

INVESTIGATION OF CORRELATIONS BETWEEN SKIN LESION COUNT AND CONCENTRATIONS OF SALIVARY BIOMARKERS IN PIGS FROM SUCKLING TO FATTENING

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ClearFarm project intends to develop a platform to monitor animal welfare continuously throughout the value chain of pigs and dairy cattle using sensor technology. This platform relies on algorithms (for each species), built up with relevant welfare indicators measured by PLF (Precision Livestock Farming) technology. Before constructing the algorithm, a selection of indicators is required and should be cross-checked with gold standards (i.e., methods conducted by human observers). In this case, skin lesions and salivary biomarkers were investigated as potential references for validation. The aim of the study was to assess the changes in skin and tail lesions, and salivary biomarkers of pigs from suckling to the fattening stage, and the correlation between lesions and salivary biomarkers. Forty-nine pigs (25 males and 24 females) were sampled five times: T1 (suckling stage) – 24 days of age; T2 and T3 – beginning and end of the nursery stage; T4 and T5 – beginning and end of the growing and fattening stage. Cortisol, haptoglobin (Hp), and adenosine deaminase (ADA) were analyzed from saliva as the biomarkers of stress, inflammatory, and immune function, respectively. Generalized linear models and correlation tests were applied. Results showed that skin lesions increased over time ($P < 0.01$): T1: 0, T2: 0.06 ± 0.24 , and T5: 6.5 ± 1.57 , whereas we hardly found tail lesions during the study. Opposite to skin lesions, cortisol, Hp, and ADA, all gradually decreased (all $P < 0.01$). Cortisol (ng/mL) T1: 153.2 ± 115.99 and T5: 70.5 ± 57.09 ; Hp ($\mu\text{g/mL}$) T1: 3477.4 ± 1878.09 and T5: 931.8 ± 957.13 ; ADA (IU/L) T1: 4609.6 ± 2826.8 and T5: 2397.2 ± 1505.10 . Correlation tests between skin lesions and salivary biomarkers of each pig were conducted. Skin lesions were negatively and moderately correlated with all the biomarkers: cortisol, Hp, and ADA ($r = -0.35, -0.48, \text{ and } -0.31, P < 0.01$). Our study concludes that skin lesions and concentrations of salivary biomarkers change over time (either increase or decrease) when pigs grow older. The negative correlations between skin lesions and salivary biomarkers are at variance with our expectations but may be due to other factors such as individual variability, in which each pig has its own coping mechanism towards the environment. Moreover, the number of skin lesions in our study was low in general. Using PLF data may assist us to understand the underlying cause. Last but not least, caution is needed when interpreting or contrasting with PLF data as the former (skin lesions and salivary biomarkers) is individual-level data, whereas the latter (PLF sensors) is often pen-level data.