Use of visual image analysis for the description of pig growth in size and shape

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Introduction Visual imaging systems provide daily plan (overhead) measurements of pigs. These allow monitoring and control of pig growth, as is essential to production efficiency. Schofield *et al*., 1999 suggest that size measurements can provide accurate estimates of live weight, but a description of growth in terms of size and shape may also give a direct quantification of body form and value. This report presents analyses of the growth of pigs of two commercial breed types in terms of live weight, body plan area and ham width, and examines the relationship between observed body shapes of living pigs and their dissected body composition.

Materials and methods Growth trends were analysed using between 70-90 consecutive daily observations for a total of 22 pigs of "Meishan" (25%) and "Pietrain" (50%) commercial types between 68 and 165 days of age. The pigs were fed ad libitum and slaughtered at five approximately equally distant weights through the live weight range of 19 to 139 kg. Daily live weight measurements were obtained from a platform balance integrated into an electronic feeding station (FIRE Feeder, Osborne Europe, Ltd). A visual imaging system placed above the feeding station provided daily the plan area and length measurements of different body parts. Growth curves associated with different measures, pigs and types were compared. Body shape was described by the ratios of ham width (L5, m) to plan (A4, m^2) area. Relationships were examined between the shape measurements obtained in the living pigs and the related body components obtained by physical carcass dissection.

Results For area and ham width measurements over the live weight range considered, growth trends were adequately described by linear functions (Figure 1, and below (with standard errors in brackets)). Auto-regressive models of order one yielded statistically similar slopes and correlation structures for different pigs in each breed, but different intercepts. The differences between the regression slopes associated with different breed types were significant ($P<0.05$).

Meishan A4 plan area (m^2) = 0.016 (0.003) + 0.0015 (0.000025) × Age (days)
Meishan L5 ham width (m) = 0.14 (0.002) + 0.0011 (0.000020) × Age (days)
Pietrain A4 plan area (m^2) = 0.006 (0.002) + 0.0016 (0.000022) × Age (days)
Pietrain L5 ham width (m) = 0.15 (0.002) + 0.0011 (0.000016) × Age (days)

Figure 1 Growth in the size of Meishan and Pietrain pigs

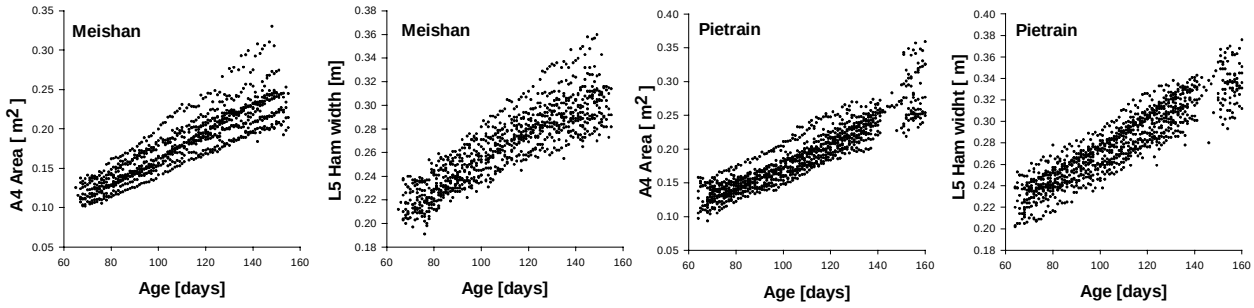

Table 1 shows that there was a strong negative correlation between the L5 ham width relative to A4 surface area and ham fat weight as a proportion of carcass weight. Respective correlations for ham muscle weight were weaker.

Table 1 Correlations (r) between shape measures in living pigs and weight (wt) of their related dissected parts.

L5 Ham width / A4 Area	Ham wt / Carcass wt	Ham fat wt/ Carcass wt	Ham muscle wt/ Carcass wt
Meishan type	0.60 (P<0.01)	-0.78 (P<0.01)	0.52 (P<0.01)
Pietrain type	0.36 (P<0.01)	-0.71 (P<0.01)	0.25 (P=0.05)

Conclusions Visual image analysis (VIA) would appear to promise the means for adequate description of the growth of pigs in size and shape. These dimensions may add significantly to measurement of live weight alone in terms of potential carcass valuation.

Acknowledgements This work is part of the UK DEFRA LINK program *Integrated Management Systems for Pig Nutrition Control and Pollution Reduction.* The authors acknowledge the support of DEFRA, MLC, BOCM Pauls Ltd, PIC (UK) Ltd, Osborne (Europe) Ltd.

Reference

Schofield, C. P., Marchant, J. A., White, R .P., Brandl, N. and Wilson, M. 1999. Monitoring Pig Growth using a prototype imaging system. *Journal of Agricultural Engineering Research* 72: 205-210.