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Meat and milk production on irrigated birdsfoot trefoil pastures in the Mountain West USA

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Introduction

Irrigated birdsfoot trefoil (BFT; *Lotus corniculatus* L.) is a productive, persistent perennial legume in the Mountain West region of the United States of America (USA) (MacAdam and Griggs 2006). It does not cause bloat, even when grazed in pure stands, because it contains a relatively small amount (2-4% of dry matter (DM)) of condensed tannins (Mueller-Harvey 2006; Waghorn 2008). Birdsfoot trefoil tannins bind excess plant proteins at rumen pH (~ pH 6.2) sufficiently to prevent bloat and then release these proteins into the abomasum at gastric pH (~ pH 2.5). This allows plant proteins to be digested to amino acids that can be absorbed in the small intestines (Waghorn *et al.* 1987). Short-term increases in productivity have been demonstrated in beef cattle (Wen *et al.* 2002) and dairy cows (Woodward *et al.* 1999) grazing BFT, but few studies have looked at longer-term effects on commercial farms.

This study investigated the rate of season-long average daily liveweight gain and meat quality of cattle (MacAdam *et al.* 2011) and the intake and milk production of dairy cattle grazing pure stands of BFT on commercial farms during the summer grazing period of 2012.

Material and methods

Beef cattle production

Cattle and grazing details are shown in Table 1. Flood-irrigated pastures were seeded with BFT cv. Norcen in 2010 on 2 ranches (in Morgan and Box Elder counties, Utah) Cattle were weighed in May 2012, when grazing commenced, and in September, as they were removed from pastures. Differences in rumen fill were minimized by weighing at mid-day. Pastures were rotationally grazed at different stocking rates. Two cattle were slaughtered as they were removed from the Box Elder Co. BFT pasture, and steaks were compared with purchased grain- and grass-finished steaks in a randomized, blind-coded 120-member consumer panel.

Dairy production

A sprinkler-irrigated pasture in southeast Idaho USA was

seeded with Norcen BFT in August 2011. Data are presented for 2012. Nine dairy cows rotationally grazed for 10 weeks on either a BFT or grass-based pasture, comprised of *Lolium perenne*, *Dactylis glomerata*, *Schedonorus arundinaceus*, *Elymus repens* and *Trifolium repens*. Cows were fed 2.27 kg of barley with a vitamin and mineral supplement and moved to fresh paddocks after each milking (every 12 hours). Intake was determined as the difference between pre-grazing and post-grazing DM with a rising plate meter. Milk production was measured at the beginning of the study and every 2 weeks, by collecting milk from each cow at 4 successive (2 morning and 2 evening) milkings.

Results and Discussion

Beef cattle production

Results from the beef producers' cattle are reported in Table 1. The relatively low stocking rate of the Morgan Co. producer's fall-born cattle resulted in under-

Table 1. Liveweight gain of steers grazing pure birdsfoot trefoil irrigated pastures owned and managed by rancher cooperators in Morgan and Box Elder Counties in Utah, USA

Location	Morgan County	Box Elder County
Pasture size	2.43 ha	2.63 ha
Number of cattle	7 Angus steers	10 Angus-Simmental cross steers
Average initial weight per head \pm SEM	383 \pm 8 kg (~ 9 months old)	432 \pm 13 kg (~ 12 months old)
Total initial weight	2683 kg	4324 kg
Initial weight per ha	1104 kg/ha	1644 kg/ha
Grazing period	30 May - 6 September 2012	24 May - 5 September 2012
Length of grazing period	99 days	104 days
Average final weight per head \pm SEM	507 \pm 16 kg	604 \pm 14 kg
Total herd gain	867 kg	1713 kg
Liveweight gain/head/day \pm SEM	1.25 \pm 0.06 kg/day	1.65 \pm 0.12 kg/day
Liveweight gain/ha/day	3.60 kg /ha/day	6.26 kg /ha/day

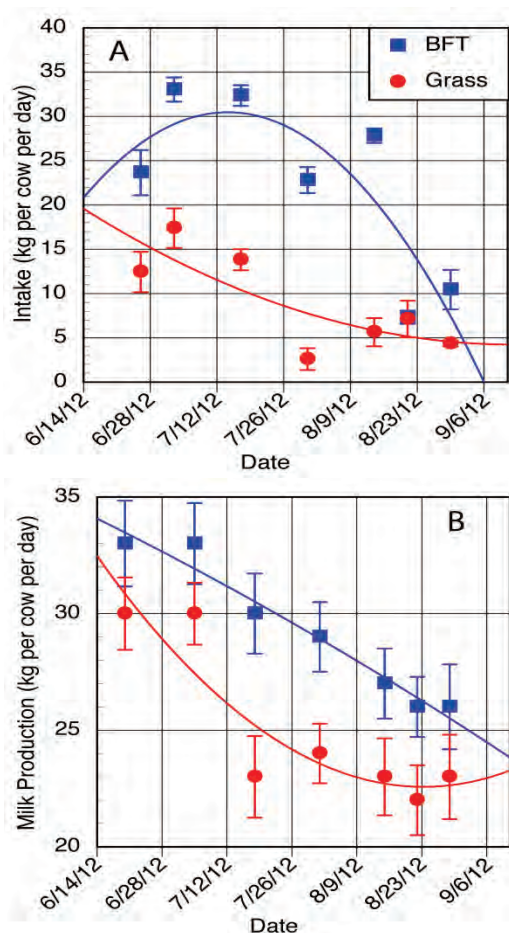


Figure 1. Pasture intake (A) and daily milk production (B) of cows grazing either BFT or grass-based pastures. Error bars indicate \pm SEM

utilization of the forage produced, whereas the high stocking rate of the Box Elder Co. producer's yearling cattle resulted in good forage utilization. The average daily gains from the more intensively stocked pastures approached those expected from grain finishing (1.65 kg/day). Steaks from the 2 cattle finished on the BFT pasture were graded 'high select' and considered by the consumer panel to be either equal to or preferred to grain-finished steaks. Both BFT- and grain-finished steaks were preferred to steaks from organic grass-finished cattle for most traits.

Dairy production

Intake of dairy cows grazing BFT in mid-summer was higher than for cows grazing grass pasture (Fig. 1A), resulting in higher milk production for cows fed BFT than grass (Fig. 1B).

Conclusion

We have demonstrated that the production increases found in controlled studies can be achieved by producers managing their cattle within the constraints of a working farm or ranch. Birdsfoot trefoil has the potential to be an alternative beef finishing system and is an excellent mid-summer dairy pasture.

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