Barrow and Gilt Vocalizations during a Human Approach Test

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Summary and Implications

The objective of this study was to investigate differences between barrow and gilt vocalizations during a fear test. Twenty barrows and 20 gilts were tested over two consecutive weeks between 1300 and 1900 hours using a human approach test (HAT). Throughout the test, vocalizations were recorded. Gilts expressed a greater number of low calls compared to barrows; however, barrows expressed a greater number of high calls compared to gilts. Further research should be done to better understand vocalization differences between barrows and gilts during a HAT.

Introduction

Swine vocalizations may provide information on affective states. Vocalizations are often reported as call frequency (Hz), total number and duration of calls. Previous studies have reported that increased total number of high calls (≥1000 Hz) may be an indicator of negative affective states in male pigs. However, few studies have investigated if vocalizations differ between male and female pigs during negative affective states. Therefore, the objective of this study was to investigate differences between barrow and gilt vocalizations during a fear test.

Materials and Methods

The protocol for this experiment was approved by the Iowa State University Institutional Animal Care and Use Committee. The experiment was conducted between February and March, 2013. A total of 40 Yorkshire barrows and gilts with a mean (±SD) age of 101 (±9) days, selected for high-RFI (n=20 barrows and n=20 gilts) were tested.

***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. Barrows and gilts were housed in mixed sex groups (15 to 16 pigs/pen) and each pen contained one Osborne single spaced electronic feeder (FIRE®, Osborne Industries, Inc., Osborne, KS) positioned at the front of the pen.

Fear test: All pigs were tested using a human approach test (HAT). Testing occurred over two consecutive weeks between 1300 and 1900 hours. The pigs 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. During testing, pigs were individually moved from their home pen to the test arena, which was located in a different room within the same building. Each individual pig was allowed to habituate for one minute in a weigh scale where it could not see the arena. At the conclusion of the one minute the weigh scale door was opened into the back corner of the test arena and an unfamiliar human wearing orange coveralls was standing still at the center of the opposite wall. Each pig was assessed for 10 minutes.

Vocalization collections: Digital audio recordings of pig vocalizations during HAT were captured with a Marantz PMD 661 recorder (Marantz Corp., Kanagawa, Japan) and a Crown PZM185 microphone (Crown Int., Elkhart, IN). The recorder digitized the audio into a wav file at 16 bit and a sampling rate of 48 kHz. Raven software (Raven Pro 1.5, The Cornell Lab of Ornithology, Ithaca, NY) was used to produce spectrograms (Hanning window, window size of 1024 samples and overlap at 75%; time grid size of 256 samples; frequency grid size of 46.9 Hz) and manually identify vocalizations.

Vocalization measures: Two call categories were developed based on published literature: low defined as <1000 Hz and high defined as ≥1000 Hz. Within these call categories peak frequency, duration, and total number of vocalizations were calculated (Table 1).

Table 1. Definitions for collected vocalizations

Measure	Definition	Unit
Peak frequency	Frequency with the highest power	Hz
Duration	Length of the vocalization which contains 90% of the energy	S
Number of vocalizations	Total number of vocalizations made by the pig during the human approach test	Count

Data analysis: Data were analyzed using proc glimmix of SAS (SAS Institute Inc., Cary, NC, USA). The model included the fixed effects of genetic line and test week, random effect of pen, and covariate of age on the day of testing. The significance level was fixed at $P \leq 0.05$ and tendency at $P \leq 0.10$.

Results and Discussion

Low calls: Gilts had a greater number of low calls than barrows ($P < 0.01$). No differences were observed between barrows and gilts for peak frequency or duration ($P \geq 0.27$; Table 2).

High calls: Gilts tended to have a higher peak frequency of high calls than barrows ($P = 0.08$). Barrows had more high calls compared to the gilts ($P < 0.01$); however no differences were observed between barrows and gilts in duration of high calls ($P = 0.47$; Table 2).

Behavioral analysis of these pigs showed that gilts were more active, attempted to escape more often, and froze more often compared to barrows (unpublished data); suggesting greater fearfulness in gilts than barrows. The increased total number of low calls and higher peak frequency of high calls observed in gilts compared to barrows suggest greater fearfulness in gilts and agrees with the behavioral analysis. However, the longer high call duration and increased total number of high calls observed in barrows compared to gilts was unexpected as it suggests greater fearfulness in barrows. Further research should be done to better understand vocalization differences between barrows and gilts during a HAT.

Table 2. Peak frequency, duration, and total number of low and high calls (least square means ± SE) of barrows and gilts during a human approach test.

Parameters	Sex		*P*-value
	Barrow	Gilt	
Low Calls			
Peak Frequency	238.56 ± 17.36	212.50 ± 15.46	0.27
Duration	0.47 ± 0.02	0.45 ± 0.02	0.47
Total Number	257.50 ± 3.59	297.70 ± 3.86	<0.01
High Calls			
Peak Frequency	1722.25 ± 105.48	2012.67 ± 117.42	0.08
Duration	0.53 ± 0.03	0.46 ± 0.02	0.47
Total Number	28.40 ± 1.23	14.24 ± 0.83	<0.01

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