



For more information contact:
 daren.harmel@ars.usda.gov
 (254) 770-6521

On-Farm Economic and Environmental Impacts of Poultry Litter Fertilization



Daren Harmel¹, Rick Haney¹, Doug Smith¹, Monty Dozier², Bob Harmel³, Mike Patterson³, John W. Smith²

¹ USDA-ARS, ² Texas A&M AgriLife Extension, ³ Midwestern State University

Introduction

➤ The shift to expanded confined animal operations has led to localized excesses of manure and wastewater by-products, which if improperly managed can contribute to environmental degradation.

➤ **Poultry industry in Central Texas is currently expanding.**

➤ The question is: Can these by-products provide farmers and ranchers an economically and environmentally viable organic fertilizer alternative to commercial (inorganic) fertilizers?

➤ The major difficulty in adapting efficient on-farm fertilizer alternatives is balancing cost, nutrient value, soil enhancement, and environmental impact.

➤ **Therefore, the objectives of this study were to:**

- Determine the litter rate that maximizes on-farm profit for cultivated crop production
- Determine the litter rate that minimizes adverse environmental impact.

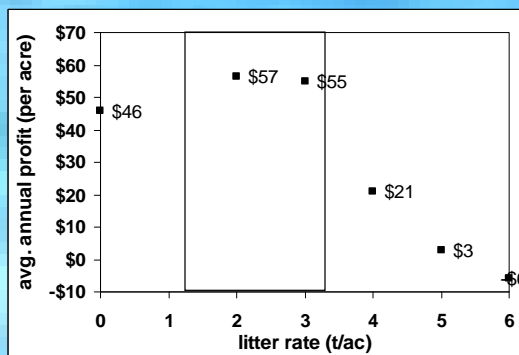


Figure 1: Profits for Various Annual Litter Rates

Methods

- This study is on-going at the USDA-ARS Grassland, Soil and Water Research Laboratory near Riesel, TX.
- Ten small watersheds managed as typical farm and ranch fields were studied.
- Each watershed has received a consistent annual poultry litter application rate of 0-6 ton/ac since 2001.
- A corn-corn-wheat rotation was implemented on cultivated fields.
- Background and post-treatment data on water quality, soil quality, management practices, and economics were collected.
- Economic analysis included:
 - throughput (crop sales revenue minus fertilizer costs)
 - total budget analysis
 - long-term crop modeling



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Results and Discussion

Economics

- Annual poultry litter rates of 1-3 ton/ac with appropriate supplemental N all produced profits greater than or equal to commercial fertilizer.
- Litter rates from about 1.5 to 3 ton/ac (shaded area in Figure 1) all produced average annual profits of more than \$50 per acre.
- Applying litter at 1.5-2 ton/ac per year maximized profit.

Environmental

- Litter rates in excess of 2-3 ton/ac caused a rapid and dramatic buildup of soil phosphorus (P).
- Fields with litter rates above 1-3 ton/ac produced runoff water quality P concentrations greater than TCEQ levels of concern.

Conclusions

➤ **This study determined that an annual fertilizer strategy with 1-2 ton/ac poultry litter and recommended supplemental N is ideal in terms of both:**

- **maximizing on-farm profitability for cultivated crop production offsite of poultry production facilities**
- **minimizing environmental concern.**
- This establishes the scientific basis for an environmentally-friendly, cost-effective litter utilization program in Central Texas.
 - Litter sales provide a revenue source rather than a cost to poultry producers.
 - Litter provides farmers and ranchers a cost-effective alternative to high priced inorganic fertilizers.
 - Pro-active management prevents environmental problems instead of waiting to clean them up, which
 - enhances public perception
 - minimizes the potential for environmental litigation
 - saves the public remediation and water treatment costs.