

# Evaluating The economics of Litter Use



*MAFES agricultural economist Diane Hite, left, and graduate research assistant Ashley Renck discuss results from a poultry litter market analysis.*

By Charmain Tan Courcelle

**MAFES** researchers are evaluating the environmental and economic impacts of land application of poultry litter as part of an ongoing effort to support the poultry industry.

A team led by Diane Hite, MAFES agricultural economist, has developed several economic models that will aid the search for an environmentally sound and economically practicable solution to litter disposal. The work complements research projects underway at the Coastal Plain Branch Experiment Station in Newton.

Most litter from Mississippi broiler farms is used on-site as a fertilizer or soil amendment in hayfields and pastures. However, the soil storage capacity for nutrients can become exhausted with continued large applications of poultry litter, leading to potential environmental problems from runoff events.

“Runoff from overapplication of phosphorus — one nutrient found in poultry litter — has long been recognized to have a major environmental impact on waterways,” Hite said.

“When litter is overapplied to one site, not only is there an environmental cost, but the value of this fertilizer is lost as well. We’re trying to create a market for poultry litter that will allow this byproduct to be taken away from a point where it has negative value and used at another point where it has value.”

One analysis that Hite’s group has performed is based on a simulation program that incorporates local physical data — including soil types, meteorological conditions and topography — and fertilizer and tillage practice information. Research assistant Tasha Maupin and postdoctoral research assistant Walaiporn Intarapapong are using this biophysical modeling program to predict the amount of nutrient, fertilizer, sediment and pesticide runoff under various cropping and management systems over a 25-year period.

“There is only about two years of physical data from agronomy studies with poultry litter at the Newton branch station, so we don’t have a good understanding of the effect of different cropping practices on nutrient runoff over time,” Hite said. “The simulations give us an idea of this long-term effect and allow us to take into account different crops, various application rates of litter and other inputs to establish the best and most profitable combinations of litter, fertilizer and cropping practices.”

Hite said the simulation results are compared with field data collected from the Newton research plots to ensure the accuracy of this model. The modeling program is then calibrated accordingly.

Litter application rates can be calculated on a nitrogen or a phosphorus basis. Maupin and graduate research assistant Ashley Renck have compared the land use requirements and associated costs for each of these standards.

“We found with a nitrogen standard that much more phosphorus is applied than can be used by crops, so there is a cost from potential damage to the environment from runoff,” Renck said. “With a phosphorus standard, which allows litter to be applied ‘safely,’ at least twice as much land is needed for litter application as with a nitrogen standard.”

Maupin and Renck’s results suggest there is not enough land in poultry-producing Mississippi counties to sustain indefinitely the practice of litter application on poultry farms. And keeping litter in its “source

county” could cost poultry producers an average of \$21 or \$23 per ton of litter in labor, equipment and land expenditures based on a nitrogen or a phosphorus standard, respectively.

Because proper utilization of litter within Mississippi poultry-producing counties is limited by land availability, finding uses for litter outside these areas is regarded as one solution to this situation. To determine whether this approach will be economically feasible, Renck has examined the value and demand for poultry litter as a fertilizer at sites outside of the poultry-producing counties and the least cost for transporting litter from its source to these markets. She has also developed a goal-programming model that has allowed environmental goals to be included in her market analyses.

“The goal-programming model was set up to consider two diametrically opposed options — to get rid of litter safely and to do this as cheaply as possible,” Renck said.

Renck established the value of litter in counties outside of the poultry production area from the value of litter nutrients (nitrogen, phosphorus and potassium), crop acreage, the types of crops grown and farm structure, or size, in these counties. She then determined the minimum cost for adopting this practice based on county-to-county distances, transportation cost per mile, transportation cost per ton of litter and litter application costs.

Results from this model suggest that the average value of litter in off-site counties is \$34.40 or \$35.76 per ton of litter using a nitrogen or a phosphorus standard, respectively.

“This suggests that a grower could realize a net gain of \$13.40 or \$12.76 per ton of litter (the difference between value of litter off-site and cost to keep litter) on a nitrogen or a phosphorus basis, respectively, by transporting litter to distant counties,” Renck said.

In another study, Hite’s group is assessing consumer willingness to pay more for “eco-labeled poultry products.”

“An eco-label is a seal of environmental approval awarded by public or private organizations,” Hite explained. In this study, the eco-labeled product would be poultry from a farm that uses additional environmental standards which are more stringent than currently required to utilize and dispose of litter.

Hite said poultry producers will incur costs for litter disposal as government regulatory policies for poultry and livestock production change to address potential environmental problems associated with these industries. By Hite’s calculations, the cost of this regulation would be about 3 cents per pound of chicken. Renck has designed a survey to determine whether a green marketing approach using eco-labels could help producers cover this extra regulatory cost.

“We want to find out whether consumers would be willing to share the burden of environmental regulations with producers, and how much more they would pay for chicken grown under environmentally friendly conditions,” Hite said.

The survey has been sent to approximately 7,200 consumers nationwide. Results from this study will give the researchers an idea of the price that consumers are willing to pay for whole and cut chicken grown in an environmentally sound way and predict changes in demand due to price increases.

Renck said that previous green marketing studies on diverse goods, such as cosmetics, fish, fruit and forestry products, have shown that consumers are willing to pay for environmentally friendly products. She cited consumers’ willingness to pay more per can of “dolphin-safe” tuna as an example of this.

“Green labeling for poultry raised in an environmentally friendly way could be a real economic benefit — a win-win situation,” Hite concluded. “The consumer benefits from a very small price increase for cleaner waterways, and the producer benefits because he doesn’t have to bear all of the burden of meeting environmental regulations.”

*This pond shows visual signs of eutrophication — algal blooms and muddied, discolored water — which is caused by excessive nutrients in the water.*

