

SCIENCE & EDUCATION Impact

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Waste Is a Terrible Thing to Mind

Reduce, reuse, recycle.

The three Rs of a cleaner environment – reduce, reuse, recycle – apply on a large scale in agriculture. Waste, byproduct or effluent – whatever you want to call it – is the end product of meat and poultry production. Overall, agriculture is responsible for more than 95 million tons of waste each year. The difference between a waste product and an asset often is just imagination. In the pasture or barn it's called manure. Another way to think of it is as fertilizer, energy and compost. Land-Grant Universities and the USDA are providing research and education to turn waste into resources.

Payoff

- **Chicken litter loot.** In West Virginia's Pendleton County, 9,000 tons of poultry litter (manure and bedding) are part of a nutrient management plan by 80 farmers who are collectively saving between \$150,000 and \$200,000 annually by using this poultry industry byproduct as fertilizer. In Maryland 800,000 tons of litter containing an estimated 27,600 tons of nitrogen and 26,500 tons of phosphorus are used in large-scale composting operations to produce a safe, versatile product used on both farm fields and by the nursery and greenhouse industry. **Auburn Scientists** think there is "gold" in chicken litter. One truckload of chicken litter contains the equivalent of \$150 of commercial fertilizer. That's why they started the Certified Waste Vendor program to help poultry producers safely and responsibly tap this source of income. **Maine** research on soil management systems found that by amending the soil with manure, one can substantially reduce chemical fertilizer rates and still increase yields.
- **Rottin' research.** In 1997 Penn State started a campuswide composting project to transform food wastes, animal manure and landscape debris into compost for use in campus projects. The project processes 6 to 9 tons of food waste, 18 to 22 tons of dairy manure and 12 to 14 tons of landscaping debris annually. This saves \$300 to \$400 per week in waste removal fees and significantly reduces odor problems. **Georgia** Extension helped grade school students create a cafeteria waste composting system that eliminated odor and problems with scavenger animals. The project was featured in the "Biocycle" Journal of Composting and Organic Recy-

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cling. **Texas A&M** researchers found that composting in sealed containers, called in-vessel, reduces breakdown time from six months to about one month.

- **Aroma therapy.** **Purdue** researchers fed pigs a reduced protein-soy hull diet that costs less than the standard diet. It was supplemented with synthetic amino acids, which helped reduce the odor by cutting ammonia emissions by a third. **Michigan State** Extension found that treating swine manure with ozone is an environmentally sound, cost-effective way to remove odor.
- **Waste reduction.** Texas cattle produce approximately 400,000 tons of manure annually, requiring 100,000 acres of cropland to properly use the fertilizer. **Texas A&M** research found that cutting the phosphorus in the feed reduced the acreage needed to properly apply manure by approximately 226 acres for an average size herd. **Virginia Tech** Extension helped more than half of the state's swine and poultry producers learn to use phytase to reduce nutrient excretion. Nutrient excretion reductions of 50 percent are possible, which makes animal waste less of an environmental concern.
- **Grazing in the grass is a gas.** **Virginia Tech** researchers developed a dairy loafing lot rotational management system that enables dairy producers to rotate cows out of a single muddy lot and into fully vegetated grass paddocks. This simple change at three dairy operations reduced soil loss by 852 tons per year and provided 4,635 pounds of nitrogen and 921 pounds of phosphorus fertilizer to the pastures. **Utah State's** intensive rotational grazing program helps small family dairy operations stay competitive by reducing equipment and other input costs. The herd becomes both the harvester and fertilizer for the pasture.
- **Cow lights.** U.S. livestock produce millions of tons of waste annually, according to the Council for Agricultural Science and Technology. **Washington State** researchers calculate that as a fertilizer, dried manure is worth only about 1 cent a pound, but that value rises to 40 cents a pound if the manure is converted to various chemicals currently produced from petroleum. In terms of energy production, one cow's average daily manure translates into enough energy to burn a 100-watt bulb

for a day. **California** Extension is experimenting with second-generation biodigesters. One proposed for the L.A. Turf Club could yield \$2 million annual savings on electricity and hot water. Another \$720,000 savings is projected by eliminating the cost of hauling stable waste to the landfill.

- **Reduced wastewater worries.** **Alaska** research found that constructed wetlands seeded with native plants act as biological filters to remove pollutants from water. **Maryland** is using constructed wetlands to treat dairy farm wastewater and protect against outbreaks of microorganisms dangerous to human health. Constructed wetlands may be less expensive to operate than energy- and labor-intensive conventional wastewater treatment systems. **North Carolina A&T** research found that innovative approaches such as marsh-pond-marsh systems can remove 90 percent to 95 percent of nitrogen and easily can be built for operations with fewer than 500 hogs.
- **Waste profits.** **Purdue** researchers helped 12 pork producers develop manure management plans that saved an average of \$30 per acre by transforming their hog manure into fertilizer and also kept manure nitrogen out of Indiana water supplies. **Louisiana** Extension helped convert municipal sewage sludge, composted sewage sludge, forestry processing wastes of paper mill sludge and boiler ash, and cotton gin trash wastes into soil amendments. On test plots, cotton yields increased 1,000 pounds per acre over five years following a single application of these waste materials. This could increase the value of cotton in Louisiana by more than \$20 million per year and reduce stress on landfills.



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