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The relation between feed efficiency and fibre digestibility in dairy cows on commercial farms

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Enhancing feed resource efficiency and cows' ability to digest fibre is essential for advancing a circular food system that reduces feed-food competition and the environmental impact of dairy farming. This study examined the relation between feed efficiency (FE; fat and protein corrected milk (FPCM) yield/dry matter intake (DMI)) and apparent total tract digestibility (ATTD) of neutral detergent fibre (NDF) in 483 cows across four Dutch commercial farms, where individual feed intake was recorded. Three farms were visited twice, one farm once, resulting in seven sampling periods. During each period, milk yield and composition were determined, and spot samples of faeces were collected at six 4-hour intervals over three to four consecutive days, covering all 4-hour periods within a 24-hour cycle. Pooled faeces and feed samples were analysed for NDF and acid-insoluble ash content to determine ATTD. Feed efficiency was analysed with a mixed model and included NDF-ATTD, sampling period and their interaction as factors. Days in milk (DIM), body weight, and parity were included as covariates, and period was treated as random effect. On average, cows had a parity of 1.5 ± 0.73, were 138 ± 53.2 DIM, produced 38.5 ± 6.87 kg/d of FPCM, and had a DMI of 23.9 ± 3.46 kg/d, FE of 1.62 ± 0.209, and NDF-ATTD of 58.9 ± 9.47%. Dietary NDF content averaged 308 ± 27.9 g/kg DM. Preliminary results indicate that FE was overall positively associated with NDF-ATTD ($P = 0.02$), however, this relation was positive in two sampling periods ($P = 0.02$ and $P = 0.10$) and negative in one period ($P < 0.01$; digestibility × period interaction, $P < 0.01$). These findings suggest that while an increase in feed efficiency is generally associated with an increase in NDF digestibility, this relation varies by farm and visiting period.