

Drinker to Nursery Pig Ratio: Preference for a Drinker Location within a Pen and its Effects on Aggression

A.S. Leaflet R2640

Ciara J. Jackson, graduate student;
Anna K. Johnson, assistant professor;
Larry J. Sadler, ag specialist;

Ken J. Stalder, associate professor, Department of Animal Science, Iowa State University;
Locke A. Karriker, assistant professor, VDPAM, Iowa State University;
Roy E. Edler, J. Tyler Holck, Boehringer Ingelheim Vetmedica, Ames, IA;
Paul R. DuBois, Cargill Pork, Wichita, KS

Summary and Implications

The objectives of this study were to (1) calculate aggressive interactions around the water bowl drinkers and to (2) determine preference for a water bowl location when pigs were offered either one, two or three water bowl drinkers per pen. Information is available on the current drinker to nursery pig's ratios (drinker: pigs). In the UK producers are recommended 1:15, while in the US it is 1:10 for nursery pigs. A total of 225 crossbred were seven weeks of age. Conventional nursery pens had plastic flooring and all pigs had *ad-libitum* access to a commercially formulated diet. Water was delivered through a single stainless steel water bowl drinker and was provided *ad libitum*. All pigs received a natural light cycle from a curtain sided building. Nine pens were used for behavioral measures. Three treatments were compared. Treatment one (TRT 1; n = 3) was defined as one water bowl drinker per pen. Treatment two (TRT 2; n = 3) was defined as two water bowl drinkers per pen. Treatment three (TRT 3; n = 3) was defined as three water bowl drinkers per pen. One day prior to visual recording of drinking behavior, all pigs in a pen were identified with an individual number. One 12 V black and white CCTV camera was positioned over each water bowl drinker and behavior was recorded from 0700 to 1300 h over two consecutive days onto a DVR at 1 frame per second. The acquisition of drinking behavior (defined as the pig having its head in the water bowl drinker for 5 s or longer) was obtained by three experienced observers who viewed the recordings using 24 h mode (5 frame / s) onto the Observer software. Total number of aggressive interactions and length of aggression around the water bowl drinker over the 6 h period was not ($P < 0.05$) different between the treatments. The total amount of time that nursery pigs spent when offered two (F vs. O) water bowl drinkers in a pen did not ($P = 0.47$) differ. However, when pigs were offered three (F vs. O vs. A) water bowl drinkers in a pen there was a difference ($P < 0.0001$) for total amount

of time spent at all three locations. In conclusion, pigs displayed a water bowl drinker preference with the alley location being the least favored; however, there were no difference in the number or length of aggressive interactions.

Introduction

Knowledge on correct placement for key resources to facilitate unhindered drinking for nursery aged pigs is limited. Wolter et al., (2000) conducted some elegant work on feeder designs and location for the 17 d old nursery pig and reported that feeders positioned in multiple locations within a pen did not increase performance (Gain :Feed ratios [0.70 vs. 0.70 vs. 0.69 ± 0.008] or feed disappearance ($P > 0.10$) between the treatment groups. Many factors need to be considered when optimizing drinking availability to the pig; drinking system design, management strategies, quality and quantity of the water supply and age and health of the pig are a few. Finally, providing the optimal ratio of pigs to water resource needs to be considered. To date, information pertaining to drinker to pig ratio is 1:15 in the UK and 1:10 in the US. The objectives of this study were to (1) calculate aggressive interactions around the water bowl drinkers and to (2) determine preference for a water bowl location when pigs were offered either one, two or three water bowl drinkers per pen.

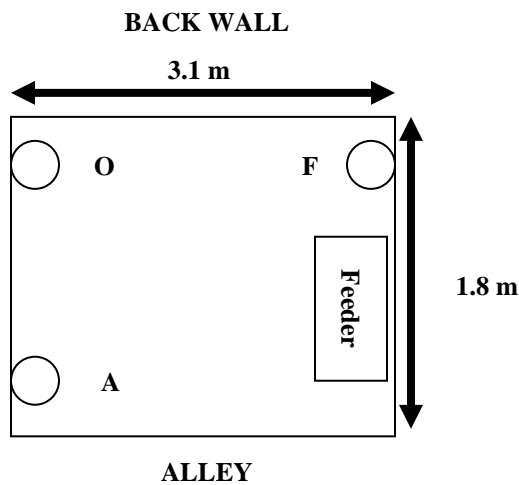
Materials and Methods

Animals and Location: The project was approved by the Iowa State University Animal Care and Use Committee. A total of 225 crossbred, seven weeks of age were used in this study. Research was conducted over 6 weeks from October to December 2006 at a commercial nursery facility.

Diets, Housing and Husbandry: Each nursery pen measured 1.8 x 3.1 m, providing 0.22 m² / pig. Steel penning dividers were 3.1 m length x 91 cm height. Plastic flooring was utilized in all pens and pigs had *ad-libitum* access to a commercially formulated diet formulated to meet or exceed NRC requirements (NRC, 1998). Diets were provided through a five-hole stainless steel feeder 68.6 cm high x 91.4 cm length. The building was curtain sided so that pigs received a natural light cycle. Farm personnel observed all pigs twice daily at 0730 and 1530 h respectively. Each pen contained either one, two, or three stainless steel water bowl drinkers that measured 28.6 cm high x 17.8 cm wide (Farmweld DRINK-O-MAT[®] Wean-to-Finish Cup).

Treatments: A total of nine pens were used ($n = 3$ per treatment containing 25 gilts per pen). Treatment one (TRT 1) was defined as one water bowl drinker per pen. TRT 1 had the water bowl drinker positioned on the same side as the feeder and close to the back wall (F). This provided 1 water bowl drinker per 25 gilts per pen. Treatment two (TRT 2) was defined as two water bowl drinkers per pen. TRT 2 had the water bowl drinkers positioned as follows; F and the second positioned across from the feeder along the back wall side (O). This provided 1 water bowl drinker per 12 gilts per pen. Treatment three (TRT 3) was defined as three water bowl drinkers per pen. TRT 3 had the water bowl drinkers positioned as follows; F, O, and the third water bowl were positioned across from the feeder next to the alleyway (A). This provided 1 water bowl drinker per 8 gilts per pen (Figure 1).

Figure 1. Schematic diagram of the treatment set up in one nursery pen (not to scale).



Behavioral Equipment and Acquisition: One day prior to visual recording of behavior, all pigs in a pen were identified with an individual number placed between the scapulas using an animal safe crayon (Laco® Twist-Stick Livestock Marker, LA-CO Markal, Illinois). One 12 V black and white CCTV camera (Model WV-CP484, Panasonic® Matsushita Co Ltd., Japan) was positioned over each water bowl drinker and recordings were made over two consecutive days from 0700 to 1300 h onto a DVR (RECO-204) Darim Vision®, USA) at 1 frame / s. Behavior was collected over two consecutive days in November 2006 (Week 4) from 0700 to 1300. The acquisition of behavior was collected by three experienced observers who viewed the DVD's using a 24 h mode (5 frames / s) and recorded observation data using Observer software (The Observer, Ver. 5.0.25 Noldus® Information Technology, Wageningen, The Netherlands).

Behavioral Measurements: Drinking related behaviors from all pigs were individually collected over the trial from 0700 to 12:59:59 respectively. Aggression around the water bowl drinker was defined as any fight, bully, head-knock, or chase which occurred in a radius of 0.6 m or less from the edge of the water bowl drinker. The number and length of time (s) engaged in an aggressive interaction was recorded. Water bowl drinker preference was defined as the pigs head was in and terminated when the pigs head moved out of the water bowl drinker. Pigs within treatment two (F vs. O) and pigs within treatment three (F vs. O vs. A) were compared respectively for preference for water bowl drinker location in the pen.

Statistical Analysis: The experimental unit was the nursery pen. The number of visits and the duration of visits made by each individual pig were evaluated through Observer. Any visit less than 5 s in duration was not included in the final analysis. The total number of aggressive interactions and length of aggression was analyzed for the total 6 h period using the PROC MIXED procedure of SAS (2007; SAS® Inst. Inc., Cary, NC) software for parametric data on a pen basis. The model included treatment (one, two, or three water bowl drinkers) and a weight block was used as a linear covariate. Pen nested within treatment and day was included as a random effect in the model. Non-significant ($P > 0.05$) main effect (day) and the interaction were removed from the final model. Water bowl drinker preference was analyzed using the PROC MIXED procedure of SAS (2007; SAS® Inst. Inc., Cary, NC) software for parametric data on a pen basis. The model included water bowl drinker position (F, O, A) and a weight block was used as a linear covariate. Pen nested within pig was included as a random effect in the model. Non-significant ($P > 0.05$) main effect (day) and the interaction were removed from the final model.

Results and Discussion

Behavioral Results: Total number and length of time engaged in aggressive interactions around the water bowl drinker were not ($P > 0.05$) different between treatments. The total amount of time that nursery pigs spent when offered two (F vs. O) water bowl drinkers in a pen did not ($P = 0.47$) differ. However, when pigs were offered three (F vs. O vs. A) water bowl drinkers per pen there was a difference ($P < 0.0001$) for total amount of time spent at all three locations (Figure 2).

Conclusions: Nursery aged pigs displayed a water bowl drinker preference with the alley location being the least favored (noted as their dunging area for the pens), however the number and length of aggressive interactions did not differ between treatment groups. Additional information on placement of key resources within a pen to enhance the drinking behavior for the pig is a useful tool for the swine

industry and stakeholders when designing water delivery systems to enhance pig well-being and overall profitability.

Acknowledgements

Support was provided by Boehringer, Ingelheim Vetmedica and Iowa State University Department of Animal Science. Thanks to Cargill Pork for use of their facilities and care of the animals. This project was approved by the ISU Animal Care and Use committee (IACUC# 4-06-6102-S).

Figure 2. Least squares means and standard errors for the total amount of time “preferred by seven week old pigs” at a drinking bowl when offered three (Feeder [F], Opposite the feeder [O] and next to the alleyway [A] $P < 0.0001$).

