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Adjunctive Use of a Gastrin-Targeting Nutraceutical Pellet Significantly Reduces ESGD Severity in Endurance Horses

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ABSTRACT

Equine squamous gastric disease (ESGD) often necessitates extended administration of acid-suppressing drugs, prompting growing interest in nutraceuticals with potential anti-ulcer effects. This investigation evaluates the therapeutic impact of the Trophogast pellet on ESGD in endurance horses. Fifteen endurance horses were enrolled following gastroscopic assessment and were randomly allocated either to a treatment cohort, which received a Trophogast pellet for 30 days along with management adjustments, or to a control cohort, which only underwent management revisions. Gastroscopy was repeated at the end of the intervention. Lesions were graded according to the Equine Gastric Ulcer Council scoring criteria. Each horse was weighed at baseline and at completion. Pre- and post-treatment ESGD scores and bodyweight values were analysed. At baseline, the treatment group exhibited a median ESGD grade of 2, whereas the control horses showed a median grade of 1. Following the 30-day period, the treatment cohort demonstrated a significant reduction in ESGD severity (median 1, $p = 0.0078$), while the control cohort showed no variation (median 2). Bodyweight remained unchanged in both groups. Trophogast pellet supported improvement of mild ESGD in horses undergoing endurance training.

Keywords: Equine squamous gastric disease (ESGD), Nutraceutical supplementation, Endurance horses, Gastric ulcer healing

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Introduction

Equine gastric ulcer syndrome (EGUS) is frequently diagnosed in horses and is recognised as a key contributor to decreased athletic output in performance animals [1]. Among equine athletes, Thoroughbred racehorses in active work exhibit the highest documented occurrence of gastric lesions, ranging from 82% to 94% [2–5], while Standardbred racehorses show a prevalence of 63%–95% [6–8]. In mature horses, 75%–80% of ulcerative lesions appear within the squamous mucosa [9], especially near the margo plicatus [4, 10]. Owing to the absence of protective mucus and bicarbonate, the squamous epithelium is more vulnerable to hydrochloric acid, pepsin and bile acid injury [11]. This manifestation is known as equine squamous gastric disease (ESGD) [1]. Only two investigations have focused on ESGD in endurance horses, reporting prevalence rates between 46% and 93%, depending on competition level [12, 13]. Increasing duration and intensity of exercise have been linked to higher frequency, severity and lesion count in the squamous region [2, 8, 14]. Because endurance horses work for extended periods relative to other sport disciplines [12], they may face greater exposure to the mechanisms involved in ESGD development and therefore show elevated risk [13].

Although ulcers can occasionally resolve without therapy [15], this is infrequent in horses that are training or racing, necessitating medical intervention. Omeprazole, a proton-pump inhibitor, is regarded as the mainstay for preventing and treating squamous ulceration by reducing gastric acid output [1, 5, 11, 16–22]. However, pharmacologic therapy can be costly and may require long-term use, motivating interest in nutraceutical products with anti-ulcerogenic activity. Numerous studies have assessed their usefulness in ulcer prevention and management [13, 15, 23–29]. Trophogast pellet is a nutritional supplement formulated to enhance gastric protection and contains pectin, soy lecithin, zinc oxide and Castanea sativa Mill. (sweet chestnut extract). Experimental work on pectin–lecithin formulations has produced variable outcomes [13, 15, 23, 25]. In acidic environments, pectin forms a gel capable of binding bile acids present in gastroduodenal reflux, thereby moderating their damaging effects [15, 30]; it may also help stabilize mucus, increase buffering activity and support a post-feeding rise in gastric pH [31]. Lecithin, a supplemental phospholipid, contributes to forming a hydrophobic barrier that enhances the native acid-repelling properties of the squamous mucosa [32, 33]. Zinc oxide and C. sativa Mill. may offer antioxidant effects, counteracting harmful oxygen-derived free radicals [34–39]. This study examines the 30-day administration of the the Trophogast pellet for naturally occurring ESGD in endurance horses in work.

Materials and Methods

Horses

From the caseload presented to the Equine Unit of the Veterinary Teaching Hospital of the University of Milan for gastroscopic evaluation, 15 endurance horses originating from three stables were recruited. Inclusion criteria required that horses be actively training for endurance, free of other clinical disorders, untreated for EGUS, unaffected by equine glandular gastric disease (EGGD) and not classified as having ESGD necessitating medical therapy (grade 1–2 out of 4 without compatible clinical signs) [26]. Enrolled horses were randomly assigned by coin toss to the treatment group (10 horses) or the control group (five horses). All horses underwent a complete physical examination before gastroscopy to rule out concurrent diseases.

Gastroscopic examination

Endoscopic evaluations were scheduled twice, first on Day 0 and again on Day 30 to coincide with the end of the intervention. In accordance with prior recommendations [26], horses had no feed for 6–8 h before each procedure, though water access continued freely until the moment of examination [26, 27]. A video endoscope (PV-G 34–325; Storz, Germany) paired with an aspiration device (208-ACH; Faset, Italy) was used throughout. Sedation was achieved using detomidine hydrochloride (0.01 mg/kg IV; Domosedan; Vetoquinol, Italy), and animals were kept still with a nasal twitch.

To obtain full visualization of the squamous lining, glandular areas, margo plicatus and pyloric outflow, the stomach was inflated, and residual feed or mucus was washed away using the endoscope's air/water channels. If any defect was detected in the glandular mucosa, that horse was removed from the study. One blinded observer evaluated lesions using the Equine Gastric Ulcer Council 0–4 scoring protocol, following the standards outlined by the ECVEIM Consensus Statement [1, 11].

Treatment

After the initial scoring, horses in the treatment category received 200 g/day of Trophogast pellet (Equiplanet, Tecnozoo SRL, Italy) for a period of 30 days **(Table 1)**. Management adjustments accompanied supplementation, including enhanced turnout, unrestricted good-quality hay access and reduction of nonstructural carbohydrates [40, 41].

The control horses underwent the same management modifications for the same duration but did not receive any added supplement. Training programmes were not altered in either group. Once the 30-day period ended, gastric lesions were reassessed endoscopically and scored again. Each horse was weighed both at the beginning and conclusion of the evaluation period.

Table 1. Composition, analytical components and additives of Trophogast pellet

Composition
Wheat semolina, pectin, beet sugar (sucrose), soy lecithin, sugar cane molasses
Analytical constituents

Crude protein	8%
Crude fat	7%
Crude fibre	5%
Crude ash	15%
Sodium	< 0.1%
Ash insoluble in HCl	12%
Additives (per gram of product)	
Trace element compounds	
3b603 Zinc (as zinc oxide)	0.0005 g
Binding agents, anti-caking agents and coagulants	
E554 Synthetic sodium-aluminium silicate	(quantity declared as part of ash insoluble in HCl)
Botanically defined natural products	
Castanea sativa Mill. (Chestnut) extract	0.00018 g

Statistical analysis

Normality was assessed with a Shapiro–Wilk test. Weight and age followed a normal distribution at the start of the study, whereas ESGD grades did not. Comparisons of age and weight between the two groups used the unpaired Student's t test. Fisher's exact test evaluated sex and breed proportions. A Mann–Whitney U test compared ESGD grades at Day 0. To measure changes over time, ESGD grades were analysed with a Wilcoxon paired test and bodyweight with a paired t test.

Metrics conforming to normal distribution are reported as mean ± SD; non-normal variables are summarised using medians and interquartile ranges (IQRs). Statistical significance was accepted for $p < 0.05$. All analyses were run with GraphPad Prism 9.1.0 for MacOS (GraphPad Software, San Diego, CA).

Ethics approval statement

Approval for all procedures was granted by the University of Milan Animal Welfare Organisation (Protocol Number OPBA_156_2019), and informed consent was obtained from all owners.

Results

Horses

Table 2 contains age, sex, breed, bodyweight, and ESGD grades for Days 0 and 30. The group consisted of eight Arabian and seven Anglo-Arabian horses (5 mares, 10 geldings), aged 7–16 years (mean ± SD: 10.27 ± 2.31 years). Mean ages did not differ significantly between groups at enrolment (treatment 9.8 ± 2.15 years; control 11.2 ± 2.78 years; $p = 0.29$).

Although males constituted a larger proportion of the control horses (four males, one female) compared with the treatment set (five males, five females), this difference was not significant ($p = 0.58$). Breed distribution also showed no meaningful variation between the two cohorts ($p = 0.12$). All horses were clinically normal at the start of the trial. No adverse reactions occurred during the study, and treated horses readily consumed the supplement.

Table 2. General information about enrolled horses, including age, sex, breed, body weight (BW), ESGD grade at Day 0 and ESGD grade at Day 30

Horse ID	Group	Age (years)	Sex	Breed	Body weight (kg)	ESGD grade Day 0	ESGD grade Day 30
1	Treatment	12	M	Arabian	428	2	1
2	Treatment	11	M	Arabian	383	2	1
3	Treatment	9	M	Arabian	396	2	1
4	Treatment	8	M	Arabian	420	2	1
5	Treatment	9	G	Arabian	400	2	0
6	Treatment	7	G	Arabian	443	1	1
7	Treatment	10	G	Anglo-Arabian	472	1	1
8	Treatment	9	M	Anglo-Arabian	525	2	1
9	Treatment	14	G	Arabian	425	2	0
10	Treatment	9	G	Anglo-Arabian	415	2	0

11	Control	10	M	Arabian	458	1	1
12	Control	9	G	Anglo-Arabian	475	1	2
13	Control	10	G	Anglo-Arabian	460	1	0
14	Control	16	G	Anglo-Arabian	400	2	2
15	Control	11	G	Anglo-Arabian	515	2	2

Abbreviations: C, control; G, gelding; M, mare; T, treatment.

Weight

Initial weights ranged from 383 to 525 kg (mean ± SD: 441 ± 42.76 kg). Starting weights did not vary significantly between groups (treatment 430.7 ± 47.73 kg; control 461.6 ± 41.36 kg; p = 0.20). At Day 30, horses in the treatment category weighed 398–490 kg (mean ± SD: 430.6 ± 26.93 kg), whereas those in the control category weighed 388–490 kg (mean ± SD: 456.6 ± 41.08 kg). Neither the treatment group (p = 0.9893) nor the control group (p = 0.51) exhibited meaningful changes in bodyweight.

ESGD grade

Adequate visualization of the squamous region was achieved in all horses at both time points. At baseline, ESGD scores in the treatment group varied between 1 and 2 (median 2, IQR 2–2), mirroring the control group, which showed a median of 1 (IQR 1–2). No between-group difference was detected at enrolment (p = 0.25).

Following the intervention period, the treatment group showed scores ranging from 0 to 1 (median 1, IQR 0–1), while the control horses exhibited values spanning 0 to 2 (median 2, IQR 1–2). ESGD assessments for both cohorts at Day 0 and Day 30 are illustrated in **Figure 1**. A statistically meaningful reduction was noted only in the treated horses (p = 0.0078) **(Figure 2)**, whereas the control animals displayed no temporal change (p > 0.9999).

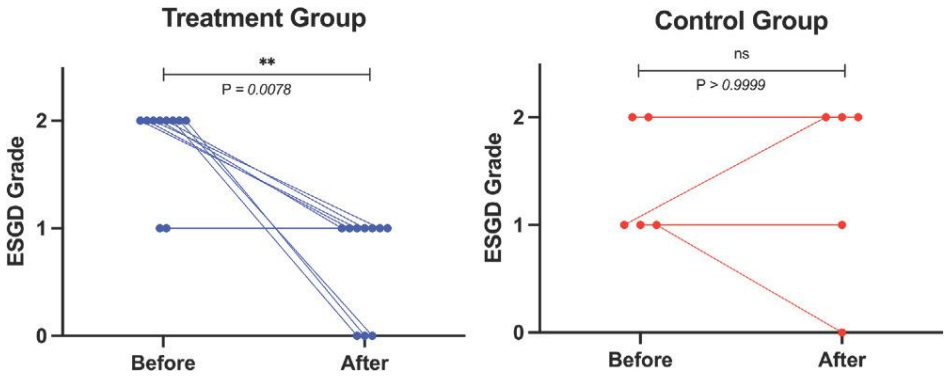

Figure 1. ESGD grades before and after the study period in treated (blue) and untreated (red) horses

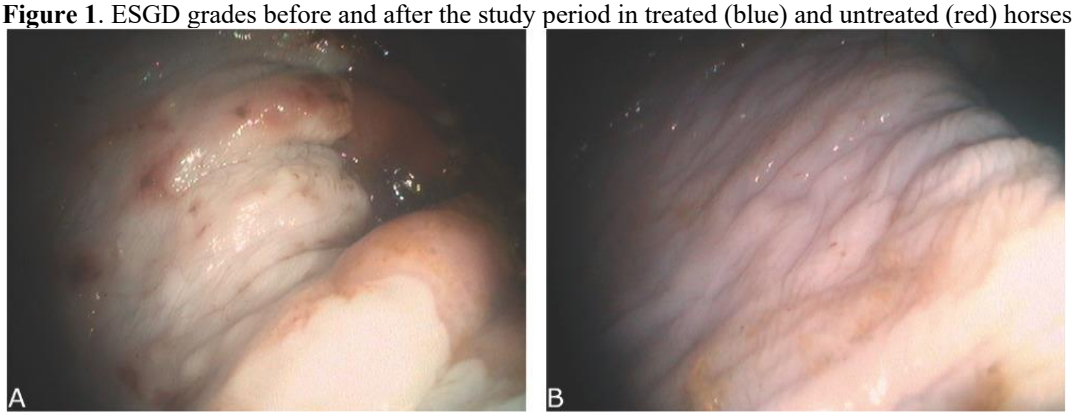

Figure 2. Endoscopic images from a treated horse at Day 0 (a) and Day 30 (b)

Discussion

Findings from this trial indicate that the Trophogast pellet may facilitate recovery of the squamous epithelium in endurance horses presenting with mild ESGD. Statistical evaluation confirmed a marked decline in ESGD severity

following supplementation in the treatment group. Management adjustments accompanied product administration and may also influence mucosal integrity; factors such as limited turnout, meal spacing, and diets rich in nonstructural carbohydrates are established contributors to EGUS [40–45]. Increasing forage availability, maximizing grazing time, and lowering carbohydrate load are all reported to mitigate ulcer risk [1, 21, 40, 41, 46]. Despite both groups being advised to follow identical management modifications, only the supplemented horses demonstrated improvement, suggesting that the pellet itself likely played a substantial role. Some improvement might have been anticipated in the controls as well; however, the degree to which trainers implemented these recommendations could not be verified. Although trainers were asked to keep training schedules consistent, fluctuations in exercise intensity—known to aggravate squamous ulceration [41, 43, 47]—may have occurred. These uncontrolled variables represent a limitation, though horses resided in similar environments and were handled by the same trainers, implying comparable conditions between groups.

The proposed mechanism behind Trophogast's effectiveness is probably composite and linked to several of its ingredients. Literature on pectin–lecithin formulations remains contradictory: two clinical investigations suggested benefit under field settings [13, 15] but lacked control groups, making alternative explanations (such as management variation) impossible to exclude. Conversely, two fasting-model studies reported no therapeutic effect [23, 25], though such models do not reflect the multifactorial nature of EGUS in real-world conditions. Consequently, the value of pectin–lecithin remains unresolved.

Other constituents may have contributed substantially. Zinc is recognized for supporting oxidative balance [36–38], moderating inflammation [37, 48], and maintaining epithelial barrier integrity, including that of the gastrointestinal tract [37]. Work in horses has examined chelated zinc sources [49]; in one recent investigation, zinc–methionine improved ESGD scores following omeprazole therapy [50]. In human studies, serum zinc correlates with mucosal injury [51], and zinc-based compounds have shown anti-ulcer activity [37, 52]. Additionally, C. sativa Mill. (sweet chestnut extract) possesses notable antioxidant capacity attributed to its phenolic content [34, 35, 39], although its suitability for gastric ulcer management has not previously been evaluated.

Gastric ulceration has frequently been linked to reduced body condition in horses [1, 5, 11, 20, 21, 42], and several investigations have noted body-weight gains following treatment that coincided with better ulcer scores [13, 16, 23, 41]. In contrast, the present study detected no meaningful change in body weight across the 30-day period in either the supplemented horses or the controls. This is not unexpected, given that weight is influenced by numerous variables, including training workload, environmental shifts, and overall dietary energy supply. Additionally, all horses in the current trial exhibited mild, subclinical ESGD, which likely exerted minimal effect on body mass. Consequently, in this population, the reduction in ESGD severity occurred without parallel alterations in weight.

In summary, a 30-day administration of the Trophogast pellet supported the recovery of mild ESGD in endurance horses. These findings indicate that the product may be beneficial for animals with low-grade subclinical disease. Nonetheless, more severe ESGD (grades 3–4) was not represented in this trial, so further studies are required to determine its usefulness when combined with conventional pharmacologic treatment in advanced cases. Future research should also assess whether the supplement can help prevent recurrence after drug therapy is discontinued, and whether it may have a role in managing EGGD.

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