PRODUCTION ANIMALS

Oesophagogastric ulceration in pigs: a visual morphological scoring guide

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Objective To provide a visual guide for oesophagogastric ulcer scoring and recognition of different morphological changes in the pars oesophagea.

Design Pig stomachs were collected at slaughter and visually evaluated and scored for parakeratosis, erosion and ulceration in the pars oesophagea.

Results A visual and descriptive guide is presented that will aid in the objective assessment and scoring of oesophagogastric ulceration in pigs within the pig health monitoring system (PHMS), namely to the four categories of 0 = normal stomach, 1 = parakeratosis and thickened epithelium, 2 = erosions and 3 = developed ulcers with and without stenosis.

Conclusion A visual guide has been developed that illustrates the full range of morphological changes that can occur in the pars oesophagea of the stomach within the few currently recognised stages of the disease.

Key words: oesophagogastric ulceration, pigs, pig health monitoring system, PHMS

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Although the specific cause is unknown, oesophagogastric ulceration, or gastric ulceration as it is more commonly known, is a continuing and persistent problem in pig production systems.[1] In assessing the value of any treatment or preventative strategy, stomachs are taken from slaughtered animals and the appearance of the pars oesophagea is scored to gauge the relative success of any attempts to solve the problem. Alternatively, endoscopic evaluation of the stomach can be carried out in an anaesthetised animal if slaughter is not desirable (Kopinski unpublished observations). Currently, a number of scoring systems have been applied in the analyses of surveys and experimental ulceration evaluations.[2,3]

Previous work has shown that generally the gross appearance of ulcerated stomachs is directly related to the histological appearance of various degrees of parakeratosis, erosion and ulceration.[4] It is believed that the lesion development usually progresses from parakeratosis of the stratified squamous epithelium that predisposes the thickened, rough surface to fissure and slough, eventually resulting in erosion and ulceration.[5] We present here a morphologically based photographic scoring guide that would aid in consistency of evaluations of oesophagogastric changes that may lead to ulceration.

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Material and methods

Two hundred and eighty stomachs from finisher pigs from one farm were collected from an abattoir and transported in ice to a post mortem examination facility. Stomachs were opened by puncturing the cardiac region and cutting along the greater curvature, the contents were expelled and the stomach was gently rinsed with water. The pars oesophagea was everted to facilitate easier morphological comparisons. The condition of the pars oesophagea of each stomach was ranked, graded, and photographed. The photographs were collated to produce a morphological guide of the different changes ranging from normal epithelium to ulceration or stenosis. These were graded within the four established criteria of the Pig Health Monitoring Service (PHMS) scoring system.[3] That system ranks the appearance of the pars oesophagea from 0 to 3, with 0 = shiny white squamous epithelium, 1 = parakeratosis of pars oesophagea and thickened epithelium, 2 = erosion of squamous/glandular junction and start of ulcers, 3 = developed ulcers, haemorrhage and stenosis present.

Results

Figures 1 to 16 provide a visual means for assessing the condition of the pars oesophagea with relation to the stage of development of ulceration, erosion or stenosis. Each photograph has an accompanying descriptive outline of the morphological changes present. A score of 0 was given for 11 stomachs with smooth squamous epithelium whether white or bile stained, while a score of 1 was given for 98 stomachs with parakeratotic, bile stained, squamous epithelial area, with ridging but little or no sloughing of the epithelium. A score of 2 was given for 84 stomachs with extensive sloughing of thickened yellow epithelium, with small remnants of parakeratinisation and erosions at the squamous/glandular junction. A score of 3 was given for 87 stomachs, where red active ulcers were observed adjacent to varying degrees of persistent parakeratosis and pale erosion, or where larger areas of persistent ulceration occurred leading to stenosis of the pars oesophagea.

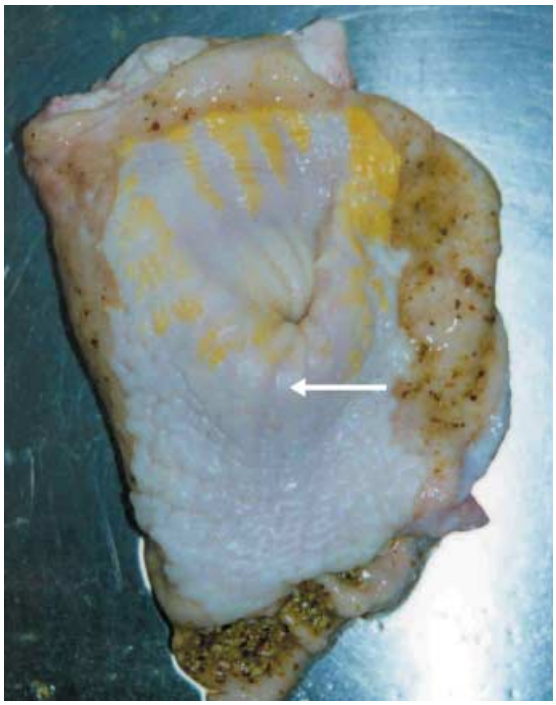

Figure 1. Normal pars oesophagea with a smooth white squamous epithelium (arrow). Gastric ulcer score = 0.

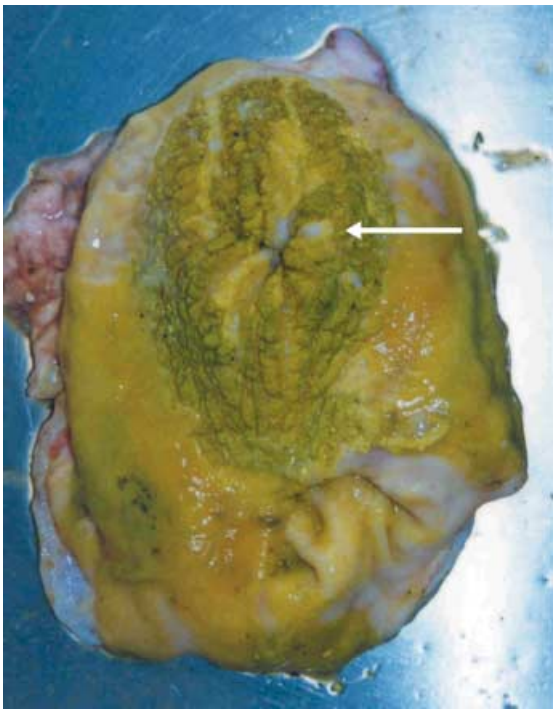

Figure 3. Parakeratosis of squamous area with mild ridge formation and stained yellow-green with bile. Spots of white epithelium (arrow) remain with no sloughing of the epithelium. Gastric ulcer score = 1.

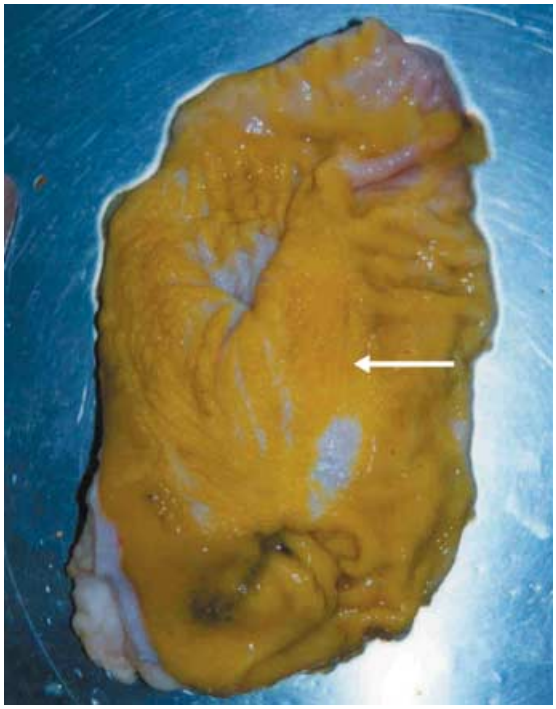

Figure 2. Normal pars oesophagea with a smooth squamous epithelium and yellow bile staining (arrow). Gastric ulcer score = 0.

Figure 4. Parakeratosis of squamous area with presence of extensive ridging (arrow) stained dark yellow-green with bile. No sloughing of the epithelium has occurred. Gastric ulcer score = 1.

Figure 5. Parakeratosis of the squamous area, which is stained pale yellow. Some sloughing (arrow) of the thickened yellow epithelium appears to have occurred. Gastric ulcer score = 1.

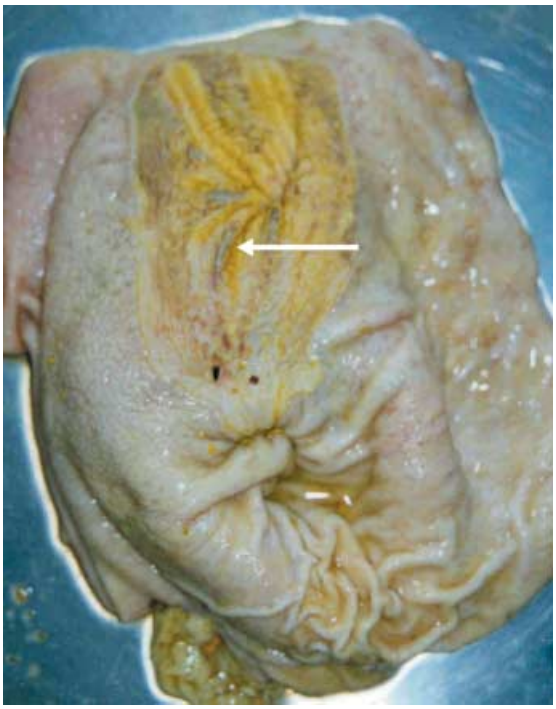

Figure 7. Remnants of parakeratosis with extensive and almost complete sloughing of the yellow epithelium. Large distinct and deep pale erosions (arrow) at the squamous/glandular junction suggesting the start of ulceration. Gastric ulcer score = 2.

Figure 6. Remnants of parakeratosis with extensive sloughing of thickened yellow epithelium. Distinct areas of erosions seen at the squamous/glandular junction (arrow). Gastric ulcer score = 2.

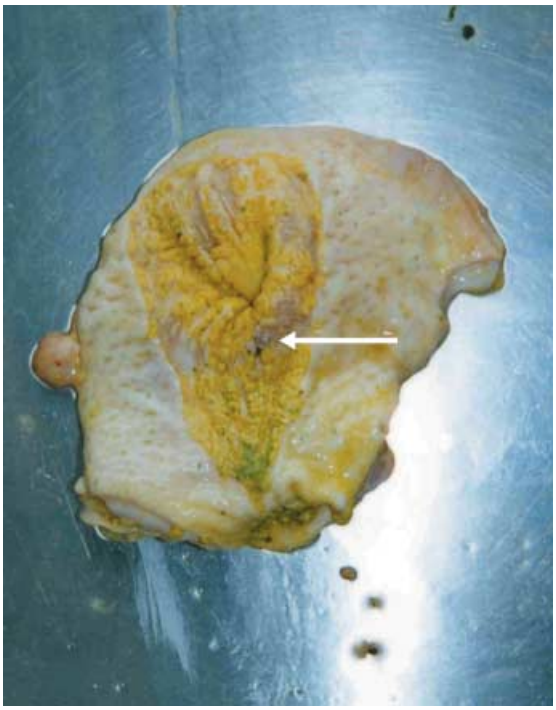

Figure 8. Parakeratosis of squamous area with pockets of sloughing of thickened yellow epithelium. Distinct erosion with some red areas (arrow) observed at the squamous/glandular junction and along the ridge formations Gastric ulcer score = 2.

Figure 9. Mild parakeratosis of the squamous area with mild ridge formation. This area is stained yellow-green with bile, with some spots of white epithelium (arrow). A small active ulcer (red) is clearly seen. Gastric ulcer score = 3.

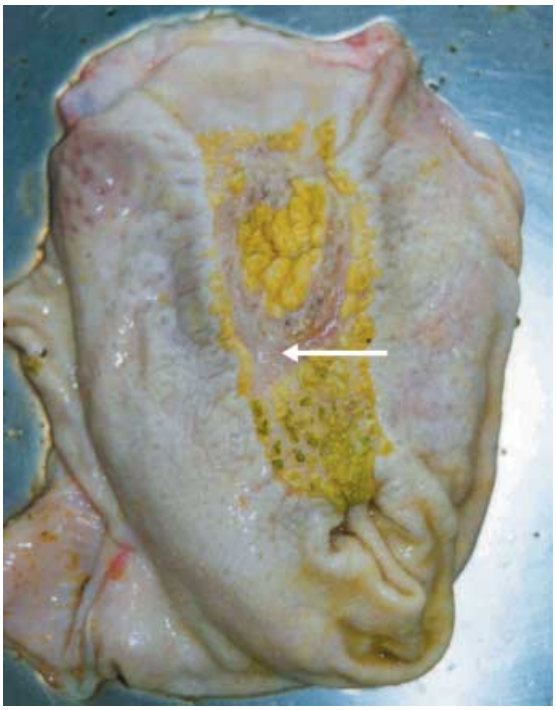

Figure 11. Parakeratosis of squamous area, which is yellow/green from bile staining. Extensive erosions (arrow) have occurred with complete sloughing of the epithelium near the oesophageal opening. The depth of the erosion has resulted in a small active ulcer. Gastric ulcer score = 3.

Figure 10. Parakeratosis of squamous area with extensive ridge formation. This area is stained yellow with bile. Deep erosions (arrow) are observed at the squamous glandular junction with almost complete sloughing of epithelium. A number of small active ulcers border the erosion. Gastric ulcer score = 3.

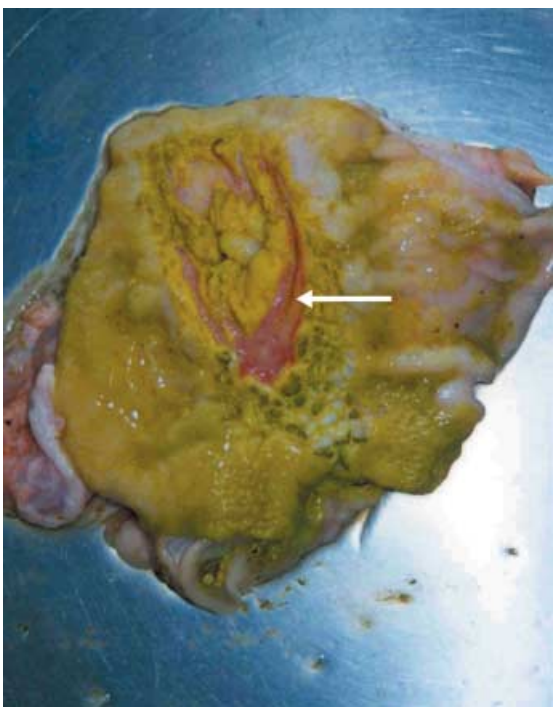

Figure 12. Parakeratosis of squamous area with deep ridge formation and yellow-green from bile staining. Some erosion at squamous glandular junction is observed. A large deep active ulcer (arrow) is clearly distinguished. Gastric ulcer score = 3.

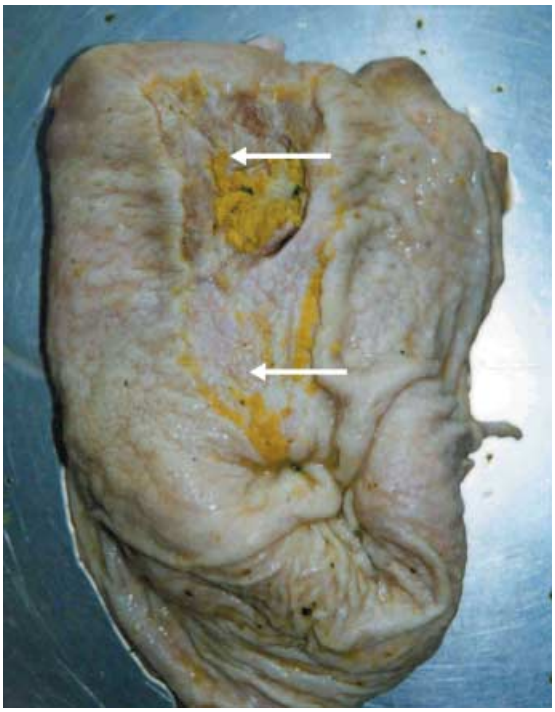

Figure 13. Sparse remnants of parakeratosis (lower arrow) of squamous area are observed there has been complete sloughing of this epithelium. A medium to large developed ulcer (upper arrow) is visible with some indications of healing. Gastric ulcer score = 3.

Figure 15. Large developed ulcer (arrow) covering the entire pars oesophagea area is present. Some healing/recovery is apparent. Gastric ulcer score = 3.

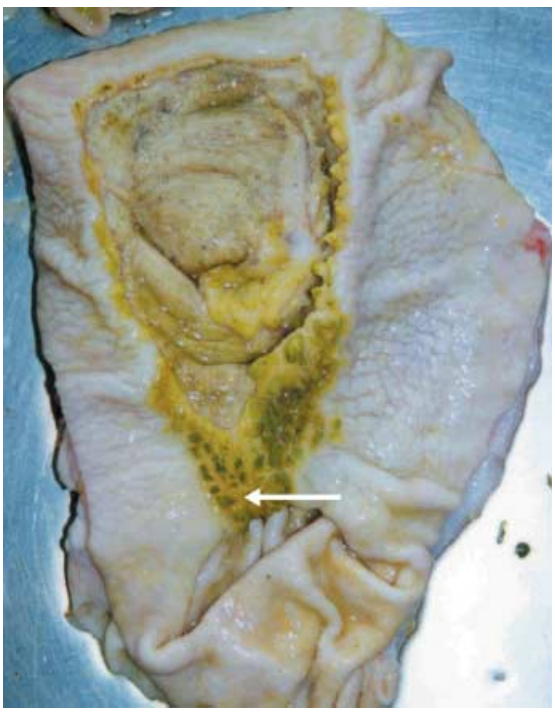

Figure 14. Remnants of parakeratosis (arrow) of squamous area are observed with some bile staining. Little to no squamous epithelium remains. A large developed ulcer is visible with some indications of healing. Gastric ulcer score = 3.

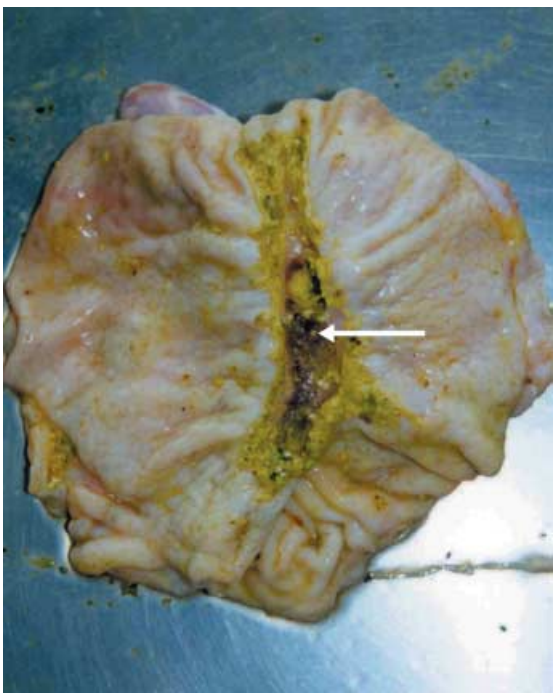

Figure 16. Large active developed ulcer is visible with stenosis (arrow) of the pars oesophagea causing partial obstruction. Gastric ulcer score = 3.

Discussion

Inspection at abattoirs provides an important tool to monitor and rank pig health in a pig raising facility. However, pig stomachs are generally not monitored routinely at an abattoir within this scheme. This is because the extra time needed to empty and clean them is incompatible with the speed of the processing line and may lead to carcase contamination. Also, there are conflicting scientific opinions concerning the possible relationship between subacute chronic ulceration, growth and feed efficiency.[5] At present gastric health assessments are limited either to specific requests for examination of stomachs from meatworks or to onfarm necropsies. Submission of alimentary tract tissue to a veterinary diagnostic laboratory usually occurs only when there are elevated mortalities in finisher pigs, possibly from oesophagogastric ulceration. The possible signs of gastric ulceration or preulcerative abnormality can range in severity from subclinical to peracute where animals are found dead. The presence of substantial blood in the stomach of a dead pig together with a high-grade ulcer score (3) would suggest that the most likely cause of death was due to this condition alone.

Traditionally the level and severity of the disease, as indicated by stomach lesions, has been assessed in Australia using the PHMS oesophagogastric ulceration scoring system. However this scoring system, although descriptive, is subjective and reliant on the expertise and experience of the scorer. A number of single photographs, generally of clear-cut or severe examples of each category of oesophagogastric lesions, have been published previously.[6] Although the scoring system used there was simple and clear, the photographs were of limited value in categorising the gradation of stomach lesions. A limited colour photographic ulcer guide has been published previously,[7] however it used a very different ulcer scoring scale, from 0 to 10.[8] Although a study[9] on the risk factors for oesophagogastric ulceration in Australia did use digitalised photographs of stomachs to minimise variability between assessors, the photographs have not been published and the scoring was based on a New Zealand monitoring system.[10] This current photographic guide when, linked to the PHMS grading system, should provide a means of making more objective decisions on oesophagogastric ulcer assessment by showing the diversity of morphologies encountered within each ulcer score.[11]

References

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