EUROPE FAT CARCASS CLASSIFICATION AND EATING QUALITY OF ICELANDIC LAMB MEAT

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I. INTRODUCTION

There is a growing interest in the effects of intramuscular fat (IMF) on the eating quality of lamb meat. Flavour, juiciness, and consumer liking increases with growing marbling. Minimum values from 2,5-5% intramuscular fat have been proposed for guaranteeing consumer satisfaction [1-3]. Little is known about the effects in IMF on the eating quality of Icelandic lamb meat. IMF is low and averaged 1,86% in 790 samples of muscle *longissimus dorsi* in a study in 2016 [4]. This may probably be explained by low slaughter age (4-5 months) and maybe also extensive breeding for more muscled and less fat carcasses. The effects of subclasses of EU fat classification of lamb carcases on chemical fat, visual marbling scores and eating quality of loin muscle (*m. longissimus dorsi*) were studied.

II. MATERIALS AND METHODS

Six carcasses of subclasses 2^-, 2, 2^+, 3^-, 3 and 3^+ were selected randomly in the chillroom of a slaughterhouse the day after slaughter. *M. Longissimus dorsi* (pH^{24} below 5,8) was cut with subcutaneous fat attached, trimmed and *vacuum* packed, aged for 6 days at 2°C, then blast frozen and kept at -25°C for 5 months until analysis. Then it was thawed at room temperature overnight before analyses. The raw muscle was analysed for visual marbling using a 5-point scale and intramuscular fat using acid hydrolysis. The cooked muscle (68°C sous vide) was analysed for odour, flavour and texture attributes using General Descriptive Analysis on the scale of 0-100 as well as Warne Bratzler Shear Force. The General Linear Model and Duncan's test were used to estimate the effects of fat subclasses and Pearson correlation coefficient to calculate the linear relationship between variables.

III. RESULTS AND DISCUSSION

Intramuscular fat was lowest on average in class 2^- (1.52%) but ranged from 1.83-2.17 in other groups. The average IMF content was 1.92% with a great variation within each class. Correlation coefficients between fat classes, chemical fat content and marbling scores were low or 0.30 and 0.22 respectively. Meat from the fattest carcasses (3^+) scored highest in strong odour (hormone/skatole like). It also scored highest in softness (easiness of first bite), tenderness when chewing the meat as well as juiciness while the meat from leaner carcasses had the lowest scores for strong odour/flavour and texture attributes (Table1). % IMF and visual marbling score correlated moderately with tenderness and juiciness while correlation of carcass fat class with sensory attributes was quite low (Table 2).

Table 1. The effects of EU fat classes of lamb carcasses on sensory attributes and of *M. Longissimus dorsi.*

Sensory attributes	EU lamb carcass fat class						SD[1]	P-value
	2-	2	2+	3-	3	3+		
Fatty odour	16.0	14.1[b]	17.7[a]	17.4[a]	14.5[b]	14.9[b]	2.56	0.002
Strong odour	2.90[c]	3.90[bc]	6.70	10.5[ab]	5.00[bc]	12.3[a]	6.26	0.004
Strong flavour	3.00[b]	4.40	4.20	8.90[a]	4.70	6.70	3.94	0.032
Softness	59.8[b]	62.4	63.5	61	61.7	66.1[a]	7.61	0.049
Tenderness	58.9[c]	62.9	66.0[ab]	59.5[bc]	60.3[bc]	67.9[a]	7.33	0.003
Juiciness	50.7[b]	51.9[b]	56.7	51.3[b]	53.2	60.6[a]	7.34	0.020

[1]SD: Standard Deviation; The table show the average for each sensory attribute. Different letters in row indicate a statistical difference between fat classes.

Table 2. Pearson correlation coefficients with sensory attributes, % intramuscular fat, visual marbling score *Longissimus dorsi* and EU fat carcass class.

Sensory attribute	% IMF	Visual marbling score	EU fat carcass class
Strong odour	0.26	0.39	0.31
Fatty odour	0.13	-0.28	-0.03
Strong flavour	0.20	0.29	0.18
Softness	0.21	0.41	0.01
Tenderness	0.44	0.47	0.07
Juiciness	0.46	0.40	0.19

IV. CONCLUSION

The was a difference in texture between the meat from the leanest and fattest carcasses that is not caused by intramuscular fat. Which could hypothetically be explained by differences in chilling rates.

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REFERENCES

1. Pannier, L., Gardner, G. E., O'Reilly, R. A. & Pethick, D. W. (2018). Factors affecting lamb eating quality and the potential for their integration into an MSA sheep meat grading model. Meat Science 144: 43-52.
2. Realini, C. E., Pavan E., Johnson, P. L., Font-i-Furnols, M., Jacob, N., Agnew, M., Craigie, C. R. & Moon, C. D. (2021). Consumer liking of *M. longissimus lumborum* from New Zealand pasture-finished lamb is influenced by intramuscular fat. Meat Science 173: 108380.
3. Craigie, C. R., Agnew, M. P., Stuart, A. D., Shorten, P. R., Reis, M. M., Taukiri, K. R. & Johnson, P. L. (20 17). Intramuscular fat content of New Zealand lamb *M. longissimus lumborum*. Proceedings of the New Zealand Society of Animal Production 77: 189-193
4. Thorkelsson, G., Eythorsdottir, E. & Einarsson, E. 2019. Áhrifaþættir um gæði lambakjöts. Factors influencing the quality of lamb meat) Rit LBHÍ, 120: 48. (In Icelandic).