

Reduction of heat consumption in weaner and farrowing rooms: Evaluation of "Intelligent heat lamp".

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Reducing heating consumption in post weaning and farrowing pig barns: assessment of "Smart nest" efficiency. The presence of a nest in post weaning and farrowing pens allows the heating zone to be located and therefore offers a range of differentiated comfort to piglets. Recently, smart nests have been developed. They are provided with heating by infrared lamps controlled by the skin temperature of the piglets measured using an infrared sensor. These smart nests were evaluated in post weaning rooms (130 and 140 piglets) in two commercial farms in Brittany and in a farrowing room with 8 pens in an experimental farm. After one year of testing in the post weaning rooms and six months in the farrowing room, reductions in heating costs made possible by the nests were higher than 50% in the three facilities. Depending on farmer practices and respect for the installer's recommendations, heating bills can be reduced by up to 90%. While heating represents on average 46% of the energy consumption in breeding/ finishing pig farms, setting up nests in post weaning and / or farrowing pens constitutes an interesting response for reducing energy expenses. This equipment is identified as one of the possible levers leading to future "positive energy" pig barns.

Introduction:

Based upon cost of energy increases, caused by shortage of energy and increasing focus on the environment, forces farmers to reduce the energy cost.

ADEME³ (L'Agence de l'environnement et de la maîtrise de l'énergie) financed in 2006 a survey on energy cost in pig production. It showed that the average energy consumption is 983 kWh annually. Production of feed and slurry treatment is not included. In 2012 the cost of 983 kWh was around 70€ annually. The major part is heat, which totals to 46%. For a birth to bacon farmer the weaner room totals to 36% followed by the farrowing room with 22%. You have many possibilities to reduce the consumption in weaner and farrowing rooms. Optimized control of ventilation and heat respecting the recommended minimum values is an important step for reducing energy consumption. Beside this optimized control, which is rather cheap to implement at the farms, various companies offers a variety of solutions to reduce energy consumption and in particular heat consumption. Among these the Danish company VengSystem A/S has developed the intelligent heat lamp for farrowing rooms and intelligent canopy for weaner rooms. The actual savings using these technologies has been tested at two Brittany farmers (weaner) and in a farrowing room at the research centre in Guernévez.

1. Materiel and procedure.

The achieved savings comes from comparing a test room and a reference room, which comply with the usual design and management.

1.1 Description of the materiel.

An infrared temperature sensor, fixed at the canopy at the creep area, measures the surface temperature of the pigs and adjusts the heat from a 150 Watt heat lamp according to the pigs' demand of heat.

A rubber mat, which covers the floor of the creep area, creates a uniform zone of comfort for the piglets. The canopy is fixed at the level of the penning walls, at weaners at the rear of the pen, in farrowing in the corner of the pen. In weaner room a ram adjust the position of the canopy, even when the heat lamps are off.

The test farms are situated in the French regions Finistère (F) and Côtes d'Armor (C) in Brittany has 130 respectively 140 weaner places. A current probe measures the heat consumption in both test and reference room.

The comparison of farrowing rooms happened at the research centre at Guernévez. Both test and reference room had a power meter recording electrical consumption of heat as well as and ventilation.

¹ French Chamber of Agriculture in Brittany

² Institute for Research and Expertise within Pig Production

³ France Energy and Environment Agency

1.2 Description of test condition.

In rooms with intelligent canopies VengSystem recommends a set temperature of 20° for ventilation. The farmers practice showed, however, to be somewhat different. As an example the ventilation was set to 20 degrees in C but set to 23 in F. The reference room started at 27° with 8 kg piglets and terminated at 24°, when the weaners went out at 30 kg. The P-band was 6° in test and reference.

In farrowing ventilation in test room was set to 20° against 24° in reference room, P-band set to 6°.

2. Results and Discussion

2.1 Weaners:

The test went over 6 batches in C from marts 31st 2011 to February 2nd 2012 and over 4 batches in F from marts 3rd 2011 to January 1st 2012.

Test farm	Reference room	Test room	Savings %
Farm C 6 batches	5,36 kWh/pig	0,39 kWh/pig	93%
Farm F 4 batches	7,28 kWh/pig	3,45 kWh/pig	53%

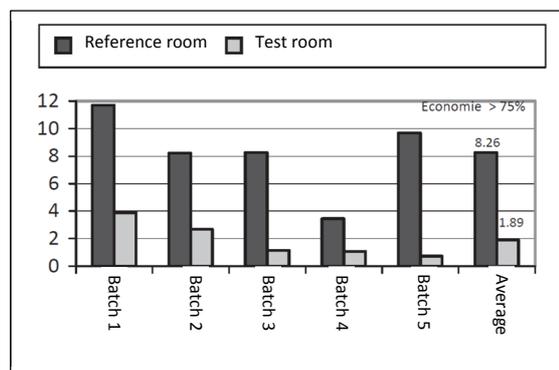
The intelligent canopy saves 53 % at farm F and 93 % at farm C. The explanation of the difference is different control of the ventilation. The recommendation of the supplier of 20° in the room creates two different climate zones: A warm comfort zone below the canopy and a cooler zone, where the pigs eat, drink and dung. The test in Finistère, where the space temperature was 23°, the pigs were less encouraged to stay below the canopy. As a consequence the infrared sensor observed the pigs less and engaged the lamps in order to attract the piglets below the canopy. This caused elevated heat consumption.

The producer also recommends a lying board below the canopy in order to accumulate the heat and optimize the performance of the system. As the lying boards were hard to handle between the batches, the farmer in Finistère chose to use them for the two first batches only. This also explains the difference in consumption of the two farmers. Despite the missing lying

boards during the two last batches the savings was anyway 62 %.

2.2 Farrowing room

The data concerns 5 batches from September 27th 2012 to marts 3rd 2013. During this time span the average savings using intelligent heat lamps was 75 %.



The average heat consumption in the reference room was 8.26 kWh/ piglet and 1.89 kWh/ piglet in the test room; savings are 77 % in spring/ summer 2012. These encouraging results indicate follow-up test in a winter period.

Conclusion:

Using the heat lamp is very interesting for saving heat costs. It is important to follow the producers' instructions on how to use the system, in particular using mats/ lying boards and obeying ventilation settings with set temperature of 20 degree C.

The results confirm a previous test of intelligent canopies in weaner rooms (IFIP, Villefrance-de-Rouergue, winter 2011 to 2012), showing heat savings at 75 % (Massabie, 2012).

In the light of increasing energy prices the system is interesting for cutting production costs. The infrared temperature sensor, which measures the surface temperature of the pigs, permits supply of heat as close as possible to the actual need.

Furthermore this solution fits to the major part of farmers having electrical heat today.

Thanks to VengSystem A/S, to EDF (Electricité de France) and to the cooperatives for their participation in the test. The test has come into existence during project CASDAR⁴ (Conception de bâtiments d'élevage innovants à énergie positive.

⁴ Project for positive energy solutions in pig houses.