

Behavioral Fear Response to a Novel or Human Stimuli in Barrows Selected for Feed Efficiency

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Summary and Implications

The objective of this study was to relate fear behaviors to feed efficiency gains through the human approach and novel object tests. Eighty Yorkshire barrows divergently selected for feed efficiency were tested using the human approach and novel object tests to evaluate fear behavior. Testing occurred over four consecutive weeks between 1300 and 1700 h. Barrows were tested individually within a 4.9 x 2.4 m test arena. Live observations were collected continuously by one observer. Data was collected on latency and total number of urinations, defecations, and human/cone touches. All data is presented descriptively. During both the human approach and novel object tests more feed efficient, low residual feed intake (LRFI) barrows took longer to approach the human or cone than the less feed efficient, high residual feed intake (HRFI) barrows. Once the pig made contact with the novel stimuli, total number of stimuli contacts were similar between genetic lines. During the human approach test, HRFI line barrows took less time to urinate but longer to first defecate compared to pigs from the LRFI line. During the novel object test, HRFI line barrows took more time to first urinate but less time to first defecate compared to pigs from the LRFI line. Throughout both tests, pigs eliminated a similar number of times. In conclusion, barrows of the LRFI line took longer to approach the human and cone compared to HRFI line barrows but once they made contact with the novel stimuli, interactions were similar between genetic lines.

Introduction

Residual feed intake (RFI) is a unique way to select pigs for the efficiency in which an animal utilizes feed for growth. Low RFI (LRFI; more feed efficient) pigs consume less feed for equal weight gain compared to their less efficient, high RFI (HRFI; less feed efficient) counterparts. Factors that are known to contribute to divergence in feed

efficiency and RFI include digestion, metabolism, and thermoregulation. However, little is known about how fear behavior contributes to RFI and feed efficiency. The perception of danger causes fear in the animal. When an animal is threatened it can react in one of three ways: fight, flight, or freeze. Many measures can be taken to evaluate these behaviors, including the pig approaching the novel human or object and elimination. The extent to which selection for RFI is associated with a behavioral fear response to a novel object or human has not yet been determined. Therefore, the objective of this study was to relate fear behaviors to feed efficiency gains through the human approach and novel object tests.

Materials and Methods

Experimental design: The protocol for this experiment was approved by the Iowa State University Institutional Animal Care and Use Committee. The experiment was conducted from October to November, 2011. A total of 80 Yorkshire barrows (46.5 ± 8.6 kg) divergently selected for RFI were tested (40 HRFI and 40 LRFI).

Animals and housing: This work was conducted at the Lauren Christian Swine Research Center at the Iowa State University Bilsland Memorial Farm, near Madrid, Iowa. All barrows were housed in groups (15 to 16 pigs/pen) and each pen contained one Osborne FireFeeder (FIRE®, Osborne Industries, Inc., Osborne, KS) positioned at the front of the pen.

Human approach and novel object approach test: Pigs were equally divided by RFI line, half received the human approach test first while the other half received novel object test. One week later, barrows were allocated to the other test. Testing occurred over four consecutive weeks between 1300 and 1700 h. Barrows were tested individually within a 4.9 x 2.4 m test arena. Arena sides were lined with black corrugated plastic at a height of 1.2 m. The arena floor was divided into four zones (Figure 1).

During both tests, barrows were individually moved from their home pen to the test arena, which was located in a different room within the same building. Each barrow was weighed and allowed to habituate for one minute on a weigh scale. At the conclusion of the one minute the weigh scale door was opened into the back corner of the test arena and each barrow was assessed for 10 minutes.

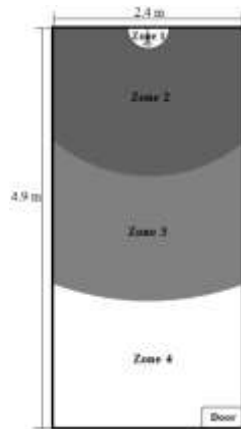


Figure 1. Arena where barrows received human approach and novel object tests.

Measures: Live observations were collected continuously by one observer. During the human approach test, the human observer was located in zone 1. During the novel object test the observer was located behind zone 4, outside the test arena, with corrugated black plastic blocked the pig’s view of the observer. Data was collected on latency and total number of urination, defecation, and human/cone touches (Table 1). All data is presented descriptively.

Table 1. Definitions for collected behaviors.

Behavior	Definition
Urination	Passing of urine
Defecation	Passing of feces
Human/cone touches	Barrow touching the human or cone with their mouth, nose, or face

Results and Discussion

During both the human approach and novel object tests barrows of the LRFI line took longer to approach the human or novel object (traffic cone) than the HRFI line barrows (Figure 2).

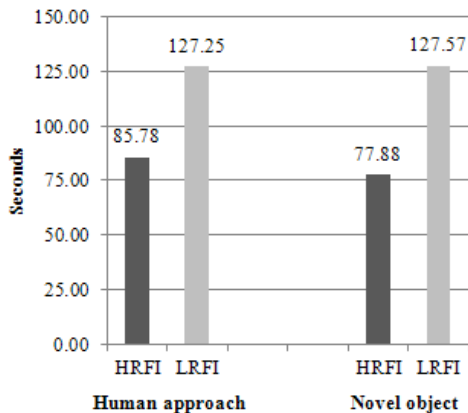


Figure 2. Latency to first human / cone touch.

The total number of human and cone touches by the LRFI and HRFI line barrows were similar (Figure 3).

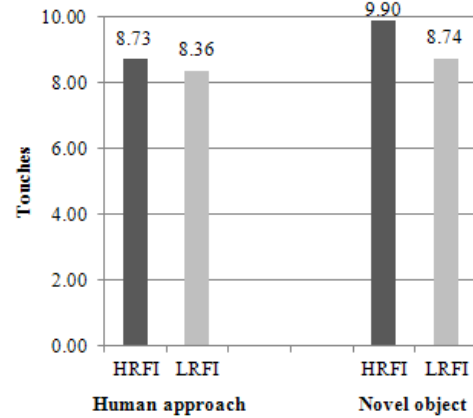


Figure 3. Total number of human/cone touches.

During the human approach test, barrows from the HRFI line took less time to urinate but longer to defecate compared to pigs from the LRFI line. During the novel object test, barrows from the HRFI line took longer to urinate but less time to defecate compared to pigs from the LRFI line. Throughout both tests, pigs eliminated a similar number of times (Table 2).

Table 2. Latency and total urination/defecation during the tests.

	Urination		Defecation	
	Latency, s	Total	Latency, s	Total
Human approach test				
HRFI	184.68	0.55	199.53	4.93
LRFI	259.87	0.45	147.60	3.45
Novel object test				
HRFI	270.45	0.50	113.13	4.30
LRFI	193.83	0.6	152.36	3.43

In conclusion, barrows of the LRFI line took longer to approach the human and cone compared to HRFI line barrows. However, once they made contact with the novel stimuli, interactions were similar between genetic lines. This indicates that feed efficiency influences the initial fear response, but both lines recover equally as well within 10 minutes.

Acknowledgements

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