

# Calf Notes.com

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## *Calf Note #158 – Water for calves – cold or warm?*

### Introduction

Water is an essential nutrient and an important feed for calves. Every good calf raiser begins offering fresh, clean water in the first few days of life and always keeps it clean, fresh and available. There's no question about how important water is to calves. For more information on the importance of water, see Calf Notes [#04](#), [#68](#), and [#132](#).

One question routinely asked about water is whether the temperature of water offered to calves affects their intake and subsequent starter intake, rumen development and growth. A recent article in the Journal of Dairy Science (May, 2011) addresses this article. We'll review the results and put them into context for producers in other parts of the world.

### The Research

This study was conducted at the Agrifood Research Institute in Finland and used 60 calves per treatment. Calves were fed either warm (16 to 18°C; 61 to 65°F) or cold (6 to 8°C; 43 to 47°F) water from 20 to 195 days of age. Calves were housed in an insulated barn, so the extremes of Finland's climate were avoided. Prior to weaning (calves were weaned at 75 days of age), all calves were fed 7.5 liters of commercial milk replacer (CMR; 21% CP, 20% fat, reconstituted to 11.9%

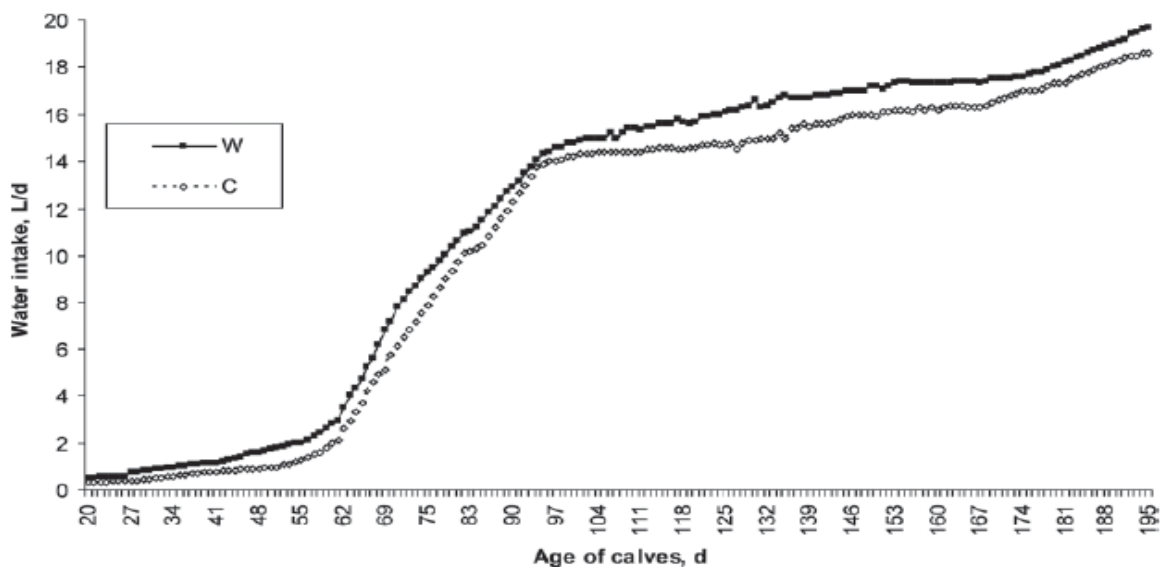


Figure 1. Intake of water by calves fed warm (W) or cool (C) water from 20 to 195 days of age. From: Huuskonen et al., 2011.

DM) and commercial calf starter (20.5% CP), grass hay (5.5% CP) and grass silage (16.6% CP) were available for *ad libitum* consumption. The CMR was fed at 37°C (100°F) through an automated computerized feeder. Calves were housed in pens (2.1 m<sup>2</sup>/calf) with five calves per pen.

After weaning, calves were offered 3 kg/day of starter and ad lib hay and grass silage. They were housed in the same pens as during the preweaning period. The researchers monitored intake of feed, water, growth and health of the calves.

The ambient temperature of the insulated barn varied between 11 and 20°C in winter (October–April) and between 15 and 23°C in summer (May–September). Thus, there were no extremes of temperature that would be observed in either the Northern parts of the U.S. in winter or very hot weather (>35°C or 95°F) that is experienced in some parts of the world in summer.

Calves fed warm water drank more water throughout the study (Figure 1). Difference in water intake was observable by 27 days of age and was maintained throughout the trial. Water intake was less than 2 L per day until about day 60, when weaning began (milk offered was reduced). Presumably, during this time, starter intake increased, driving the increase in water intake. This consistent with other research, though the amount of liquid in CMR in this study was greater than in some other trials. Consequently, the amount of water consumed early in this trial was somewhat lower than others (Quigley et al., unpublished).

Item	Warm	Cool	SE	P
<b>Preweaning</b>				
Water intake, L/d	2.8	1.9	0.09	0.001
Dry feed intake, kg/d	1.38	1.36	0.022	NS
Feed conversion	28.4	27.2	0.64	NS
<b>Postweaning</b>				
Water intake, L/d	16.3	15.3	0.36	0.08
Dry feed intake, kg/d	4.79	4.73	0.05	NS
Feed conversion	44.0	43.8	0.50	NS
<b>Overall</b>				
Water intake, L/d	11.8	10.9	0.24	0.02
Dry feed intake, kg/d	3.66	3.60	0.04	NS
Feed conversion	40.5	40.1	0.37	NS

Table 1. Performance of calves fed warm or cool water. From Huuskonen et al., 2011. NOTE: Feed conversion is MJ of ME intake / kg of BW gain.

Table 1 shows some of the data from the trial. Calves fed warm water consistently consumed more water than calves fed cool water but this difference didn't affect intake, BW gain or feed conversion. Body weights of calves at the start of the study were 50 kg; at weaning (75 d), calves fed warm and

cool water weighed 89 and 90 kg, respectively. By the end of the study (195 d), calves in both groups weighed 234 kg with no difference between treatments.

It's generally accepted that water and starter intake are highly related and as starter intake increases, water intake will follow similarly. The authors in this paper did not report starter intake during the preweaning period and calves also had access to both dry hay and silage. This type of management is not typical on modern farms in the U.S. In addition, it's likely that the low water consumption during the first two months of the study were due to the relatively constant temperature of the heated barns and large amount of liquid fed. In this study, calves were fed 7.5 L/day of CMR that was reconstituted to 11.9% solids. Thus, there is significant contribution of the water in the CMR to total water needs of the calf.

It's important to keep these data in context and not extrapolate them to conditions dissimilar to those used in the study. Calves in this study were not exposed to temperatures higher than 23°C (73°F) throughout the study. In many parts of the U.S., calves will be exposed to much higher temperatures, and the availability and temperature of water may be more important. For example, Baker et al. (1988) reported improved (lower) respiration rates and body temperatures when mature cows were fed chilled (9.5°C) water compared to warm (27.5°C) water in the Texas summer (high temperatures during this study ranged from 28 to 38°C).

In data from calves in Iowa (Quigley, unpublished), we found that increasing temperatures above approximately 25°C increased water intake irrespective of starter intake and age, indicating that calves were consuming water in response to increasing temperature.

## **Summary**

These data suggest that under conditions of the research, calves fed warm water consumed more water without effect on other production parameters.

## **References**

Baker, C. C., C. E. Coppock, J. K. Lanham, D. H. Nave, J. M. Labore, C. F. Brasington, and R. A. Stermer. 1988. Chilled drinking water effects on lactating Holstein cows in summer. *J. Dairy Sci.* 71:2699-2708.

Huuskonen, A., L. Tuomisto, and R. Kauppinen. 2011. Effect of drinking water temperature on water intake and performance of dairy calves. *J. Dairy Sci.* 94 :2475–2480.

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