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Editorial: Management methods to enhance animal welfare and product quality

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Editorial on the Research Topic
Management methods to enhance animal welfare and product quality

Food animals are exposed to numerous stressors in any given production environment. Of particular importance, both from animal welfare and profitability viewpoints, is how livestock intended for meat production are managed prior to slaughter. During this phase, animals may be exposed to intense stressors in quick succession, which can seriously affect the animal's well-being if not managed well. There is considerable evidence that high animal care standards also enhance profitability and product quality. The articles in this Research Topic address animal well-being issues in the management of meat animals prior to slaughter, management methods that improve both animal welfare and product quality, novel assessment tools used to evaluate the welfare of both meat and dairy animals, and product quality as a measure of antemortem welfare status in animals.

In the scoping review conducted on the impact of pre-slaughter management factors on indicators of beef cattle welfare, Davis et al. searched three databases, namely PubMed, CAB Abstracts, and Web of Science, with the objectives of identifying the management factors that influence animal welfare, indicators used, and the relationships between these pre-slaughter circumstances and the welfare indicators. The authors shortlisted 69 studies to be included in the review analysis and grouped the outcomes into four categories. Physiological indicators were evaluated the most in the studies reviewed, and behaviors were used the second most, which included frequencies of falls, slips, and vocalization, among others. Outcomes that fell within health, injury, and disease and those related to stunning and insensibility were used in fewer studies. The review revealed that transportation and handling are the most important pre-slaughter factors affecting beef cattle welfare based on the number of studies in which these factors were researched. In this paper, Davis et al. also reviewed the literature to show that transportation is one of the most stressful events that cattle may experience, since multiple components, such as hauling distance, duration, temperature-humidity in the trailer, and the training and skill level of the vehicle driver, can all influence animal welfare during and after transportation. The importance of low-stress handling methods is also discussed in this paper, as this is an easily controllable component of pre-slaughter management. Global variations in animal welfare assessment due to cultural, religious, and socioeconomic differences also became apparent through this review.

In addition to implications for animal welfare, pre-slaughter management can affect meat quality characteristics in beef cattle. To address this, Sullivan et al. conducted a scoping review of the impact of management factors prior to slaughter on meat quality outcomes in cattle. The authors selected 85 articles that met the criteria for inclusion out of 3,217 eligible records identified for the review. The study revealed that the pre-slaughter factors most reported were transportation, lairage, and handling practices, with muscle pH as the most studied outcome of interest. This review also showed that data on the effects of pre-transport factors on meat quality in beef cattle are scanty. The authors concluded that taking stock of the existing literature and assessing knowledge gaps on the impacts of pre-slaughter management practices on product quality and economic returns are critical steps in further improving and optimizing these processes that will benefit beef industry stakeholders.

Vibration of livestock trailers during pre-slaughter transportation can be a significant stressor to animals, an aspect that has not been studied adequately. One of the articles in this Research Topic, authored by Alambario et al., focuses on the vibration profiles of commercial straight-deck trailers during transportation of market-weight pigs in summer. Their work showed that pigs transported in the bottom deck were subjected to greater horizontal accelerations, in addition to being exposed to higher temperatures compared to the pigs transported in the top deck. Although the authors acknowledge the need for further research under controlled conditions, this study conducted under an industry setup revealed that trailer vibrations could exceed injury thresholds if attention is not paid to this component of transportation stress.

Injuries sustained by animals during the hauling process can be reflected on their skin and carcasses in the form of bruises and blemishes. Hernandez et al. evaluated the use of ante- and post-mortem measures as indicators of animal welfare, the relationships between these indicators and demographic features of vehicle drivers, and conditions the pigs were exposed to during transportation to a commercial slaughterhouse in Columbia, South America. An interesting finding in this study was that there was a significant relationship between the number of skin lesions and age, experience, and marital status of the vehicle drivers. The authors stated that antemortem animal-based indicators in lairages and postmortem indicators in the evisceration area could be valuable in monitoring diseases and pre-slaughter welfare of pigs in low throughput slaughterhouses.

In the dairy cow industry, lameness is a widespread problem that causes animal welfare and health challenges and negatively impacts production. Lame cows are known to spend more time lying down and less time feeding, resulting in poor nutrition and reduced milk yield. Lameness is a major problem on farms with automatic milking systems since it hinders the cow's ability to enter the milking parlor. Davis et al. used decision tree analysis, a data classification machine- learning algorithm, to identify animal and farm-level factors related to lameness on farms with automatic milking systems. The model not only enabled them to identify the most significant factors associated with lameness in dairy herds but also allowed them to rank them based on their importance. The authors present this as a promising approach to identifying farm- and cow-level issues to focus on and reduce the incidences of lameness on dairy farms with automatic milking systems.

Continual reassessment of existing livestock management methods on animal welfare and product quality through scientific research is essential. Discovery of novel welfare assessment methods, based on research data, is crucial for the continuous improvement of animal welfare in commercial production situations. We hope the research articles in this collection add value to that end.

Author contributions

Both authors have made substantial, direct, and intellectual contribution to the work and have approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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