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Assessment of a probe to measure fat depth of lambs (#255)

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Introduction

The total tissue depth over the 12th rib 110 mm from the midline (GR tissue depth) has long been used as an indicator of lamb carcase yield in Australia, currently there is no method for objective measurement. Previously the AUS-MEAT sheep probe has been used [1], yet this is no longer available. Palpated fat depth is the most common method used by Australian lamb processors to estimate GR tissue depth as it is not feasible to use a GR knife at chain speed. Therefore, the aim of this study was to evaluate the potential for a probe developed in Iceland (the Icemeat probe) to measure the GR tissue depth of Australian lambs in commercial processing plants.

Methods

Lambs (n= 1087) were measured at 2 abattoirs over 4 months. Lamb carcases were first measured at the GR tissue depth location with a GR knife prior to being measured with the Icemeat probe (Fig 1). The relationship between the measurements taken using the GR probe and the GR knife was estimated by a linear model. Sample date was included as a random effect to account for the batch effect of carcases measured on each day. Measurements of 25mm on the GR knife were excluded as this is the upper limit of detection. The model fitting was conducted in R using the lme4 package [2].

Results

The carcases measured had a range of GR tissue depths of 1 – 24 mm and a mean of 14 mm (s.d. 5.36 mm). The model to predict GR knife measurements using the probe yielded the equation:

Predicted(GR Knife) = 0.63 (s.e = 0.40) + 0.92 (s.e. = 0.02) probe

Establishing a correlation between readings from the two instruments does not necessarily indicate that one can reliably substitute for the other [if supportFields]><spanlang=EN-US style='font-size:11.0pt;font-family:"Arial","sans-serif";mso-fareast-font-family:Batang;mso-ansi-language:EN-US;mso-fareast-language:KO;mso-bidi-language:AR-SA'><spanstyle='mso-element:field-begin'><spanstyle='mso-spacerun:yes'> ADDIN EN.CITE <EndNote><Cite><Author>Bland</Author><Year>1986</Year><RecNum>3887</RecNum><DisplayText>[4]</DisplayText><record><rec-number>3887</rec-number><foreign-keys><keyapp="EN" db-id="arz002rrlffz9jer9wavset2t9z0fxxazpra"timestamp="1549857587">3887</key></foreign-keys><ref-typename="JournalArticle">17</ref-type><contributors><authors><author>Bland,J.M.</author><author>Altman, D.G</author></authors></contributors><titles><title>STATISTICALMETHODS FOR ASSESSING AGREEMENT BETWEEN TWO METHODS OF CLINICAL MEASUREMENT</title><secondary-title>TheLancet</secondary-title></titles><periodical><full-title>TheLancet</full-title></periodical><pages>307-310</pages><volume>327</volume><number>8476</number><dates><year>1986</year><pub-dates><date>1986/02/08/</date></pub-dates></dates><isbn>0140-6736</isbn><urls><related-urls><url><styleface="underline" font="default"size="100%">http://www.sciencedirect.com/science/article/pii/S0140673686908378</style></url></related-urls></urls><electronic-resource-num><styleface="underline" font="default"size="100%">https://doi.org/10.1016/S0140-6736(86)90837-8</style></electronic-resource-num></record></Cite></EndNote><spanstyle='mso-element:field-separator'><![endif][3][if supportFields]><spanlang=EN-US style='font-size:11.0pt;font-family:"Arial","sans-serif";mso-fareast-font-family:Batang;mso-ansi-language:EN-US;mso-fareast-language:KO;mso-bidi-language:AR-SA'><spanstyle='mso-element:field-end'><![endif]. As highlighted by Figure 2, consideration of the differences between the measurements over increasing fat depth demonstrated some areas of concern. For lean carcasses there was an over estimation of GR knife by the probe. As the GR knife fat depth measurements increased there was also an increase in the variability of measurement using the probe.

The lack of precision at higher GR tissue depths is a challenge for the adoption of the probe in its current form as a carcase with a 20 – 24+ mm GR tissue depth (fat score 4 and 5) may be under represented, resulting in a measurement which corresponds to a lower fat score. In a commercial processing plant, this error would result in the carcase being given a premium grade rather than being penalised for having high fat, yet the processor would need to pay labour to have the fat removed. Thus, further development

Notes

is required prior to the adoption of the probe.

Increased variability of measurement by the probe at high GR tissue depth may be the result of the mechanism pushing the fat of the carcase in during the measurement for fatter carcases. Further hide puller damage and uneven fat depths caused a discrepancy between measurements on smaller carcases as the slider on the knife which measures the depths is considerably smaller than the plate on the front of the probe. Consequently, further development is suggested to reduce the required force which is exerted on the subcutaneous fat of the carcase by the plate on the front of the probe and/or a reduction in the size of the plate on the front of the probe to match the size of the knife.

Conclusion

Overall, the practical use of the probe was favourable for industry application, however the probe in its current design does not meet the requirements for industry application due to the errors associated with the measurement of leaner and fatter carcases. Therefore, further development of the probe is required to reduce the errors associated.

References

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3. Bland, J.M. and Altman, D.G. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. The Lancet, 327: 307-310

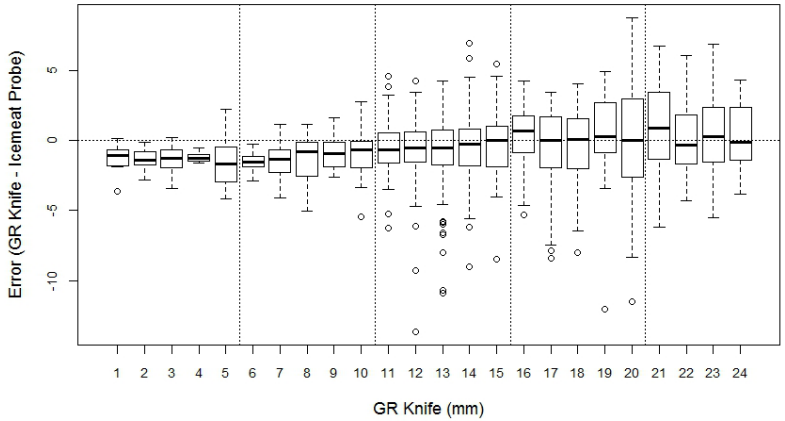

Figure 2. The error of the measurement of GR Tissue depth with the Icemeat probe (GR knife – Icemeat probe) with increasing GR knife depths where the vertical dotted lines represent each fat score (1 – 5) and the horizontal line represents 0 error.

Figure 1. Measurement at the GR tissue depth site using the Icemeat probe .

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