AGBU ANIMAL GENETICS AND BREEDING UNIT
A joint unit of NSW DPI and UNE

# Improvement of Selection Response in Lean Tissue Growth Rate and Efficiency and Meat Quality

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## Aim

1. Determine a genetic evaluation system which optimises lean tissue growth rate and efficiency for both sexes under commercial conditions.
2. Determine whether implementation of different selection indices for the different sexes will reduce the current performance differentials between boars and gilts.

## Background to research

One major goal in pig production is the efficient transformation of feed into lean tasty meat. Traditionally, genetic improvement of lean meat growth and feed efficiency has been based on ad libitum feeding. However, selection for lean meat growth and feed efficiency under *ad libitum* feeding has led to a reduction in feed intake in modern genotypes to the extent that feed intake is often not sufficient to meet the animal's requirement for maximum protein deposition.

Results from selection experiments have indicated that it might be beneficial to select pigs under restricted feeding for efficient lean meat growth. These selection experiments were conducted under research conditions where pigs were single penned and feed intake of the individual pig was well monitored. However, in commercial conditions pigs are group penned and in order to record feed intake in these commercial conditions electronic feeders have to be used. So far, genetic parameters for performance traits are limited when animals were group penned and feed intake was recorded with an electronic feeding station.

Breeding programs assume that performance traits recorded in different sexes are genetically the same trait. It is hypothesised that differences in phenotypic performances between sexes have a genetic background and that genetic parameters for performance traits differ between boars and gilts.

## Methodology

Over a two and a half year period 9500 animals were performance recorded using electronic feeders. Animals included boars and gilts chosen at random from 2400 litters of Large White and Landrace sows. During each week of performance recording two to three groups of approximately 30 pigs each were tagged at an average live-weight of 80 kg to enter the five to six week test period. On average pigs were 138 and 174 days old at test entry and test exit. During the test period animals were group penned with three electronic feeders per pen. Animals were fed either *ad libitum* or restricted in their feed intake to about 90 per cent of the *ad libitum* intake during the five to six week test period. Genetic parameters were then obtained between performance traits defined as different traits under both feeding regimes and in both sexes.

## Main Conclusions

### Selection for lean meat growth under restricted feeding

Feeding regime did influence genetic parameters for some traits. Under *ad libitum* feeding growth rate was highly correlated with feed intake but lowly correlated with

feed conversion ratio. In contrast, genetic correlations between growth rate and feed intake were reduced under restricted feeding. Only feed intake and feed conversion ratio were genetically a different trait under both feeding regimes. Implications of changes in genetic parameters were evaluated through index calculations. Direct selection for feed conversion ratio under *ad libitum* feeding will give the highest response in feed conversion ratio. However, this response is mainly achieved through a reduction in feed intake. Although the high response in feed conversion ratio might be beneficial in the short term, in the long term this reduction in feed intake is not desired since a reduced feed intake will limit lean meat growth. In contrast, selection for efficient lean meat growth under restricted feeding showed the highest response in growth rate and backfat thus lean meat growth. Feed intake is reduced to a lower extent when pigs are selected for efficient lean meat growth under restricted feeding.

**Selection indices can remain the same for both sexes**

A further aspect of this project was to investigate whether any performance traits are genetically a different trait in each sex leading to genotype by sex interactions. Results indicated genotype by sex interactions for growth rate recorded during test at a later weight range and lifetime average daily gain. Further genotype by sex interaction was found for back leg weight, which is a trait highly correlated with growth rate. However, the magnitude of these genotype by sex interactions was not large enough to define these traits as different traits in each sex. Currently performance traits recorded in each sex are regarded as the same trait which has been confirmed as the correct genetic evaluation procedure by this study. Given that testing facilities are limited preference should be given to accurate genetic evaluation of boars since selection intensities are higher in boars than in gilts.

## Funding

The project was funded by the Pig Research and Development Corporation under project UNE20P/1006.

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