High Energy Forages for Grass-Finishing Beef

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In late 2013, we were excited to receive a USDA grant for just under a half-million dollars. This three-year grant will be conducted at LCRC with the objective of evaluating use of high-energy forages to grass-finish beef. The work has four objectives: 1) evaluate finishing potential of high-energy pastures for beef cattle, 2) determine consumer acceptability of beef from the four pasture treatments versus commercial corn-fed beef, 3) determine consumer acceptability of fresh versus frozen grass- and corn-fed beef, and 4) determine factors limiting acceptance of frozen beef in the meat supply chain.

This first phase of the research is being conducted by Jason Rowntree and Kim Cassida. It will build from the previous work at Lake City Research Center by Dr. Rowntree, which showed that cattle with the right genetics can be successfully finished to choice quality grade on irrigated pastures. The control pastures to be used in upcoming trial are the same ones used in the previous work so that we can maintain a standard of comparison. Control pastures contain primarily bluegrass, smooth brome, orchardgrass, white, red, and alsike clovers, and a small amount of alfalfa. The irrigation research showed that low pasture growth rates and low energy content of this mixture limited cattle growth during fall, which coincides with the final phase of finishing. In the last six to eight weeks before market, we are trying to get cattle to put on that last little bit of fat that is so important for a high quality grade. In fall, most perennial forage species are reducing growth rates and preparing for winter, and it is very difficult to get the necessary energy for fat deposition out of such a pasture.

Forage brassicas, such as this turnip hybrid, have become popular forages. They contain very high levels of non-structural carbohydrates that can support rapid animal weight gain, but do they taint the flavor of the beef?

Market-driven limitations for the expansion of grass-fed beef include consumer fears about off flavors in grass-fed meat and the supply chain preference for fresh product. It is obvious that Michigan has limitations in being able to provide a constant supply of local pasture-finished beef throughout the year, and it would be less costly to supply grass-fed beef to local markets if they would accept frozen beef. Therefore, the second phase of

the research will include investigating consumer and food industry preferences in both fresh and frozen forms for beef from our four pastures and purchased corn-fed beef from a supermarket. The second phase of the research will be conducted by Matt Raven, Janice Harte, Jeannine Schweihofer, and Sarah Wells.

We took two approaches to increasing the energy potential of the finishing pastures. The first approach is to establish a perennial mix of forages selected for increased sugar concentration. We are using a mix of perennial and Italian ryegrass selected for high sugar content, in combination with a small proportion of alfalfa and white clover for nitrogen fixation (SucraSeed 'Cash Cow' mix). The second approach is to use annual forages that are replanted each year. The right annual forages for this task will grow quickly, tolerate cool temperatures, and even increase sugar content during cool fall weather. Components of the annual forage mixtures were selected for specific purposes. The simple mix contains a fast-growing brassica ('Winfred' hybrid turnip, 5 lb/acre) to supply non-structural carbohydrate and oats ('Forage Plus' oats, 50 lb/acre) to provide effective fiber. The complex mix contains Winfred turnip (3 lb/acre) and Forage Plus oat (20 lb/acre), plus 'Barsica' rape (3 lb/acre), 'Jumbo' annual ryegrass (5 lb/acre) and 'Arvika' spring field pea (10 lb/acre). The additional species provide biodiversity, nitrogen fixation, and an broader range of time to maturity.

Pastures are being managed with minimum inputs. Existing sod was killed using an application of Roundup Weathermax in May, and forages were planted into residue two weeks later using a no-till drill. Nitrogen was applied to newly planted treatments at a rate of 50 lb/acre approximately one month after planting. Irrigation water has been applied if needed to provide about 1 inch of water to pastures each week. The control pastures have been rotationally grazed through the end of July, at which time they will be stockpiled for fall grazing. Each two-acre pasture will be strip grazed by two steers beginning in September each year, or earlier if forage growth permits. Dry hay will be offered to insure that cattle have enough effective fiber for good rumen function. Cattle will be sent to the abattoir in stages through October and November when backfat reaches 1 cm thickness. Carcass traits will be measured at harvest. The meat evaluations will conclude during 2016 and will include consumer taste panels comparing our grass-finished frozen beef to commercial feedlot frozen beef.

We have already learned some useful things from this trial. In an ideal world, we know that we should have sprayed Roundup in fall of 2013 and allowed plant residue and sod to break down over the winter. Unfortunately, we could not do this because we did not know we were getting the grant until December. Playing catch-up with the late, wet, cold spring, we did not get the sod killed until May, by which time there was a vigorous stand of spring grass. Drilling into this heavy sod residue two weeks later in June was less than ideal. The large-seeded annuals managed to establish adequately, but the small-seeded perennial ryegrass struggled. Some ryegrass did emerge, but it soon disappeared, probably eaten by a healthy population of insects supported by the plant residue. We replanted the perennial ryegrass in late July and it remains to be seen if the second planting into a partially decayed sod will be more successful. At any rate, we will not be able to graze the ryegrass this year, so the first year of the trial will proceed with only three grazing treatments. This experience should emphasize the importance of planning pasture renovation operations at least a year ahead of time to be sure all steps can be completed on time. Trying to rush things rarely produces good results!