

MSU Comprehensive Nutrient Management Plan: Keeping Everything in Balance

As part of the verification process for the Michigan Agriculture Environmental Assurance Program (MAEAP) livestock system, farmers must develop a comprehensive nutrient management plan (CNMP) that addresses manure collection, treatment, storage, transfer and land application to ensure that water and other natural resources are protected. A CNMP is also required for any operation classified as a concentrated animal feeding operation (CAFO) or an operation that applies for a National Pollutant Discharge Elimination System permit from the Michigan Department of Environmental Quality.

MAEAP is a proactive program that helps farms of all sizes and all commodities voluntarily prevent or minimize agricultural pollution risk. MAEAP teaches farmers how to identify and prevent environmental risks and comply with state and federal environmental regulations. Farmers who successfully complete the three phases of a MAEAP system are rewarded by becoming verified in that system. There are three systems: livestock, farmstead and cropping.

MAEAP was developed by a coalition of agricultural producers, commodity groups, state and federal agencies, and conservation and environmental groups. Though the Michigan Department of Agriculture is the verifying agency, MAEAP is a partnership effort, not a government or regulatory program.

All 14 MAES field research stations around the state are moving toward MAEAP verification; the Lake City Experiment Station and the Northwest Michigan Horticultural Research Station have received verification in the applicable systems. The East Lansing field research facilities on south campus, usually referred to as the south campus farms, also are working toward MAEAP verification. Ben Darling, assistant director of the Land Management Office, oversaw the 2-year process to develop the MSU CNMP. The Land Management Office manages the south campus farms as well as the MAES field research stations.

“We had a lot of the components necessary for the CNMP already in place,” Darling explained. “We just needed to go through the formal process of putting them under the CNMP umbrella in a formal document.”

Bounded by Collins Road on the west, Hagadorn Road on the east, Mount Hope Road and Service Road on the north, and Sandhill Road on the south, the south campus farms encompass approximately 2,700 acres, with about half of the acreage used to support university research through general crop production and pastures. The farms are also home to a number of livestock facilities:

- Beef Cattle Teaching and Research Center.
- Beef Cow/Calf Teaching and Research Center.
- Dairy Cattle Teaching and Research Center.
- Horse Teaching and Research Center.
- Poultry Teaching and Research Center.
- Sheep Teaching and Research Center.
- Swine Teaching and Research Center.
- Veterinary Research Center.
- Pavilion for Agriculture and Livestock Education.
- Veterinary Clinic/Hospital (located on the main part of campus).

“We have nine farms, each with different animals,” Darling said. “Plus, MSU is a research, teaching and demonstration site, so the number of animals at each farm will vary as projects begin and end. The goal was to bring everything together. The process of creating the CNMP was very important. Everyone involved began to think of the farms as one system, which they are. This concept was very important. We scrutinized everything from management, operation and housekeeping to location, layout, design and future planning, maintenance, inspection and record keeping, and how each individual farm fits into the south campus farms system.”

In addition to Darling, Kevin Shelle, University Farms Service Center manager, was heavily involved in creating the CNMP. They took advantage of expertise available from MSU Extension specialists and MAES scientists such as Natalie Rector, Dann Bolinger, Dale Rozeboom, Ben Bartlett and Rich Leep.

The assessment and evaluation necessary to create the CNMP revealed that phosphorus levels were generally going up on fields that were receiving manure. To offset this, a portion of the manure generated on campus is exported and another portion is composted. Darling said a feasibility study also is under way to see if an anaerobic digester would be a good fit for the south campus farms.

“We started composting manure in 2002,” Darling explained. “Of the approximately 11,000 tons of solid manure produced each year, about 6,800 tons are composted. On campus, MSU Grounds uses it, and we also sell it to the public through the MSU Surplus Store. We’d like the composting operation to be self-sustaining through the compost sales and are investigating how we can do that.”

Exported manure, about 1.2 million gallons of liquid and almost 600 tons of solids per year, goes to privately owned land. Darling said that’s a win-win situation because the owner of the land has a reliable source of nutrients for crop production, and MSU can sustainably manage the nutrients from the rest of the manure generated on the south campus farms land base.



Ben Darling, assistant director of the Land Management Office, oversaw the 2-year process to develop the comprehensive nutrient management plan for the south campus farms. Everything from management, operation and housekeeping to location, layout, design and future planning, maintenance, inspection and record keeping were scrutinized.

The manure that’s not exported or composted is stored and applied to campus fields twice a year. The storage facilities are inspected weekly, and storage volumes are documented.

The CNMP also incorporates a number of conservation practices, including grass filter strips around tile risers, inlets and surface water. Darling explained that the farm managers began using GPS locating and mapping system software about 2 years ago to determine exactly where all the water that touched south campus farms was going. They also began using manure management planning software to schedule manure applications.

“We made aerial maps of every field,” he said. “Each employee carries the maps whenever manure is applied. The maps identify all the sensitive areas. There is a setback of 35 feet for these areas that’s identified by a green circle. A 100-foot red circle signifies the setback that must be maintained if field condition quality or the integrity of the grass buffer strip is compromised.”

The fields generally receive minimum tillage, and fields are tilled in the fall only when manure is applied so the manure is incorporated immediately. Any fields that have elevated phosphorus levels are used to grow alfalfa. In addition, roofs were installed over cattle pens to divert clean water, and changes were made to feed storage and management areas to further conserve and protect water.

The CNMP will be reviewed annually or whenever changes of 10 percent or higher occur. Because new research projects may cause a dramatic shift in the number of animals at a facility, the CNMP uses historical average annual amounts of manure applied to land as a guide as well as projections of animal numbers for the upcoming year.

“The CNMP development process led to significant improvements in the overall farm system and its operation,” Darling said. “We now refer to our CNMP on an almost daily basis. It compiles not only all the ‘who, what, when, where and why’ about the livestock farm system but also all the facility and field aeriels and facility infrastructure information. It is an invaluable resource.”

∴ Jamie DePolo