The interaction between stocking level and loose enrichment material on pig performance

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**Application:** A deeper understanding of how loose enrichment material and stocking levels impact the production parameters of terminal line pigs may provide producers with the necessary insight to make informed decisions on increased welfare implementations.

**Introduction:** To meet the welfare standards defined in EU animal welfare legislation, pig producers need to adapt their current management practices. This is particularly the case in relation to tail docking. At the same time, it is essential that pig enterprises remain profitable. Straw is the gold standard as enrichment for pigs but it is not always available in Ireland. Thus this study compared straw (*n* = 12 pens) with three alternative manipulable enrichment materials; Haylage (*n* = 12), Hay (*n* = 12) and Grass (*n* = 11), with the hypothesis that responses of the pigs to the various materials would not differ. As stocking density is related to the risk of tail biting, we applied these treatments to pigs in equally dimensioned pens containing either 8 (*n* = 16), 10 (*n* = 16) or 12 (*n* = 15) pigs (weaner: 0.62, 0.49, 0.41m2/pig; finisher: 1.24, 1.00, 0.83 m2/pig, respectively), and hypothesised that pigs in lower stocked pens would have improved performance, and reduced incidence of tail biting outbreaks.

**Material and methods:** Forty-seven litters containing healthy, undocked piglets, balanced by weaning weight and sex, were assigned at weaning to Enrichment and Space Allowance treatments in a 4x3 factorial design. Enrichment was provided via a mesh rack hung on the front wall of the pen. Pens of pigs were weighed at three time points; when transitioning from the weaner phase to the finisher phase (Transfer; six weeks post-weaning), three weeks later (Mid-finish), and the day prior to slaughter (Week 21). Pig were fed ad libitum, and feed delivery recorded daily at pen level. Metrics included in analysis were pig weight, average daily gain (ADG), average daily feed intake (ADFI) and feed conversion ratio (FCR). An outbreak of tail biting was considered when at least one pig had an open wound on its tail and an intervention was put in place (e.g. addition of supplementary enrichment). Data were analysed using SAS v9.4 accounting for repeated measurements, and considering the pen as the experimental unit.

**Results:** The different enrichment materials did not affect pig weights either over the entire experimental period, or at any time point (P = 0.15). However there was an interaction between time point and stocking levels (P = 0.006), and at Week 21 this effect of stocking level was significant (P<0.05); pigs kept in pens of 12 were lighter at this time (127.1 ±1.1 kg) than those in pens of 10 or 8 (131.0 ±1.0 kg, 130.4±1.1 kg, respectively). The materials also had no significant effect on the ADG, ADFI or FCR. There was an interaction between stage and stocking level (P = 0.04), whereby in the weaner stage ADG of pigs kept in pens of 8 (0.613±0.014 g/day) was higher than those kept in pens of 12 (0.530±0.014 g/day; P <0.01), and tended to be higher than those in pens of 10 (0.556±0.014 g/day; P= 0.06). An interaction between stage and stocking level was also observed in the ADFI (P = 0.06), with pigs in pens of 10 (2.54±0.03 g/day) having a higher ADFI than those in pens of 12 (2.39±0.03 g/day) in the finisher stage. When considering the FCR, there was no interaction between stocking levels and stage. However in the finisher stage there was a tendency for an effect of stocking density (P = 0.06), with pigs in pens of 12 (2.016±0.026) having a numerically lower FCR than those in pens of 8 (2.064±0.025) or 10 (2.105±0.025). With regard to tail biting outbreaks, 97 were recorded during this study, of which the majority occurred in Haylage pens (38.14%), followed by Hay (31.96%), Straw (22.68%), and then Grass (7.22%). Within stocking levels, the largest portion of outbreaks occurred in pens of 12 (67.01%), followed by pens of 10 (21.65%) and 8 (11.34%).

**Conclusion:** The results indicate that the materials used had virtually the same effect on the weight gained by the pigs, intake, daily gain and efficiency of feed conversion. Keeping pigs at lower stocking levels however seemed to have a positive impact on the weight gained, but this only became significant near the end of the finishing period when there was less space in the pen. Furthermore, pens stocked at the highest stocking level performed poorer on average than lower stocked pens when comparing the ADG and ADFI, indicating that lower stocked pens may reach slaughter weight sooner than higher stocked pens. When considering tail biting outbreaks, Grass seemed to perform better than other materials and the occurrence of outbreaks seemed to increase the more densely the pens were stocked.

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