Predicting the composition of lamb carcases

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MEAT & LIVESTOCK AUSTRALIA

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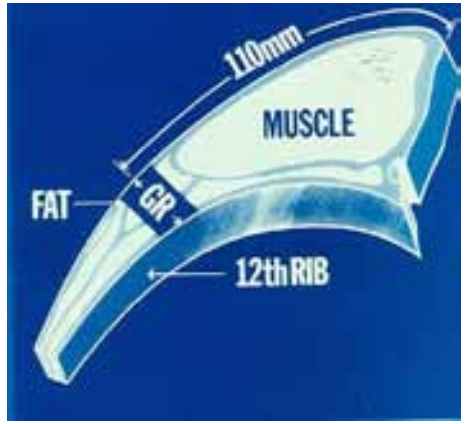
Background

- Currently sheep for breeding in Australia are ultrasonically scanned to measure;

  Fat depth over the 12th rib (Fat C).

  Muscle depth of the m. *longissimus* (loin) – EMD.

  FatC converted to GR measures.



Background

- The live animal measures are used to produce breeding values (BV's) – ASBV's.
- The BV's are combined into selection indices to aid breeders.

Background

- These BV's have been shown to produce change in the carcases of progeny – e.g. selection for ↑ muscle depth ↑ carcase lean.
- However single site selection may lead to localised changes at the expense of all of carcase changes.
- Can selection be improved by using alternative measurement sites?

Background

- A report in 1979 (Kirton & Johnson) suggested measurement in the rump region had potential.

- This site has been used in live cattle – see Wolcott et al. 2001.

Objectives

- To establish whether a fat or muscle depth measure taken over the rump region could improve the accuracy and precision of compositional estimates in lamb carcases and;

- Whether the use of multiple measurement sites would improve the discriminatory power for predicting carcase composition.

Design & Measures

- Measures on 312 lamb carcases were made for;
  - FatC, EMD, GR,
  - Rump muscle depth (RMD) & rump fat depth (RFD) - 30 mm distal to the lumbar-sacral junction.

- Each right side carcase was scanned using X-ray absorptiometry (DXA).

Design & Measures

Analysis

- Fat, lean and bone mineral %'s were predicted using the DXA based on human algorithms.
- Regression analysis was used to;
  - Develop models for the prediction of carcase lean and fat (%) from carcase measures.
  - Examine the relationship between measures of fat depth at different sites on the carcase.

Results

TABLE 1. Prediction models for lean composition (%) from carcase measures, hot carcase weight (HCW), fat measures (GR, Fat C, RFD) & muscle measures (EMD, EMA, RMD)

Model terms	R^2	r.s.d
85.4 – 0.07 $HCW^{n.s.}$ – 0.48 GR	48.3	1.89
85.2 – 0.15 HCW – 1.04 Fat C	48.7	1.87
85.9 – 0.18 HCW – 0.59 RFD	40.3	2.01
83.4 – 0.11 HCW – 0.49 GR + 0.10 EMD	49.2	1.87
83.6 – 0.19 HCW – 1.05 Fat C + 0.08 EMD	49.2	1.86
87.6 – 0.10 HCW – 0.65 RFD – 0.09 RMD	42.0	1.98
84.8 – 0.08 HCW – 0.82 Fat C – 0.33 RFD	51.7	1.81

Summary

- Current fat depth measure (Fat C) better than rump.
- Combing Fat C and EMD better than rump alternative.

Summary

- Multiple measures at different sites can increase accuracy, but not currently practical.
- Would require new genetic parameters.

Results

TABLE 2. Prediction models for GR (mm) from Fat C and RFD measures (mm) and hot carcase weight (HCW; kg)

Model terms	R^2	r.s.d
5.4 (± 0.34) + 1.74 (± 0.10) Fat C	51.9	2.40
-0.7 (± 0.64)$^{n.s.}$ + 6.66 (± 0.35) Fat $C^{0.5}$	53.7	2.36
-5.7 (± 0.78) + 0.40 (± 0.04) HCW + 4.57 (± 0.38) Fat $C^{0.5}$	63.8	2.08
4.7 (± 0.41) + 1.16 (± 0.07) RFD	48.5	2.47
-2.5 (± 0.83) + 0.43 (± 0.04) HCW + 0.76 (± 0.07) RFD	60.3	2.17

Summary

- Conversion of Fat C measures to GR equivalents is not perfect.
- Conversion would less accurate if based on rump measures.
- Relationship is not linear.

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