

Prediction of Manure Output from Dairy Cattle.

T. D. Nennich^{1*}, J. H. Harrison¹, L. M. Johnson¹, D. Meyer², A. J. Heinrichs³, W. Weiss⁴, N. R. St-Pierre⁴, R. L. Kincaid⁵, D. Davidson¹, and E. Block⁶

Washington State University, Puyallup¹, University of California, Davis², Pennsylvania State University³, The Ohio State University⁴, Washington State University, Pullman⁵, Church & Dwight Co. Inc., NJ⁶.

Accurate estimates of manure excretion are needed for planning of manure storage facilities and for nutrient management. The standards published by the American Society of Agriculture Engineers in 1999 did not include data based on levels of milk production or data for young and non-lactating animals. In an effort to update the standard excretion values, data sets from metabolism studies conducted at Washington State University, University of California - Davis, University of Wisconsin, Pennsylvania State University, and The Ohio State University were compiled to obtain mean values for daily excretion of total manure, nitrogen, and minerals. The data were arranged according to milk production and animal age. The milk production ranges for lactating cows were <20 kg, 20 to <30 kg, 30 to <40 kg, and ≥40 kg milk per day. Additional age or management classifications were dry cows, heifers, weaned calves, and milk fed calves. The new estimates include updated values for urine excretion, total excreted N, and the excretion of selected micro and macro minerals including P, K, Mg, Cu, and Zn. Regression equations were developed to predict manure output using specific cow parameters. Predictors used in the regression equations include milk production, milk crude protein %, milk fat %, and diet crude protein %. This compilation effort is ongoing and projected to be finalized by the end of 2002. Representative and draft values of manure excretion are shown in the table below. The new standards should improve predictions of excretion and enable more accurate planning of manure storage and nutrients to be managed at the farm level.

Item	<20 kg	n	20 to <30 kg	n	30 to <40 kg	n	≥40 kg	n
Feces, kg/d	29.0	15	38.3	46	45.8	132	54.4	57
Urine, kg/d	22.2	15	23.7	46	24.0	132	25.4	57
Manure, kg/d	51.2	15	61.9	46	69.8	132	79.8	57
Fecal N, kg/d	0.155	15	0.193	46	0.235	132	0.293	57
Urine N, kg/d	0.179	15	0.195	46	0.204	132	0.194	57
Excreted N, kg/d	0.334	15	0.387	46	0.439	132	0.487	57

Cow protein intake was within 12% of 2001 Dairy NRC recommended levels.