Issue 7

Hog-Handling Update™
TIPS FOR BETTER PIG HANDLING

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Effects of Transport Floor Space on Transport Losses in Market Weight Pigs

What is Transport Floor Space?

Floor space or stocking density during transport refers to the area that pigs have on the trailer during the journey from the farm to the plant. Optimal transport floor spaces should stock pigs tight enough to provide support for one another during sudden stops and/or turns, but should also provide pigs with enough space to lie down, if they choose to do so. Swine producers and transporters commonly use the following measurements as indicators of transport floor space:

- Number of pigs per load
- Total load weight
- Square feet per pig

Ideally, transport floor space should be expressed as pounds per square foot as this measurement allows producers and drivers to adjust load size for the weight of their pigs and the size of their trailers.

Why is Transport Floor Space Important?

Transport floor space has important implications for animal well-being, transportation costs, carcass quality, and compliance with U.S. D.O.T. regulations for weight. In regards to animal well-being, it has been established that transport floor space affects the following parameters in market weight pigs:

- Stress responses (body temperature[1], heart rate[1], respiration rate[1], and plasma creatine kinase[2,3])
    - Plasma creatine kinase is an indicator of muscle damage and physical stress
- Internal trailer temperature during transport[4] and during waiting time at the plant[5]
- Number of pigs lying down on the trailer during transport[6] and during waiting time at the plant[7]
- Transport losses at the packing plant[8,9,10]

Effects of Transport Floor Space on Transport Losses

When I was in graduate school at the University of Illinois, we conducted three studies under commercial conditions to examine the effects of transport floor space on transport losses at the packing plant and the key findings from these studies are summarized below:

Study #1[8]

Study #1 utilized 74 trailer loads of pigs to examine the effects of two different transport floor spaces (4.20 vs. 5.17 ft^2/pig) on transport losses in market weight pigs at the packing plant. The floor space treatments were compared on both decks of each trailer and this study was replicated over all four seasons in the Midwest. The average pig weight was 284 lbs and the average transport time was approximately 3 hours. This study demonstrated that transport floor space has a major impact on transport losses (Table 1):

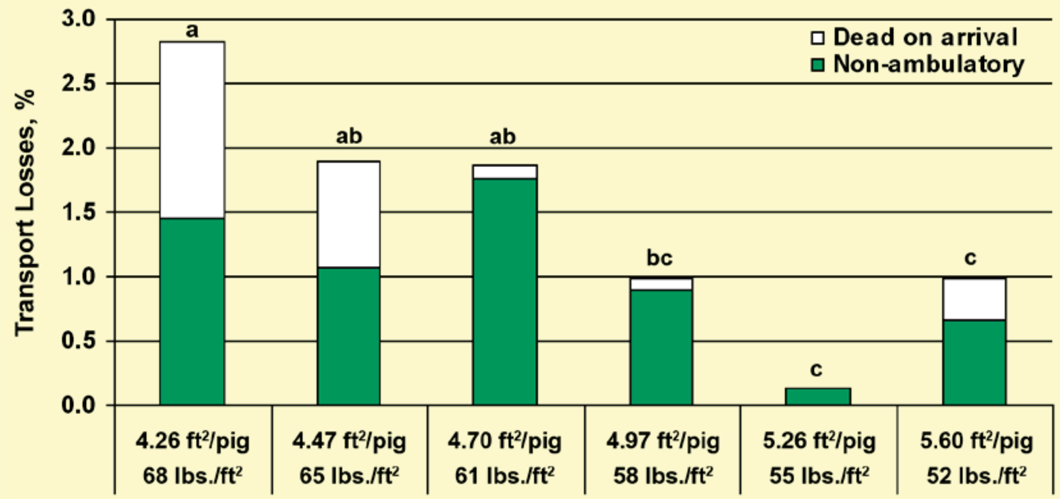
Table 1. Effects of transport floor space on losses at the plant (study #1).

	Transport Floor Space		
Trait	4.20 ft^2/pig	5.17 ft^2/pig	P-value
Loading density, lbs/ft^2	68 55	---	
Dead on arrival, %	0.27	0.08	0.06
Non-ambulatory, %	0.62	0.27	0.04
Total losses, %	0.88	0.36	0.02

Study #2[9]

This study utilized 42 trailer loads of pigs to examine the effects of six different transport floor spaces (4.26 vs. 4.47 vs. 4.70 vs. 4.97 vs. 5.26 vs. 5.60 ft^2/pig) on transport losses in market weight pigs at the packing plant. This study was replicated over the spring and fall in the Midwest. The average pig weight was 289 lbs and the average transport time was approximately 3 hours. Transport losses were minimized at floor spaces of 4.97 to 5.60 ft^2/pig (Figure 1).

Figure 1. Effects of transport floor space on transport losses at the plant (Study #2)

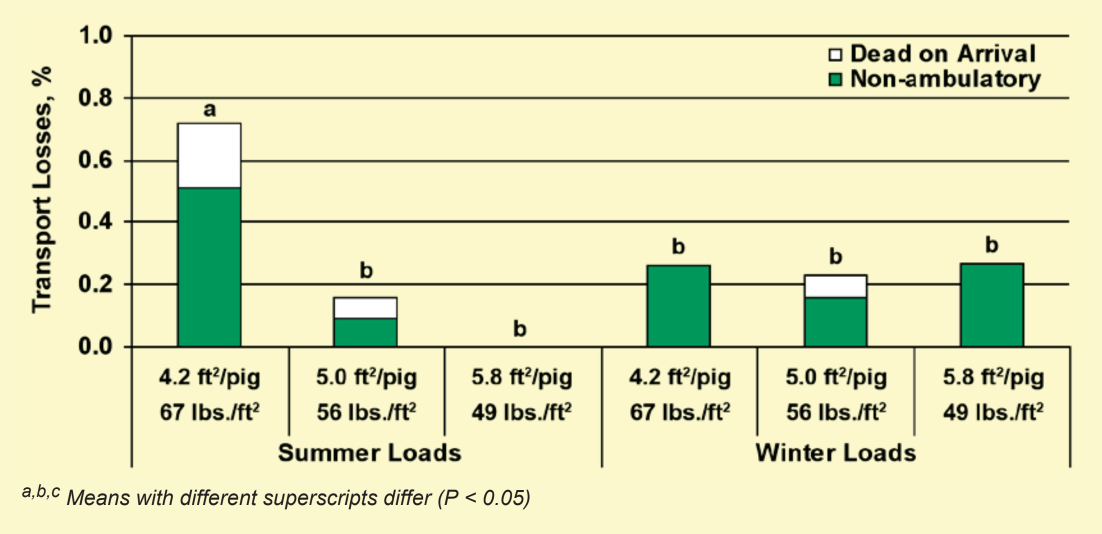


[a,b,c] Means with different superscripts differ (P < 0.05)

Study #3[10]

Study #3 utilized 72 trailer loads of pigs to examine the effects of three different transport floor spaces (4.2 vs. 5.0 vs. 5.8 ft^2/pig) on transport losses in market weight pigs at the packing plant. This study was replicated over the summer and winter months in the Midwest. The average pig weight was 282 lbs and the average transport time was approximately 2 hours. The effects of transport floor space on transport losses were dependent upon season (Figure 2). In other words, crowding pigs during the summer had a major negative impact on transport losses, while floor space did not affect transport losses in the winter.

Figure 2. Effects of transport floor space on transport losses at the plant (Study #3)



Conclusions

- Transport floor space has a major impact on dead and non-ambulatory pigs at the packing plant.
- In study #3, the effects of transport floor space on losses at the plant were more pronounced in the summer than the winter, and thus, the effects of floor space may be dependent upon season.
- In general, transport losses were minimized when pigs weighing approximately 285 lbs were provided with at least 5 ft^2/pig during a 2-3 hour transport to the packing plant.
- Additional research is necessary to determine the optimal transport floor spaces for minimizing losses on short and long hauls over all four seasons.

Elanco's Transport Floor Space Recommendations

Based on the three studies discussed above, we recommend loading market weight pigs at loading densities of 55 to 58 lbs/ft^2. By following these recommendations, producers and drivers will be able to adjust load size for the weight of their pigs and the size of their trailers.

Common Loading/Transport Mistakes Associated with Transport Floor Space

Drivers are commonly instructed to load X pigs/load. Although the driver may have put the correct number of pigs on the trailer, we have to keep in mind the following:

1. There are literally hundreds of different ways to put, for example, 170 pigs on a trailer
2. Trailers within a production system may vary in length, width, and available floor space
3. It only takes one trailer compartment to be over-crowded to result in transport losses

Three common mistakes that we see on transport floor space are:

1. Not adjusting load size for the weight of the pigs
2. Not adjusting load size for the length of the trailer
3. Calculating the square footage of the trailer (trailer length x trailer width) and not the compartments

Elanco's Loading Density Calculator

We have developed a loading density calculator that enables producers and transporters to:

1. Determine the available square footage for each trailer compartment
2. Determine current loading densities (lbs/ft^2) in each compartment
3. Determine the optimal number of pigs to load in each compartment for a given pig weight
4. Compare transport costs of your current loading density vs. our recommendations

The loading density calculator is attached in this email for your use. This calculator requires you to enter information into the cells highlighted in orange and consists of three basic steps:

Step #1: Enter trailer compartment dimensions
Step #2: Determine current loading densities
Step #3: Determine optimal loading densities

We recommend using this calculator to develop loading guidelines that clearly state how many pigs to load into each compartment for a given pig weight (i.e., 250 lbs, 265 lbs, and 280 lbs). If you have anyquestions about the loading density calculator, please contact your Elanco representative.

Concluding Remarks

Transporting pigs at loading densities of 55 to 58 lbs/ft^2 is an effective management strategy to reduce transport losses in market weight pigs. I will be the first to admit that reducing the number of pigs loaded onto a trailer will increase transportation costs. I also know that great emphasis is being placed on reducing transportation costs as fuel prices are currently at record highs. However, saving one dead or non-ambulatory pig could not only off-set these increased transportation costs, but it could put more money into your pocket! If you don't believe me, use our loading density calculator to compare the transport costs of your current loading density vs. our recommendation and calculate how many pigs you would have to save to off-set the increased transportation costs.

Handling Help?

Elanco Animal Health offers a variety of animal-handling resources including:

- Load-site assessments
- Loading crew and driver training
- Facility design evaluations
- Standard Operating Procedure (SOP) development
- Developing databases to track transport losses

To learn more about Elanco's animal handling resources, contact your Elanco representative.

References

[1] von Mickwitz, G. 1982. Various transport conditions and their influence on physiological reactions. Pages 45-56 in Current Topics in Veterinary Medicine and Animal Science Volume 18, Transport of Animals Intended for Breeding, Production and Slaughter. R. Moss, ed. Martinus Nijhoff Publishers, London, UK.

[2] Barton Gade, P. and L. Christensen. 1998. Effect of different stocking densities during transport on welfare and meat quality in Danish slaughter pigs. Meat Science. 48(3/4):237-247.

[3] Warriss, P. D., S. N. Brown, T. G. Knowles, J. E. Edwards, P. J. Kettlewell, and H. J. Guise. 1998. The effect of stocking density in transit on the carcass quality and welfare of slaughter pigs: 2. Results from the analysis of blood and meat samples. Meat Science. 50:447-456.

[4] Haley, C., C. Dewey, T. Widowski, and R. Friendship. 2005. Population and truck level factors involved in in-transit death of finishing pigs in Ontario in 2001 and 2004. Pages 179-185 in Proceedings of the Allen D. Leman Swine Conference, St. Paul, MN.

[5] Murphy, C. M. 2007. The effect of floor space and external environmental conditions on the internal environment of a swine livestock trailer and transport losses. MS Thesis. University of Illinois, Urbana-Champaign.

[6] Warriss, P. D. 1998. Choosing appropriate space allowances for slaughter pigs transported by road: a review. The Veterinary Record. 142:449-454.

[7] Orellana, D. G., M. Ellis, R. Bowman, J. Brinkmann, C. M. Murphy, M. J. Ritter, J. M. Schlipf, and B. F. Wolter. 2006. Behavior of finisher pigs during transport – effects of trailer floor space and mixing unfamiliar pigs. Pages 1-2 in Proceedings of the 59th Annual Reciprocal Meat Conference, Champaign, IL. (Abstr.)

[8] Ritter, M. J., M. Ellis, J. Brinkmann, J. M. DeDecker, M. E. Kocher, K. K. Keffaber, B. A. Peterson, J. M. Schlipf, and B. F. Wolter. 2006. Effect of floor space during transport of market weight pigs on incidence of transport losses (dead and non-ambulatory pigs) at the processing plant and relationships between transport conditions and losses. J. Anim. Sci. 84:2856-2864.

[9] Ritter, M. J., M. Ellis, C. R. Bertelsen, R. Bowman, J. Brinkmann, J. M. DeDecker, K. K. Keffaber, C. M. Murphy, B. A. Peterson, J. M. Schlipf, and B. F. Wolter. 2007. Effects of distance moved during loading and floor space on the trailer during transport on losses of market weight pigs on arrival at the packing plant. Journal of Animal Science. 85:3454-3461.

[10] Ritter, M. J. 2007. Effects of animal handling and transportation factors on the welfare, stress responses, and incidences of transport losses in market weight pigs at the processing plant. PhD Diss. University of Illinois, Urbana-Champaign.

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