



The effect of selection for residual feed intake on general behavioral activity in Yorkshire gilts

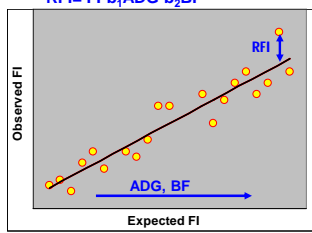
Iowa Feed & Nutrition Seminar
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Introduction

- Feed intake independent of production traits is referred to as residual feed intake (RFI)
- Residual feed intake = (Observed FI) – (Expected FI) based on average energy requirements for growth and maintenance
- Low RFI = a pig that requires less feed for the same growth and backfat

$$RFI = FI - b_1 ADG - b_2 BF$$




- 20% – 40% variation in feed intake is related to non-production traits (van der Heide, et al., 1999)
- RFI is heritable ($h^2 = 0.15 - 0.40$; Von Felde et al., 1996; Johnson et al., 1999)

Residual Feed Intake

- Factors that may contribute to genetic variation include (Herd et al., 2004):
 - ▣ Behavior: feeding, general activity, aggression
 - ▣ Nutrient digestion
 - ▣ Metabolism: anabolism & catabolism
 - ▣ Thermo regulation
 - ▣ Body composition

ISU Yorkshire RFI Selection



Selection

Low RFI line

Control line

← Direct & correlated responses →


Develop tools to improve feed efficiency

Objective

Determine the effect of selection for RFI on general behavioral activity of gilts in their home pen


Animals

- IACUC Approved
- 192 Gilts
 - ▣ 96- 5th generation purebred Yorkshires selected for low residual feed intake (LRFI)
 - ▣ 96- 5th generation randomly bred Yorkshires to serve as a control (CRFI)

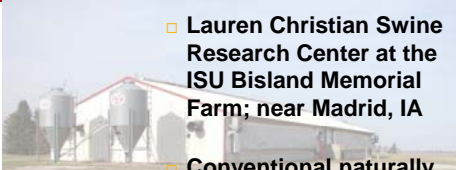



Animals Placed on Trial

- April 15, 2008 – August 14, 2008
- Started in 2 groups, 2 weeks apart
- Group 1
 - 104 ± 3 d of age
 - Start trial 41.7 ± 5.6 kg body weight
 - Ended trial 79.5 ± 8.9 kg
 - Group 2
 - 92 ± 8 d of age
 - Start trial 37.6 ± 5.8 kg body weight
 - End of trial 67.5 ± 10.7 kg



Facility

- Lauren Christian Swine Research Center at the ISU Bisland Memorial Farm; near Madrid, IA
- Conventional naturally ventilated finisher unit
- 2-nipple type waterer
- 16 pigs/pen (0.82 m²/pig)



FIRE Feeder








Day of Placement

- Sorted from home pen and moved to new barn
- Moved through weigh scale and tagged
- Identified with a unique mark on back with animal safe paint stick
- Allocated to pen by line and litter
- 8 LRFI and 8 CRFI pigs / pen

Video Collection

- 12 color cameras; 2 / pen
- 3 DVRs
 - 10 fps
- Collected 4 times (12 hours)
 - Day of placement
 - 3 Subsequent rounds


Scoring Video

- 576 hours of video scored by two trained technicians
- 10 minute scan sampling technique
- ~ real time to score



Ethogram

- 5 behaviors/postures
 - ▣ Locomotion
 - ▣ Standing
 - ▣ Lying
 - ▣ Sitting
 - ▣ At drinker
 - ▣ Unknown



Experimental design

- Randomized complete block design
- Pen as block
- Individual pig as experimental unit

Statistical Analysis

Day of placement & subsequent rounds

- Each posture/behavior summarized as %
- Categories created
 - ▣ Active (locomotion, standing, and at drinker)
 - ▣ Inactive (sitting and lying)
- Arcsine square root transformation applied

Day of Placement

Behaviors	LRFI		CRFI		percent transformed	
	Estimate	SE	Estimate	SE	P-value	P-value
Locomotion	4.25	1.59	4.00	1.59	0.23	0.73
Standing	10.30	2.94	11.90	2.94	0.10	0.11
Sitting	2.25	0.37	1.98	0.37	0.33	0.50
Lying	82.70	5.02	81.60	5.02	0.36	0.34
At drinker	0.46	0.13	0.50	0.13	0.79	0.78
Active	15.09	5.09	16.38	5.09	0.32	0.29
Inactive	84.88	5.02	83.54	5.03	0.31	0.27

Subsequent Rounds

Behaviors	LRFI		CRFI		percent transformed	
	Estimate	SE	Estimate	SE	P-value	P-value
Locomotion	2.26	0.17	2.37	0.17	0.64	0.58
Standing	13.72	0.88	15.21	0.88	0.06	0.03
Sitting	2.50	0.28	2.12	0.28	0.18	0.05
Lying	80.25	0.92	79.16	0.92	0.23	0.18
At Drinker	0.88	0.09	0.93	0.09	0.62	0.52
Active	16.88	0.82	18.50	0.82	0.06	0.03
Inactive	82.70	0.87	81.33	0.87	0.12	0.06

General Behavioral Activity

- Day of placement
 - ▣ No differences between lines
 - ▣ Active 15%; Inactive 85%
- Subsequent rounds
 - ▣ LRFI line was less active then CRFI
 - ▣ LRFI stand less and sit more

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Thank You

Questions?

