

DEXA measurement of lamb carcass composition is accurate in both wethers and ewes

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Dual Energy X-Ray Absorptiometry (DEXA) analysis of lamb carcasses is proving to be a highly robust, rapid and precise method of determining total body fat¹, potentially giving plant operators and producers an improved ability to select for ideal carcass composition. Ewes will generally have a higher total fat percentage than that of wethers², as is the case with most production animals. However previous evidence in pigs has demonstrated that medical DEXA scanners could still predict the composition of gilts and barrows without bias³. Therefore, we hypothesised that the prototype DEXA system will predict all lambs with a similar accuracy, irrespective of age or sex.

An online prototype DEXA scanner, installed within an abattoir at Bordertown, SA, was used to generate dual digital radiographs of 468 carcasses (217 female, 251 male). These images were used to calculate total fat % within each carcass. The carcasses were also scanned using Computed Tomography (CT) to determine the actual fat content of the carcass. Using SAS, a model of actual body fat percentage (CT Fat %) and predicted body fat as determined by the DEXA images (DEXA Fat %) was used to determine the system's prediction line. For each individual, a residual number was calculated as the difference between the CT Fat % and the prediction line, while also correcting for hot carcass weight. Residuals from this model were tested for difference between sexes and age.

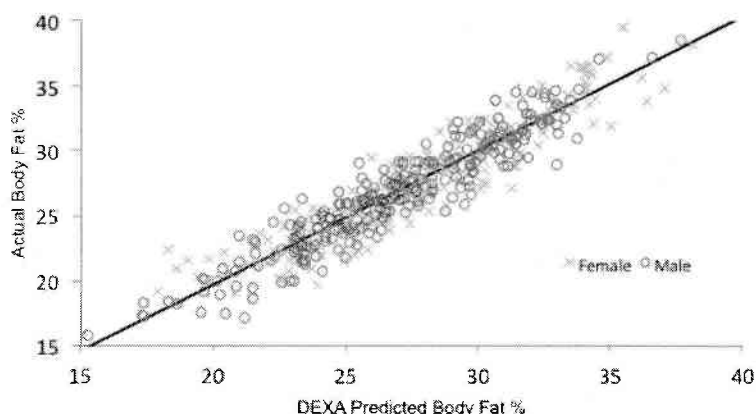


Figure: A scatter plot of actual body fat % and DEXA predicted body fat %, with hot carcass weight correction and prediction line

The DEXA scanner predicted CT Fat % with good precision ($R^2 = 0.88$; see figure). The raw CT data demonstrated that the females (27.8 CT Fat %) were fatter ($P < 0.01$) than the males (26.7 CT Fat %) in this study. The DEXA successfully predicted this difference (CT Fat % of 27.8% for females versus 26.7% for males), however when slaughter age was accounted for the difference between sexes (-0.03% for males, 0.04% females) was no longer significant ($p > 0.6$).

In keeping with our hypothesis, there was no significant difference between the mean residuals of the two sexes when factoring for age. The DEXA system was able to accurately predict the total body fat of both wethers and ewes, and with insignificant bias.

This implies that even by factoring in the age of the lamb, the precision of the DEXA system would not be significantly improved by inclusion of sex identification when determining carcass composition. A system that requires less additional information to be included in individual assessments is logistically superior, as there is less opportunity for error. This will result in a highly accurate wealth of knowledge of carcass information for plant operators and producers, giving rise to a vastly improved genetic selection process and lean meat yield.

References

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