

Distance of Nursery Pig Snout and Tails from a Human Observer during an Approachability Test

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Summary and Implications

The objective of this experiment was to determine the distance of nursery pigs snout and tails from a human observer when classified as touched, orientated to the human or s not-orientated during a human-animal interaction test using a digital image collection methodology. A complete randomized experimental design was utilized in this study where the pen of pigs was the experimental unit. Two methods, a human observer and a digital image, were assigned within rooms to all pens. Two treatments were compared for snout and tail distance ($n = 27$). There was a difference in proximity between the observer's index finger and the snout and tail base anatomical locations when pigs were classified in the "touch", "look", and "not" categories. The snouts and tail bases for pigs classified in the "touch" category were closest ($P < 0.0001$) to the observer's index finger, followed by "look" and "not", respectively. When counting the number of snout and tail base locations, the author was unable to measure 15% of tail bases (1.5 pigs out of 10 pigs/pen) and 33% (3.3 pigs out of 10 pigs/pen) of snouts in the digital image. The majority of unobserved anatomical locations were pigs classified in the "not" category for snouts (53%) compared to pigs classified in the "touch" (38.9%) and "look" (4.8%) categories, respectively. Tail base anatomical locations across all categories for unobserved data locations were similar for all pigs ("touch" 15.1, "look" 14.3, and "not" 12.9%). In conclusion, snouts were closer to the observer in the following order: Touch > Oriented > Not Oriented. This might seem like an intuitive result, that pigs faced the human. However, if pigs were fearful, they could be facing away from the observer, resulting in the tail base being the closest anatomical location across behavioral categories.

Introduction

Numerous human-animal tests in a variety of farm species have been used to try and determine fear levels. Such tests include the open field, human and novel approach-tests. Fangman and others (2010) coined the term "willingness to approach" (WTA) as a more positive

alternative to fear. This WTA method allocated nursery pigs as either touching or orientating to the human in their home pen. A third category "not-orientated" included nursery pigs not meeting the previous criteria. The WTA method was conducted in real time by the human in the pen. In addition, how an animal reacts to a human can be vastly dependent upon the animals' age and sex, as well as previous caretaker-pig interactions. Therefore, the objective of this experiment was to determine the distance of nursery pigs snout and tails from a human observer when classified as touched, orientated to the human or s not-orientated during a human-animal interaction test using a digital image collection methodology.

Materials and Methods

Animal care and husbandry protocols for this experiment approved by the ISU-IACUC committee.

Location: The study was conducted November 4, 2010, at the Lauren Christian Swine Research Center at the Iowa State University Bilsland Memorial Farm, near Madrid, Iowa.

Animals: Purebred Duroc and Yorkshire crossbred barrows and gilts, body weight (BW) ranging from 24.4 kg to 31.9 kg, respectively. Pigs were not individually weighed before the study began. Average body weight was determined from previous performance records maintained on-site for nursery pigs of that age and genetic cross. All pens contained the same sex of nursery pig.


Housing and feeding: Each pen contained approximately 10 pigs per pen (0.32 m² per pig). Pens measured 1.5 m x 2.1m length, with steel dividers (81.3 cm height) between pens and one steel gate at the front of each pen (93.9 cm height.) A 4-hole dry feeder was located centrally at the front of the pen. Pigs were provided ad libitum access to a pelleted feed (1503 kcal/kg ME and 20.7% CP) formulated to meet or exceed requirements. Each pen contained one stainless steel nipple cup drinker 1.4 m from the front gate attached to the left or right pen divider, at a height of 33 cm above floor level. Metal tri-bar flooring was utilized in all pens. Caretakers observed all pigs at least once daily.

Experimental design: A complete randomized experimental design was utilized in this study where the pen of pigs was the experimental unit. Two methods, a human observer and a digital image, were assigned within rooms to all pens. Two treatments were compared for snout and tail distance ($n = 27$).

Approachability methodology: The methodology followed that previously described by Weimer and others (2014). On approach assessment day, a human observer approached the nursery pen, positioned the image-capturing device at the front of the gate at the approximate midpoint, and quietly stepped into the pen immediately crouching down near the center of the gate. The evaluator extended and held still the left leather-gloved hand with the index finger extended, and began a stop watch, avoiding eye contact with the pigs for a 15-second period. The left hand and finger were extended to allow for the same anatomical location to be clearly visible in each digital image so that distance could be measured. At the end of the 15-second period, the observer looked behind her to ensure the sensor light on the digital camera had deployed and captured the digital image. The observer then proceeded until all pens in the room had been entered, scanned and recorded.

Snout and tail-base proximity: Using the digital image, proximity (cm) from the index finger of the human observer to the snout and tail base for each pig was measured and classified into three categories touch orientated and not (Table 1). Snout and tail-base anatomical locations were chosen because they were visible in more digital images than other anatomical locations, such as the pig ear or hoof. If a pig snout or tail base was not clearly visible in the digital image, proximity was replaced as an unobservable value in the data set. It was possible to collect 262 total snout and tail-base anatomical data locations.

Table 1: Behavior classification of nursery pigs in a live human interaction test*

Measure	Description
Touch [1]	Any part of the pig's body touching the human observer
Oriented [2]	Pig oriented toward the human. Using Adobe Photoshop (Adobe Systems Incorporated, Arden Hills, Minnesota) in the digital image, a line was drawn from the midpoint between the pig's eyes to the center of the snout and then extended out towards the edge of the pen. If the line intersected with the human, the pig was classified as Orientated.
Not Oriented [3]	Pigs not exhibiting the above two behavioral classifications
	

Snout was defined as the midpoint of the superior snout, and tail base was defined as the point of the pig's superior rear where the tail began. Snout and tail-base proximities were measured using the ruler tool in Adobe Photoshop CS5 (Adobe Systems Inc., San Jose, California). In order to determine the actual distance in cm for snout proximity, lengths collected from the digital image using the Adobe ruler were converted. The converted distance was calculated using the actual feeder radius (55.9 cm) and the feeder radius in pixels (556 pixels) from the digital image using the Adobe ruler tool. The conversion ratio was 13.6 (621 pixels = 47.5 cm).

Statistical analysis: All data were evaluated for normal distribution before analysis by using the PROC UNIVARIATE procedure of SAS. A *P*-value of ≤ 0.05 was considered to be significant for all measures. Data was normally distributed. These data were analyzed using the PROC MIXED procedure of SAS. Two statistical models were used to analyze snout and tail base measures separately. The fixed effect of room (1 and 2) and were included. Pen by room and position by pen by room were nested and was included as a random effect in the model. PDIFF was used to determine differences.

Results and Discussion

There was a difference in proximity between the observer's index finger and the snout and tail base anatomical locations when pigs were classified in the "touch", "look", and "not" categories. The snouts and tail bases for pigs classified in the "touch" category were closest ($P < 0.0001$) to the observer's index finger, followed by "look" and "not", respectively (Table 2). When counting the number of snout and tail base locations, the author was unable to measure 15% of tail bases (1.5 pigs out of 10 pigs/pen) and 33% (3.3 pigs out of 10 pigs/pen) of snouts in the digital image. The majority of unobserved anatomical locations were pigs classified in the "not" category for snouts (53%) compared to pigs classified in the "touch" (38.9%) and "look" (4.8%) categories, respectively. Tail base anatomical locations across all categories for unobserved data locations were similar for all pigs ("touch" 15.1, "look" 14.3, and "not" 12.9%). In conclusion, snouts were closer to the observer in the following order: Touch > Oriented > Not Oriented. This might seem like an intuitive result, that pigs faced the human. However, if pigs were fearful, they could be facing away from the observer, resulting in the tail base being the closest anatomical location across behavioral categories.

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Table 2. Nursery pig snout and tail base proximities from the human observer's index finger using digital image evaluation when housed in small pens.

	Behavior classification			<i>P</i> -value
	Touch	Orientaed	Not	
No. pigs	27	27	27	.
<u>Anatomical location, cm</u>				
Snout	38.2 ± 7.1 ^a	55.9 ± 6.3 ^b	75.9 ± 6.0 ^c	<0.0001
Tail base	78.5 ± 4.2 ^a	98.1 ± 4.4 ^b	92.5 ± 3.6 ^b	<0.0001