2018.12.12 Opcool project meeting minutes

Participants:

Poul Pedersen (Skov), Svend Morsing (Skov), Lise Bonne Guldberg (SKOV), Thomas Ladegaard Jensen (SKOV), Anders Riis (SEGES), Kasper (SEGES), Bjarne Bjerg (KU), Guoqiang (AU), Li Rong (AU)

Date and time: 2018.12.12, place: Skov A/S

Minutes by Li

Thomas from Skov introduced the mechanical operation of ceiling inlet prototype of DA1540. The air-force required to pull the flap was tested and there is still challenge of the design to extend the opening larger.

Anders presented the experimental plan in Grønhøj for discussion. In Grønhøj, there are six identical pig barns with dimensions of 6.0 x 4.8 x 2.5 m3. It should be determined if 4 or 6 sows are going to be tested at one time. Three types of boxes to limit the sow’s activity were shown from the companies of Jydan Bur, Vissing Agro and Egebjerg. To conduct such experiments, permit is required to be applied 3 months before the test and the agreement with farmers should be 5 month in advance.

The testing periods are proposed. If the test starts when the gestation sows is at the period of day 10, then it could risk the loss of fetuses at the early pregnant stage. It is preferred to start at day 50 (then the test period could be day 50 – 103).

In WP1, we have 18 combinations which are: temperature levels of 25, 30 and 35 oC; RH level of 30 and 70%; and air speed levels of 0.2, 1.0 and 2.5 m s-1. Anders proposed the following items for further discussion, which include: (1) exposed to 2 hours for each individual test; (2) respiration rate (RR) will be taken as the main response parameter; (3) pilot test will be conducted to determine the final test procedure; (4) the shows will be moved to loose house next door at the thermal conditions just below the level when the RR begins to increase. The questions are asked: (1) how to set up the experiment? (2) how to create the environment for tests? (3) How to combine the Grønhøj tests with WP2?

Some suggestions have been made. For example, we could run a test fixing the temperature and relative humidity but change the air speeds with three levels. The argument is that the change of the air speed is relatively easy to be regulated. Two hours exposure could bring uncertainties to the tests since there is an accumulation process of heat during the process of heat stress.

Concerning to the question of how to create the expected environment, Bjarne presented a design of air supplying box. Before that, he also presented a recent study of using floor cooling to relieve the heat stress of sows. We can refer to the test conditions and procedures in that paper. For floor cooling, Thomas mentioned that the results from pig research center showed around 60-70 w/sow could be taken by floor cooling (please correct me if it is not correct). Svend mentioned that the skin surface temperature by using the floor cooling will be quite different from the ones by using the higher air speed.

It is agreed that Bjarne make a draft of experimental design for WP1 experiments at Grønhøj and to circulate it a round for comments.

For the air supplying box, four fans are suggested and a plate (2.5 x 3 m2) with poriferous holes to supply a relatively uniform airflow to the sows and according calculations have been presented. Due to the high airflow rate and pressure drop, it could be a challenge to have a uniform pressure drop through the holes, so does the airflow rate. It is suggested to test the air supplying box at AU Skejby Lab first before using it at the experimental tests with the sows. Before making the air supplying box, Poul would provide the dimensions of the fans and Bjarne would provide the geometrical configurations of the air supplying box.

It is also initiated by Anders how to connect the Grønhøj tests with WP2. During the meeting, Li mentioned we can combine the tests data with the heat transfer process modelling. But after reading the description of WP2, Li is wondering if we could run a few tests with supplying air to part of the body.

After Li is left at 14:30, Poul has presented the idea to combine LPV and HP cooling. The idea is briefly discussed on nozzle location and spraying direction. This will be further discussed in the next meeting with consideration on future ventilation /cooling unit development.

Next meeting: it is decided in AU Skejby Lab, 301 Skejby Nordlandsvej, 8200 Aarhus; (the date is tentative in week March 11-15, is not decided yet at the moment this minutes is done)