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Relationships of carcass conformation of cattle and sheep with carcass composition

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ABSTRACT

Objective measurements in cattle accounted for a significant percentage of the variation of hindquarter muscle weight after adjustment for weight of hindquarter and within the N.Z. export P grade. The conformation measurements on lamb accounted for only a small percentage of the variation of the weight of muscle and fat-free frozen carcass weight. Objective conformation measurements in cattle may be of use in a grading system unlike the conformation measurements taken in sheep.

INTRODUCTION

Kempster and Harrington (1980), Colomer-Rocher *et al.* (1980) and Bass *et al.* (1981) have reported that visually assessed conformation of beef carcasses can select high-meat-yielding carcasses, whereas a number of reviewers (Preston and Willis, 1970; Berg and Butterfield, 1976) have considered conformation a poor indicator of carcass composition.

Colomer-Rocher *et al.* (1980) also found that carcasses with convex shaped hindquarters (good conformation) tend to have shorter and deeper muscles than those from carcasses with concave hindquarters (poor conformation). The blockier muscles from the carcasses with good conformation may, as suggested by Cuthbertson and Harrington (1973), minimise butchering wastage.

The present study compares the ability of various objective conformation and "muscling" measurements to predict carcass composition in both cattle and sheep.

MATERIALS AND METHODS

Trial 1

Carcasses from 64 crossbreed steers were dressed and export graded. The sides were quartered between 12th and 13th rib.

Photographs of lateral, dorsal and ventral surfaces of each right hindquarter were taken under standardised conditions after the sides had been hung for 24 h at 4°C. The lateral area of the right hindquarter posterior to the pelvis was measured from photographs. Objective conformation measurements were taken by inserting a steel pin along the line of the posterior edge of the cut surface of the symphysis pubis. A rule was then extended from the free end of the pin (A) to the tuberculus (B). The middle of the patella (C) was located so that

the area ABC could be calculated. The distance from the line A-B to the surface of the carcass was measured at regular intervals. This allowed the area of the carcass and area of air within the triangle ABC to be estimated (Bass *et al.*, 1981). Objective conformation measurements were taken directly on the hot and chilled carcass and on the chilled carcass minus the subcutaneous fat. The right hindquarter of each carcass was dissected into bones, fat-cleaned muscles and various fat depots which were weighed.

Trial 2

Carcasses from 106 Romney ewe lambs were dressed and chilled for 24 h at 4°C. Photographs were taken of the lateral and dorsal surfaces of the chilled carcasses under standardised conditions. The lateral areas and length of the carcass was determined from photographs.

The width, depth and area of the eye muscle was measured on the cut surface of the carcass at the 13th rib. The soft tissue depth over the 12th rib (GR) was recorded. The hindquarter was dissected into total muscle, various fat depots and bone. These components were weighed.

The results are presented as the percentage variation (R^2) of weights of various carcass components accounted for by objective carcass measurements after adjustment for live weight, fatness or within an export fatness grade.

RESULTS

Trial 1

The area of the carcass within the prescribed triangle significantly improved the prediction of muscle weight regardless of whether it was within the P fat grade or not (Table 1). The area of air within the triangle failed to improve the prediction of muscle

weight. The conformation measurements taken after the removal of subcutaneous fat gave similar results to the hot and cold intact carcass conformation measurements within the P grade but accounted for a lower percentage of the variation in the overall data (Table 1).

The lateral hindquarter area measurements, taken from photographs, improved the prediction of muscle over weight alone.

TABLE 1 Percentage variation (R^2) of hindquarter muscle weight accounted for by hindquarter weight and conformation.

	64 steers P, L, M grades	43 steers P grade
Right hindquarter weight	49%	61%
Conformation measurements		Additional variation
Area of carcass		
hot	25.62	16.83
cold	29.12	17.33
minus subcutaneous fat	9.04	16.35
Area of air		
hot	0.07	0.04
cold	1.36	0.13
minus subcutaneous fat	2.78	1.76

Trial 2

The carcass measurements tested significantly improved the prediction of muscle weight and fat-free frozen carcass weight after the variation associated with carcass weight and GR had been removed (Table 2).

TABLE 2 Percentage variation (R^2) of hindquarter muscle weight and fat-free frozen carcass weight accounted for by weight and conformation (106 ewe lambs).

Right hindquarter weight	83.3%	
Fat-free frozen carcass weight		84.9%
Conformation measurements		Additional variation
Eye muscle measurements		
depth x width x carcass length	6.25	4.89
depth x width	5.83	4.52
area x carcass length	4.14	4.10
area	3.91	3.74
Carcass measurements		
length	0.98	1.74
area	0.92	1.80

Depth x width of the eye muscle accounted for a higher percentage of the residual variation of muscle weight and fat-free frozen carcass weight than eye muscle area. Both these predictions were marginally improved by multiplying eye muscle measurements by carcass length. The length and lateral area of the carcass did not account for as high a percentage of the variation of carcass components as the eye muscle measurements.

DISCUSSION

In trial 1 the additional variation of muscle weight accounted for by the area of carcass within the designated triangle on the hindquarter was similar to that reported by Bass *et al.* (1981), and it made little difference to the prediction whether conformation was measured on the hot or cold carcass. The removal of subcutaneous fat failed to improve the prediction of muscle weight. Measurement of the area of the hindquarter significantly improved the prediction of the weight of hindquarter muscles.

The objective measurements on lambs produced a slight but significant improvement in the prediction of muscle weight and fat-free frozen carcass weight, whereas a substantial improvement was achieved by eye muscle measurements.

The results presented indicate that objective conformation measurements improve the prediction of carcass composition in cattle and may be of commercial use but not in a sheep grading system.

ACKNOWLEDGEMENTS

The staff of Ruakura Meat and Biometrics Sections.

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