

# SNP association analysis of meat quality traits in the Finnish Landrace pig breed

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## Introduction

- » Pork meat is important
  - » in food processing
  - » in home cooking
- » Finnish national breeding value estimation includes
  - » lightness (colour-L)
  - » green-redness of the meat (colour-A)
  - » pH
  - » measured on loin muscle and the ham muscle

## Objectives

- » The purpose of this study was to identify the SNPs associated with meat quality traits in Finnish Landrace breed using Illumina's PorcineSNP60 BeadChip.

## Data set

- » 390 Finnish Landrace AI boars born in 1996–2009
- » average number of daughters per sire was 141

## DNA extraction and genotyping

- » DNA was extracted either from hair follicles (280 samples) or from semen (110 samples)
- » genotyping was performed at the FIMM (Institute for Molecular Medicine Finland, Helsinki, Finland) using the PorcineSNP60 BeadChip

## Method

- »  $y_i = \mu + b \cdot x_i + a_i + e_i$
- »  $y_i$  is the deregressed EBV;  $x_i$  is the number of minor alleles (0, 1, or 2);  $b$  is the corresponding regression coefficient
- »  $a_i \sim N(0, A\sigma_a^2)$ ,  $e_i \sim N(0, I\sigma_e^2/w)$ ,  $w$  is the weight
- » deregression was based on Garrick et al. (2009)
- » analyses were performed using the AI-REML method in the DMU program package
- » significance was based on Bonferroni correction:
  - » significant P-value < 2.0E-06
  - » suggestive P-value < 4.0E-06

## Results: SNP quality

- » Five samples (DNA extracted from hair follicles) had a call rate of 0
- » 366 samples had call rate > 0.9
- » 57,868 SNPs had a call rate of 0.9
- » 7,632 SNPs were monomorphic
- » 7,642 SNPs had MAF < 0.05

## Results: association

- » 3 significant SNPs
- » 2 suggestive findings
- » After these initial findings have been confirmed in a larger population study, the SNPs can be used in national breeding program using either marker-assisted selection or genomic selection

**Table 1. Allele effects of minor allele (b) and P-values of significant (in bold face) and suggestive SNPs**

Trait	Marker	CHR	MAF	N	b	S.E.	P-value
pH (loin)	INRA0050276	15	0.24	339	0.03	0.006	<b>7.11E-07</b>
colourA (ham)	ASGA0037025	7	0.36	335	0.35	0.070	<b>8.65E-07</b>
colourA (ham)	ASGA0037027	7	0.32	334	0.34	0.072	3.60E-06
colourA (ham)	MARC0045334	7	0.35	334	0.33	0.070	<b>1.79E-06</b>
colourA (ham)	ASGA0045619	10	0.49	335	0.31	0.067	2.68E-06

