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Evaluation of ulcerative lesions from the perspective of gastric contents in fattening pigs

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Abstract: *he main aim of this work was to investigate how gastric contents affect lesionsin the parts esophagea of fattening pigs. We focused on the contents of the stomachs, whether they were empty, full of feed or had liquid contents. Pathological changes in the pars esophagea of the stomach were rated on a scale of 0 – 3. We found a high prevalence of erosions and gastric ulcers in association with gastric filling. Stomachs with empty contents had the highest prevalence of lacerations. Parakeratosis occurred in 14.3%, erosions in 28.5 % and gastric ulcers in 57.2%. This may be attributed to starvation of the pigs before slaughter. Stomachs with liquid contents also had a higher number of gastric lesions. Parakeratosis occurred in 53.3% and erosions in 22.6%. On the contrary, full stomachs had the best results, up to 77% of the stomachs had healthy mucosa without compromising its integrity.*

I. INTRODUCTION

Gastric ulcers occur in pigs in two places. Most often in the non-glandular part of the stomach *pars esophagea*[1,2,3]. However, they can also occur in the fundus area. A variety of infectious agents are associated with gastric ulcers in the fundus area [4]. The *pars esophagea* is not protected by mucus and is therefore susceptible to irritation, e.g. by hydrochloric acid, produced mainly in the fundal part of the porcine stomach [5]. Although rarely manifested clinically, gastric ulcers are responsible for significant economic losses due to reduced feed intake and decreased average daily weight gain [6]. They can cause sporadic cases of acute bleeding and death or various chronic changes resulting in parakeratosis, erosion and eventually ulceration [7]. Usually affects fast growing and fattening pigs [8].

The etiology is multifactorial. Several factors are involved, including feed particle size [9], husbandry management [10], gastric microbiota composition, *Helicobacter suis* infection [11], and hormonal changes [12].

The pathogenesis of gastric ulceration in pigs remains unknown. Many researchers have attempted to monitor the prevalence and severity of gastric ulceration in herds by conducting inspections at slaughterhouses [13,14]. Ulcers can appear in less than 24 hours, sometimes up to 12 hours, and healing is also relatively fast [15]. Per acute mortality caused with ulceration of *the pars esophagea* has developed into a widely recognized

health and welfare problem in most countries where pigs are kept [16,17].

The main objective of this study was to determine whether gastric contents affect gastric lesions in the *pars esophagea.*

II. Materials and Methods

We evaluated stomachs from 350 fattening pigs (average weight 100 – 120 kg), originating from 3 commercial farms in Slovakia. The stomachs were assessed immediately after slaughter. They were opened along the greater curvature (*curvatura major*).Pathological changes *in the pars esophagea*(Figure 1) of the stomach were evaluated based on the method of Robertson [13]on a scale of 0 – 3 (score 0 no changes, score 1parakeratosis, score 2 erosions, score 3 gastric ulcer).

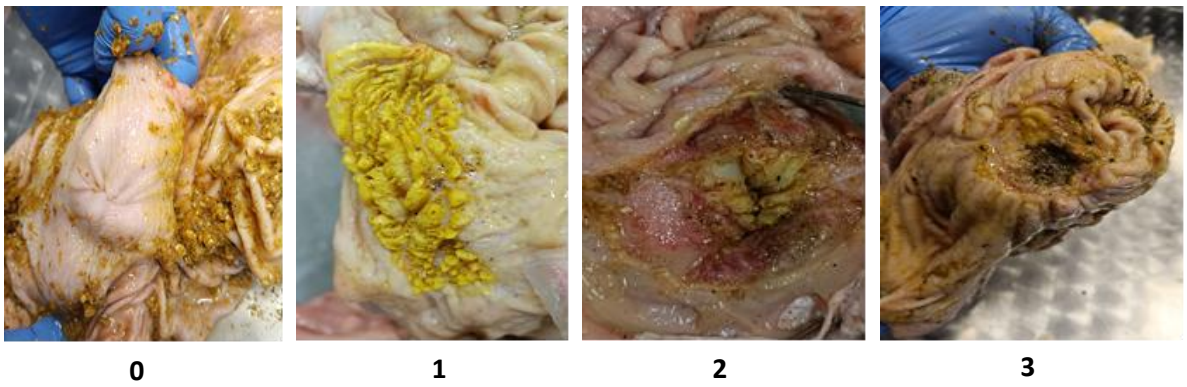


Figure 1. Gastric lesions score: 0 - no changes, 1 - parakeratosis, 2 - erosions, 3 - gastric ulcer
Photos: own source

Veterinarians from the respective farms developed an anamnestic protocol on feeding and management of the fattening pigs. In the study, we also evaluated the contents of the stomachs, whether they were empty, full or had liquid contents. We compiled the results into clear tables and graphs.

III. Results and Discussion

The main economic problem associated with gastric ulceration is mortality. On some farms, sudden death from bleeding gastric ulcers is the most common cause of mortality in the rearing and finishing stages [18]. Less acute blood loss can lead to anaemia in pigs. Scar formation during healing can lead to stenosis of the oesophageal opening to the stomach. It may be so extensive that it makes passage of feed difficult, but in addition, there may be leakage from the stomach into the oesophagus, causing inflammation of the oesophagus [19].

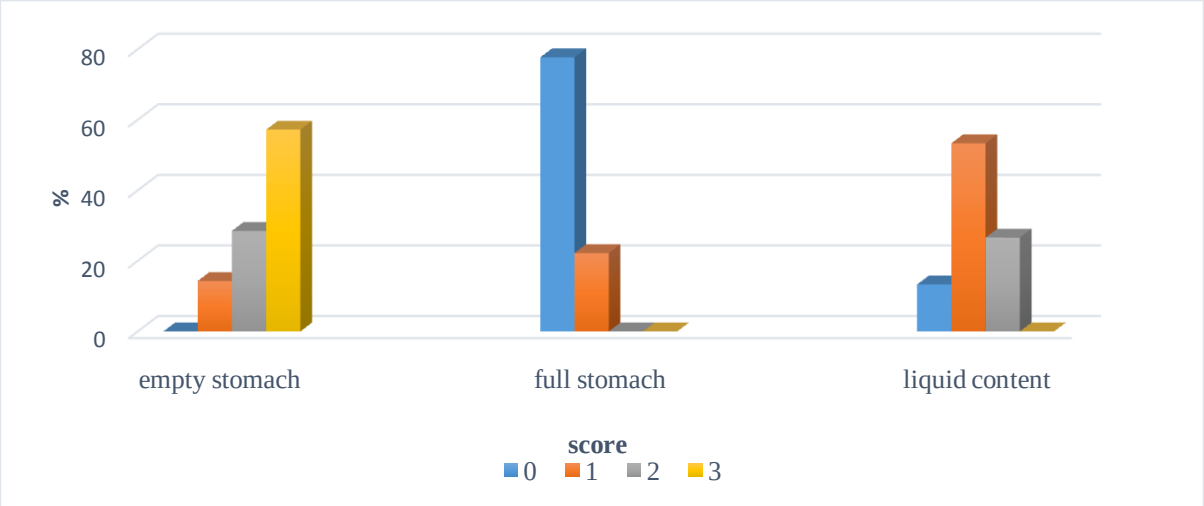
An important diagnostic method to detect the presence of macroscopic lesions indicating ulcerative changes is the examination of the stomach in slaughterhouses [20]. Literature sources provide several classifications for the assessment of macroscopic lesions in the oesophageal area [21, 22, 23].

Several scientific studies have extensively described the effect of starvation and irregular feed intake on the development of gastric lesions in pigs [24, 25, 26]. The *pars esophagea*is protected from the harmful effects of stomach acid, enzymes and bile while the stomach is full. Anything that causes the stomach to be empty is a risk factor. Finely ground pelleted food is associated with a high incidence of gastric ulcers [27]. This is a consequence of the rapid emptying of the stomach when pigs are fed rations with a fine particle size. A study by Cybulski et al. [28] showed that starvation of animals and restriction of access to water was significantly related to the frequency of gastric ulcers in pigs, which was confirmed in our study.Pigs that had empty stomachs

(Table 1, Graph 1) showed the worst scores, had the most erosions (28.5%) and gastric ulcers (up to 57.2%), and none of the stomachs had a completely healthy pars oesophageal mucosa (score 0).
On the contrary, full stomachs had the best results, where up to 77.7% of the stomachs had healthy mucosa (score 0) and erosions and gastric ulcers did not occur in any of the cases (Table 1, Graph 1).

Table 1. Comparison of stomach contents (%)

Score	Empty stomach	Full stomach	Liquid content
0 – no changes	0	77.7	20.1
1 – parakeratosis	14.3	22.3	53.3
2 – erosions	28.5	0	26.6
3 – gastric ulcer	57.2	0	0



Graph 1. Graphical comparison of stomach contents – empty, full and liquid contents (%) *Explanations: score 0 – no changes, score 1 – parakeratosis, score 2 – erosions, score 3 – gastric ulcers*

According to a study by Maxwell et al. [29], pigs with gastric ulcers have predominantly highly fluid stomach contents with disturbed or absent pH layering. This high fluidity of the gastric content allows direct contact of the *pars esophagea* with a low pH gastric content and high concentrations of pepsin, which is normally restricted to the fundus of the stomach [30,31]. Since the stratified squamous epithelium of the *pars esophagea* does not produce mucus, hyperplasia then develops because of prolonged exposure to the low pH and pepsin enzymatic activity resulting from highly fluid gastric content [13, 32].

Our study confirms Maxwell's observation [29], as stomachs with liquid contents had more numerous gastric lesions. Although there was no gastric ulcer, but erosive changes occurred in 26,6 % and parakeratosis changes in up to 53.33 % (Table 1 and Graph 1).

IV. Conclusion

Our study demonstrates a high prevalence of erosions and gastric ulcers associated with gastric contents. We found ulcerative gastric lesions in all empty stomachs, which may be related to the starvation of pigs before slaughter or poor feeding management. Stomachs with liquid contents also had a higher incidence of gastric lesions, with a total of 79.9%. The results indicate that starvation significantly contributes to the development of gastric ulcers in fattening pigs.

V. Acknowledgements

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