

**IN VITRO ASSESSMENT OF FIBER DIGESTION CAPACITY IN FOALS. S. Hayes, H. Werner and L. Lawrence. Presented at the 18<sup>th</sup> Equine Nutrition and Physiology Symposium, June 2003.**

There has been relatively little study of developmental changes in the digestive tract of equine neonates. In particular, little is known about the time course of establishment of the microbial population responsible for fiber digestion in the large intestine. This project utilized *in vitro* methods to assess changes in fiber digestion capacity in foals from birth to 3 months of age. Because it was not possible to obtain cecal fluid from non-fistulated growing foals, in this study *in vitro* incubations were inoculated with feces. Although the microbial population in equine feces is not exactly the same as in the equine large intestine, we hypothesized that comparing neutral detergent fiber (NDF) disappearance from *in vitro* incubations using fecal inoculum from foals and their dams would still provide useful information regarding the development of the fibrolytic population in the equine neonate.

Fecal samples were manually collected from 11 mares and their foals at 1 d and 1 mo after foaling. Additional collections were obtained from 6 of the mare-foal pairs at 2 and 3 mo after foaling. Following collection, fecal samples were placed in a warm insulated container and transported to the laboratory within 30 min of collection. *In vitro* incubations were performed using modifications of the techniques described by Tilley and Terry (1963; J. Brit. Grassland Sci. 18:104) and Goering and VanSoest (1970; Agric Handbook, No. 379, USDA-ARS.) using diluted feces as the inoculum in place of rumen fluid. For each horse on each day, triplicate incubations were performed for 24 and 48 h with tall fescue hay as the NDF source. The tall fescue hay contained 63.4% NDF (dry matter basis).

On day 1 following foaling, NDF disappearance was greater ( $P < .05$ ) in incubations inoculated with mare feces than in incubations inoculated with foal feces. However, by 1 mo post-foaling NDF disappearance was not different between incubations using mare or foal inoculum. (20.7% vs 22.2% at 24 h and 43.1% vs 45.6% at 48 h.). Similarly, there were no differences among incubations using mare or foal feces at 2 and 3 mo post-foaling for either incubation time. These results suggest that by 1 mo of age, the microbial population in the feces of foals is similar to the microbial population in the feces of their dams.

Mean NDF disappearance using foal feces collected 1 d after foaling was 11.0 % in the 24 h incubations and 18.2% in the 48 h incubations. These values for NDF disappearance in the incubations using feces collected from foals at 1 d of age were higher than expected. However, when tall fescue hay was incubated with all reagents except fecal inoculum, mean NDF disappearance was 6.9% at 24 h and 10.1% at 48 h. Therefore, the amount of NDF disappearance attributed to microbes contained in the fecal inoculum from foals at 1 d of age would be minimal.

*In vivo*, NDF disappearance will be influenced by the population of fibrolytic microbes in the digestive tract as well as the amount of time that fiber is retained in the large intestine. These results suggest that the microbial population in the digestive tract of foals is established by 1 mo of age. However, it is likely that retention time is much longer in mares than in foals, which would result in marked differences in fiber digestion *in vivo*.