

THE ROLE OF ANIMAL WELFARE ON MEAT QUALITY

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Abstract: *Mixing livestock and poultry kept separately in batches of similar weights and ages increases stress, engages them in fighting on arrival at processing facilities, exhausts them because of long-distance transport, rough handling, deprivation of water or feed. All this has effects on animal welfare with harmful effects on the quality of carcasses and meat obtained during processing in abattoirs. The requirements regarding high-quality carcasses and meat should be improved to meet quality indices through handling, housing, immobilizing, stunning, and bleeding while observing the rules imposed for animal welfare.*

Key words: *animals, meat, welfare, transport*

INTRODUCTION

Improvement farm animal meat production and processing should be based on the general principles of animal welfare in animal production systems [5,11,12]:

- Genetic selection should always take into account animal health and welfare;
- The physical environment (resting surface, substrate, walking surface) should be suitable for each livestock and poultry species and breed to minimize the risk of deterioration of carcass, skin damage, or transmission of diseases or parasites to animals;
- The physical environment should allow for comfortable and safe movement, comfortable rest, normal postural changes, and the opportunity to engage in the types of natural behaviour that animals are entitled to have [3,17];
- The social grouping of animals should be managed so that it enables positive social behaviour and minimizes chronic fear, harm, and suffering;
- Air quality, temperature and humidity in confined spaces should meet good animal health requirements and not have negative effects on animals: if extreme conditions occur, animals should not be prevented from using their natural methods of thermoregulation;
- Livestock and poultry should have access to sufficient feed and water, depending on age and needs, to maintain their normal health and productivity and to prevent hunger, malnutrition, prolonged dehydration, or thirst [7,9,10];
- Diseases and parasites should be prevented and controlled as quick as possible through good management practices: animals with serious health problems should be isolated and promptly treated or humanely killed if treatment is not possible or if recovery is not recommended;
- If painful procedures cannot be avoided, the resulting pain should be managed within acceptable limits;
- Handling livestock and poultry should favour a positive relationship between humans and animals without causing injury, lasting fear, panic, or stress;
- Owners and handlers of livestock and poultry should have enough appropriate skills and knowledge to ensure that animals are treated in accordance with these principles.

Measuring the level of welfare of livestock and poultry specialized for meat production is done according to several general criteria, to which are added criteria specific to each species [1,2,16]:

- general criteria: body condition, presence/absence of lameness, degree of skin or plumage cleanliness, wounds/injuries, bruises, mortality rate (%), heat stress, cases not requiring hospitalization (%), overloaded trailers and handling measures;
- specific criteria for each species:
 - sheep:
 - foot rot;
 - infections caused by *Chrysomya rufifacis* and *Lucilia cuprina* fly species;
 - traces of the removal of skin folds from the tail area to prevent infections caused by flies;
 - wounds caused by shearing wool;
 - blindness caused by wool falling over the eyes;
 - bruise caused by lifting woolly sheep;
 - poultry:
 - foot injuries;
 - broken wings in broiler chickens due to brutal handling;
 - twisted legs in broiler chickens;
 - blister on the chest (due to dirty bedding);
 - the state of the feathers;
 - fractures caused by osteoporosis in laying hens;
 - burns on the upper thigh caused by ammonia in chicken;
 - pigs:
 - shoulder injuries;
 - bite on the vulva;
 - stress syndrome in pigs;
 - ractopamine given for difficult and slow movement;
 - serious scratches caused by fights between pigs [4,6];
 - blood lactation caused by the stress of handling;
 - beef cattle:
 - liver abscesses in grain-fed cattle;
 - neoplasia of the eye;
 - pneumonia;
 - skin condition (no hairless areas);
 - all legs inflamed due to high dose of bronchodilator.

The well-being of animals specialized for meat production does not enjoy a unanimously agreed definition in the scientific world [8,13] but in the specialized literature three orientations centred on three functions affective, biological and natural [17,19]. The most serious consequence of stress is death, which is not uncommon among pigs transported in poorly ventilated and overcrowded trucks in hot weather. [14,15]

MATERIALS AND METHODS

The welfare of livestock and poultry impacts the conditions of maintenance during animal fattening, the economic efficiency of processing meat, the management of animal nutrition, the management of inflow at well-coordinated processing units contributing to producing high-quality carcasses, and the quantity and quality of meat. In this scientific approach, we conducted an analysis to find the most effective solutions to reduce the factors that contribute to the degradation of carcasses obtained by processing livestock and poultry, with the aim of avoiding exhaustion because of the long transport distances, avoiding the lack of rest ante mortem, avoiding water deprivation from the point of view of livestock and poultry welfare, or reducing stress because of mixing animals.

RESEARCH RESULTS

Mixing livestock and poultry kept separately in batches of similar weights and ages increases stress, engages them in fighting on arrival at processing facilities, exhausts them because of long-distance transport, rough handling, deprivation of water or feed. All this has effects on animal welfare with harmful effects on the quality of carcasses and meat obtained during processing in abattoirs. From boarding at the farm to the point of stunning, animals should be treated gently, and animal handling equipment, housing, and trailers should be designed to facilitate humane treatment. The stress of waiting for rest in the slaughter house right before slaughter materialises in the fight between animals causes the glycogen stored in the muscles to be released into the blood stream. After slaughter, the glycogen breaks down in the muscles producing lactic acid; the high level of acidity causes a partial breakdown of the muscle structure, which produces exudative, pale, and soft meat - especially in pigs. For these reasons, the preparation of animals for slaughter is of utmost importance; it should be done in accordance with European Community Regulations (Council Regulation (EC) No. 1099/2009 of 24 September 2009 on the protection of animals at the time of killing) because the process of obtaining meat by slaughtering means preparation, stabbing, stunning, and other operations to produce carcasses and meat intended for human consumption.

The general requirements for the slaughtering of animals (“the intentionally caused process causing the death of an animal”) and related operations (“the handling, housing, immobilization, stunning and bleeding of animals, which take place in the context and place where they are to be killed”) should pay attention to the following if we need to produce high-quality meat:

- During the processing (and related operations) of livestock and poultry carcasses, the animals should be protected from any form of pain, observing the rules imposed by pain management (avoiding any form of torment or suffering possible);
- Both farmers and processors should take all the necessary management measures (solutions to guarantee animal welfare and reduce pain in livestock and poultry:
 - Avoiding suffering due to a prolonged deprivation of food or water;
 - Ensuring housing conditions taking into account their normal behaviour;
 - Implementing pain management through solutions that avoid signs of fear or pain related to abnormal behaviours;
 - Livestock and poultry on the technological production flows benefit from physical comfort and protection;
 - Livestock and poultry should be prevented from interacting with other animals that could affect their welfare and compromise the biosecurity of the farm;
 - Maintaining personal hygiene and cleanliness in appropriate thermal conditions and avoiding falls and slips;
 - Protecting livestock and poultry from injuries during the formation of the lot at the farm gate.

Finding managerial solutions for the operations related to obtaining carcasses were the concerns of the research undertaken in a processing unit for obtaining swine carcasses regarding: handling, sheltering for rest after “transport, immobilization, stunning and bleeding”:

- the correct handling of swine on boarding from farms to processing units involves:
 - the use of modern trailers with microclimate regulation possibilities and the possibility of batch transport of swine according to age and weight;
 - appropriate behaviour of manipulators, to avoid stress;

- unloading the animals as quickly as possible after arriving at the slaughterhouse for rest and providing water at discretion;
- avoiding rushing the animals to the housing boxes;
- maintaining the 12-hour rest period.
- antemortem housing of swine (“keeping animals in stalls, boxes, in covered spaces associated with slaughtering operations”) is done in housing structures in the case of:

- housing for rest until slaughter;
- animals that are not slaughtered within 12 hours of arrival, which should be watered;
- animals that are not slaughtered within 12 hours of arrival should receive an adequate amount of bedding or other equivalent materials, generally sawdust, which guarantee an appropriate level of comfort and guarantee efficient drainage or ensure absorption adequate urine and dejections;
- the immobilization of swine on the slaughter conveyor (“the application of a procedure designed to restrict the animal’s movements, which spares it from any avoidable pain, fear or agitation, in order to facilitate stunning”) is done:

- with the maintenance and verification of immobilization equipment;
- respecting the instructions for the use of immobilization equipment;
- in immobilization boxes that prevent lateral movements;
- in order to stun;
- individually, depending on the slaughter system, horizontally or vertically;
- mechanical by using the ramp;
- the stunning of swine (“intentionally induced process causing loss of consciousness and sensation without pain, including any process causing immediate death”) is of several types:

- gas stunning, electrical stunning/electrocution, prolonged exposure to anoxia/hypoxia (“lack of oxygen in body tissues”) followed by bleeding (“laceration of the central nervous tissue and spinal cord using an elongated rod-shaped instrument inserted into the cranial cavity”);
- it is necessary to determine the loss of consciousness and sensitivity before or at the moment of stunning the animals, through pain management;
- is done with stunning equipment designed and engineered to be effective in a specific context;
- should be followed the verification of stunning efficiency;
- bleeding swine:
- it is done with the help of special knives;
- should be done as soon as possible after stunning.

Tracking the obtaining of swine carcasses from slaughter, to bleeding with respect for handling, rest, preparation for stunning, stunning and bleeding, through concrete solutions, can contribute to ensuring appropriate welfare from the perspective of the following functions:

1. affective where the control through managerial measures of the animals’ potential to suffer is emphasized, that pain management, during embarkation, transport, disembarkation, rest, preparation for slaughter, stunning and normal behaviour is maintained regarding the well-being of the swine and the possibilities of adaptation without suffering from positive emotional experiences (feelings) during interactions with congeners from other batches, with those who manipulate them and with the conditions created up to slaughter;

2. biological by which it is stated that the well-being in normal parameters when the animals are healthy, when they are calm during manipulations and do not show the syndrome of fear, and extreme stress and produce quality meat;

3. natural. Welfare may be compromised proportional to the extent in which transport conditions at the processing facility deviate from the original state of the species and to the extent that swine may or may not express their natural behaviours or those created through selection and breeding work.

CONCLUSIONS

During loading, unloading, and preparing for slaughter, at the point of stunning and bleeding, meat-producing animals should be treated gently; animal handling equipment, shelters, and trailers should be designed to facilitate humane treatment and avoid stress in animals. The stress of waiting for rest in the slaughterhouse shortly before slaughter, involving fight between animals, or caused by brutal handling, results in glycogen storing in the muscles and then being released into the blood stream which, after slaughter, breaks down in the muscles, producing lactic acid and a high level of acidity, which causes a partial decomposition of the muscle structure resulting in exudative, pale, and soft meat (in swine, for instance). Obtaining high-quality pig carcasses, from arrival at the processing units to bleeding (while observing handling, rest, preparation for stunning, stunning and bleeding) through concrete managerial solutions, contributes to the improvement of high-quality meat production management under conditions of good economic efficiency.

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