

Inter-conversion Equations Between Fat Thickness and Subcutaneous Fat

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An inter-conversion equation between 12th-ribfat thickness (mm) and subcutaneous fat (kg) is used in a research tool to predict growth and carcass characteristics called the Davis Growth Model (DGM; McPhee *et al* 2008a). The original Sainz and Hasting (2000) equation did not cover a wide range of measurements (n=12; 12th rib fat = 2.80 to 19.00 mm; subcutaneous fat = 7.99 to 37.83 kg). The aim of this study was to develop a new 12th rib fat inter-conversion conversion equation that covered a wider range of carcass characteristics.

Data from a serial slaughter study of 91 Angus steers from 3 yearling growth rate selection lines (high, low, and an unselected control line; Perry and Arthur 2000) were used to develop a new conversion equation. After slaughter the non-carcass fat depots (omental, mesenteric, kidney, pelvic, and testicular) were weighed separately and subcutaneous and intermuscular fat (kg) and muscle and bone were dissected from the right side of the carcass. The carcass 12th rib fat thickness data was provided by D. Perry (pers. comm.). The 12th rib fat thickness was measured 4cm medial to the lateral border of the muscle and subcutaneous fat was dissected from the right side of the carcass and weighed. The calculation of frame size of individual steers is described by McPhee *et al* (2008b). All dissected fat values were converted to chemical fat (dissected fat x 0.80).

In order to facilitate its application in the modelling process, the inter-conversion equation was developed to enable estimation of 12th rib fat thickness from subcutaneous fat mass and vice versa. The development of the conversion equation was based on the assumption that the carcass assessment of the 12th rib fat thickness had less error than the dissection of subcutaneous fat (kg) therefore the 12th rib fat was designated as the independent variable. The development data (n=75; frame size = 3.20 to 5.40; 12th rib fat = 0 to 53mm; subcutaneous fat = 2.54 to 102.63kg) covered a wider range than the data used by Sainz and Hasting (2000). The final equation accounted for 88% of the variation ($P < 0.01$; SE = 10.00). Neither frame size ($P = 0.46$) nor the interaction term (12th rib fat x frame size; $P = 0.86$) improved the fit. The prediction equation was then rearranged with 12th rib fat thickness as the dependent variable (Figure 1).



Figure 1. Relationships between dissected subcutaneous chemical fat (kg) and 12th rib fat thickness (mm) for 2 frame sizes (small (■; < 4) and medium (Δ; ≥ 4 & < 6)

The data of Perry and Arthur (2000) increased both the sample size and range of observations for development of an inter-conversion equation and showed a strong linear relationship (Figure 1). This empirical equation will be incorporated into the Davis Growth Model (McPhee *et al* 2008a) as part of an ongoing program for modeling beef cattle growth and carcass quality. The Davis Growth Model is also the backbone of a simple computerised calculator of 12th rib fat and P8 fat thickness for beef producers to help them make critical management decisions in meeting market specifications (Dobos *et al* 2008).

Dobos, R.C., McPhee, M.J., McKiernan, W.A. and Oddy, V.H. (2008). *Proc. Aust. Soc. Anim. Prod.*

McPhee, M.J., Oltjen, J.W., Fadel, J.G. and Sainz, R.D. (2008a). *Proc. Aust. Soc. Anim. Prod.*

McPhee, M.J., Oltjen, J.W., Fadel, J.G., Perry D. and Sainz, R.D. (2008b). *J. Anim. Sci. (in press)*.

Sainz, R.D. and Hasting, E. (2000). In "Modelling Nutrient Utilization in Farm Animals", (Eds J.P. McNamara, J. France and D.E. Beever) p. 175 (CAB International, Wallingford, U.K.).

Perry, D. and Arthur, P.F. (2000). *Livest. Prod. Sci.* **62**:143.

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