

**Appearance of aminogenic nutrients in the portal vein as a tool for feed protein evaluation in the DVE/OEB System.** (Zur Anflutung von aminogene Nährstoffen in der Pfortader als Mittel zur Bewertung von Futterproteine im DVE/OEB System) M. Gierus\*, G.A.L. Meijer, A.M. van Vuuren, Lelystad, The Netherlands.

The DVE/OEB protein evaluation system aims to quantify the amount of dietary and microbial protein that arrives in the duodenum of cows for further digestion and absorption. However, the effect of amino acid metabolism in gut wall on the final amount of amino acids available for specific tissues and organs is not clear. The objective of this study was to relate the appearance of aminogenic nutrients in the portal vein of several publications to estimated protein value according to the DVE/OEB system.

**Methods:** In literature, limited data are available on portal appearance of aminogenic nutrients in the portal vein for dairy cows. Therefore, the analysis was extended to other ruminant species. Criteria for inclusion of published data were that the publications contained [at least] information about the feed, feed composition, feed intake and the net flux of aminogenic nutrients in the portal vein. Data from 11 experiments with a total of 40 dietary treatments ( $n=40$ ) in sheep, steers, heifers and dairy cows were included. The evaluation of protein feeding was restricted to the intake of degradable nitrogen (DN) as a common value between different feed evaluation systems. The DN (%) of a feed was calculated as 100 minus the percentage of feed protein escaping from rumen fermentation (%BRE), according to Dutch Feed Tables (1), based on results from the nylon bag technique. Rations included forage and concentrates with a wide distribution of ingredient types. Data were corrected for metabolic body weight ( $W^{0.75}$ ) and the level of production ( $L$  = metabolizable energy intake [MJ/d]/maintenance energy [MJ/d]) to enable the comparison across different species in the database.

**Results:** The DN intake varied from 0.16 to 0.64  $\text{g} \cdot \text{d}^{-1} \cdot \text{L}^{-1} \cdot \text{W}^{-0.75}$  over all species. The DN represented 31 to 84% of the total nitrogen intake. On average, net ammonia-N flux in the portal vein was 70% of the DN intake. The reflux of urea was, on average, 0.2  $\text{g} \cdot \text{d}^{-1} \cdot \text{L}^{-1} \cdot \text{W}^{-0.75}$ , and was not related to the increasing DN intake. A positive linear relationship between DN intake and portal flux of ammonia was observed, suggesting an increasing waste of N with increasing DN intake. No clear relationship was observed for the flux of amino acids in the portal vein with varying DN intake over all species. The data suggests, however, that other sources contribute to the variation of the amino acid flux in the portal vein, like amino acids from the undegradable protein fraction and presence of bypass true protein in the soluble fraction of some feeds. The last one is included in the washout fraction of the nylon bag technique, which is considered as immediately and completely degraded in the rumen. The prediction of aminogenic nutrient appearance in the portal vein is confounded by those additional sources of amino acids, by the recycled nitrogen in the form of urea, the contribution of ammonia from the lower gut and the adaptation of gut wall metabolism to different physiological stages.

**Conclusion:** The catheterization of the portal vein has the potential to be applied in the validation of the protein value of feeds, but DN is only applicable to classify protein in the forestomachs. The contribution of the metabolism of aminogenic nutrients by the gut wall is important and needs to be investigated. Further, in vitro studies are necessary to quantify the bypass true protein from soluble proteins as potential sources of amino acids in the portal vein.

1) CVB, Centraal Veevoederbureau. Veevoedertabel 1999. Lelystad, The Netherlands.