**Application**

Ear necrosis is a major welfare concern in Irish pigs. However, little is known about physiological alterations associated with the disease. This study investigated the use of oral fluid biomarkers to determine systemic alterations in markers of inflammation, stress and immune function in pigs with ear necrosis.

**Introduction**

Ear necrosis presents as scabbed and bleeding sections of the ear tip that vary in severity but which can progress to the stage that the ear structure is degraded (Richardson et al., 1984). Affected pigs clearly suffer from a health and welfare point of view but there is limited information on the associated physiological alterations and implications for pig performance. Some pigs may suffer from a failure to thrive and lameness (Papatsiros., 2011) and there is an association between ear necrosis in growing pigs and pericarditis at slaughter (Pessoa et al., 2021). This could be due to pathogens entering the lesions on the ear and causing secondary disease (Boyle et al., 2022). However, the mechanisms behind these relationships are unknown and it is not fully established if ear necrosis affects the pig systemically. Oral fluids can be used as a non-invasive method to measure internal biomarkers and assess the health and welfare of animals. This study investigated the differences in oral fluid biomarkers for stress, inflammation, and immune activation between pigs with and without ear necrosis. It was hypothesized that pigs with ear necrosis would have increased biomarker levels than pigs without ear necrosis.

**Materials and Methods**

Oral fluid samples were collected from weaner pigs (N = 61) across two farrowing batches at 9 weeks of age. Sampled pigs were healthy with no visual impairments other than the presence (n = 31) or absence (n = 30) of ear necrosis, and were balanced by sex. Pigs were further categorised based on ear necrosis severity: mild (n = 8), moderate (n = 8), and severe (n = 15). Samples were analysed for the following biomarkers: cortisol, alpha-amylase, and butyrylcholinesterase as indicators of stress, haptoglobin as an indicator of inflammation, adenosine deaminase and ferritin as indicators of immune activation, and creatine kinase as an indicator of general tissue damage. Ear necrosis category (none, mild, moderate, severe), and sex effects were investigated using separate linear models for each of the biomarkers. Pairwise comparisons between categories were determined using Tukey’s method.

**Results**

Levels of all biomarkers were similar between sexes (*P* > .05). The only biomarker that was statistically different between EN categories was haptoglobin. Since there were no differences between ‘none’ and ‘mild’ categories (*P* > .05), and ‘moderate’ and ‘severe’ categories (*P* > .05), the final model combined these categories. Haptoglobin was higher in both moderate and severe (6353.4 ± 5234.93 ng/mL) pigs compared to pigs with mild and no EN (2193.7 ± 2322.69; F1,60 = 26.29, *P* < .0001). The other biomarkers showed no differences (*P* > .05).

**Conclusions**

These results indicate that both moderate and severe ear necrosis is associated with an inflammatory response. Further research on whether these inflammatory alterations can lead to secondary health and welfare impairments is warranted. A longitudinal study would also be of interest to determine the development and duration of the inflammatory response. There was a large variation between pigs, thus further research using a larger sample size and additional/alternative biomarkers to more precisely identify systemic responses to ear necrosis is warranted.

**References**

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