

Estimating Water Usage on Michigan Dairy Farms (1,000 head)

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Water usage on dairy farms can be divided into two general categories: 1) direct usage by dairy animals, and 2) indirect usage required for the general operation of the dairy facility. Direct water usage involves drinking water for dairy animals (cows, heifers, calves).

The level of direct water usage is determined by such factors as: (See reference 2)

- level of milk production (for cows in milk),
- body weight,
- level of feed intake (dry matter basis),
- percentage of the diet dry matter,
- level of sodium intake
- air temperature

Table 1 shows typical water intake for various classes of dairy animals.

TABLE 1. Direct usage of water by dairy animals (1).

Animals	Water Usage (gal/hd/d)¹
Calves	6-10
Heifers	10-15
Dry Cows	20-30
Milking Cows	35-50

¹During periods of heat stress (hot weather) drinking water intake can easily double.

Indirect usage of water on dairy farms falls into one, or more, of the following categories:

- milking system clean-up
- milking parlor clean-up and if used, milking parlor flushing
- milk bulk tank clean-up
- prepping cows for milking
- milk pre-cooling
- miscellaneous (e.g., milk house usage, restroom usage, etc.)(1).

Table 2 shows typical amounts of water used for indirect purposes.

TABLE 2. Indirect usage of water on dairy farms (1).

Operation	Water Volume
Milking system clean-up	75-125 gal/wash
Parlor clean-up	800-1,200 gal/milking
Milk bulk tank clean-up	50-60 gal/wash
Prepping cows for milking	0.25-0.5 gal/cow/milking
Milk pre-cooling	2 gal/gal of milk cooled
Miscellaneous	10+ gal/d

Table 3 shows an example of the estimated direct daily water usage for a 1,000 cow dairy farm raising their own heifers.

TABLE 3. Estimated direct daily water usage for a 1,000 cow dairy raising its own heifers (see reference 1).

Animals	No. of Hd	Lower Limit of Usage (gal/hd/d)	(gal/hd/d)	Lower Limit of Total Usage (gal/d)	Upper Limit of Total Usage (gal/d)
Calves (weaned)	120	6	10	720	1,200
Heifers (6-8 mo)	120	10	15	1,200	1,800
Heifers (9-12 mo)	180	10	15	1,800	2,700
Heifers (13-15 mo)	120	10	15	1,200	1,800
Heifers (16-24 mo)	380	15	20	5,700	7,600
Dry Cows	150	20	30	3,000	4,500
Milking Cows	850	35	50	29,750	42,500
			Total	32,750	62,100

Table 4 shows an example of the estimated indirect daily water usage by a 1,000 cow dairy farm.

TABLE 4. Estimated indirect daily water usage for a 1,000 cow dairy (see reference 1).

Operation	Lower Limit of Usage		Lower Limit of Total Usage	Upper Limit of Total Usage
Milking system clean-up ¹	75 gal/milking	125 gal/milking	225	375
Milking parlor clean-up and flushing ¹	800 gal/milking	1,200 gal/milking	2,400	3,600
Milk bulk tank clean-up ²	50 gal/wash	60 gal/wash	75	90
Cow prepping for milking ¹	0.25 gal/cow/milking	0.5 gal/cow/milking	638	1,275
Milk pre-cooling ³	2 gal/gal of milk	2 gal/gal of milk	16,386	16,386
Miscellaneous	10+ gal/d	100+ gal/d	10	100
			Total	19,733
				21,826

¹Assumes three time per day milking.

²Based on 80 lbs/cow/d milk production that would require the cleaning of a 6,000 gallon bulk tank 1.5 times per day.

³Assumes 80 lbs/cow/d milk production.

⁴This water could be recycled for other uses (e.g., drinking water for dairy animals).

Tables 5 and 6 show the estimated water usage for hypothetical 1,000 cow dairy farms.

TABLE 5. Estimated total daily water usage for a 1,000 cow dairy farm not recycling milk pre-cooling water (see reference 1).

Usage	Raise Heifers		Do Not Raise Heifers	
	Lower Limit of Total Daily Usage	Upper Limit of Total Daily Usage	Lower Limit of Total Daily Usage	Upper Limit of Total Daily Usage
Direct	32,750	62,100	22,130	47,000
Indirect ^{1,2,3}	19,733	21,826	19,733	21,826
Total	52,483	83,926	41,863	68,826

¹Assumes three time per day milking.

²Based on 80 lbs/cow/d milk production that would require the cleaning of a 6,000 gallon bulk tank 1.5 times per day.

³Assumes 80 lbs/cow/d milk production.

TABLE 6. Estimated total daily water usage for a 1,000 cow dairy farm that recycles milk pre-cooling water (see reference 1).

Usage	Raise Heifers		Do Not Raise Heifers	
	Lower Limit of Total Daily Usage	Upper Limit of Total Daily Usage	Lower Limit of Total Daily Usage	Upper Limit of Total Daily Usage
Direct	32,750	62,100	22,130	47,000
Indirect ^{1,2,3}	3,348	5,440	3,348	5,440
Total	36,098	67,540	25,478	52,440

¹Assumes three time per day milking.

²Based on 80 lbs/cow/d milk production that would require the cleaning of a 6,000 gallon bulk tank 1.5 times per day.

³Assumes 80 lbs/cow/d milk production.

References

- 1 Midwest Plan Service (MWPS). 2000. MWPS-7, Dairy Freestall Housing and Equipment, Chapter 10-Utilities. Iowa State University, Ames Iowa, page 137.
- 2 National Research Council (NRC). 2001. Nutrient Requirements of Dairy Cattle. 7th Ed., National Academy Press, Washington, D. C.