**Risk of weaner pigs developing ear necrosis – preliminary investigation of associations with pre-weaning ear biting behaviour and other early life characteristics**

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***Application***: The etiology and risk factors for ear necrosis are largely unknown, which hampers efforts to prevent and treat the disease. This study attempts to elucidate some of the risk factors, which can help improve pig health and welfare.

***Introduction***: Ear necrosis is a major welfare concern in recent years but we have poor understanding of the risk factors and causes. These are likely multifactorial but one theory proposes ear biting as a risk factor for the disease whereby trauma to the ears caused by biting behaviour enables infection by opportunistic pathogens (e.g. Staph aureus). Another hypothesis is that the infection arises from an internal systemic imbalance resulting in immunosuppression. Such an imbalance could be inherent to the pig (e.g. birthweight) or caused by dietary inadequacies/weaning stress, etc. Pigs start directing behaviour to their littermates’ ears early in life and progress to more traumatic biting as they age. This pilot study investigated the role of ear biting behaviour performed by piglets in the week prior to weaning and other early life characteristics in the development of ear necrosis (EN) post-weaning.

***Materials and methods:*** A total of 138 piglets born to 11 sows were housed in conventional farrowing crates with plastic slatted floors, one solid plastic heating mat, and one plastic toy attached to the wall. At weaning (28 d of age), they were mixed into 13 same sex pens of 9-10 pigs with single space feeders, plastic slatted floors, and two rubber floor toys. At three weeks of age, pigs were individually marked on their backs with hair dye to facilitate individual behaviour observations. All occurrences of ear biting behaviour were recorded by direct observation with continuous sampling (3-minute sessions; n=24 minutes total/litter) over three days in the week prior to weaning. The identity of the bitten pig was recorded, and the average number of bites per observation session was calculated for each pig. Pigs were individually inspected for EN weekly from weeks 2 to 6 post-weaning (until transfer to finisher accommodation), and scored 0 to 5 according to severity. Scores were collapsed into 1] presence or absence of EN; 2] the maximum score the pig achieved during this time (MaxScore). Data were analysed using SASv9.4 (PROC Glimmix and Spearman correlations) to investigate associations between pre-weaning ear biting behaviour, birthweight, and litter characteristics (total piglets born, litter size at d1, mortality rate from d1 to day of behaviour observation) and EN.

***Results:*** While 58.7% of pigs developed EN post-weaning, the majority received mild scores (Table 1) and no pigs received a score of 5. The average number of ear bites per 3 min observation session was 0.36 bites/litter. This equates to an average of 1.5 ear bites per minute occurring in a single litter when piglets are active in the week prior to weaning. There was no apparent association between ear biting and EN (*P* > 0.05). While total born (P > 0.05) and litter size at d1 (*P* > 0.05) were not associated with EN (data not shown), mortality rate had a moderate positive association with both EN of any severity (r(136) = 0.21, *P* = 0.01), and EN MaxScore (r(136) = 0.21, *P* = 0.02). Additionally, pigs that developed EN of any severity had higher birthweights than those that did not develop EN (1.57 ± 0.312 vs. 1.44 ± 0.293 kg, *P* = 0.03).

***Conclusion:*** The lack of an association between ear biting behaviour and EN could relate to the small number of pigs in the study and to the limited number that developed severe EN post-weaning. It may also be that the numerous stressors imposed on the pig at weaning outweighed any effect of behaviour recorded pre-weaning. Five pigs with an EN score of 4 received on average the numerical highest number of ear bites pre-weaning. This suggests the need for further research with more animals before rejecting the hypothesised link between ear biting behaviour and EN. The link between EN and higher birthweights supports on-farm findings where pigs with higher weaning weights had an increased risk of EN (Busch et al., 2008). Likewise, Diana et al. (2019) showed that the fastest growing pigs were more likely to develop EN. This suggests the possibility of an imbalance in the biological requirements of fast growing animals (e.g. nutritional, space etc.). Our preliminary findings indicate that further research on early life characteristics would help us better understand the role of internal, systemic factors in EN development.

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***References:*** Busch, M.E., Dedeurwaerdere, A., and Wachmann, H. 2008. The development and the consequences of ear necrosis in one herd. 20th International Pig Veterinary Society Congress, 278.

Diana, A., Boyle, L.A., Manzanilla, E.G., Leonard, F.C., and Calderon Diaz, J.A. 2019. Ear, tail and skin lesions vary according to different production flows in a farrow-to-finish pig farm. Porcine Health Management, 5(19).

**Table 1.** Descriptive data (mean ± SE) of ear biting behaviour pre-weaning and early life characteristics and ear necrosis (EN) development post weaning.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Maximum EN score | | | | |
| Variable | 0 | 1 | 2 | 3 | 4 |  |
|  |
| Pigs (no., %) | 57 (41.30) | 43 (31.16) | 15 (10.87) | 18 (13.04) | 5 (3.62) |  |
| Ear bites/3 min obs (no.) | 0.39 ± 0.39 | 0.32 ± 0.42 | 0.37 ± 0.30 | 0.34 ± 0.29 | 0.50 ± 0.16 |  |
| Birthweight, kg | 1.44 ± 0.29 | 1.54 ± 0.29 | 1.58 ± 0.35 | 1.62 ± 0.29 | 1.54 ± 0.39 |  |
| Litter mortality, % | 11.50 ± 10.11 | 15.66 ± 10.04 | 15.97 ± 10.10 | 16.31 ± 9.77 | 18.39 ± 8.46 |  |