Taiwan Livestock Res. 56(3)：208-219, 2023
DOI：10.6991/JTLR.202309_56(3).0007


# Investigation on microclimate and air quality of wet-pad cooling system pig house in hot season [1]

Tein-Ming Su [2][3] Wei-Zhi Liu [2] Yi-Hsiang Weng [2] and Ting-Hsun Hsiao [2]

Received: Apr. 11, 2023; Accepted: Jun. 13, 2023

## Abstract

The purpose of this study is to investigate the microclimate and air quality data in the pig house before and after the pigs are reared in a wet-pad cooling system pig house. In the hot season (between May and Aug.), a total of 500 LYD [(Landrace♀ × Yorkshire ♂) ♀ × Duroc ♂)] hybrid pigs (average body weight about 36 kg) were raised in 20 pens with 25 pigs/pen. Pigs were fed diet and drinking water *ad libitum*, and the feeding period was terminated when the body weight of pigs reached 110 kg. Investigate the microclimate and air quality of the wet-pad cooling system end outside the pig house (P1), the wet-pad cooling system inside the pig house (P2), the front end of the air pollution prevention and control facilities (P3) and the back end of the air pollution prevention and control facilities (P4) during the empty house and pigs raising period. The results show that ambient temperature (AT) and temperature-humidity index (THI) of P1 was significantly higher than empty house under the condition of automatic control of the fan operating power (FOP). However, there is no difference of the AT, relative humidity (RH) and THI in the pig house when the FOP is adjusted between 40-100%, but the ventilation volume decreased with the increase of FOP ($P < 0.05$). Regardless of automatic or manual adjustment of FOP, both of the air quality indexes (AQI) in the pig house are between good and normal. The average AT outside the pig house during the grower stage and finisher stage of the pigs are about 31°C and 34°C, respectively. The RH inside the pig house is 30-45% higher than that outside the pig house ($P < 0.05$), and the temperature is significantly lower 4-6°C, THI between 30-35 is also lower than outside the pig house ($P < 0.05$), while the AQI inside the pig house is between 42-77. The ammonia concentrations in P3 and P4 during the pig grower stage were 3.66 and 0.39 ppm, and 4.86 and 0.70 ppm in the finisher stage, respectively. The measure point of P4 significantly reduces the ammonia concentration about 89% and 85% compared to P3 in grower stage and finisher stage ($P < 0.05$). It shows that the installation of air pollution prevention facilities between P3 and P4 does play a role in improving ammonia emissions. In conclusion, the application of a wet-pad cooling system to a pig house can improve the microclimate and air quality of pig houses in hot season, and improve the comfort of pigs.

Key words: Air quality, Grower-finisher pig, Pig house microclimate, Wet-pad cooling system pig house.

(1) Contribution No. 2749 from Taiwan Livestock Research Institute (TLRI), Ministry of Agricuiture (MOA).
(2) Livestock Management Division, MOA-TLRI, HsinHua, Tainan 71246, Taiwan, R. O. C.
(3) Corresponding author, E-mail: tmsu@mail.tlri.gov.tw.