



Effects of lipid and starch supplementation on total water intake of Holstein bull-calves

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Introduction

Water intake of dairy calves is often overlooked by most nutrition models which can be associated with **the misconception that dairy calves meet their water requirements with milk or milk replacer (MR) alone**

The goals herein were to investigate the effect of two isoenergetic supplements fed in a MR diet on total water intake (**TWI**) and fresh water intake (**FWI**).

Material & Methods

Table 1. Experimental diets for Holstein veal-bull-calves fed non-medicated milk replacer as control (CON; n=7), supplemented isoenergetically with menhaden fish oil (FAT; n=8), or with corn starch (CHO; n=8)

Item ¹	Treatments ³		
	CON	CHO	FAT
	g/L		
Milk Replacer	173.9	173.9	173.9
Fish oil	-	-	5.2
Starch	-	11.8	-

Twenty-three Holstein bull-calves (94.67 ± 12.07 kg) were distributed in a completely randomized design and received one of three supplements for 68 days: control (**CON**; n=7), carbohydrates (**CHO**; n=8), and lipid (**FAT**; n=8); on top of a MR-based diet.

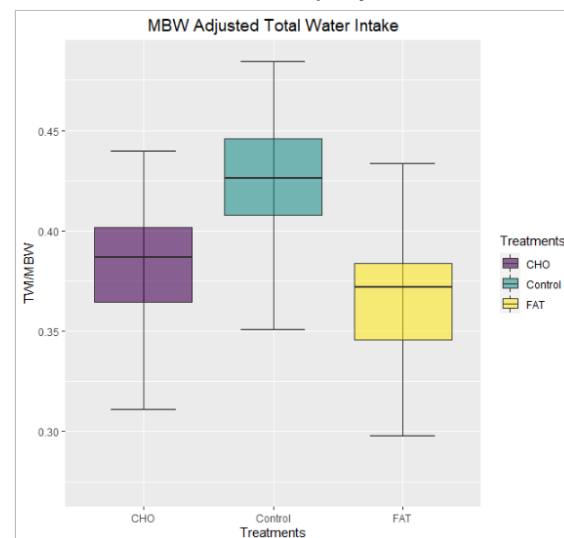
Animal diets are shown in Table 1. Additionally, all animals were provided free access to mineral mix, clean water, and 200 g daily dried brewer's spent grains.

Thermal stress was controlled with use of swamp coolers, circulating fans, and heaters to ensure environmental factors did not influence our results.

No significant differences were observed for **MR intake**, 3.13, 3.05, and 3.14 kg, **final bodyweight**, 208.75, 200.94, 202.64 kg, and **average daily gain**, 1.74, 1.60, 1.64 kg, for FAT, CHO, and CON, respectively.

TWI in a metabolic bodyweight (**MBW**) basis was different ($P < 0.05$) amongst treatments; lower TWI intake was seen for FAT than CHO than CON.

TWI without MBW resulted in similar results ($P < .05$) with average TWI of 15.69, 16.08, and 18.00 L; FWI differences ($P < .05$) were seen alone 1.51, 2.59, and 3.77 L, as well as in MBW basis 0.033, 0.060, and 0.088 L/kg^{.75} for FAT, CHO, and CON. More results are displayed on Table 2.



Results

Table 2. Water, feed, digestibility, and efficiency of Holstein veal-bull-calves fed non-medicated milk replacer as control (CON; n=7), supplemented isoenergetically with menhaden fish oil (FAT; n=8), or with corn starch (CHO; n=8)

Item ¹	Treatments			SEM ²	P-value ³	
	CON	CHO	FAT		CON vs.E	CHO vs. FAT
Water Intake, kg						
MWI/BW, kg	0.099	0.091	0.094	0.0017	<u>0.009</u>	0.241
Digestibility, g/g						
CPD	0.94	0.91	0.93	0.006	0.117	<u>0.018</u>
EED	0.95	0.94	0.96	0.005	0.955	<u>0.012</u>
Efficiency Indexes						
RFI	0.16	-0.07	-0.07	0.049	<u>0.002</u>	0.982
FC	0.52	0.55	0.56	0.013	<u>0.025</u>	0.532
FCR	1.94	1.83	1.78	0.043	<u>0.026</u>	0.474

MWI = milk water intake, DMImr = dry matter intake of milk replacer, CPD = crude protein digestibility, EED = ether extract digestibility, RFI = residual feed intake, FC = feed conversion (ADG/DMI), FCR = feed conversion ratio (DMI /ADG)

Summary

These data could potentially show that metabolic water production in early ruminant animals can significantly decrease water intake. Further, additional research will continue to seek out alternative production systems that are more sustainable. New supplementations methods that lower water footprint will continue to be developed in the near future.

Acknowledgements

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