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The cost of feeding bred dairy heifers on native warm-season grasses and harvested feedstuffs

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ABSTRACT

Heifer rearing is one of the largest production expenses for dairy cattle operations, which is one reason milking operations outsource heifer rearing to custom developers. The cost of harvested feedstuffs is a major expense in heifer rearing. A possible way to lower feed costs is to graze dairy heifers, but little research exists on this topic in the mid-south United States. The objectives of this research were to determine the cost of feeding bred dairy heifers grazing native warm-season grasses (NWSG), with and without legumes, and compare the cost of grazing with the cost of rearing heifers using 3 traditional rations. The 3 rations were corn silage with soybean meal, corn silage with dry distillers grain, and a wet distillers grain-based ration. Bred Holstein heifers between 15- and 20-mo-old continuously grazed switchgrass (SG), SG with red clover (SG+RC), a big bluestem and Indiangrass mixture (BBIG), and BBIG with red clover (BBIG+RC) in Tennessee during the summer months. Total grazing days were calculated for each NWSG to determine the average cost/animal per grazing day. The average daily gain (ADG) was calculated for each NWSG to develop 3 harvested feed rations that would result in the same ADG over the same number of grazing day as each NWSG treatment. The average cost/animal per grazing day was lowest for SG ($0.48/animal/grazing d) and highest for BBIG+RC ($1.10/animal/grazing d). For both BBIG and SG, legumes increased the average cost/animal per grazing day because grazing days did not increase enough to account for the additional cost of the legumes. No difference was observed in ADG for heifers grazing BBIG (0.85 kg/d) and BBIG+RC (0.94 kg/d), and no difference was observed in ADG for heifers grazing SG (0.71 kg/d) and SG+RC (0.70 kg/d). However, the ADG for heifers grazing SG and SG+RC was lower than the ADG for heifers grazing either BBIG or BBIG+RC. The average cost/animal per grazing day was lower for all NWSG treatments than the average cost/animal per day for all comparable feed rations at a low, average, and high yardage fee. Results of this study suggest that SG was the most cost-effective NWSG alternative to harvested feeds for bred dairy heifer rearing.
Key words: bred dairy heifer, economics, grazing, native warm-season grass, Tennessee

INTRODUCTION

For a dairy operation, heifer rearing can be one of the largest annual production expenses (Heinrichs, 1993; Harsh et al., 2001). Feed costs can account for as much as 64% of the total cost of heifer production (Gabler et al., 2000). Harvested feedstuffs such as corn (*Zea mays*) silage have been the primary feedstuffs used in dairy heifer rations. However, the cost of heifer rearing relying on harvested feedstuffs has increased due to increased cost of producing crops such as corn (Griffith, 2012; USDA-NASS, 2013).

A profit-maximizing dairy heifer producer's objective is to reduce production costs while holding output constant. One possible way to lower the cost of bred heifer rearing is to graze heifers. In the mid-south United States, tall fescue (**TF**) [*Schedonorus arundinaceus* (Schreb.) Dumort] is the primary forage cattle producers rely on for pasture and hay (Keyser et al., 2011). However, interest is growing by cattle producers in grazing native warm-season grasses (**NWSG**) during the summer months because of their drought tolerance.

Research on dairy heifer rearing while grazing NWSG has been limited. Eastern gamagrass (*Tripsacum dactyloides*) was used as an additive to corn silage and alfalfa (*Medicago sativa*) haylage in Wisconsin and was found to dilute energy content and limit DMI (Coblentz et al., 2012). Coblentz et al. (2012) stated more research

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was needed on the animal benefits from using NWSG in rearing dairy heifers. Furthermore, in our review of literature, no studies were found on the cost of grazing NWSG in the rearing of bred dairy heifers.

Research is limited on grazing NWSG with legumes in the mid-south United States. A potential shortcoming of a NWSG summer grazing program can be the cost of N fertilizer applied (Doxon et al., 2011; Biermacher et al., 2012). Legumes can replace inorganic N (Howieson et al., 2000) and can be successfully grown with switchgrass (**SG**; *Panicum virgatum* L.; Blantchet et al., 1995); however, legumes have also been found to weaken SG stand through excessive spring competition (Bow et al., 2008). Biermacher et al. (2012) studied the economics of using legumes as a substitute for N fertilizer while grazing bermudagrass (*Cynodon dactylon*) pastures in the Great Plains, and found net returns to grazing to be higher for the pastures where N fertilizer was applied than the pastures where legumes were seeded. However, more research is needed on the economics of grazing NWSG with legumes.

The objective of this research was to determine the cost of grazing bred dairy heifers on SG and a big bluestem (*Andropogon gerardii*) and Indiangrass (*Sorghastrum nutans*) mixture (**BBIG**) with and without legumes. The results from this research could benefit dairy heifer producers in the mid-south and other regions where NWSG are grown by reducing feed costs in the summer months.

MATERIALS AND METHODS

Data

Animal and Pasture Management. Data were collected from an experiment conducted at the Middle Tennessee Research and Education Center in Spring Hill, Tennessee, from 2010 to 2012. Animal performance data were collected for bred Holstein and Jersey heifers grazing mature stands of 4 NWSG treatments: (1) SG, (2) BBIG, (3) SG with red clover (*Trifolium pretense*; **SG+RC**), and (4) BBIG with red clover (**BBIG+RC**). Table 1 presents rainfall and temperature data collected at the Middle Tennessee Research and Education Center from 2010 to 2012. Treatments were assigned in a randomized complete block design with 4 replications. A total of 16 paddocks were used in each year of the study. Each NWSG treatment was established in 2008 on 1.2-ha paddocks by no-till drill at seeding rates of 7.9 kg of pure live seed (**PLS**)/ha for Alamo SG, and a 2:1 mixture of big bluestem and Indiangrass was seeded at 11.2 kg of PLS/ha. Cinnamon Plus clover was drilled in February of each year in pastures assigned to the legume treatments at a rate of 5.6 kg of PLS/ha. In the fall of each year, all paddocks were clipped to remove excess forage. No lime, fertilizer, or herbicides were applied to the treatments in any year.

Table 1. Average daily temperature (°C) and total rainfall (cm) during native warm-season grass grazing months in Spring Hill, Tennessee, from 2010 to 2012[1]

	Average	
Month	Temperature	Rainfall
May	19.76 (1.45)	18.04 (14.67)
June	24.62 (1.71)	6.80 (3.54)
July	26.89 (0.28)	12.61 (9.80)
August	25.39 (1.80)	7.07 (3.54)
May to August	24.17 (0.91)	44.81 (16.19)

[1]Source: NOAA, Spring Hill, Tennessee, weather station. Standard deviations are shown in parentheses.

Animals were managed in a continuous grazing system with a variable stocking rate beginning in mid-May. Grazing was initiated each year when forage height reached approximately 38.1 cm. Grazing was initiated on May 14, 2010, May 13, 2011, and May 11, 2012. Each paddock contained 4 tester animals with a variable amount of grazer animals dependent on the forage availability of the NWSG. Testers were animals used to evaluate the paddock quality and animal performance while grazer animals were used to maintain the target height for each NWSG (Mott, 1960). When forage growth was over the target height, grazers were added to the paddock and when forage growth was within the desired range, grazers were removed. The goal was to maintain a plant height of 38.1 to 45.72 cm for BBIG and 60.96 to 76.2 cm for SG. Although the continuous grazing system with a variable stocking rate was an appropriate method for grazing experiments (Mott, 1960), this method does not represent how producers would actually graze dairy heifers. The data, however, provide controlled measurements on how dairy heifers perform on NWSG.

In 2010 and 2012, 4 bred Holstein heifers were designated as testers and assigned to each paddock. In 2011, 3 bred Holstein heifers and 1 bred Jersey heifer were assigned as tester animals due to a shortage of Holstein heifers. Pregnancy status was 30 to 160 d for all bred heifers, and age ranged from 15 to 20 mo old for all bred heifers. In 2010 and 2012, all grazers were Holsteins, but both Jerseys and Holsteins were used in 2011. The initial stocking rate was 4 testers per paddock in 2010 and 2012 for all NWSG treatments, but in 2011 the initial stocking rate was 4 testers and 1 grazer for BBIG paddocks, and 4 testers and 3 grazers for SG paddocks.