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RESEARCH ARTICLE

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 the impact assessment of a commercially 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 diet, in an amount of 200g. Sampling was made before and immediately after the treatments and 21 days later. From the fresh faecal 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 faecal samples were measured. According to our results it can be concluded that the horses participating in the experiment responded favourably 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 favourable values obtained by crude fiber suggest that the tested product had a positive effect on the bacterial processes in the post-intestine and the efficiency of fiber breakdown. The results of the recent experiment are also confirm the important role of herbs and plant extract in the modern equine nutrition.

Keywords - herbs, faecal samples, equine nutrition, digestive test, crude fiber

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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 feed quality or improperly supplied 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 and Whishaw, 2014).

In recent years, because of some negative effects of antibiotics, growth promoters and steroids in diets of livestock, has increased the interest in the use of plant extracts and herbs. The global market size of herbal products is expected to reach \$111 billion by the end of 2023 (Mona et al., 2018). In domestic veterinary medicine, the use of medicinal herbs is becoming widespread. Fortunately, more and more veterinarians are recommending herbal cures for the treatment of certain diseases and for the relief of symptoms. Recently, many phytotherapeutic feed supplement products are also available for horses (Williams és Lampercht, 2008). Due to their beneficial effects, some herbs can enhance the performance and usability of sport and work horses, and can positively influence the digestion of nutrients. Ginger extract as a feed additive is good after exhaustion in racing and

jumping events. Garlic has a potent antioxidative effect by influencing both antioxidative enzyme activity and cellular glutathione level (Chmelikova et al., 2018). Devil's claw and echinacea are known to have anti-inflammatory, analgesic and immune-enhancing effects (Pearson et al., 1999; O'Neill et al., 2002). However scientific evidence for complete biological effects is very limited in equines. According to Mona et al. (2018) the herbs and plant extracts with potent benefits, which have not been sufficiently tested in horses have to be evaluated with a primary objective to verify the negative side effects, if any, followed by standardization of the dosage.

The benefits of certain herbs on digestion have long been known, primarily in human medicine (Bernáth, 1993; Klein, 1998; Rácz and Szabó, 2012, Csupor, 2020), but the positive effects of various herbs and their mixtures are also mentioned in the case of horses (Marton, 2005; Naujoks, 2005, Bartos et al., 2015). Hilary and Wishaw (2014) described the effect of white mallow on nutrient absorption. In the case of anise, Marton (2005) evaluated 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, Csupor, 2020).

Nowadays various “lecker snacks” are available for our horses to reward good work. Most of them contain flavour enhancers, aroma and colouring substances, and sometimes too much sugar, which in many cases are not healthy. The main goal of our research was the examination of a commercially available fermented and granulated herbal mix. The product contains only natural substances and can therefore be fed risk-free either as a reward snack or as a cure. The results of previously 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 microflora of the colon. Our experiment can play an important role in proving the digestion-improving effect of Medicinal Herbs in equine nutrition

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 treatments. 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 in pelleted form.

The basic diet consisted of 250 g mashed oat, fed twice a day (morning and evening), and ad libitum high-quality 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 fresh 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, as previously described.

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 to calculation of the apparent digestibility as an indicator (Müller, 2012). The average nutrient content (grass hay and oat) is shown in Table 1.

	dry matter	crude protein	crude fiber	AIA
hay	92.22	8.12	40.21	2.32
oat	88.45	12.86	11.84	0.94

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

The measurements were performed based on the feed test guidelines of the Hungarian Feed Codex (Codex Pabularis Hungaricus), 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 using the next formula:

$$\text{Digestive coefficient (\%)} = \frac{A - (B \times It/Ib)}{A}$$

A= Nutrient content of feed

B= Nutrient content of faeces

It = Indicator (AIA) content of feed

Ib = Indicator (AIA) content of faeces

Microbiological analyses 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 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. 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 T test at a 95% confidence level. The evaluation was carried out using the SPSS 25.0 program.

RESULTS AND DISCUSSION

The horses accepted the tested product favorably, there was no feed refusal. No unpleasant side effects or allergic symptoms occurred during the treatments

Microbiological analysis

The tested product contained a relatively low number (6 CFU/g*10⁴) of lactobacillus. Based on our results, the treatments did not significantly affect the number of lactobacillus and coli bacteria in the intestinal flora. However, the downward tendency in the number of coli bacteria (from 2.17 CFU/g*10⁵ to 0.67 CFU/g*10⁵) is noteworthy, despite the fact that there was no statistically verifiable difference in the case of so many animals.

Digestive tests

The herbal supplement was easily consumed by the animals and no feed refusal occurred. In the case of dry matter, crude protein and crude fiber no significant changes were observed immediately after the treatments. Three weeks later, however, a clear improvement in digestibility was noticeable. (Table 2).

	Before the treatments	At the end of the treatments	Three 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

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

*ab Averages with different letters differ significantly (p<0.05)

Because of the relatively low lactobacillus content of the product, it can be concluded that the positive effects experienced can be primarily attributed to the medicinal herbs. Based on experience in human medicine, among the plants in the product, primarily the bitter substances of wormwood and fennel have a good effect on both saliva and gastric hydrochloric acid production, as well as the intestinal digestive enzymes (Klein, 1998; Csupor, 2003). This can most likely explain the favourable development of protein digestion in horses as well. The medicinal herbs in the product are beneficial to the general state of the intestine, through their calming (e.g. chamomile), immune-boosting (e.g. white worm) and antispasmodic, intestinal peristalsis-increasing effects (e.g. dandelion, fennel) (RÁCZ and SZABÓ, 2012; BERNÁTH, 1993), which can also play an important role in the digestion-improving effect of the product. The positive change observed in case of crude fiber is presumably due to the beneficial effect of the treatments on the bacterial processes in the hindgut. It has long been known, that the essential oils of herbs reduce the number of pathogenic microbes (HAMMER et al., 1999; RENTSENKHAND, 2010). This effect can promote the development of beneficial microflora in the intestine.

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.

CONCLUSIONS

The herbal mixture we tested contains only natural substances and it is a healthy product. No unpleasant side effects or allergic symptoms occurred during the treatments. The beneficial effect of the product on the digestion was proven in the experiment. Among these the most important is the favorable effect detected by fiber, which, considering the experience of human medicine, is primarily due to fennel and anise (BERNÁTH, 1993; RÁCZ and SZABÓ, 2012). This can also reduce the chance of intestinal obstruction and some cases of colic. The product can play an important role in improving the utilization of the feed even in the case of horses with weak appetite, mainly due to the appetite-enhancing effect of the bitter substances (CSUPOR, 2003). Because of the large granular form of the examined product, it can be easily transported and measured. It seems to be 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 pieces). For digestion-improving and health-preserving cures (7-10 day period recommended), however, it is advisable to follow the manufacturer's recommendation for the daily dose (200g). 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 might also be considered as a positive result, although it is a fact that there was no statistically verifiable difference in the case of so many animals.

The results, similar to our previous experiment with medicinal herbs (Bartos et al., 2015), allow us to conclude that the production process (such as the granulation) did not negatively affect the beneficial effects of the herbs in the mixture.

Fermentation can be said to be particularly favourable 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 bit longer feeding period.

It can also be interesting to directly compare the herbal mixture that forms the basis of this product and this granulated and fermented form. 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 are healthy for horses, such as humic acids.

According to our results, it can be said that the tested product is liked by horses, has a clear positive effect on the health of the animals, and can be safely and easily fed together with oats and fodder.

The results of the recent experiment also confirm the important role of herbs and plant extract in the modern equine nutrition.

REFERENCES

- Bartos Á., Such N., Koltay I., Marton Zs., Bányai A. (2015): Effect of a medicinal herb mixture on the apparent digestibility of nutrients in horses. (in Hungarian) *Állattenyésztés és Takarmányozás* 64. 198-206.
- Bartos Á., Koltay I., Ujj Zs., Bányai A., Such N., Resrás Zs. (2021): Effects of different feed components and the treatment of the litter on the ammonia emission of equine urine. *Ecocycles*, Vol. 7, No. 2, pp. 1-7. DOI: [10.19040/ecocycles.v7i2.197](https://doi.org/10.19040/ecocycles.v7i2.197)
- Bernáth J. (1993): Wild and cultivated herbs. (in Hungarian), *Mezőgazda Kiadó, Budapest*. 640
- Chmelikova E, Nemecek D, Dvorakova M, Heroutova I, Sedmikova M. (2018): Organosulphur garlic compounds influence viability of mammalian cells: a review. *Sci Agric Bohem*; 49:9e16. DOI: [10.2478/sab-2018-0002](https://doi.org/10.2478/sab-2018-0002)
- Csupor Cs. (2003): Phytotherapy in family medicine. Digestive disorders and diseases (in Hungarian) *I. Családorvosi Fórum* 9. 46-51
- Csupor, Cs. (2020): Pill Guide (in Hungarian) *PharMagist Bt.*
- Durham A. E. (2009): The role of Nutrition in Colic. *veterinary Clinics of North America: Equine Practice*, 25. 67–78.
- Hammer K.A., Carson, C.F, Riley, T.V. (1999): Anti-microbial activity of essential oils and other plant extracts. *Journal of Applied Microbiology* 86: 985–990. DOI: [10.1046/j.1365-2672.1999.00780.x](https://doi.org/10.1046/j.1365-2672.1999.00780.x)
- Hilary S. and Wishaw C (2014): Herbs for digestive health. *Equine Wellness Magazin*, 5. 16-19
- Klein S., Rister, R., Riggins C. (1998): *The Complete German Commission E Monographs. Therapeutic Guide to Herbal Medicines* American Botanical Council, Austin, Texas
- Liburt, NR, McKeever KH, Streltsova JM, Franke WC, Gordon ME, Manso Filho HC, Horohov DW, Rosen RT, Ho CT, Singh P, Vorsa N. (2009): Effects of ginger and cranberry extracts on the physiological response to exercise and markers of inflammation in horses. *Comp Excer Phys*; 6:157e69. DOI: [10.1017/S175525401000005X](https://doi.org/10.1017/S175525401000005X)
- Marton Zs. (2005): *Lóherba, Medicinal herbs for horses*. (in Hungarian) *Equinter Kiadó, Budapest*, 166.
- Mona M.M.Y. Elghandour, Poonooru Ravi Kanth Reddy, Abdelfattah Z.M. Salem, Punuru Pandu Ranga Reddy, Iqbal Hyder, Alberto Barbabosa-Pliego, Duvvuru Yasaswini (2018): Plant Bioactives and Extracts as Feed Additives in Horse Nutrition. *Journal of Equine Veterinary Science* 69. 66-7. DOI: [10.1016/j.jevs.2018.06.004](https://doi.org/10.1016/j.jevs.2018.06.004)
- Meierhenry B. (szerk.) (2008): Colic: An age old problem. *Horse Report*, 26. 1-11
- Müller C.E. (2012): Equine digestion of diets based on haylage harvested at different plant maturities. *Anim. Feed Sci. Technol.*, 177. 65-74. DOI: [10.1016/j.anifeedsci.2012.06.002](https://doi.org/10.1016/j.anifeedsci.2012.06.002)
- Naujoks, C. (2005): *Naturheilkräuter für Pferde*. Cadmos
- O'Neill, W., McKee, S., Clarke, A.F. (2002): Immunological and haematonic consequences of feeding a standardized Echinacea (*Echinacea angustifolia*) extract to healthy horses. *Equine Vet. J.* 34:222-227.

DOI: [10.2746/042516402776186001](https://doi.org/10.2746/042516402776186001)

Pearson, W., McKee, S., Clarke, A.F. (1999): The effect of a proprietary herbal product on equine joint disease. *J. Nutraceuticals Functional Med. Foods.* 2:31-46.

DOI: [10.5281/zenodo.4562846](https://doi.org/10.5281/zenodo.4562846)

Rácz G., Szabó L. (2012): *Gyógynövények ismerete.* (in Hungarian) Galenus Kiadó, Budapest, 554.

Such N., Koltay I., Ujj Zs., Bányai A., Bartos Á. (2017): Effect of a probiotic supplement on the apparent digestibility of nutrients in horses. (in Hungarian) *Állattenyésztés és Takarmányozás* 66. 3. 196-205

Regulation 152/2009/EC of the Commission of the European Communities (January 27, 2009) on the establishment of sampling and testing methods used during the official control of animal feed. *Official Journal of the European Union* 26.02.2009 L54/51 point N. (Method A)

Rentsenkhand T. (2010): *Effect of essential oils and their combination on food spoilage microorganisms* PhD Dissertation. University of Szeged

Williams C A., Lamprecht E.D. (2008): Some commonly fed herbs and other functional foods in equine nutrition. *The Vet. J.*, 178. 21–31.

DOI: [10.1016/j.tvjl.2007.06.004](https://doi.org/10.1016/j.tvjl.2007.06.004)



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