A Research Tool for Modelling Fat Deposition and Distribution in Beef Steers

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A research tool to predict growth and carcass characteristics called the Davis Growth Model (DGM) is a modified version of the dynamic steer growth model (Oltjen *et al* 1986) that includes 4 fat deposition sub-models (Sainz and Hastings 2000; McPhee 2006). The DGM is being evaluated by the Cooperative Research Centre (CRC) for the Beef Genetic Technologies phenotypic prediction program (Project 1.2.1) as a predictor of fat depth at the 12th rib. The prediction of 12th rib fat thickness (mm) and its conversion to rump P8 fat depth (mm) has the potential to help the beef industry design production systems that can meet stringent domestic and export market specifications that are related to liveweight (kg) and fat thickness (mm).

The concepts of cellular hyperplasia and hypertrophy are integral components of the DGM. The net synthesis of total body fat is calculated from the net energy available after accounting for energy requirements for maintenance and protein synthesis. Total body fat is then partitioned into 4 fat depots: intermuscular, intramuscular, subcutaneous, and visceral (Figure 1). Data for three of the fat depots are then converted to carcass characteristics: intramuscular fat (kg) to intramuscular fat as a percentage (%), subcutaneous fat (kg) to 12th rib fat (mm) (McPhee *et al* 2008), and visceral fat (kg) to kidney, pelvic, and heart fat (KPH, %). The 4th fat depot, intermuscular fat, has not been converted to a carcass characteristic as yet.

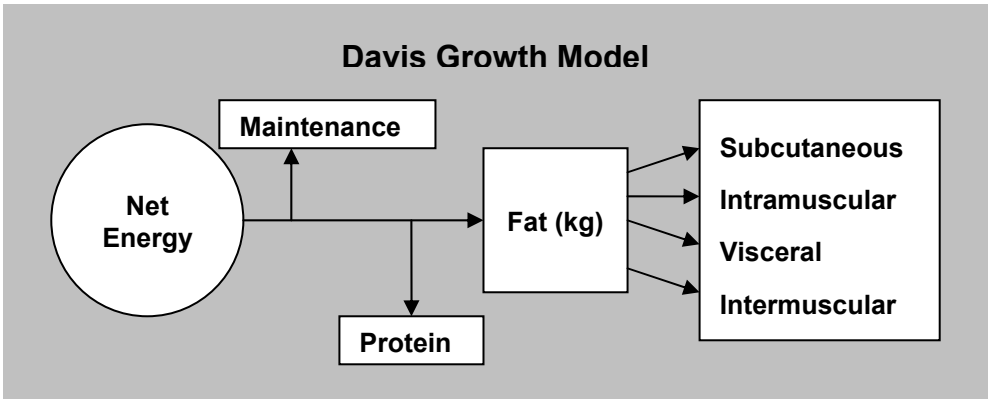

Figure 1. Partitioning of net energy in the Davis Growth Model to total body fat and then the partitioning of total body fat to 4 fat depots

The DGM was used to simulate steer growth over a range of starting weights, frame size, condition score, implant status, and ME content of feed, to generate a large matrix containing inputs and outputs. This matrix was then used to develop a multiple regression equation to predict rib fat thickness for use in a producer friendly calculator (Dobos *et al* 2008). The prototype of the "fat calculator" has been demonstrated to producers and is currently being evaluated in conjunction with a producer group in northern NSW. Further research is on-going to improve the partitioning of nutrients to each of the fat depots within the DGM to ensure predictions are suitable for a wide range of production scenarios.

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