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The Case for Acceptable Levels of Environmental Self-Regulation in the Poultry Industry: Policy and Economic Implications

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Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, August 1-4, 2004

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Abstract

With increased production of poultry in key areas of the country, poultry litter is becoming the focus of increasing concern and scrutiny. This paper proposes to identify specific concerns of growers related to management of poultry litter, and analyze potential outcomes of possible environmental quality related clauses, based on field studies.

Part 1. Research Problem:

The problem addressed in this study is that the rapid growth of the poultry industry in the US, especially in the Ozarks region, has led to the generation of large quantities of waste and nutrients as by-products. The U.S. poultry industry is one of the largest and fastest growing livestock production systems in the world, growing at an annual rate of five percent (Sims and Wolf, 1994). Between 1960 and 1998, annual broiler production in the U.S. rose from 2.3×10^9 kg to 17×10^9 kg. The economic impact of the poultry industry on the U.S. and global economics is significant and of increasing importance (Sims and Wolf, 1994). Although economically successful, the poultry industry is faced with a number of complex and challenging environmental problems, many of which are related to its size and geographically concentrated nature (Sims and Wolf, 1994). Rapid growth of the poultry industry in several states of the U.S. has resulted in huge amounts of waste, particularly litter (manure and bedding material), to be (Sims and Wolf, 1994). Because of the generation of large quantities of waste and nutrients such as nitrogen (N) and phosphorous (P) as by-products, there is a need to manage the waste properly to protect water quality (Abraham and Kepford, 2000).

Poultry litter management is an important component of poultry production. Poultry production results in large amounts of litter, which consists of manure, spilled feed, water, bedding materials and feathers. To date, the vast majority of all poultry litter has been spread on pasture and forage lands as a soil amendment and a replacement for commercial fertilizer to improve yields. The parties currently involved in litter management (growers, integrators, clean-out-contractors and off-farm users/consumers) have been unsuccessful in addressing the problem of phosphorus run-off into water sources. This problem is tied to repeated heavy land application of poultry litter, a practice that developed because it was the most economically beneficial use of the poultry litter. Alternative utilization of the litter is not currently an economically viable choice; changing the litter system will result in added costs to the poultry production process. Poultry firms (integrators) are reluctant to bear this cost, as current contracts specify the litter the property of the grower; moreover, the integrators don't want to incur the significant capital costs and potential liability associated with litter

management. Current off-farm users and consumers of litter do not have the finances or the infrastructure to implement an alternative approach on a large- scale basis, nor can they employ currently available technology to address the litter management problem. Additionally, none of the parties are comfortable with the current state of legislations and regulations that appear to be in a continued state of flux. (Goodwin et al., 2000).

There is therefore an urgent need to manage the litter properly to avoid further deterioration of water quality through effective regulation – whether governmental or self-regulation or partial self-regulation. What sort of regulatory framework would be best under the existing circumstances? The poultry industry is facing increasing regulatory/ social pressures regarding waste management in general and on-farm litter management in particular. Concerns have focused on water quality impacts from non-point sources linked to traditional on-farm litter management practices. There is furthermore a “disconnect” between incurrence of additional operating expenses at the producer level and the ability to pass those costs on to product consumers because of the unique structure of the poultry industry. It is essential that this disconnect facing the poultry industry be addressed so that expenses associated with alternative litter management practices can be adequately addressed. Accordingly, the various market interventions and incentives available to the public sector and/ or the poultry industry that could resolve this impasse and enable the poultry industry in the US to remain economically viable must be identified and evaluated (Goodwin and Wimberly, 2001).

Part 2. Objective:

Management of poultry litter as a resource to enable continued environmentally and economically sound utilization is a public policy issue. Public policies are formulated. A public policy is a causal model designed to create social change (or stabilization). The policy assumes that we are at point X and want to get to Point Z. A public policy, at least formally is the insertion of a new variable (program or policy Y) between X and Z that will move us from X to Z. This study assumes that we are currently at point X, which is one of deteriorating water quality in the Ozarks region owing in part to generation of large quantities of poultry litter, and the goal is to move to Point

Z, which would be where the increasing levels of poultry litter can be managed to control further deterioration of water quality and maintain a viable poultry industry.

The primary objective of this study is to find out what the new variable (Policy Y) is which could help this region move from Point X to Point Z. The hypothesis of this study is that this new variable would be a new type of poultry contract between the growers and integrators that would allocate equal responsibility between the two parties, would comply with current government regulations and discourage additional government regulations. Specifically, this will be accomplished by:

1. Identifying specific concerns of growers related to their poultry litter;
2. Identifying potential outcomes of possible acceptable levels of environmental compliance, through both governmental and self-regulation, in the poultry industry; and
3. Analyzing and assessing the economics and policy impacts of self-regulation on the examined watersheds versus industry versus mandatory governmental regulation on the examined watersheds.

Part 3. Approach(es) to the Problem/ Methodology:

The site and sample selection focused on the Illinois River watershed (IRW) and Eucha/ Spavinaw watershed (ESW), watersheds that have been identified by various legislative and regulatory entities as environmentally sensitive. Four one-on-one interviews with poultry growers (two per watershed) and focus group meetings of ten to twelve growers in each of the watersheds were used to provide qualitative input to the study. Sessions were held in central facilities around Northwest Arkansas and tape recorded so the discussions could be subsequently fully analyzed.

Focus group meetings of ten to twelve growers in each of the watersheds were used to provide qualitative input to the study. The main purpose of the focus groups was to identify and refine questions for the eventual grower survey, which was to take place in a later stage of the study. Another significance of the focus group sessions was that they helped us uncover how growers “feel”

with respect to impact of regulatory pressure. It was noted that while the growers in IRW were more open to discussing issues related to litter management and disposal and were inclined to demand a high price for their litter, growers in ESW were more tense and angry as they could no longer apply litter on their lands and were having to sell their litter for a loss or give it away for free to anyone who was willing to take it. The growers in both watersheds assigned a high value to their litter and considered it an asset only if they applied/ were allowed to apply it to their pasture and hay acres, and saw it as a liability if the regulatory situation did not allow them to do so. Growers in ESW were totally against the prevailing regulatory pressures weighing on them, while the growers in IRW were still open to discussion. And this difference in grower attitudes on the basis of the watershed also contributed in part to preferential difference in policy options between the two states.

Following the interviews and focus group sessions, the survey was prepared based on the results of the focus group discussions. A random sampling framework was utilized to determine the survey sample from the population of growers in each watershed. The total number of growers was collected from the Tax Assessors Offices for Benton and Washington Counties in Arkansas, and from the Oklahoma Department of Agriculture. The number of growers located in IRW and ESW as well as the contact information for them was gathered from the Department of Highway and Transportation 911 maps.

As with the assessment of any other economic utility, environmental values are measured as the amount an individual would be willing to pay for an increase in the quality or quantity of a good or service, or the amount they would be willing to accept in compensation for the decrease in the quality or quantity of the good or service. In measuring environmental benefits, values can be ascertained by an individual's willingness to pay to maintain an existing environmental amenity or their willingness to accept compensation for the loss of an amenity (Kahneman, 1993). This survey used the willingness-to-accept model as opposed to the commonly used willingness-to-pay model since one of the goals of this study is to find out the minimum compensation growers in the Ozarks region would be willing to accept in exchange for utilizing their litter.

The primary objective of this study is to find out the acceptable levels of environmental self-regulation in the poultry industry. Since the very term “self-regulation” means that the industry or profession rather than the government is regulating, the growers were asked as part of the survey - in keeping with the willingness-to-accept model - what sort of self-regulation they would be willing-to-accept in the poultry industry. The first part of the survey presented the growers with the existing regulatory structure and then asked them to select the one most acceptable from three alternative regulatory scenarios that may apply in the future. These three scenarios were:

- (1) Lobby to discourage further governmental regulation - this represented continuation of existing situation which is one of *no self regulation*;
- (2) Establish a non-governmental organization comprised of growers, integrators and representatives from public agencies that would develop and implement management practices that comply with current government regulations and discourage additional government regulations – this represented *partial self-regulation*; and
- (3) Develop contracts between growers and integrators that share responsibility, that comply with current governmental regulations and discourage additional government regulations – this represented *complete self-regulation*.

The growers were then informed about the idea of a Litter Bank being one option under consideration that could help handle the surplus litter generated in the Ozarks region. They were also informed regarding how it could, if established: (1) serve as a central clearinghouse for surplus litter generated by farms in the region; (2) coordinate and provide litter pickup and transport from the farm; (3) develop markets for litter and litter products; and (4) provide a dividend back to the grower in the form of money, goods, services or other assistance. A set of products or services was constructed by combining the selected levels (values) of each of the attributes (factors) resulting from the focus group sessions (see Table 1). The growers were then presented with fifteen different combinations of money, goods, services and assistance that a litter bank might be able to provide in exchange for surplus litter (see Table 2).

Table 1: Selected attributes, descriptions, and levels.

Attribute(s)	Description(s)	Level(s)
Value	Monetary and non monetary values	(1) Pay \$3 per ton of litter (2) Pay \$6 per ton of litter (3) Provide clean-out service in exchange for litter (4) Replace bedding in exchange for litter (5) Transport litter to off-farm site in exchange for litter
Assist	Regulatory compliance assistance	(1) Assistance in setting up a litter record-keeping system ¹ (2) Litter export certification ² (3) Government aid application assistance ³

The growers were asked to assign a score from 0 to 100 to each one, based on how acceptable that was to them. Zero meant that the scenario was totally unacceptable to them and 100 meant that it was totally acceptable to them. The aim was to find out the scenario most acceptable to the grower and to assess the extent to which respondents are prepared to trade off relevant attributes against one another.

A number of analytical methods were employed in assessing the data. Simple summary statistics, including frequency, and mean and standard deviation were derived and regression analysis was employed to achieve analysis of variance. Analysis was done for states irrespective of watersheds and vice versa. Conjoint analysis was performed to assess the results from Part 2. The formulated orthogonal plan was applied to develop a set of fifteen scores. Attribute(s) values were developed by the program on the basis of the fifteen scenario grades assigned by the surveyed growers. Regressions in SPSS and SAS were then performed using these orthogonal program results.

¹ Litter record keeping system: The litter bank would provide record-keeping forms and instructions for using them, possibly including computerized systems.

² Litter export certification: The litter bank would certify transport of surplus litter from your farm and assume full responsibility for that litter.

³ Government aid application assistance: There are several financial and technical assistance programs available to help cover part of the cost of complying with CNMPs. The litter bank would inform growers about eligibility requirements and which CNMP activities qualify, as well as provide assistance with the application process.

Table 2: Combination scenarios

#	Code	Litter Bank Grower Assistance	Litter Bank Payment to Grower	Score
1	A	Government aid application assistance	Provide clean-out service in exchange for litter	
2	B	Litter export certification	Pay \$6 per ton of litter	
3	C	Litter export certification	Replace bedding in exchange for litter	
4	D	Assistance in setting up a litter record-keeping system	Pay \$6 per ton of litter	
5	E	Assistance in setting up a litter record-keeping system	Provide clean-out service in exchange for litter	
6	F	Assistance in setting up a litter record-keeping system	Pay \$3 per ton of litter	
7	G	Assistance in setting up a litter record-keeping system	Replace bedding in exchange for litter	
8	H	Government aid application assistance	Replace bedding in exchange for litter	
9	I	Government aid application assistance	Pay \$6 per ton of litter	
10	J	Litter export certification	Provide clean-out service in exchange for litter	
11	K	Litter export certification	Transport litter to off-farm site in exchange for litter	
12	L	Assistance in setting up a litter record-keeping system	Transport litter to off-farm site in exchange for litter	
13	M	Government aid application assistance	Transport litter to off-farm site in exchange for litter	
14	N	Litter export certification	Pay \$3 per ton of litter	
15	O	Government aid application assistance	Pay \$3 per ton of litter	

And lastly qualitative research was used to analyze the grower comments. Nvivo (N5) software was used for grouping together the grower comments. This software is designed to support qualitative research projects in just about any field of application and utilizing most qualitative methodologies. N5 is useful because most projects are helped by having nodes managed in catalogs, so they can be easily located. In the Node Explorer you can create new nodes and arrange existing nodes into hierarchical trees under “tree nodes”. With N5, nodes can be used to code project documentation where their topic occurs. The grower comments in this survey were coded at 9 nodes and are presented in Table 3. After a detailed perusal of the comments, the researcher found that most growers’ comments revolved around various concerns regarding litter application and problems,

environmental issues arising out of litter usage and phosphorous in the waterways, and lastly involved regulatory concerns and government involvement. Litter concerns, environmental issues, and regulatory factors were therefore taken to be the main parent nodes.

Table 3: NVivo-Grower comments

Node #	Nodes
<i>1.</i>	<i>/Litter Concerns</i>
1.1.	/Litter Concerns/ Litter Bank
<i>2.</i>	<i>/Environmental Issues</i>
2.1.	/Environmental Issues/ Phosphorous
<i>3.</i>	<i>/Regulatory Factors</i>
3.1.	/Regulatory Factors/ Tulsa
3.2.	/Regulatory Factors/ Government
3.3.	/Regulatory Factors/ Contracts
<i>4.</i>	<i>/Other</i>

Part 4. Summary of Findings:

4.1. Part 1 of Survey: The Policy Question:

The results of this survey indicate that majority of the growers prefer the establishment of a non-government organization comprised of growers, integrators and representatives from public agencies that would develop and implement management practices that comply with current government regulations and discourage additional government regulations. Out of a total of 124 surveyed growers, 56% would like to see a non-governmental organization in place to take care of the litter problem, 34% would like a new contract developed between the growers and integrators, and a mere 10% would like to lobby to avoid further governmental regulations. Policy Alternative 2 is preferred by the majority of growers in Arkansas, and in the Illinois River and Eucha/ Spavinaw watersheds. Policy Alternative 3 was preferred by growers in Oklahoma, where 46% of the growers surveyed prefer new contracts between growers and integrators that share the responsibility as opposed to a new non-governmental organization comprised of growers, integrators, and representatives from public agencies. In Oklahoma, 41% of the growers are in favor of a litter bank,

and 13% are in favor of lobbying. In particular in Oklahoma - ESW, 49% of the growers voted for a new form of contract, 34% of the growers want a non-governmental organization, and 17% are in favor of lobbying (see Table 4).

Table 4: Ranking of policy options preferred by the growers in AR, OK, IRW, ESW, IRW-AR, IRW-OK, ESW-AR, ESW-OK, and by all growers combined

State/ Watershed	AR	OK	TOTAL
IRW	1. Alternative 2² (29/48; 60.4%) ⁴ 2. Alternative 3³ (14/48; 29.2%) 3. Alternative 1¹ (5/48; 10.4%)	1. Alternative 2² (8/13; 61.5%) 2. Alternative 3³ (5/13; 38.5%) 3. Alternative 1¹ (0/13; 0%)	1. Alternative 2² (69/124; 55.6%) 2. Alternative 3³ (42/124; 33.9%) 3. Alternative 1¹ (13/124; 10.5%)
ESW	1. Alternative 2² (18/22; 81.8%) 2. Alternative 3³ (3/22; 13.6%) 3. Alternative 1¹ (1/22; 4.5%)	1. Alternative 3³ (20/41; 48.8%) 2. Alternative 2² (14/41; 34.1%) 3. Alternative 1¹ (7/41; 17.1%)	1. Alternative 2² (37/61; 60.7%) 2. Alternative 3³ (19/61; 31.1%) 3. Alternative 1¹ (5/61; 8.2%)
TOTAL	1. Alternative 2² (47/70; 67.1%) 2. Alternative 3³ (17/70; 24.3%) 3. Alternative 1¹ (6/70; 8.6%)	1. Alternative 3³ (25/54; 46.3%) 2. Alternative 2² (22/54; 40.7%) 3. Alternative 1¹ (7/54; 13.0%)	1. Alternative 2² (69/124; 55.6%) 2. Alternative 3³ (42/124; 33.9%) 3. Alternative 1¹ (13/124; 10.5%)

¹Alternative 1: Lobby to discourage further governmental regulation

²Alternative 2: Establish a non-government organization comprised of growers, integrators and representatives from public agencies (litter bank). This organization would develop and implement management practices that comply with current government regulations and discourage additional government regulations.

³Alternative 3: Develop contracts between growers and integrators that share responsibility, comply with current government regulations and discourage additional government regulations.

⁴ Frequency of response ratios and percentages shown in parentheses

4.2. Part 2 of Survey: Preferred Policy Scenario(s):

Using the partial-profile conjoint methodology for the averaged importance scores, the scenario that all the 124 survey participants deemed most vital was scenario 2, which was a combination of Assistance 2 (litter export certification) and monetary/ non-monetary Value 2 (\$6.00

per ton of litter). Thus, for the attributes and levels evaluated in this study, the 124 growers surveyed find scenario 2 as the best possible service that the litter bank can render to them (see Table 5).

Table 5: Conjoint analysis results for the entire group

State/ Watershed	AR	OK	TOTAL
IRW	\$6.00 (18.0798 ¹ ; 77.31 ²) and litter export certification (3.4713 ¹ ; 22.69 ²) Pearson's R = 0.957 ³ Kendall's tau=0.848 ³	\$6.00 (21.4286 ¹ ; 82.65 ²) and litter record management (0.6908 ¹ ; 17.35 ²) Pearson's R = 0.968 ³ Kendall's tau=0.867 ³	\$6.00 (19.0195 ¹ ; 78.81 ²) and litter export certification (2.4216 ¹ ; 21.19 ²) Pearson's R = 0.963 ³ Kendall's tau=0.810 ³
ESW	\$6.00 (14.9212 ¹ ; 77.05 ²) and litter export certification (2.9539 ¹ ; 22.95 ²) Pearson's R = 0.936 ³ Kendall's tau=0.810 ³	\$6.00 (18.1051 ¹ ; 78.03 ²) and litter export certification (2.2180 ¹ ; 21.97 ²) Pearson's R = 0.955 ³ Kendall's tau=0.771 ³	\$6.00 (16.3159 ¹ ; 77.48 ²) and litter export certification (2.6315 ¹ ; 22.52 ²) Pearson's R = 0.951 ³ Kendall's tau=0.848 ³
TOTAL	\$6.00 (16.9752 ¹ ; 77.22 ²) and litter export certification (3.2903 ¹ ; 22.78 ²) Pearson's R = 0.955 ³ Kendall's tau=0.867 ³	\$6.00 (19.7069 ¹ ; 80.26) and litter export certification (1.0191 ¹ ; 19.74 ²) Pearson's R = 0.972 ³ Kendall's tau=0.790 ³	\$6.00 (17.9171 ¹ ; 78.27 ²) and litter export certification (2.5072 ¹ ; 21.73 ²) Pearson's R = 0.962 ³ Kendall's tau=0.829 ³

¹ Utility score

² Averaged importance score (This score for both the attributes = 100)

³ Pearson's R correlation coefficient and Kendall's tau are both an indication of how well the model fits the data. Both coefficients are desired to be close to one.

If the growers could not get their first preference of Value 2 (\$6.00 per ton of litter) and Assistance 2 (litter export certification) then they would prefer to be given bedding in exchange for litter (Value 4) and government aid application assistance (Assist 3) as a second choice (see Table 6). However, if the entire sample is evaluated by sub-groups the second choice for ESW and for Oklahoma appears to be Value 3 (clean-out service in exchange for litter) and Assistance 3 (government aid application assistance). The sub-groups Arkansas-ESW and Oklahoma-IRW also selected Value 3 and Assistance 3 as their second alternative choice.

Table 6: Conjoint analysis results for preferred alternative scenario for the entire group

State/ Watershed	AR	OK	TOTAL
IRW	Bedding (7.5084¹) and government assistance (-1.4618¹)	Cleanout (4.1528¹) and litter export certification (-0.2696)	Bedding (3.9335¹) and government assistance (-1.1698¹)
ESW	Cleanout (4.2100¹) and litter record management (-1.4282¹)	Bedding (-6.0879¹) and government assistance (1.2567¹)	Cleanout (5.3250¹) and government assistance (-0.3068¹)
TOTAL	Bedding (6.2139¹) and government assistance (-1.4841¹)	Cleanout (5.5010¹) and government assistance (0.4480¹)	Bedding (2.1145¹) and government assistance (-0.8179¹)

¹ Utility scores

* Averaged Importance Scores are not shown here as they are the same as the ones shown in Table 5.

Using the partial-profile conjoint methodology for the averaged importance scores, a CONJOINT function similar to the one discussed above was estimated for only the 73 growers who raised broilers/ Cornish to see any difference in expectations and needs. The scenarios scores for these 73 survey participants found that scenario 2 - Assistance 2 (litter export certification) and Value 2 (\$6.00 per ton of litter) - still results in the most significant attribute expressed by the respondents, thus for the attributes and levels tested in this study, these 73 broiler/ Cornish growers surveyed find scenario 2 - Assistance 2 (litter export certification) and Value 2 (\$6.00 per ton of litter) - as the best possible service that the litter bank can render to them (see Table 7).

The second best choice/ preference for the 73 broiler/ Cornish growers surveyed appears to be that if the growers could not get their first preference of Value 2 (\$6.00 per ton of litter) and Assistance 2 (litter export certification) they would prefer to be given bedding and government aid application assistance as a second choice (see Table 8). However, the second choice for Oklahoma alone in this case appears to be Value 3 (cleanout service in exchange for litter) and Assistance 3 (government aid application assistance). The sub-groups Oklahoma-ESW and Oklahoma-IRW also selected Value 3 and Assistance 3 as their second alternative.

Table 7: Conjoint analysis results – preferred combination - for broilers alone

State/ Watershed	AR	OK	TOTAL
IRW	\$6.00 (18.4914 ¹ ; 79.67 ²) and litter export certification (2.0657 ¹ ; 20.33 ²) Pearson's R = 0.978 ³ Kendall's tau=0.886 ³	\$6.00 (20.2638 ¹ ; 84.00 ²) and litter export certification (1.1520 ¹ ; 16.00 ²) Pearson's R = 0.985 ³ Kendall's tau=0.848 ³	\$6.00 (18.9227 ¹ ; 80.72 ²) and litter export certification (1.8433 ¹ ; 19.28 ²) Pearson's R = 0.979 ³ Kendall's tau=0.848 ³
ESW	\$6.00 (15.4305 ¹ ; 72.35 ²) and litter export certification (2.4058 ¹ ; 27.65 ²) Pearson's R = 0.901 ³ Kendall's tau=0.733 ³	\$6.00 (20.9420 ¹ ; 77.02 ²) and litter export certification (1.9498 ¹ ; 22.98 ²) Pearson's R = 0.972 ³ Kendall's tau=0.848 ³	\$6.00 (17.6845 ¹ ; 74.26 ²) and litter export certification (2.2193 ¹ ; 25.74 ²) Pearson's R = 0.940 ³ Kendall's tau=0.829 ³
TOTAL	\$6.00 (17.4769 ¹ ; 77.24 ²) and litter export certification (2.1784 ¹ ; 22.76 ²) Pearson's R = 0.966 ³ Kendall's tau=0.829 ³	\$6.00 (20.6138 ¹ ; 80.40 ²) and litter export certification (1.5638 ¹ ; 19.60 ²) Pearson's R = 0.981 ³ Kendall's tau=0.886 ³	\$6.00 (18.4420 ¹ ; 78.21 ²) and litter export certification (1.9893 ¹ ; 21.79 ²) Pearson's R = 0.972 ³ Kendall's tau=0.886 ³

¹ Utility score

² Averaged importance score (This score for both the attributes = 100)

³ Pearson's R correlation coefficient and Kendall's tau are both an indication of how well the model fits the data. Both coefficients are desired to be close to one.

Table 8: Conjoint analysis results for preferred alternative scenario for broilers only

State/ Watershed	AR	OK	TOTAL
IRW	Bedding (15.8514 ¹) and litter record management (-0.5043 ¹)	Cleanout (5.3539 ¹) and government assistance (-0.3279 ¹)	Bedding (12.5626 ¹) and litter record management (-0.5821 ¹)
ESW	Bedding (6.2670 ¹) and litter record management (-0.5799 ¹)	Cleanout (3.1045 ¹) and government assistance (1.9256 ¹)	Bedding (4.3760 ¹) and government assistance (-0.2917 ¹)
TOTAL	Bedding (12.6747 ¹) and litter record management (-0.5293 ¹)	Cleanout (4.1929 ¹) and government assistance (0.8351 ¹)	Bedding (9.3841 ¹) and government assistance (-0.8848 ¹)

¹ Utility score

* Averaged Importance Scores are not shown here as they are the same as the ones shown in Table 7

Part 5. Conclusion(s):

The concept behind this study was that a new variable (program or policy Y) is needed to move us from point X, which is one of deteriorating water quality in the Ozarks region owing in part to generation of large quantities of poultry litter, to Point Z, which would be where the increasing levels of poultry litter can be managed to control further deterioration of water quality and maintain a viable poultry industry. It was postulated in this study at the start that this variable (program or policy Y) would be a new type of poultry contract between the growers and integrators that would allocate equal responsibility between the two parties, would comply with current government regulations and discourage additional government regulations. Results from this study suggest hypothesis should be rejected, as the growers have indicated that they desire this new variable to be a non-governmental organization comprised of growers, integrators and representatives from public agencies that would take care of the prevailing problem. In other words, the growers would like this new policy to be one of partial self-regulation, and not of either 'no self-regulation' or of 'complete self-regulation'.

Part 6. Policy Implications of Adopting Preferred Policy, i.e. Establishing a Litter Bank:

A "Litter Bank" (LB) could help handle surplus litter in areas of concern. Any form of litter bank would be a regional approach to addressing the surplus litter problem and would seek to find economically and environmentally viable alternatives for utilizing poultry litter outside surplus areas. The general idea is that the litter bank, if established, could: (1) serve as a central clearinghouse for surplus litter generated by farms in the Ozarks region; (2) coordinate and provide litter pickup and transport from the farm; (3) develop markets for litter and litter products; and (4) provide a dividend back to the grower in the form of money, goods, services or other assistance. However, what would be the implications of establishing a litter bank on the stakeholders?

6.1. Implications on Contractual Arrangements:

The Ozarks region has always been primarily an agricultural region. The fertile soils in this region have been the direct result of the poultry manure that was applied on the land by the farmers. The farmers in this region were primarily cattle and swine producers who chose to grow poultry. This

was done mainly to augment their income by selling the grown poultry, for applying the poultry litter on their fields as a cheap source of fertilization, and for feeding it to their cattle. It was in other words a non-monetary but positive asset for the growers. The growers entered into poultry contract with vertically integrated poultry companies because it helped them financially deal with the issues facing poultry production. However with time along with increasing the fertility of the lands, poultry litter also contributed in part to the generation of water pollution, and with it increased the responsibility of the growers as the highly visible stewards of the land.

Contracts between the integrators and grower currently place the environmental liability squarely on the shoulders of the grower, not only in his status as an independent contractor under those agreements, but sometimes through specific contractual terms. The typical contract provisions have the producers assuming all environmental liability and further agreeing to indemnify the contracting company should it be liable for any environmental violations. Integrators are reluctant to bear this cost, as the litter is currently, by contract, the property of the grower, moreover, the integrators don't want to incur the significant capital costs and potential liability associated with litter management. Neither the integrator nor the grower is comfortable with the current state of flux in legislation and regulation, as they consider the liability exposure to be an impediment to any meaningful progress in the issue of off-farm management of poultry litter. By performing the vital transfer of ownership function necessary for any market to operate efficiently, the litter bank will address the responsibility/ liability issue connected with litter and its handling and hence would help strengthen the contractual arrangements between the integrators and growers.

6.2. Implications on Regulatory Scenario:

Despite decades of experimentation with very different strategies, the holy grail of efficient, effective and equitable environmental regulation has continued to elude policy-makers and regulatory theorists. In the 1990s, the less than satisfactory performance of both of the main government, and market approaches to environment protection has led to a critical re-examination of current regulatory strategies and to an exploration of the role of alternative policy mechanisms such as market-based

instruments, self-regulation, information-based strategies and "communicative" instruments such as education.

There would be no political or geographical boundaries placed artificially on the litter bank except those imposed by the type of organization selected or those dictated by sound operation and management of the enterprise. It would also be able to work more closely with governmental organizations than the poultry companies or the growers since it would have no political or economic expectations. One of the key benefits of a Litter Bank is that, as a nonprofit organization, it can obtain financial support from Federal and state agencies wanting to help cover the costs of managing surplus litter. Thus, there exists a definite need for a litter bank to address the aggregation/ assembly constraint and enable establishment of alternative litter management enterprises to move forward.

Unfortunately, local environmental conditions and local management practices vary across the country, so specific recommendations aimed at the poultry producers will have to be tailored for different geographic regions. There have been instances where confusion has existed within the regulated community regarding the interpretation of federal and state environmental regulations and base legislation. A few states are ahead of the curve regarding compliance issues, and some regulations impact the poultry and animal industries more than others.

The individual state governments should recognize the importance of the environment to all sections of society and the need to achieve a balance between the interests of all stakeholders. Regulation is sometimes a necessary part in that process. Regulation should be targeted so that it achieves the necessary safeguards while allowing maximum flexibility and imposing the minimum burden on the growers.

The results of the focus group sessions show that the grower preference for a non-governmental organization was influenced negatively by the percentage of family income from poultry operation. This means that the higher the percentage of a family's income from their poultry houses the less inclined they are in favor of a litter bank. The grower would like some government involvement too. The results do not indicate difference in results among any particular class of

growers – based on percentage of family income from the poultry operation, or years as commercial poultry grower, or type of bird grown, or number of acres under hay and pasture, etc. In fact the results appear to be based on sociological factors rather than on any rational decision. The difference in results was more significant between the states than between the watersheds. Despite difference in regulations prevailing over the watersheds grower output did not differ significantly between Illinois River and Eucha/ Spavinaw watersheds. Preferential differences prevail between the states of Arkansas and Oklahoma because of the difference in the way the problem is perceived by people in the two states. The growers in Oklahoma prefer self-regulation (new contracts) versus growers in Arkansas who want partial self-regulation (establishment of a litter bank). The growers in Oklahoma chose self-regulation since Oklahoma already has stringent litter regulations in place, and they don't want the government or any other organization involved with the management of their operations. Similar regulations are yet to be enforced in Arkansas and so the growers are optimistic about a litter bank being the answer to their problems. The main difference that causes the growers in the two states to want different policies is almost exclusively/ primarily because the political climate in Oklahoma is such that the growers feel oppressed and the policies at the state level spawn a different response from the one in Arkansas. As expressed by a grower in the Eucha/ Spavinaw watershed during the focus group session, "... I hate government involvement." Different policies at the state level are basically affecting the choice in preferences.

While partial self-regulation in the form of a non-governmental entity that would develop and implement management practices that comply with current government regulations and discourage additional government regulations is therefore seen as the need of the hour by the majority of the growers surveyed, the difference in preference between the two states has to be taken into account. Difference in preferences between the two states is an indication of the possible need for different policies for the two states. This is a possibility to be considered by the respective states legislatures. Partial self-regulation in the form of a litter bank - aided in its efforts by the government and the industry representatives - could be established in Arkansas and a new type of contract could be

developed in the state of Oklahoma. However, this would only be possible if the poultry companies – which contract with growers in both states’ would be willing to accept two different regulatory scenarios in the two states. Also, the two states are spread over two different watersheds. Both the Illinois River watershed and the Eucha/ Spavinaw watershed run through both the states, and have different applicable regulations (although the growers in both the watersheds have indicated the litter bank to be their preferred policy option). This is therefore a policy decision that can be taken by the policy makers in the two states only after consultation with the stakeholders involved. One option available to the policymakers would be to make the litter bank optional to the growers. That way only the growers who are interested in the litter bank can work with it and the others can continue with the prevailing contracts unless as mentioned above the integrators are prepared to enter into a separate contractual arrangement with the growers who have indicated a preference for a new type of contract.

The policymakers would need to consider various issues while holding consultations with the various stakeholders and later while formulating the litter management policies. Any policy that is formulated and implemented would need to take into account the importance of the contractual system of poultry production in the Ozarks region.

6.3. Implications on Environment:

It is widely recognized that the amount of phosphorous contained in poultry litter and applied to agricultural lands commonly exceeds the amount of phosphorous needed by the agricultural crop. Over time, such continued applications of excess phosphorous leads to accumulation of phosphorous within the soils in the application fields. Recent scientific data indicates that these high soil-phosphorous levels can lead to some water quality degradation, occurring primarily through non-point source runoff (Moore and Sauer, 1998).

In response to increasing environmental concerns associated with traditional poultry litter management practices, it is inevitable that the poultry industry in the United States will, sooner or later, have to embrace alternatives management strategies. These management strategies will, by necessity, focus on what to do with excess litter, i.e., litter that can no longer be applied to agricultural

lands due to environmental concerns (primarily associated with potential water quality impacts from the nutrients contained in the litter) (Goodwin and Wimberly, 2001). The litter bank is the answer to these problems as it would take care of the litter problem, by helping removal of unwanted litter from environmentally sensitive areas. However, it should be noted that the growers surveyed indicated that quality of litter as a resource impacts spreading of litter, which implies that growers use litter mainly because of its high fertility level. It was noted during the focus group sessions that the growers use the litter "... more for fertilizer. It's more valuable when you use it. And it's more valuable when you use your own litter as opposed to buying it."

6.4. Implications on Poultry Growers:

The poultry producers have indicated the need for partial self-regulation in the form of a non-governmental entity to step in and take over the management of excess litter with practices that comply with current government regulations. They have expressed the view that neither lobbying (no self-regulation) nor development of new contracts between growers and integrators (complete self-regulation) are alternatives they wish to adhere to. According to Goodwin, "Many growers feel as though they are being violated by the government. They have lost trust in the government to govern fairly and put little confidence in lobbying efforts to further their position. In addition, many have had difficulty with their integrators in their current contract. Therefore, they are willing to take up partial self regulation as opposed to complete self regulation via the medium of contracts."

A litter bank would be beneficial to the growers with its offer of cleanout service in exchange for litter. The litter bank can minimize and hopefully eliminate any potential liability for broiler producers that might be associated with off-farm litter management scenarios. But even on-farm practices could potentially expose contract growers and end-users of poultry litter under certain circumstances. A litter bank that could provide off-farm options for producers would reduce the producers' liability associated with on-farm litter management. Also, since the litter bank would provide litter export certification to the growers, it would be reducing the producers' potential liability

associated with off-farm litter management. A litter bank would therefore be beneficial to the growers if it could buy the litter or arrange for purchase and transport of the litter.

According to Goodwin, “A litter bank would allow individual farmers the flexibility to participate or not based on their particular environmental situation. If regulations are placing restrictions on their use via traditional ways then they may chose to join the litter bank which would be a form of partial self regulation as they would have a voice in the way its managed. And if they have no problem then they need not join at all. It is totally up to them. Even for the ones who would have no problem the litter bank would still provide information on land applications of litter, etc. In an ideal world it could be done through self-regulations with contracts, but because of history contracts have other problems. If they were well accepted then growers would have chosen complete self-regulation and contracts as their first choice. The reason ESW growers chose contracts was because they don’t want any other organization involved because of the abuse they feel. But growers in IRW don’t feel that abuse. The people chose the policy option that seems most non-threatening. No one wanted lobbying because of the mess it has already created. And no one wants to be in a further mess than they are already in.”

6.5. Implications on Poultry Industry:

Since mid-1998, the integrators have aggressively encouraged their contract growers to obtain and comply with litter/ nutrient management plans (developed by the NRCS and/ or Conservation District staff). And the one-one-one interviews and focus group sessions in fact showed that majority of the growers have the phosphorous based Nutrient Management plan in place which goes to prove that the integrators have been ensuring the growers’ compliance with regulations. In addition, the integrators have supported and even sponsored numerous litter management educational events directed toward contract growers and cleanout contractors.

The poultry industry is like a three-legged stool made up of the companies, the individual producers and the general public. Each is dependent on the other. With the growth of the poultry industry and its increasing impact on the environment and local communities, the role played by the

integrators has come under increasing scrutiny and criticism. The results of this study indicate the need for the poultry industry to support a partial self-regulatory system, which would be beneficial to them in face of the increasing water quality deterioration. The integrators would have to be sensitive to what impacts feed and litter amendments have on water quality since the quality of litter as a resource impacts the growers' spreading litter on their fields, and they would also have to specify the bio-security measures in the future if replacement of bedding is to be an option under the litter bank (as the AR growers have to buy their bedding while the growers in OK are provided the bedding by the integrators). The companies would therefore have to work in close collaboration with the litter bank when it is established to ensure that the bank provides the growers with environmentally satisfactory choices.

Till now the litter was completely the responsibility of the growers because they chose to use it on their farms. But with increasing regulatory scrutiny the growers can no longer spread as much as they want and in some cases cannot spread it at all, like in the ESW. The integrators may now have to become involved in helping growers utilize the litter in an environmentally friendly manner. The integrators have to be willing in the future to help the growers take care of the excess litter and to compensate the growers for the amount they would get otherwise if they were to sell their litter. They also have to be willing to discuss possible changes in prevalent poultry production and farm management practices with the growers if required. Assurance has to be given to the growers that working with the litter bank would not automatically mean cancellation of their contracts with the companies.

With the evolving state of contractual relations in the poultry industry and the increasing threat of regulatory and judicial involvement in the day-to-day management of the poultry operations, the integrators are dealing with greater challenges than when the contractual system first started decades earlier. The best that they can now do is to support partial self-regulatory whereby they would continue to serve in an advisory role by providing technical and in-kind services to the growers but need not be involved in their day-to-day management. The poultry industry is currently under

scrutiny regarding their role in contributing to non-point source pollution in run-off from land to which litter has been applied. Now with the upcoming Tulsa lawsuit court settlement the phosphorous index would have to be redone and new Nutrient Managements plans would need to be implemented on the farms. The integrators would have to continue to work closely with the growers to make sure that the latter comply with the court ruling. A litter bank would be beneficial to them because it would share some of the integrators increasing responsibilities. A litter bank would help the companies effectively address criticisms being leveled upon them. Since it would have no entrenched position with regard to litter management, it would be able to operate as an entity largely free from the impediments that the companies encounter.

6.6. Implications on Stakeholders:

The Ozark region is heavily dependent on contract agriculture for continuing economic and job security. Use of litter because of its high quality has not only increased the fertility of the soil in the Ozarks region but has also in part increased water pollution. Increasing phosphorous in water in the Ozarks region cannot be blamed completely on the growers, as majority of the growers have phosphorous-based Nutrient Management Plans in place. However, among the growers who keep their litter on-farm, majority spread it on hay and pastures, and this aspect of litter management may have in part contributed to water runoff and pollution in the Ozarks region. Further, since among the growers who move their litter off-farm, majority sold it, and the growers can no longer apply litter in ESW and can apply only small amounts in IRW, they would no longer be able to sell their litter and would have to store it on their lands, thereby contributing further to the water problem. And all these issues impact the community considerably and all of the stakeholders involved and not just the poultry growers.

The question arises as to what a regulatory or government body is needed to ameliorate the situation? Public sector market interventions considered by Goodwin and Wimberly (August 2001) consist of legislatively enabled measures to raise funds directed towards addressing the excess litter problem. These interventions could be either self-funded and industry wide or they could be

consumer-funded and tied to purchases of poultry products. Public sector incentives include any of several financial interventions that would be publicly funded through state and federal treasuries and used to defray costs associated with excess litter management at points along the litter supply/marketing chain. They could be focused at the grower level, the litter service provider level, or the end-user level. Grower-level incentives could consist of litter management rebates obtained paid on a fixed-ton basis for litter managed in a prescribed way (such as export from an excess-litter area). Ceilings on the amount of litter per house per year could be established on a regional, species-by-species basis to avoid encouraging producers to “farm” the rebate system by overproducing litter in order to increase litter management-derived revenues. Grower-level incentives for poultry would be akin to subsidies that have been used in grain and row crop agriculture under various farm bills for decades.

The states could also help the litter bank financially for litter services like cleanout, handling, and transport of excess litter to land application areas or processing facilities. Augmenting incentives incorporate any of numerous pecuniary and non-pecuniary benefits. These may include, for example, state or federal tax credits for managing excess litter in prescribed way, investment tax credits for infrastructure development and permit waivers for these producers operating under an approved excess litter alternative management plan. Any or all of these augmenting incentives, in addition to others, when coupled with other options previously mentioned, satisfies the underlying assumption that options must mitigate potentially adverse environmental consequences while minimizing negative effects on poultry producers and consumers (Goodwin and Wimberly, 2001).

A litter bank would be uniquely positioned to reflect the needs and desires of all stake holders, including area residents not involved in litter management, in planning and implementing litter management activities. Economics aspects of litter bank operations would not only involve the financial health of the enterprise itself and the economic impacts of a litter bank on the surrounding communities.

Part 7. Limitations of Study:

Policy research, can improve the quality of the debate by: reducing uncertainty; increasing logical clarity; bringing new perspectives; and improving the quality of public debate by making evidence a part of the calculus. The main advantage of this study is that it seeks to assert the necessity for partial self-regulation in the form of a non- governmental organization (in this case a litter bank) based on stakeholder input. An attempt is made to identify information needs, design and conduct appropriate research strategies and to communicate usable knowledge aimed at improving the litter problem in the Ozarks region to decision makers.

Grower responses may have been heavily influenced by emotions due to (1) the imminent change in regulatory scenario in AR (at the time of the survey the growers were informed that the new regulations would come into effect in January 2004), (2) the impending settlement for Tulsa lawsuit; and (3) time constraints. Many of the responses required subjective judgments to be made, but the growers may not have had adequate time to think about the details asked of them. However, it should also be noted that had they been given more time they may have chosen not to answer the questions asked.

By virtue of cost, manpower, time constraints and grower reluctance to participate owing to prevailing political situation, the sample had to be limited as it was. A broader geographic and larger numeric sample would infer that results could be applied on a more widespread basis. The geographic scope of the Litter Bank could easily be expanded to help growers in other parts of the region - Northwest Arkansas, Northeast Oklahoma, and Southwest Missouri - as may be needed. However, this study is limited to the states of Arkansas and Oklahoma and to the IRW and ESW. It is therefore suggested for any future research that a similar study be conducted over the Beaver Lake watershed and the state of Missouri.