

TABLE NO. 5

Theoretical Capacity Model for Standard Freestall Dairies Balanced for Nitrogen and Salt Discounted for Additional Nitrogen Loading Sources NITROGEN & SALT GENERATION CALCULATION TABLE (1)

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SECTION A: Calculation of Animal Units (AU)														
Animals	Holstein Factor (1.4AU/Head)	AU Factor (By age of Animal)	A		B		C		D		E		F	
			Freestalls (2)				Flushed Corrals (3)				Scraped Corrals (4)			
			Head		AU		Head		AU		Head		AU	
1. Milk cows	1.40	1.00	381,980	534,772	-	-	-	-	-	-	-	-	-	-
2. Dry cows & bred heifers	1.40	0.80	-	-	-	-	-	-	57,297	-	-	64,173	-	-
3. Heifers (2 yr. & older)	1.40	0.73	-	-	-	-	-	-	122,234	-	-	124,923	-	-
4. Heifers (1 to 2 yrs. old)	1.40	0.73	-	-	-	-	-	-	61,117	-	-	62,461	-	-
5. Calves (3mo. to 1 yr. old)	1.40	0.35	-	-	-	-	-	-	152,792	-	-	74,868	-	-
6. Baby Calves (<3 mo. old)	1.40	0.21	-	-	-	-	-	-	30,558	-	-	8,984	-	-
7. Total AU's:			381,980	534,772								423,998		335,409
Grand Total:														
	Head:	805,977												
	AU's:	870,181												

SECTION B: Available Land (Excess or Deficit):		
Crop Acreage Requirement for Nitrogen: Excess or (Deficit):	0 Acres	
Corp Acreage Requirements for Salt: Excess or (Deficit):	Double Crop	Single Crop
	159,691	79,845

SECTION C: Calculations for Area and Animal Density:			
Total Acreage Considered		A.U. Density (5)	
250,056 Acres		Total Acreage	3.48
		Cropland only	3.70
Acreage Available		Total Head Density (5)	
Cropland	Dairy Facilities	Total Acreage	3.22
235,483 Acres	14,573 Acres	Cropland only	3.42

SECTION D: Calculation of Nitrogen Loading Capacity:					
N-Acreage Required for Liquid Manure	Values from Table 1	Liquid Manure		Solid Manure	
		Factor (2-4)	Nitrogen	Factor (2-4)	Nitrogen
163,530 @ [x] lb./ac./yr.	870,181				
Where x = 267 lbs./N/Acre					
N-Acreage Required for Solid Manure					
71,953 @ [x] lb./ac./yr.					
Total N-Acreage Required					
235,483 Total Ac. Req'd					
Crop N Acreage Requirement: Excess or (Deficit)					
0 Acres					
Estim'd Total AU's:	870,181				
AU's from B.7.	534,772	65.70	35,134,502		
AU's from B.1.	534,772	16.06	8,588,434		
AU's from B.7.	534,772			8.21	4,391,813
AU's from B.1.	534,772			2.01	1,073,554
AU's from D.7.	-	49.28	-		
AU's from D.1.	-	12.05	-		
AU's from D.7.	-			16.43	-
AU's from D.1.	-			4.02	-
AU's from F.1.	-	10.22	-		
AU's from F.1.	-			45.99	-
AU's from F.7 - F.1.	335,409			41.06	13,772,725
Time Factor (6):			0.50		0.25
Total N in lb./yr.			43,722,936		19,238,092
Total N in lb./yr. (both from liquid manure and solid manure):					62,961,028

- NOTES:
- Source: This model for estimating the herd size is based on RWQCB's Fact Sheet No. 4.
 - Freestalls: Liquid Waste Factor for Milk Cow = $0.8 \times 0.11 \times 0.5 \times 365$, Support Stock = $0.8 \times 0.45 \times 0.5 \times 365$, and Solid Waste Factor for Milk Cow = $0.2 \times 0.11 \times 0.25 \times 365$, Support Stock = $0.2 \times 0.45 \times 0.25 \times 365$.
 - Flushed Corrals: Liquid Waste Factor for Milk Cow = $0.6 \times 0.11 \times 0.5 \times 365$, Support Stock = $0.6 \times 0.45 \times 0.5 \times 365$, and Solid Waste factor for Milk Cow = $0.4 \times 0.11 \times 0.25 \times 365$, Support Stock = $0.4 \times 0.45 \times 0.25 \times 365$.
 - Scraped Corrals: Liquid Waste Factor for Milk Cow = $0.1 \times 0.56 \times 0.5 \times 365$, Support Stock = $0.1 \times 0.45 \times 0.5 \times 365$, and Solid Waste Factor for Milk Cow = $0.9 \times 0.11 \times 0.25 \times 365$, Support Stock = $0.9 \times 0.45 \times 0.25 \times 365$.
 - Milk cows and support stock.
 - Time Factor: The typical N loss from lagoons is time dependent. A loss of 30% of the N for a storage time of less than 30 days, 40% for 30-60 days, and 50% for more than 60 days. Solid manure Nitrogen loss is estimated to be 75%.

SECTION E: Estimate of Salt Loading Capacity:					
	Values from Table 1	Factor	Liquid Manure Salt (lb./yr.)	Factor	Solid Manure Salt (lb./yr.)
	Estimated Total AU's:				
AU's from B.7.	534,772	378.43	202,374,732	94.61	50,593,683
AU's from D.7.	-	283.82	-	189.22	-
AU's from F.7.	335,409	47.30	15,866,179	425.74	142,795,611
Total (Salt lb./yr.)	870,181		218,240,910		193,389,293
Total Salt Generated (both from liquid and solid manure):					411,630,204
Salt (lb./day) generated per 1,000 lb. A.U.:	1.296			Days per year:	365
Acreage available in crops:		42,062	264,629	Total	
Salt uptake per acre per year (6):		1,000	2,000		
Total lb. of Salt uptake per year from cropland:		42,062,343	529,258,827		571,321,170

Total lb. of Salt Generated by dairy herd (SECTION G):

411,630,204

Available cropland uptake vs. salt generated by herd: Excess or (Deficit):

159,690,966

(6) In order not to double count the acreage of double cropped land, add an additional 1,000 lb./acre/year to the single crop limit of 2,000 lb. of salt/acre/yr.

NOTES for determining land area needed for the actual dairy facilities (DF):

Acreage in existing Dairy Facilities (DF):	4,756	Acreage is based on GIS calculation from satellite image of area in existing dairy facilities.
# of existing Dairies:	145	# of dairies is based on the identified existing DFs from the GIS review of the satellite image of Kings Co.
# of existing Milk Cows:	124,660	# of milk cows based on the annual report from UC Cooperative Extension

Average Ac. per existing DF: 32.80 Average Acres per Dairy Facility
 Average # of cows per Ac of existing DF: 26.21 Milk Cows/Acres per Dairy Facility

Available Cropland from Fig. 2 & Table 4	
DDOZ =	217,657 Acres
NSOZ =	416,150 Acres
Total	633,807 Acres
Available	463,611 Acres

Estimated Dairy Capacity (Milk Cows): 381,980 Total # of Milk Cows (from Sec. A)

Estimated Acres required for DFs: 14,573 Ac. in DF

Estimated acres for other Nitrogen Sources (Table No. 5A): 95,395 For other Nitrogen

SECTION F: Estimate of Nitrogen Requirements for Certain Crops (7)

CROP (Source: NRCS)	YIELD Units	LBS. of N per Acre	Nitrogen Needs (lbs./acre)				Total Acres	Field Acres 1st Crop Only	Total lbs.N
			1st Crop (Acres)	2nd Crop (Ac.)	3rd Crop (Acres)				
Alfalfa (tons)	9.00	540	42,060	-	-	42,060	42,060	22,712,455	
Alfalfa, seed		540	17,427	-	-	17,427	17,427	9,410,738	
Barley, grain (tons)	2.50	160	7,624	-	-	7,624	7,624	1,219,911	
Barley, Early (tons)	8.00	128	-	-	-	-	-	-	
Barley, Late (tons)	16.00	160	-	-	-	-	-	-	
Bermudagrass (tons)	4.00	224	-	-	-	-	-	-	
Corn, grain (tons)	5.00	240	-	-	-	-	-	-	
Corn, silage (tons)	30.00	240	39,965	-	-	39,965	39,965	9,591,714	
Cotton (bale)	3.00	180	166,732	-	-	166,732	166,732	30,011,809	
Cotton, seed		180	2,765	-	-	2,765	2,765	497,683	
Mixed Small Grain (tons)	18.00	198	-	-	-	-	-	-	
Oats, grain (tons)	1.60	115	1,592	-	-	1,592	1,592	183,389	
Oats, silage (tons)	12.00	144	-	-	-	-	-	-	
Oats, hay (tons)	4.00	140	-	-	-	-	-	-	
Pasture, fescue (tons)	6.00	192	9,216	-	-	9,216	9,216	1,769,541	
Safflower (tons)	2.00	200	13,825	-	-	13,825	13,825	2,764,907	
Sorghum (tons)	4.00	252	-	-	-	-	-	-	
Sudan, silage (tons)	8/cuttings	88	-	-	-	-	-	-	
Sudan, hay (tons)	8.00	256	-	-	-	-	-	-	
Sugar beets (tons)	30.00	270	4,189	-	-	4,189	4,189	1,131,098	
Triticale, early (tons)	12.00	180	-	-	-	-	-	-	
Triticale, late (tons)	22.00	220	-	-	-	-	-	-	
Wheat, grain (tons)	3.00	174	-	-	-	-	-	-	
Wheat, early (tons)	10.00	160	51,947	-	-	51,947	51,947	8,311,478	
Wheat, late (tons)	18.00	198	2,681	-	-	2,681	2,681	530,862	
Other (Specify)	Second Crop	240	-	57,225	-	57,225	-	13,734,047	

(7) Source: U.C. Extension Service and Natural Resource Conservation Services

SECTION G: Cropland Nitrogen Requirement:	360,024	57,225	-	360,024
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Other Nitrogen sources reduction area from Table No. 5A: 95,395

Subtotal: Gross Cropland Acreage available for dairy manure: 264,629

Subtotal: Dairy Facility Acreage (from SECTION E above): 14,573

Net available cropland (in acres) available for dairy manure: 250,056 70,753,907

Average Nitrogen demand in lbs. per acre (single and double crop) for the project: 267

SECTION H: Estimate of Available Crop Land for Nitrogen Usage from Dairies:

All Crops Harvested:	680,821	Total acres harvested countywide from 1999 Agri. Crop Report
Selected Crops Harvested:	498,000	Total acres countywide of selected crops(s) harvested from 1999 Agri. Crop Report
Ratio 1:	73.15%	Ratio of Selected crops harvested to total crops harvested.
DDOZ & NSOZ in acres:	633,807	Acres in the DDOZ and NSOZ.
Total Acreage:	463,611	Ratio of selected crops harvested in DDOZ and NSOZ areas based on Ratio 1.
Available Acreage:	417,250	90% croplable area

Crop	Harvested Acres (1999) Countywide	Available Acreage (8)
Alfalfa	50,200	42,060
Alfalfa, seed	20,800	17,427
Hay, other	1,900	1,592
Barley	9,100	7,624
Corn (silage)	47,700	39,965
Cotton (lint, all varieties)	199,000	166,732
Cotton (seed, all varieties)	3,300	2,765
Pasture, fescue	11,000	9,216
Safflower	16,500	13,825
Sugar beets	5,000	4,189
Wheat	62,000	51,947
Wheat, seed	3,200	2,681
Other (double crop acreage)	68,300	57,225

Total: 498,000 417,250
 Less Double Crop: 429,700 360,024

360,024 Acreage available less double cropped acreage. Note that this is nearly 100,000 acres less than the estimated acreage in the DDOZ and NSOZ due to the actual acreage of the selected crops.

(8) Source: On average 90% of the acreage is available for crop production due to structures, roads, canals, etc.