Characterizing Economically Relevant Environmental Regulation of the Livestock Sector Over Time

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The views expressed are the author's and do not necessarily reflect those of the Economic Research Service or the USDA.

United States Department of Agriculture
Economic Research Service

1972/1976 Clean Water Act (CWA)

- Defined “concentrated animal feeding operations” (CAFOs)
- Declared CAFOs as “point sources” of pollution
- Put stipulations on production area of livestock operation, not fields where manure applied
- Enforcement devolved to states

DESPITE FEDERAL LAWS, GROWING CONCERN OVER POLLUTION FROM LIVESTOCK FARMS…

MANURE SPREADING GETS FAILING GRADE
Wisconsin State Journal (Madison, WI) - Sunday, December 27, 1992
Author: *Mike Flaherty Agriculture reporter*

STATE DRAFTS PLAN TO CURB DAIRIES' THREAT TO WATER
Seattle Post-Intelligencer - Thursday, April 29, 1993
Author: *Rob Taylor, P-I Reporter*

Hog Manure Becomes a Hot Political Issue
Omaha World-Herald (NE) - Thursday, December 28, 1995
Author: *THE BALTIMORE SUN*

FORMER DAIRY FARMER CHARGED - MANURE WAS DUMPED INTO PUBLIC WATERS
Seattle Post-Intelligencer - Monday, December 1, 1997
Author: *THE ASSOCIATED PRESS*

NO NATIONAL STANDARDS CONTROL HUGE AMOUNTS OF ANIMAL WASTE
Lexington Herald-Leader (KY) - Monday, December 29, 1997
Author: *Associated Press*

Animal Waste 'Staggering' U.S. Problem Harkin Seeks New Rules For Big Farms
Omaha World-Herald (NE) - Tuesday, December 30, 1997
Author: *JULIE ANDERSON, WORLD - HERALD STAFF WRITER*

Animal - Waste Rules Need Scrutiny
Omaha World-Herald (NE) - Wednesday, December 31, 1997

Increasing environmental regulation of CAFOs

- 1991: NRDC v. Reilly
  - Environmental groups sue EPA for not enforcing CAFO rules
- Late 1990s, early 2000s
  - Many states revise their individual CAFO rules as federal law changes negotiated
- 2003 Federal CAFO Rule
  - Revisions in 2005, 2008, 2011
- States adopt federal rules sporadically
  - Incorporate federal rules into own state laws, also adopt own regulations

Even after 2003 CAFO rule,

States adopt federal rules and their own rules slowly amidst

Lawsuits, protests, and regulatory uncertainty…

EPA AND STATE FAILURES TO REGULATE CAFOs UNDER FEDERAL ENVIRONMENTAL LAWS

Outline of Remarks Prepared for the
National Commission on Industrial Farm Animal Production Meeting
on September 11, 2006

Michele M. Merkel

EPA Flexes Water Muscle; Cattle Groups On Offensive

NCBA News Releases *Apr. 29, 2011*

NRDC NATURAL RESOURCES DEFENSE COUNCIL
THE EARTH'S BEST DEFENSE

Pollution from Giant Livestock Farms Threatens Public Health

Waste lagoons and manure sprayfields -- two widespread and environmentally hazardous technologies -- are poorly regulated. (2005)

Saturday, Sept. 22, 2007

Groups say Iowa not regulating factory farms, seek EPA takeover (blog headline referring to *Des Moines Register* article by P. Beeman (09.21.12)

http://www.uky.edu/CommInfoStudies/IRJCJ/blog.htm

QUESTIONS REMAIN ABOUT EFFECTS OF REGULATIONS….

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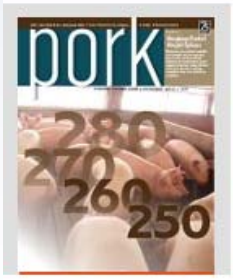

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This Month in Pork pork

Environmental Laws and Regulations Threaten Profits

PORK source | Updated: October 8, 2012

SIERRA CLUB FOUNDED 1892

White Paper

Living in a World of Decreasing Resources & Increasing Regulation: How to Advance Animal Agriculture

Information synthesized from the 2012 Annual Conference of the National Institute for Animal Agriculture March 26-29, 2012

"A study of the economic impact of regulations affecting animal agriculture is warranted" (p. 6).

No More Manure, Say Michiganders

By Laura Fauth

Thanks to lax enforcement of environmental laws and weak local protections, Michigan has become a "manure magnet," said Dan Farough, political director of the Sierra Club's Mackinac (Michigan) Chapter. In recent years, animal factories have moved to the state in droves, creating a myriad of water quality and public health problems. "Animal factories profit by pollution," said Farough. "They shop around for states with the weakest environmental and public health protections. Michigan was rolling out the red carpet."

What are the questions?

- Do environmental regulations..

  …raise costs of production?

  …impact the location of businesses?

  …lead to different production practices?

  …lead to more observable on-farm conservation practices?

Today

1. Describe method of gathering information on state-level environmental regulations of livestock operations.
2. Provide descriptive statistics of state regulations over time.
3. Examine associations between state-level livestock production location and regulations.

How do we analyze the empirical effects of state regulations on the livestock industry?

- Need information (at least) on outcomes and regulations
- Need variation in regulation…

  …Over time and/or…

  …Across states and/or…

  …Between comparable farms

Little information on state-level regulations

- GAO, 2008: "No federal agency collects consistent, reliable data on CAFOs"
  - Referring to individual operations
- 10/2011: EPA proposed rule to collect data on CAFOs
  - But withdrew it in 7/2012
    - Would instead pull together information from states
- Prior literature on state-level CAFO rules:
  - Description of individual states or laws
    - no attempt to compare these over time or across states
  - Compendia of state laws
    - Don't necessarily cover all states
    - Dated
    - Internal comparisons between states often difficult

Objective of data-gathering:

- Characterize federal- and state-level regulations of environmental regulations of the livestock sector in a meaningful, coherent, and consistent way such that this information can be merged with quantitative data

Methodology

- Examine several sources of regulations
- Contact officials and extension specialists
- Read numerous legal documents (including state registers)
  - need for cooperation with legal professionals
- Generate matrix of regulations by state and year
- Get regulations for all states in Census years and for specific ARMS states in ARMS years

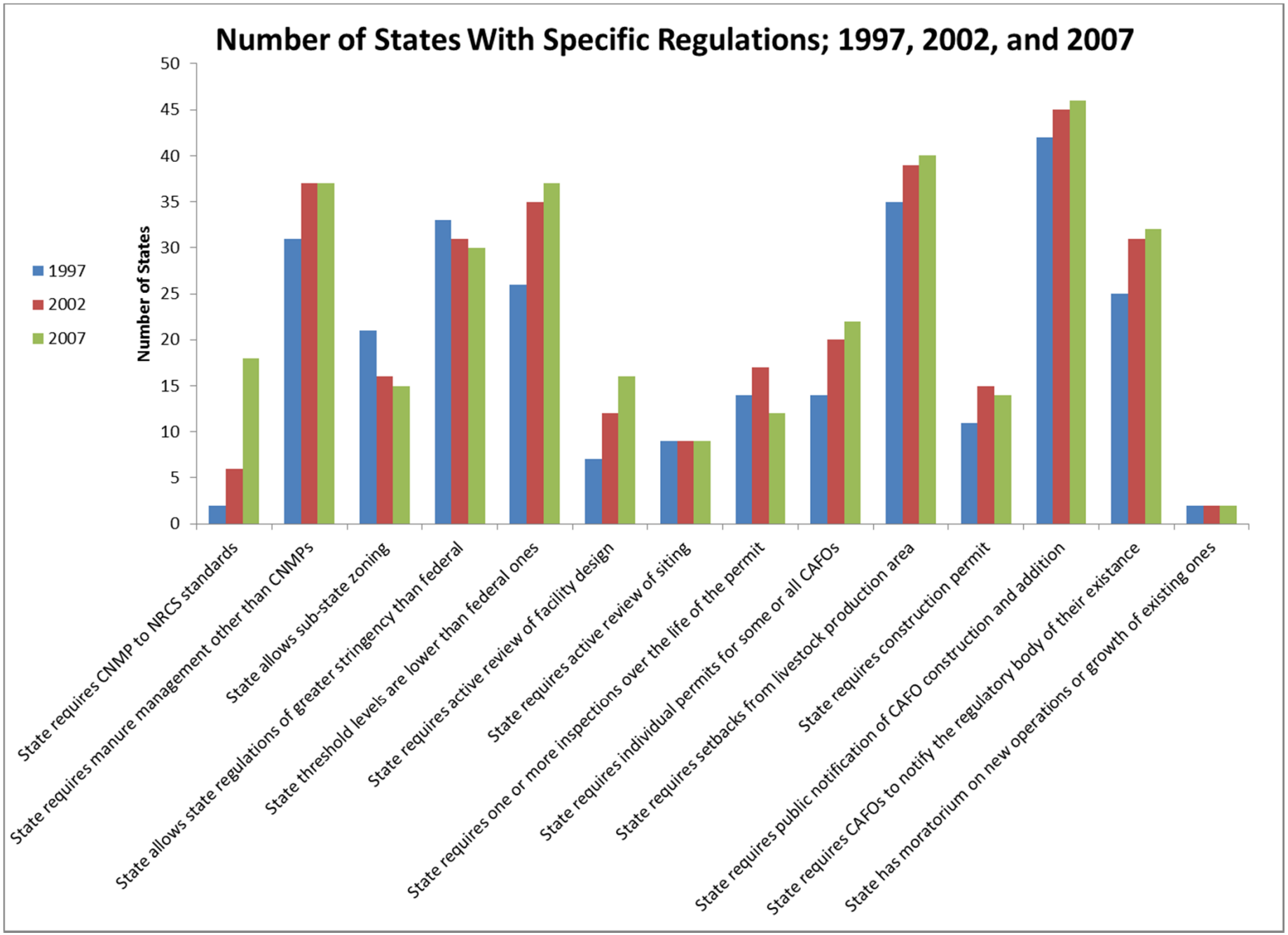
List of Regulations/Stipulations	
1	Who is main regulatory body? (State environmental, state agricultural, or federal)
2	CNMP to NRCS standards required
3	Manure management other than CNMPs required
4	Does not prohibit sub-state zoning
5	Does not bar state regulations of greater stringency than federal ones
6	Threshold levels are lower than federal ones
7	Active review of facility design required
8	Active review of siting required
9	One or more inspections over the life of the permit required
10	Individual permits for some or all CAFOs required (versus general)
11	Setbacks from livestock production area required
12	Construction permit required
13	Public notification of CAFO construction and addition required
14	CAFOs must notify regulatory body of existence
15	Moratorium on new operations or growth of existing ones

Caveats

- Sometimes state regulations differ by animal type, even in same year
  - Generate separate matrices by animal type
- Meant to be a general characterization of regulations in the state/year
  - Not every regulation applies to every livestock operation in state
- California coded as two separate regions due to strong sub-state differences in regulations

State Environmental Agencies Generally Have Responsibility for Environmental Regulations of Livestock Farms

Agency with Responsibility for Environmental Regulation of Livestock Agriculture, by Animal Type; 1997, 2002, and 2007			
	Any species		
	1997	2002	2007
State Environmental Agency	37	35	35
State Agricultural Agency	1	1	1
Responsibility Shared by State Environmental and Agricultural Agencies	7	11	11
Federal Government	6	4	4
Total states or sub-state regions	51	51	51


Number of States With Specific Regulations; 1997, 2002, and 2007
Number of States
0
5
10
15
20
25
30
35
40
45
50
1997
2002
2007
State requires CNMP to NRCS standards
State requires manure management other than CNMPs
State allows sub-state zoning
State allows state regulations of greater stringency than federal
State threshold levels are lower than federal ones
State requires active review of facility design
State requires active review of siting
State requires one or more inspections over the life of the permit
State requires individual permits for some or all CAFOs
State requires setbacks from livestock production area
State requires construction permit
State requires public notification of CAFO construction and addition
State requires CAFOs to notify the regulatory body of their existance
State has moratorium on new operations or growth of existing ones

Preliminary Findings 1

- State department of environment is most likely to have responsibility for regulation
- Setbacks, manure management, and public notification are most common regulations
- Moratoria and CNMPs to NRCS standards are least common

States Gain Some Regulations But Not Others

Number of States Gaining Specific Regulations; 1997-2002 and 2002-2007			
		1997-2002	2002-2007
Gained			
	State requires CNMP to NRCS standards	5	12
	State requires manure management other than CNMPs	10	3
	State allows sub-state zoning	0	0
	State allows state regulations of greater stringency than federal	0	0
	State threshold levels are lower than federal ones	9	3
	State requires active review of facility design	5	5
	State requires active review of siting	2	1
	State requires one or more inspections over the life of the permit	7	0
	State requires individual permits for some or all CAFOs	9	4
	State requires setbacks from livestock production area	5	2
	State requires construction permit	4	0
	State requires public notification of CAFO construction and addition	4	1
	State requires CAFOs to notify the regulatory body of their existance	6	3
	State has moratorium on new operations or growth of existing ones	1	0

States Also Lose Regulations

Number of States Losing Specific Regulations; 1997-2002 and 2002-2007			
		1997-2002	2002-2007
Lost			
	State requires CNMP to NRCS standards	1	0
	State requires manure management other than CNMPs	4	3
	State allows sub-state zoning	5	1
	State allows state regulations of greater stringency than federal	2	1
	State threshold levels are lower than federal ones	0	1
	State requires active review of facility design	0	1
	State requires active review of siting	2	1
	State requires one or more inspections over the life of the permit	4	5
	State requires individual permits for some or all CAFOs	3	2
	State requires setbacks from livestock production area	1	1
	State requires construction permit	0	1
	State requires public notification of CAFO construction and addition	1	0
	State requires CAFOs to notify the regulatory body of their existance	0	2
	State has moratorium on new operations or growth of existing ones	1	0

Specific regulations most frequently gained and lost by individual states

- 1997-2002:
  - Gained: Manure management other than CNMP, thresholds lower than federal ones
  - Lost: Inspections, sub-state zoning
- 2002-2007:
  - Gained: CNMP to NRCS guidelines
  - Lost: Inspections

Preliminary Findings 2

- States generally become more stringent over time, overall
- Some become less stringent, often by prohibiting sub-state zoning and barring state regulations that are more stringent than federal ones

Does location of industry change with regulatory stringency?

- Use 1997, 2002, and 2007 Censuses of Agriculture
- Use involved NRCS methods to calculate numbers of animal units, confinement, type of farm, likelihood of regulation

Outcomes at state level:

--Number of livestock farms
--Number of livestock farms with confined animals
--Number of large CAFOs
--Number of livestock
--Number of confined livestock
--Number of livestock at large CAFOs

Outcomes at farm level:

--Size of livestock farm
--Size of livestock farm with confined animals
--Size of large CAFO

Empirical strategy

- State-level observations:

$$Y_{st} = \alpha + R'_{st}\beta + State'_{s}\lambda + Year'_{t}\delta + e_{st}$$

  - Observation is the state-year
  - Standard errors clustered at state level
  - To examine number of farms
  - Takes into account entry and exit
- Individual farm-level observations:

$$Y_{ist} = \alpha + R'_{st}\beta + State'_{s}\lambda + Year'_{t}\delta + e_{st}$$

  - Observation is the farm
  - Pooled cross-section
  - Standard errors clustered at state level

Summary of Results – State level

- Regulations with statistically significant negative effect on livestock numbers:
  - State allows state regulations of greater stringency than federal
    - -1.15M animal units (29%)
    - -1.13M confined animal units (31%)
    - -588,000 animal units at large CAFOs (55%)
  - Public notification required
    - -855,000 animal units (17%)
    - -852,000 confined animal units (16%)

Summary of Results – Farm Level

- Regulations with statistically significant negative effect on livestock numbers:
  - State allows state regulations of greater stringency than federal
    - -28 animal units per farm
    - -31 confined animal units per farm
    - -19 animal units at large CAFOs
  - Public notification required
    - -26 animal units per farm
    - -24 confined animal units per farm per farm

Discussion 1

- States adopt statement that regulations cannot be more stringent than federal ones
  - When they do so, they *gain* animal units
  - Between 1997 and 2002: Arizona and Maine
    Between 2002 and 2007: Indiana
  - No relationship to number of farms
- Adoption of public notification correlated with fewer animal units in state
  - Between 1997 and 2002: Idaho, Maine, New York, Tennessee
    Between 2002 and 2007: Arizona
  - No relationship to number of farms
- Effect seems to be in farms changing sizes
- Effects are not just in large CAFOs

Discussion 2

- State Level by Type of Animal:
  - Effects of state not allowing state regulations more stringent than federal ones, public notification requirement:
    - Effects strongest for poultry
    - Somewhat strong for cattle/dairy
    - Not statistically significant for hogs
- Farm Level by Type of Animal:
  - No consistent effects

Further analyses

- Census:
  - Does the number of fields to which manure is applied change with regulatory stringency?
  - Does size distribution change with regulatory stringency?
- ARMS:
  - Does nutrient application change with regulatory stringency?
  - Does manure management change with regulatory stringency?

Remaining questions…

- Enforcement?
  - How to measure?
  - Is threat of penalty enough?