NY Pollution Discharge Elimination Permits for CAFOs, Management Adjustments and the Environment

Dolapo Enahoro, Todd M. Schmit and Richard N. Boisvert
Applied Economics and Management, Cornell University

Poster prepared for presentation at the Agricultural & Applied Economics Association 2010 AAEA, CAES & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010

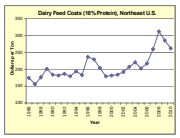
NY Pollution Discharge Elimination Permits for CAFOs, Management Adjustment & the Environment

Dolapo Enahoro, Todd M. Schmit & Richard N. Boisvert*

Applied Economics & Management, Cornell University

Introduction

- NY's 2009 CAFO regulations may exacerbate pressure on dairy farm operating margins
- NY's Pollution Discharge Elimination for CAFO
  - ✓ Set manure application rates consistent with Cornell's nutrient recommendations
  - ✓ Prohibits application where soil P is excessive
  - ✓ Limits application where soil P test is high
- Reduced opportunities for manure application will increase off-farm disposal costs
- Feed costs are below 2008 record high, but remain well above historic levels
- NY dairy producers look for cheaper feeds
  - ✓ Existing DDGS supplies in Western NY
  - ✓ More to come if second plant reopens
  - ✓ New CME Group's DDG contract may help manage feed cost risk



Objectives and Contribution

Examine linkages among dairy management adjustments & environmental quality in response to:

Changing feed prices & supplies

NY's 2009 CAFO regulations

Management Adjustments

dairy rations
feed production & purchases
crops sales
manure management & disposal

Measured Outcomes

1. Change in farm income
2. Change in land use
3. Change in manure spreading and disposal
4. Distinguish value of land for production from its value as site for manure disposal
5. Change in environmental quality, as measured by change in P runoff

*Research supported in part by USDA Hatch funds NYC-121-6429

A Three-county Study Region in Western New York

- A concentration of Dairy CAFOs
- A major portion of the Genesee River Watershed, draining into Lake Ontario
- Finger Lakes to the east natural barrier to transport manure for disposal

Some Regional Data		
	Total	Ave./farm
No. Dairy CAFOs	111	
No. Dairy Cows	80,354	724
Cropland in CAFOs (ac.)	157,495	1,419
Other Cropland* (ac.)	237,780	2,142
* Regional cropland not controlled by CAFOs Sufficient for manure disposal, location unknown		

Analytical Approach

A regional mathematical programming model that:
Maximizes expected income over variable costs for dairy CAFOs

Key Components of the Model:

- **Livestock:**
  - Rations: lactating cow, dry cow, replacement heifers (CPM-Dairy program, Cornell & U of Penn)
  - Forage bases: 60/40 & 40/60 corn silage/hay crop silage
  - DDGS products: 8% and 12% fat
  - Milk and manure production (incl. levels of N & P) differ by ration
- **Crops (with rotation restrictions):**
  - Alfalfa, orchardgrass, corn silage, corn grain (grow, buy, sell)
  - Manure must be applied to cropland or disposed of off-site
  - Different manure disposal costs to reflect different average distance to site
- **Cropland assigned to three land classes based on**
  - Soil capability class
  - Soil characteristics & silage yields (4.9, 5.3, and 5.9 t/acre, DM)
  - **From survey data:10%, 65%, & 25% high, medium, & low quality land, respectively**

- **CAFO Regulations:** Apply N&P from manure/purchased fertilizer based on soil test P (STP)
- **From county soil P test data: 7%, 53%, & 40% of cropland in HP, MP, & LP, respectively**

Soil test P (STP lbs/ac.)

If STP ≥ 40—High P (HP)

Corn	No Manure
Alfalfa	No P fert.

If 9 ≤ STP < 40—Medium P (MP)

Corn	Manure allowed, application
Alfalfa	P-based at ½ crop removal

If STP < 9—Low P (LP)

Corn	Manure or N fert. allowed, application N-based
Alfalfa	Manure or P fert. allowed at P crop removal

Empirical Results

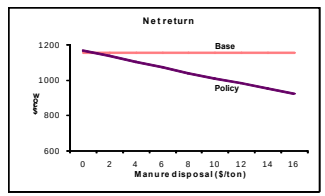
Base Scenario	Policy Scenario
• 2005-09 average prices	• 2005-09 average prices
• DDGS rations available	• DDGS rations available
• All manure spread on farm	• CAFO rules for manure spreading
• Can exceed N&P requirement	• Model alternative disposal costs

Dairy Rations: For both scenarios rations for dairy cows include 10% DDGS & 8% DDGS for dry cows & replacements

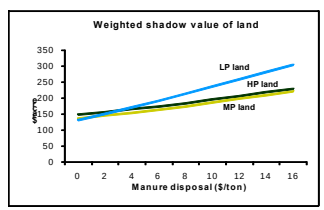
Manure Production: 29.3 t/cow (include dry cow and replacement)

Off-site disposal: Base = 0.0 t/cow **Policy** = 15.5 t/cow (53% of total)

Net Return: Initial drop (<10%) due to increased disposal cost
- Higher disposal cost (e.g., greater travel distance), 20% drop
- Corn acres fall by 20%; manure is spread on increased alfalfa acres



Shadow value of land under policy:
- Land has value for crops & for manure disposal
- As off-site disposal costs rise, value of land with no restrictions on manure application (LP) rises relative to other groups.



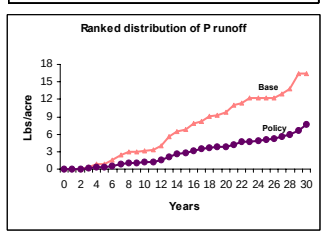
Environmental quality: P runoff (RO_p) based on corn land using Vada, et al. (*J. Environ. Qual.* 2009) & differ by soils & weather

Ave. runoff : Base = 7.2 lbs/ ac.
Policy = 2.9 lbs/ac.

Safety-first: Drop in threshold runoff exceeded 10% of the time

Base P{ RO_p > 13.8 lbs/ac.}=0.1

Policy P{ RO_p > 6.0 lbs/ac.}=0.1



Implications & Conclusions

- Policy requires off-site disposal of half the manure
- Net revenue sensitive to availability of nearby land suitable for disposal
- CAFO land with low soil P has enhanced value for crop production and waste disposal
- Off-site disposal may require additional oversight to realize/ensure environmental improvements from CAFO permits