Question to EURCAW-Pigs

Question

We have some problems in a pig slaughterhouse where a high number of pigs regain consciousness after CO2 stunning. The CO2 concentration and the duration of the stay of the animals within the CO2 seem to be sufficient. The problem presents itself mainly when sows are slaughtered, and not so much with slaughter pigs. The stunning system used is a dip-lift.
Is there any information available on possible causes of regaining consciousness after CO2-stunning (maybe possible loss of CO2 somewhere, …)? And is there any information available on the CO2 stunning of sows specifically? Maybe there are other parameters that need to be observed when sows are slaughtered in comparison to slaughter pigs?

EURCAW's response

Dr. Inga Schwarzlose from FLI, Institute of Animal Welfare and Animal Husbandry wrote the initial reply. Additional suggestions were provided by dr. Marien Gerritzen of Wageningen Livestock Research. The EURCAW secretariat did the final editing. For queries: info.pigs@eurcaw.eu.

Answer

The induction of unconsciousness via a dip-lift system and also the depth and duration of unconsciousness depend on the combination of 1) the CO2 concentration and 2) the exposure time. A group of pigs should experience at least 80% CO_2 (preferably 90%) at the bottom of the pit. The duration of exposure should be no less than 100 s (preferably 180 s), after which the animals are taken out of the gondola to be bled by the slaughterhouse personnel [Reg. (EC) No 1099/2009; EFSA, 2004; OIE Terrestrial Code].

Following carbon dioxide stunning, the bleeding as a potential procedure ensuring death must be applied as quickly as possible (Article 4 of the Regulation). According to the German Order on the protection of animals in connection with slaughter and killing (2012), pigs must be bled within 20 s after leaving the stunning facility or within 30 s after the last stop in the CO_2 atmosphere. In Germany, deviations from this are possible upon application to the competent authority, if it is proven in the course of a meaningful investigation that the effectiveness of the stunning procedure permits an extension of the maximum interval [exemption according to § 13 (2), see also von Wenzlawowicz and von Holleben, 2017].

To our knowledge there is not a significant difference between sows and slaughter weight pigs in sensitivity to CO2 concentrations and thus no other parameters are required.

Therefore, the first advice to the requestor would be to measure the CO2 concentration and increase the CO2 concentration to preferably 90% and / or increase the exposure time.

Further suggestions for consideration are given in the background section below.

Background

According to Hartung et al. (2002) and EFSA (2004), at least 90% CO_2 is recommended at the bottom of the pit. While 66.3% of the animals exhibited a positive corneal and palpebral reflex at 80% CO_2 for 100 seconds and a stun-to-stick-interval of 40-50 seconds, this proportion was

reduced to 5.9% by the use of 90% CO_2 under otherwise identical conditions (Nowak et al., 2007). Higher system-specific minimum exposure times may be necessary depending on the size of the group and the conditions in the pit (bsi Schwarzenbek, 2013).

Possible difficulties may arise from the stocking density in the gondolas or from a non-optimal gas distribution within the stunning plant (Grandin, 2018).

Unfortunately, it is not possible to answer the request more adequately without further information. In order to assess the above described problem, the following questions (each printed in italics) need to be answered:

- *How long is the exposure time and what is the gas concentration? Where are the measurement locations and how are the alarm thresholds defined? Which gas quality is used? How long is the stun-to-stick interval?*

Please refer to the reference values above. Are they achieved? These are basic data which serve as a first description and assessment of the stunning facility.

- *What are the floor area and the height of the gondola? Is it possible that at least two sows have enough space to lie and stand without interfering with each other?*

The space available to the pigs and the stocking density in the gondolas are critical for a gentle and anxiety-free initiation phase of the stunning procedure (von Wenzlawowicz and von Holleben et al., 2017). The question is whether the gondola size is suitable for sows. When determining the stocking density, the body weight and, if necessary, also the breed must be taken into account with regard to body width and chest width (von Wenzlawowicz and von Holleben et al., 2017). The German Order on the protection of animals in connection with slaughter and killing (2012, Annex 1 to §12 section 3 and 10) prescribes that the animals can stand upright without constriction of the chest and on firm ground until they lose consciousness. Therefore, the available space in the gondola (based on the available floor space) must be weighed against the standing area of the animal in chest width (von Wenzlawowicz und von Holleben et al., 2017). Only if they put their feet far apart (in chest width), the animals have the possibility to counteract the movements of the gondola and the beginning gas effect and to maintain a standing position. Otherwise, they would lose their standing position before losing consciousness (von Wenzlawowicz und von Holleben et al., 2017).

- *Have there been any changes to the ventilation system of the plant?*

It is also possible that the gas distribution in the pit is not optimal. On the one hand, this can be due to a design fault of the chamber or to a ventilation system that removes gas from the chamber (Grandin, 2018). On the other hand, factors in the environment such as wind around the premises, changes in the number of fans switched on in the plant or the opening and closing of doors near the chamber can lead to the removal of gas from the chamber by generating stacking pressure (Grandin, 2018). The latter should be taken into consideration if suddenly non-stunned animals appear in the system, which has previously worked well (Grandin,2018).

- *Is the gas consumption per pig higher than usual?*

A higher gas consumption can indicate carbon dioxide losses from the stunning facility due to changed environmental conditions, for example (see above).

- *What is the temperature of the gaseous carbon dioxide?* T

The temperature of the gaseous carbon dioxide should also be taken into account when considering the distribution of the gas in the pit. Ideally, this temperature should be 18 degrees (Butina, 2014, cited from von Wenzlawowicz and von Holleben et al., 2017). A good distribution of the gas must be ensured even at cold ambient temperatures by using f.ex. suitable heating devices (von Wenzlawowicz and von Holleben et al., 2017; bsi Schwarzenbek, 2013).

Relevant references

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