INCREASED COMPUTED TOMOGRAPHY LEAN % IS ASSOCIATED WITH REDUCED INTRAMUSCULAR FAT % OF THE *M. LONGISSIMUS THORACIS* IN AUSTRALIAN PORK

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I. INTRODUCTION

Lean meat yield (LMY) % represents the proportion of lean in a carcass, with increases correlating with more saleable meat and greater profit. In Australia, pork producers are rewarded indirectly for LMY % based on hot carcase weight and a measure of P2 fat depth (mm) [1, 2]. Genetic associations between selection for leanness and reduced intramuscular fat (IMF) % have been reported in pork [3]. Given, that IMF % has generally demonstrated a positive relationship with the eating quality of pork [4, 5], selection for increased muscling and LMY % has the potential to reduce pork eating quality. Computed tomography (CT) has been recognised as a gold standard for the determination of LMY % in pork and lamb and can be used to benchmark the LMY% predictions of other objective carcass measurement (OCM) devices. Therefore we hypothesised that CT will demonstrate a negative relationship between LMY % and IMF % in pork, and that this relationship will be stronger compared to LMY % measured from other OCM devices.

II. MATERIALS AND METHODS

Pork sides were collected from an Australian abattoir (n = 120) following scanning using a Hennessy probe to predict LMY % and P2 (mm). Sides were transported to Murdoch University, Western Australia and cut into sections (fore, loin, belly and hind) prior to CT scanning with a Canon Aquilon Lightning machine with dynamic mAs at 120kV. Images were captured at 5 mm slice width, with images analysed using thresholding as previously described by Anderson *et al* [6] to determine lean % of the whole carcass and the loin primal section which represents the carcase portion between the 5th and 12th rib with a tail extending 4cm from the edge of the loin muscle. An 80 g sample of the *M. longissimus thoracis* (loin), was weighed, frozen to -20°C, freeze dried (ScanVac CoolSafeTM, LabogeneTM, Lilleroed, Denmark) and ground. Chemical IMF was measured on these samples using near infrared spectroscopy (Technicon Infralyser 450, Unity Scientific), which was calibrated using chloroform Soxhlet extraction of fat and expressed as a percentage chemical fat in wet tissue based on the dry matter percentage. A general linear model was fitted to describe the relationship between loin IMF % and CT lean % in either the loin or whole carcase, with precision reported as R^2 and root mean square error (RMSE).

III. RESULTS AND DISCUSSION

As carcass CT lean % increased there was an associated decrease in loin IMF% (Figure 1a: $P < 0.05$, R^2 0.29, RMSE 0.67). Across a 4 standard deviation range of CT lean %, the IMF % decreased by 1.74 IMF % units. Using CT lean % of the loin section from where the IMF sample was collected did not improve the association with IMF % (Figure 1 b). For the Hennessy probe, neither the lean % or the P2 (mm) output demonstrated a significant relationship with IMF % ($P > 0.05$).

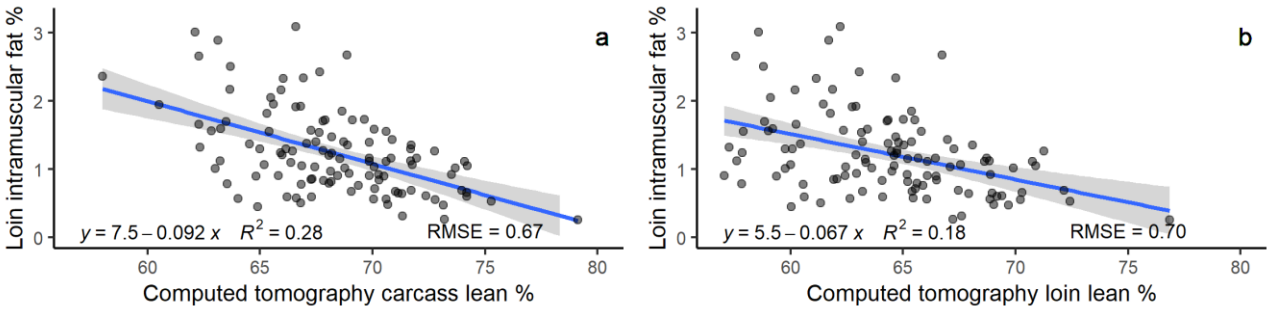

Figure 1. The relationship between loin intramuscular fat % and carcass computed tomography lean % of the carcass (a) and loin section (b). Lines show predicted best fit ± SD (grey shaded areas) with dots representing individual observations

Selection for improved muscling in Australian pork has been associated with a reduction in intramuscular fat (IMF) % [7] however, this is the first time that CT has been used to quantify this phenotypic relationship. To assess the ongoing relationship between LMY % and IMF % the relationship needs to be reliably described, with current abattoir OCM unable to do so. The ability to maintain selection pressure on lean % while improving meat quality through increases in IMF % will rely on precise measurement of these two traits independently. Ideally prediction of IMF % should be measured directly, rather than relying upon other correlated carcass measures such as leanness. This would allow differential selection between fat depots, specifically enabling positive selection for IMF while maintaining negative selection pressure on subcutaneous fat. Future work across a range of genetics would be beneficial to understand the potential impact of selection for increases in LMY % on the IMF % and eating quality of pork.

IV. CONCLUSION

There is a negative relationship between CT lean % and loin IMF % indicating that selection pressure on increased LMY is likely to result in reductions in IMF % and therefore eating quality.

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