PREDICTION OF INTRAMUSCULAR FAT OF LAMB LOINS EARLY POSTMORTEM *IN-SITU*

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I. INTRODUCTION

There is a distinct need and interest from industry for the development of rapid, non-destructive grading tools for Australian lamb carcases, particularly for intramuscular fat content (IMF) due to its importance to meat and eating quality, early in the processing chain to enable carcases to be sorted for further processing [1]. However, the development of such methods for commercial processors in Australia is challenging as lamb carcases are not split or quartered prior to the breakdown of the carcase into saleable meat. Therefore, research was completed to determine the potential for near infra-red spectra (NIR) collected on the topside early post mortem to predict the IMF content of lamb loins.

II. MATERIALS AND METHODS

NIR spectra were collected from the topside with the subcutaneous fat removed of Merino lamb carcases at 25 min post-mortem *in-situ* over 5 measurement periods (kills). This was completed using an ASD® TerraSpec4 high resolution spectrometer with the ASD® contact probe attached via a fibre optic cable, in transmittance mode using an integration time of 34 milliseconds and an instrument sample count of 50. At 24 hr post-mortem, the left *M. longissimus lumborum* (loin) was removed from the carcase and a portion was analysed for IMF content using a modified AOAC (1992) method [2]. Spectra were analysed by first converting them from transmittance to absorbance and averaging by carcase, prior to being pre-processed using splice correction at 1000nm and 1800nm with a linear interpolation of 5 bands and the continuum removal method. The optimal number of latent variables were established by evaluating the RMSEP before Partial Least Squares models were run using leave one out cross validation methods [3].

III. RESULTS AND DISCUSSION

Overall, prediction models using the topside spectra were unable to accurately predict the IMF content of the loin given the correlation between predicted and observed values of 0.2 and a root mean square error (RMSE) of 1.32 using 5 components (Fig 1). This is similar to previous studies which have demonstrated NIR spectra collected in the early post-mortem period to predict the IMF of lamb were unable to successfully predict the IMF content yielding a correlation of 0.27 [4]. It is hypothesised that the ongoing metabolic changes which occur as the pH declines and temperature of the muscle are limit the predictive ability when spectra are collected during the early post-mortem period. However, as no pH or temperature data was collected further research is needed to ascertain the impact of metabolic processes on NIR spectra and determine if this limitation can be overcome to yield accurate models early post mortem.

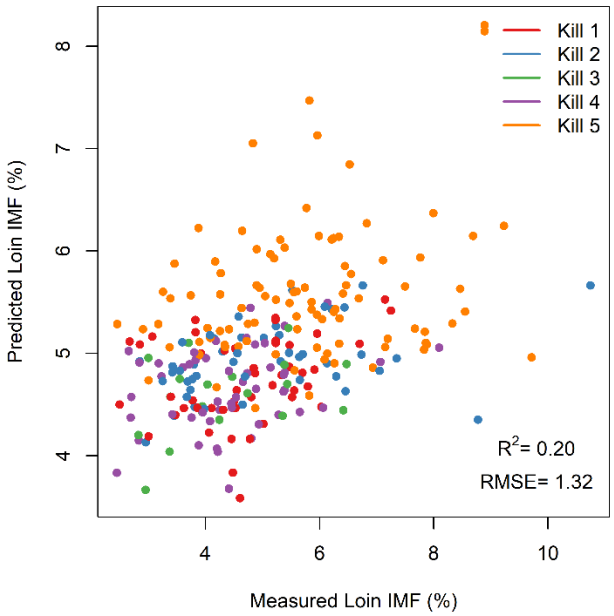

Figure 1. Prediction of the loin IMF content of loin using NIR spectra collected from the topside at 25 min post mortem.

Although measurement was conducted on the topside *in-situ* as it is easily accessable in commercial processes without altering cut lines, low accuracies in the current study are also attributed to differences in IMF content given the topside has a lower fat content when compared to the loin [5]. While previous research has indicated that the loin is 2.1% lower in fat content, only a small number of samples in a short period were measured. Consequently, in order to create an adjustment factor to be included in the model, a larger survey is required to better quanitfy the difference.

IV. CONCLUSION

Overall, NIR measurements in the topside early post-mortem were unable to accurately predict the IMF content of lamb loins as shown by the low correlation between predicted and observed values. Given the value to industry in being able to predict IMF early post-mortem, further research is warranted.

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