Animal Industry Report

Animal Industry Report

AS 655

ASL R2470

2009

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Recommended Citation

Pairis, Monique; Young, Ann; Millman, Suzanne T.; Garvey, Jill; and Johnson, Anna K. (2009) "Can Fear Be Effectively Assessed in Swine? A Study Measuring Fear Levels during a Human Approach Test ," *Animal Industry Report*: AS 655, ASL R2470.
DOI: https://doi.org/10.31274/ans_air-180814-927
Available at: https://lib.dr.iastate.edu/ans_air/vol655/iss1/92

Can Fear Be Effectively Assessed in Swine? A Study Measuring Fear Levels during a Human Approach Test

A.S. Leaflet R2470

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Summary and Implications

This study evaluated the effect of experience and social companionship on the degree of fearfulness in pigs during a human approach test. Experience had no significant effect on fearfulness of pigs while social companionship significantly decreased number of vocalizations (156 (unpaired) vs. 54 sec (paired) $P < 0.05$), latency to enter within 1 meter (97 (unpaired) vs. 50 sec (paired) $P < 0.05$), and 0.5 meter (133 (unpaired) vs. 70 sec (paired) $P < 0.05$), as well as significantly increased number of contact bouts (5.7 (unpaired) vs. 7.75 (paired) $P < 0.05$). These results suggest that experience with a novel environment and novel human will not necessarily decrease fear, but the social environment does play a large role in decreasing fearfulness in pigs. Producers can use the human approach test to evaluate levels of fear and implement positive management strategies to decrease fearfulness in the herd.

Introduction

Fear, anxiety, and stress are a few of the major emotional states being observed in cattle, swine, poultry, and sheep (Forkman et al. 2007). From the stages of weaning to finishing, pigs will encounter several fear-inducing and stressful interactions with humans (Siegford et al. 2007). Different approaches to weaning, moving, marking, and daily husbandry can play a large role in how pigs interact and react with humans (Hemsworth et al. 1985). The human approach test was first established as a means to examine the influence of human behavior and interaction on the emotional state of an animal (Hemsworth et al. 1986, Von Borell and Veissier, 2007). Although the human approach test has been used for over 20 years to assess behavior, its validity and repeatability have not been evaluated.

When an animal is placed in a novel environment, such as a human approach test, the animal can react in three ways: 1) Fear, 2) Exploration, or 3) Indifference. In order to determine what reaction is occurring, specific behaviors such as defecation and vocalization are observed. An increase in defecation is an indicator of porcine arousal via the sympathetic nervous system and has been correlated with higher states of stress and fear (Denenberg, 1964). Likewise, pig vocalization, especially high frequency vocalizations are directly associated with how dangerous a situation is perceived, and these vocalizations act as warning signals to con-specifics (Weary and Fraser, 1995). An increase in both of these factors, as well as a correlation with the reluctance for a pig to approach a human, will provide a solid method to measure fear in response to a human. Two major concerns regarding the human approach test deal with factors concerning animal experience and social environment. With the exception of boars, pigs are very social animals that remain in groups and they interact frequently using vocalization, body language, and physical contact (Fraser, 1995). During human interaction tests, pigs can be evaluated both individually (Siegford et al. 2007) and in groups (Erp-van-der-Kooij et al. 2002). Variation in the social environment may lead to discrepancy of fear levels within the same test. Likewise, data may be difficult to interpret if pigs react in a different manner each time the same test is repeated. The objectives of this study were 1. Determine the effects of experience on fearfulness of pigs during a human approach test and 2. Determine the effects of social environment on fearfulness of pigs during a human approach test.

Materials and Methods

Animals and Housing: All procedures were approved by Iowa State University's Animal Care and Use Committee. The trial was conducted in the summer of 2008. All experiments were completed on site at the Swine Nutrition Farm, located in Ames, IA. A total of 40 PIC Camborough 22 crossbred Duroc swine (20 gilts, 20 barrows) were tested at 9-11 weeks of age. Pigs were housed by sex in ten pens with 10 pigs / pen. Four pigs were randomly selected from each pen and were identified by ear tags. This experiment was part of a larger multi-site experiment funded by the USDA NC 1029 project examining internal and external validity of two additional fear tests (novel object and startle test).

Human approach test: Pigs were guided down a 26 m hallway and held in a weigh scale for approximately 1 minute before being released into a testing area (4.6 m by 2.7 m). An observer wearing orange coveralls was stationed standing upright in the middle of the testing area (Figure 1). The test began as soon as the front shoulder / hooves of the pig entered the testing area and ended after 10 minutes. A second observer was located outside of testing area. The behaviors observed included: latency to enter within 1 m, and 0.5 m of human, latency to touch human, number of contact bouts, number of grid crossings, number of vocalizations, and number of

defecations and urinations. All tests were completed between 9am-12pm CST. All pigs completed a human approach test individually over a four day period. Approximately one week later, the test was repeated and 20 of the pigs were paired with pen mates and the remaining 20 repeated the test individually.

Figure 1. Human approach test; Observer recording latency to approach and stress related behaviors of the test pig.

Statistical Analysis: Data were analyzed using Minitab version 15.1.10 for Windows XP. All behavioral variables were tested for normality prior to analysis. Paired T-tests were used to determine changes in behavior between test 1 and test 2.

Results and Discussion

The fear responses of pigs did not differ with experience but pigs were less fearful when retested with a social companion. Significantly higher number of vocalizations (Figure 2) and defecations (Table 1) when tested individually suggests that the reactions of the pigs were fearful responses rather than exploratory responses. The increased latency to approach within 1 m (Table 1) and 0.5 m (Figure 3) suggests that pigs were not just fearful of a novel environment but of the human itself. Latency to touch (Table 1) was not significantly different between the first and second test which demonstrates that making contact with a human is an extremely fearful action, and social companionship did not significantly change that reaction. However, once contact was made, individuals tested in pairs did make more contact bouts (Figure 4) with humans than in test 1. This experiment exposed pigs to three fear inducing situations: 1) Introduction to a novel environment 2) Introduction to a novel human (orange coveralls) 3) Isolation from con-specifics. The results conclude that prior experience with a novel environment and novel human did not decrease fearfulness, but social companionship did help decrease the level of fear in pigs. The high levels of vocalizations and defecations, along with a strong correlation in increased latency to approach, suggest that the human approach test is a valid method in measuring fear. From a production standpoint these results may help in establishing protocols in moving and isolating pigs as well as emphasizing the importance of continual human interaction. The National Pork Board (www.pork.org) recommends that pigs be moved in groups of 5 to 6 and to avoid moving pigs individually to prevent stress on both the handler and pig (Lewis and McGlone, 2006). This test showed that providing a social companion not only decreased the fearfulness of both pigs, but allowed for an increase in exploratory behavior as shown with an increase in number of contact bouts. Experience with the human approach test did not decrease fear levels when tests were repeated. This suggests that if producers want less fearful pigs, it will require a significant amount of human interaction. Experience with a novel human did not decrease fear levels in pigs but the presence of a social companion did mitigate the fearful reaction significantly. By acknowledging the important social constructs in swine and realizing that experience does not necessarily negate fear, producers can facilitate a healthier environment for pigs by evaluating and reducing factors that increase levels of fear.

Acknowledgements

The authors would like to thank the Summer Scholars Program and Iowa State University Animal Science department start up funds for providing financial assistance for funding. Thanks to Dan, Chris, Joel, and the rest of the staff at the Swine Nutrition Farm. Miss Monique Pairis. 2008. Can fear be assessed in swine? A study measuring fear levels during a human approach test. Second place poster for Phi Zeta Gamma poster contest at ISU CVM research day. August 15th 2008. Monique Pairis, Jill Garvey, Ann Young, Anna Johnson, and Suzanne Millman.

Table 1. Change in mean response for behavioral variables in test 1 and test 2. UP = Unpaired and P= Paired †.

Behavior	Paired Unpaired	Test 1 (Mean +/- SE)	Test 2 (Mean +/- SE)	P-value
Vocalization	Unpaired Paired	162 +/- 21 156 +/- 22	153 +/- 22.4 55 +/- 6.2	0.12 0.001
Defecation	Unpaired Paired	4.6 +/- .60 5.6 +/- .60	5.7 +/- .72 4.7 +/- .50	0.14 0.07
Latency 1 m	Unpaired Paired	64 +/- 14 sec 97 +/- 22 sec	50 +/- 13 sec 50 +/- 10 sec	0.45 0.02
Latency 0.5 m	Unpaired Paired	122 +/- 23 133+/- 28	85 +/- 22 sec 70 +/- 14 sec	0.25 0.02
Latency to touch	Unpaired Paired	117+/- 29 sec 114 +/- 24 sec	77 +/- 38.sec 86 +/- 23 sec	0.32 0.37
Contact bouts	Unpaired Paired	6.8 +/- 1 5.7 +/- .7	7.1 +/- .6 7.8 +/- .8	0.81 0.01
Grid Crossing	Unpaired Paired	42 +/- 3 44 +/- 5	45 +/- 3 43 +/- 3	0.23 0.79

Figure 2. Mean frequency of vocalizations in ten-minute test per pig. N= 20 Columns with different superscripts are significantly different ($P < 0.05$) †.

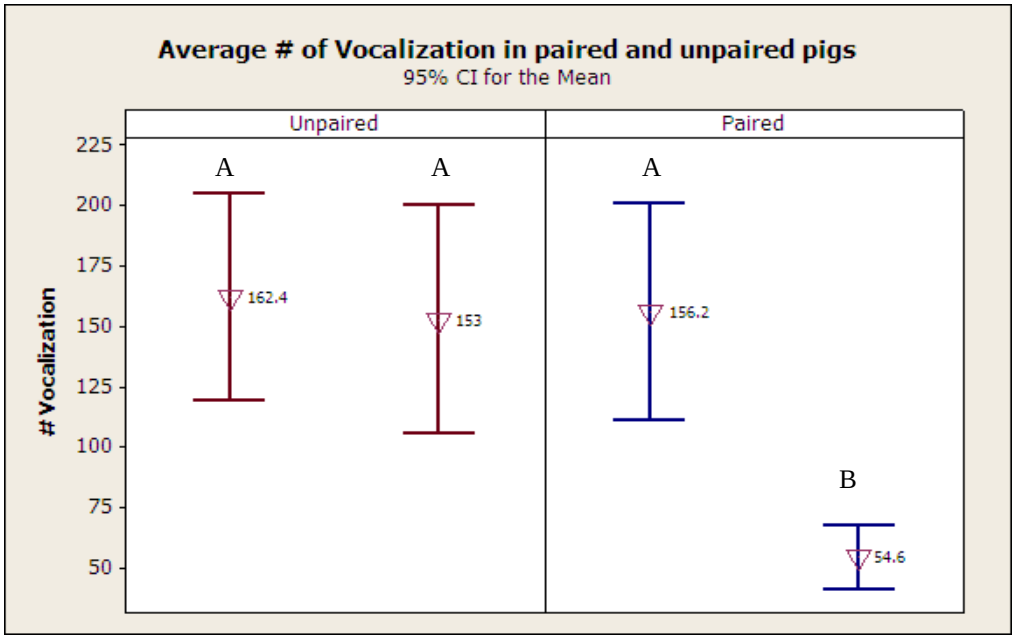


Figure 3. Mean latency for pig to enter within .5 meter of human in ten-minute test per pig. N= 20 Columns with different superscripts are significantly different (*P* < 0.05) †.

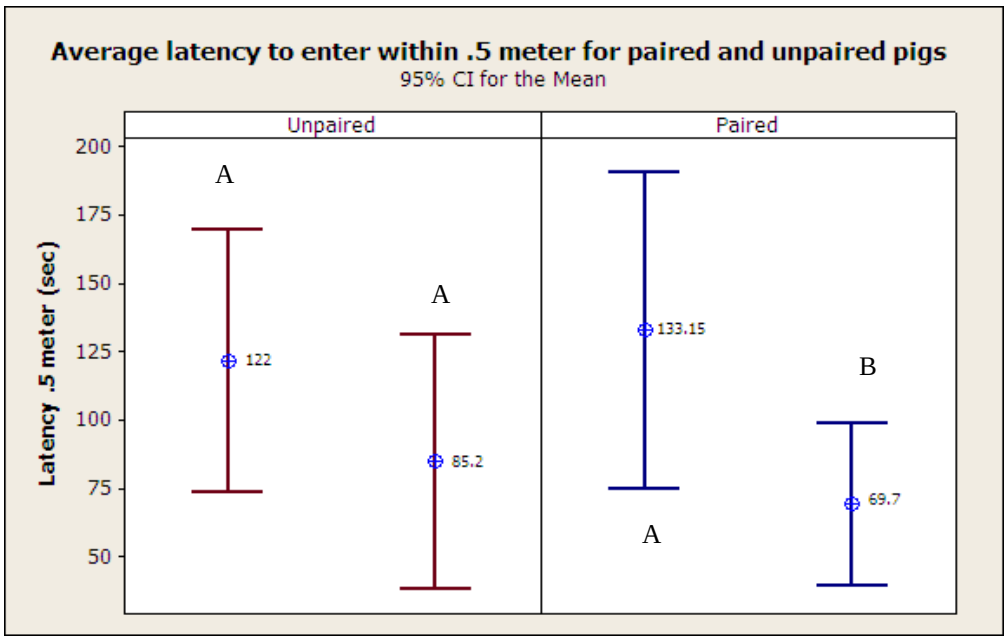
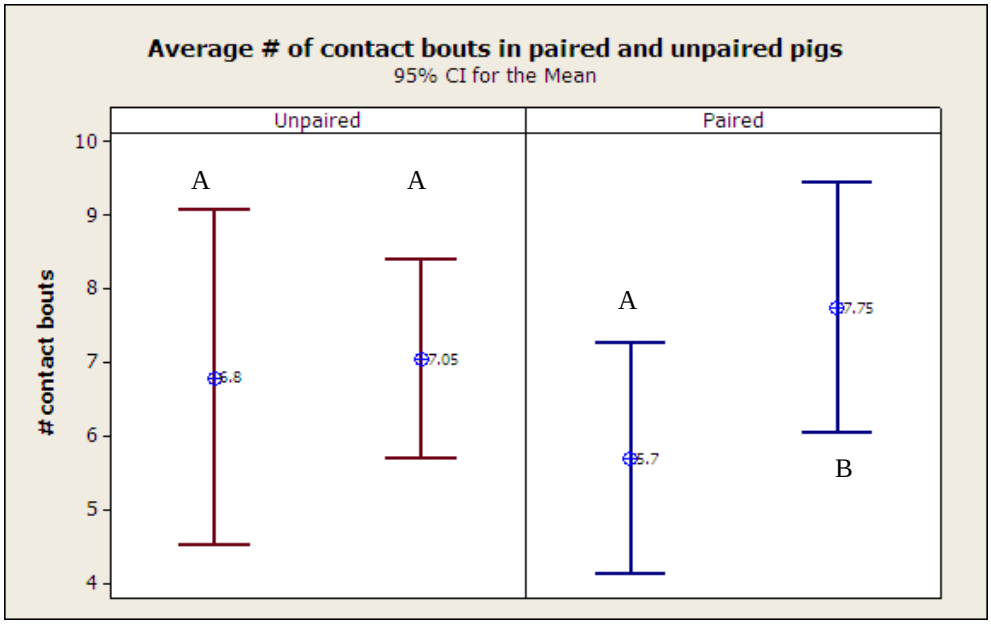


Figure 4. Mean frequency of contact bouts in ten-minute test per pig. N= 20.Columns with different are significantly different (*P* < 0.05) by *P* = 0.014 (*) †.



† All pigs were tested individually in test 1.