The relationship between body dimensions of living pigs and their carcass composition

A. B. Doeschl-Wilson[1], D. M. Green[2], A. V. Fisher[3], S. Carroll[4], C. P. Schofield[5], and C. T. Whittemore[6]
[1]PIC International Group at Animal Nutrition and Health, SAC, Bush Estates, Penicuik, EH26 0PH, UK E-mail: andrea.wilson@sac.ac.uk [2]Department of Zoology, University of Oxford, Tinbergen Building, South Parks Road, Oxford OX1 3PS, UK [3]Division of Farm Animal Science, University of Bristol, Langford, Bristol BS40 5DU, UK [4]School of Biology, University of Leeds, Leeds LS2 9JT, UK [5]BBSRC Silsoe Research Institute, Wrest Park, Silsoe, Bedford MK45 4HS, UK [6]School of GeoSciences, University of Edinburgh, West Mains Road, Edinburgh EH9 3JG, UK

Introduction Recent analysis pointed towards visual imaging analysis (VIA), which yields pig body size measures and shape indices from two-dimensional visual images of living pigs, as a potential technique for estimating fat and lean content in pig carcasses (Doeschl et al., 2004). The present analysis further explored the potential of using VIA body size and shape indices as indicators of the proportion of lean and fat in various carcass joints, either alone or in combination with ultrasonic backfat depth of the live animal. Due to increasing interest in the shape of retail cuts in the meat industry, the association between VIA size measures and the dimensions of the *longissimus dorsi* and *gluteobiceps* muscles is also assessed.

Materials and methods Ultrasonic backfat depth measurements at the P2 site (BF) and 9 VIA indices representing the shapes of various body regions were obtained for 48 pigs (24 boars and 24 gilts) prior to slaughter. Variations in shape and composition were achieved by differences in crude protein contents of the diets ranging between 0.14 kg/kg and 0.19 kg/kg. The body weights of the pigs prior to slaughter ranged from 52 to 120kg. Partial carcass dissection together with full pelvic limb dissection was carried out for all 48 pigs; a full carcass dissection was performed on a randomly selected subset consisting of 22 of these 48 pigs. The relationship between *in vivo* measures and carcass composition was assessed using multiple linear regression analysis.

Results The association between the carcass muscle areas and VIA size measures was statistically significant ($P<0.05$). Adjusted R^2 values were 0.52 (boars) and 0.18 (gilts) for the *longissimus dorsi* and 0.35 (boars) and 0.19 (gilts) for the *gluteobiceps* muscle. The relationship between carcass muscle dimensions and VIA size measures was stronger for boars than for gilts. A statistically significant relationship ($P<0.05$) between *in vivo* VIA body shape and carcass composition was found for most body regions (Table 1, model A). Adjusted R^2 statistics ranged between 0.13 and 0.50 for relative fat weights and between 0.14 and 0.51 for relative lean weights. The association between *in vivo* measures and carcass composition strengthened if VIA indices were combined with other *in vivo* measurements (Table 1, model B).

Table 1 Adjusted R^2 statistics for the proportion of fat and lean in the whole carcass or individual joints as dependent variables and the VIA shape indices and ultrasonic backfat depth (BF) as independent variables. Two types of models are presented for each carcass component: model A used only VIA shape indices as predictors, whereas model B combined shape indices BF measurements as predictors. With exception of those models denoted by NS (not significant) in the predictors, all of the shown relationships were statistically significant ($P<0.05$).

		Relative fat tissue weight		**Relative lean tissue weight**	
Carcass component	**Sex**	**Model A (VIA only)**	**Model B (VIA and BF)**	**Model A (VIA only)**	**Model B (VIA and BF)**
Shoulder	Pooled	0.13	0.49*	0.19	0.48*
Foreloin	Pooled	0.42	0.84	0.21	0.21**
Belly	Pooled	0.14	0.58*	0.15	0.47
Hindloin	Pooled	0.28	0.67*	0.38	0.39*
Flank	Pooled	0.14	0.47*	NS	0.13*
Pelvic Limb	Boar	0.42	0.62	0.14	0.19
	Gilt	0.50	0.56	0.29	0.32*
Entire Carcass	Boar	NS	0.54*	0.24	0.28
	Gilt	0.36	0.66	0.51	0.37*

*The final regression model contained only BF as predictors
** The final regression model contained only VIA shape indices as predictors

Conclusion These results show *in vivo* VIA measurements to be useful in the estimation of muscle size, carcass conformation and composition, all of which are measures of market importance.

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Reference

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