

ANIMAL TYPE AND ANIMAL MANURE INFORMATION

Table 1. The Typical Animal Production

Animal Type	Average Weight (lbs)	No. of Animals per animal unit	No. For Large Confined Livestock Operation	Concentrated Animal Feeding Operation Numbers
Beef or dairy calf	250	4	4,000	4,000
Beef or dairy weaned calf	550	1.82	1,820	1,820
Beef Feeder	800	1.25	1,250	1,250
Beef Cow	1,000	1	1,000	1,000
Dairy Replacement Heifer	1,065	0.94	940	1,000
Dairy Cow	1,400	0.71	714	700
Layer	4	250	250,000	82,000
Pullet (<3 months old)	2.5	400	454,545	82,000
Pullet (>3 months old)	4	250	250,000	82,000
Broiler	2.2	455	454,545	125,000
Turkey Hen	20	50	50,000	55,000
Turkey on feed	15	66.67	66,667	55,000
Wean-Feeder Swine	30	33.3	33,333	10,000
Feeder-Finish Swine	135	7.41	7,410	2,500
Farrow-Wean Swine	433	2.31	2,310	2,500
Farrow-Feeder Swine	522	1.92	1,920	2,500
Farrow-Finish Swine	1,417	0.71	710	2,500
Replacement Gilt	150	6.67	6,670	2,500
Boar	400	2.5	2,500	2,500

Notes: A poultry operation is considered a large **Concentrated Animal Feeding Operation** when it has greater than 30,000 chickens and employs a liquid waste system.

An Animal Unit is defined as 1,000 pounds of live weight of any given livestock species or any combination of livestock species. A large confined livestock operation is defined as that which exceeds 1,000 Animal Units or 1,000,000 lbs. of live weight.

Calculation for total pounds of live weight in the confined livestock operation:

<u>Animal Type</u>	<u>No. Animals</u>		<u>Avg. Animal Wt.</u>		<u>Total Live Wt.</u>
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
			*Total	=	_____

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Table 2. Animal Manure Generation

Animal	Manure Production		Nutrient Content		
	(lb/d/1000#)	(cf/d/1000#)	N	P	K
Dairy Cow	80.00	1.30	0.45	0.16	0.31
Feeder Swine	63.40	1.00	0.42	0.36	0.26
Gestation Sow	27.20	0.44	0.19	0.14	0.14
Lactation Sow w/pigs	60.00	0.96	0.47	0.34	0.36
Nursery Pig	106.00	1.70	0.60	0.57	0.42
Pullet Litter	10.10	0.36	0.16	0.20	0.18
Breeder Litter	13.40	0.30	0.21	0.27	0.23
Broiler Litter ¹	17.80	0.57	0.52	0.43	0.33

¹ In absence of actual production date use the following for broiler litter production: 1.6 ton/animal units/year; 81% solids; 57 lbs/ton N; 29 lbs/ton P; and 59 lbs/ton K.

Table 3. Pounds of Nutrients per 1000 Gallons of Effluent

	(Liquid)	(Sludge)
<i>Dairy:</i>		
Nitrogen	1.67	20.83
Ammonia- NH ₄	1.00	4.17
Phosphorous- P ₂ O ₅	1.10	20.98
Potash- K ₂ O	4.85	15.00
<i>Swine:</i>		
Nitrogen	3.336	25.00
Ammonia- NH ₄	2.856	6.33
Phosphorus-P ₂ O ₅	1.266	51.53
Potash-K ₂ O	4.686	75.97

The nutrient content from animal waste management systems is highly variable. Waste analyses should be made to establish trends for the specific management system to determine the rates of application.

Annual manure production can vary depending on management.

Lagoons are anaerobic with volumes accounting for animal waste, minimum treatment, surface rainfall, 5-year sludge accumulation, and milking parlor washwater (if appropriate). Storage pond volumes account for animal waste, surface rainfall, and milking parlor washwater (if appropriate) for a 180 day storage period. No outside runoff is considered.

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Table 4. Ammonia Nitrogen Available for Crop Use After Volatilization Losses ^{1/}

Application Method		Available N from Ammonia	
Wet		Soil Conditions	
	%	%	%
Injection	90	95	100
Irrigation	65	75	85
Other Surface Application			
<i>Days between application and incorporation</i>			
1-2	70	90	100
3-5	60	80	95
6+	50	70	90

Table 5. Organic Nitrogen Which Becomes Available for Crop Use ^{1/}

Application Method	Available Nitrogen from Organic Nitrogen
	%
Surface applied	60
Incorporate	75

^{1/} The forms of nitrogen which occur in manure or organic waste are: ammonia N (NH₃-N), organic N (ON), and nitrate/nitrite N (NO₃/NO₂). The nitrate/nitrite forms are usually <1% of the total N or below detection level. This form is usually ignored. Ammonia N & nitrate N are both readily available for plant use. Ammonia N is subject to volatilization, while nitrate is subject to leaching. Organic N becomes slowly available through mineralization. Total Kjeldahl Nitrogen (TKN) equals ammonia N plus organic N. Laboratories often report TKN as Total N.

Example: To determine available N using Tables 2 & 3:

Situation: Lagoon effluent irrigation on a warm dry soil

Lab analysis of effluent (reported on an as-is basis):*

TKN = 100 lbs/acre inch

Ammonia N (NH₃-N) = 70 lbs/acre inch

Solution: Organic N (ON) = TKN - NH₃-N

ON = 100 - 70 = 30 lbs/acre inch

Available N = (70 lbs NH₃-N/acre inch) (.65) + (30 lbs ON/acre inch) (.65) = 65 lbs/acre inch

* Results were converted to a wet basis (Some laboratories report results on a dry-weight basis).

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Table 6. Percent Nutrients Remaining After Handling and Spread Activity

Handling/Spread Activity	N (%)	P (%)	K (%)
Anaerobic Lagoon	20 – 35	35 – 50	50 – 65
Storage Pond	65 – 80	80 – 95	80 – 95
Sprinkler Application	50 – 75	90 – 95	90 – 95
Gated Pipe Application	50 – 70	90 – 95	90 – 95
Tank Wagon Spreading	50 – 70	90 – 95	90 – 95
Dry Litter Spreading	50 – 70	80 – 95	80 – 95

Table 7. Soil Limitations for Liquid Application of Animal Manures

Soil Property	Limiting Factor		
	(slight)	(moderate)	(severe)
(0 - 60 inch depth)	(slight)	(moderate)	(severe)
Available water capacity (in/in)	>0.10	0.05 - 0.10	<0.05
Permeability affecting surface water (in/hr)	0.6-2.0	0.2 - 0.6	<0.2
Permeability affecting ground water (in/hr)	0.6-2.0	2.0 - 6.0	>6.0
Depth to high water table (ft)	>4.0	2 - 4	<2.0
Slope (percent)	<8.0	8 - 15	>15.0
Depth to bedrock (ft.)	>4.0	2 - 4	<2.0