New bone detection method for lamb carcass DXA scanning improves total composition predictions

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Dual Energy X-ray Absorptiometry (DXA) has been used as an on-line apparatus in multiple Australian lamb abattoirs as a precise predictor of carcass composition, however some small inaccuracies have been shown in high bone-content breeds. This is likely due to the existing method of bone detection within DXA images, which allocates all pixels with an R-value more than the mean of the whole carcass image as bone, resulting in the smaller, higher bone % lambs having more pixels classified as soft tissue rather than bone. A new method was developed to more accurately identify bone containing pixels, while still providing computational efficiency sufficient to keep up with abattoir chain-speed, thus providing results in real time. The updated method uses a function of the logarithmic square of pixel R-values and a proxy for pixel thickness, which in this case was used as the natural log of the low-energy image. A set value was then determined for the threshold between soft tissue and bone containing pixels, with all values above this value identified as bone containing pixels. This new image analysis method was compared to the existing method within a population of 200 phenotypically diverse lambs that were slaughtered at a commercial abattoir where a DXA was installed. These carcases were also scanned using computed tomography (CT) as a gold-standard reference method for composition. The precision of DXA predicting the CT determined % of each tissue type (fat, lean and bone) was analysed with general linear models, with the bone % predictions increasing in precision from R^2=0.23, RMSE=1.55% to R^2=0.72, RMSE=0.93%. Similarly, predictions of fat % had improved precision from R^2=0.84, RMSE=1.71% to R^2=0.89, RMSE=1.38%, and lean % from R^2=0.73, RMSE=1.89% to R^2=0.75, RMSE=1.77%. This improved precision for predicting carcase composition would decrease the inaccuracy seen at the extremes of predicting lamb bone %, giving confidence that lamb carcasses would be graded and sorted correctly based on their objective carcass composition measurement.

Intramammary administration of lipopolysaccharides at parturition on goat colostrum and milk quality

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Twenty Majorera dairy goats were randomly allocated in one of the two experimental groups (TRT vs CON). The TRT group (n=10) received an intramammary administration (IA) of saline (2 ml) containing 50 µg of lipopolysaccharides (LPS) from *E. coli* O55:B5 in each quarter. The CON group (n=10) received an IA of saline (2 ml) without LPS. Rectal temperature (RT) was measured at d0 before the IA and then on d0.125, d1 and d7 relative to IA. Colostrum/milk yield as well as milk composition (fat, protein, lactose and total solids, and somatic cell count (SCC)) were measured on d0.125, d1 and d7. The data was analysed using the MIXED procedure from SAS (9.4) and the model included the IA as fixed effect (TRT vs CON), time (T) and the interaction between both (IA×T). The SCC data was log-transformed (log10) to comply with the model assumptions (i.e. variance homogeneity and normality of residuals). Statistical significance was set as $P \leq 0.05$, and tendencies were set as $0.05 < P \leq 0.10$. Animals from the TRT group increased RT after the IA, while the CON decreased RT ($P_{IA \times T}$=0.005). Colostrum/milk yield as well as colostrum/milk composition was not affected by IA. Somatic cell count was higher in the TRT group than in the CON group (3.3±0.09 and 2.9±0.09 cells×10^6/ml in the TRT and CON group, respectively; P_{IA}=0.001) and declined from d1 to d7 (3.3±0.10 and 2.9±0.10 cells×10^6/ml on d1 and 7, respectively; P_T=0.003). In conclusion, the intramammary administration of LPS at parturition caused increased SCC in colostrum without affecting either yield or composition.