



Review Article

Dietary Approaches to Optimize the Fasting Period Before Laparoscopic Surgery in Horses: An Overview



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ABSTRACT

This article highlights the role of preoperative feeding before laparoscopic interventions in horses. Laparoscopy is increasingly used in equine surgery. Preoperative feeding and determination of an optimal fasting time are important events for a successful surgery and rapid recovery of the animal. Optimal fasting time is necessary to limit gut distension during the laparoscopic intervention. On the other hand, fasting horses for long time may lead to postoperative complication. Therefore, an ideal preoperative diet targets low gas formation and short transit time in the gastrointestinal tract. The article mainly focuses on the effects of feed ingredients (forages and concentrates types), feeding regimes (amount and feeding intensity and feed change), feed processing (concentrate processing, particle size), as well as dietary supplements (plant oils, essential oils) on the hindgut fermentation and transit time to determine a feeding approach that fulfills best the aforementioned conditions. Taken together, feeding stem-rich long hay in several small portions, in 2-hour intervals, may help in reducing the fasting time <26 hours before common laparoscopic interventions in horses.

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1. Introduction

The diagnostic and surgical laparoscopy has gained more and more in popularity in recent years in horses [1–4]. Major benefits of laparoscopic interventions are its minimal invasiveness and the opportunity of performing the surgery in standing horses, sedated under local anesthesia, and hence avoiding complications coming from a general anesthesia [5,6]. Compared with laparotomic approaches, postoperative patients undergoing laparoscopy show lower frequency of postoperative infection associated with a faster recovery [7–9].

The length of fasting periods before laparoscopic intervention in horses is important to enhance the surgeon's evaluation of the abdominal cavity. An empty and less distended digestive tract allows a better evaluation of the abdominal organs and of the peritoneum [3]. In contrast, intestine filled with gasses may impair the view and the inspection capacity of the surgeon. Less distension of the intestine results in less risk of perforating the intestine when introducing the trocar. On the other hand, a prolonged retention time of the ingested feeds in the gastrointestinal tract (GIT) and prolonged fasting periods induce postoperative complications such as an increased risk of typhlocolitis [10], a disorder considered as the most dangerous postoperative complication in horses [11].

Maintaining a short fasting time requires preoperative patients dietary ingredients that have a low capacity of gas formation and feeding feedstuffs with a fast transit time in the GIT. Several feed supplements with inherent ability to lower the activity of gas-producing

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microbial communities without disturbing gut health and host health might also be dietetically helpful. Thus, establishing a successful fasting protocol for laparoscopy reasons in the horses requires proper considerations of feed chemical composition, nutritional physiology, and a rapid recovery of the gut functions after surgery.

This review article evaluated recent data regarding the effects of various feed ingredients and dietary supplements on the fermentation profile and digestive processes in equine GIT. The main aim of the review was to help in determining a feeding approach that leads to less amounts of gas produced and shorter transit time in the equine intestine before laparoscopic surgeries.

2. Fasting Time Before Laparoscopy

One of the most serious complications associated with laparoscopic surgery is the bowel puncture [12]. To decrease the risk of a bowel puncture, it is important to make sure that there is limited gas in the hindgut and ingesta distension of the bowel [12]. This is one of the main reasons why horses are fasted before a laparoscopy. Another reason of fasting is to optimize the view on the organs [7] by reducing the distension of the intestine filled with gas.

In standing laparoscopic procedures, the recommended fasting period ranges between 18 and 24 hours [12,13]. Depending on the size of the horse, longer fasting periods up to 36 to 48 hours are also advised [13–15]. For surgery in a dorsal recumbency, 24 to 36 hours of fasting are generally recommended [12,16]. However, there are other cases with much shorter fasting time too. For example, Desmaizières [17] inserted a cannula by laparoscopy after fasting horses only for 12 hours. In addition, Teixeira [18] recommended a fasting time of 12 hours in a mini pony. In case of emergency, like postoperating bleeding after castration, even no fasting period has been used [14]. To give a better overview of the highly variable recommended fasting times in horses

for different kinds of laparoscopic surgery or diagnosis, data reported from different studies are summarized in Table 1.

3. Transit Time of Digesta in the Gastrointestinal Tract

3.1. Differences in GIT Segments and Effects of Feeding Regimens

Predicting transit time of digesta is important for estimating fasting time protocol before a laparoscopic intervention. The transit time is different for each anatomic segment of the digestive tract. The retention time of digesta in the prececal part of the GIT is estimated to be on average 6 to 8 hours, which represents circa 15% of the total tract retention time [31]. The prececal retention time includes the transit time between the mouth and the distal ileum. Gastric emptying is an important part of the prececal transit time and is influenced by meal size as well as meal composition [31]. It has been estimated that the stomach retains the digesta for a period of 2 to 6 hours [32]. Little information is available about the transit time of digesta in the small intestine. However, it has been shown that the transit rate of digesta in the small intestine is nearly 30 cm/min, and most of the ingested feeds start appearing at the cecum and ventral colon in almost 3 hours after ingestion [32].

Factors with an effect on the transit time are breed, level of exercise, and, most importantly, the composition and processing of the diet [33]. The retention time of digesta was reported to increase when a mixed diet in a pelleted form was fed compared with feeding the crude ingredients [31].

There is a wide agreement in the literature that transit time is shorter for hay diets than concentrate-based feeding [31,34]. This can be explained by the fact that higher proportions of cell wall carbohydrates, contained mostly in fiber-rich feeds, generally require a shorter transit time in the GIT of horses. Indeed, in a recent study by Rosenfeld and

Table 1

Recommended fasting times for different kinds of laparoscopic surgery.

Type of Laparoscopic Surgery	Fasting Time in Hours	Authors
Ovariectomy		
Dorsal recumbent position	24–72	[19]
Standing position	36–48	[6]
Biopsy	18–24	[11]
Castration	48	[20]
	36	[6]
Colic	18–24	[11]
Colopexy	24	[21]
Cryptorchidectomy		
Dorsal recumbent position	18–24	[11]
	24–48	[22]
Standing position	36	[6,22]
Granulosa cell tumor removal		
Standing position	24	[23]
Inguinal herniorrhaphy	Feed was withheld overnight	[11]
Nephrosplenic space closure	Hay and straw 24 hr, grain 12 hr	[24]
Insertion of cannulas	12	[25]
Laparoscopic ovariectomy in mares	36–48	[26]
Laparoscopic-assisted cystotomy technique		
Removal of uroliths	12	[27]
Standing laparoscopic inguinal hernioplasty	Hay 36 hr, pellets 12 hr	[28]
Standing laparoscopy combined with a limited median celiotomy for ovariectomy in mares	36	[29]
Standing laparoscopic treatment of left dorsal displacement of the large colon	24	[30]

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