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ZONE REQUIREMENTS ON REPRESENTATIVE TEXAS DAIRIES**

AFPC Working Paper 98-6

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Department of Agricultural Economics
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Background

This briefing paper contains an analysis of the proposed TNRCC rule as printed in the Texas Register, March 6, 1998 on Texas dairy farms. The proposed rule states:

“At the time of initial application, any new facility or expansion of an existing facility designed to confine livestock in numbers equal to or greater than 1000 animal units, or confine poultry at numbers greater than 30,000 with a liquid waste handling system shall not locate any permanent odor sources within 0.50 miles of any occupied residence or business structure, school, church, or public park without written consent and approval from the landowner. For the purposes of this section, any measurement of a buffer distance shall be from the nearest edge of the permanent odor source to the nearest edge of an occupied structure or designated recreational area listed under this subsection.”

The 1000 animal unit CAFO definition relates to about 700 dairy cows.

The Agricultural and Food Policy Center maintains a database of 26 representative dairy farms in the major production areas around the country. Four of those dairy farms are located in Texas. There are two dairies, representing moderate and large scale operations in the Erath and Hopkins County areas. The large dairy in each region exceed the number of animal units defined as a CAFO when considering cows, replacement heifers, calves and bulls.

A complex regulation such as the TNRCC proposed rule is not easily analyzed from an economic perspective because of the myriad of assumptions that must be made relative to the spatial and economic characteristics of land markets. This paper includes the assumptions that are made to perform the analysis, a brief discussion of the impacts of purchasing the necessary land, the results, farm characteristics and baseline projections.

Assumptions

The following assumptions are incorporated into this analysis.

- ! The dairy needs at least 1440 acres to meet buffer zone requirements. This acreage assumes the dairy sits on 160 acres of land at the center of a 1 ½ mile square tract of land.
- ! The additional land necessary to meet the 1440 acre requirement is readily available and is purchased in 1998 at current market value.
- ! The additional purchased land has the same proportion of pasture and cropland as currently exists on each representative farm.
- ! The leased land currently on the representative farm does not have to be purchased.
- ! The farm can purchase the additional land with no down payment, 100% long-term debt financing, and a variable interest rate of 8.44% APR in 1998 without exceeding a total term debt-to-asset ratio of 50 percent.
- ! The additional pasture and crop land is leased to area farmers and ranchers at cash rates equal to what the dairy is currently paying for its leased land.
- ! Before the additional land is purchased the farms have a long-term debt to asset ratio of 30 percent.
- ! Intermediate term debt is assumed at 30 percent on machinery and intermediate term facilities. The representative dairies raise replacement heifers therefore there is no term debt on breeding stock since the debt incurred in this process is operational.
- ! The number of cows does not increase over the 1998-2003 period.
- ! The input and price assumptions reported in the FAPRI March 1998 Baseline are incorporated for 1998-2003 (Appendix A).

Moderate Size Farms

Neither of the moderate size Texas dairies currently qualify as 1000 animal unit or larger CAFOs. The moderate size dairy in the Stephenville area has 400 cows while the farm in Hopkins County has 210 cows. To analyze the impact of additional land purchases on these dairies would require numerous assumptions about cow number expansion and their impact on the economic efficiency of the dairy operation. Neither moderate size dairy could finance the additional land to meet the ½ mile buffer zone with their current structure.

Even without considering the impacts of the proposed regulations under the AFPC Baseline analysis, the Central Texas 400 cow dairy (TXCD400) is projected to be in serious financial condition by year 2002 (AFPC Working Paper 98-1). The Baseline analysis suggests that major changes in the operation must occur for it to remain viable longer term. Increasing size might be one of those changes. In that case, not only would more land have to be purchased to meet the buffer requirements if it reached CAFO limits, but financing for the new facilities and cows would have to be arranged.

The moderate size East Texas dairy (TXED210), while profitable under the Baseline, is a very efficient dairy in the area that has lost more than 30 percent of its producers over the last 3 years. Expectations of continued structural change in the area indicate that this dairy will also have to make operational changes in the future. This East Texas dairy faces the same situation as the TXCD400 dairy in that it could not economically make the land purchase necessary to meet the requirements of the one-half mile buffer zone with its present size. Outside equity capital would have to be infused for this farm to make the transition even if all of the previously mentioned assumptions were met. Therefore, the proposed rules would likely lock these types of dairy operations into a structure that is not sustainable.

Central Texas 825 Cow Dairy

The Central Texas large dairy (TXCD825) currently owns 500 acres of land evenly split between crops and pastures (Appendix B). Therefore, to meet the proposed regulation, the farm must purchase 940 acres of land at a weighted average market value of \$675 per acre (\$850 for cropland, and \$500 for pasture). The additional debt financing to purchase \$634,500 of land increases the farm term debt/asset ratio from 17 percent to 48 percent.

The economic and financial impacts of the additional land purchased follows:

- ! Cash receipts increase on the farm due to allowing the operation to lease out the newly acquired land at current cash lease rates of \$50 acre for cropland and \$12.50 acre for pasture land (Table 1).
- ! Net cash farm income (NCFI) defined as total cash receipts minus all cash expenses declines annually over a range of 11 to 15 percent. The lower NCFI is due to increased property taxes and interest payments that more than offset increased revenues from leasing.
- ! The additional land purchase increases the average probability that the dairy will have a cash flow deficit from approximately 16 percent to 29 percent over the 1998-2003 study period.
- ! Ending cash reserves (NCFI minus minimum family living, principal payments, income and employment taxes, and cash down payments on new machinery) declines by 34 to 39 percent from baseline levels. The dairy however, is still capable of accumulating cash throughout the 1998-2003 period.
- ! If the dairy was required to make a down payment on the land of 30 percent, the operation would not cash flow in 1998.
- ! The probability of refinancing deficits, i.e., the chance that cash flow deficits could not be covered by cash reserves, increases in the land purchase alternative. In 1998 the dairy would

have a 26 percent chance that it would have to refinance the operation from outside sources compared to 17 percent under the Baseline. As cash reserves build this the probability of refinancing declines, reaching only 2 percent by 2003 under the land purchase alternative.

- ! Due to the assumed increase in the value of land over the study period, there is only a small impact on the average net worth of the dairy. Under the land purchase alternative, real net worth is 4 percent lower than the Baseline in 2003.

East Texas 650 Cow Dairy

The large scale East Texas dairy (TXCD650) owned 800 acres of land, thus it must purchase 640 acres to meet the 1440 acre requirement.

- ! Cash receipts increase under the land purchase alternative due to leasing the additional acreage to area farmers and ranchers at a rate of \$35 acre for cropland and \$20 acre for pasture.
- ! The NCFI declines annually between 7 and 11 percent from the baseline.
- ! The probability of a cash flow deficit increases to over 50 percent in 2001. While ranging between 30 and 40 percent under the baseline, the land purchase alternative yields probabilities 5 to 14 percentage points higher, significantly increasing the cash flow risk that this dairy faces.
- ! Ending cash reserves are reduced from 42 to 55 percent from annual baseline levels.
- ! If a 30 percent down payment was required, the dairy would average negative ending cash reserves in 1998 and 1999.
- ! The probability that the dairy will have to refinance deficits increases over the baseline by 6 to 15 percentage points. In 2003 the dairy faces a 22 percent chance of experiencing negative ending cash reserves compared to 7 percent under the Baseline.

! Real net worth declines by approximately 2 percent in 2003 relative to the Baseline.

Therefore, the speculative increase in market value of a larger owned land base offsets some of the increased cash flow exposure on the period.

Summary

While the assumptions that were made relative to land availability, its characteristics and its market value were rather overly simplistic, they point out the complexity of analyzing the implementation of such a proposed rule, especially for expanding dairy facilities. In this respect, the adverse consequences described are conservative. In reality, land is not always readily available for purchase. Even if it were the knowledge that the dairy must have it to expand would likely result in increases in the market power of the landowner and thus the price. Moderate dairies currently under structural pressure to grow could be constrained from growing to an economical size. This constraint could result in lower market values for existing dairies of all sizes.

Table 1. ECONOMIC IMPACT ON REPRESENTATIVE TEXAS DAIRIES OF PURCHASING LAND TO MEET ½ MILE BUFFER ZONE FOR CONFINED ANIMAL FEEDING OPERATION.

	TXCD825 BASELINE	TXCD825 PURCHASE	TXED650 BASELINE	TXED650 PURCHASE
Total Cash Receipts (\$1000)				
1998	2324.88	2354.33	1655.15	1673.95
1999	2359.32	2388.62	1681.37	1700.17
2000	2391.92	2421.20	1704.23	1723.03
2001	2413.44	2441.91	1718.14	1736.94
2002	2436.08	2465.41	1733.79	1752.59
2003	2455.82	2485.19	1746.05	1764.85
Net Cash Farm Income (\$1000)				
1998	340.08	288.95	226.06	200.09
1999	391.59	340.76	269.27	243.74
2000	401.54	354.67	278.29	254.25
2001	393.07	344.04	267.89	245.32
2002	386.07	341.81	260.39	239.39
2003	379.61	336.96	247.42	228.48
Prob. of a Cash Flow Deficit (%)				
1998	17.00	26.00	32.00	38.00
1999	17.00	28.00	39.00	44.00
2000	17.00	30.00	39.00	47.00
2001	16.00	27.00	38.00	52.00
2002	19.00	29.00	33.00	43.00
2003	10.00	31.00	33.00	43.00
Ending Cash Reserves (\$1000)				
1998	145.99	88.68	61.02	27.30
1999	321.18	208.55	146.79	80.93
2000	491.29	322.70	233.01	134.60
2001	649.93	419.74	305.19	172.46
2002	818.01	525.85	388.89	219.70
2003	981.75	624.47	479.97	273.68
Prob. of Refinancing Deficits (%)				
1998	17.00	26.00	32.00	38.00
1999	5.00	11.00	25.00	35.00
2000	0.00	10.00	17.00	29.00
2001	0.00	5.00	12.00	29.00
2002	0.00	4.00	11.00	24.00
2003	0.00	2.00	7.00	22.00
Nominal Net Worth (\$1000)				
1998	1849.58	1810.94	1787.17	1766.13
1999	2150.73	2108.93	2014.82	1994.61
2000	2385.23	2331.09	2174.71	2149.73
2001	2572.38	2497.58	2294.13	2260.91
2002	2725.73	2626.45	2381.09	2335.26
2003	2896.19	2779.68	2499.41	2446.48
Prob. of Losing Real Net Worth (%)				
1998	0.00	0.00	0.00	0.00
1999	15.00	15.00	21.00	21.00
2000	4.00	5.00	11.00	14.00
2001	1.00	2.00	11.00	12.00
2002	3.00	4.00	12.00	15.00
2003	2.00	4.00	10.00	12.00
Real Net Worth (\$1000)				
1998	1811.54	1773.69	1750.41	1729.80
1999	2056.02	2016.06	1926.10	1906.78
2000	2222.68	2172.22	2026.50	2003.22
2001	2337.06	2269.11	2084.27	2054.09
2002	2412.44	2324.56	2107.40	2066.84
2003	2499.29	2398.74	2156.88	2111.20

Appendix A. FAPRI 1998 BASELINE PRICES, INTEREST, AND INFLATION RATES.

	1998	1999	2000	2001	2002	2003
Corn (\$/bu.)	2.39	2.37	2.42	2.46	2.49	2.54
Wheat (\$/bu.)	3.33	3.37	3.49	3.54	3.57	3.62
Cotton (\$/lb.)	0.6888	0.6894	0.69420	.7005	0.7069	0.7129
Sorghum (\$/bu.)	2.21	2.19	2.24	2.29	2.33	2.38
Soybeans (\$/bu.)	5.87	5.91	5.92	5.97	6.01	6.08
Barley (\$/bu.)	2.25	2.26	2.32	2.34	2.36	2.39
Oats (\$/bu.)	1.54	1.54	1.56	1.58	1.59	1.61
Rice (\$/cwt.)	9.31	9.30	9.33	9.37	9.39	9.42
Soyb. Meal (\$/t)	176.10	177.20	179.50	181.90	183.40	185.80
All Hay (\$/ton)	93.00	92.80	93.40	94.70	95.60	96.70
Cattle Prices						
Fdr Cattle (\$/cwt)	81.83	91.20	95.00	90.20	85.65	81.90
Fed Cattle (\$/cwt)	69.29	74.90	78.55	74.79	71.70	69.11
Cull Cows (\$/cwt)	40.34	46.05	47.39	47.51	45.41	43.95
Milk Prices -- National and State						
All Milk (\$/cwt)	13.27	13.15	13.11	13.09	13.08	13.07
Texas (\$/cwt)	13.64	13.51	13.46	13.42	13.41	13.38
Annual Interest Rates						
Long-Term (%)	8.44	8.31	7.94	7.78	7.53	7.29
Intermed-Term (%)	9.10	8.98	8.60	8.60	8.35	8.39
Savings Acct. (%)	5.10	4.98	4.60	4.60	4.35	4.39
Annual Rate of Change for Input Prices Paid						
Seed Prices (%)		1.74	1.81	2.03	1.93	2.07
Fertilizer Prices (%)		0.30	1.60	1.86	1.86	1.26
Chemical Prices (%)		-0.34	1.11	1.91	2.04	2.26
Machinery Prices (%)		0.83	-0.40	-0.90	0.28	-0.09
Fuel and Lube Prices (%)		0.31	3.01	3.51	3.46	2.22
Labor (%)		1.61	1.96	2.19	1.95	1.82
Other Input Prices (%)		1.93	1.84	1.85	2.22	2.17
Non-Feed Dairy Costs (%)		1.68	2.07	2.24	2.01	1.92
Non-Feed Beef Costs (%)		0.34	1.10	1.20	1.16	0.99
Non-Feed Hog Costs (%)		0.90	1.59	1.69	1.61	1.47
Annual Change in Consumer Price Index (%)		2.75	2.59	2.57	2.65	2.56
Annual Rate of Change for U.S. Land Prices (%)		4.93	2.99	2.12	1.14	2.13

Source: Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri-Columbia and Iowa State University.

Appendix B. Characteristics of Representative Texas Dairy Farms Before and After Land Purchase to Meet Proposed ½ Mile Buffer Zone.

	TXCD825 BASELINE	TXCD825 PURCHASE	TXED650 BASELINE	TXED650 PURCHASE
Total Cropland	250.	720.	500.	900.
Acres Owned	250.	720.	500.	900.
Acres Leased	0.	0.	0.	0.
Pastureland				
Acres Owned	250.	720.	300.	540.
Total Land	500.	1440.	800.	1440.
Assets (\$1000)				
Total	2205.	2770.	2238.	2576.
Real Estate	913.	1547.	980.	1364.
Machinery	254.	254.	371.	371.
Other & Livestock	1038.	969.	887.	841.
Debt/Asset Ratios				
Total	0.16	0.35	0.20	0.32
Intermediate	0.06	0.07	0.13	0.13
Long Run	0.30	0.57	0.30	0.48
Number of Livestock				
Dairy Cows	825.	825.	650.	650.
Cwt Milk/Cow	192.	192.	170.	170.
1998 Gross Receipts (\$1,000)*				
Total	2322.0	2322.0	1653.3	1653.3
Milk	2172.5 93.6%	2172.5 93.6%	1493.0 90.3%	1493.0 90.3%
Dairy Cattle	149.5 6.4%	149.5 6.4%	160.3 9.7%	160.3 9.7%
1998 Planted Acres**				
Total	450.0	450.0	500.0	500.0
Hay	0.0 0.0%	0.0 0.0%	140.0 28.0%	140.0 28.0%
Silage	430.0 95.6%	430.0 95.6%	360.0 72.0%	360.0 72.0%
Sorghum Chop	20.0 4.4%	20.0 4.4%	0.0 0.0%	0.0 0.0%

* Receipts for 1998 are included to indicate the relative importance of each enterprise to the farm. Percents indicate the percentage of the total receipts accounted for by the livestock categories and the crops.

** Acreages for 1998 are included to indicate the relative importance of each enterprise to the farm. Total planted acreage may exceed total cropland available due to double cropping. Percents indicate the percentage of total planted acreage accounted for by the crop. The additional land purchased to meet the 1440 total acre requirement are assumed leased to local farms and ranches at current cash rental rates.

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