

Calf Notes.com

Calf Note #77 – Methods of feeding water

Introduction. Water is fundamentally important to proper rumen development and good growth of young calves. Far too many producers fail to provide enough water to calves. This has an effect of slowing dry feed intake, delaying rumen development, increasing stress and, possibly, increasing the risk of disease. There are many ways to offer water – this Calf Note will provide some newer information regarding water availability.

Water in buckets. Most calf raisers provide water to calves in individual water buckets. Sometimes these buckets are the same ones used for milk or milk replacer, and sometimes these are buckets dedicated to water only. Buckets are common and, in cases where few calves are raised at one time, they are the most efficient method of providing water.

Buckets do have disadvantages, however. Proper management requires that they be filled – and emptied – frequently to ensure that the water is fresh and clean. Further, buckets are prone to damage and have many other possible uses. So, they tend to disappear for other purposes. So, buckets are labor intensive and the quality of the water provided depends on the frequency of cleaning and refilling.

Water from nipples. One method of bringing water to calves is to deliver the water through nipples. In many large calf ranches in the western U.S., this is done by fitting each hutch (each hutch contains a pen for three calves; see photo) with plastic tubing. Running water between hutches is accomplished by fitting flexible hoses with quick-fit connections on each end of the hutch, as in the photo.



Calves can obtain water at any time through a nipple that covers a conventional hog watering nipple. Hog watering nipples are usually stainless steel and are easy for calves to use. The hog water nipple connects to the water line using a plastic “T” fitting into the water line. Covering the hog nipple with a nipple (simply take a milk bottle nipple and cut it just above the base) makes the water nipple easy to use. See the photo (below) to see how the nipple in the hutch provides water. Some producers place the nipple close to the milk feeding holder while others place the water nipple in a different part of the hutch.

Nipples allow access to water at any time. The water systems are always turned on, so there is a constant supply of water to the calves. Ready availability of water – especially in hot climates – promotes good dry feed intake and allows earlier weaning.

Sanitation of water lines becomes important when a system of water lines is used. Some producers will flush lines regularly (weekly) while others use a chlorine additive to reduce the growth of microorganisms in the system. If a system of water lines is used, the water should be tested regularly to determine the frequency of line cleaning to maintain good quality water.



Of course, smaller producers may not be able to justify the cost of water lines.

Installing water lines in individual plastic or fiberglass hutches may not be feasible or practical, either. One option for smaller operations is offering water from nipple buckets rather than simply from open buckets. An interesting question is whether water intake is influenced by the method of feeding water – from buckets or nipples.

We asked this question in an undergraduate research program conducted at the APC Calf Research Unit in conjunction with Iowa State University. Two undergraduate students monitored daily water intake during a 56-day study conducted between June 29 and September 6, 2001. This research project used 32 calves in two blocks of 16 calves that were assigned to receive water from buckets (plastic, 6 L) or from nipple buckets (6 L). The calves were about 5 days of age at the start of the study and were purchased from dairies and sale barns. All calves had free access to water and the amount of water offered and remaining was measured every 24 hours. Calves were normally offered water once daily; however, as intake increased to > 6 L/day, water was also offered in an additional feeding in the afternoon. Calves were also offered calf starter (intake was measured daily) and were housed in individual hutches bedded with shavings.

Daily high and low temperature has a significant effect on water intake – therefore, the daily high and low ambient temperature at the ISU weather station is included in figure 1. The daily high temperatures ranged from 19 to 35 C and the daily low temperature ranged from 10 to 19 C. Therefore, the calves were usually in the thermoneutral range, although during at least part of many days, the calves could be considered as heat stressed.

Based on our experience, there are a number of very important factors that affect water intake – the two most

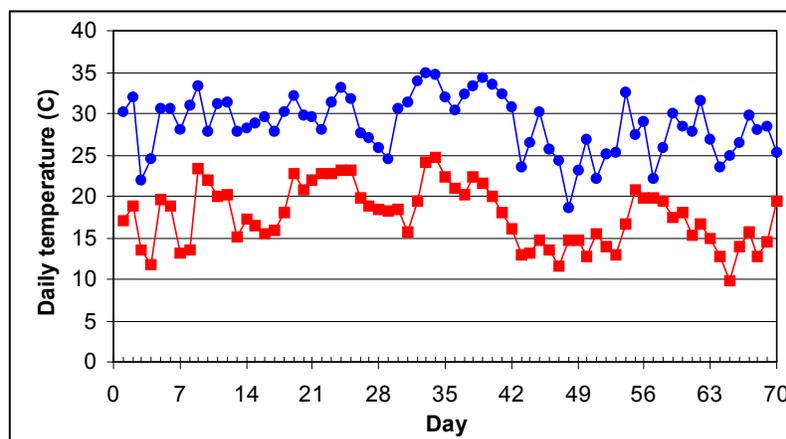


Figure 1. Mean daily high and low temperatures for the experiment.

important are the ambient temperature and the intake of calf starter. Intake of calf starter is usually affected by the availability of water (and vice versa).

Water intake in the study ranged from 0 L to 11 L per day with a mean water intake of 2.5 L during the study. As you can see from Figure 2, calves fed water from nipples exhibited a different profile of water intake compared to calves fed from buckets. The day x treatment interaction was highly significant ($P < 0.0001$) when analyzed statistically.

Calves fed from buckets appeared to consume more water during the first five weeks of the study compared to calves fed from nipples. However, during the last three weeks of the study, calves fed water from nipples consumed more water, so that by the end of the study (56 days), calves fed water in nipples consumed more water every day. We were able to predict the water intake of calves with good accuracy – the r^2 of regressions were 0.89 (nipples) and 0.83 (buckets), indicating that age of the animal (and starter intake!) was responsible for a big part of the intake of water.

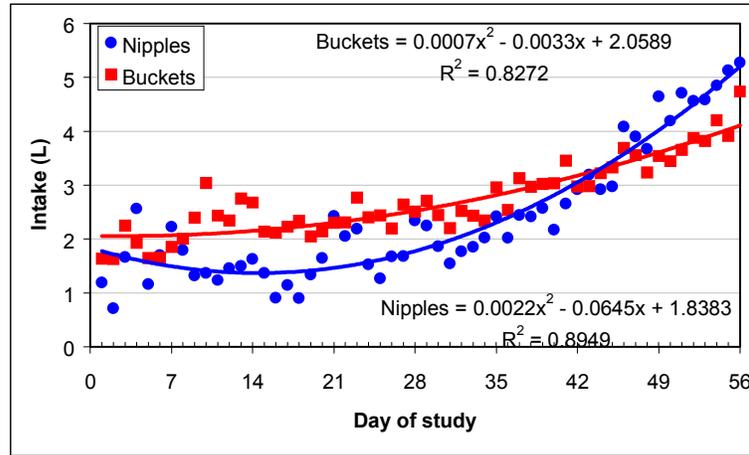


Figure 2. Least squares means of daily water intake.

Intake of calf starter (Figure 3) was highly correlated with water intake. As you can see from both figures, as starter intake increased, so water intake increased. There was no effect of water feeding (nipples or buckets) on starter intake, although it appears that calves fed water from nipples tended to consume more starter – however, this was not different when analyzed statistically. Again, we were able to predict the average calf starter DM intake with great accuracy. On average, calves ate very little calf starter for the first 7 days, then began consuming increasing amounts to maximum intake of nearly 2 kg by 56 days.

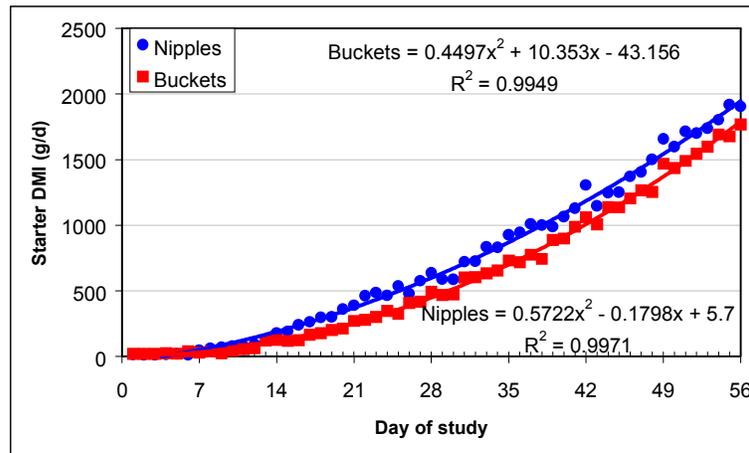


Figure 3. Least squares means of daily starter intake (DM basis).

It is quite possible that calves consumed more water early in the study when fed by buckets because of the ready availability and “novelty” of having a bucket of free water available at all times. Intake of water by calves fed from nipples didn’t increase much during the first four weeks of the study, suggesting that their intake of water from the nipples was sufficient, or that calves were nursing

from the nipples (to satiate the “nursing” instinct) and as a result obtained enough water. However, the differences between the two groups during the first four weeks of the study were fairly large – the mean intakes during the fourth week were 2.1 and 2.8 L/day for calves fed by nipple and bucket, respectively. By the eighth week, average intakes were 4.4 and 3.6 L/day, respectively. Either method was able to support good starter intake. In this study, both groups were ready to be weaned (consuming 1 kg of starter per day) before day 42. Calves fed water from buckets appeared to be ready for weaning about 5 or 6 days earlier, which could result in savings in both labor and milk replacer costs.

Note that the overall water intakes in this study were not as large as we have seen in past research at the APC Research Facility. In some studies, calves have averaged more than 6 L/day during the last weeks of a study. In others (especially in cold weather), intakes are much lower – sometimes not exceeding 2 L/day throughout the study. Other researchers have also reported wide individual variation in water intake – some calves will drink large amounts of water, others very little.

This undergraduate research project showed very interesting differences between methods of feeding water to calves. Calves appear to respond to water intake in different ways, depending on the way that the water is presented. Water is a critical part of calf raising – we need more research to better understand how to better incorporate water and dry feed consumption into overall calf management. This trial showed clearly that calves can consume sufficient water when fed from nipples and feeding from nipples does not negatively affect starter intake or rumen development.

Congratulations to the Iowa State University undergraduate students responsible for this study and special thanks to ISU Animal Science Department, APC, Inc., and the members of the APC Calf Research Unit technical staff for assistance with the care and feeding of the calves.

**Written by Dr. Jim Quigley (18 November, 2001).
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