SCRUBBER SYSTEMS TO IMPROVE AIR QUALITY AND ANIMAL WELFARE IN INTENSIVE PIG FARMS

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Air quality is a key factor impacting pig welfare, especially in indoor-intensive production. Inside the barns, high levels of ammonia (NH3), methane (CH4), and suspended particulate matter (PM) can negatively affect animal health, welfare, productivity and environment. The objective of the European LIFE-MEGA Project is to test new technologies (wet (WS) and dry scrubber (DS)) to reduce the levels of NH_3, CH_4, and PM inside and outside pig barns. The scrubbers were installed in two different rooms, and a third room was used as control (all measuring 125 m^2 (11.30m x 11.07 m), divided in 6 pens (0.26m^2/piglet)). Nine batches were evaluated at the beginning and end in two intensive weaning farms. The air quality parameters assessed inside and outside the barn were: NH_3, CH_4, CO_2, H_2S, N_2O, PM2,5 and PM10. Animal welfare measures were assessed at individual level (weight, body condition score, skin condition, tail and ear lesions, manure on the body in 810 pigs, and saliva cortisol in 270 pigs) and pen level (thermal comfort, respiratory and digestive measures, and behavioural observations). Behavioural observations were conducted by scan sampling (6 scans/day/pen to record positive and negative social interactions, interaction with pen, interaction with enrichment, resting) and continuous focal sampling (15 min/day/pen, recording ear and tail biting, positive and negative social interactions). In each batch, 30 pigs per treatment were individually identified, and 10 of these used for saliva cortisol analysis. Data were analysed through the difference in the indicators between the last and first visit using different ordered logistic regression and multivariate linear models. The results of this study regarding air quality showed that the DS in fewer PM10 compared to the control (mean±SD: 1.13±0.02 µg/L control; 0.97±0.02 µg/L DS; 1.07 ±0.08 µg/L WS, $p<0.05$). Despite NH_3 concentration inside the barn was not reduced, the WS retained a mean of 52.09±28.68 g/day of nitrogen. Regarding animal welfare, the DS presented reduced diarrhoea at pen level (median percentage: -5% control; -22% DS; -11% WS; $p<0.001$) and fewer social negative interactions (median percentage: +39% control; -25% DS; +38% WS; $p<0.001$). In conclusion, although the technologies did not have a significant impact in all parameters, DS reduced PM and improved some animal welfare indicators, while WS reduced NH_3 emission outdoor. These results are promising, and further studies should be conducted to validate the technologies as a tool to improve animal welfare whilst reducing the environmental impact of pig production.