



The effects of organic grass and grass-birdsfoot trefoil pastures on Jersey heifer development: Herbage characteristics affecting intake

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ABSTRACT

Low dietary energy and decreased intake of herbage have been attributed to the reduced performance of grazing dairy cattle. We hypothesized that grasses with inherently greater energy would interact in a complementary way with condensed tannins (CT) in birdsfoot trefoil to increase herbage intake by grazing dairy heifers. Eight pasture treatments comprising high-sugar perennial ryegrass (*Lolium perenne* L.), orchardgrass (*Dactylis glomerata* L.), meadow bromegrass (*Bromus riparius* Rehm), and tall fescue [*Schendonorus arundinaceus* (Schreb.) Dumort] were established in Lewiston, Utah as monocultures and binary mixtures with birdsfoot trefoil (*Lotus corniculatus* L.; BFT). Pasture treatments were rotationally stocked by Jersey heifers for 105 d in 2017 and 2018, and herbage samples were collected pre- and postgrazing for each 7-d grazing period and analyzed for herbage mass, nutritive value, and apparent herbage intake. We observed differences among pasture treatments in herbage quantity and nutritive value, as well as differences in herbage intake by grazing Jersey heifers. On average, grass-BFT mixtures had greater herbage intake than grass monocultures, and every grass-BFT treatment individually had greater herbage intake than their respective grass monocultures. Using multivariate analyses, we determined that approximately 50% of the variation in herbage intake was due to nutritive and physical herbage characteristics, with the most explanatory being characteristics related to fiber and energy, followed by those related to the percent of BFT in the herbage. Grass monocultures exhibited a range of inherent dietary energy, but there was indication that an imbalance of energy to crude

protein (e.g., protein deficient) reduced intake of grass monocultures. Moreover, there was some evidence of a complementary effect between increased dietary energy and CT; however, low CT levels made it impossible to determine the effect of CT on herbage intake per se. This study confirmed that chemical and physical characteristics inherent to different pasture species have a large effect on herbage intake by grazing cattle. Pastures planted to binary mixtures of nutritious grasses and birdsfoot trefoil increase herbage intake of temperate pastures by grazing Jersey heifers.

Key words: dairy heifer, dry matter intake, grass-legume mixture, grazing, herbage nutritive value, pasture

INTRODUCTION

Pasture-based dairies and organic milk production are becoming more prevalent, with organic milk production being the fastest growing segment of organic agriculture (McBride and Greene, 2009; AgMRC, 2015). Over 60% of organic dairies use pastures as their primary ($\geq 50\%$) source of forage, and 90% use pastures for at least 25% of their forage (McBride and Greene, 2009; AgMRC, 2015). Organic milk companies often promote their product based upon the health and environmental benefits of milk from cows grazing pasture (Anon, 2020a) and usually require at least 120 grazing days per year for both lactating cows and replacement heifers (Anon, 2020b). However, milk production was 32% lower in organic dairies using the highest amount of pasture forage (75–100%) compared with those using 25% or less pasture forage (McBride and Greene, 2009). Research has shown that low forage DMI by grazing dairy cows is a major factor limiting milk production (Bargo et al., 2003). Producers have also observed that dairy cattle appear to be more selective grazers than beef cattle, with many dairy cattle showing strong pref-

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