

in Table 2-1 are estimates rather than accurate data for your farm.

Nutrient losses during storage and treatment are discussed in the animal waste utilization section.

Estimate livestock weights from Fig 11-1.

Table 2-2. Nutrients in livestock manure as produced.

Nutrients produced per animal per year.

Animal	Size lb	N lb/yr	P ₂ O ₅ lb/yr	K ₂ O lb/yr
Dairy cattle	150	22	9.1	18
	250	37	15	30
	500	75	30	59
	1,000	150	61	119
	1,400	210	116	166
Beef cattle	500	62	45	53
	750	93	68	80
	1,000	124	91	106
	1,250	155	114	133
Cow		131	100	114
Swine				
Nursery pig	35	5.7	4.3	4.6
Growing pig	65	11	8.2	8.6
Finishing pig	150	25	19	19
	200	33	25	27
	275	23	18	18
Gestating sow	275	23	18	18
Sow and litter	375	84	64	66
Boar	350	28	22	23
Sheep	100	16	5.5	14
Poultry				
Lavers	4	1.05	0.93	0.54
Broilers	2	0.85	0.43	0.31
Horse	1,000	99	39	75

lb/yr = lb/day x 365 x animal wt /1,000

Bedding

Some wastes include bedding. Table 2-3 lists density and water-absorbing capacity of common beddings. To estimate the amount of bedding used, weigh the bedding added to each pen per week and multiply by the number of pens and weeks between cleaning.

To estimate the total **weight** of bedding and manure, add the amount of manure produced per animal from Table 2-1 (solids and liquids) to the amount of bedding; subtract any liquids to be drained off that are not absorbed by the bedding. If well bedded, neglect drained liquids.

Total weight = manure weight + bedding weight

To estimate the **volume** of manure and bedding, add the manure production volume, Table 2-1, to V_z of the bedding volume. Bedding volume is halved during use.

Total volume = manure volume + V_{fe} bedding volume

Example 2-1:

Calculate storage requirements for manure with bedding for a 100-milking cow herd in free stall housing using chopped straw bedding.

Table 2-3. Bedding materials.

Approximate water absorption and density of dry bedding (typically 10% moisture).

2-3a. Water absorption of bedding.

Material	water absorbed per lb bedding
Wood	
Tanning bark	4.0
Fine bark	2.5
Pine	
Chips	3.0
Sawdust	2.5
Shavings	2.0
Needles	1.0
Hardwood chips, shavings or sawdust	1.5
Com	
Shredded stover	2.5
Ground cobs	2.1
Straw	
Flax	2.6
Oats	
Combined	2.5
Chopped	2.4
Wheat	
Combined	2.2
Chopped	2.1
Hay, chopped mature	3.0
Shells, hulls	
Cocoa	2.7
Peanut, cottonseed	2.5
Oats	2.0

2-3b. Bedding material density.

Form	Material	Density lb/ft ³
Loose	Alfalfa	4-4.4
	Nonlegume hay	3.3-4.4
	Straw	2-3
	Shavings	9
	Sawdust	12
Baled	Alfalfa	6-10
	Nonlegume hay	6-8
	Straw	4-5
	Shavings	20
Chopped	Alfalfa	5.5-7
	Nonlegume hay	5-6.7
	Straw	5.7-8

Table 2-4. Bedding requirements for dairy cattle.

Housing system	Type of bedding		
	Long straw	Chopped straw	Shavings
	lb/day per 1,000 lb weight		
Stanchion barn	5.4	5.7	
Free stall housing		2.7	3.1
Loose housing bedding area	9.3	11.0	