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EFFECT OF BIOSECURITY PROCEDURES ON DUST LEVELS IN PIG FARMS

Costa Annamaria* (1), F.M. Tangorra (1), S. Nava (1), M. Lazzari (1)

(1) Department of Health, Animal Science and Food Safety (VESPA), Faculty of Veterinary Medicine, Università degli Studi di Milano, via Celoria 10, 20133 Milan, Italy

Pollutants in animal facilities are mainly dust, ammonia and greenhouse gasses. They originate from animals and manure. Bio-aerosols in animal houses are emitted in considerable quantities into the environment by ventilation systems and consequently can also affect the respiratory health of people living close to livestock enterprises (IPCC, 2000). Pollutants levels in animal houses are variable and depends mostly on the species, its behavior (Costa, 2009; Costa et al., 2017), stocking density, feeding and littering strategies, and climate conditions inside the barn (Liao et al., 2001). Dust can derive from feed (mostly by dry feed), from manure that can be re-suspended by ventilation and by animals walking on the dirty floor.
The aim of this study was to compare the concentrations and emissions of PM10 in two identical farrowing rooms, classified as BAT, evaluating the efficacy of the biosecurity procedure applied.
The farrowing rooms measure 10.95 m per 17.30 m. The rooms are mechanically ventilated through a control system (FANCOM) based on a free running impeller, for continuous, real-time monitoring of the ventilation rate. Air entered from the roof through a pierced PVC ceiling, two exhaust chimneys guarantee air exchanges (7666 m3 h-1 and 7566 m3 h-1). Thirty sows were housed from 3 to 6 days before farrowing to 21 days after delivery. Each sow was assigned 12 piglets after parturition. The measurements were taken for 27 days totally for two farrowing cycles, from the entrance of sows in the room to the piglets' displacement to the weaning room.
One of the farrowing room was not washed after the end of the production cycle, the other one was completely washed, as the pit (both rooms are equipped with vacuum system) according the biosecurity protocol usually applied in the farm. During the trial, dust was measured through a GRIMM Portable Laser Aerosol Spectrometer Model Mini-LAS 11-R. Swab samples were performed on a weekly basis, on 7 points in each room to evaluate airborne bacteria as potential piglets mortality causes. The sanitary status of sows and piglets was evaluated by the vet.
Data were processed through variance analysis (Proc GLM, SAS 9.2 2017) to test the biosecurity procedure effect on dust concentration and emission considering all the recorded variables (temperature, humidity, ventilation rate). A correlation procedure (Proc CORR, SAS 9.2 2017) was performed to evaluate the interdependence between the considered variables.
Environmental quality in the two rooms resulted significantly affected by the biosecurity procedure in agreement with Costa et al.(2014) and Hernandez et al. (2000), for dust concentrations (108 µg/m3 vs 321 µg/m3, $P<0.001$) and emissions (13 mg h-1 animal-1 vs 31 mg h-1 animal-1; $P<0.01$) relative humidity affected dust concentration that resulted inversely related to ventilation rate ($r=0,37$, $P<0.01$). No differences in airborne bacteria were detected in the two rooms, the higher mortality rate of piglets in the untreated room (+4 %) room was caused by the infection of Clostridium perfringens, probably for the unremoved manure from the cages during the production cycles.

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