Opinion

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# A Review on the Minimization of Potential Hazards in Animal Diets

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## Description

Food waste (FW) reutilization as animal feed can alleviate both the burden posed by FW disposal as well as that of food insecurity. Studies on the incorporation of catering waste (CW) in swine and poultry diets have provided promising results in regard to animal performance and quality of derived products.

However, disease concerns have led to the prohibition of the above-mentioned practice in the European Union (EU). It is necessary that biological, chemical and physical hazards in CW are examined and controlled. The risk of biological hazards such as exotic viruses posed by feeding CW to animals can primarily be reduced by processing of CW prior to feeding, preventing cross-contamination between raw and processed CW, and separating animal materials in CW based on animal species, as they are considered important risk factors.

## Biological Hazards

For the minimization of biological hazards in CW, hydrothermal treatment, extrusion, heat treatment, fermentation and solar drying resulted in considerably reduced concentrations of hygiene indicators in the studies examined, while pathogenic microorganisms were not detected in most cases. Chemical hazards in CW include but are not limited to heavy metals the concentrations of which can be controlled at low levels through risk analysis and sampling. Physical hazards in CW including, but not limited to, paper, metal and plastic are separated manually and/or mechanically. Spoilage of CW has been little studied and one study suggests that community structures in CW which is composed of the same food constituents vary when it is collected from different locations. Furthermore, biogenic amines are associated with spoilage and may affect animal health and performance. Lipid peroxidation is another issue that should be limited through measures such as adding antioxidants in the diet and lowering exposure of CW to heat during thermal processing. Salt content of CW is elevated and this should be taken into account during feed formulation. Processing of FW is essential to substantially decrease the risk of animal diseases transmission.

The occurrence of tail biting is one of the most important animal welfare problems in pig farming and needs to be recognised early to reduce injuries and suffering. The posture of the tail could be used as an indicator to detect tail biting at an early stage. This study analysed the relationship between tail posture and tail lesions in two different trials within the rearing period of piglets. The aim was to determine whether the tail posture should be recorded at animal or pen level to serve as a reliable early indicator of tail biting. The study used data from 368 (Trial 1) and 480 (Trial 2) pigs that were scored twice a week (11 and 12 scores) within the 40 days of rearing whereby tail posture (lifted or lowered) and tail lesions (lesions or no lesions) were observed. For analysis, a random regression model was used to determine random animal and pen effects on each score for tail posture and tail lesions. Data was analysed using the MIXED procedure of SAS® software. The correlation between tail posture and tail lesions for each score was determined using the random animal and pen effects. Results revealed correlations between tail posture on ScoreX and tail lesions on the successive Score+ 1 (3–4 days between the scores) which showed an increase in Trial 1 from the second to the tenth score at animal (0.32–0.44) and pen level (0.61–0.82). In Trial 2, the correlations ranged from 0.26 to 0.52 at animal and from 0.65 to 0.70 at pen level. The highest correlations (>0.9) were achieved in Trial 2 between scores five and nine. Between tail posture on ScoreX and tail lesions on Score+ 2 (7 days between the scores), the correlations showed a similar development and level as the correlations between ScoreX and Score+ 1. In general, this study identified a relationship between a lowered tail posture and the presence of tail lesions. In addition, this relationship was present a week before the first appearance of tail lesions with stronger correlations at pen than at animal level in both trials. Hence, the farmer should observe the tail posture of animals at pen level during daily inspection in order to intervene early by using appropriate measures against tail biting.

## Antibiotic Pollution

Antibiotic pollution in the environment caused by animal breeding has become a serious issue. The persistent release of antibiotics with animal waste may lead to antibiotic resistances in the environment, which poses a threat to human health. This study tries to provides a practical method for screening prioritized antibiotics via a comprehensive risk assessment and determination of their major sources, and put forward corresponding regulatory measures for animal industries. We investigated the occurrence and distribution of 20 antibiotics belonging to eight classes, spanning the areas of animal feed, drinking water, and animal feces on 59 animal farms in

Shandong Province, China. The results showed that antibiotic contamination was prevalent in different environmental mediums (feed, feces, and drinking water) on these farms. Tetracyclines typically exhibited higher concentrations than the other classes in all samples, and the majority of antibiotics had greater concentrations in cattle feces than in pig- or chicken feces. For the antibiotic ecological risks in feces, doxycycline, tetracycline, and enrofloxacin exhibited much more toxic effects on terrestrial organisms (e.g., wheat, cucumber, and rice). Ciprofloxacin, enrofloxacin, ofloxacin, and tetracycline levels in drinking water samples can lead to high risk of antibiotic resistance, while no antibiotic posed obvious risks to human health. Based on compressive risk assessments, 11 antibiotics were prioritized to control in the animal breeding environment. Based on the survey of feeds, drinking water and animal waste from the farm, roxithromycin in the feces mainly originated from the feeds, while most prioritized antibiotics, were from extra addition in the animal breeding process (including injection and other oral routes). The key point of local antibiotic management in animal farms should be adjusted from the feed factory to the extra addition of antibiotics in animal breeding processes.