The levels of pathogens in abattoir waste

A study at the University of Bristol at the beginning of the last decade aimed to define what levels of the main foodborne pathogens were contained in abattoir effluents that were being applied to agricultural land.

The results of the study covered some 28 commercial abattoirs that were representative of the UK meat industry. About three quarters of the abattoirs in the study slaughtered one or more red meat animal species and the rest slaughtered poultry only.

The abattoir wastes being applied on agricultural land were either effluent based wastes or animal based waste.

The effluent based wastes were of three types – separated solids, sludge and water – and approximately two thirds of the surveyed abattoirs apply one or more types of effluent based wastes to land.

Animal based wastes included two main sub-groups – digestive tract content and blood. All surveyed red meat abattoirs apply some of these wastes to land, and 37 such wastes were counted. Approximately 70% of these wastes are digestive tract-based including lairage waste mixed with lorry waste, and/or with stomach content, and/or with some other wastes types; lairage only wastes; and stomach content wastes.

The remaining 30% of 'animal based wastes' comprise blood, either alone or together with some other component, such as sludge. All surveyed poultry-only abattoirs dispose some wastes to land; most commonly it is a mixture of blood and sludge (70%) or blood alone and sludge alone (15% each).

A microbiological survey of the abattoir wastes was conducted using methods specifically developed for these types of substrates. Generally, the methods performed well during their routine use, but could be considered as quite laborious, which may limit the total number of samples to be handled daily in the laboratory and they are relatively expensive.

However, a large number of different types of wastes and their various mixtures are produced at abattoirs, and this may have caused variations in the performance (sensitivity) of the microbiological methods. In that respect, in this study, the methods for bacterial pathogens (recovering only viable forms) may have been affected more than the protozoan pathogens methods (viability not assessed).

Bacterial and protozoan foodborne pathogens were surveyed only in abattoir wastes being applied on agricultural land.

The average incidence (from all wastes tested) of the most commonly isolated viable bacterial pathogen, campylobacter, was 5.7% – but was higher in positive types of wastes: effluent from poultry abattoirs and lairage and blood from red meat abattoirs. Listeria monocytogenes was found only in 1.1% of all waste samples (4.2% in lairage waste), and not in any sample from poultry abattoirs. Salmonella and E. coli O157 were not isolated from any of the abattoir waste samples.

A number of possible explanations for these relatively low levels of the bacterial pathogens in abattoir wastes exists:

- The bacterial pathogens may have been shed only by a small proportion (and/or in low numbers) of slaughtered animals, and subsequently become 'diluted' by mixing of these wastes with wastes from non-shedding animals, and/or blood, and/or water. This diluting could reduce the overall pathogen level below the limit of detection.
- Much of the microbiological sampling was conducted before the official end of the Foot and Mouth situation, during which time significantly increased amounts of both water and disinfectants were used daily at abattoirs. This practice would have both 'diluted' and eliminated a proportion of pathogens in abattoir wastes at the time.
- A proportion of pathogens could have died off in stored wastes before sampling, which could decrease their counts to below the limits of detection.

Since the two protozoan pathogens are not expected in poultry, they were not examined in samples collected from poultry-only abattoirs. The overall incidence of total giardia and cryptosporidium (viability not assessed) in red meat abattoir wastes was relatively high – around 50% and 40%, respectively – and the incidences were used to consider various waste type and abattoir type related trends.

The waste type most frequently contaminated with protozoan pathogens was lairage waste, followed by effluent. In lairage wastes from single-species abattoirs, the incidences of giardia and cryptosporidium were higher at sheep and pig abattoirs than at cattle abattoirs.

Also, the incidences of both protozoan pathogens in lairage wastes at three species abattoirs were higher as the throughput was higher, and vice versa.

On the other hand, the sampling season did not show any significant effect on either overall incidences of giardia or cryptosporidium or on their average total counts per gram in abattoir wastes.

Due to the highly variable nature of abattoir wastes, and because numbers of samples tested (per type of waste and/or per abattoir) were relatively limited, a direct extrapolation of the above microbiological results to all abattoirs would have been difficult.

Globally, in simple terms, from the abattoir hygiene perspective, wastes should not be stored on the abattoir premises, while from the agricultural land contamination perspective they should be stored at abattoirs as long as possible.

To balance these opposing interests, more information is required on the time/survival rates of pathogens during abattoir storage and through treatment processes.

If waste is to be stored at abattoirs, further research is needed to address the issue of optimising and standardising the storage conditions to minimise risks for both the meat and the environment, as well as to develop related control and monitoring mechanisms. ■

F gases

Fluorinated greenhouse gases (F gases) are powerful greenhouse gases that contribute to global warming if released into the atmosphere. Their effect can be much greater than carbon dioxide. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) are all types of F gas.

HFCs are the most common type and are mainly used as the refrigerant in air conditioning and commercial refrigeration systems.

F gases form part of the Kyoto Protocol's 'basket' of greenhouse gases. Action to contain, prevent and reduce emissions of F gases is being taken by the EU as part of its obligations under the Kyoto Protocol.

In 2006, the EU introduced the EU F gas Regulation. The obligations in this regulation are fleshed out by a number of European Commission Regulations that provide extra detail and introduce minimum requirements which must be complied with. In the EU, the relevant regulation is 842/2006 on certain fluorinated greenhouse gases (the EU F gas Regulation), which aims to reduce emissions of HFCs, PFCs and SF6. This came into force in July 2007.