tenderisation and injection with brine containing a protein hydrolysate were used, gave significantly lower hardness value than both control (A) and blade-tenderisation alone (B). For Juiciness the same tendency was

observed; that treatment with brine solution containing protein hydrolysate in combination with blade-tenderisation, gave meat which seems to be easier to chew and swallow. The protein hydrolysate used in treatment D contained about 1.5% salt, which probably caused the higher score for Salty taste. Some food products where protein hydrolysates have been added get a bitter taste. Treatment D showed a tendency to Bitter taste, but it was not significant. Another interesting observation was that samples from treatment D had substantially lower thaw-loss than the other samples. The present results clearly show that blade-tenderisation combined with injection of a solution able to withstand in the muscle improve tenderness and juiciness. These results are in agreement with previous work [3].

Table 1 Sensory evaluation of meat samples given different treatments. Means with different letters (a-c) in the same line are significantly different, P<0.05.

Treatment	A	B	C	D	P-value
Hardness	6.61 ^{a}	4.48 ^{b}	3.91 ^{bc}	3.61 ^{c}	<0.001
Tenderness	2.53 ^{b}	4.69 ^{a}	5.61 ^{a}	5.75 ^{a}	<0.001
Juiciness	4.24 ^{b}	4.51 ^{ab}	4.67 ^{ab}	5.18 ^{a}	0.039
Salty taste	2.64 ^{b}	2.64 ^{b}	2.76 ^{b}	3.61 ^{a}	0.004
Bitter taste	3.65 ^{a}	3.60 ^{a}	3.37 ^{a}	4.64 ^{a}	0.053

IV. CONCLUSION

This study has shown that blade tenderization combined with injection of protein hydrolysate improves tenderness and juiciness of beef. Such processing can contribute so roast and steak products still can be consumed by people with reduced oral health.

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