



Warm drinking water lowers core temperature in dairy cattle

Tiffany J Rudderham¹ and J Small²

Department of Plant and Animal Sciences, Nova Scotia Agricultural College, Agriculture and Agri-Food Canada, Truro NS B2N 5E3

Introduction

- Bewley et al. reported strong correlations between reticular temperature and rectal temperature and suggested reticular temperature was affected by water consumption [1].
- Cunningham et al. reported the amount and temperature of water consumed affects the temperature of the reticulo-rumen. Reticular-rumen temperature was depressed immediately upon consumption and rectal temperature depressed within 20 min. [2].
- Deviations from normal Tc could be useful information for indicating illness, heat stress, general physiology, and estrus in dairy cattle [1].
- Osborn et al. reported free water intake was greater in warm water compared to ambient temperature water [3].
- Hypothesis: Warm drinking water will prevent the acute decrease in rumen temperature that follows cold free water intake (FWI).
- Objectives: to determine the effect of warm drinking water on reticulo-rumen (Trr) and vaginal (Tv) measures of core temperature in dairy cattle.

Materials and Methods

- Transponder boluses were administered to lactating (<90 DIM) Holstein cows (N=8) housed in the tie-stall barn.
- All procedures were in accordance to the Canadian Council on Animal Care guidelines.
- Trials were performed in autumn (THI 42 to 49) and winter (THI 40 to 54) each using four cows in a cross-over design.
- Cows were randomly assigned to one of two groups to receive either warm (39°C) or control (7° to 12° C) tap water twice a day.
- Drinking water (free water intake, FWI) was offered twice daily following the morning and afternoon milking at 0600 and 1700.
- Cattle were given a total mixed ration ad libitum.
- Trr were measured in real time with a hand held reader (DVM Systems, LLC Denver, CO) and Tv were measured manually with a digital thermometer.
- The Tc were measured every 15 min from -90 to 90 min from FWI.
- Data were subjected to PROC MIXED repeated measures analysis of variance to determine the effects of drinking water temperature and period of day on Tv and Trr.

Results



Figure 1. Cow consuming drinking water (free water intake, FWI), transponder bolus, hand held reader (DVM, Systems LLC Denver, CO).

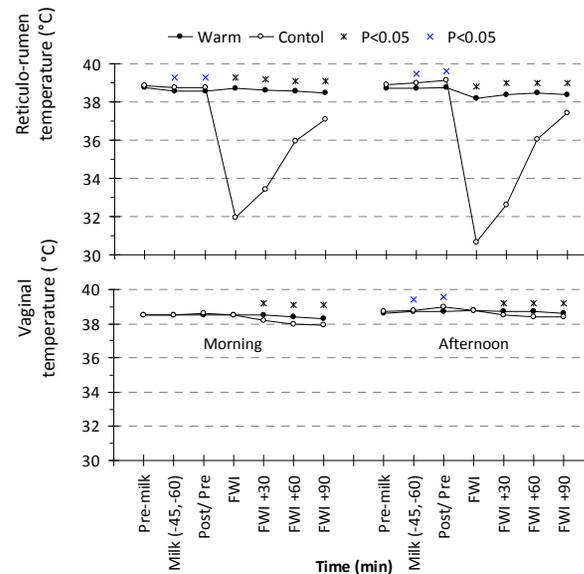


Figure 2. Effects of warm free water intake (FWI) after milking on morning and afternoon reticulo-rumen (Trr) and vaginal (Tv) temperatures in dairy cattle.

- Milk yield and FWI (41.9, 48.1 and 50.0, and 39.5 ± 7.2 L for warm treatment (W) and control (C) in the morning and afternoon, respectively) were not affected (P>20) by the warm water treatment.
- Warm FWI prevented a transient decrease in Tv (0.5 °C after 30 min; P<0.05), and an acute decrease (10° C after 10 min. P<0.05) in Trr that followed FWI by the control (Figure 2).
- The mean Tv values before FWI in the afternoon were lower for W than C (38.5, 38.6 ± 0.06 and 38.6, 38.8 ± 0.04 P< 0.05, morning and afternoon, respectively).
- Mean Trr values before FWI were lower for W than C (38.9, 39.3 ± 0.20 and 38.9, 39.3 °C ± 0.13 P<0.05, morning and afternoon, respectively).

Discussion

- The pre-FWI temperatures were within normal range for cattle and agree with the average Trr reported by Bewley et al. [1].
- The decrease in Tv and Trr following FWI agreed with the trend resulted by Cunningham et al [2]. However Cunningham et al did not report the affect of warm water on afternoon TC.
- Based on results there is evidence to support further research to determine potential benefits of offering cattle warm drinking water occasionally.

Conclusion

Warm FWI prevented a transient decrease in Tv and an acute decrease that followed FWI lowered afternoon basal core temperature in dairy cattle.

References

- [1] Bewley et al. 2008 J Dairy Sci. 91: 4661-4672.
- [2] Cunningham et al. 1964 J Dairy Sci. 47: 382-385.
- [3] Osborne et al. 2002 Can. J. Anim. Sci. 82: 267-273.

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