IMPACTS OF EPA DAIRY WASTE REGULATIONS ON FARM PROFITABILITY

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With the initiation of dairy waste regulatory activity in Texas and Florida during the early 1990s, questions have arisen regarding the impacts of these regulations if extended throughout the United States. The Agricultural and Food Policy Center (AFPC) system of representative dairy farms provided a unique opportunity to evaluate the impacts of these regulations on dairy farm profitability if extended to all other states.

EPA Dairy Waste Policy

With the exception of concentrated animal feeding operations (CAFOs), agriculture has been treated as a nonpoint source of pollution. Nonpoint pollution means there is no legally recognized identifiable source of that pollution. Point pollution, on the other hand, can best be illustrated by an industrial plant or a sewer system that drains directly into a river or stream, leaving no question regarding the source of that pollution. The requirement has been that such point sources of pollution internalize the cost of cleaning up the discharge except under extremely unusual and basically uncontrollable circumstances. Such point sources of pollution must receive a permit explaining measures taken to prevent illegal discharges.

Concentrated animal feeding operations have been identified as a point pollution source because, in the eyes of the regulatory authorities, they are much like a factory. The issue becomes one of defining a CAFO. The Environmental Protection Agency (EPA) currently requires a discharge permit for any dairy having more than 700 cows. The permit will be issued if the dairy farmer demonstrates he or she has taken steps to contain pollutants and prevent discharges up to a twenty-five-year/twenty-four-hour storm event. If there is already an identifiable direct discharge, the threshold for receiving a permit may extend to 200 cows or even less, if a complaint is received by the EPA. The requirements for receiving a permit are more stringent for new operations than they are for existing operations.

In most states, EPA regulations are enforced by state environmental regulatory agencies under what is called delegated authority (Table 1). The requirement for a state to receive delegated authority

Table 1. Delegated and Nondelegated EPA Regulated States, by EPA Region.

EPA Region	Delegated	Nondelegated
I	CT, RI, VT	MA, ME, NH
II	NJ, NY[a]	[b]
III	DE, MD, PA, VA, WV	DC
IV	AL, GA, KY, MS, NC, SC, TN	FL
V	IL, IN, MI, MN, OH, WI	
VI	AR	LA, NM, OK, TX
VII	IA, KS, MO, NE	
VIII	CO, MT, ND, UT, WY	SD
IX	CA, HI, NV	AZ[c]
X	OR, WA	AK, ID

[a]The Virgin Islands are delegated.
[b]Puerto Rico is nondelegated.
[c]None of the Pacific Islands in Region IX are delegated.

is that its regulations are *at least* as stringent as the federal EPA standards. The twelve states and the District of Columbia that do not have delegated authority experience a considerably higher level of EPA supervision and involvement even though they may have a state level counterpart to the federal EPA. Texas and Florida are both non-delegated states which, to a degree, contributed to these states becoming "test cases" in the establishment of EPA dairy waste regulatory policy.

The authors completed a survey of state environmental protection agencies to determine their regulatory strategy regarding the dairy waste issue. This survey found substantial variation among states in enforcement strategy regarding dairy waste. Some states interpreted the spirit of the EPA policy as being one of no discharge except under extreme circumstances. Thus, Minnesota, in an effort to protect its 10,000 lakes from pollution, has adopted a seven-cow threshold for the receipt of permits by dairy farmers. On the other hand, Wisconsin, Iowa and Vermont interpret the EPA 700-cow policy literally. That is, with no dairies having more than 700 cows at the time of the survey, they had issued no permits.

The EPA regional offices indicated to the authors an intent to move in the direction of using the evolving Region VI policy as the standard for controlling dairy waste. This would require all dairies to develop a waste management plan that meets the twenty-five-year-storm-event criterion. In addition, dairies would be required to keep records on handling and discharging dairy wastes.

Costs of Meeting EPA Regulations in Texas and Florida

Coincidentally, the AFPC representative dairy farms in Texas and Florida were developed before the EPA policies on dairy waste management were implemented. Recently, these farms have been updated after the farms had been renovated and retrofitted to meet the new EPA standards. This provided a perfect environment for determining a before/after context in the costs of meeting the EPA regulations. The findings are presented in Table 2. Part of the farm-to-farm variation in costs is reflected in the extent to which the farms had already dealt with the waste management issue. The $528,000 investment required of the large Florida dairy (FLLD) was the result of the unique conditions and requirements to curb the contamination of fragile waters related to the Everglades.

Using the FLIPSIM policy simulation model developed by James Richardson at Texas A&M, the authors simulated the impacts of the new, more stringent EPA policies on the profitability of Texas and Florida representative farms (Table 3). In this table, *Base* represents the baseline net costs income prior to retrofitting for the EPA policies while *Enviro* indicates the results after
retrofitting. These results indicate that dairy farms having cash flow problems are simply put out of business sooner as a result of the new EPA requirements. On the other hand, the larger profitable East Texas dairy (TXEL) and the Central Texas dairy (TXCL) were sufficiently profitable to pay off the amortized debt resulting from the new investments.

While the moderate-size Florida dairy (FLMD) reflects the same pattern of results as the Texas dairies of comparable size, the large Florida dairy (FLLD) represents a case in which the EPA investment requirements were so large that its ability to cash flow is placed in jeopardy. This was the only case in which a large and otherwise profitable dairy is projected to encounter cash flow problems due solely to the EPA regulations. This result, in part, is a consequence of the large investments required ($528,000) to build the unique waste containment structures.

Table 2. Incremental Environmental Costs Obtained from Texas and Florida Dairy Producers.

Number of cows	TXCM 300	TXCL 720	TXEM 200	TXEL0 812	FLMD 350	FLLD 1500
Dirt and concrete work ($)[a]	40,600	60,000	7,000[e]	35,000	0	528,000
Machinery and equipment ($)[b]	6,000	46,000	0[e]	50,000	10,000	72,000
Annual maintenance ($)[c]	0[d]	0[d]	5,000[d]	0[d]	1,200	25,000

[a]Dirt and concrete work includes the cost of constructing or renovating a drainage pit, retention lagoon and storage lagoon.

[b]Machinery and equipment includes the cost of any additional pumps and irrigation equipment required and was not previously in the equipment complement of the dairy.

[c]Annual maintenance costs include lot cleanup, pumping, and additional repair and maintenance costs.

[d]For these dairies, the annual maintenance was included in the cost of hired labor and could not be easily separated, except for the moderate-size East Texas dairy which contracted annual lagoon cleaning and maintenance.

[e]The moderate East Texas (TXEM) dairy was only required to update existing equipment and facilities.

Table 3. Analysis of the Environmental Compliance Costs for Dairy Farms Assuming Continuation of the FAPRI January 1993 Baseline, Central and East Texas and Florida.

	TXCM		TXCL		TXEM		TXEL		FLMD		FLLD	
	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO
Average Change in Real Net Worth (%)	-33.32	-34.86	60.65	59.94	-36.02	-41.09	20.54	19.69	-45.75	-47.06	-5.24	-26.29
Average Annual Ratio Expense/Receipts (%)	101.38	101.91	80.05	80.14	108.71	109.71	86.62	86.80	101.70	101.94	95.43	97.32
Average Present Value End Net Worth ($1000)	483.0	471.91	3271.04	3256.46	340.09	313.13	3241.25	3218.42	529.01	516.20	3330.08	2590.30
Average Annual Cash Receipts ($1000)	692.28	692.28	2063.96	2063.96	487.63	487.63	2167.21	2167.21	1035.94	1035.94	4332.08	4332.08
Average Annual Cash Expenses ($1000)	701.36	705.03	1651.40	1653.34	529.52	534.41	1875.69	1879.67	1053.34	1055.89	4133.50	4215.43
Average Annual Net Cash Income ($1000)	-9.08	-12.75	412.56	410.63	-41.89	-46.79	291.52	287.54	-34.12	-37.94	164.95	73.25
Average Annual Net Cash Income ($1000)												
1992	7.51	7.51	408.25	408.25	-23.36	-23.36	307.61	307.61	2.58	0.06	206.65	171.72
1993	-8.70	-12.34	358.48	352.50	-40.15	-45.91	223.02	220.06	-6.92	-10.43	200.00	115.67
1994	-2.49	-7.30	448.04	441.54	-40.82	-47.28	296.78	289.56	-8.60	-12.37	254.48	162.25
1995	-32.65	-38.86	374.30	373.31	-63.23	-70.60	245.97	239.61	-66.58	-70.63	53.89	-48.61
1996	405.99	405.8	291.96	286.45	-59.84	-64.20	108.63	-3.69				
1997	417.82	417.82	316.17	312.49	-65.35	-70.08	166.05	42.17				

Change in Real Net Worth—Percentage change in real net worth over the simulation period, 1992-1997.
Average Annual Ratio of Expenses to Receipts—Ratio of all cash expenses to all farm receipts including government payments.
Present Value Ending Net Worth—Discounted value of net worth in the last year simulated.
Annual Cash Receipts—Total cash receipts from crops, dairy, livestock, government payments and other farm related activities.
Annual Cash Expenses—Total cash costs for crops, dairy and livestock production, including interest costs and fixed cash costs; excludes depreciation.
Annual Net Cash Income—Total cash receipts minus total cash expenses; excludes family living expenses, principal payments and costs to replace capital assets.

Extension to Dairies in Other States

In an effort to help Texas dairies assess their investment requirements for meeting EPA Region VI standards, Lacewell and Schwart developed a model designed to estimate the costs of meeting the EPA standards under alternative animal concentration, soil and rainfall conditions. This model was used to estimate the costs of meeting the more stringent EPA standards for AFPC representative dairy farms in other regions (Table 4). These cost estimates should be treated as rough approximations since labor and machinery costs in other states may be outside the range used to develop the Texas model. The investment requirements ranged from slightly more than $21,000 for the 50-cow Wisconsin dairy ($10,581 + $10,518 for WIMD) to nearly $42,000 for the 186- cow Vermont dairy.

Of substantial significance is the requirement that approximately every five years, solids had to be cleaned out of the lagoon at a lump sum cost ranging from nearly $600 for the moderate-size Missouri dairy (MOMD) to more than $17,000 for the large Vermont dairy. This periodic cost could become a significant factor in farm prosperity and survival.

Table 5 presents the net cash income simulation results for the dairies on which investment and cost requirements were made as indicated in Table 4. These results generally indicate that dairies having no problems cash flowing before retrofitting to meet the EPA standards will be able to pay off the resulting costs without encountering financial problems. However, dairies that are already having problems cash flowing, such as the Vermont dairies, will experience even greater problems. For dairies experiencing cash flow problems, the EPA regulations could be the decisive factor resulting in an exit decision.

Implications

EPA regulations are often criticized by farmers and their organizations as being unrealistic and as creating havoc on the farm. This analysis suggests that this criticism may not be true for the vast majority of dairies that are currently relatively profitable. However, if a dairy is already experiencing cash flow problems, compliance with EPA regulations could push this farm over the brink into financial failure. Such farmers would probably find it desirable to minimize their losses and exit the dairy industry.

Dairy farmers that are bringing their farms into compliance with the new EPA standards could find it desirable to expand their dairy operations simultaneously. Such expansion may involve conversion to different farm structures such as free stall confinement housing on a concrete slab. The related investments are substantially larger than those estimated in this study for simply meeting the EPA standards on an existing operation. Such large investments may lead to

Table 4. Cost Assumptions Utilized in the Analysis of Impacts of Environmental Regulations.

Number of cows	MOMD 65	GAMD 160	GALD 600	WAMD 160	WIMD 50	WILD 175	NYCM 100	NYCL 175	VTMD 70	VTLD 186
Dirt and concrete work ($)[a]	14,499	1,440	4,844	25,283	10,581	27,904	17,710	28,195	13,839	30,335
Machinery and equipment ($)[b]	10,518	3,574	5,569	10,110	10,518	12,558	11,538	12,303	10,518	12,418
Annual maintenance ($)[c]	844	0[e]	23,064	1,780	335	1,140	790	1,374	561	1,467
Year 5 Lagoon cleanup ($)[d]	589	242	909	7,345	4,591	16,068	9,181	9,181	3,214	17,077

[a] Dirt and concrete work includes the cost of constructing a drainage pit, retention lagoon and storage lagoon.

[b] Machinery and equipment includes the cost of any additional pumps and irrigation equipment that is required and was not previously in the equipment complement of the dairy.

[c] Annual maintenance costs include lot cleanup, pumping and additional repair and maintenance costs.

[d] Year 5 lagoon cleanup is a one-time charge for custom hiring the cleanup of the retention lagoon.

[e] An annual maintenance of $4,000 was incorporated into the baseline scenario.

Table 5. Analysis of the Environmental Compliance Costs for Dairy Farms Assuming Continuation of the FAPRI January, 1993 Baseline, Wisconsin, Vermont, New York, Washington, Missouri and Georgia.

	WIMD		WILD		VTMD		VTLD		NYCM		NYCL		WAMD		MOMD		GAMD		GALD	
	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO	BASE	ENVIRO
Average Change in Real Net Worth (%)	7.44	6.04	37.10	35.80	-25.91	-30.82	-16.48	-21.10	-9.75	-12.41	22.24	20.69	-45.16	-47.64	7.35	5.18	-35.58	-43.89	-6.29	-18.51
Average Annual Ratio Expense/Receipts (%)	51.41	53.68	64.14	65.03	88.32	89.94	92.64	94.11	81.49	83.06	74.66	75.82	93.58	94.70	71.66	72.96	96.55	98.67	94.57	96.78
Average Present Value End Net Worth ($1000)	346.93	342.40	1195.70	1184.35	280.76	262.15	749.99	708.59	520.04	504.71	921.34	909.68	237.19	226.47	385.74	377.96	322.67	281.03	1117.69	971.87
Average Annual Cash Receipts ($1000)	125.53	125.53	499.98	499.98	218.24	218.24	525.46	525.46	297.12	297.12	506.58	506.58	489.58	489.58	221.47	221.47	435.50	435.50	1768.42	1768.42
Average Annual Cash Expenses ($1000)	64.51	67.36	320.55	325.04	192.66	196.20	486.59	494.32	241.91	246.54	377.87	383.72	457.94	463.38	158.67	161.56	420.41	429.63	1672.12	1711.18
Average Annual Cash Income ($1000)	61.03	58.18	179.43	174.94	25.58	22.04	38.86	31.13	55.21	50.58	128.72	122.87	31.64	26.20	62.80	59.90	3.02	-12.04	54.30	1.86
Average Annual Net Cash Income ($1000)																				
1992	57.75	57.75	170.87	170.87	33.86	33.86	55.75	55.75	58.08	58.08	125.06	125.06	40.84	40.84	60.52	60.52	16.14	6.17	90.80	53.80
1993	54.39	53.02	160.08	156.20	24.49	22.74	32.15	28.22	47.32	45.07	107.35	103.69	25.5	21.64	58.04	56.03	11.53	-2.84	63.37	15.39
1994	61.78	59.23	184.31	179.04	30.13	27.16	48.24	42.79	60.04	56.49	133.27	128.09	42.24	37.18	63.84	60.72	16.09	1.03	93.46	42.37
1995	58.56	55.92	172.20	169.91	22.60	19.15	28.44	22.76	54.21	50.41	119.24	113.79	24.84	19.54	58.50	55.20	-7.94	-23.76	21.69	-31.73
1996	62.58	59.89	192.58	191.29	25.84	21.52	35.77	29.56	61.27	57.22	135.37	130.27	33.74	28.59	64.67	61.14	-10.05	-27.08	32.36	-27.13
1997	64.07	56.68	182.17	164.81	19.17	11.89	33.38	9.31	51.49	38.14	134.98	120.10	25.09	12.45	64.89	60.61	-7.67	-25.78	24.13	-41.57

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effects on structure such as occurred roughly two to three decades ago with the requirements for bulk tanks, milk houses and related facilities. That is, we may see large numbers of dairy farm exits and quantum leaps in dairy farm size over a relatively short time period—making the results of our study appear inaccurate.

This study of dairy waste compliance has implications for all of animal agriculture. In particular, EPA waste handling requirements could be one of the factors that lead to structural change in both the hog industry and the demise of the few farmer-feeders of beef cattle that remain. That is, the most decisive effect may be those cases in which farmers, as a result of the EPA requirements, decide to restructure their operations. As a result, U.S. agriculture could experience even more rapid structural change.