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Thumb H2O Project: Part 3, Water Delivery*

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In the previous two parts of this series (January, 2011 and April, 2011), the extreme importance of drinking water for dairy cattle was emphasized. By weight, water is the most important nutrient for milking cows. The previous articles focused on the chemical and mineral composition of dairy cattle drinking water and the steps to take if your cow's drinking water contains high levels of undesirable constituents. It is recommended that you test your farm's water for the constituents most often leading to water quality issues (total dissolved solids (TDS), sulfate (SO_4), chloride, (Cl), iron (Fe), and nitrate-nitrogen ($\text{NO}_3\text{-N}$)) and take action if any of these constituents are consistently above actionable levels.

A cow's water intake can be influenced by many factors including: 1) dry matter intake (DMI), 2) milk production, 3) sodium (Na) intake, and 4) air temperature (2). This leads to wide variations in water requirements among milking cows. For example, at 60°F a cow milking 40 lb/day will eat an estimated 42 lb/day of DM and drink about 10.1 gal/day less water than her herdmate producing 100 lb milk/day and eating 60 lb/day of DM (3). Both cows will increase their water consumption by about 3.5 gal/day when the temperature increases from 60 to 80°F (3). These intake figures assume water quality is satisfactory and no other factors are interfering with water consumption.

Even though water quality may be fine, other issues may prevent cows from satisfying their water needs. Thus, analyzing cows' drinking water is only the first step to ensure that "water nutrition" and water intake are satisfactory. Remember, drinking water should receive attention in two regards: 1) water quality ("Is your water fit to drink based on its chemical and mineral composition?"); and 2) water delivery ("Are you providing an ample supply of good quality, fresh, clean water to your cattle?"). Water quality is addressed by the chemical/mineral analysis. Water delivery concerns such issues as numbers of waterers per group and waterer location, size, and cleanliness. The most common waterer problems on dairy farms are: 1) inadequate number of waterers; 2) inadequate watering space; 3) poorly designed watering spaces; and 4) dirty waterers.

Parlor Area

Provide about 2.0 linear ft of watering space per milking parlor stall in return alleys from the milking parlor (e.g., 40 ft of watering space for a double-20 parlor). Warm plate cooler water is a good source for this water since cows prefer to drink warm water. This is true even in warm weather and warm climates. Remember, milk is about 87% water and cows may drink as

much as 50 to 60% of their total daily water intake immediately after milking if given the opportunity (1, 2, 3).

Waterers in Cow Housing Areas

Provide a minimum of two waterers/group and cows should not have to walk more than 50 ft to get a drink of water. Waterers should be located close to feed bunks and protected from direct sunlight. Direct sunlight promotes algae growth which decreases water palatability. It is crucial to provide adequate open space around waterers. This is particularly important for waterers located in cross-over alleys. Cross-over alleys should be at least 13.5 ft wide to allow adequate watering and walking space. There should be approximately 4 inches of linear waterer space per cow in every group. It is critical to provide adequate waterer space and locate waterers properly to keep boss cows from preventing other cows from obtaining adequate water (1, 2, 3).

Waterer Cleanliness

Waterer cleanliness is the final, but very important, critical link in water nutrition. How clean? Would you be willing to drink from it? If “no,” then clean it. Water trough cleaning should be a regular chore that receives high priority (1, 2, 3).

Thumb Water Project

The Thumb H₂O Project involved 36 dairy farms in Huron, Sanilac, St. Clair, and Tuscola Counties. Milking cow drinking water was sampled on each farm and then analyzed using the services of a certified commercial laboratory (2, 3). These results were presented in the first article of this series (January, 2011). In addition, data were collected from milking parlors and milking cow housing facilities on these farms concerning waterer numbers, space, location, and cleanliness. Results of this aspect of the Thumb H₂O Project are presented in Tables 1 through 5 following.

Parlor Area

Table 1 presents the data concerning waterers in the parlor area. Only 40.5% of the farms provided drinking water in the parlor holding pen and only 19.3% provided drinking water in the parlor exit alleys.

All the farms supplying drinking water in the parlor holding pen used recycled plate cooler water while only 50% of the farms providing drinking water in the parlor exit alleys used recycled plate cooler water. The water offered in parlor holding pens was usually offered using an oval drinking tub. In each case of water offered in the parlor exit alleys, water trough linear space met, or exceeded, minimum recommendations. These data indicate that opportunities exist on many farms for increasing drinking water availability to milking cows. It should be noted, however, that waterers in these areas were, on average, quite dirty.

The average cleanliness rating was only about 1.5 (1=very dirty, 5=very clean). One would naturally expect these waterers to be dirtier since all milking cows have access to them at least twice per day and cows drink more water immediately after milking. These drinking water sources probably should be cleaned at least daily, and preferably after or before every milking. Also, some of these waterers were nearly empty. Granted, most farms were evaluated during times cows were not being milked. But, be sure waterers in these areas remain nearly full when cows are present. This may require supplemental sources of water if plate cooler water is unable to fully meet the demand.

Table 1: Waterers in the parlor area.

Location	Water provided ¹	Recommended linear inches/cow	Average linear inches/cow ¹	Water provided comes from plate cooler ²
Holding Pen	40.5%	N/A	7.3 inches	100%
Exit Alleys	19.3%	24.4 inches/parlor stall	24.4 inches	50%

¹Statistics calculated only from the subset of farms on the study providing water in these locations.

²Percentage represents only the subset of farms providing water in either location.

Cow Housing Areas

Table 2 indicates that every farm in the study met the minimum recommendation of two waterers per group. In some respects I question the full importance of this criterion, since total linear waterer space may be the more important indicator of whether or not cows are exposed to adequate amounts of drinking water.

Table 2: Waterers in cow housing (numbers of waterers per group).

Criteria	Farms meeting criteria	Average maximum walking distance	Highest number of waterers/group	Lowest number of waterers/group
Minimum of 2 waterers/group	100%	3.6	4.5	2.0

Table 3 shows that only about one in five farms met the recommendation (50' or less) for maximum walking distance to water. The average maximum walking distance was over the limit by 22.5 ft (72.5 ft), the longest distance was over double the recommended maximum (109.3 ft) and the shortest was about 10 ft below the maximum (40.5 ft). As I collected these data it became obvious that the larger and newer free stall barns were clearly those barns that most often exceeded the recommended maximum walking distance to water. However, these barns also tended to have the greatest linear feet of waterer space. Perhaps exceeding the walking distance maximum is less critical as long as adequate linear space is provided.

Table 4 presents waterer data in cross-over alleys. Only slightly over half (57%) of the farms had waterers in cross-over alleys. Most of these farms tended to have older free stall barns. Less than 25% of farms with cross-over alleys met the recommended minimum width of 13.5 ft. The barns meeting this recommendation also tended to be newer free stall barns. Many older barns have cross-over alleys only 8 to 10 ft in width. Waterers in these narrow cross-over alleys are difficult for large cows to access and easy for boss cows to defend, keeping more submissive cows from drinking. It should be remembered that when these older barns were built they met the standards existing at the time.

Table 5 presents the data on waterer linear space and cleanliness. There were wide variations in waterer linear space per group. The average linear space was 2.2 inch/cow, about half of

the recommendation (4 inch/cow). The highest linear space was well above the recommendation at 5.8 inch/cow; and the low was a meager 0.7 inch/cow. Once again, the farms with lower linear waterer space tended to have older free stall barns; while those providing adequate space tended to be newer facilities. Some of the older barns were equipped with dual waterers providing only 2-10 inch watering spaces per waterer. This appears to be very deficient, especially when these waterers are often located in narrow cross-over alleys.

Table 3: Waterers in cow housing (maximum walking distance to water).

Criteria	Farms meet-ings criteria	Average maximum walking distance	Longest maximum walking distance	Shortest maximum walking distance
Maximum walking distance (<50 ft)	20.8%	72.5 ft	109.3 ft	40.2 ft

Table 4: Waterers in cow housing (waterers located in cross-over alleys).

Criteria	Farms with waterers in cross-over alleys	Farms meet-ing minimum cross-over width ¹	Farms not meeting minimum cross-over width ¹
Minimum cross-over alley width of 13.5 ft	57.0%	24.6%	75.4%

Table 5: Linear waterer space and cleanliness in barns.

Waterer criteria	Met minimum ¹	High ²	Average ²	Low ²
Linear space recommendation (4 inch/cow)	19.6%	5.8 inch	2.2 inch	0.7 inch
Waterer cleanliness ³	N/A	3.0	2.3	1.6

¹Percentage of farms with waterers in cross-over alleys.

²Linear waterer space measured in inches per cow.

³Waterer cleanliness scale of 1-5 (1= very dirty, 5=very clean).

In my opinion, nearly every farm evaluated could do a better job to keep waterers clean. Admittedly, waterer cleanliness is a subjective measure. I used a scale of 1 to 5 with 1 being “very dirty”, and 5 being “very clean.” On average, most water troughs were very dirty (2.3). The best farm scored an average cleanliness rating of 3.6 and the worst farm scored only 1.6. Most producers indicated they routinely clean water troughs every 1 to 2 weeks. Clearly, water troughs should be cleaned at least weekly, and possibly twice weekly. It should be a high priority routine chore.

Conclusion

These data clearly indicate that only a few (about 30%) farms provide water in the parlor area. I recommend that every dairy farm should give serious consideration to offering water in one or both parlor locations (holding pen, exit alleys). This is especially true if the housing area is: 1) below the recommended waterer linear space, 2) exceeds the maximum walking distance recommendation, and/or, 3) has numerous waterers located in narrow cross-over alleys.

Correction of waterer deficiencies in housing areas is problematic. Many farms' waterer linear spaces were less than half the recommendation. In those instances additional waterer space in the barn should be a high priority. Many of those barns could be easily retrofitted with larger waterers. Those farms with adequate waterer space and longer walking distances would require more extensive remodeling to decrease walking distance to water.

I question any benefit of more waterers as long as waterer linear space meets or exceeds the recommendation. However, those farms exceeding the minimum walking distance or with numerous waterers in cross-over alleys may be good candidates for offering water in the parlor area. In new construction or major renovations, the number of waterers, maximum walking distance to water, waterer linear space, water trough design, and location should receive more attention.

All farms, regardless of age of facilities or other water related considerations, would benefit from increasing the frequency and intensity of waterer cleaning.

Is the water nutrition program on your farm adequate? Does it meet current recommendations? Do you routinely test your water for composition? Do you know how many waterers are available and whether they are working properly? Do you know the maximum distance cows have to walk in your barn to get water? How much waterer linear space is in your barns? And, are cows' waterers clean? Maybe you don't know the answers to these questions, but your cows do; they are responding through their performance, or lack thereof.

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