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Diarrhea in Dairy Calves

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What's the impact, how does it happen, and how do we treat and prevent it?

Dave Renaud

March 2, 2023


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Schinwald et al. 2022

Fecal scored (0-3) 2,616 calves daily for the first 28 d after arrival to a calf research facility

Evaluated the impact on mortality, antimicrobial treatment, and growth in 77 d at facility

Schinwald et al. 2022

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-9 KG

BODY WEIGHT AT 77 D

GROWTH

-108 g/d

ADG

Schinwald et al. 2022

Fecal scored (0-3) 2,616 calves daily for the first 28 d after arrival to a calf research facility

Evaluated the impact on mortality, antimicrobial treatment, and growth in 77 d at facility

69% vs. 56%

RESPIRATORY DISEASE

HEALTH

8% vs. 4%

MORTALITY

Abuelo et al. 2021

Followed 2,200 calves through to the end of first lactation at a large Michigan dairy farm

Abuelo et al. 2021

Followed 2,200 calves through to the end of first lactation at a large Michigan dairy farm

+ 7 d

AGE AT FIRST CALVING

REPRODUCTION

73% vs. 78%

CONCEPTION RATE

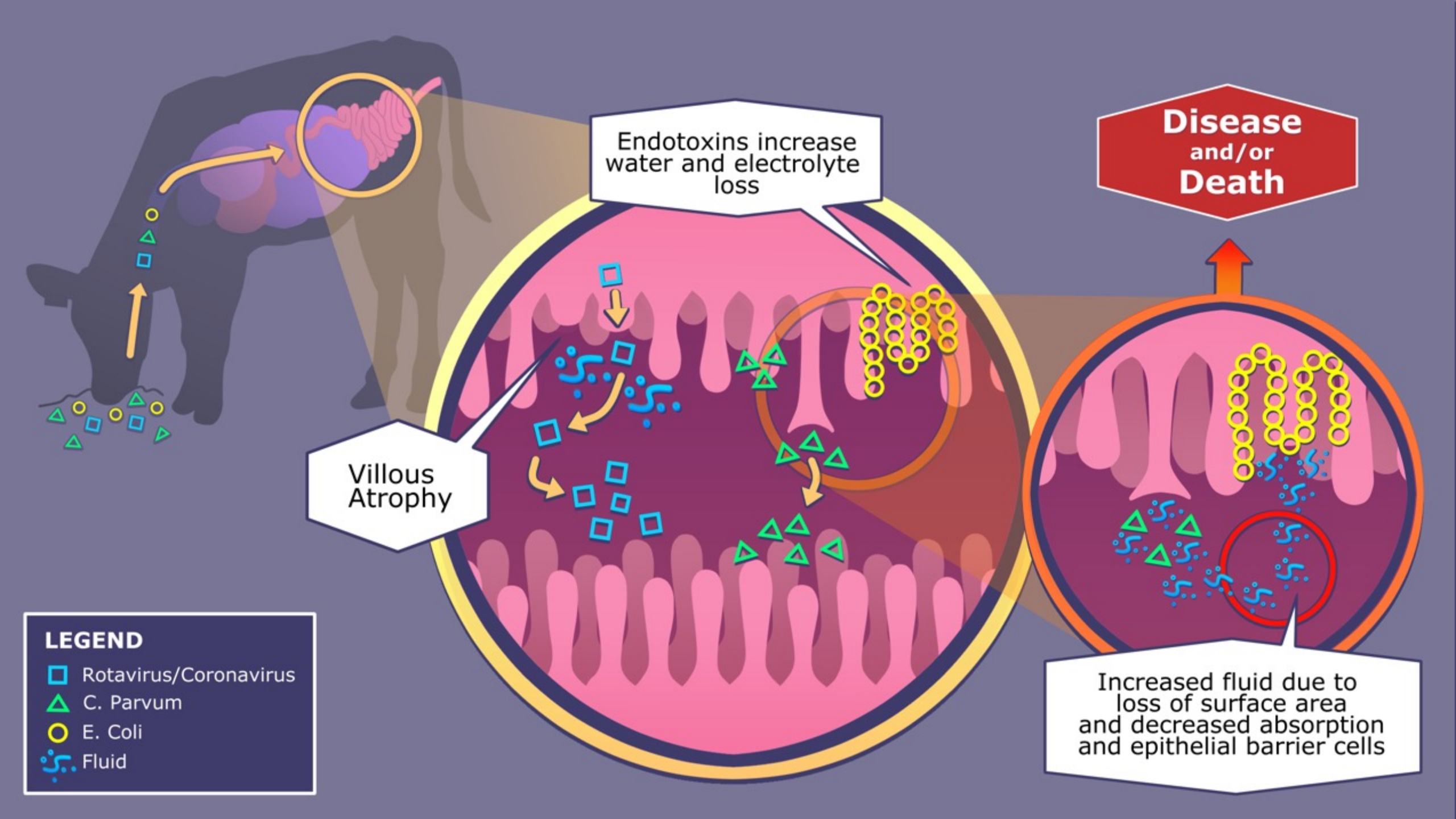
Abuelo et al. 2021

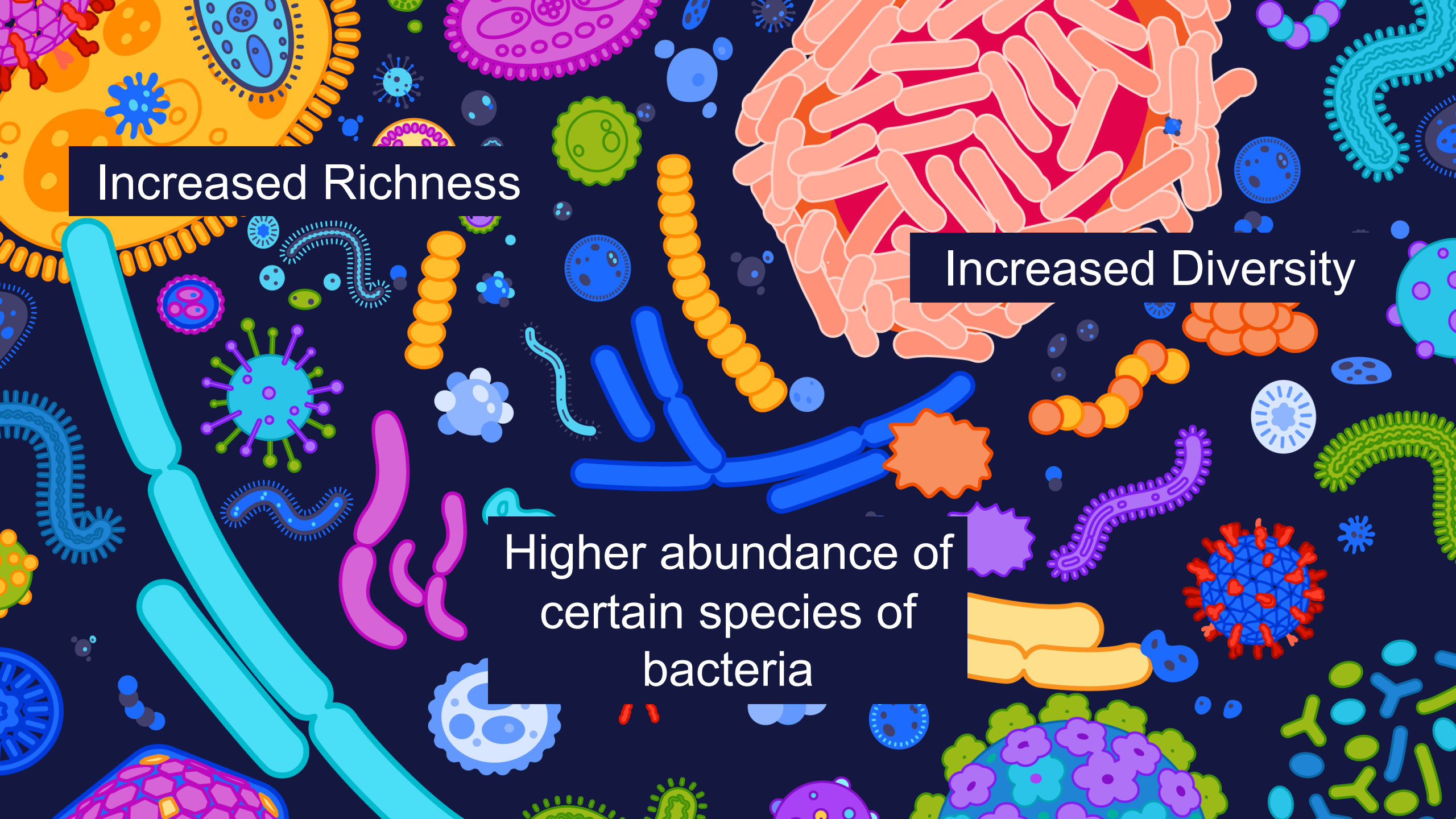
Followed 2,200 calves through to the end of first lactation at a large Michigan dairy farm

-325 KG

305 MILKING EQUIVALENT

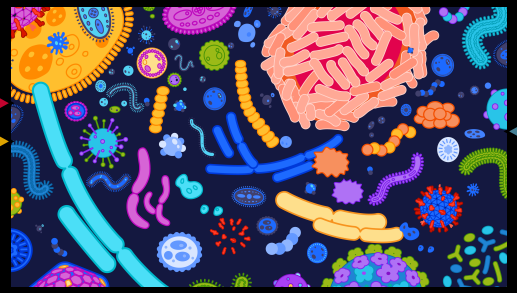
MILK


Endotoxins increase water and electrolyte loss
Villous Atrophy
Disease and/or Death
Increased fluid due to loss of surface area and decreased absorption and epithelial barrier cells
LEGEND
Rotavirus/Coronavirus
C. Parvum
E. Coli
Fluid


Increased Richness
Increased Diversity
Higher abundance of certain species of bacteria

Setting the Calf Up for Success

1. Colostrum management
2. Plane of milk nutrition
3. Environment



Failed Transfer of Passive Immunity.

< 10 g/L IgG

Raboisson et al. (2016)
Calves with FTPI 1.51 times more likely to have diarrhea

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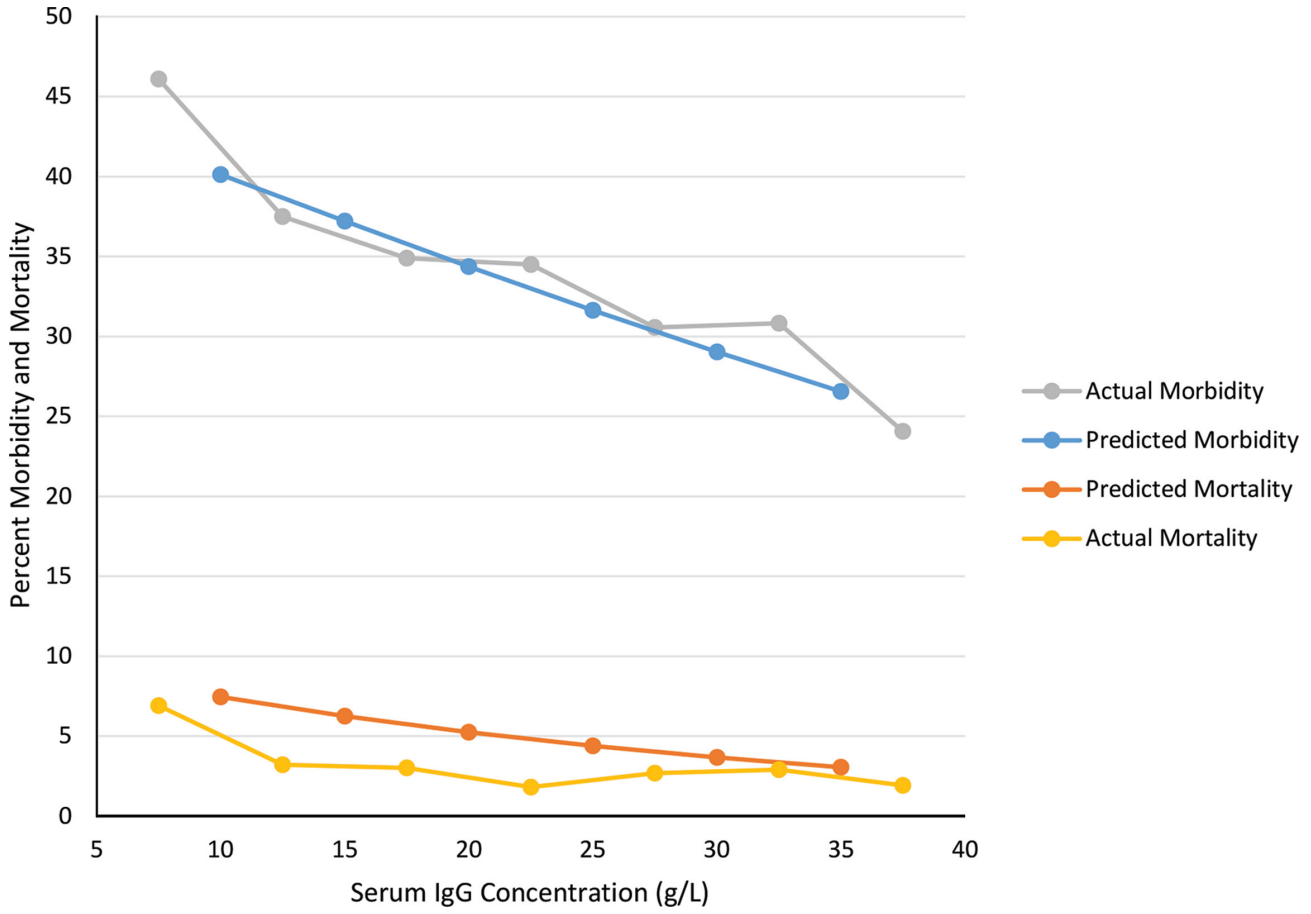
Failed Transfer of Passive Immunity.

~~< 10 g/L IgG~~



Source: Lombard et al., 2020

Failed Transfer of Passive Immunity.

Category	Serum IgG (g/L)	Total Protein (g/dL)	% Brix	Target (% calves)
Excellent	≥ 25.0	≥ 6.2	≥ 9.4	> 40
Good	18.0 to 24.9	5.8 to 6.1	8.9 to 9.3	~ 30
Fair	10.0 to 17.9	5.1 to 5.7	8.1 to 8.8	~ 20
Poor	< 10.0	< 5.1	< 8.1	< 10

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Source: Lombard et al., 2020; Crannell and Abuelo, 2023

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Source: Trotz-Williams et al., 2008; Renaud et al., 2020

Quantity	Quality	Quickness	Cleanliness

Achieving passive immunity.

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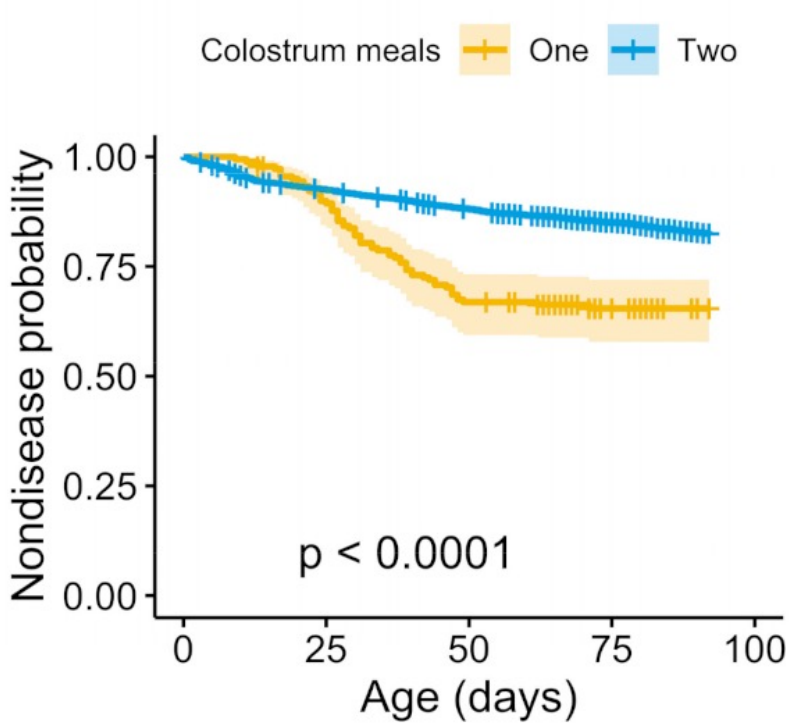
8.5% to 10% of body weight at first feeding

2 meals of colostrum or ≥ 6 L in first 24 hrs

Quantity | **Quality** | **nliness**



Achieving passive immunity.

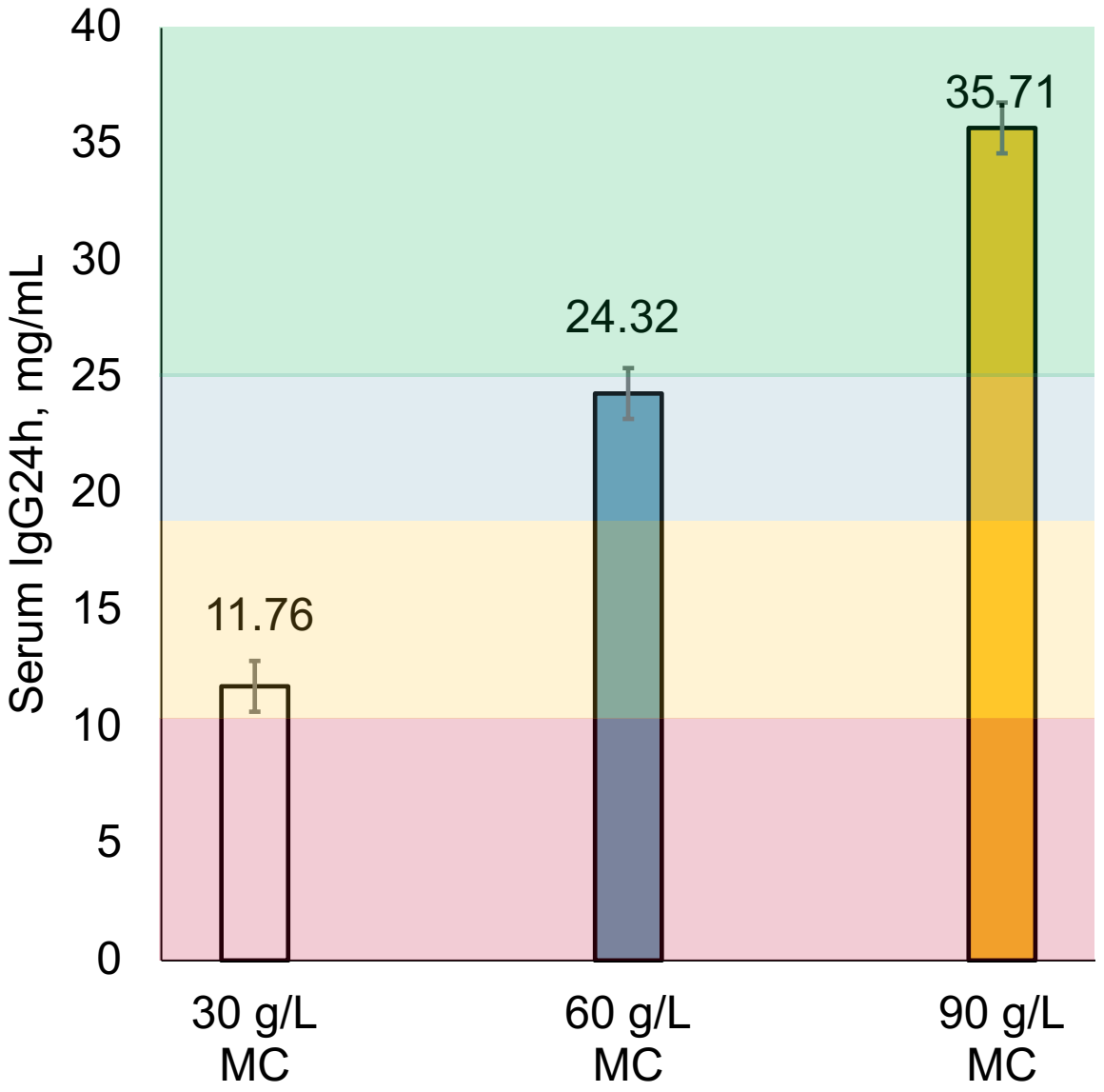
Source: Renaud et al., 2020; Connelly et al., 2014; Abeulo et al., 2019

≥ 50 g/L of IgG

OR ≥ 22% BRIX

Quantity **Quality**

Achieving passive immunity.



Source: Bielmann et al., 2010; Lopez et al., 2023

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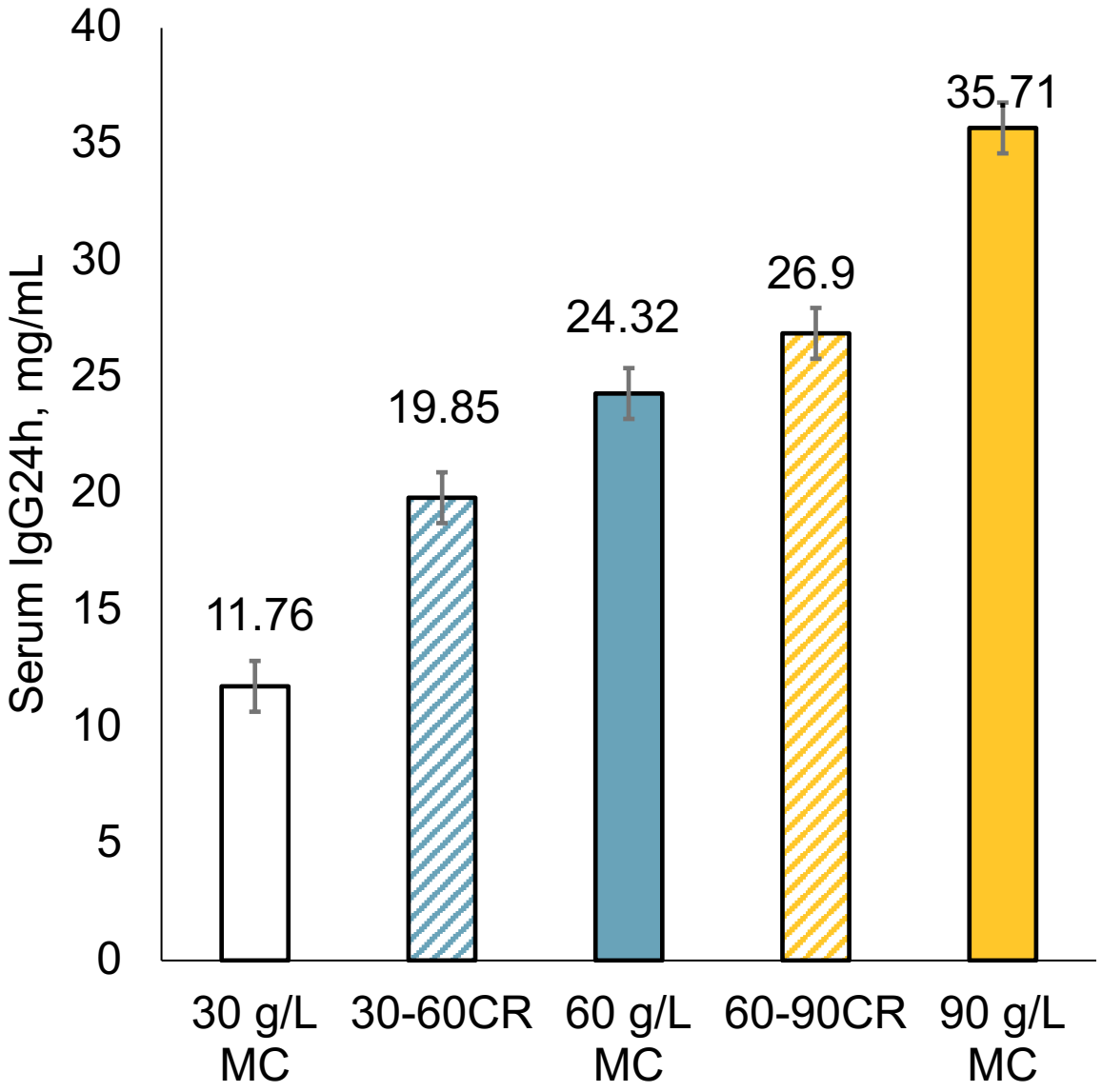
≥ 50 g/L of IgG

OR ≥ 22% BRIX

Can enrich poor quality?

Quantity **Quality**

Achieving passive immunity.



Source: Bielmann et al., 2010; Lopez et al., 2023

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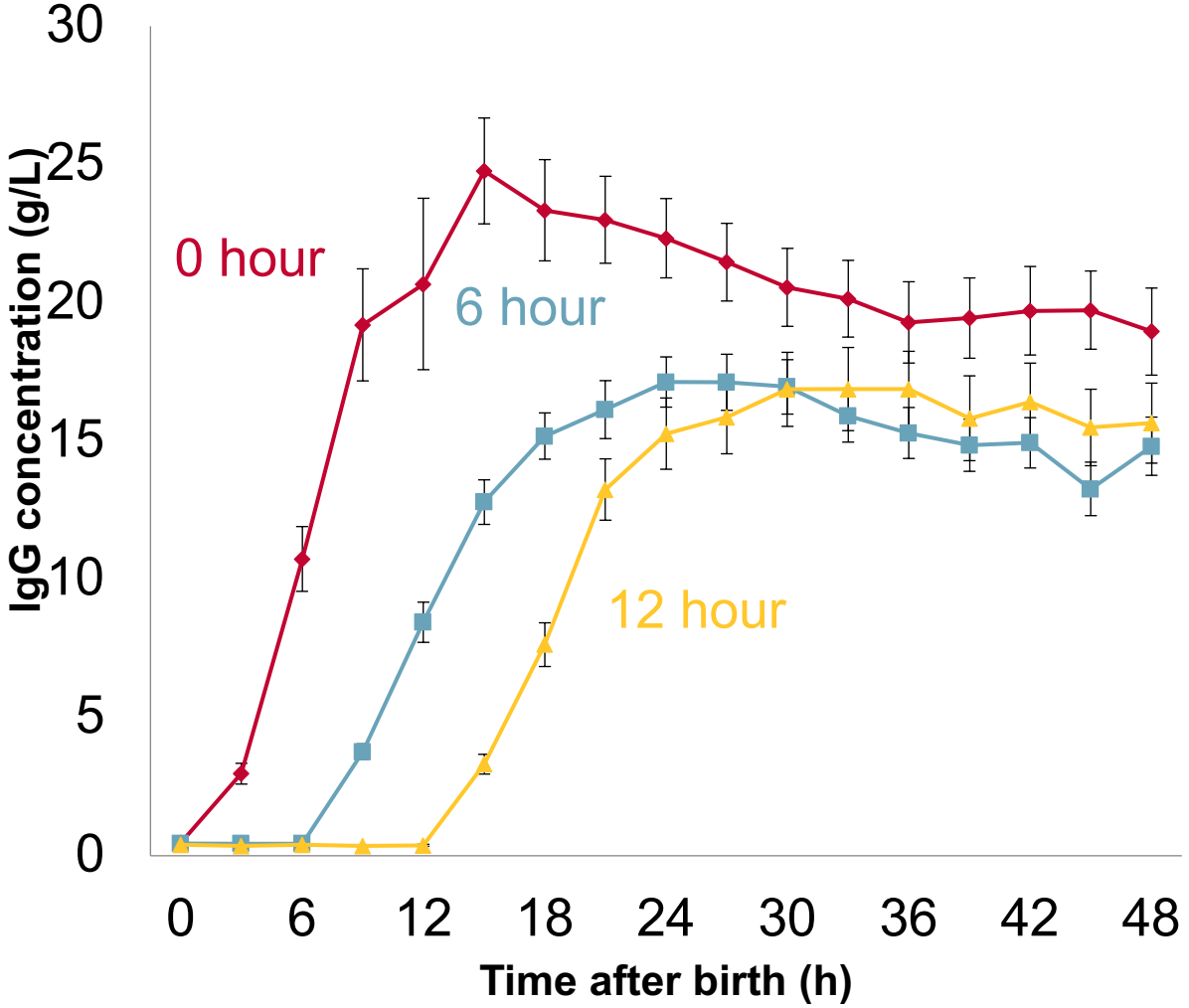
As quick as possible?

Quantity **Quality**

Achieving passive immunity.



Source: Fisher et al. 2018

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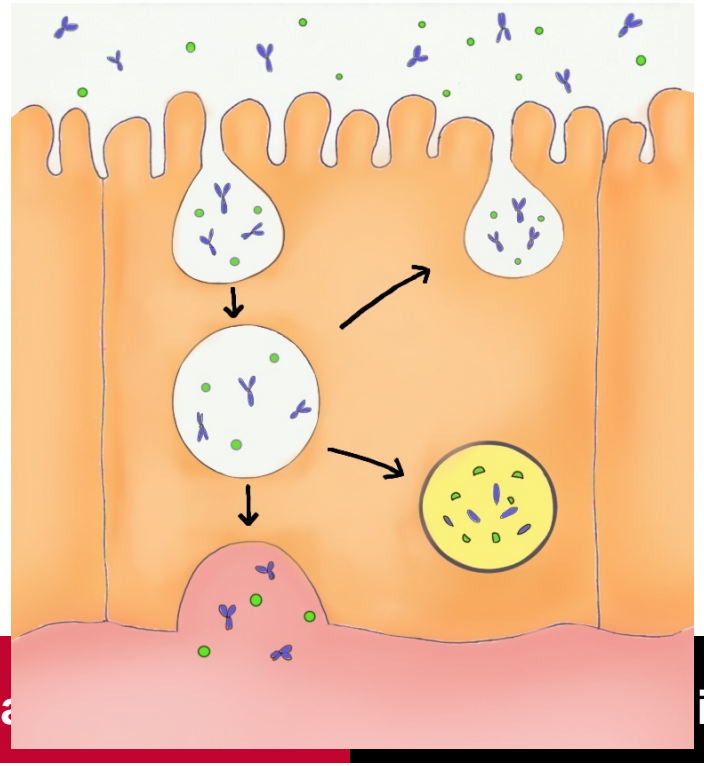
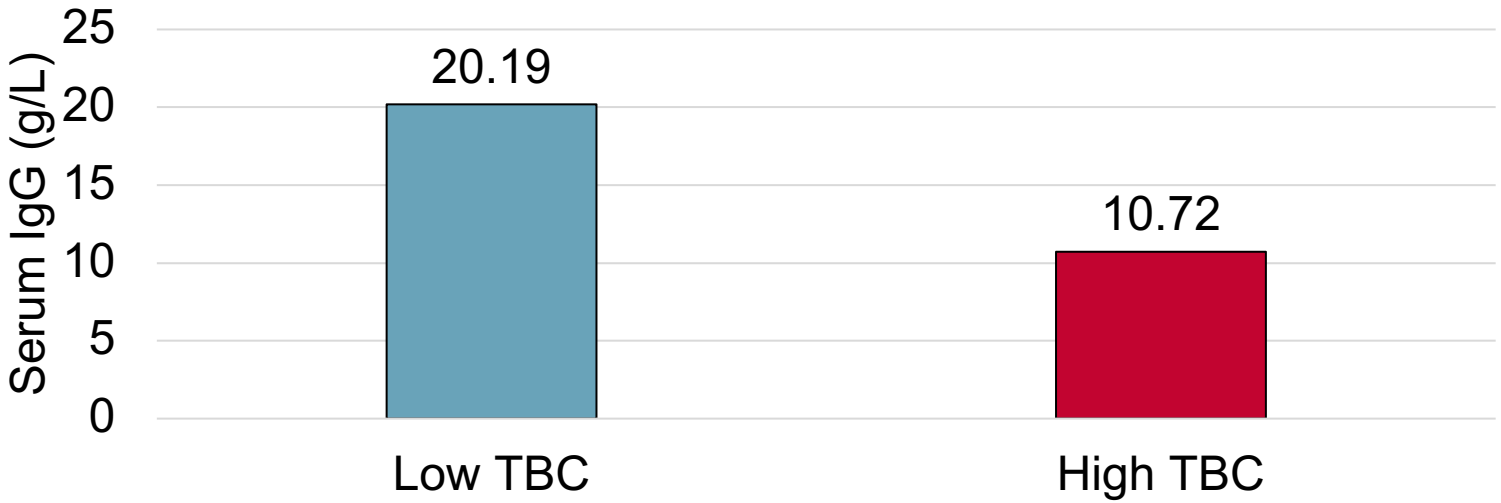


Qua ity

Quickness

Cleanliness



Source: Gelsinger et al. 2015

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Quantify!

Achieving passive immunity.

Source: Renaud et al. 2020

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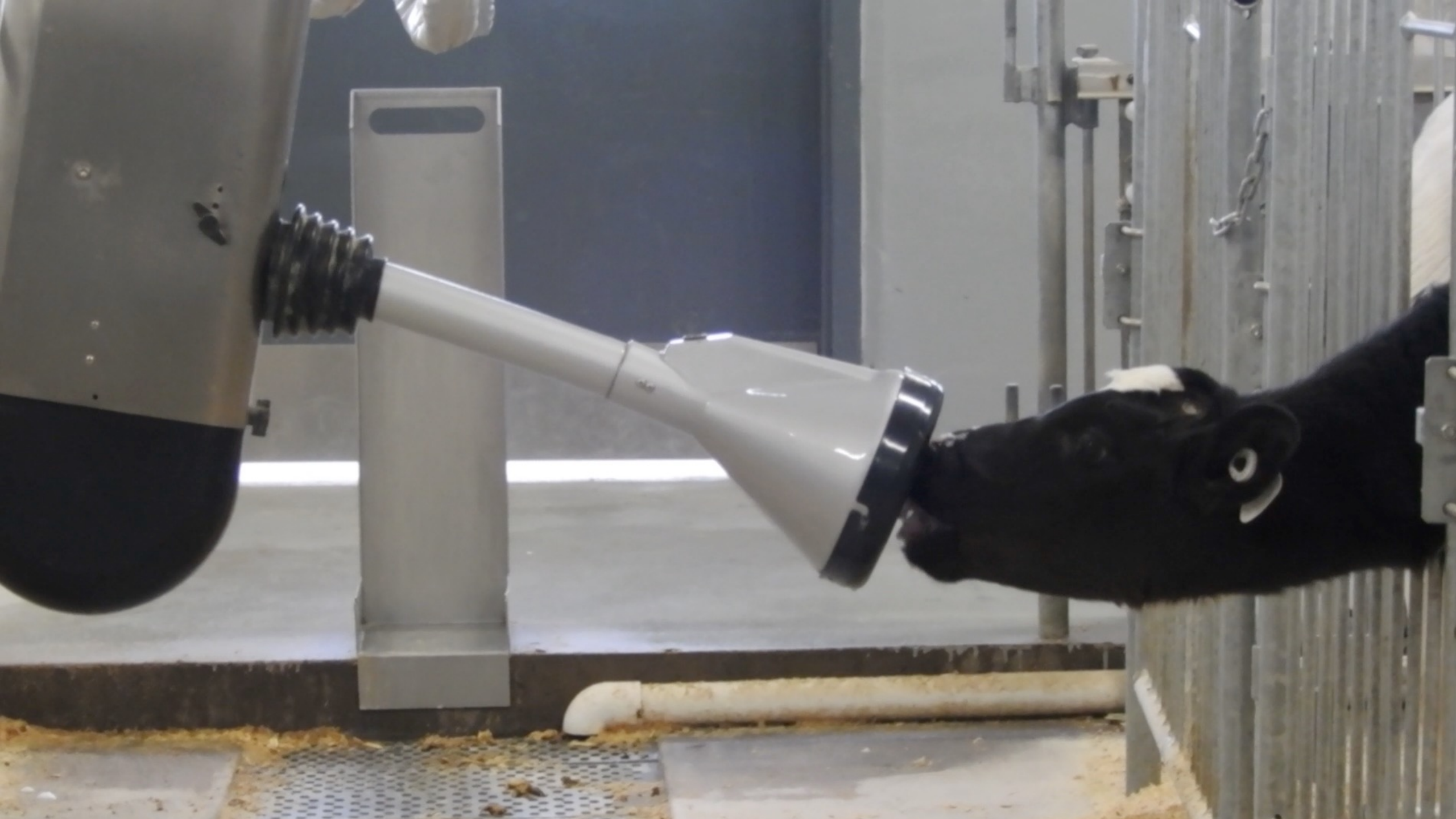
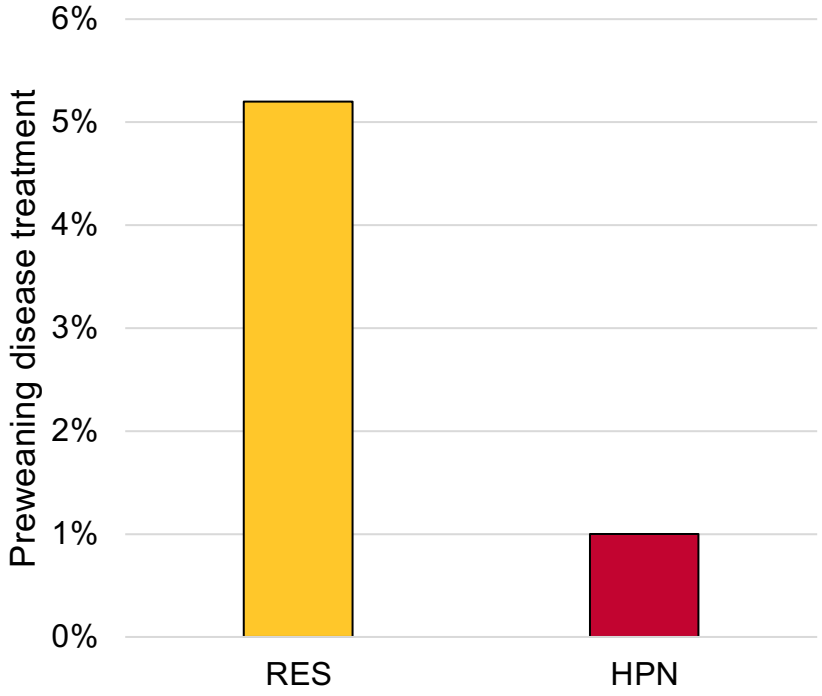


Plane of Nutrition.

Health Benefits

1. Improved immune function
2. Lower treatment for disease
3. Improved recovery from diarrhea



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Source: Ballou et al. (2012); Ollivett et al. (2012)

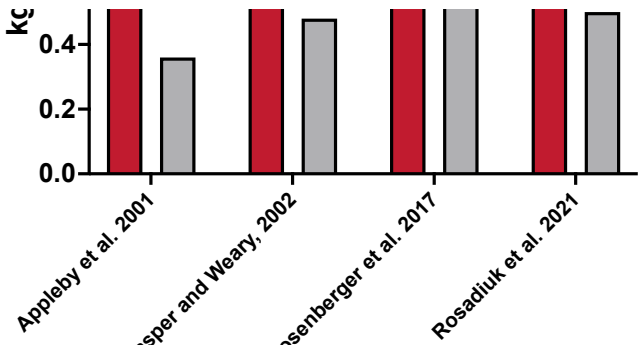
Plane of Nutrition.

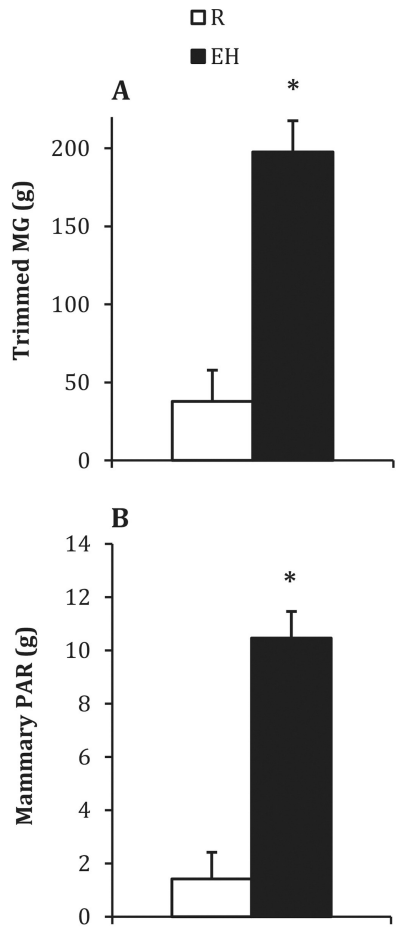
Growth Benefits

1. Higher ADG and feed efficiency

+130 to 155 kg more milk

Every 100 g/d in preweaning ADG





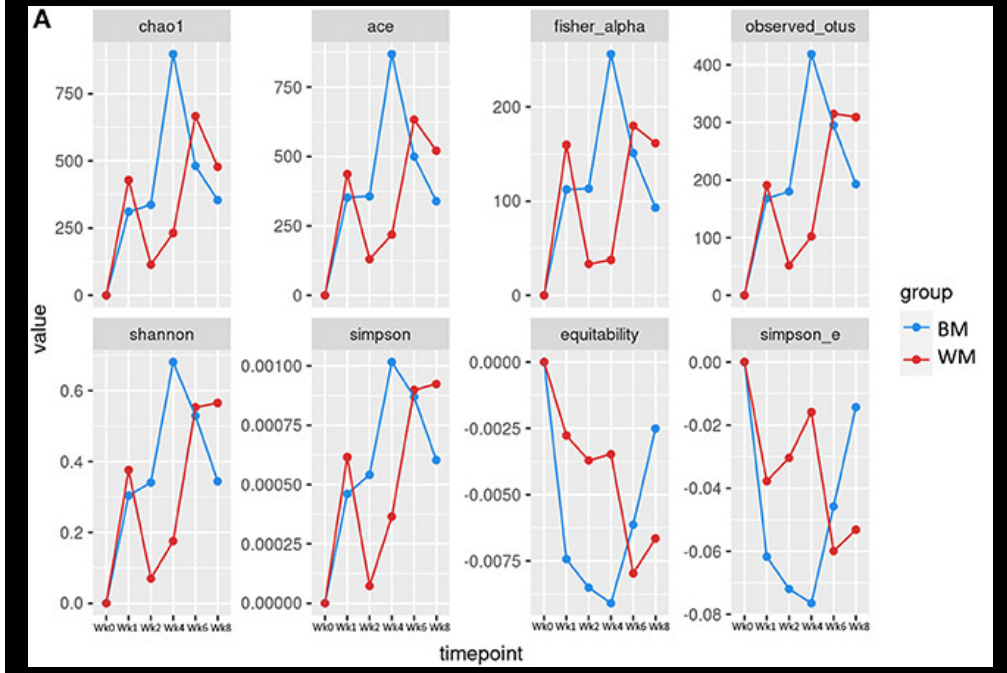
Source: Rosadiuk et al., 2021; Geiger et al., 2016; Soberon et al., 2012; Soberon and Van Amburgh, 2013; Gelsinger et al., 2016

Type of Nutrition.

—

Penati et al. 2021

Compared feeding waste milk to bulk tank milk in 12 calves



Waste milk

Higher level of diarrhea

Several changes in fecal microbiota composition

Source: Renaud et al., 2017. Validation of commercial luminometry swabs for total bacteria and coliform counts in colostrum-feeding equipment.

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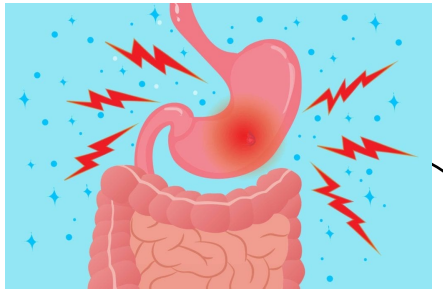
3.8 to 6.4 L fluid lost each day

Source: Phillips et al. (1971)

How should we treat diarrhea?

Calf with Diarrhea

Oral electrolyte solutions (high SID)



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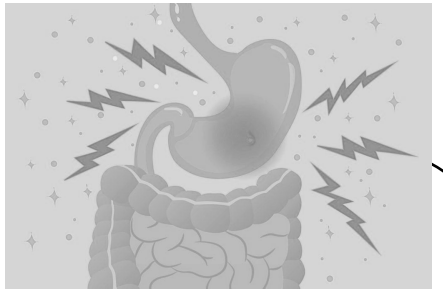
How should we treat diarrhea?

Anti-inflammatories

- Increase body weight gain
- Improve hydration score and fecal score
- Increase consumption of milk, starter, and water

Source: Todd et al., 2010.



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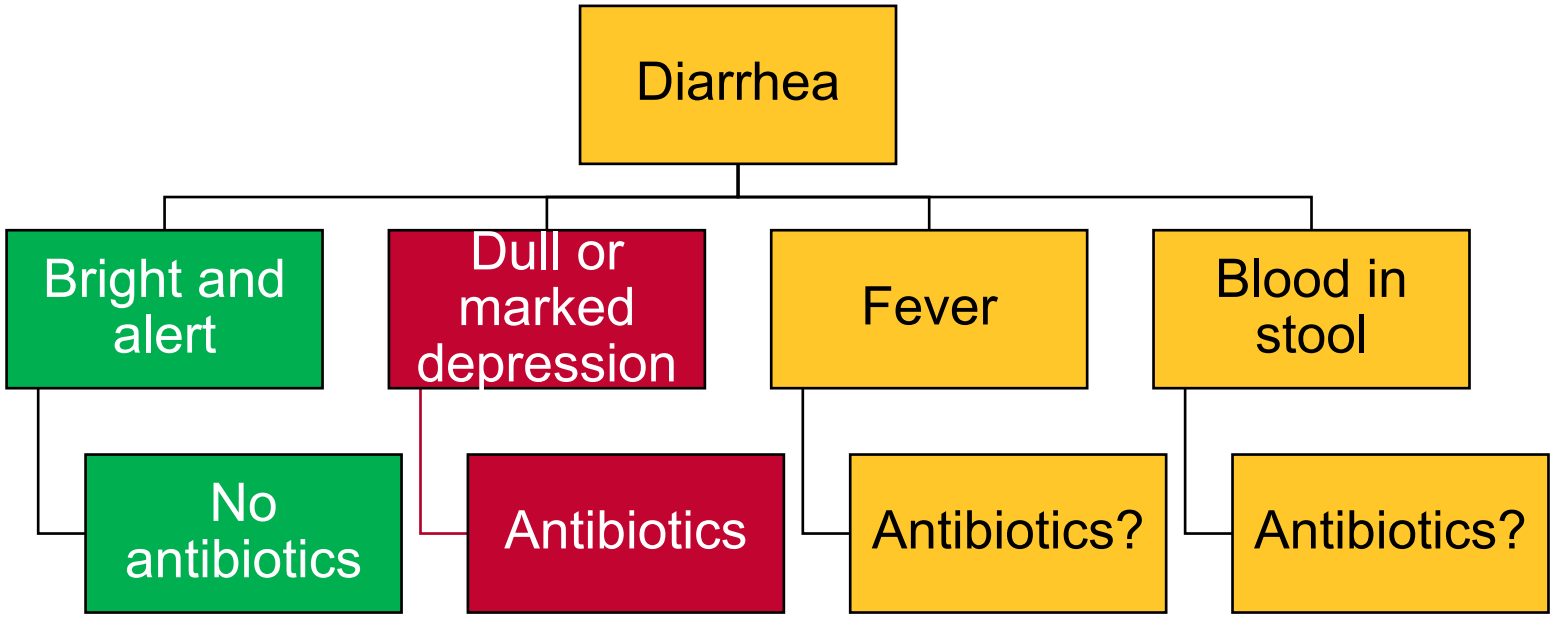
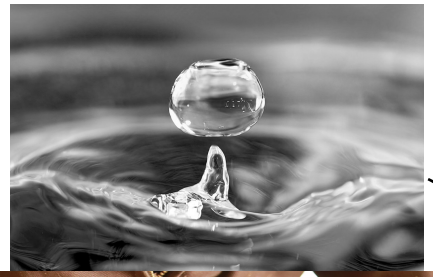
How should we treat diarrhea?

Only 10 to 30% of calves with bacteremia



Source: Garcia et al., 2021; Fecteau et al., 1997; Gomez et al., 2017.



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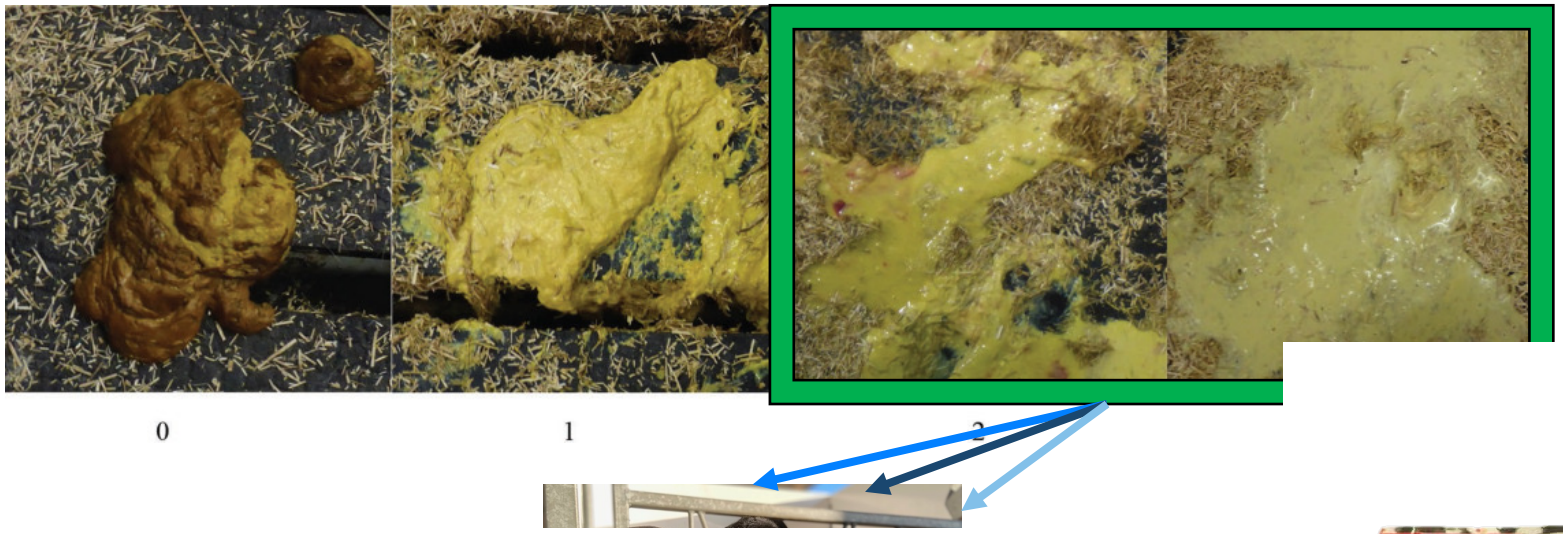
Evaluating colostrum as a therapy for diarrhea



01. Fecal consistency scoring

Calves were evaluated daily after arrival to a calf rearing facility in Ontario.

/ assigned to 3 groups

163.5 g of colostrum replacer

+

163.5 g of milk replacer

+

2.5 L of water

signed to
5), short-term
ntation (2 days)
n
days) (n = 38).

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Evaluating colostrum as a therapy for diarrhea

Component	Milk Replacer (MR)	Colostrum Replacer (CR)	Mixture (MR and CR)
Moisture (%)	3	5.8	4.4
Crude Protein (%)	26	56.9	41.5
IgG (%)	-	26	13
Fat (%)	20	14.5	17.3
Lactose (%)[1]	44	11	27.5
Metabolizable Energy (Mcal/kg)[2]	4.71	4.66	4.70

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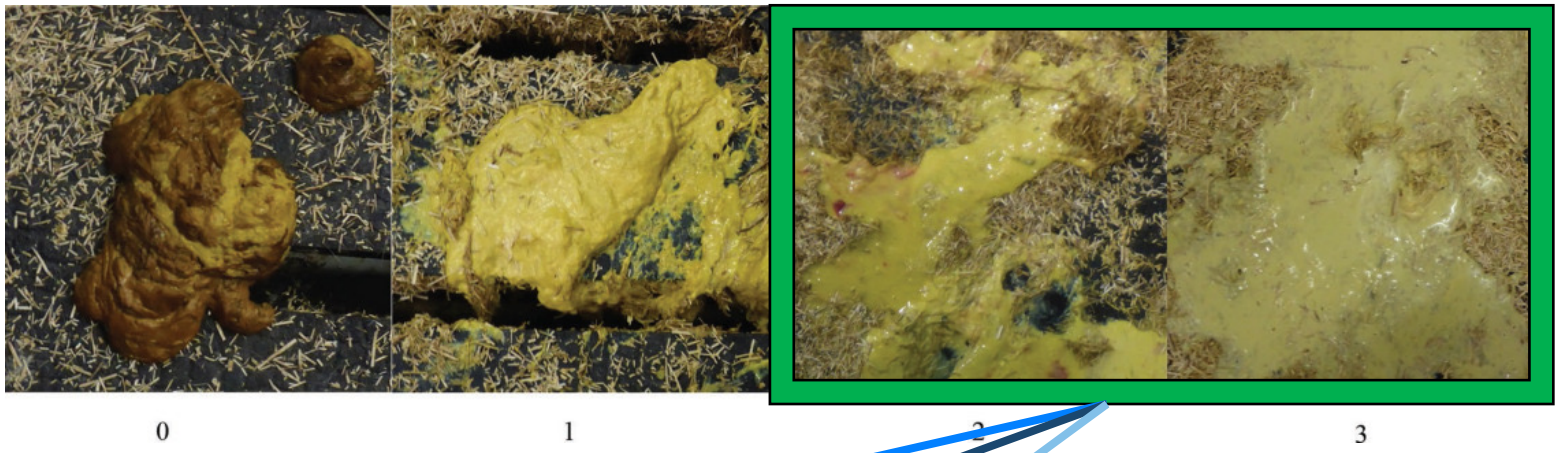
Evaluating colostrum as a therapy for diarrhea



01. Fecal consistency scoring

Calves were evaluated daily after arrival to a calf rearing facility in Ontario.

02. Randomly assigned to 3 groups

Calves randomly assigned to control group (n = 35), short-term colostrum supplementation (2 days) (n = 35), or long-term supplementation (4 days) (n = 38).

03. Followed for 56 d after enrollment

Calves fecal and respiratory scored daily and had body weight collected weekly.

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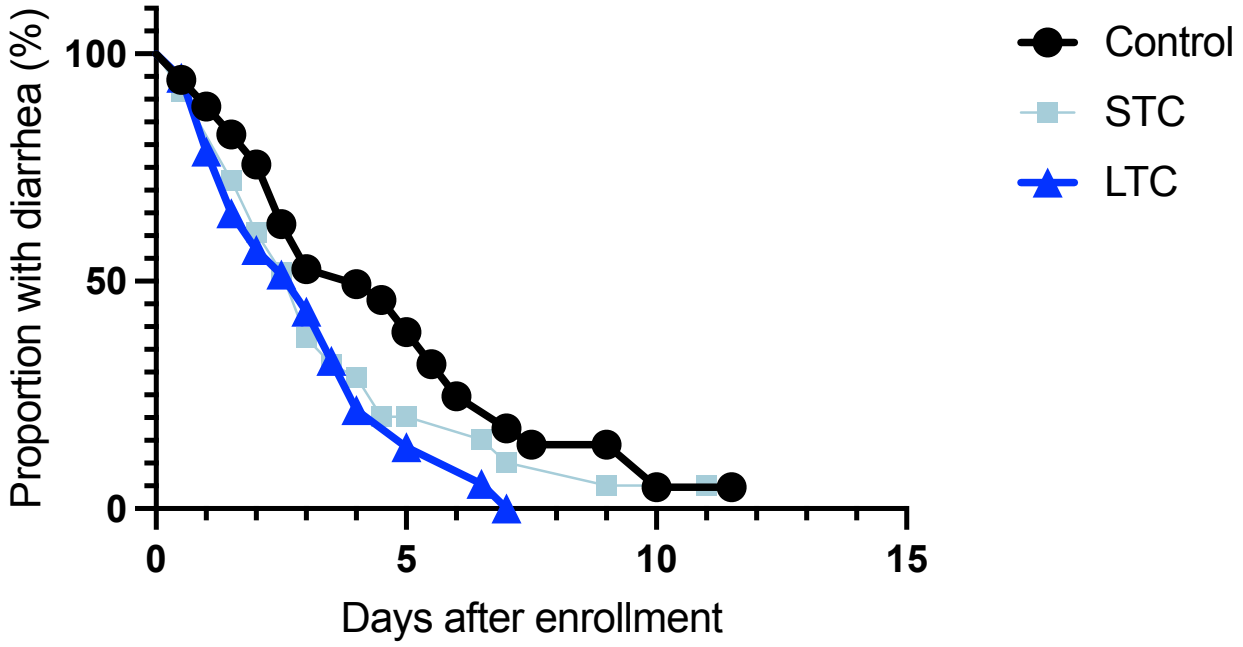
Key Findings

Evaluating colostrum as a Therapy for Diarrhea

Faster resolution of diarrhea in long-term supplementation group

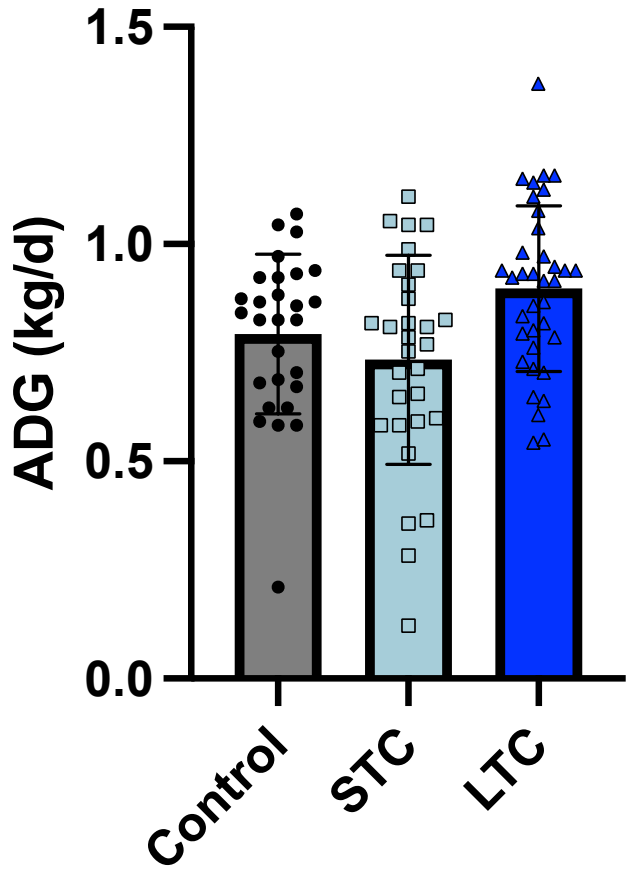


Key Findings

Evaluating colostrum as a Therapy for Diarrhea

Faster resolution of diarrhea in long-term supplementation group

Higher body weight gain in the long-term supplementation group



Key Findings

Evaluating colostrum as a Therapy for Diarrhea

- **Faster resolution of diarrhea in long-term supplementation group**
- **No difference in antimicrobial treatment for diarrhea**
- **Higher body weight gain in the long-term supplementation group**

Key Findings

Evaluating colostrum as a Therapy for Diarrhea

- **Faster resolution of diarrhea in long-term supplementation group**
- **Higher body weight gain in the long-term supplementation group**
- **No difference in antimicrobial treatment for diarrhea**
- **No difference in mortality (14% in CON vs. 0% LTC)**

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Take Home Messages

—

Diarrhea occurs commonly and have many impacts

Keep things simple with thinking about prevention

Focus on **colostrum**, nutrition, and housing

Treatment starts with fluid therapy!

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Questions?