

A black and white cow calf is lying down in a bed of straw bedding. The calf has a white face with black markings around its eyes and ears. The background is a wooden wall. The text is overlaid on the right side of the image.

**The impact of heat-treating
colostrum on calf
development in the neonatal
and pre-weaned periods**

**Coral Kent-Dennis
Dairy Info Day January 30th, 2015**

Photo credit: Dairycarrie.com

Importance of colostrum

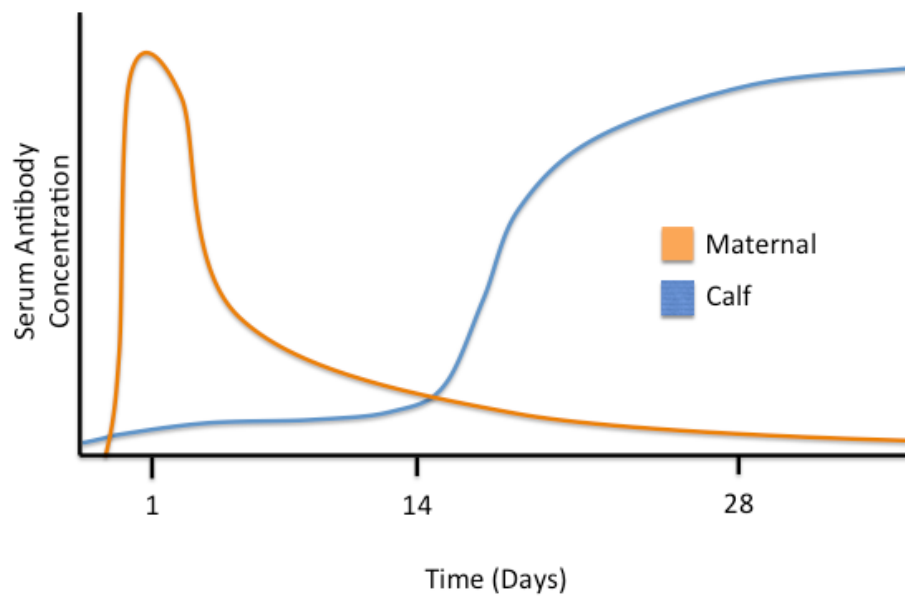


Component	Colostrum	Milk
Total Solids (%)	23.9	12.9
Lactose (%)	2.7	5
Fat (%)	6.7	4
Total Protein (%)	14	3.1
Casein (%)	4.8	2.5
Albumin (%)	6	0.5
B-lactoglobulin (g/L)	14.3	4.2
Immunoglobulins (%)	6	0.09
IgG ₁ (g/L)	69.5	0.35
IgG ₂ (g/L)	1.85	0.055
IgA (g/L)	4.9	0.045
IgM (g/L)	4.7	0.05
IGF-I (µg/L)	310	< 2
Insulin (µg/L)	65	< 2
Glucagon (µg/L)	0.16	0.01
Growth Hormone (µg/L)	1.4	< 2
Prolactin (µg/L)	280	15
Total Ash (%)	1.11	0.74
Vitamin A (µg/100 mL)	295	34
Vitamin E (µg/g fat)	84	15
Lactoferrin (g/L)	1.84	N.D.
TNF-α (µg/L)	5	< 2

Data from Blum and Hammon, 2000; Foley and Otterby, 1978

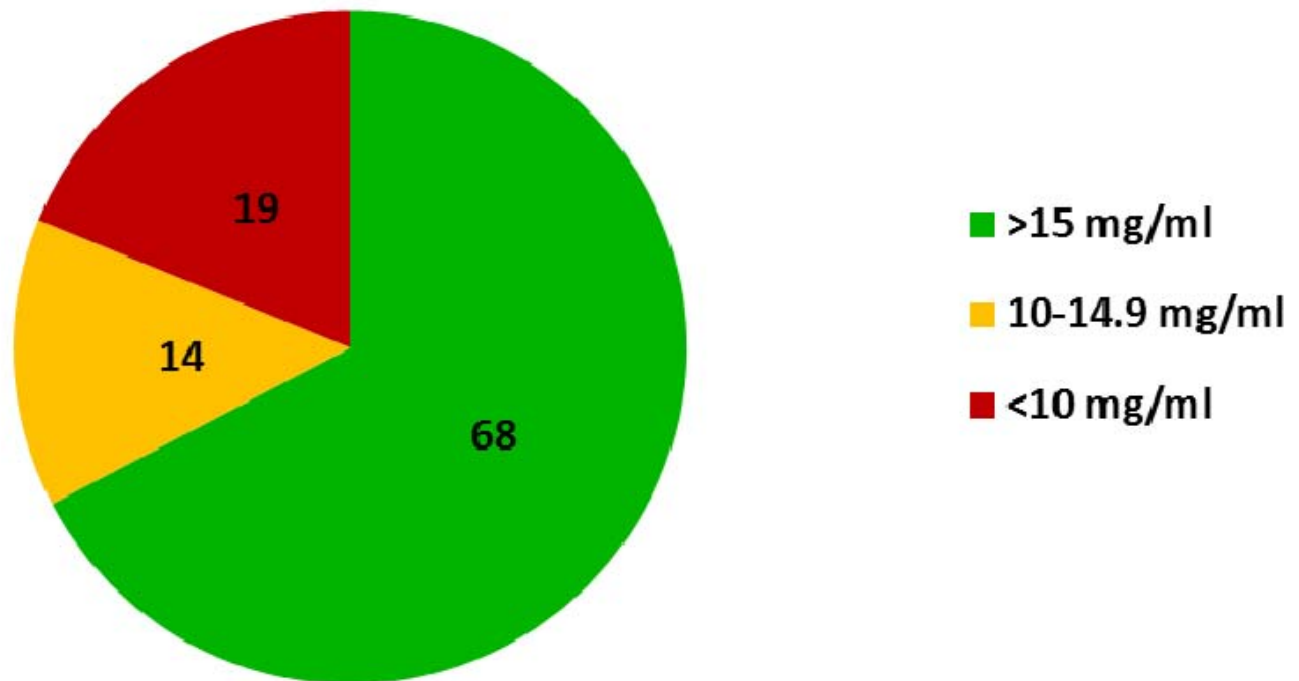
Importance of colostrum

- Passive transfer of immunity



Passive transfer

Percent of calves achieving different levels of passive transfer (Blood IgG)





Besides IgG...

- Other factors of colostrum effect:
 - Gut development¹
 - Immune function²
 - Growth¹
 - Long-term productivity³

Examples of bioactive factors found in bovine colostrum

Bioactive component	Example
Growth factors	Insulin-like growth factor
Hormones	Insulin, growth hormone
Antimicrobial peptides	Lactoferrin
Maternal immune cells	B- and T-leukocytes
Vitamins	Vitamin A
Whey proteins	B-lactoglobulin
Cytokines	Tumor necrosis factor (TNF- α)
Bacteria?	Many species

(¹Pakkanen and Aalto, 1997; ²Reber et al., 2008; ³Soberon and Van Amburgh, 2013)



Heat-treatment of colostrum

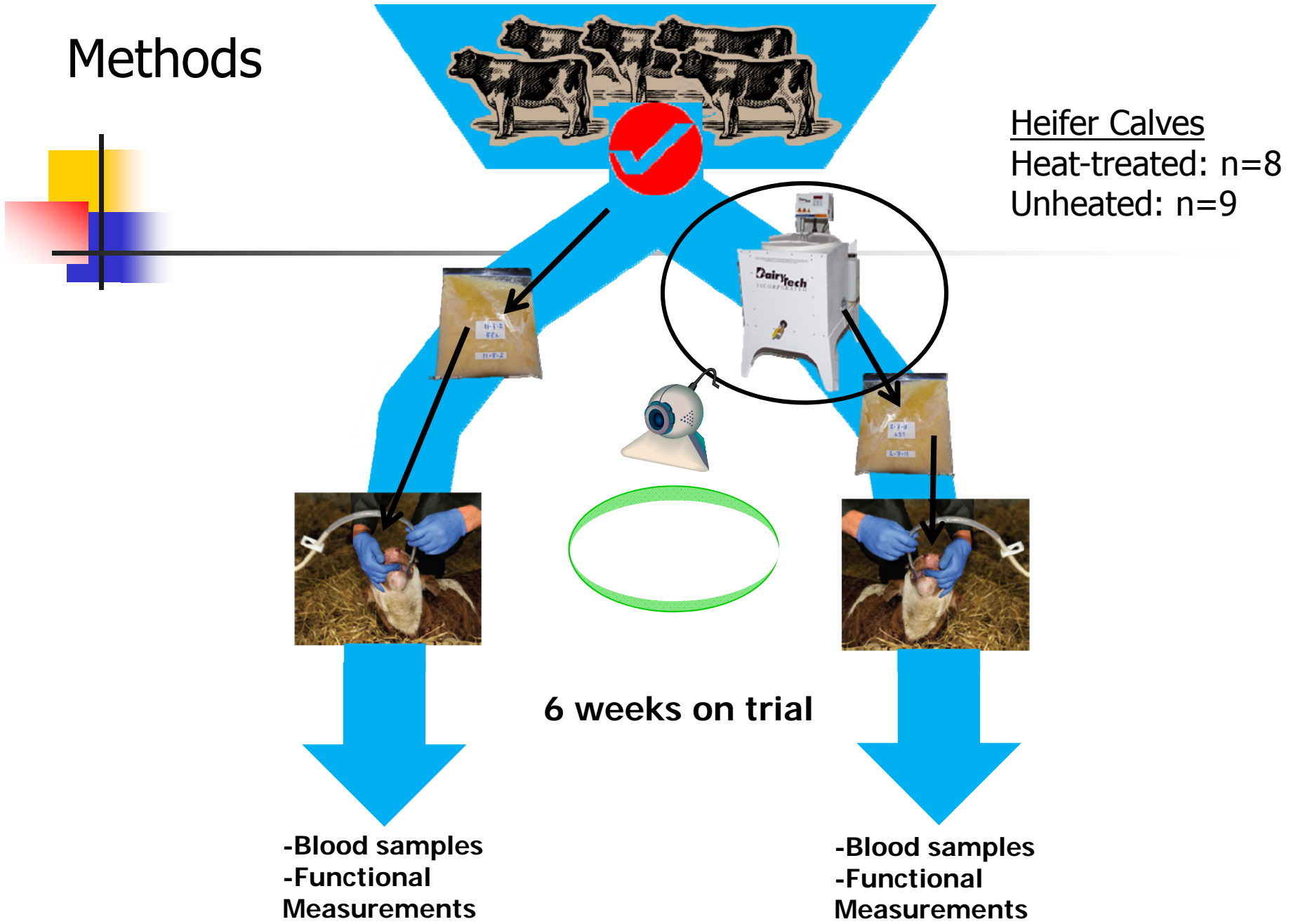
- Method for reducing pathogen load
- Colostrum can be heated to 60°C for 60min without reducing IgG concentration



Objective of study

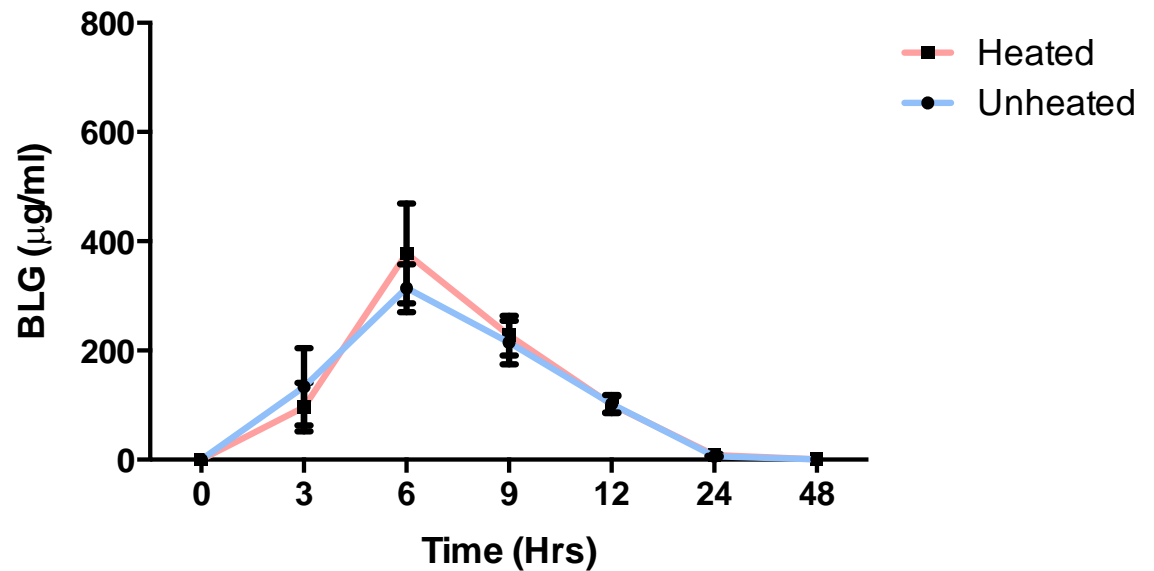
- Investigate the effects of heat-treatment of colostrum on gut absorption, growth and health of pre-weaned heifer calves

Methods

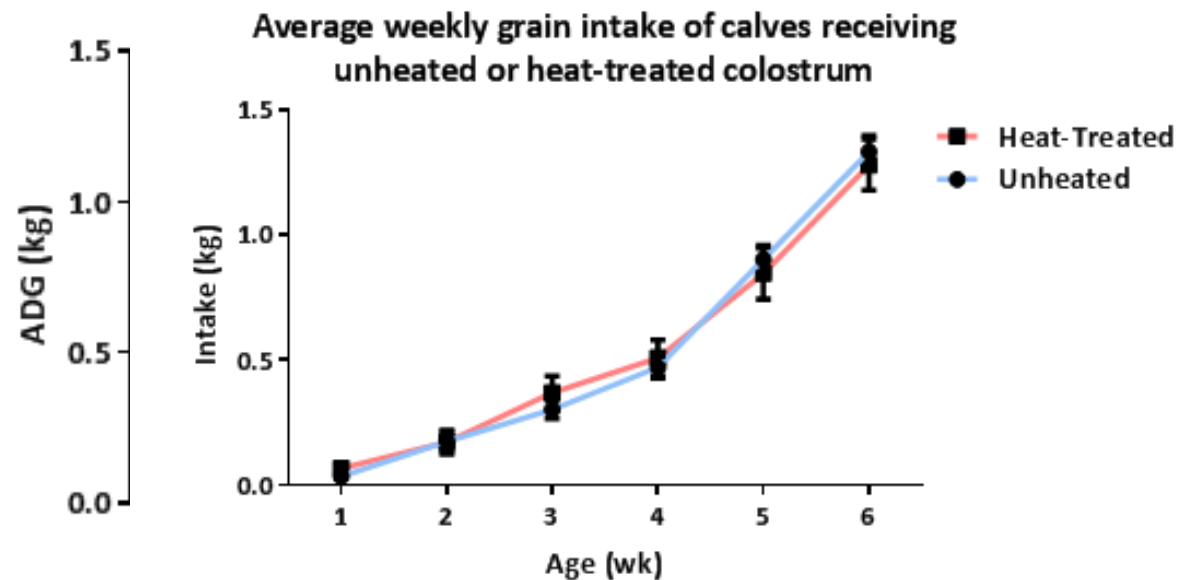


Results: Plasma IgG and BLG in neonatal heifer calves

Plasma β -Lactoglobulin Concentration in Heifer Calves Fed Unheated or Heated Colostrum



Results: Effects of heat-treated colostrum on response to a management stressor (Dehorning)



Day relative to Dehorning



Recommendations

- Colostrum is more than just IgG
 - Consider all bioactive components, not just IgG
- Consider the impacts of management stressors
- Heat-treating colostrum can have positive OR negative effects on calf performance



Questions?

Photo credit: dairykarrie.com