**Minutes of Opcool project meeting No. 4**

Participants

Poul Pedersen (SKOV); Svend Morsing (SKOV), Thomas Ladegaard Jensen (SKOV); Kasper Balslev Sørensen (SEGES), Anders Leegaard Riis (SEGES); Pia Brandt (KU), Bjarne Bjerg (KU), Li Rong (AU), Guoqiang Zhang (AU)

Date &Time: 2019.06.04; 10:15-15:00

Location: AU Lab in Skejby, 301 Skejby Nordlandsvej, 8200 Aarhus

Minutes: Li Rong (AU)

Guoqiang welcomes all the partners and asked if there were any comments on the minutes of last project meeting. The minutes of last project meeting was approved as well as the agenda.

Li presented some CFD simulations of the air supply box which was installed on the diffuse ceiling. Seven cases were simulated with reference case, plate (0.1 m above the supply holes), and plate plus flaps to guide the flow down between the fan and the supplying slots. The results showed that adding the porous white plate provided by Skov improved the flow greatly while it was difficult to conclude if the flaps were needed to improve the airflow distribution. The velocity magnitude distribution at the plane of Y=0.8 m and Y=1.25 m were similar at the range of 0-2.5 m s-1 (difference can be seen if the maximum air speed is set as a larger value). At the same time, the experimental results were shown, which was obtained from the tests with the air supply box in Skejby. The air supply box was located in the center of the room (5.8 x 4.8 x 2.6 m3) and 0.53 m below the ceiling. The porous white plate was installed 0.1 m above the supply holes. The results clearly showed that the porous white plate improved the results and reasonable air distributions were achieved at the aimed air speed of 2.5 m s-1 and 0.5 m s-1 at the height of 0.8 m above the floor. The CFD results were not well aligned with the experimental data. The geometry model in CFD simulation was not the same as in the experimental test, which includes: the fan location to the supplying holes and the location of whole air supply box in the room. Based on the experimental data, basically it is agreed that the current design of the air supply box could fulfill the requirements of the tests in WP1.

Kasper introduced the situation at Grønhøj. The experiments being conducted now will be completed on 11th June. After that, the pen partitions and feeding equipment will be removed. Kasper also mentioned that the sows should be ordered 50 days before the test. It is agreed that the crates should be installed for pretests since they could affect the airflow. Whether the Kimateknik A/S controller should be used or not was discussed. In order to avoid spending too much time to figure out how the controller works and convert the signals, it is decided to replace it with Skov’s controller. Thomas will visit Grønhøj. It is suggested to make a more detailed time plan because July and August are holiday period. The service in Skov should be booked at least four-six weeks ahead.

Bjarne used staldvent to run the simulations how large ventilation rate is needed to maintain the indoor thermal conditions. The results showed that around 200 – 500 m3 h-1 is needed to remove the extra heat in the first 12 weeks of 2020. Bjarne also presented the results of humidifier with the capacity of 4 kg h-1 which needs power supply of 2000 W. The results showed that it took around 10 minutes to start evaporation and another 30 minutes to reach 70% with closed door and windows when the tests were run in his office.

Bjarne also presented the design of the experimental test with 17 hours of acclimatization at 29 oC (70% RH) and air speed of 0.2 m s-1 and then with 3 hours at 35 oC, 70% and 0.2 m s-1; followed by another 3 hours at 35 oC, 70% and 1.2 m s-1 and finally with 2 hours more at 35 oC, 70% and 2.5 m s-1. It is mentioned if we should consider the effect of feeding. Due to the objective of these tests only focusing on the animal’s reaction to the environmental factors, it is suggested to feed the sows during acclimization period and not give food during other period. Guoqiang suggested to run all the tests for the fattening pigs, which were designed for sows. These data can also be beneficial for evaluating the heat stress of fattening pigs since the data is missing in current literature.

Anders mentioned if two extra sows should be added to avoid the radiation from the sows on the sides so that the four sows were tested under the same conditions.

Poul introduced the status of DA1540. Now it can be open to 110o and it would be released in the near future. The chill sensor has been used in commercial broiler house. Skov would like to test the chill sensor in other situations. So it is suggested that probably two chill sensors (one vertical and one horizontal) can be used in the experimental test in WP1 to collect some data.

The suggested plan is:

1. To confirm the dimensions of the air supply box
2. Grønhøj will apply for the permission of using animals in tests
3. Grønhøj will contact carpenter to make the air supply box, four uniform boxes instead of one large box
4. Thomas will go to Grønhøj to have a look at the facility in the barn
5. Skov will book the service to install the required facilities such as fans and controller after coordinating with Grønhøj