

ANIMAL SCIENCE

Title: The effect of the hydrogen ion concentration evaluation mathematical methodology on genetic prediction and fixed effects estimation when assessing muscle quality in pork. **NPB # - 01-153**

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Date Received: 1/22/2002

Abstract

An evaluation of pH and hydrogen ion concentration was conducted to determine if the mathematical conversion of hydrogen ion concentration to pH could affect 1. fixed and random effect inferences made when analyses of a study occurs and 2. prediction of genetic merit of animals when pH is used as an indicator in the assessment of pork quality. Data from 4,262 animals having complete three-generation pedigrees from National Barrow Show™ Progeny Test were utilized in this study. Existing muscle pH data was converted to its original hydrogen ion concentration. Existing fixed effects and their levels were not altered. Statistical analyses of the two dependent variables, pH and hydrogen ion concentration, were conducted using identical models using PROC MIXED of SAS (SAS, 2001). The model utilized in the analyses of each trait included the fixed effects of breed, test, gender, Hal 1843™ genotype, herd, and off test date within test group. Numerical changes in values occurred across all effects and in some cases, most notably breed and test, changes in ranking of subclasses occurred. These changes result in differing inferences that can be made depending on whether pH or H⁺ concentration is used as the dependent variable. Heritability estimates for pH and H⁺ concentration were 0.52 ± 0.074 and 0.62 ± 0.078 , respectively. Pearson coefficient of correlation between pH and H⁺ breeding values concentration was -0.92. Spearman Rank coefficient of correlation of -0.85 between pH and H⁺ breeding was calculated and indicates that animals do not rank the same when ordered by breeding values for each trait. Loss in H⁺ selection differential by selecting on pH instead of H⁺ ranges from 5% to 13% depending upon selection intensity utilized. The genetic correlation between pH and H⁺ concentration was -0.96. Changes in the absolute values of the genetic correlations between various pork quality indicator traits and pH or H⁺ concentration were 0.04 or less.

Differences in the fixed effect results from the pH and H⁺ concentration and would likely impact decisions that swine breeders and meat processors who are concerned about pork quality. This combined with the greater heritability for H⁺ concentration indicate that H⁺ concentration rather than pH is the more appropriate trait breeders and processors should focus on when attempting to improve pork quality.

These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed

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