

Florida inmates sow barley seed into trays, and in seven days a crop of nutrient-rich fodder for livestock is ready to harvest, thanks to GrazeGreen's NFT technology



By Jacquelyne M. Docauer

Inside a greenhouse on the grounds of the Manatee County Jail, in Palmetto, Fla., it's warm, quiet and lit only by a small area of opaque plastic covering on one end. Row after row of gutter-like trays are filled with barley grain in different stages of maturity. On one end, a NFT system pumps micro-nutrients slowly into the trays, five minutes at a time, five times a day. From sowing to harvest, a crop of fodder is ready to serve as cattle food after just seven days.

In November, Manatee County Jail inmates and staff began operating a second 24-by-60-foot greenhouse that produces on average 2,000 pounds of fodder a day. Hydroponic technology is utilized to grow the fodder quickly and efficiently. It's a branded process called GrazeGreen, developed by Australian Peter Doyle and brought to the United States and distributed by CropKing.

New Project: Hydroponic Fodder

In 2003, it was still a dream of the staff at Manatee County Sheriff's Department and jail to provide a new way to grow fodder in order to add a herd of registered beef cattle to their inmate training and self-sufficiency program. Limited space and poor growing soil for fodder production meant the only

Faster Fodder

Above: Roger Seagraves, a Manatee County Jail inmate, harvests seven-day-old barley grass in one of two greenhouses located on the jail's 70-acre grounds in Palmetto, Fla. The fodder, grown using GrazeGreen's NFT process, is used as cattle feed. CropKing is the U.S. distributor for GrazeGreen systems. Below: Every day Manatee Jail inmates harvest about a ton of hydroponic barley fodder from each of two 24-by-60-foot greenhouses.



way to achieve this was to look at an alternative method of fodder production, such as that offered by GrazeGreen.

Jail staff had written for and received grants from the Department of Justice in the amount of over \$265,000, enough to buy a GrazeGreen system. Ground was broken for the first greenhouse in October 2004, and construction was completed less than five months later. It was decided that the crop would be barley grass because of its nutritional profile. Project supervisor Lt. Doug Baird said Anheuser-Busch provided good-quality barley seed at a good price.

The first seeds were planted on March 8, 2005, with the first harvest on March 15—2,008 pounds of fodder. By June 8, inmates and staff had harvested 151,844 pounds of fodder. Warmer summer temperatures slowed production a bit on this mostly colder-weather crop, but first signs of longer nights and cooler temperatures in the fall brought higher production rates again, said Deputy Rhonda Parks, project coordinator at the Manatee farm. Producing GrazeGreen Fodder The process of growing fodder the GrazeGreen way begins with the seed. Once the seed has been soaked in water,



CropKing supervised installation of controls and pumps used to operate the NFT system at the Manatee greenhouses.

it is then sowed in the gutters to a depth of about 1/2 inch. Nutrients, referred to as Micro-Mix by CropKing, are mixed with solutions of calcium nitrate, potassium nitrate, iron chelate, magnesium sulfate and ammonium nitrate. pH is controlled by using small amounts of phosphoric acid added to the solution. Energy stored in the seed and the micronutrients allow the seeds to mature quickly using only ambient light.

Trays are carefully labeled with dates of planting. After seven days, fodder is gently pulled from the trays and cut into yard-long pieces, laid on a flat-bed cart and transported where needed by a four-wheeler.

In each greenhouse about 300 pounds of seed are planted every day. That amount of seed will yield about a ton of grass in a week, which is used as supplemental feed for 130 cattle, including a registered head of Brangus cattle, raised on the jail's 70-acre grounds.



Above right: Manatee inmates Cody Marzec (left) and Roger Seagraves inspect NFT-grown barley grass in the greenhouse. Below: Deputy Rhonda Parks helps supervise inmates who plant and harvest hydroponic fodder grown using GrazeGreen NFT technology.

Manatee Seeks to Train Inmates

Although prison industries are popping up all over the country, Manatee County Jail has taken it a step further. In addition to growing a herd of registered Brangus cattle as food for inmates and staff, they also have an aquaculture program that harvests about 400 pounds of tilapia a week, and the fish are processed at an onsite processing plant.

Supervised by staff, inmates are trained in meat processing, culinary arts, horticulture, carpentry and welding, painting, sewing and milling. They operate a grist mill where they grind corn into grits, meal and flour. They make their own mattresses, one of the biggest expenses at any jail complex, and uniforms. And they run several types

of horticultural programs ranging from hydroponic lettuces, peppers, tomatoes and okra, greenhouse-grown flowers and house plants that they sell to the public every week to earn spending money. In addition, field-grown ornamental trees, shrubs and flowers tended by inmates are used throughout the county for landscaping projects and highway rights-of-way, thus saving the expense of having to purchase these from outside vendors.

These programs benefit inmates by providing them with hands-on job training and benefits the county by offsetting operational costs at their county jail. In 2004 it was estimated that over \$1 million in expenses was offset by these operations.



Right: Doug Baird oversees the GrazeGreen fodder-growing operation. Below right: After soaking for a time, barley seeds are spread 1/2-inch deep in trays to germinate and grow. Hydroponic nutrients flow down trays to feed the growing barley. Directly below: Root mass of six-day-old hydroponic barley grass grown in the Manatee greenhouse. This grass will be harvested the next day and feed to cattle. Bottom: Manatee staff tinkered with the GrazeGreen system to solve problems encountered during the first year of operation. In this case, they modified drip tubes to prevent wet spots like this one forming in the root mass.



Nutrients present in the grass are average range or better, according to the tests done at Dairy One, an outside testing lab contracted by Manatee.

Working Out the Bugs

Manatee staff have worked to solve some initial problems with fodder production. Manatee jail is located in the southern part of western Florida, with a climate best described as tropical. To avoid outbreaks of fungal disease, staff had to figure out ways of maintaining both heat and humidity levels inside the greenhouse. The dehumidifier-air conditioner now operates continuously to pull out moisture and keep the inside temperature between 65 to 75 F. Staff installed a 90% shade cloth on the south end of the greenhouse to reduce the heat and light. They also added 9 inches of insulation between the layers of plastic from the ground up on the greenhouse sides. Double-walled, insulated construction allows them to further reduce heat and maintain more consistent temperatures and humidity.

In addition, Baird now uses a 30% bleach solution when cleaning trays to ensure elimination of fungal spores.

Some early issues regarding regulating pH were handled by modifying the amounts of phosphoric acid added to the drip solutions. And the drip system tubular end piece was slightly modified in order to maintain a more even flow through the grains in the tray, which ended the tendency for the grain to bunch at the beginning of the drip.

Future of GrazeGreen

Paul Brentlinger, CropKing president, said demand for the GrazeGreen was slow at first. In the meantime, CropKing has spun off two other products that are both income-producing—Microgreens System and the Wheat Grass System.

Brentlinger said few areas of the country suffer land issues associated with growing fodder for livestock. But as the problems surrounding land

use and water shortage continue to grow in size and complexity, he hopes GrazeGreen will be viewed as the answer to at least some of the problems facing growers.

Manatee jail still has the only system in place east of the Mississippi River, other than the model set up at CropKing Headquarters at Seville, Ohio. But CropKing recently shipped its first international sale of the fodder system to Mexico, and Brentlinger sees this as a possible sign that interest in the GrazeGreen system is picking up.

“And there seems to be interest coming in from other parts of the world,” Brentlinger said. “What GrazeGreen does for the livestock rancher is it allows them to make their land pay for itself in a new way. As costs for growing or buying field-grown hay continue to rise, GrazeGreen may allow a rancher to grow at least some of the fodder needed for their stock without the need for heavy machinery, large amounts of water or large tracts of land, hence possibly reducing their overall feed costs,” Brentlinger said.

As research and testing continues on hydroponic fodder systems, he thinks there will be more interest in GrazeGreen. “Ranchers and farmers are waiting for the studies to come in on the nutritional values associated with hydroponic fodder systems. And we hope that a study currently underway at the University of Colorado will help.”

Jacquelyne M. Docauer is a regular contributor to Growing Edge. She covers agriculture including hydroponics from her home in Georgia.

Sources and Resources

CropKing
www.cropking.com
www.grazegreen.com
 330.769.2002
 Manatee County Sheriff's Department
www.manateesherriff.com