



Zimmerman Dairy



Size:

60 milkers and 20 dry cows

Challenge:

This dairy was previously a dry lot operation and the owners had recently constructed a free-stall barn and changed to sand bedding. The existing manure storage was not practical to use for sand-laden dairy manure. The milking parlor water was not contained and the open lot runoff was not controlled. Manure from the free-stall barn was being stockpiled immediately outside the barn. Liquid and runoff from the pile was not controlled.



Demonstrated Practices:

- Manure Storage
- Wetland
- Filter Strip
- Fencing
- Diversion

EIF Contribution	Producer Contribution	Total Project Cost
\$46,972	\$14,582	\$61,554

Demonstrated Practices:

Manure Storage, Wetland, Filter Strip, Fencing, and Diversion

Description:

Constructed wetlands are an alternative technology for treating runoff and wastewater. Manure from the free stall barn is collected in a 60-foot by 80-foot concrete manure storage. The concrete debris basin collects runoff from the open lot and wash water from the milk parlor and routes it to the constructed wetland. The pumping station is used to maintain a constant liquid depth in the wetland and excess is pumped via an underground pipe to a field filter at the top of the hill. Clean water is diverted around the facility by two diversions. The wetland is very shallow and has been planted to cattails. The wetland utilizes a small pump to distribute excess liquid to a filter area. The filter area consists of furrows and gated pipe.

Environmental Benefits:

Manure, parlor water and lot runoff are now collected. Nutrients from the dairy are being treated by the wetland and field filter. The wetland was constructed with a clay liner to protect groundwater and the wetland can provide habitat for wildlife.

Design:

- **Diversions**

A diversion was constructed around the lot, concrete basin, and wetland to direct clean water around the site. A second diversion was constructed just to the east of the constructed wetland to divert roof water and a small area coming from the driveway.

- **Debris Basin**

An existing manure storage was converted into a debris basin and an outlet structure was installed. The debris basin can route the runoff from a 25-year, 24-hour storm to the wetland in 9 hours. The parlor waste and waste water is discharged to the debris basin.

- **Manure Storage**

A new concrete manure storage was constructed just to the west of the free stall barn. The north west corner of the structure has a 20-foot wide ramp for clean out. The structure is designed for manure and sand storage for 120 days. The south wall of the structure has two 8-foot (width) by 4-foot (high) openings for porous gates to allow the liquids to drain from the structure into the wetland.

- **Pump Station and Wetland**

The wetland is designed to operate at a depth of 12 inches while still maintaining sufficient capacity to contain the runoff from a 25-year, 24-hour storm event and still have 0.5 foot of freeboard. The pump station consists of a pump with a 300 gpm capacity (capacity needed to convey 25-year, 24-hour storm is 151 gpm). The pump also gives the producer the ability to de-water the wetland should it exceed the operating depth or expect an upcoming storm event.

The area was over-excavated and a liner installed after which a 1-foot layer of soil was placed in the bottom for wetland plants to grow in. The liner was installed as an extra precaution since the dairy is in a wellhead protection area.

• **Vegetative Filter**

When the pump engages, the liquid will be pumped 325 feet to the vegetative filter which is a corner of a pivot irrigated crop field. A riser was installed so the liquid can be distributed to furrows using gated pipe. An area of at least 1 acre will be utilized for a vegetative filter. The filter is sized for corn. This area does not receive commercial fertilizer. Cattle will be excluded from the filter area when the corn stalks in the field are pastured. The gated pipe is kept in place at all times except during times of field operations. The filter is operated so that runoff does not leave the field.

