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Use of diallel matings to estimate maternal effects and general and specific combining abilities in swine

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Abstract

As early as 1926, Danish workers reported that cross-breeding gave larger litters at weaning that gained faster on less feed per pound of gain. Crossbreeding is now used extensively in market hog production. It uses heterosis that results from hybrid combinations. Heterosis (superiority of crossbred progeny over the average of their parents) may be evaluated in terms of a high general combining ability, the capacity to cross well in several crosses, and specific combining ability, the ability to "nick" or cross particularly well with certain other strains, but not with all. Strains that "nick" well are said to have specific combining ability.; Swine Day, Manhattan, KS, October 1, 1970

Keywords

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Use of Diallel Matings to Estimate Maternal Effects and General and Specific Combining Abilities in Swine

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As early as 1926, Danish workers reported that cross-breeding gave larger litters at weaning that gained faster on less feed per pound of gain. Crossbreeding is now used extensively in market hog production. It uses heterosis that results from hybrid combinations. Heterosis (superiority of crossbred progeny over the average of their parents) may be evaluated in terms of a high general combining ability, the capacity to cross well in several crosses, and specific combining ability, the ability to "nick" or cross particularly well with certain other strains, but not with all. Strains that "nick" well are said to have specific combining ability.

General combining ability results primarily from additive gene action, or the average effects of genes, while specific combining ability results from dominance or epistasis, a nonadditive effect from interaction of certain genes. In addition to combining ability, maternal effects apparently cause many differences observed in certain traits in swine.

To evaluate general and specific combining ability and maternal influence, we are making diallel matings. Because a shipment of boar semen to breed a group of gilts in which estrus had been synchronized arrived late, Tom Yu, a Ph.D. degree candidate, returned to Taiwan to conduct the research. He will return to K-State to receive his degree.

Too few pigs resulted from the matings at Kansas State for meaningful data analyses. However, in Taiwan, 27 gilts and three boars in each of the Yorkshire, Duroc, and Landrace breeds were used in diallel matings.

Boars and gilts were crossed in all possible combinations including three purebred and six crossbred matings. Semen from two boars of different breeds was collected and mixed to inseminate each gilt involved in a cross. That resulted in littermates that were purebred or crossbred pigs. Boars and gilts were studied carefully and body type and color were recorded. If possible, they will also be grouped according to blood types to assist in distinguishing between crossbred and purebred pigs in a litter when the dam was a Yorkshire or Landrace.

Each pig will be weighed at birth, 21, 56, and 154 days of age and slaughtered at 210 pounds. Performance and carcass data will be collected and analyzed.