A Policy Evaluation of Transport Subsidies for Poultry Litter in West Virginia

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Research Objectives:

Evaluate the effectiveness of the West Virginia litter transport subsidy program in achieving program goals of:

(1) Attracting first time litter buyers;

(2) Subsidizing farmers who would continue to use litter in the future; and

(3) Encouraging farmers to utilize litter properly.

Problem Statement:

Poultry houses are geographically concentrated around processing facilities and generally depend upon feed imported from outside the area to support the industry. This nutrient inflow has led to numerous concerns about manure handling and disposal methods during land application. Encouraging the transport of litter from high density to low-density livestock production areas has been shown to be a least cost policy option for reducing nutrient overloads from land application.

In West Virginia, much of the poultry industry is concentrated in the Potomac Headwaters region of Grant, Hampshire, Hardy, Mineral, and Pendleton counties (see Figure 1). In 2002, 89.7 million broiler chickens and 3.6 million turkeys were grown in more than 900 poultry houses located in this five county region. This concentrated production is supported almost exclusively by imported feed, resulting in a large surplus of nutrients contained in poultry waste products. An estimated 160,000 tons of poultry litter are generated each year accounting for approximately seven million pounds of nitrogen (N) and phosphorus (P).

Transport Program Description:

To stimulate the movement of litter outside the entire Potomac watershed (including the Headwaters region), the West Virginia Department of Agriculture administered a transport subsidy program to farmers throughout West Virginia during 2001 and into 2002. These subsidies were intended as a pilot program to demonstrate the feasibility of moving surplus poultry litter from the five-county region. Litter was to be moved to areas of West Virginia (primarily in the central and northern parts of the state) where the soils are nutrient deficient, particularly in terms of P, and applied in an environmentally appropriate manner. A total of $75,000 in funding was provided for this program by the West Virginia Department of Agriculture and a poultry integrator (Pilgrim's Pride).

The primary feature of this program was to provide transportation cost subsidies to farmers outside the Potomac watershed who purchased poultry litter. Farmers were responsible for paying the first fifty miles of transport costs and then the program paid $2 per loaded mile of transport cost thereafter. No maximum distance was established, although only in-state farmers were eligible. Minimum and maximum tonnages were established at 15 and 100 per enrollment, respectively. To impress upon farmer participants the importance of nutrient planning in litter management, approval into the program was based upon an on-site assessment to determine farmer eligibility and development of a N-based nutrient management plan by a certified Nutrient Management Consultant.

Research Methods:

- A short mail survey was sent to 60 program participants during March 2002 with a 78% response rate.

- A detailed telephone survey was conducted on 31 farmers during April and May 2002.

- A brief, follow-up telephone survey was conducted in October 2003 to 26 farmers.

- Economic feasibility computations were made using excel spreadsheets to determine if litter use on tall grass hay land in West Virginia would be economically viable when compared with commercial fertilizer application.

- Feasibility computations were based upon two assumptions of management goals: (1) application of sufficient litter to increase the level of soil test P to a high soil fertility index; and (2) meeting the annual maintenance needs of P with a recommended 40 pounds of P_2O_5 per acre. Using these two management goals, present value costs were computed for both litter and commercial fertilizer. These present value costs of nutrient application were computed over a lifetime of management (into infinity).

- Economic feasibility was based on the net savings per acre by litter application. Net savings were computed by the present value cost for commercial fertilizer minus the present value cost for litter. Litter application under positive net savings was regarded as feasible while negative savings meant that commercial fertilizer was economically the less expensive nutrient source.

Research Summary:

A total of 5,935 tons of broiler and turkey litter were purchased by farmer participants (Figure 1). Three program goals were evaluated using mail and telephone survey data and economic computations of litter versus commercial fertilizer costs made with excel spreadsheets. These program goals were: (1) an ability to attract first time litter buyers; (2) to subsidize farmers who would continue to use litter in the future; and (3) to encourage farmers to utilize litter properly.

The first two goals were met about two-thirds of the time with 62% program participants being first time users and 64% of the subsidized litter being an economically feasible replacement for commercial fertilizer. In counties where litter application was economically feasible, the average cost reduction achieved by litter use was between 14% and 17% (see Figure 2). Under the third goal, environmental protections provided by the transport program were found to be comparable to that utilized by poultry growers within the Potomac Headwaters region (see Tables 1 and 2).

Despite most of the litter being transported to economically feasible regions, the program did not convince the majority of farmer participants to become committed users of litter without continued transport subsidies (Table 3).

Policy Recommendations:

Like many other states, budget problems in West Virginia have prevented the litter transport program from continuing into 2003. If the subsidy program was to be continued at some point in the future, the West Virginia Department of Agriculture should consider some of the following suggestions for future subsidy programs: (1) give funding priority to first time buyers; (2) establish a transport mileage cap within an economically feasible region, around 200 miles for tall grass hay land in West Virginia; (3) pay a portion of the transport bill rather than 100% after 50 miles in order to attract more buyers closer to but outside of the Potomac Headwaters region; and (4) avoid a continued dependence on subsidies by requiring prior program participants to pay an increasing portion of the transport costs to continue participation in the program over time.

Table 2. Proper litter management practices: transport program participants versus West Virginia poultry growers.

Proper Litter Management Practice	**Transport Program Participants**	**Poultry Growers[a]**
	(% of respondents)	(% of respondents)
Covered Storage of Litter	87%	82%
Soil Tests Conducted Prior to Litter Application	73%	71%
Calibration of Litter Spreader	60%	60%

[a] Source: Basden, T., C. Ritz, and A. Collins. "Incentive-Based Policies and Poultry Waste Management in West Virginia." *The West Virginia Public Affairs Reporter*. Institute for Public Affairs, West Virginia University, Morgantown, WV. 17(Summer 2000):2-6.

Table 1. Litter management practices by transport program participants.

Litter Management Practice	Percentage of respondents
Closely followed nutrient management plan	75%
Soil tests conducted prior to litter application	73%
Calibration of litter spreader	60%
Applied litter within a week of receipt	56%
Covered storage of litter	87%
Complied with NRCS setback guidelines for critical areas (surface water, wells, etc.)	82%

Table 3. Indicators of continuance for litter purchases after subsidy program ended.

Indication of Continuance	**Transport Program Participants**
Litter was purchased within an economically feasible region.	64% of litter
Survey response that indicated “yes” to continued purchase of litter after the subsidy program ended	6% of respondents
Purchase of litter in 2003, one and ½ years after the transport subsidy program had ended.	10% of respondents

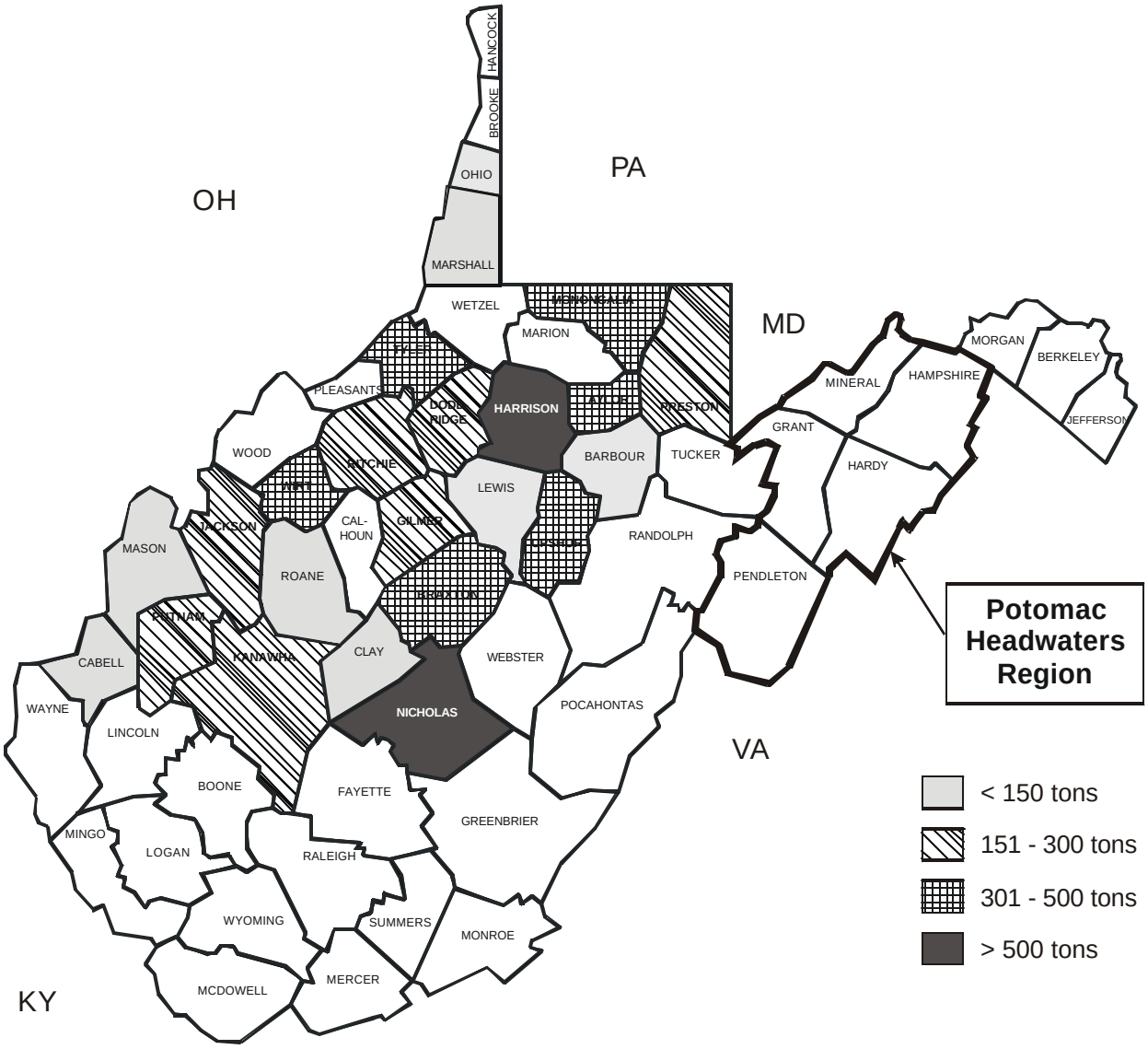

Figure 1. Poultry litter distribution by county under the litter transport subsidy program.

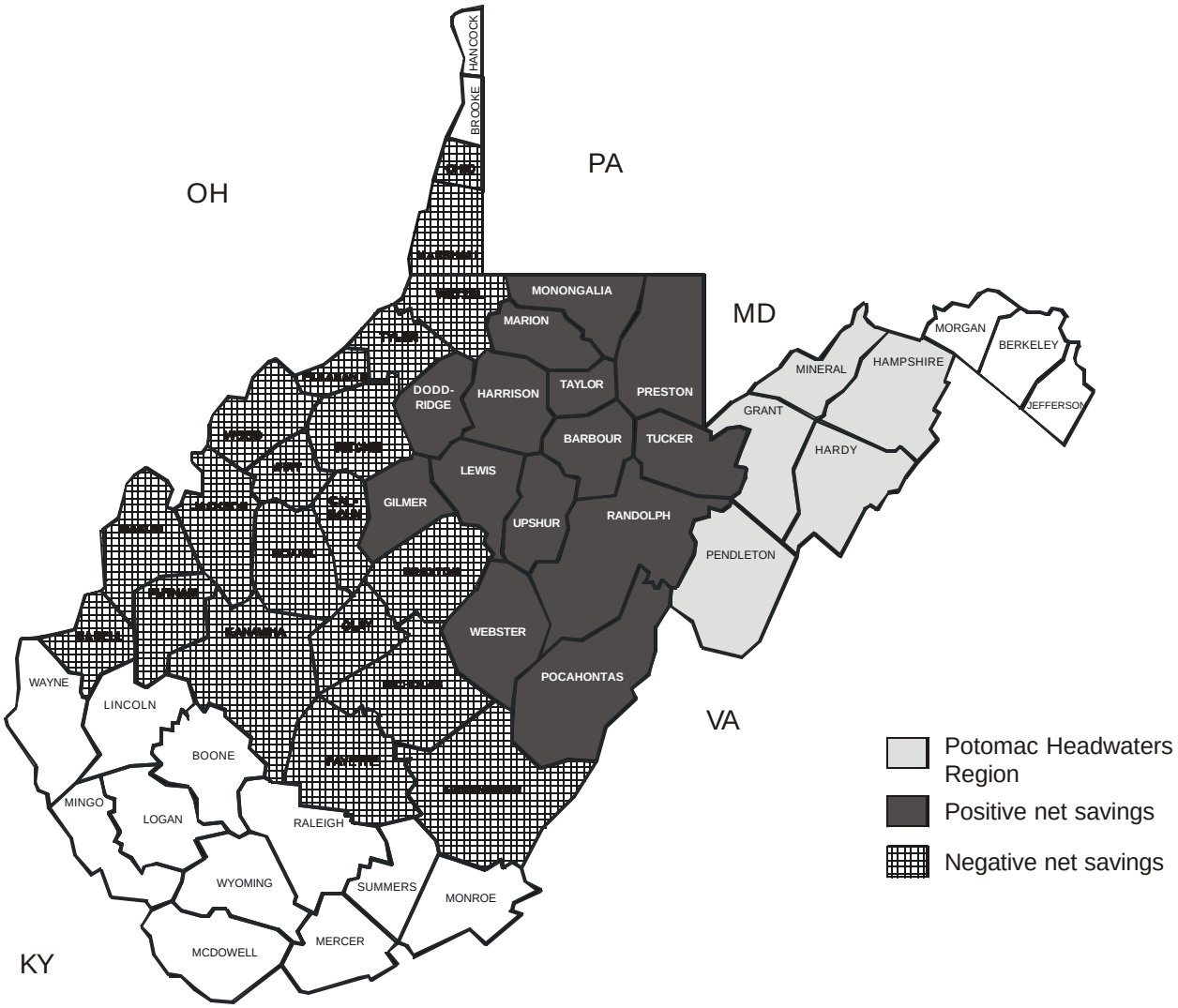

Figure 2. Economic feasibility of broiler litter application on tall grass hayland transported from Hardy County, WV without a transport subsidy at 80% nitrogen efficiency in fertilizer use.

Data and assumptions used to determine the economic feasibility of poultry litter transport by county.

Data Description	Assumption	Justification
Price Of Broiler Litter Fob ($/Ton)	$7.76	Average broiler litter price from survey sample (weighted by tons purchased).
Nutrient Content Of Litter (Lb/Ton) $N - P_2O_5 - K_2O$	53.3 (N) 41.95 (P_2O_5) 53.2 (K_2O)	Average nutrient content of dry broiler litter processed during 2002 at the West Virginia Department of Agriculture lab
Nitrogen availability for Organic N Mineralization of Broiler litter (%)	50% (year 1) 15% (year 2) 8% (year 3)	Available N due to mineralization. Source: Maryland Department of Agriculture (1993)
Application Cost Of Litter ($/Ton)	$7.17	Survey sample average weighted by tons spread. Cost assumptions for litter spreading were based upon labor at $7.50 per hour; spreader at $30 per day; and tractor costs from computed at the University of Illinois ($14.49 per hour plus respondents' fuel cost or $16.92 per hour including fuel cost).
Hauling Distance For Litter (Miles)	Varies by county	Mileage for each county was based upon average distance of transport from the survey sample. For counties not represented in the sample, distance was from Moorefield, WV to the county seat
Hauling Cost ($/Mile)	$2.50	Average transport cost from survey sample.
Litter Per Load (Tons)	20	Typical transport load.
Fertilizer Prices Fob ($/Ton) Diammonia Phosphate Urea Potash	 $265.00 $20.00 $180.00	Fertilizer prices were from Southern States in Weston, WV during May 2003.
Efficiency of Fertilizer N for plant use	60% and 80%	Sources: Moore (1996); Long, Kennedy and Gracey (1991); and Fowler and Brydon (1989)
Fertilizer Application Cost ($/Acre)	$6.00	Spreading charge by Southern States in Weston, WV during 2002
Fertilizer Delivery Cost	$0.00	Zero was used because the average pasture acreage spread with litter was 33 acres in the survey sample. This acreage is larger than the minimum charge from Southern States for fertilizer application.
Initial Level Of Soil P (Lb/Acre)	Range from 36 to 66	County-wide averages for tall grass hay land based on data from the West Virginia University Soil Testing Lab
Soil P Fertility Index	65	Median index for a high level of soil test P on tall grass hay or pasture in West Virginia
Efficiency of Soil P Additions	27% for litter 15% for fertilizer	Changes in soil test P in response to P_2O_5 applications from litter or fertilizer. Sources: Basden *et.al.* (2003) and Rasnake (1996) for litter and Mullins (2001) for fertilizer.
Interest Rate (%)	7%	Agricultural land value discount rate from Lamb and Henderson (2000)