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Improved animal welfare, the right technology and increased business

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ABSTRACT

Animal welfare is receiving increasing attention from the authorities, the public and NGOs. For this reason, the improvement of animal welfare and animal handling systems is of the utmost importance for the meat industry. Technological developments have led to more animal friendly systems that handle animals on the day of slaughter, and these developments will be even more important as consideration for animal welfare and sustainability is no longer just a trend but a licence to operate. Improvement of animal welfare also leads to a higher value of the carcasses due to higher product quality, less cut-off caused by fewer injuries, and reduced working load, which leads to increased business opportunities. Therefore, good animal welfare is good business, and the development and implementation of new technology is the way to obtain improved animal welfare. These subjects will be addressed using examples and cases from the pork and broiler production industry.

1. Introduction

Concerns and demands for animal welfare from authorities, NGOs, markets and the public in general are increasing. For example in the EU, animal welfare is the subject of an ongoing debate, and several national governments have focused on animal welfare and called for the reduction of tail docking, alternatives to piglet castration, improvements of transport conditions etc. The legislation reflects the increased emphasis on animal welfare. To comply with these demands, new technology and new systems for handling the slaughter animals are needed. At the same time, the market has established additional requirements and specifications for food quality, including the demand for a uniform and well-defined meat quality. Fierce competition in the food industry means that the production has to become even more efficient, but also with increased focus on working conditions. Production systems and technologies that improve animal welfare, product quality, efficiency and working conditions must be available for the future development of the meat industry.

Regulations, such as Council Regulation (EC) No. 1099/2009, have led to significant improvements in the handling of animals on the day of slaughter. As required by EU legislation, the slaughterhouse must appoint an animal welfare officer, establish standard operating procedures and entrust the handling of animals to properly trained staff. Operators need a certificate of competence. In the global context, OIE (World Organisation for Animal Health) has contributed to the awareness of animal welfare of slaughter animals and is trying to establish international standards.

To maintain a cost-effective production system including an efficient and fast process flow, the improvement of animal welfare will depend on efficient and targeted technology. Even though the operators are becoming more and more educated and are aware of animal welfare issues, systems with less humane involvement will be advantageous when operating a slaughterhouse. This will minimize the impact of unavoidable differences between operators. Through the development and introduction of new technology in which animal behaviour is taken into consideration, it is possible to obtain an efficient production system with a high level of animal welfare and at the same time maintain a high level of quality and yield. The importance of looking at the production chain as a whole needs to be emphasized, since the chain is no stronger than its weakest link, and the different process stages must be aligned meaning that the optimal performance and level of one stage depend on the rest of the stages in the chain.

Haemorrhages are examples of injuries that may cause harm to the living animal. Recent results from Danish investigations document the fact that most haemorrhages in a pig carcass occur during the last 2 h before sticking (Dich-Jørgensen, Larsen, Leifsson, & Jensen, 2016), illustrating that pre-slaughter handling needs attention. Haemorrhages are not only an animal welfare issue, since injuries also reduce the value of the carcass, and there is considerable economic potential in optimizing the handling of the pigs at the day of slaughter to reduce the incidence of, for example, haemorrhages. Likewise, the reduction of skin lesions, bone fractures etc. and improvement of water holding capacity resulting from a gentle handling on the day of slaughter contribute to improved value of the carcass due to less cut-off and greater use of cuts for higher value products.

Focus areas in this paper are:

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- Influence of animal handling on the day of slaughter – from loading at the farm to slaughtering at the slaughterhouse – on animal welfare, product quality and value
- Importance of efficient systems to improve animal welfare as well as product quality, yield and working conditions
- Systems to monitor the handling of the animals and animal welfare.

Slaughter pigs and poultry are used as main examples. The optimal conditions and the solutions are quite different for the two species; however, some experience from pigs can be used in poultry production and vice versa.

2. Pre-slaughter handling

According to Velarde and Dalmau (2014), pre-slaughter handling refers to interaction between humans and animals during the phases of the preparation for transport, loading, transport, unloading, lairage and moving to the point of stunning. The handling and the development of new systems need to be based on the knowledge of animal behaviour to create efficient systems that cause less harm and that do not require physical force during handling of the animals.

2.1. From farm to slaughter

2.1.1. Pigs

2.1.1.1. The group-based principle. To obtain a high level of animal welfare, DMRI has developed a concept for pre-slaughter handling of pigs, whereby pigs are kept in the same groups during transport, lairage and stunning (Gade & Christensen, 1999) (see Fig.1). The idea behind this concept is to reduce the level of aggression and fighting by keeping unfamiliar pigs separate. Thereby, the occurrence of skin damage and bruises is reduced, and meat quality, especially the water holding capacity, is improved. Støier, Aaslyng, Olsen, and Henckel (2001) reported a lower drip loss in *m. longissimus dorsi* (3.2% vs. 3.7%, $P < 0.01$) and in *m. biceps femoris* (1.6% vs. 1.9%, $P < 0.05$) from pigs kept in separate groups of 15 during lairage and when moving to the stunner compared to pigs from traditional systems with larger groups. A comparison test, in which pigs were kept in groups of 15 instead of groups of 45 during transport and lairage, shows less aggression and less skin damage in legs (3.9% vs. 5.2%) and shoulder (16.1% vs. 23.7%) (Gade & Christensen, 1999).

Pigs in groups of 15 are easier to move at unloading, during transfer to holding pens and to the stunner (Gade & Christensen, 1999). In the lairage area, a series of flap gates and one push-hoist gate divide the holding pen into an area suitable for 15 pigs, and the pigs move calmly into the lairage pen. Furthermore, pigs are moved using a driving board only. The fact that animals have a tendency to move from a darker area towards a brighter area, and the fact that pens, passageways and races should be designed and constructed to allow the animals to move freely (Velarde, Fàbrega, Blanco-Penedo, & Dalmau, 2015) are used as elements in the concept for slaughtering pigs in groups.

The final part of the concept involves an automatic system to transfer the pigs from the holding pens to the stunning area. Sliding division gates subdivide the pigs into two or three groups dependent on the capacity of the stunner. The smaller groups are automatically transferred to the CO_2 stunning equipment including the stunning box by a sliding wall. The CO_2 equipment consists of a number of stunning boxes. Movement of the gates is operated mechanically. The push-hoist gate system can be used to ensure compliance with the line speed, although it is important that the gates are finely adjusted, so that they stop and do not drag non-ambulatory animals (Gade, 2004). Sensors are integrated in the gates to register the gate pressure to ensure that the operating gates do not drag a pig. Due to the more gentle handling of the animals, the incidence of skin damages and bruises is lowered, the water holding capacity is improved (Støier et al., 2001), and the noise level in the production area is reduced (Gade & Christensen, 1999). Furthermore, the working conditions are improved due to less working load and a lower noise level.

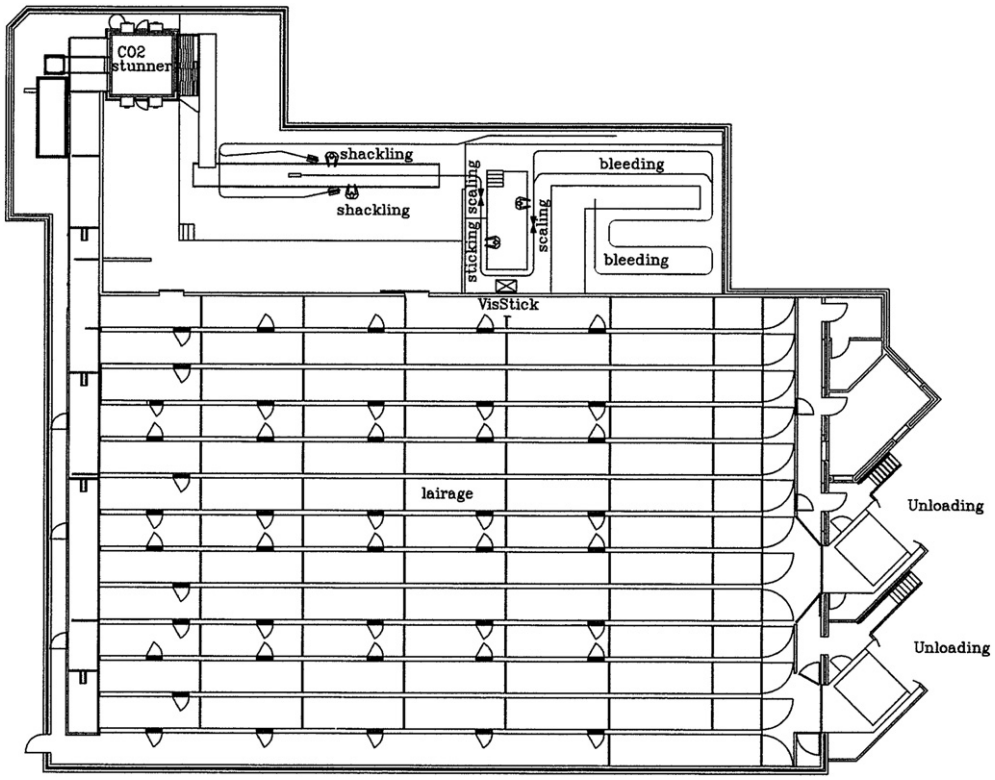

Fig. 1. Concept; holding pen, race, stunning box, shackling, sticking.