IDENTIFYING POSSIBLE MARKET ADVANTAGES OF MEAT FROM NATIVE ENDANGERED CATTLE BREEDS

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I. INTRODUCTION

Six endangered cattle breeds, native to Norway, have increased in population sizes during the last decade to 4,489 breeding cows in 2021. The number of suckler cows in beef production has increased by 386 percent in this period. This indicates a successful approach of Norwegian farmers in production and sale of beef. However, their successful approach could be even better, as in securing more animals, if desirable meat quality traits were identified. No scientific study on meat qualities have ever been carried out on Norwegian URFE ("ancient cattle"). A pilot project was thus started with the aim to identify possible marked advantages of meat from these breeds. Loins (*longissimus thoracis et lumborum, LTL*) from 83 young bulls (Norwegian categorization) were collected for a pilot study of meat variables. While many quality traits were measured, this abstract, beyond describing the collection of carcasses, focuses on the content of some of the important trace elements in meat.

II. MATERIALS AND METHODS

The endangered breeds are raised on many small farms (approx. 800) with a total of 300 and 2,000 breeding females per breed. The native and endangered breeds have a common brand-name URFE.

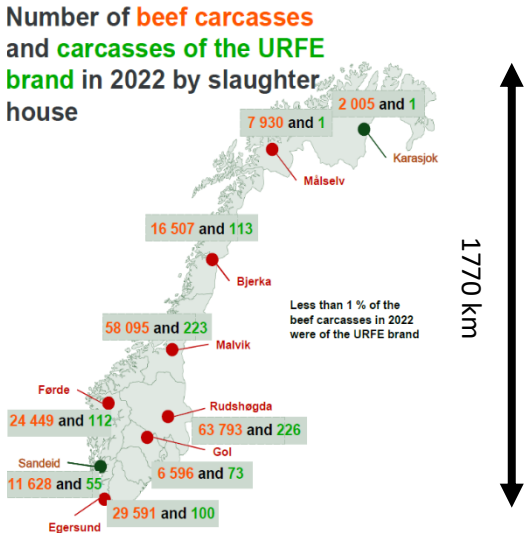

Figure 1. The number of NRF and URFE carcasses slaughtered at Nortura AS's abattoirs in 2022. The figure is modified from a version obtained from Nortura AS.

Figure 1 illustrates, by abattoir, the low number of URFE carcasses arriving in 2022 at slaughterhouses compared to total number of beef carcasses. All animals slaughtered in Norway are registered in a database [1] managed by Animalia, Norwegian Meat and Poultry Research Centre. The number of URFE carcasses in the young bull category was per breed: 63 from Western Red Polled, 83 from both Døla and Eastern Red Polled, 114 from Telemark, 198 from Western Fjord and 523 from Black Sided Trønder and Nordland (STN). The database provided data on carcass classification plus slaughter details and farm information on all carcasses studied in this project.

Totally 96 animals were included in this study. LTL was cut on Day 2 *post-mortem* and chill-stored, vacuum-packed, until Day 11 when freezing at -20°C was done at a relevant slaughterhouse. Transfer to -80°C was then performed after 4-8 weeks. The frozen samples were thawed overnight for quality measures and mineral analysis. Mineral analyses were performed to quantify cobalt (Co), copper (Cu), iron (Fe), selenium (Se) and zinc (Zn) (Agilent 8800 ICP-MS). Norwegian Red (NRF) was used as a reference breed. One Way ANOVA with Games-Howell as post hoc test (MINITAB) for unequal variance was used.

III. RESULTS AND DISCUSSION

NRF young bulls were in 2022 slaughtered at an average age of 18.3 months (data not shown); STN at 17.1 months, Telemark and Eastern Red Polled at 15.8 months ($P < 0.05$) and the remaining breeds between 17.1-15.8 months. The slaughter time point for NRF bulls is ~18 months for economical reasons while it is unclear why Telemark and Eastern Red Polled can be slaughtered at younger age. All URFE breeds appear to have lower slaughter weights than NRF [2]. Since the production routines are not aligned, the meat could also be influenced by other variables than genetics. The collected loin samples were subjected to the following analyses: pH, drip and cooking losses, shear force, proximate composition, fatty acid profiles, selected trace elements and sensory analysis. The actual data measured for the trace elements are provided in Table 1.

Table 1. Content of selected trace elements in LTL muscle

mg/ 100 g*	URFE (n=83)	NORWEG-IAN RED (n= 13)	WESTLAND FJORD (n=14)	TELEMARK (n=13)	WESTERN RED POLLED (n=14)	STN (n=14)	EASTERN RED POLLED (n= 15)	DØLA (n=14)	ANOVA SEM**
Se	9.27	$8.77^{ab,***}$	10.02^{ab}	6.35^{b}	11.27^{a}	9.30^{ab}	8.66^{ab}	10.00^{ab}	0.37
Zn	5.63	6.14^{a}	5.59^{a}	5.11^{a}	5.94^{a}	5.81^{a}	5.60^{a}	5.73^{a}	0.09
Fe	2.74****	2.11^{b}	2.60^{ab}	2.56^{ab}	2.85^{a}	3.01^{a}	2.60^{ab}	2.82^{a}	0.05
Cu	0.32****	0.08^{b}	0.31^{ab}	0.28^{a}	0.25^{a}	0.35^{ab}	0.37^{a}	0.31^{a}	0.03
Co	0.31	0.68^{a}	0.30^{a}	0.29^{a}	0.26^{a}	0.32^{a}	0.37^{a}	0.29^{a}	0.31

*Cobalt (Co) and Selenium (Se) are given in µg/100g.**SEM is standard error of mean. *** Numbers with different letters were significantly different. **** These values are significantly different from the NFR values.

The mineral content of all loins from the URFE breeds was first compared with those from Norwegian Red (NRF; Table 1). Clearly, the Fe content was significantly ($P < 0.05$) higher in the URFE breeds. The same was the case for the Fe/Zn ratio (not shown). This difference is presumed due to a higher prevalence of oxidative fibres in URFE muscles. Compared to the NRF, the Cu content of the other breeds was higher. The measured Cu level (mg/100 g) of URFE is closer to that observed in reindeer [3] (~0.25) where national breeding has never been carried out. The Se content varied significantly between the breeds. Western Red Polled loins showed a desirable Se content. The Co level also varied a lot in NRF. This may, among others, be due to variation in feeding practise. Both Se and Co are minerals of interest from a health perspective, having the potential to affect B12 levels. Referring to a nutrient being >15% of EFSA's reference values [4], all loins were sources of Fe and Zn, but only URFE loins were sources of Cu. Only Western Red Polled loins were qualified as a "source of Se".

IV. CONCLUSION

Our pilot data suggested that some elements largely depended on genetic differences while other elements must be studied further to separate the effects of feed and genetics.

ACKNOWLEDGEMENTS

This work was partly the outcome of a Nordic Joint Committee for Agricultural and Food Research (NKJ) network – 'Nordic Native Meat' – running from 2018–2021. In addition, we thank the Norwegian Agriculture Agency for support through grant 2020/3161 Afros 126009.

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