

Selection to Improve Feed Efficiency in the Swine Industry – An overview of the DanBred Experience

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Brief Background

- ✓ DanBred Genetics originate from the National Pig Breeding Program of Denmark, supported by a national cooperative of swine producers
- ✓ Owned by producers, this genetic program is focused solely on improving the profitability of the commercial pork producers that it serves
- ✓ This is the largest nucleus system of sows in the world, numbered at 12,000 females located in Denmark and the U.S.
- ✓ Composed of three breeds:
 - Landrace and Yorkshire, maternal breeds crossed to produce the F1 female used in commercial production
 - Duroc, used as a terminal sire



The DanBred Lines



Landrace



Yorkshire



Duroc



Feed Cost in the Swine Industry

- ✓ Differences from beef industry
 - Cannot utilize by-products as easily (DDG)
 - Negative impact on feed intake, growth rate, feed conversion
 - Negative impact on carcass yield
 - Negative impact on fat quality
 - Processed DDG is worse (e.g. oil extracted), mycotoxin
 - More exposed to corn (grains) and the impact of those costs
- ✓ Historical average = 50-60% of the market pig C.O.P
- ✓ New average = 70% of the market pig C.O.P.
- ✓ 'Relative' value of feed cost to other costs has not changed *dramatically* (i.e. labor, housing), but there is more financial risk
- ✓ Given the substantial contribution to cost, the inclusion of feed efficiency in the selection objective is justified



Considerations for Implementation

- ✓ Should you measure?
 - Achieve ~ 70% of the F/G response by selection for growth and percent lean (give up 0.02 units of F/G per year)
 - Value of \$0.20 - \$0.30 per market pig
- ✓ Feed Intake Recording Equipment (FIRE)
 - Measure individual pig feed intake
 - Can measure body weight at the same time
 - One dominant supplier worldwide...Osborne Industries
 - Expensive
 - 'Messy' data that requires 'sanitizing' prior to analysis
 - Is feeding behavior altered? Does this affect intake?



Considerations for Implementation

- ✓ What to measure?
 - Feed intake for the finishing growth period (time)
 - Feed intake for a given weight range (weight)
 - Intermittent measures of feed intake
 - Example...2 weeks on FIRE, 2 weeks off FIRE
 - Allows more animals to be measured, impute missing data
 - Impact of changing pens and feeder types?
 - Number of animals to record
 - Males versus females
 - Highest indexing or a broader sample
 - Impact of additional data on response to selection



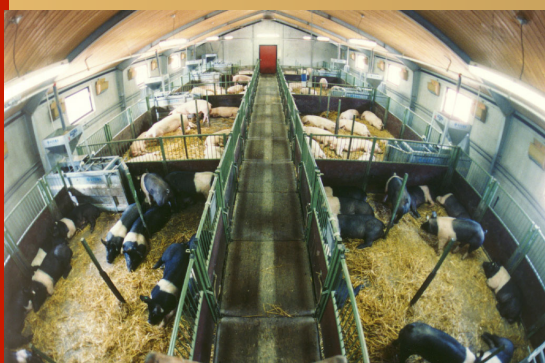
Considerations for Implementation

- ✓ Where to measure?
 - Within 'normal' pig flow (a few pens within a larger finisher)
 - 'Consistent' health status
 - Opportunity for inclusion of more pens (expanded testing)
 - Dilutes management, interrupts pig flow (12 pigs/pen)
 - Central test station
 - 'Commingling' of animals from different sources, health
 - Specialized management
 - Better data?

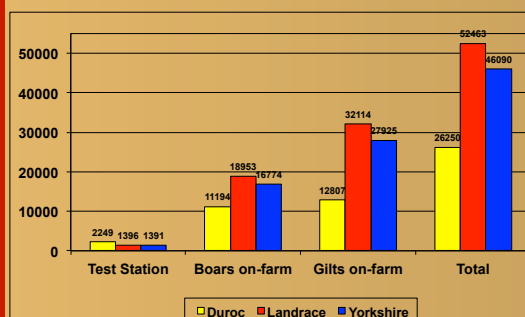


Our approach

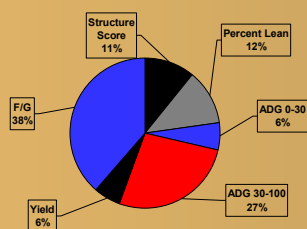
- ✓ Measure feed intake on top indexing males
 - 25% of Duroc
 - 10% of Maternal lines
- ✓ Measure total feed intake in the weight range from 30 to 100 kg, not intermittent, fixed weight gain
- ✓ Test station
 - Overcome the commingling effect during nursery stage
 - Ability to implement was the main driver in this decision
 - Specialized labor
 - Higher quality data
- ✓ Use the ratio today (F/G), this could change going forward
- ✓ Selection is to a fixed end weight, not a fixed age



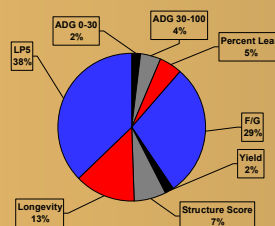
Number of Animals Performance Tested (125,000)



Selection Objective – Duroc



Selection Objective – Maternal Lines



Four Trait Analysis

- ✓ Nursery gain = start wt. + YHM + sex + litter + animal
- ✓ Finish gain = start wt. + sex + room + pen + litter + animal
- ✓ F/G = start wt. + room + pen + animal
- ✓ % Lean = sex + room + pen + litter + animal
- ✓ Comments:
 - Pigs must weigh **28 to 32 kg** when placed 'on-test', irrespective of age
 - Finish gain is gain adjusted to a fixed finish weight
 - Therefore, growth, F/G and lean measures are taken at a fixed weight, NOT age

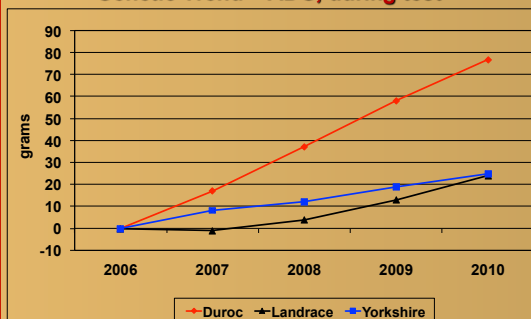


Genetic Parameters, Duroc example

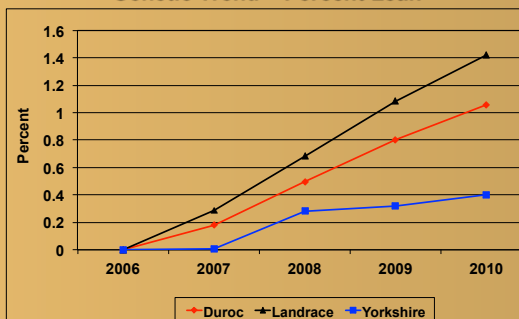
	Nursery Gain	Finish Gain	F/G	% Lean
Nursery Gain	0.23	0.46	0	0
Finish Gain		0.27	-0.30	-0.20
F/G			0.29	-0.34
% Lean				0.37



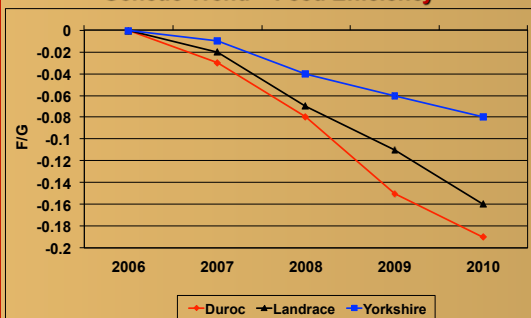
Genetic Trend – ADG, during test



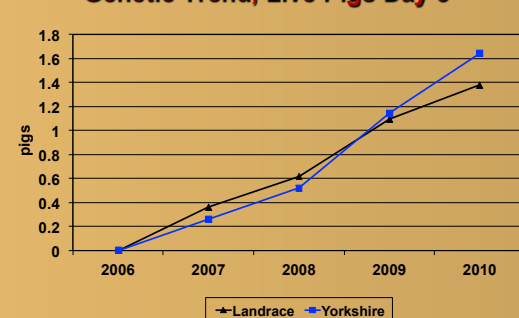
Genetic Trend – Percent Lean

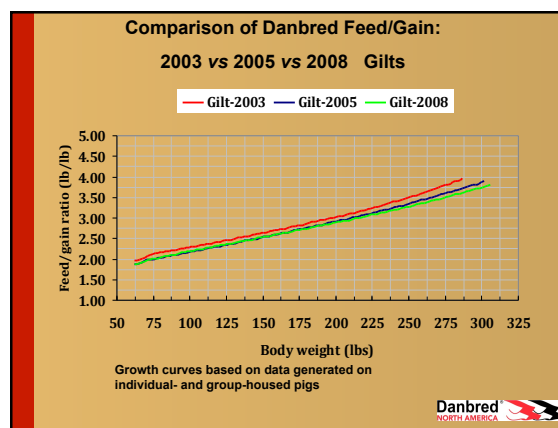
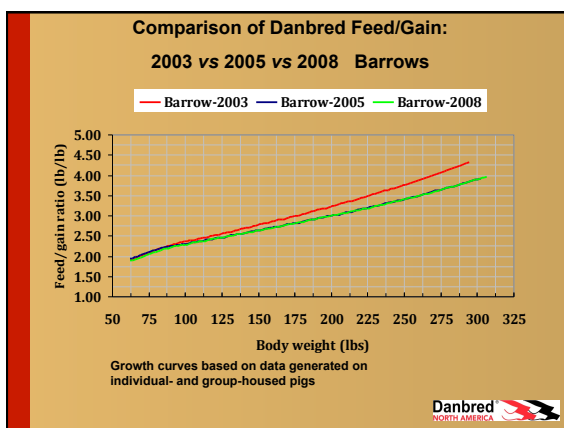
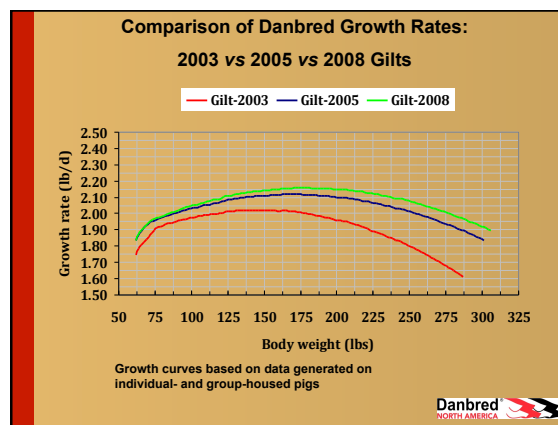
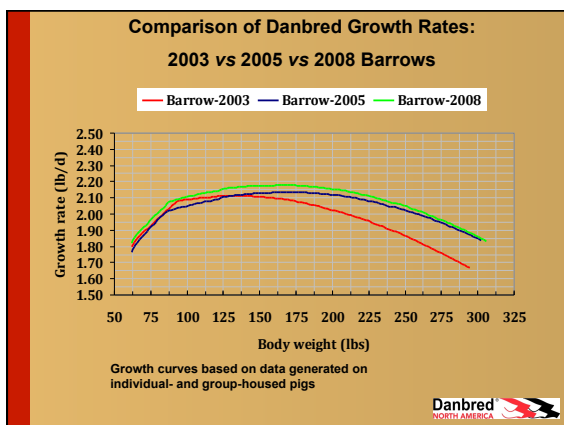


Genetic Trend – Feed Efficiency



Genetic Trend, Live Pigs Day 5





Emerging Questions

- ✓ Selecting for efficient lean growth and litter size has produced highly efficient, fast growing and lean sows with the ability to produce over 30 pigs per sow per year
 - What are the biological limits of such selection?
 - How is such an animal to be managed and fed to capture the genetic potential available?
 - Impact of selection on:
 - Sow herd feed efficiency? Sow maintenance requirements?
 - Sow feed intake during the lactation period?
 - Age at puberty?

Danbred NORTH AMERICA

