

THE EFFECT OF A FERMENTED HERBAL FEED SUPPLEMENT ON THE DIGESTION OF HORSES

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ABSTRACT

The main goal of recent study was to investigate the effect of a commercial available fermented herbal feed supplement on the digestion of horses and the intestinal microflora. The experiment was made with four adult horses. The product was consumed by the animals for seven days in addition to the usual oats and hay, in an amount of 200g. Sampling was made before and immediately after the treatments and 21 days later. From the fresh fecal samples the number of lactic acid and coliform bacteria was determined. At the end of the experiment, the dry matter, crude protein, crude fiber, and acid-insoluble ash (AIA) content of hay, oats and fecal samples were measured. According to our results it can be concluded that the horses participating in the experiment responded favorably to the treatments. The positive effect of the product was clearly evident for all nutrients only 21 days after the treatments. Based on our results, the lactobacillus content of the product was relatively low. Thus, we concluded that the positive effect of the product is mainly due to the beneficial effect of herbs. The favorable values for digestibility obtained in the present study suggest that the tested product had a positive effect on the bacterial processes in the large intestine and on the efficiency of fiber breakdown.

ÖSSZEFOGLALÁS

Munkánkban egy kereskedelmi forgalomban kapható fermentált gyógynövényes takarmány kiegészítő lovak emésztésére és a bél mikroflórájára gyakorolt hatását vizsgáltuk. Az említett készítmény kifejlesztéséhez a Georgikonon korábban végzett kísérletek eredményei is nagyban hozzájárultak. Kísérletünket négy felnőtt lóval végeztük. A vizsgálatok megkezdése előtt valamennyi lóval fűszénát, valamint nedvesített darált zabot etettünk naponta kétszer. A vizsgált terméket az állatok a szokásos zab és széna mellett hét napon át fogyasztották, 200g mennyiségben. Mintavétel a kezelések előtt, közvetlenül után és 21 nappal később történt. A friss bélsármintákból meghatároztuk a tejsav termelő és coliform baktériumok számát. Mértük a széna és a zab, valamint a bélsár minták szárazanyag, nyersfehérje, nyersrost, valamint savban nem oldódó hamu (AIA) tartalmát. A kapott eredmények alapján megállapítható, hogy a táplálóanyagok (szárazanyag, fehérje, rost) emészthetőségét javító hatás a 21. napi mérésnél mutatkozott meg egyértelműen.

Introduction

In recent decades the role of horses in everyday life has changed, primarily their use in sports and hobbies has come to the fore. At the same time, the unique value of animals increased significantly (Bartos et al., 2021). For the owners the health and long-term balanced usability of the horses has become even more important than before. Among our farm animals, the digestive system of the horses is the most sensitive and vulnerable, so special attention must be paid to the quality of the feed (Bartos et al., 2015). The most common disease of horses is colic (Durham, 2009). The main reasons for its development are insufficient quality or improperly feed (Meierhenry, 2008).

The feed utilization of horses is extremely different, which is also significantly affected by age. Efficient digestion by a healthy digestive system has a positive effect on the horse's general well-being (Hilary és Whishaw, 2014).

In domestic veterinary medicine, the use of medicinal herbs is becoming widespread, and fortunately, more and more veterinarians are recommending herbal cures for the treatment of certain diseases and for the relief of symptoms. In the case of horses, herbal treatments play an important role in achieving long-term balanced performance. Due to their beneficial effects, some herbs can significantly improve the performance and usability of sport and work horses, and can positively influence the digestion of nutrients, thereby contributing to the preservation of the health of our horses.

The beneficial effect of certain herbs on digestion has long been known, primarily in human medicine (Bernáth, 1993; Blumenthal et al., 1998; Rácz and Szabó, 2012), but the positive effects of various herbs and their mixtures are also mentioned in the case of horses (Marton, 2005; Naujoks, 2005). Hilary and Whishaw (2014) write about the effect of white mallow on nutrient absorption. In the case of anise, Marton (2005) describes its antispasmodic, stomach-strengthening and appetite-improving effects. Mint has a remarkable antispasmodic, taste-enhancing and bile-producing effect. Wormwood is mainly used as a general immune booster and diuretic, and is also used in folk medicine as a natural anthelmintic. Dandelion supports bile production, increases intestinal contractions and has a positive effect on gastric acid production. Its essential oil and dried extract are recommended in human medicine by Rácz and Szabó (2012) for people suffering from gastric mucosa complaints and hyperacidity. The roots are primarily digestive and appetite enhancing (Marton, 2005). Chamomile has an antispasmodic and kidney-functioning effect by horses. In addition, its stomach-strengthening and calming effects are also known from human medicine (Bernáth, 1993).

Nowadays various lecker snacks are available for our horses to reward good work, but most of them contain flavor enhancers, aroma and coloring substances, and sometimes too much sugar, which may have digestive health risk. The main goal of our research was to evaluate the impact of a commercially available fermented herbal feed, which contains only natural substances and can therefore be fed risk-free either as a reward snack or as a cure. The results of previous experiments carried out on the Georgikon Campus also greatly contributed to the development of the mentioned product (Bartos et al., 2015; Such et al., 2017). During our study, we tested the effect of the feed supplement on the digestion of horses and the intestinal microflora.

Materials and methods

Four adult horses (averages weight 500 kg) were used in the experiment. The average daily work of the horses did not change during the experiment, and the animals were not affected by other external stressors. The examined product contains fermented grain bran, fermented herbal mixture (so-called Fitocavallo mix: anise seed (*Anisi fructus*), dandelion root and leaf (*Taraxaci radix cum herba*), peppermint leaf (*Menthae Piperitae Folium*), white wormwood (*Absinthii herba*), chamomile (*Chamomillae Flos*), feed contained wheat flour, Zeofeed zeolite powder, sugarcane molasses, and purified water.

The basic diet consisted of 250 g mashed oat, fed twice a day (morning and evening), and ad libitum highquality mixed grass hay (on average 1100g /100kg BW). The first faecal samples were collected at the beginning of the experiment. Sampling was made from the manure on two consecutive days in the morning. After the sampling, the basic diet was supplemented with 200g of the product, according to the manufacturer's recommendation, which the horses received in two parts per day, mixed with the oats, for seven days. After it the horses were fed with their regular diet. Additional faecal samples were collected at the end of feeding the herbal supplement and three weeks after the treatments.

Measurements

Faecal samples were sealed in nylon bags and stored at -20°C until the start of the assays. At the end of the experiment, the dry matter, crude protein, crude fiber and acid-insoluble ash (AIA) content of the feed (hay, oats) and faecal samples were determined. The AIA was used in calculation of the apparent digestibility of dry matter, crude protein and crude fiber (Müller, 2012). The average nutrient content (grass hay and oat) is shown in Table 1.

Table 1: Average nutrient content of hay and oats fed in the experiment (%)

	dry matter	crude protein	crude fiber	AIA*
hay	92,22	8,12	40,21	2,32
oats	88,45	12,86	11,84	0,94

* AIA: acid-insoluble ash

The measurements were performed based on the feed test guidelines of the Hungarian Feed Codex (Codex Pabularis Hungaricus, 2004), and the acid-insoluble ash content was measured as described in Regulation 152/2009/EC (Official Journal of the European Union, 2009). From the obtained data, the apparent digestibility of certain nutrients were calculated.

Microbiological analysis were also carried out. 10 g of fresh faecal sample per horse was weighed and added to 90 ml of sterile Ringer's solution in an Erlenmeyer flask. The resulting mixture was homogenized with a vortex 3 times for half a minute. While waiting for 10 minutes, it was shaken several times by hand for proper homogeneity. Afterwards, a series of dilutions was prepared from the solutions up to the order of 10⁻⁷, then 1-1 ml of the appropriate dilutions were pipetted into a petri dish, and after cooling to 50°C, 15 ml of MRS agar for lactic acid bacteria and EMB agar for coliforms were added and gently mixed with it. The samples were incubated at a constant temperature (27°C) and the colonies were counted after 2 days.

The statistical analysis was performed with a paired sample Student T-test at a 95% confidence level. The evaluation was carried out using the SPSS 25.0 program.

Results and discussion

The horses consumed the tested product, there was no feed refusal. No unpleasant side effects or allergic symptoms occurred in any of the tested horses when feeding the product. The tested product contained a relatively low number (6×10^4 CFU/g) of lactobacillus. Based on our results, the treatments did not significantly affect the number of lactobacillus and coli bacteria in feces. However, the downward trend in the number of coli bacteria may be noteworthy, even though we did not experience statistically verifiable differences with such a large number of animals. In the case of dry matter, crude protein and crude fiber digestibility no significant changes were observed immediately after the 7 days supplementation, but three weeks later, a clear improvement in digestibility was noticeable. The main reason for this is assumed to be that probably longer time is required for the prebiotic effect (Table 2).

Based on the relatively low lactobacillus content of the product, it can be concluded that the positive effects experienced are primarily due to the beneficial effects of the medicinal herbs. The positive change observed in crude fiber digestibility is presumably due to the beneficial effect of the treatments on the bacterial processes in the hindgut. Our results were similar to the observations obtained in a previous experiment with a medical herb mixture conducted at the Georgikon Campus (Bartos et al., 2015), however in that trial the beneficial effect was already noticeable directly after the treatments.

Table 2: Effect of the herbal supplement on the digestibility of individual nutrients (%)

	before the treatments	at the end of the treatments	3 weeks after the treatments
dry matter	46±5,3 ^a	43±1,0 ^a	52±2,8 ^b
crude protein	61±5,2 ^a	56±11,0 ^a	67±3,8 ^b
crude fiber	44±4,5 ^a	41±4,0 ^a	51±3,4 ^b

^{ab} averages with different letters differ significantly ($p < 0.05$)

The herbal mixture we tested contains only natural substances and it is a product to promote gut health, so it can be used without risk in the case of horses. The beneficial effects of the product were proven in the experiment. Among these the most important is the favorable effect on the digestion of fiber, which, considering the experience of human medicine, is primarily due to fennel and anise (Bernáth, 1994; Rácz and Szabó, 2012). This can also reduce the chance of intestinal obstruction and some cases of colic. Feed composition and feed supplements can play an important role in improving the utilization of the feed even in the case of horses that utilize the nutrients of individual feeds less well or have a weak appetite, mainly due to the appetite-enhancing effect of the bitter substances (Csupor, 2003). Due to the large granule form of the examined product, it can be easily transported and measured, and is a good choice for horse owners.

Since it was proven during our investigation that the animals enjoy consuming the product, it is also suitable for rewarding the work done in small quantities (one or two granules). For digestion-improving and health-preserving cures, however, it is advisable

to follow the manufacturer's recommendation for the daily dose (200 g). It may be recommended to repeat the treatments after a break of a few weeks. During our experiment, it was also proven that some herbs and their extracts can play an important role in horse nutrition and health maintenance (Williams and Lampercht, 2008; Hilary and Wishaw, 2014). In addition to the significant improvement in the digestibility of nutrients, the downward trend in the number of coli bacteria can also be considered as a positive result, although in the latter case we could not statistically verify the differences with such a low number of animals.

The results, similar to our previous experiment with medicinal herbs (Bartos et al., 2015), allow us to conclude that the production process (e.g. the granulation process) did not influence the beneficial effects of the medicinal herbs in the mixture. Fermentation can be said to be particularly favorable in terms of the utilization of individual active ingredients. The beneficial effects of the product can probably be proven even more authentically if the experiment is carried out with a larger number of horses, possibly with a longer feeding period.

It can also be interesting to directly compare the herbal mixture that forms the basis of this product and the product itself. In this way, the beneficial effects of fermentation could be clearly proven. Due to its favorable dietary effects, it may be recommended to mix into the granulate other supplements that support gut health of horses, such as humic acids.

Conclusion

According to our results, it can be stated that the tested product is ok by horses, has a clear positive effect on digestibility of nutrients and gut microbiome of the animals, and can be safely and easily fed together with oats and fodder.

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