

Vendor:

MultiForm Harvest

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Industry:

Dairy

Project type:

MultiForm Harvest
Struvite Crystallizer

Project goal:

Make manures phosphorus free and available to reform as struvite

Date of Case Study:

October 2016

MultiForm Harvest — Struvite Crystallizer

Jones Family Dairy, Massey MD

OVERVIEW

1,800 Wet Cows

Scrape dairy producing wastewater that runs through a slope screen for fibrous solids removal before entry to the MultiForm Harvest Struvite Crystallizer. Treated effluent then is stored in lagoons prior to field application.

BACKGROUND

Equipment type

• **MultiForm Harvest Struvite Crystallizer**

- The wastewater upflows through the bottom of the crystallizer, seeded by an existing bed of struvite crystals.
- At entry, sulfuric acid is dosed to lower pH to release the bound phosphorus, followed by subsequent dosing of anhydrous ammonia to restore the pH in presence of additional dosing of magnesium chloride solution. This drives the production of struvite on the seed crystals.
- System designed to treat 60,000 gallons per day and produces roughly 180 dry tons of struvite per year, which is roughly 0.1 dry tons/cow/year.

Products

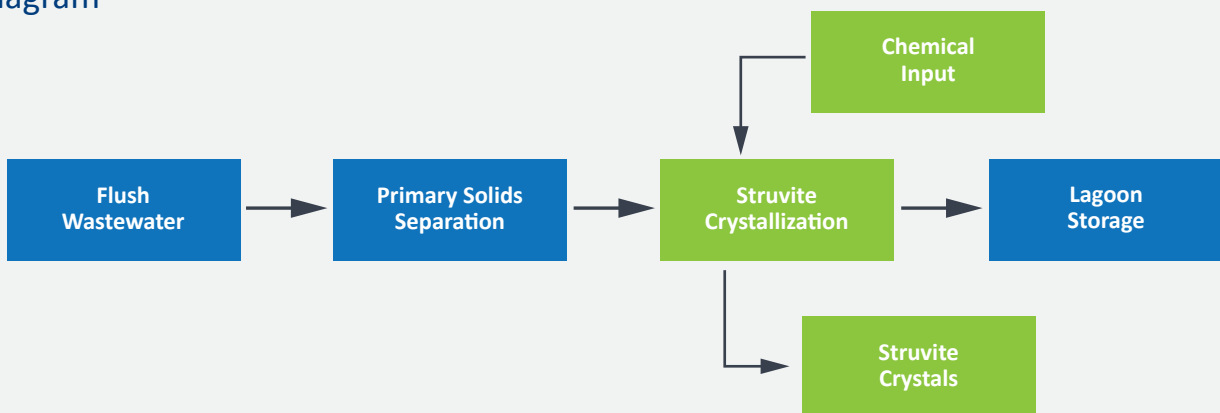
- **Struvite Crystals**

Economics

Capital Investment – The capital investment for this project was \$300,000, of which roughly ½ was paid for by external grants. This amounts to a capital cost of \$167/cow.

Operating and Maintenance – MultiForm Harvest chemical dosing costs as well as electricity and labor costs are in the range of \$80-100/cow/year, or for this project \$144,000-180,000 per year. Independent confirmation of this range is not available, although the dairyman quoted \$0.03/gallon for entire manure management, including collection, fiber separation, struvite and field application.

Flow Diagram



Performance

The high presence of calcium in the dairy cow diet induces production of colloidal, non-crystalline phosphate salts. This requires the added pH adjustment expenses to break these up and make the phosphorus free and available to reform as struvite. Crystallization on other manures such as swine do not require this breaking of structure and pH addition. Performance data from pilot testing at a Washington State dairy as well as informal confirmation from the Jones Family Dairy show that the system is able to consistently remove 70-80% total phosphorus from the influent wastewater, while also removing approximately 10% of total nitrogen due to the inclusion of ammonia within the struvite crystal structure (6-29-0-16Mg fertilizer rating with P reported as P2O5 and Mg reported as MgO).

Contractual relationship with MultiForm Harvest has produced struvite owned by MultiForm Harvest for sales and export out of the farm and watershed. Market pricing and penetration continues to evolve for struvite sales worldwide. Quoted pricing in 2015 was \$500-600/dry ton, although exact pricing structure and volume of sales have not been confirmed. Produced product is a blend of fine granular versus pelleted form, with approximate 10% moisture, although MultiForm Harvest, at all sites, continues to refine the process for production of more valued crystals.

CONCLUSION

MultiForm Harvest has completed extensive pilot testing at Qualco Dairy in Washington State with one commercial dairy application at the Jones Family Dairy. MultiForm Harvest has 4 installations on municipal wastewater facilities across the US (Yakima WA, Corvallis, OR, Boise ID, and Green Bay WI) where they treat the filtrate from

digested biosolids for P removal. Additional dairy installations have been slow to realization due to the availability of polymer processes. However, while the latter may require less capital expense, they do not yield the valuable struvite product in readily-useable fertilizer form as compared to the polymer products. This difference gives the MultiForm system an advantage for dairies with no economical outlet for the lower-value polymer system product. Neither product from the two competing systems are available for organic certification at present, but MultiForm is seeking certification. The MultiForm system can be used with or without AD as a pretreatment and a mobile lagoon treatment is feasible.



MultiForm Harvest Struvite Crystallizer
Jones Family Dairy, Massey, MD

Key Benefits & Results Summary:

- The system is able to consistently remove 70-80% total phosphorus from the influent wastewater, while also removing approximately 10% of total nitrogen due to the inclusion of ammonia within the struvite crystal structure (6-29-0-16Mg fertilizer rating with P reported as P2O5 and Mg reported as MgO).
- Produced product is a blend of fine granular versus pelleted form, with approximate 10% moisture.

For more information about MultiForm Harvest, or to join our mailing list, email info@newtrientllc.com.

Newtrient’s mission is to help all dairy farmers reduce the environmental footprint of manure while enhancing their economic opportunities and their social license to operate. The information contained in this case study was developed with the cooperation of the organizations involved and Newtrient has endeavoured to make sure it is accurate and complete as possible.



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