Effects of sequence of nylon bags rumen incubation on kinetics of degradation in some commonly used feedstuffs in dairy rations

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Abstract

Nowadays, most available information on the degradative behaviour of feeds in ruminants is based on in situ incubation in the rumen, and it is adopted by many feed evaluation systems currently in use for ruminants. However, the outcome of this technique might be affected by many factors such as sequence of nylon bags incubation in the rumen. The objective of current study was to investigate effects of sequence of nylon bag incubation on degradative behavior of dry matter (DM), crude protein (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) in some feed ingredients commonly used in dairy rations, including alfalfa haylage, corn silage, corn grain and soybean meal. Four multiparous Holstein lactating cows fitted with permanent ruminal cannulas were used. The nylon bags containing feed samples either were placed in the rumen at once and removed at designated time intervals (all in-gradually out method; AG) or were placed in the rumen at designated time points and retrieved at once (gradually in-all out method; GA). Fractional rate of degradation of potentially degradable fraction, lag time and effective rumen degradability (ED) of DM and CP were significantly higher in the AG compared to the GA method (P<0.05). Fractional rates of DM and CP degradation was higher in alfalfa haylage samples incubated in the rumen using the AG method compared to that using the GA method (0.138 h⁻¹ vs. 0.073 h⁻¹ and 0.002 h⁻¹ vs. 0.1125 h⁻¹, for DM and CP, respectively; P<0.05). Due to a higher fractional rate of degradation (Kd) of DM and CP, the ED of DM and CP at different fractional passage rates were higher in the AG than those in the GA method (P<0.05). Potentially degradable fraction and lag time of NDF were higher in the AG method compared to the GA method (P<0.05). Placing all bags in the rumen at once and removing them at designated time intervals compared with introduction of bags in reverse sequence and removing them all at once led to a lower undegradable fraction (U) of NDF in alfalfa (1.8% vs. 4.0%, respectively; P<0.05) and corn silage (3.3% vs. 6.7%, respectively; P<0.05) samples. Potentially degradable fraction of ADF was significantly higher in the AG method compared with the GA method (P<0.05). Bag incubation sequence had profound effects on kinetics of degradation of DM, CP and NDF in situ in the feed samples studied. The effects were more evident in the forages (especially alfalfa haylage) than in the concentrate ingredients.