

Appendix to rules 901:10-2-04 and 901:10-2-10: Daily manure production and characteristics, as-excreted (per head per day)

Manure Production Characteristics

Values are as-produced estimations and ~~so~~ do not reflect any treatment. Use these values only for planning purposes. Values do not include bedding. The actual characteristics of manure can vary $\pm 30\%$ from table values due to genetics, dietary options and variations in feed nutrient concentration, animal performance, and individual farm management. Increase solids and nutrients by 4% for each 1% feed wasted above 5%.

Animal	Size ^a (lbs)	Total Measure of Manure ^b Quantity Volume and/or Weight of Manure			Water ^c %	Density ^c (lb/ft ³)	Total Solids ^d (lb/day)	Volatile Solids ^e (lb/day)	BOD ₅₂ (lb/day)	Nutrient Content (lb/day)		
		(lb/day)	(ft ³ /day)	(gal/day)						(N) ^d	(P ₂ O ₅) ^d	(K ₂ O)
Dairy Cattle												
Calf	150	12 ¹³	0.18 ^{0.20}	1.38 ^{1.5}	88	65	1.4	1.2	0.19 ^{0.20}	0.06 ^{0.05}	0.01 ^c	0.05 ^{0.04}
	250	20 ²⁴	0.31 ^{0.32}	2.30 ^{2.4}	88	65	2.42 ³	2.0 ^{1.9}	0.31 ^{0.33}	0.11 ^{0.08}	0.02 ^c	0.09 ^{0.07}
Heifer	750	45 ⁶⁵	0.70 ^{1.0}	5.21 ^{7.8}	88	65	6.76 ⁸	5.75 ⁸	0.69 ^{1.0}	0.23	0.08 ^{0.07}	0.23 ^{0.22}
	1,000	60	0.93	6.95	88	65	8.9	7.6	0.92	0.30	0.10 ^c	0.31
Lactating cow	1,000	111 ¹⁰⁸	1.79 ^{1.7}	13.36 ^{12.7}	88	62	14.3 ^{10.0}	12.1 ^{8.5}	1.67 ^{1.60}	0.72 ^{0.58}	0.37 ^{0.30}	0.40 ^{0.31}
	1,400	155 ¹⁴⁸	2.52 ^{2.4}	18.70 ^{17.7}	88	62	20.0 ^{14.0}	17.0 ^{11.9}	2.34 ^{2.24}	1.01 ^{0.82}	0.52 ^{0.42}	0.57 ^{0.48}
Dry cow	1,000	51 ⁸²	0.82 ^{1.30}	6.14 ^{9.7}	88	62	6.59 ⁵	5.58 ¹	0.75 ^{1.20}	0.30 ^{0.36}	0.11 ^c	0.24 ^{0.28}
	1,400	71 ¹¹⁵	1.15 ^{1.82}	8.60 ^{13.6}	88	62	9.1 ^{13.3}	7.7 ^{11.3}	1.04 ^{1.70}	0.42 ^{0.50}	0.15 ^{0.20}	0.33 ^{0.40}
	1,700	87	1.40	10.45	88	62	11.0	9.3	1.27	0.51	0.18 ^c	0.40
Veal	250	6.69	0.11 ^{0.14}	0.79 ^{1.1}	96	62	0.26 ^{0.32}	0.11 ^{0.14}	0.04 ^{0.22}	0.03 ^{0.04}	0.02 ^{0.03}	0.05 ^{0.06}
Beef Cattle												
Calf (confinement)	450	48 ²⁶	0.76 ^{0.42}	5.66 ^{3.1}	92	63	3.81 ^{3.40}	3.20 ^{2.88}	1.06 ^{0.58}	0.20 ^{0.14}	0.09 ^{0.10}	0.16 ^{0.11}
	650	69	1.09	8.18	92	63	5.51	4.63	1.54	0.29	0.13	0.23
Finishing High forage	750	37 ⁶²	0.59 ^{1.0}	4.40 ^{7.5}	92	63 ⁶²	2.97 ^{5.8}	2.42 ^{5.2}	0.60 ^{1.05}	0.27 ^{0.41}	0.08 ^{0.14}	0.17 ^{0.25}
	1,100	54 ⁹²	0.86 ^{1.4}	6.46 ^{11.0}	92	63 ⁶²	4.35 ^{8.5}	3.55 ^{7.6}	0.89 ^{1.50}	0.40 ^{0.61}	0.12 ^{0.21}	0.25 ^{0.36}
High-energy	750	54	0.87	6.5	92	62	4.2	3.9	1.0	0.38	0.14	0.22
	1,100	80	1.26	9.5	92	62	6.2	5.7	1.50	0.54	0.21	0.32
Cow (confinement)	1,000	92 ⁶³	1.46 ^{1.00}	10.91 ^{7.5}	88	63	11.07 ^{7.0}	9.38 ^{6.00}	2.04 ^{1.40}	0.35 ^{0.31}	0.18 ^{0.19}	0.29 ^{0.26}
Swine												
Nursery	25	1.9 ^{2.7}	0.03 ^{0.04}	0.23 ^{0.3}	89	62	0.21 ^{0.27}	0.17 ^{0.22}	0.06 ^{0.09}	0.02	0.01	0.01
	40	3.0	0.05	0.37	89	62	0.33	0.27	0.10	0.03	0.01	0.02
Finishing Grow-Finish	150	7.4 ^{9.5}	0.12 ^{0.15}	0.89 ^{1.2}	89	62	0.82 ^{1.0}	0.65 ^{0.90}	0.23 ^{0.30}	0.09 ^{0.08}	0.03 ^{0.05}	0.04
	180	8.9	0.14	1.07	89	62	0.98	0.78	0.28	0.10	0.04	0.05
	220	10.9	0.18	1.31	89	62	1.20	0.96	0.34	0.13	0.05	0.06
	260	12.8	0.21	1.55	89	62	1.41	1.13	0.41	0.15	0.05	0.08
	300	14.8	0.24	1.79	89	62	1.63	1.30	0.47	0.17	0.06	0.09
Gestating	300 ²⁷⁵	6.8 ^{7.5}	0.11 ^{0.12}	0.82 ^{0.9}	91	62	0.61 ^{0.69}	0.52 ^{0.59}	0.21 ^{0.23}	0.05	0.03 ^{0.04}	0.04
	400	9.1	0.15	1.10	91	62	0.82	0.70	0.28	0.06	0.04	0.05
	500	11.4	0.18	1.37	91	62	1.02	0.87	0.35	0.08	0.05	0.06
Lactating	375	17.5 ^{22.5}	0.28 ^{0.36}	2.08 ^{2.7}	90	63	1.75 ^{2.25}	1.58 ^{2.03}	0.58 ^{0.75}	0.17 ^{0.18}	0.11 ^{0.13}	0.13 ^{0.14}
	500	23.4	0.37	2.78	90	63	2.34	2.11	0.78	0.22	0.15	0.18
	600	28.1	0.45	3.33	90	63	2.81	2.53	0.93	0.27	0.18	0.21
Boar ^c	300 ³⁵⁰	6.2 ^{7.2}	0.10 ^{0.12}	0.74 ^{0.9}	91	62	0.57 ^{0.66}	0.51 ^{0.59}	0.20 ^{0.23}	0.04 ^{0.05}	0.03 ^{0.04}	0.03 ^{0.04}
	400	8.2	0.13	0.99	91	62	0.75	0.67	0.26	0.06	0.05	0.05

	<u>500</u>	<u>10.3</u>	<u>0.17</u>	<u>1.24</u>	<u>91</u>	<u>62</u>	<u>0.94</u>	<u>0.84</u>	<u>0.33</u>	<u>0.07</u>	<u>0.06</u>	<u>0.06</u>
Sheep^c	100	4.14 ⁰	0.06	0.50 ⁴	75	63	1.05 ¹ 1.10	0.91	0.10	0.04	0.02	0.04
Poultry												
Layer	<u>34</u>	0.15 ⁰ 0.26	0.002 ⁰ 0.004	0.017 ⁰ 0.031	75	65	0.037 ⁰ 0.065	0.027 ⁰ 0.049	0.008 ⁰ 0.015	0.0026 ⁰ 0.0035	0.0008 ⁰ 0.0027	0.0012 ⁰ 0.0016
Broiler	2	0.19 ⁰ 0.18	0.003	0.023 ⁰ 0.021	74	63	0.050 ⁰ 0.047	0.038 ⁰ 0.034	0.011 ⁰ 0.010	0.0021 ⁰ 0.0023	0.0014	0.0010 ⁰ 0.0011
<u>Turkey (female)</u>	<u>10</u>	<u>0.47</u>	<u>0.007</u>	<u>0.056</u>	<u>75</u>	<u>63</u>	<u>0.117</u>	<u>0.088</u>	<u>0.034</u>	<u>0.0078</u>	<u>0.0051</u>	<u>0.0034</u>
<u>Turkey (male)</u>	<u>20</u>	0.74 ⁰ 0.90	0.012 ⁰ 0.014	0.088 ⁰ 0.108	75	63	0.186 ⁰ 0.225	0.139 ⁰ 0.171	0.054 ⁰ 0.066	0.0111 ⁰ 0.0126	0.0074 ⁰ 0.0108	0.0048 ⁰ 0.0054
Duck	<u>46</u>	0.44 ⁰ 0.33	0.007 ⁰ 0.005	0.053 ⁰ 0.040	73	62	0.118 ⁰ 0.089	0.089 ⁰ 0.053	0.016 ⁰ 0.012	0.0043 ⁰ 0.0046	0.0034 ⁰ 0.0038	0.0026 ⁰ 0.0028
Horse	1,000	<u>50</u>	0.80	<u>5.98</u>	<u>78</u>	<u>63</u>	11.00	<u>9.35</u>	<u>1.40</u>	<u>0.28</u>	0.11	<u>0.23</u>
<u>Sedentary</u>	<u>1,000</u>	<u>54.4</u>	<u>0.88</u>	<u>6.56</u>	<u>86^d</u>	<u>62</u>	<u>7.61</u>	<u>6.5</u>	<u>1.52</u>	<u>0.18</u>	<u>0.06</u>	<u>0.06^d</u>
<u>Intense Exercise</u>	<u>1,000</u>	<u>55.5</u>	<u>0.90</u>	<u>6.70</u>	<u>86^d</u>	<u>62</u>	<u>7.78</u>	<u>6.6</u>	<u>1.56</u>	<u>0.30</u>	<u>0.15</u>	<u>0.23^d</u>

~~Weights represent the average size of the animal during the stage of production.~~

^a Use linear interpolation to obtain values for weights not listed in the table.

^b Calculated using total solids divided by the solids content percentage.

^c Based on MidWest Plan Service historical data.

^d Values calculated or interpreted using diet based formulas in ASAE Standard D384.2: *Manure Production and Characteristics* (March 2005).

Source: MWPS-18 (1) *Manure Characteristics* (2004~~2000~~). Mid West Plan Service, Iowa State University: Ames, IA