Feedback of slaughterhouse information – practical steps (part 2)

In the second part of this article, Pat Kirwan MVB Cert Pig Medicine, looks at the slaughter process as it applies to the pig industry and the information that can be gathered at both ante- and post-mortem by the temporary veterinary inspector at pig-slaughter facilities

It is now a requirement that all animal consignments being shipped to slaughter must be accompanied by food chain information. This is made available to the food business operator (FBO) and the temporary veterinary inspector (TVI) on delivery of the consignment. Thereafter, the TVI must inspect the pigs during the unloading process to check for compliance with the welfare of animals during transport regulations. The animals should have been loaded 'sound' and fit for transport and should exit the lorry in a similar fashion.

ANTE-MORTEM

Occasionally, and through no fault of either the transporter or the consignor, a pig can exit the lorry with evidence of compromised welfare. A leg could have been broken during transit, a pig could have slipped and developed a pelvic injury or a pig could have died during transport due to heart failure or other previously undetected afflictions. The TVI must record these specific transport incidents and feedback the information gathered to the consignor and also to the FBO. Some of the findings may require emergency or immediate slaughter while others may require that the animal be slaughtered in the lairage and disposed of in the skip. The veterinary inspector (VI) in charge of the plant will give ongoing guidance on which animals fall into which category. Most pigs killed in this fashion will be detained post-mortem for additional inspection to ensure suitability for human consumption, or otherwise.

A regular discovery ante-mortem is erysipelas infection. Erysipelas, caused by *Erysipelas rhusiopathie*, is characterised by the appearance of diamond-shaped lesions on the skin of the pigs (see Figure 1). The significance of

Figure 1: Diamond-shaped lesions of erysipelas seen in the lairage ante-mortem.

discovery of these lesions is that international trade of pig meat from affected animals is not allowed. Many pig-trade documents specifically name pig erysipelas as a disease, which is unacceptable for trade purposes. Discovery of an affected pig in the lairage will result in the pig being humanely despatched there. If an affected pig makes it to the slaughter line and is condemned at post-mortem inspection, then the production for the entire day will be prohibited from entry to international pig-meat markets. Both TVIs and farmers often question how cases of erysipelas are discovered at ante-mortem inspection and why they were not seen on the farm of origin prior to loading. Lesions for swine erysipelas can develop quite quickly and the stress of loading and transport can precipitate a lesion developing. There has also been an increase in the numbers of coloured pig breeds (see Figure 2) over the last few years and these make the identification of the diamond-shape lesions a little more difficult even to the trained eye. Post-mortem pig erysipelas does entail the pig suffering a significant rise in body temperature to in excess of 40°C so the animal, if slaughtered will be running a temperature and the carcase may also be septicaemic, hence the need to condemn. Other lesions associated with swine erysipelas post-mortem include vegetative endocarditis lesions seen in the heart when incised (see Figure 3).

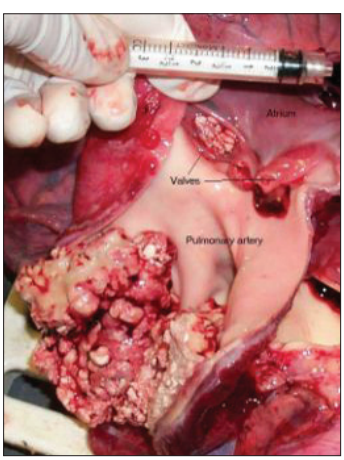

Figure 3: Vegetative endocarditis seen post-mortem.

THE SLAUGHTER PROCESS

Those unfamiliar with the pig-slaughter process will be surprised by its complexity. It takes up to 40 minutes from stunning to the final weighing of the carcase and more than 30 minutes between slaughter and the pig being presented to the TVI for post-mortem inspection. This is quite a significant time interval and one where many processes have opportunity to affect the appearance and general result for the pig at post-mortem.

Figure 2: Coloured breeds are now in widespread use in Ireland making discovery of erysipelas ante-mortem very difficult.

All of the pig-slaughtering facilities in Ireland use CO_2 gas stunning as standard. Originally, CO_2 stunning involved individual pigs being lowered in a single-cage compartment into a CO_2 pit where they remained for 40-60 seconds. At this point, the pig was released onto the shackling table unconscious prior to being elevated onto the slaughter line for sticking and bleeding. Recent developments have included group stunning of four or five pigs per compartment in variable CO_2 concentrations, some with other inert gas mixtures. All are designed to ensure no excitement in the stunning phase and all are regularly audited by the plant VI to ensure effectiveness of process and maintenance of proper welfare standards.

After sticking, pigs are scalded in a water bath at 60°C for approximately six minutes to loosen the hair follicles. If there is a line break and the pigs are kept here much longer than the prescribed time period, then it is likely that the carcase will have been cooked and will have to be condemned at post mortem. TVIs should be aware of this possibility. FBOs are also aware of this possibility and would endeavour to empty the water bath if there are line breaks.

At the gambolling table, where the pigs are hung on the line, the skin is clean and can be readily inspected for evidence of mange, seen as areas of skin damage, particularly in the axillary and inguinal area (see Figure 4). Ears of affected pigs will also have significant deposits of ear wax present. Mange is a production disease resulting in increased days to slaughter, poorer slaughter weights and poorer daily live-weight gains. Long-established preventative treatments and eradication programmes can be put in place at farm level to rid pig units of mange-associated problems.

The pig carcases are singed and scraped to remove any residual hair. There is live consideration been given at

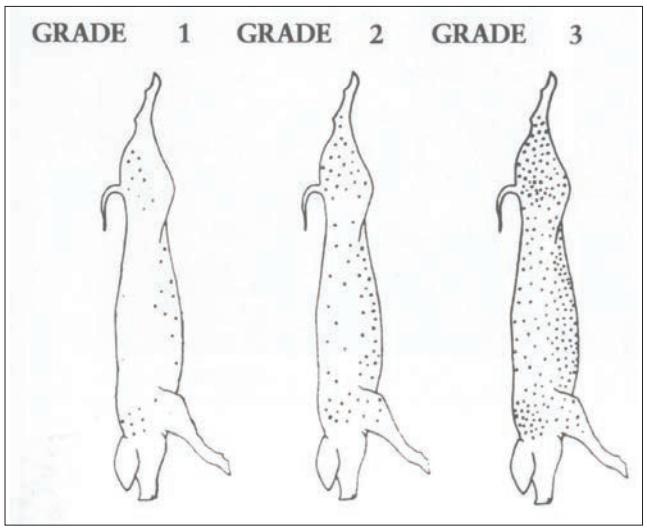

Figure 4: Mange scoring after carcase scalding.

Figure 5: Spinal abscess burst during carcase splitting.

Figure 6: Liver white spot.

present to the possibility of double-singeing of pig carcases to remove additional possibility of carcase contamination with Salmonella. TVIs should be aware that a carcase could be burnt if trapped in the singeing apparatus when a line break occurs and this would again be condemned at post-mortem inspection.

The next significant process is the removal of the intestines and the genitalia from the slaughtered pig. The anus of the pig must have a bag placed around it to reduce the risk of faecal contamination on removal of the intestines. Every effort must be made to avoid incision of the intestines and gut spillage. The TVI should be aware of carcase contamination and the detention and remedial action to ensure that there isn't cross-contamination as a result. Hernias pose a significant challenge to the operative when slaughtering because there will be significant gut involvement, particularly in navel hernias. The risk of contamination and gut rupture when trying to excise a hernia is significant.

Carcase splitting is the next significant event. If there is a farm history of tail-biting, then the possibility of a spinal abscess is omni-present (see Figure 5). In the event that the saw strikes a spinal abscess, the carcase will be contaminated and needs to be condemned. All cutting equipment needs to be decontaminated prior to recommencement of the slaughter line. This loss is highly significant for the farmer and feedback of information in this regard is highly important.

After gut removal (and inspection), the liver, lungs, tongue and heart are removed as one. This is the area most concentrated upon by the pig practitioner since diseases or conditions detected here have the greatest impact on performance and production. The liver is important from the point of view of detecting white spot (see Figure 6), the lesions associated with infestation with *Ascaris suum* (see Figure 7). The roundworm parasite of the pig, particularly those in fully slatted or outdoor accommodation. Loss of sale of livers is a significant loss for the FBO and also reflects sub-optimal housing and production systems for the farm of origin. Worm-treatment programmes are very effective at reduction in white-spot incidence and in ensuring that all livers are saleable. Production will also improve at farm level if worms are controlled.

A *suum* has a very short lifecycle of just five weeks. Hence, for a worming programme to be effective in pig production,

Figure 7: A *suum* – roundworm of the pig.

Figure 8: Typical M hyopneumonia lesion at slaughter.

the worming products should be administered at intervals of fewer than five weeks. The egg associated with A *suum* is quite resistant to washing and disinfecting and requires products that can penetrate the thick and resistant shell of the egg for them to be effective. Products like OO-cide and Bio-oocyst are effective here.

A range of conditions can be determined through thorough examination of the lungs of pigs at slaughter. TVIs will see evidence of pneumonia caused by *Mycoplasma hyopneumonia* (see Figure 8). These lesions reflect earlier infection with Mycoplasma which often acts as a door-opener to other pathogens. A scoring system is regularly applied to lungs called the Goodwin scoring system (see Figure 9). Each of the four cranial lobes of the lungs are given a score of 0-10 points depending on the level of lung involvement in the disease. The cardiac and two caudal lobes are given 0-5 scores, giving a total score of 55 per lung. Based on the cumulative and then average score for a herd, we can use these figures to determine the extent of lesions in the herd and the corrective methods that would be required to remediate the problem and restore lung health.

Pleurisy (see Figure 10) is also readily detected by TVIs at post-mortem examination (PME). In particular, extensive pleurisy can require significant effort to strip and remove from the rib surface. Pleurisy may be an indicator of *Actinobacillus pleuropneumonia* (APP [see Figure 11]), or of prior suffering with Glasser's disease (*Haemophilus parasuis* [HPS]). It can be mild or severe and can be sterile or infected. Large, angry-looking, abscess-type lesions on the dorsal aspect of the lungs can also indicate recent APP infection, a condition on farm that may result in sudden deaths. APP is very significant since it causes sudden death in older pigs as they approach slaughter weight and these deaths represent a significant loss.

Viral infections can be suspected based on the appearance of the lungs at slaughter. Conditions like swine influenza (SI) and porcine respiratory and reproductive syndrome (PRRS) will present as bilateral areas of consolidation throughout the lung surface. The interpretation of these diseases comes with a significant caveat since there may also be vestigial findings in the lungs due to the length and complexity of the

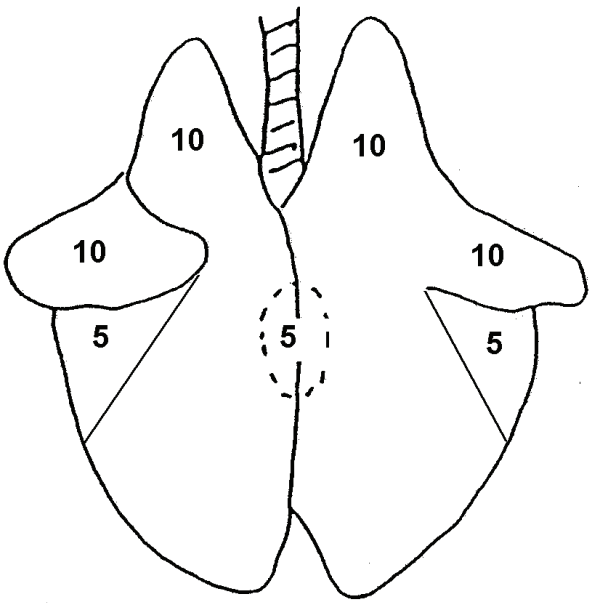

Figure 9: Goodwin method of lung scoring for *M hyopneumonia*.

Figure 10: Extensive pleurisy.

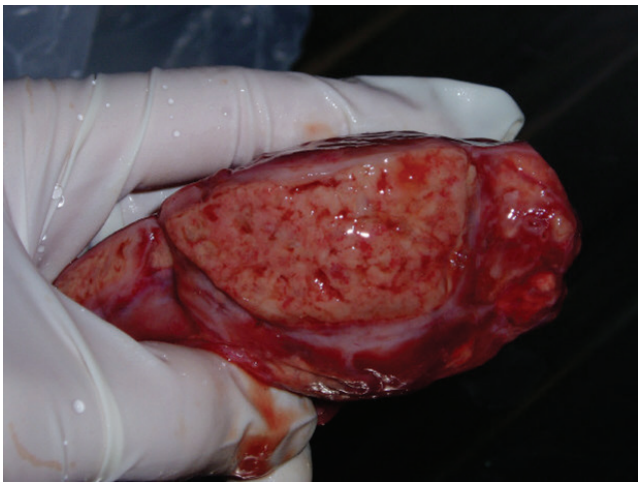

Figure 11: Typical APP lesion - dorsal aspect of lung.

slaughter process with back bleeding and other artefacts often confused with viral diseases on the lung surface. With increasing concern over new strains of swine flu and their potential for mutation into the human population, swine flu will continue to be a cause for concern into the future. Pericarditis (see Figure 12) can be readily seen on the pericardium of a small percentage of pigs at slaughter. Though not considered normal, incidence of pericarditis can run at about 5% in a consignment of pigs. However, some consignments run with levels far greater than 5% and this should be investigated at farm level. Are pigs from high pericarditis-incidence herds more likely to drop dead during loading, transport or unloading? Given the level of constriction and scarring seen on some pigs, post-mortem, it is likely that pericarditis could be an issue with sudden death. Pericarditis may have been caused by any challenge on the growing pig, especially Glasser's disease (HPS). Atrophic rhinitis (ART) arises in a pig as a result of infection with toxigenic *Pasturella multocida* and *Bordetella bronchiseptica*. This results in considerable deviation of the nasal septum and distortion of the nasal snout on the pig. If the filtration processes of the nasal turbinates (see Figure 13) are interfered with through infection and subsequent distortion, then there is the likelihood of additional lung pathology. Distorted and deviated snouts should be visible both ante- and post-mortem.

POST-MORTEM

- Enzootic pneumonia-like lesions;
- Pleuropneumonia-like lesions;
- Pleurisy;
- Pericarditis;
- Pyaemia;
- Other lung lesions;
- Atrophic rhinitis;
- Peritonitis;
- Milk-spot liver (hepatic scarring);
- Papular dermatitis;
- Tail-damage;
- Mange.

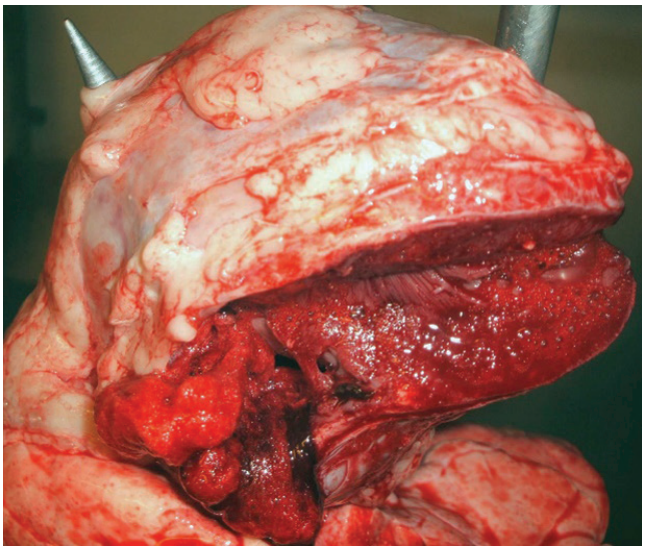

Figure 12: Pericarditis lesion.

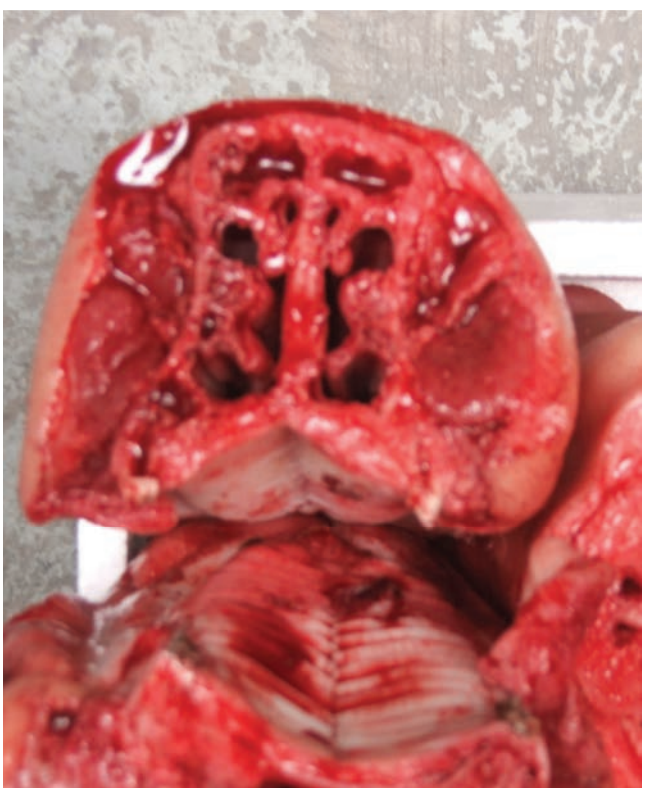

Figure 13: Snout sections indicating nasal turbinates in healthy pigs.

CONCLUSION

Though not exhaustive, the conditions described above are some of those encountered at slaughter and which are of significant interest to the pig farmer and the pig vet. Some are of significance to the FBO because they reduce the quality of the final meat product. Some are particularly relevant to the competent authorities from a public health and international trade perspective. The TVI should be aware of these conditions and should be in a position to report same once appropriate systems are installed at slaughter.