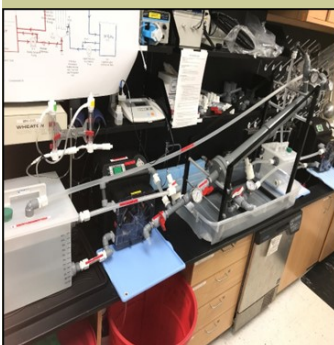


Diagram showing a basic configuration of ammonia capture system for NH<sub>3</sub> recovery

**Features and Benefits:**

- **Membrane modules are submerged in the liquid waste**
- **Removes 98% of ammonia from raw and digested wastewater**
- **Recovers rather than destroys a valuable resource**
- **Produces a high quality, saleable fertilizer product**



For More Information on Commercialization Contact:  
**Ms. Tanaga Boozer**  
 Technology Transfer Coordinator  
 USDA-ARS, OTT Southeast Area  
 Mobile: 662-336-9351  
[tanaga.boozer@usda.gov](mailto:tanaga.boozer@usda.gov)

For More Information on Scientific Aspects Contact:  
**Dr. Matias Vanotti**  
 Distinguished Senior Research Scientist  
 USDA-ARS CPSWPRC  
 2611 W. Lucas St.  
 Florence, SC 29501  
 Mobile: 843-245-6625  
[matias.vanotti@usda.gov](mailto:matias.vanotti@usda.gov)



**Agricultural Research Service**  
 U.S. DEPARTMENT OF AGRICULTURE

**Using Gas Permeable Membranes for Ammonia Recovery**

Disclosed is a system and method for passive capture of ammonia in an ammonia-containing liquid effluent. The invention allows for the passage of ammonia through microporous hydrophobic gas-permeable membranes and its capture in a circulated stripping solution with concomitant production of a concentrated non-volatile ammonium salt.

Two United States Patents cover the technology developed by ARS for liquid applications: "Systems and methods for reducing ammonia emissions and for recovering the ammonia from liquid effluents" US Patent 9,005,333 and US Patent 9,708,200 by Matias Vanotti and Ariel Szogi.

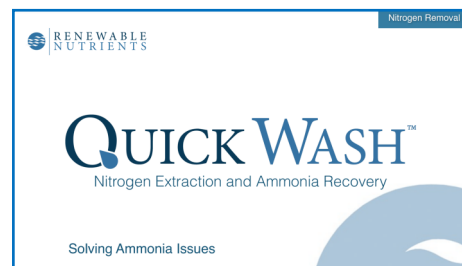
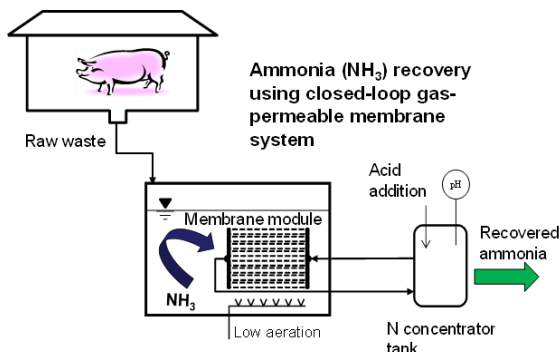
The process is disruptive to current technologies as it recovers the ammonia for beneficial use and by its very nature can be operated with no impact to the biological process. The process breaks the recycling loop by extracting—and recovering—valuable nutrients.

Renewable Nutrients, a small business with experience recovering phosphorus from wastes, was the recipient of the ammonia-trapping technology through exclusive licenses granted by the USDA. The technology is commercialized as Quick Wash® Nitrogen Removal & Ammonia Recovery.

In 2021, USDA/ARS received the FLC National Award in Excellence in Technology Transfer for "Recovery of Ammonia from Waste using Gas-Permeable Membranes".



**FLC Success Story:**  
 "USDA and industry partner improve nitrogen recovery from livestock and municipal wastes"



**About the Research Organization**

USDA/ARS delivers scientific solutions to national and global agricultural challenges. The technology was developed at the ARS Coastal Plains Soil, Water and Plant Research Center in Florence, SC. An important part of the Center's mission is development of treatment technologies to better manage manure from swine, poultry, and dairy operations to reduce releases to the environment of odors, pathogens, ammonia, and greenhouse gases as well as to maximize nutrient recovery.

Center inventions include: a high-performance nitrifying sludge, novel anammox bacterium isolate, recovery of ammonia from manure using gas permeable membranes, recovery of phosphorus from liquid and solid manures, recovery of proteins from wastes, and integrated systems of treatment technologies.