

Attachment 3

Calculating Feedlot Emission Factors for California Incorporating Cattle Entering as Calves

Introduction: All manure data are from the "Draft Proposal for ASAE D384.1 Manure Production and Characteristics." Dated 12/9/04, revised to include calf feeders.

The analysis below develops separate emission estimates for beef feedlots that start their cattle animals at about 745 lbs and grow them to 1200 pounds, and feedlots that start their animals at about 300 pounds and grow them to 1200 pounds.

For simplicity, the feedlots that start with larger cows will be called beef ranches and the ranches that start with the smaller cows will be called calf-fed, even though in both cases the facilities are feedlots with the goal of bring cattle to market for beef.

Step 1 - Compute Manure Output for Beef Finishing Cattle and Calf-Feds

	Manure Output (lbs/finished animal)	Finishing Time (days)	Manure Output (lbs/day)
Beef	9800	153	64.1
Calf Feds	*see below	335	44.0

*Total manure output is not provided for calf-feds, so daily manure output was computed based on the ratio of average daily total solids produced by beef versus the total solids produced by calf feds.

	Beef	Calf-Fed	Ratio (Calf:Beef)
Total Solids (lbs/day)	5.1	3.5	0.69

Step 2 - Compute Updated Per-Animal Emission Factors

The dairy emission factor of 12.8 lbs ROG/head/year is used as the baseline for emissions. Emissions for the other cattle are computed based on the ratio of manure output to the dairy baseline.

	Manure Output (lbs/day)	Dairy Manure Ratio	ROG Emissions (lbs/head/year)
Dairy Cattle	150	1	12.8
Beef	64.1	0.43	5.5
Calf-Feds	44.0	0.29	3.8

Step 3 - Compute Regional Per-Animal Emission Factors

Within a region, some of the animals on feedlots enter as calves and some enter as larger animals. The California Cattlemen's Association compiled information showing the percentage of animals that enter as calves for the three regions shown below.

(Provided by Tracy Schohr, California Cattlemen's Association, 7/20/2005)

	Total on Feed	Total entering as calves	Percentage entering as calves
Statewide	483,850	383,250	79%
San Joaquin Valley	184,050	101,550	55%
Imperial Valley	299,800	281,700	94%

To reflect the composite per-head emissions in each region, the percentage of beef and calf-feds are multiplied by the appropriate emission factors and combined to get a composite emission factor.

	Percentage Entering as Mid-Size	ROG Emision Factor (lbs/head/year)	Percentage Entering as Calves	ROG Emision Factor (lbs/head/year)	Composite ROG Emission Factor (lbs/head/year)
Statewide	21%	5.5	79%	3.8	4.1
San Joaquin Valley	45%	5.5	55%	3.8	4.5
Imperial Valley	6%	5.5	94%	3.8	3.9

Step 4 - Compute Facility Emissions Using Composite Emission Factors

To best reflect the statewide feedlot herd, the statewide composite ROG emission factor is used for the feedlot facility estimates.

# of Feedlot Cattle	ROG Emissions (tons/year)
2500	5.1
3000	6.2
3500	7.2
4000	8.2

For comparison, a dairy with 1,000 milking head (assuming 700 additional support stock) is estimated to produce 7.2 tons/year of ROG