

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						
		AUs: 870,181						

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

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

SECTION D: Calculation of Nitrogen Loading Capacity:					
N-Acreage Required for Liquid Manure 163,530 @ [s] lb./ac./yr. Where x = 267 lbs./N/Acre	Values from Table 1	Liquid Manure		Solid Manure	
		Factor (2-4)	Nitrogen	Factor (2-4)	Nitrogen
N-Acreage Required for Solid Manure 71,953 @ [s] lb./ac./yr.	Estim'd Total AU's: 870,181				
Total N-Acreage Required 235,483 Total Ac. Req'd	AU's from B.7. 534,772	65.70	35,134,502		
Crop N Acreage Requirement: Excess or (Deficit) 0 Acres	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:					
Estimated Total AU's:	Values from: Table 1	Liquid Manure Factor	Liquid Manure Salt (lb./yr.)	Solid Manure Factor	Solid Manure Salt (lb./yr.)
	AU's from B.7.	534,772	378.43	202,374,732	94.61
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

Dairy Element of the Kings County General Plan

	Double Crop	Single Crop	Total
Acres available in crops:	42,062	264,629	
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):

Acres 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
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

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

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

CROP (Source: NRCS)	YIELD Units	LBS. of N per Acre	Nitrogen Needs (lbs./N/acre)				Field Acres 1st Crop Only	Total lbs.N
			1st Crop (Acres)	2nd Crop (Ac.)	3rd Crop (Acres)	Total 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
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 I:	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 I.
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: 498,000 417,250 360,024 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 on 90% of the acreage is available for crop production due to structures, roads, canals, etc.