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### **Guest Editors**

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## A new-designed feeding device for sustainable hay feeding management in ponies

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In nature, equines consume frequent, small forage-based meals during the day. The use of slow feeding devices (SFDs) helps to safeguard the equine need to forage when fed restricted amounts by reducing hay intake rate in equines (IR, g/h). In addition, climate change is progressively reducing the availability of resources and SFDs are of growing interest as tools for decreasing hay waste in horse feeding management. The aim of this study was to assess the use of different SFDs – a new-designed slow feeder (HB) and small-holed (3.5 × 3.5 cm holes) hay net (HN) – on the IR of ponies. Nine healthy ponies belonging to two breed-type – Shetland (SH) and 4 Welsh Cob (WC) – mean ± SD: 12 ± 4 years, BCS 7.6 ± 0.7/9, BW 222 ± 51 kg were involved. After the adaptation period, a Latin Square design was applied by providing hay through 3 feeding methods: 3 kg of hay fed on the ground (G), 3 kg of hay fed on small holed hay net (HN), and 3 kg of hay fed in a new-designed slow feeder (HB). For each hay feeding method, the IR (g/h) was measured during the morning meal, 3 h/day for 3 repetitions/pony. A mixed model was performed to assess differences in IR (g/h) among the feeding methods, breed-types and their interactions. Significance was set at  $p < 0.05$ . Considering differences between feeding methods, our results showed that the IR was significantly lower ( $p < 0.0001$ ) in HB (365.44 ± 37.76 g/h,  $p < 0.0001$ ) and HN (363.03 ± 31.53 g/h), compared to G (677.87 ± 31.53 g/h). No difference in IR was found between HB and HN suggesting that these methods are equally useful in reducing IR in ponies. Moreover, our findings revealed that IR was influenced by the breed-type ( $p < 0.0001$ ) – SH ponies showed lower IR for G (563.86 ± 42.03 g/h), HB (274 ± 50.35 g/h) and HN (277.29 ± 42.32 g/h) compared to WC ponies for G (791.89 ± 42.94 g/h), HB (456.88 ± 56.29 g/h) and HN (448.78 ± 46.73 g/h). Body morphology therefore also influences the IR of ponies. In conclusion, HB could be a promising SFD for the feeding management of ponies by exerting a similar IR to HN and by favouring a more natural feeding posture. HB are likely to promote an even lower hay wastage than HN which should be evaluated further as may lead to a more sustainable equine feeding management.

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## Effect of two feeding managements on the microbiota of different intestinal compartments of the horse digestive tract

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Feeding horses unbalanced diets rich in starch still represent a common mistake in their feeding management, even if it is well-known that an adequate forage:concentrate ratio is crucial for promoting a healthy microbiota. The composition of microbiota changes among the different intestinal segments but the knowledge about such diversity according to the feeding management is currently scanty in horses. The aim of the present study was to evaluate the effects of two different feeding managements – one based on high amounts of starch (HS) vs. one based on high amounts of forage (HF) – on the microbiota composition of different intestinal segments of the horse digestive tract. Nineteen Bardigiano horses, 14.3 ± 0.7 (mean ± sd) months of age, were randomly assigned to two dietary groups – HS ( $n = 9$ ) vs. HF ( $n = 10$ ). At the end of the fattening period horses were slaughtered and digesta content were sampled from: duodenum (DU), jejunum (JEJ), ileum (IL), apex of the caecum (CAE), sternal flexure (SF), pelvic flexure (PF), right dorsal colon (RDC), and rectum (RE). Samples were stored at  $-80^{\circ}$  until the DNA extraction and 16S rRNA amplicon target sequencing. Alpha diversity indices were used to find differences according to the feeding management and to the selected intestinal segments. Shannon index showed higher diversity (Kruskall Wallis test,  $p < 0.01$ ) in CAE, PF and RDC in horses fed HF.  $\beta$ -diversity showed a clear separation of the microbial communities as a function of the diet (PERMANOVA;  $p < 0.01$ ). At the highest taxonomic level, the 88 ASVs fell into two main clusters. One cluster included CAE, PF, RDC and RE of horses belonging to HF characterised by a high abundance of *Peptococcaceae*, *Paraprevotellaceae*, *Oscillospira*, *Bacteroides*, *Campylobacter* and *Lactobacillus*. The second cluster included DU, JEJ and IL of horses belonging to HS and it was characterised by high abundance of *Lactococcus*, *Fusobacterium*, *Ruminococcus*, *Bacillus* and *Clostridium*. Moreover, specific differences in microbial composition were shown in each of the selected intestinal segments suggesting that they may be considered as a distinct ecological niche. The feeding management