



UNIVERSITY OF
SASKATCHEWAN

Preservation of Colostrum: Impacts on Immunoglobulin Bioavailability and Passive Transfer in Dairy Calves

Literature Thesis

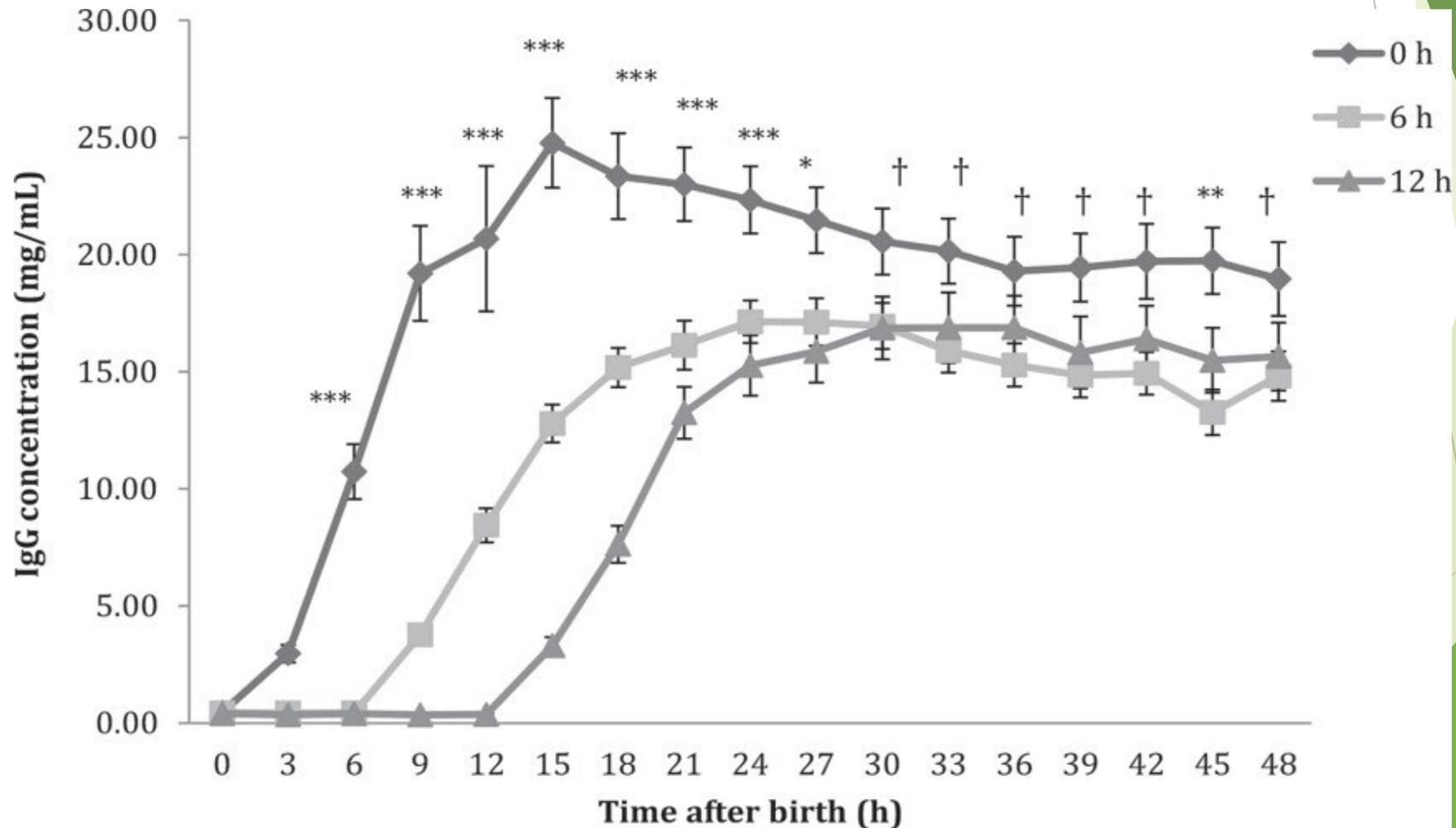
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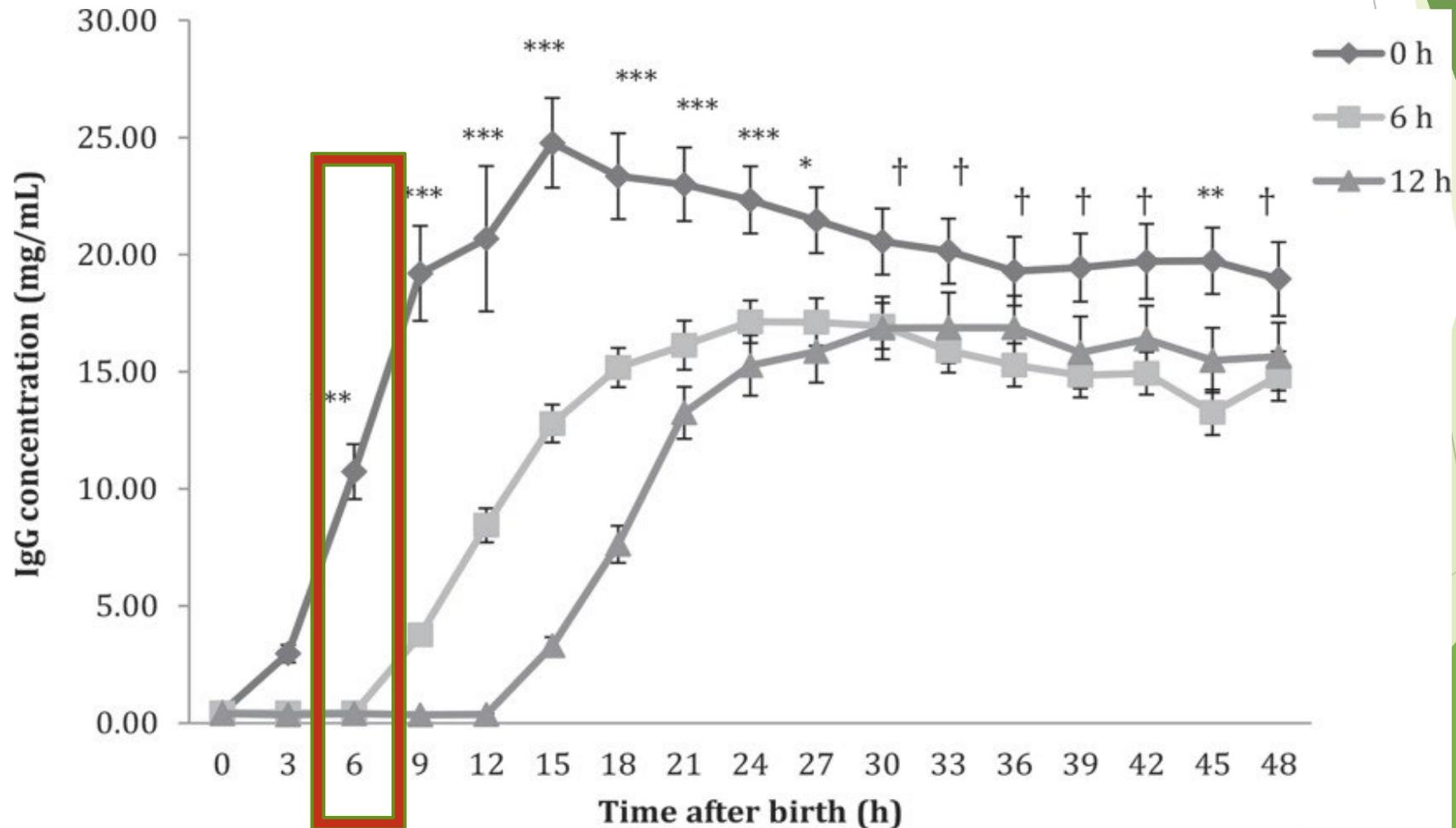
Introduction

- ▶ What is colostrum?
- ▶ Why is it important?
- ▶ Nutrients
 - Fat
 - Protein
 - Oligosaccharides
 - Insulin-like growth factors
 - IMMUNOGLOBULINS
- ▶ Passive immunity

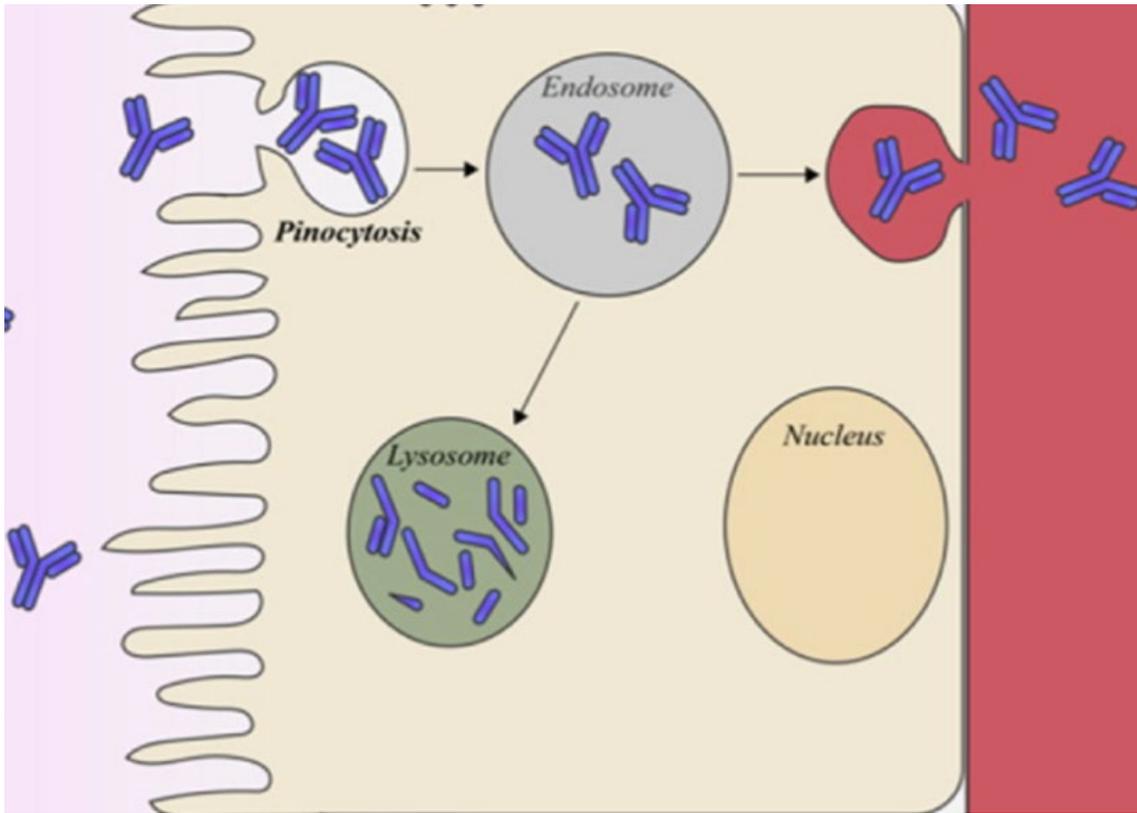
Colostrum provides immune protection, but only when provided early



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Mechanism of immunoglobulin absorption in neonates



- ▶ IgA
- ▶ IgM
- ▶ **IgG**

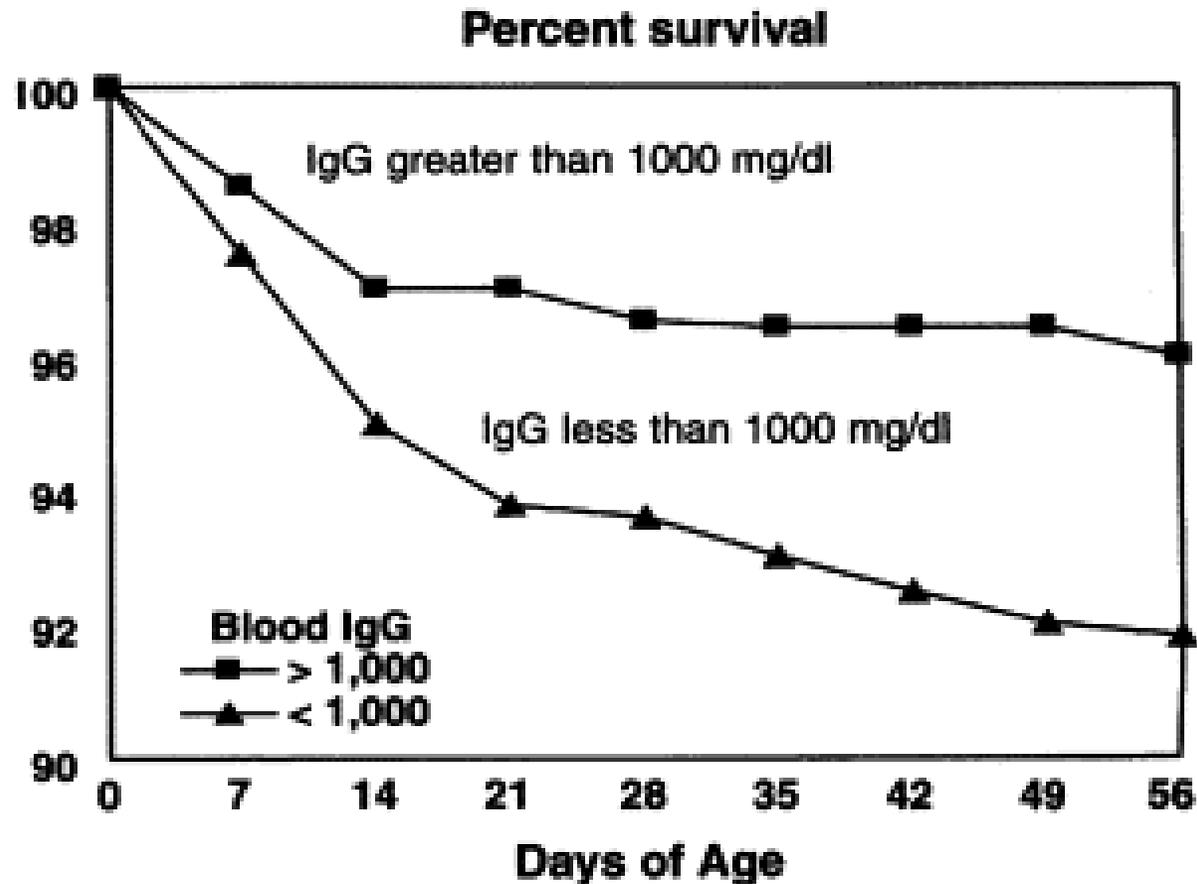
Strategies to assess adequate passive transfer



- ▶ Assessment is needed for immune protection and long-term productivity
 - ▶ Brix %
 - ▶ Indirectly measures IgG through solid total proteins (STP)
- ▶ Documenting passive transfer outcomes can help!

Poor	Fair	Good	Great	Excellent
<9.0%	9.1- 10.0%	10.1 - 11.0%	11.0-12.0%	>12%

Morbidity, mortality, and diarrhea rates are associated with lower serum IgG



Factors influencing passive transfer

- ▶ Timing - within 0-2 hours
- ▶ Quality - >25% Brix
- ▶ Quantity - 10% of birth body weight (typically 4 liters assuming a 40 kg birth weight)
- ▶ Clean - bacteria lower passive transfer
- ▶ Bottle vs esophageal tube feeding

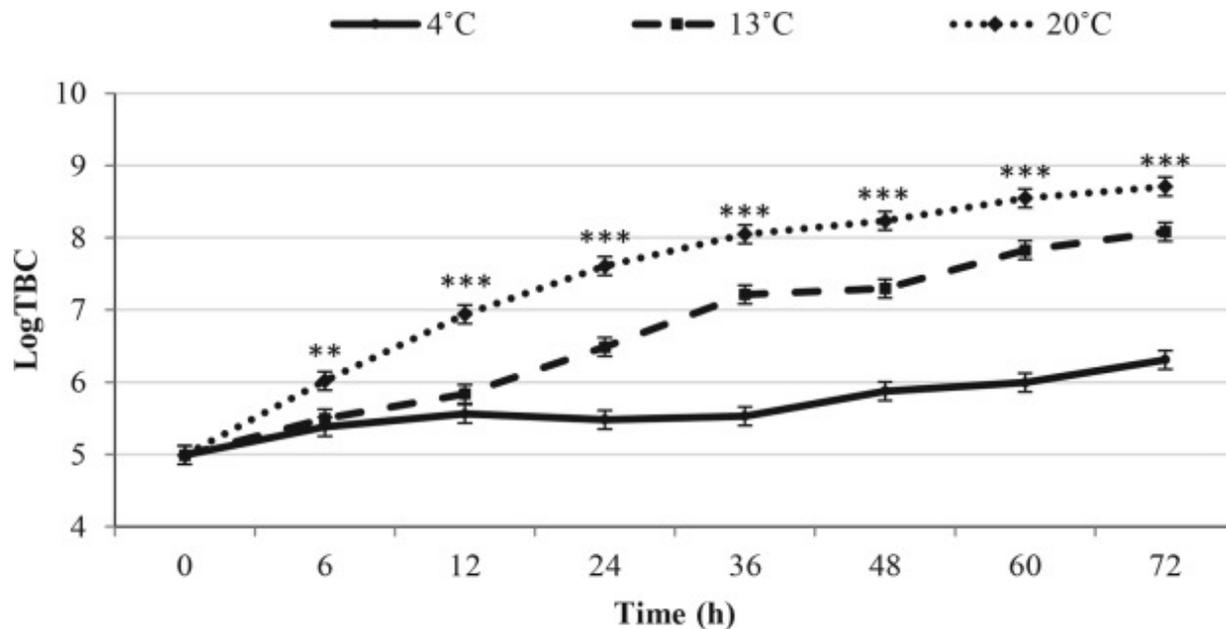
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Preservation methods concerning immunoglobulin integrity and bacterial counts

Pasteurization

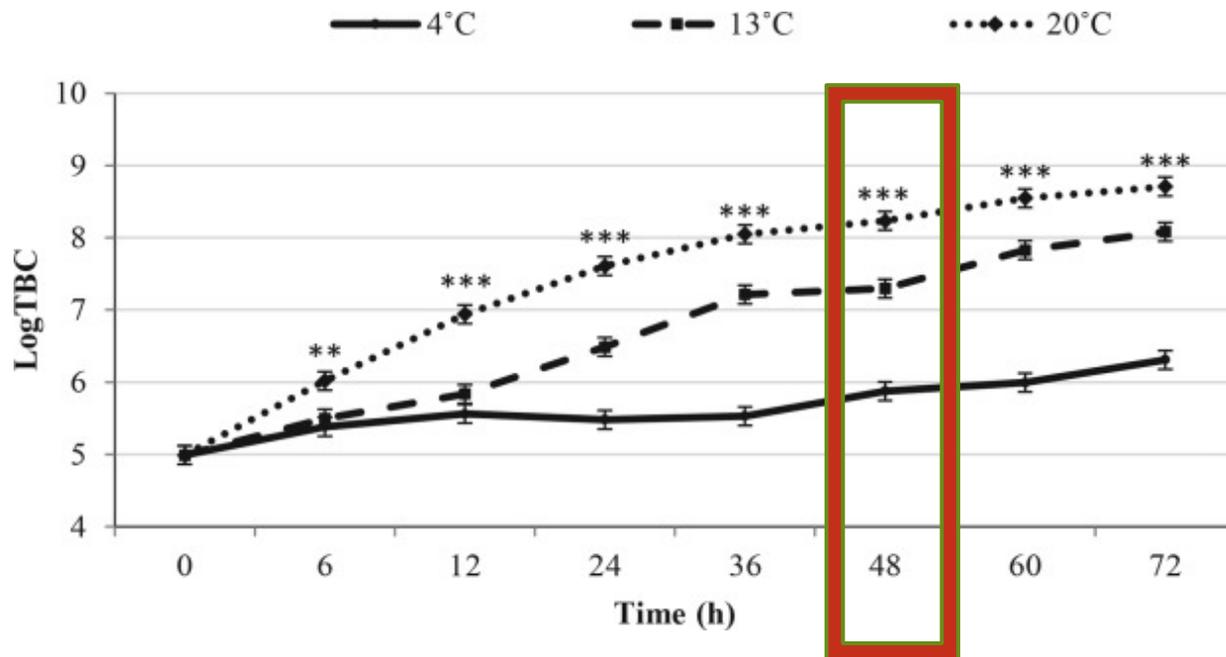
- ▶ Kills bacteria
 - ▶ But IgGs are heat-susceptible!
- ▶ What temperature?
 - ▶ 60°C? 75°C?
- ▶ How long should colostrum be pasteurized?
 - ▶ 30 minutes? 60 minutes?
- ▶ Pasteurize then store for easy access

Refrigeration



- ▶ Stored below 4°C
- ▶ It is a short-term preservation method
- ▶ No longer than 48 hours

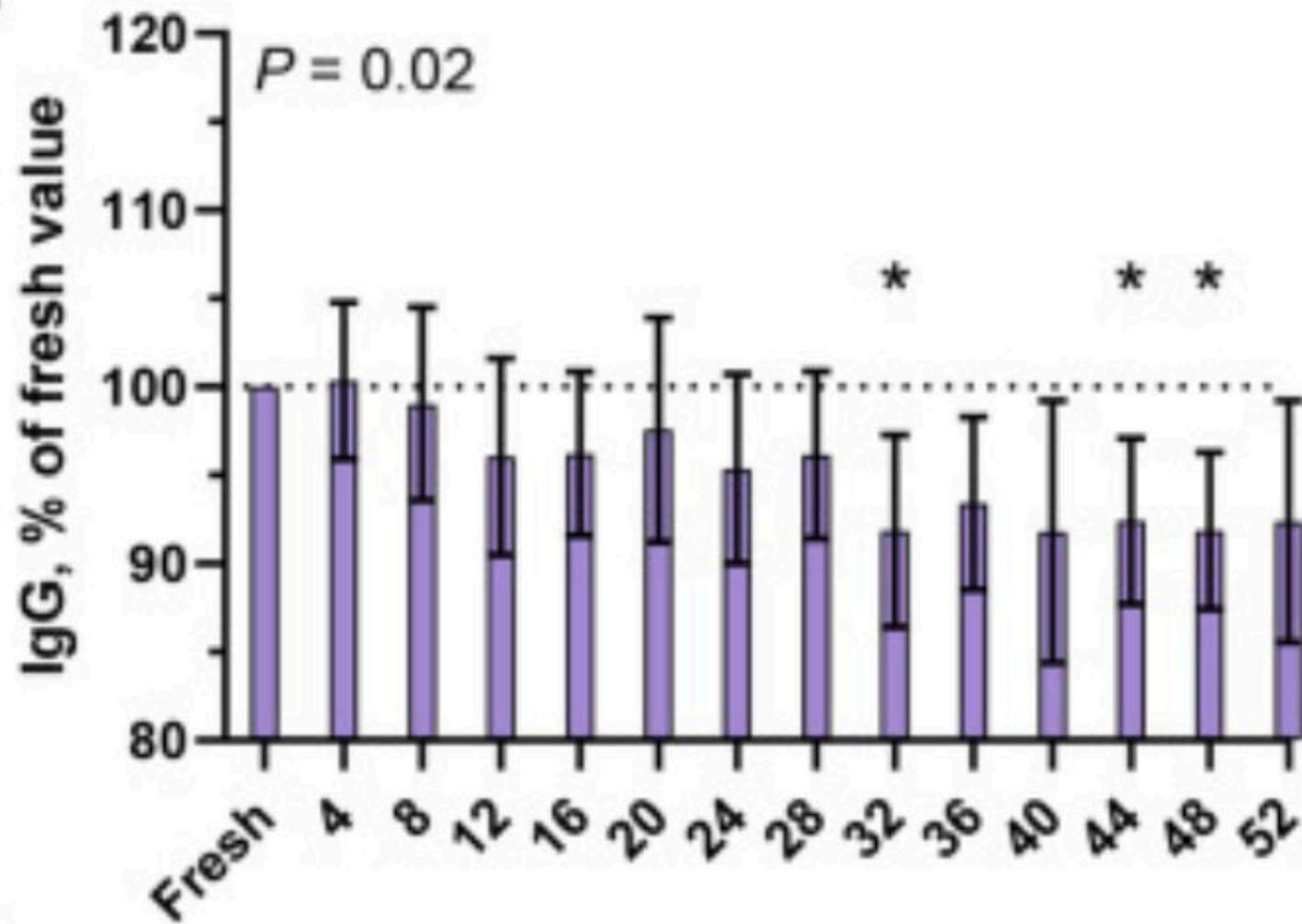
Refrigeration

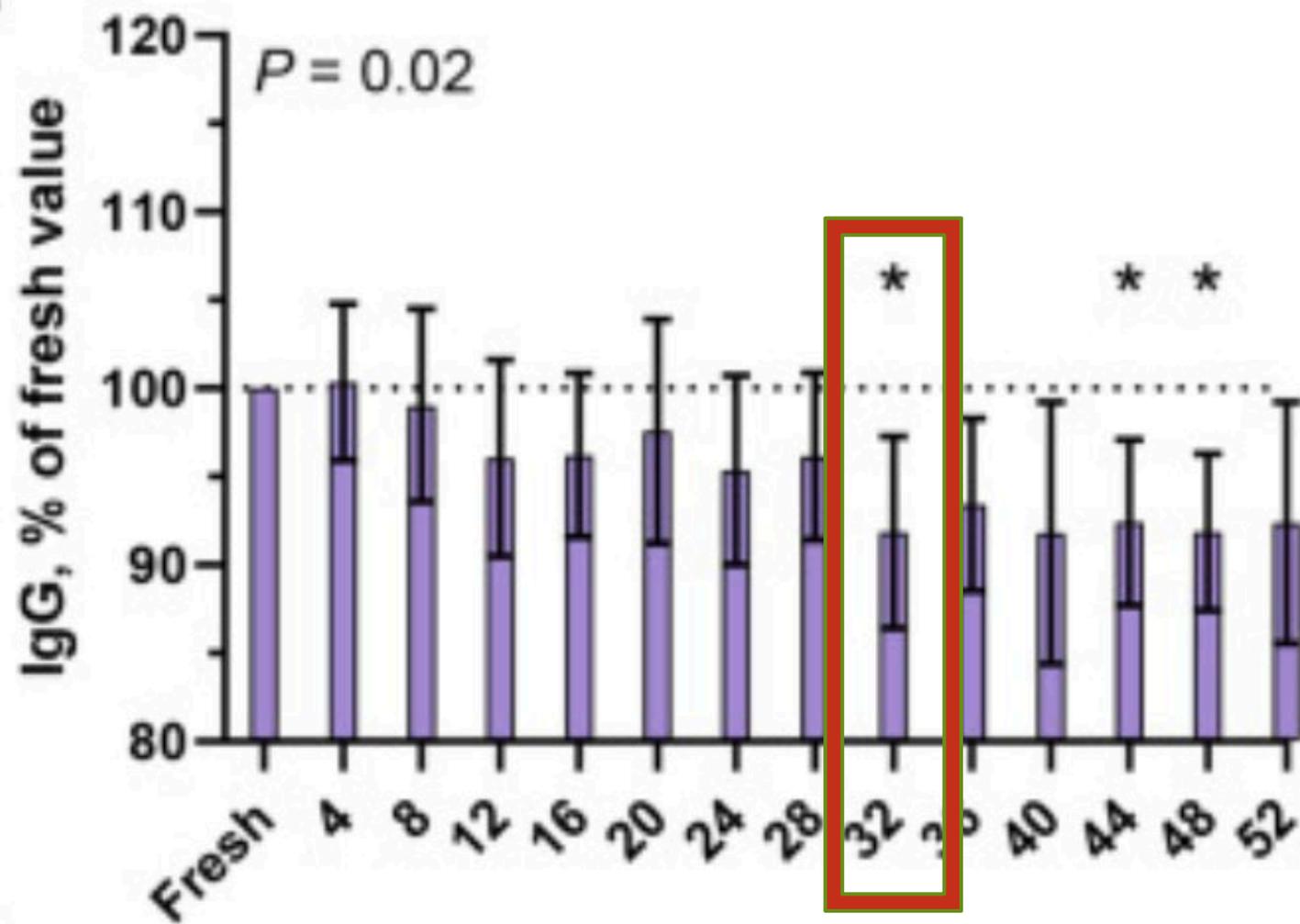


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Freezing and thawing

- ▶ Long-term storage option
- ▶ Minimizes bacterial growth
- ▶ For how long can you store it?





Freezing and thawing

- ▶ How should I thaw colostrum?
 - ▶ Microwaving?
 - ▶ Water?
- ▶ Multiple freeze-thaw cycles can decrease IgG concentrations

Spray-drying



Spray-drying

- ▶ Complex process, complex equipment needed
- ▶ High inlet temperature of 180°C
 - ▶ Is this an issue for IgG stability?
- ▶ No bacteria or moisture present -> Shelf stable!
- ▶ When to use?

Impact of health outcomes

- ▶ Arguably the most important concept here...
 - ▶ Long-term evidence suggests that early immune status shapes later-life outcomes such as immune responsiveness, heifer development, and early lactation productivity
- ▶ Key concept: The preservation method has relatively little direct influence on long-term health compared to maintaining colostrum quality during preservation.

Summing it up!

- ▶ The best preservation technique depends on your operation
- ▶ Follow proper colostrum management
 - ▶ Minimize bacterial contamination
 - ▶ Feed ASAP
 - ▶ Feed enough IgG
 - ▶ Confirm and document passive transfer outcomes



Thank you for listening!

If you have further questions or wish to contact me, my email is
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