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The Effects of Age and Adiposity on the Digestibility of Micellar Casein in Rats

Nathalie Atallah¹, Audrey Boulier², Alain Baniel², Dalila Azzout-Marniche¹, Claire Gaudichon¹, and Juliane Calvez¹,

¹Université Paris-Saclay, AgroParisTech, INRAE, UMR PNCA, Paris, France; and ²Ingredia SA

Objectives: The aim of this study was to evaluate the digestibility of casein and its amino acids (AA) in rats of different ages (2 months vs 11 months) and adiposity levels (normal vs high).

Methods: Wistar rats of 1 month ($n = 15$) and 10 months ($n = 15$) at their arrival were fed *ad libitum* for 28 days either with a standard diet (14% P/E, 75% C/E, 11% L/E) or a Western diet (14% P/E, 51% C/E, 35% L/E) in order to obtain respectively rats of normal and high adiposity levels. Four groups were constituted ($n = 7/8$): 2 months/normal adiposity (2 M/NA), 2 months/high adiposity (2 M/HA), 11 months/normal adiposity (11 M/NA) and 11 months/high adiposity (11 M/HA). After a week on the standard diet, the rats consumed a 4 g meal containing ¹⁵N labeled casein (Prodiect® 85B). Blood samples were taken at $t = 0$, $t = 1$ h, $t = 3$ h after meal consumption, and the rats were euthanized at $t = 6$ h. Digestive contents were collected and body composition

was determined. Nitrogen quantity and ¹⁵N enrichment were analyzed in the meal and digestive contents by EA-IRMS, allowing for the estimation of casein digestibility. Concentrations in AA and their ¹⁵N enrichments were determined respectively by UHPLC and GC-C-IRMS to obtain the digestibility of individual AA.

Results: Weight did not differ between groups of the same age, but body composition analysis showed a significant difference in adiposity ($P = 0.0008$ between the 2 M groups; $P = 0.0004$ between the 11 M groups). Nitrogen fecal digestibility of casein increased significantly in rats with higher adiposity levels (2 M/NA = $94.1 \pm 1.1\%$; 2 M/HA = $95.2 \pm 1.7\%$; 11 M/NA = $94.5 \pm 2.2\%$ for 11 M/HA = $95.9 \pm 0.7\%$; $P = 0.0339$). No difference was found in the digestibility of individual AA. 6 hours after meal ingestion, there was significantly more exogenous nitrogen in the stomach of rats aged 11 months compared to those of 2 months ($3.9 \pm 6.9\%$ for the 2 M groups and $11.3 \pm 9.2\%$ for the 11 M groups $P = 0.0188$). Except for methionine, there was no difference in plasma concentration levels of essential AA over time between the groups.

Conclusions: Our results suggest that age slows down digestion, in accordance with the literature. We showed that adiposity increased casein digestibility but without any effect at the level of individual AA digestibility.

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