

Space Allowance for Finishing Pigs Affects Productivity, Health and Behaviour

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SUMMARY

The reduction in average daily gain due to reduced space allowance for pigs in both small and large groups occurs at a similar point as that previously reported in the literature ($k =$ approximately $0.033 - 0.036 \text{ m}^2/\text{BW}(\text{kg})^{0.667}$). Lameness was more common in the less spacious treatment during the final weeks of the study. Pigs in crowded conditions had fewer meals and less total time spent eating compared to the more spacious treatment. Space allowance can affect health and behaviour as well as productivity.

INTRODUCTION

Space allowance is an important consideration in finishing pig production as it has both economic and animal care implications. Producers must balance the efficiency of production while maintaining acceptable levels of animal care. Most studies on space allowance have been limited to the effects on animal productivity, and were designed to 'stand alone' and yield results specific to the conditions studied. In the case of space allowance, for which numerous studies have been published, it is possible to conduct an analysis of all of their results to obtain a more precise measure of the effects on productivity. We conducted such an analysis on previously published results on space allowance. We also conducted a study combining both space allowance and group size as a part of a larger series of studies on the effects of space allowance.

EXPERIMENTAL PROCEDURE

We collected previously published material on the effects of space allowance on animal productivity. We restricted our analysis to average



A small-pen, crowded scenario was one of the four scenarios examined within the experiment.

daily gain, feed intake and feed efficiency as these were consistently reported while few other variables were. We analyzed the data on a relative basis, that is, the results of the more crowded treatments were expressed as a proportion of the least crowded treatment within each study. In this way we were able to control for housing conditions, general health, genotype and nutritional programs that differed among studies, but were consistent within each study. We expressed space allowance using the allometric equation $\text{Area} = k * \text{body weight}^{0.667}$, which allowed us to use studies based on different final weights. To obtain a precise estimate of the point at which reduced space allowance results in a reduction in performance, we conducted a broken line analysis of the data.

"The effects of reduced space allowance may be seen in both health and behaviour, as well as in productivity.."

We conducted a study on finishing pigs kept in either small (18 pigs/pen) or large (108 pigs/pen) groups, under two space allowances (0.52 vs $0.78 \text{ m}^2/\text{pig}$; 5.6 vs $8.4 \text{ sqft}/\text{pig}$). Within group size we analyzed production variables on a relative basis and applied a broken line analysis. We also examined the pigs for injuries and lameness, and observed their behaviour at 2-week intervals throughout the study. We limit our analysis of this study to the effects of space allowance for this article.

RESULTS AND DISCUSSION

The data obtained from the literature resulted from studies in Canada, Europe and the United States (see Figure 1). Analysis of this published data published identified the point at which space allowance began to reduce average daily gain as a 'k' value of $0.0336 \text{ m}^2/\text{kg}^{0.667}$. For a typical finishing barn with a target market of 115 kg, and making their first pull when 10% of their pigs reach this target, this 'k' value represents $0.72 \text{ m}^2/\text{pig}$ ($7.75 \text{ sqft}/\text{pig}$). The space allowance per pig would differ if market weight or the 1st pull percentage varied from these levels. For every 1% reduction in space allowance below this level, average daily gain over the entire trial was reduced by an average of 0.33%. The same pattern was detected in the data on average daily feed intake. No effect of space allowance was seen for feed efficiency.

In our study we saw no significant difference in the effect of space allowance in the two group size treatments (Table 1). Average daily gain was reduced by crowding in both small and large groups. The

“Pigs in the crowded scenario experienced less total eating time, and had a greater health problems near the end of the finishing period.”

broken line analysis indicated that average daily gain began to be depressed when space allowance fell below a k value of 0.036, slightly higher than the literature value. However, the difference would not be considered statistically significant. The key production result is that our average daily gain results identified a break point similar to previous studies.

In terms of health and injuries, the pigs in our less spacious treatment evidenced more lameness during the final weeks of the study. This is in agreement with our expectations that health problems associated with space allowance should only develop at the end of the study when pigs become more crowded. A second difference that we observed was that crowded pigs had fewer meals, of the same length as uncrowded pigs, and therefore less eating time. This pattern is that of an animal with a reduced appetite. In contrast, pigs in large groups, that had to travel further to eat, had fewer but longer meals, and maintained their total daily eating time. This ‘reduced appetite’ effect of crowding is supported by previous research indicating that crowded pigs will reduce their energy intake even if the feed is made more energy dense, which should have enabled the pigs to maintain daily nutrient intake if they wanted to.

IMPLICATIONS

Results obtained under conditions more typical of commercial production confirm that reductions in space allowance below a ‘k’ value of approximately 0.0336 m²/kg^{0.667} will reduce productivity. The effects of reduced space allowance may also be seen in health variables, such as lameness, but only near the end of the finishing period. The eating patterns of pigs in crowded conditions suggest a reduction in appetite rather than a simple restriction of feeder access.

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Table 1. Effects of crowding on productivity of pigs in large and small groups

| | Average Daily Gain (grams) | | Reduction Due to Crowding | |
|------------------------|----------------------------|---------|---------------------------|---------|
| | Uncrowded | Crowded | Grams/Day | Percent |
| Small group (18 pigs) | 1,098 | 1,049 | 49 | 4.4 |
| Large Group (108 pigs) | 1,055 | 1,016 | 39 | 3.6 |

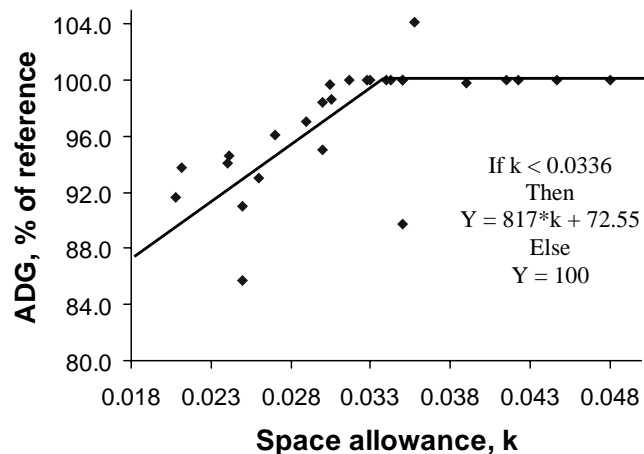


Figure 1. Broken line analysis of ADG for grower-finisher pigs on fully slatted floors. The allometric expression of space allowance is k where k = Area (m²) / BW (kg)^{0.667}. ADG is expressed as a percentage of that in the most spacious treatment within each experiment. r² = 0.90, P < 0.001.