

**31. Plasma free amino acids in high-yielding dairy cows: Is glutamine indispensable for milk protein synthesis?** G.A.L. Meijer, J. van der Meulen and A.M. van Vuuren. Research Institute for Livestock Feeding and Nutrition, IWO-DLO, Lelystad, The Netherlands.

The objective of this study was to assess normal plasma free amino acid levels in high-yielding dairy cows from late pregnancy to 15 weeks of lactation. Special emphasis is given towards plasma glutamine levels, since we hypothesize glutamine is one of the first limiting amino acids for milk protein synthesis in high-yielding dairy cattle. Plasma was obtained from 36 Friesian-Holstein cows weekly from 2 weeks before until 3 weeks after parturition, and once every 3 weeks from 6 to 15 weeks after parturition by puncture of the jugular vein between 04.00 and 05.00 hr, prior to milking and feeding. Amino acids were determined using an LKB4151 amino acid analyzer employing the standard lithium buffer system. All amino acids except aspartate, serine, glycine and taurine showed a decreased plasma concentration immediately after calving but most of them returned to the level of late pregnancy within 3 weeks. However, recovery was delayed for ornithine and was absent for glutamate, glutamine, methionine and phenylalanine. There were no significant changes in amino acids from 6 to 15 weeks of lactation. Comparing average values during this period with those of late pregnancy, significantly lower levels ( $P < 0.0001$ , Student *t*-test) were found for glutamate (31.1  $\mu\text{M}$  vs. 41.3  $\mu\text{M}$ , -25%), glutamine (231  $\mu\text{M}$  vs. 310  $\mu\text{M}$ , -25%), phenylalanine (41.4  $\mu\text{M}$  vs. 54.0  $\mu\text{M}$ , -24%), and methionine (20.5  $\mu\text{M}$  vs. 24.2  $\mu\text{M}$ , -16%). The latter two of these amino acids are regularly found to be amongst the first limiting ones for milk production in dairy cows. The decrease in plasma levels of glutamate and glutamine, both relatively and quantitatively, as found in the study, underlines the importance of these non-essential amino acids in high-yielding dairy cows.