

A Study Investigating Farm-Level Risk Factors for Variation in Carcass Characteristics in Pigs in Southern Ontario

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Introduction

The three main factors acting on the growing pig are the environment, nutrition and genetics. Disease is an important component of the environment, and if present exerts a negative effect on performance of the growing pig and is detrimental to carcass quality. These factors lead to variation, which occurs both within groups and between groups and is primarily due to inherent biology and individual response to the environment. Genetics is a prime determinant of carcass characteristics and may influence length of carcass, longissimus muscle area, carcass lean¹, backfat and days to 100kg².

Carcasses undergo processing within the abattoir. Each carcass has separate measurements such as fat and muscle depths, usually in the back and/or rib area of the pig, and the hot carcass weight. The ideal pig is well muscled with low back fat measurements. This is in response to consumer pressure for ever leaner carcasses, a fact recognised as early as 1936³. There is pressure from the meat packer for uniform carcasses to be produced within a narrow weight range with a maximum fat depth and a minimum muscle depth⁴. This 'ideal pig' can be easily handled within the semi-automated processes at the packing plant and results in a consistent product for the end consumer. Producers are now seeking ways of reducing variation in carcass characteristics of market-weight pigs in order to maximise profitability and minimise penalties imposed by the packers for pigs that do not meet the stringent requirements⁴.

The objectives of this study were to investigate barn-level factors associated with variation in fat depth and muscle depth of the individual pig, factors associated with barn-level coefficient of variation of carcass fat depth, muscle depth and hot carcass weight and the barn-level factors associated with marketing the maximum proportion of ideal pigs.

Materials and Methods

Data were collected in Microsoft Excel from a single abattoir in Southern Ontario for a two-year period from February 2002 to February 2004. These data included producer information and carcass characteristics for each pig slaughtered at the abattoir within the study period. A telephone survey of producers supplying pigs to the abattoir during the study period was conducted from July to September 2003 (survey available on request). This survey incorporated questions on farm characteristics, nursery-barn management, grower-finisher environment, grower-finisher nutrition and genetic source. These data were coded and entered into Microsoft Excel and then exported to SAS version 8.02⁵ for statistical analysis.

Multiple linear regression models were developed using a backwards elimination technique and then Procedure MIXED⁵ was used to build mathematical models whose purpose was to

investigate the proportion of variation in the outcome due to a variety of putative causal factors. Models were developed for two pig-level dependent variables: carcass fat depth and carcass muscle; and four barn-level dependent variables: coefficient of variation of fat depth, coefficient of variation of muscle depth; coefficient of variation of hot carcass weight and percentage of ideal pigs marketed per month by the barn.

Results and Discussion

Surveys were completed by 90 out of 173 producers, a return rate of 52%. There was a strong seasonal effect within all models, which suggests that careful management of temperature and humidity within confinement systems is necessary to optimise performance.

Fat and muscle depth at the individual pig-level

Absence of disease in the barn increased fat and muscle depths. The use of all-in-all-out in the nursery barn reduced fat depth and in the grower barn increased muscle depth. Therefore disease control and the use of all-in-all-out pig flow may improve these carcass characteristics and consistency of carcass quality, as well as increase barn income. The use of all-in-all-out pig flow within the nursery was important within both of the models but may have different effects on larger farms compared to smaller farms. This suggests that producers should pay particular attention to pigs within the nursery barn in order to optimise future growth performance of these pigs and minimise variation in the carcass characteristics of these pigs. Increasing space allowance was related to a decrease in fat depth, which is a highly desirable characteristic for the producer and the abattoir.

Coefficient of variation of fat depth, muscle depth and hot carcass weight

Boar and gilt genetics were associated with coefficient of variation of fat depth and coefficient of variation of muscle depth. Barns should consider selection on muscle depth in the carcass when choosing genetics for both boars and gilts. All-in-all-out pig flow within the nursery was important in the coefficient of variation of hot carcass weight. Producers should pay particular attention to pigs within the nursery barn in order to optimise future growth performance of these pigs and minimise variation in their carcass characteristics. An increase in minimum space allowance per pig in the finisher barn was associated with a decrease in the coefficient of variation of hot carcass weight up to a threshold level of space where the coefficient of variation of hot carcass weight plateaued. Provision of appropriate space allowances to finisher pigs allows pigs of the same genotype to more closely reach their potential growth. Absence of clinical mange was associated with lower coefficient of variation of muscle depth therefore control of clinical mange may result in carcasses with consistent muscle depth.

Percentage of ideal pigs marketed per month

The relative importance of the parameters in the model using the inter-quartile range method suggests that coefficient of variation of muscle depth has a stronger association with the percentage of ideal pigs marketed than the coefficient of variation of fat depth or the coefficient of variation of hot carcass weight. Absence of clinical mange was associated with an increase in the percentage of ideal pigs marketed therefore mange control may help in improving carcass characteristics and increase barn income. Nursery barns managed on a continuous flow basis resulted in a lower percentage of ideal pigs marketed compared to all-in-all-out by pen, room or site, which suggests that barns should pay particular attention to pigs within the nursery barn in order to maximise future performance. An increase in space allowance was associated with an

increase in the percentage of ideal pigs marketed, which supports the need to follow published recommendations on space allowances.

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