

EFFECT OF DIETARY RESTRICTION AND EXERCISE ON PROLACTIN RESPONSE TO A THYROTROPIN RELEASING HORMONE CHALLENGE. D.M. Powell, L.M. Lawrence and S. Hayes. Presented at the 18th Equine Nutrition and Physiology Symposium, June 2003.

Prolactin (PRL) is principally recognized as a hormone important in parturition and milk secretion in horses. However, in other species, changes in PRL concentrations have been associated with weight gain/loss and changes in appetite. This report provides basic information regarding the relationship between nutrient restriction and PRL response to a thyrotropin releasing hormone (TRH) challenge in sedentary and exercising horses. In addition to increasing thyroid hormone concentrations, TRH stimulates the release of PRL from the pituitary. It was hypothesized that the PRL response to a TRH challenge would be reduced in nutrient restricted horses.

Sixteen mature geldings were adapted to a diet of orchard grass hay and a 10% crude protein concentrate for 2 wk. Horses were weighed 2x/wk and feed intake adjusted to maintain initial body weight. Horses were not exercised during the adaptation period. At the end of this adaptation period, food was withheld overnight and horses were challenged with TRH (1 mg/horse/i.v.). Blood samples were obtained before and at 1 h intervals for 6 h after administration of the TRH. Horses were maintained on the adaptation diet for another 21-d and then allocated to one of four treatment groups. The four treatment groups were: CONTROL (sedentary, fed to maintain body weight), SED-RES (sedentary, total calorie intake restricted to 70% of CONTROL), EX-RES-F (exercised 5d/wk, high forage diet with total calories restricted to 70% of requirement for maintenance and exercise), and EX-RES-C (exercised 5d/wk, high concentrate diet with total calories restricted to 70% of requirement for maintenance and exercise). For the CONTROL, SED-RES and EX-RES-F groups, most of the dietary calories were provided by the forage, whereas for the EX-RES-C group, the concentrate portion of the diet was the predominant calorie source (Powell et al, 1999. Equine Vet J. (Suppl. 30):515). After the horses had received their assigned treatments for 7 wk, the TRH challenge was repeated.

The imposed treatments resulted in weight loss ($P < 0.05$) in all feed restricted groups. Initial and final body weights, respectively for each treatment group were: CONTROL, 581 kg vs 579 kg; SED-RES, 587 kg vs 536 kg; EX-RES-F, 545 kg vs 502 kg and EX-RES-C, 597 kg vs 549 kg. In response to the TRH challenges, there were no differences among groups ($P > 0.05$) for peak PRL concentration or AUC for the initial challenge. However, there were differences among treatment groups in response to the TRH challenge administered at the end of the treatment period for both AUC and peak PRL concentration. AUC was lower ($P < 0.05$) for horses in the SED-RES and EX-RES-F groups compared to horses in the CONTROL and EX-RES-C groups. AUC for horses in the EX-RES-C group was not different ($P > 0.05$) from CONTROL. Similarly, peak PRL was lower in the SED-RES and EX-RES-F groups than in the CONTROL and EX-RES-C groups ($P < 0.05$). We have previously reported that TRH challenge increased thyroid hormone concentrations in these horses, but that the response was not affected by nutrient restriction (Powell, et al 1999. Proc Equine Nutr Physiol Symp 16:100).

Recently Gentry and coworkers (2002. J. Anim. Sci. 80:2695) reported that feed-restricted mares challenged with a combination of TRH and growth hormone had suppressed PRL response compared to full-fed mares with higher body condition scores. Both groups of mares received forage-based diets. In our study, the PRL response to TRH challenge was suppressed (compared to CONTROL) in both sedentary and exercised geldings receiving restricted diets, but only when the diets were primarily forage. In the exercised feed restricted group that received the higher concentrate diet, PRL responses were not different from CONTROL. Therefore, the effects of feed restriction on PRL may be moderated by calorie source.