

Indoor climate for fatteners during summertime in presence and absence of chill

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Introduction

Rearing pigs to market weight in temperatured zones has focused on maintaining comfortable temperatures during wintertime. However, also in temperatured zones risk for side effects due to Temperature-Humidity Indexes (THI) above 25 may arise in summertime¹. Therefore the aim of this study was to evaluate the potential of running the heating system backwards during the summer with the aim to accomplish a more comfortable indoor climate.

Table 1. Study periods during the years and mean climatic conditions during the study periods

| | 2010 | 2012 | 2013 |
|---------------------------------|-----------|-----------|----------|
| Study period | May-July | July-Sept | June-Aug |
| Outdoors** | | | |
| Temp (°C) | 19.6±5.4 | 17.3±4.4 | 20.2±3.1 |
| Humidity (%) | 48.3±11.5 | 74.2±14.3 | 55.0±9.2 |
| THI | 18.1±3.9 | 16.7±3.3 | 18.8±2.3 |
| THI-max | 22.8 | 22.7 | 21.6 |
| Indoors** | | | |
| Temp (°C) | 24.0±2.8 | 23.3±1.5 | 23.6±1.7 |
| Floor temp (°C) | 26.2±1.7 | 25.3±1.4 | 26.3±0.8 |
| Humidity (%) | 49.4±9.6 | 70.0±8.2 | 56.2±5.5 |
| THI | 21.4±2.3 | 21.9±1.3 | 21.4±1.5 |
| THI-max | 24.8 | 25.1 | 23.3 |
| Indoors; 16.00-19.00 | | | |
| Temp (°C) | 25.1±3.5 | 24.3±1.7 | 24.6±2.2 |
| Floor temp (°C) | 26.3±1.8 | 25.2±1.4 | 26.5±0.7 |
| Humidity (%) | 47.6±8.9 | 65.8±9.4 | 54.3±7.3 |
| THI | 22.1±2.7 | 22.4±1.4 | 22.1±1.7 |
| THI-max | 25.5 | 25.8 | 23.9 |

** = mean of whole day (from 07.00 to 19.00)

Materials and Methods

The study was made in an integrated herd with a module stable for fatteners with a natural mechanic ventilation system (www.nyborghuse.dk). Each unit had two pens sized 19.6 m², out of which 5.7 m² was a dunging area located outdoors. Each pen housed 20 pigs (0.98 m² per pig). Pigs entered the stable at 12 weeks of age and were reared to market weight all in-all out. Temperature and relative air humidity were monitored and Temperature-Humidity Indexes (THI) were established.

Summer batches from three years were compared. In 2010, no attempt to chill was made. In the summer of 2012 a heat exchanger with a high effect (Alfa Laval 70 kW; Δt = 10 °C) was installed and connected to the water-based heating system of floors, running from the 18th of July in 2012 and from the 28th of May in 2013.

Table 2. Mean temperatures of water in the heating system during 2013

| | Into stable | From stable | Difference |
|---------|-------------|-------------|------------|
| Am (°C) | 24.2±0.8 | 26.2±0.8 | 2.0±1.1 |
| Pm (°C) | 24.7±1.0 | 26.3±0.5 | 1.6±1.0 |

Results

The mean outdoor temperatures ranged within 3°C between the three years. The summer 2012 was coldest and the outdoor THI was lowest that year. Despite this, the mean indoor temperatures and THI-values were equal.

In 2013, the water from the heat exchanger increased with 2.0±1.1 °C from entering to leaving the fattening stable at 08.00 and with 1.6±1.0 °C at 16.00, indicating an absorbance of heat from the concrete floor (Table 2). The mean floor temperature was 1°C lower in 2012 compared 2012, but equally high in 2013 as in 2010 (Table 1).

The mean THI-levels were below the critical value of 25 during all years. However maximal THI values above 25 were denoted in 2010 and 2012, but not during 2013. The mean indoor temperatures were constantly 1°C higher in the late afternoon. Thus, also the highest THI-values were recorded in the afternoons (Table 1).

Conclusions and Discussion

As the top THI-values obtained in 2010 and 2012 exceeded 25, the results confirmed the risk for heat stress of pigs also in temperatured zones. Chilling floors could be a way to deal with this, but the results obtained indicated the need for high efficacy of such systems - which we think we had. Obviously the concrete floors accumulate heat, which probably also makes the time point of initiating chilling critical and we will further scrutinise the impact of that. Despite the failure to document a true decrease in floor temperature, a possible positive effect was indicated since THI-values above 25 not were recorded in 2013.

References

1. Zoric et al, 2012. Sw Vet J. 64, (1) 11-21.