Binary and complex legume-grass mixtures affect the forage energy to protein ratio

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Abstract

Forages with a greater ratio of energy availability to protein degradability increase dairy cow N use efficiency. We determined the variation in this ratio among 18 binary grass-legume mixtures and among 8 complex mixtures combining three or four grass species with one of two legume species. Species included in those two experiments were alfalfa (*Medicago sativa* L.), birdsfoot trefoil (*Lotus corniculatus* L.), white clover (*Trifolium repens* L.), orchardgrass (*Dactylis glomerata* L.), Kentucky bluegrass (*Poa pratensis* L.), meadow bromegrass (*Bromus biebersteinii* Roemer & J.A. Schultes), meadow fescue (*Festuca elatior* L.), reed canarygrass (*Phalaris arundinacea* L.), tall fescue [*Schedonorus phoenix* (Scop.) Holub], and timothy (*Phleum pratense* L.). Carbohydrate and protein fractions of the Cornell Net Carbohydrate and Protein System (**CNCPS**) were measured in forages from two simulated grazing events of the first post-establishment year at two sites in eastern Canada. The water soluble carbohydrate to crude protein ratio ranged from 0.39 to 0.70 among binary mixtures and from 0.64 to 1.04 among complex mixtures, while the ratio of readily fermentable carbohydrate fractions A and B1 to readily soluble protein fractions A and B1 ranged from 3.62 to 5.28 and from 4.33 to 5.64, respectively. Our results confirm the possibility of improving the balance between energy and proteins through the choice of species in grass-legume mixtures.

Keywords: Binary forage mixtures, complex forage mixtures, energy to protein ratio, yield, digestibility