

Barn climate advice and pig tear staining: preliminary insights into an emerging welfare indicator

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Barn climate influences pig welfare and has been associated with tear staining (TS), a potential welfare indicator. This intervention study examined whether barn climate advice affects TS in finisher pigs and evaluated TS's utility as a welfare indicator. Five Dutch *Beter Leven* onestart farms participated in a larger study, with one production unit per farm equipped with a *Slimme Stal* sensor (Connecting Agri & Food) to monitor barn climate. A crossover design was used with two batches per farm (advice vs. control), where farms were blocked and treatments randomized by batch starting month. In the advice group, a climate advisor reviewed sensor data and recommended adjustments. Up to five focal pens per unit were monitored for TS, lesions, tail biting severity, and lameness during two visits per batch—approximately two weeks after setup and one week before slaughter. TS (both eyes), tail biting, and lameness were scored on a 0–100 visual analog scale, and lesion numbers were classified according to the Welfare Quality® protocol. For each batch, changes in welfare indicators between visits were calculated. Climate data were summarized as hours exceeding thresholds for CO, NH, and a temperature-humidity index, while hourly outdoor temperature was averaged. Linear mixed-effect models (with treatment as a fixed effect and pens nested within farms as a random effect; base model) showed that treatment did not significantly affect TS changes (Left: $P = 0.175$; Right: $P = 0.747$), though the control group recorded more hours of elevated CO (+266h; $P = 0.0399$) and NH (+439h; $P < 0.001$). Alternating individual climate variables and changes in welfare indicators in the TS base models (left and right) did not reveal significant linkages between TS and climate parameters. However, left-eye TS changes were positively associated with increased ear lesions ($\beta = 1.98$, $P < 0.01$) and nearly so with increased lameness ($\beta = 0.64$, $P = 0.083$) and total lesions ($\beta = 0.30$, $P = 0.067$), while right-eye TS changes correlated with increased lameness ($\beta = 0.77$, $P < 0.05$) and nearly with front lesions ($\beta = 0.66$, $P = 0.074$). Although climate advice did not significantly impact TS, the linkage with other welfare indicators highlights the potential validity of TS as a welfare measurement. Importantly, further research is needed to validate TS as a robust welfare indicator, to delve deeper into eye-side differences, and to clarify the interplay between environmental and physiological stressors in pig production.