

Exploring Antibiotic Alternatives for Improved Health in Goat Kids

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dairy

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Introduction



Goat kid health can be challenged in intensive production systems

Overuse of antibiotics can lead to resistance

Preweaning mortality in kids is ~ 6% to 38%

(Dwyer et al., 2016, Ratsep, 2020, Bélanger-Naud et al., 2021).

Nutritional supplements are potential alternatives to antibiotic use in animals



Goat kids

Goat kids are born without an immune system
FTPI = high correlation with mortality

Birth weight also important

Most common causes of death

- Gastrointestinal complications (41%)
- Septicemia
- Arthritis
- Respiratory disease

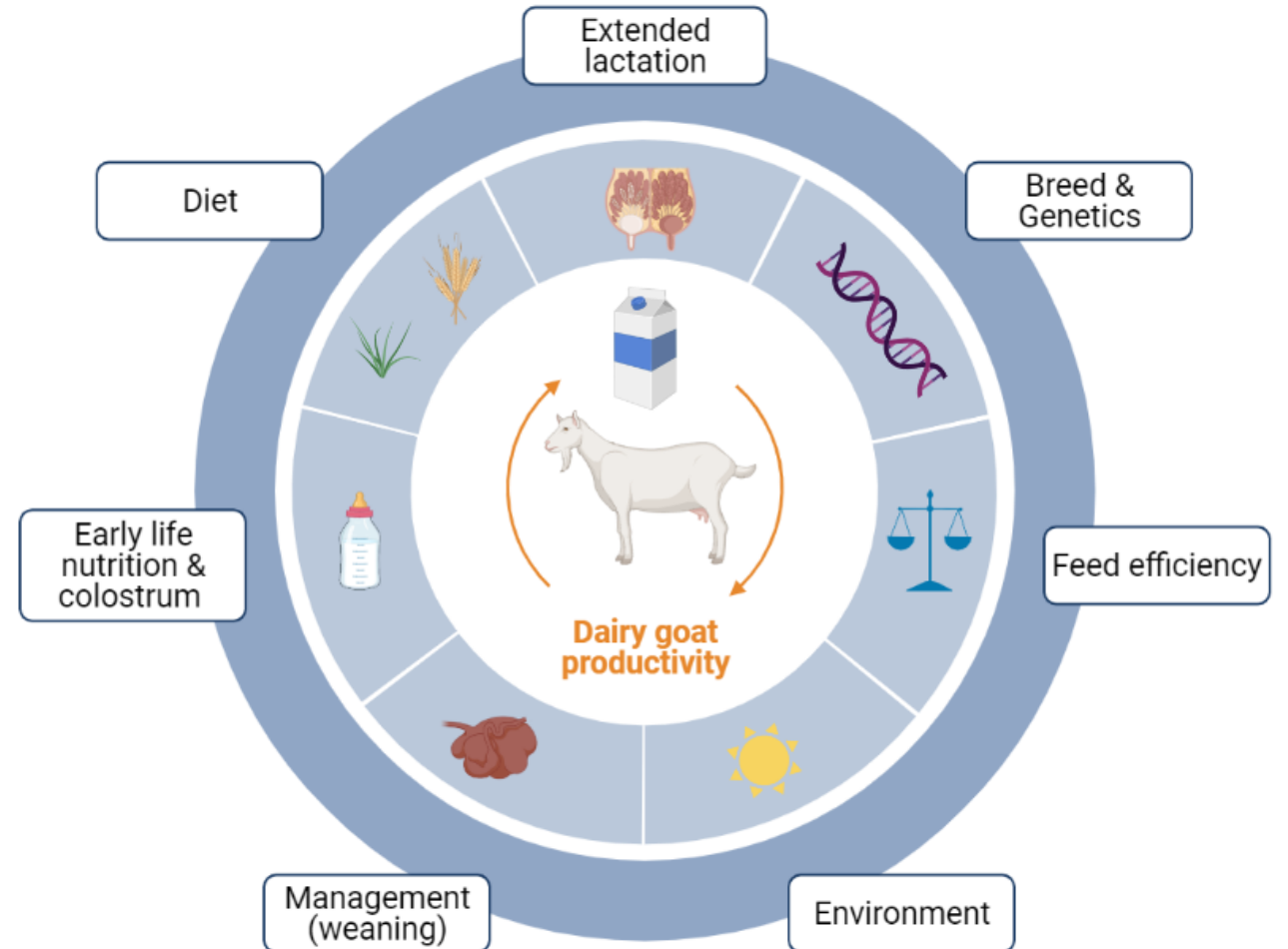


Failed Transfer of Passive Immunity (FTPI)

Impacted by

- Colostrum quality
- Volume
- Feeding frequency

On farm assessment of colostrum is essential & Brix is reliable in goats



The importance of Colostrum



> 50 g/L of IgG at 3.0 g of IgG per kg of BW within 4 hrs

FTPI serum IgG <12 g/L 24-48h after birth

There is less information in goats than in cows



Antibiotics improve survival in goat kids

Metaphylactic penicillin reduced mortality odds in FTPI kids comparable to STPI (Zamuner et al. 2024)

- doubled survival rates <42 days
- tripled survival <14d

However, STPI tripled survival rates

- reduced mortality
- improved growth performance (increased ADG & weaning BW)

Thus, colostrum management should be the priority



How to improve colostrum production



Genetics

Nutrition

- balanced, clean water,

Supplements

- vitamin E, selenium & fatty acids

Preventative healthcare

- udder health

Proper housing

Selective breeding

Timely collection?



Does timing of colostrum collection matter?



Colostrum collected after delays of

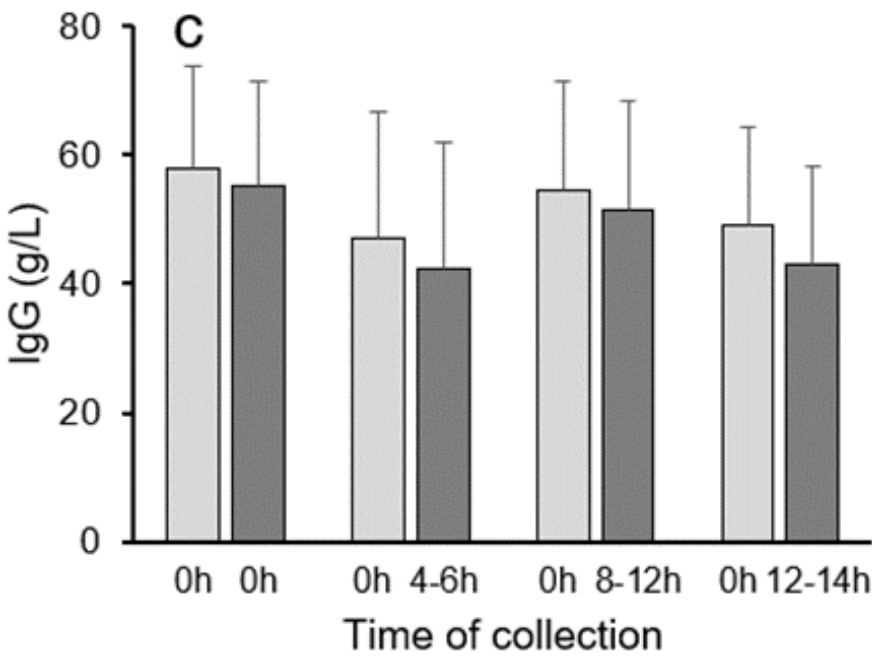
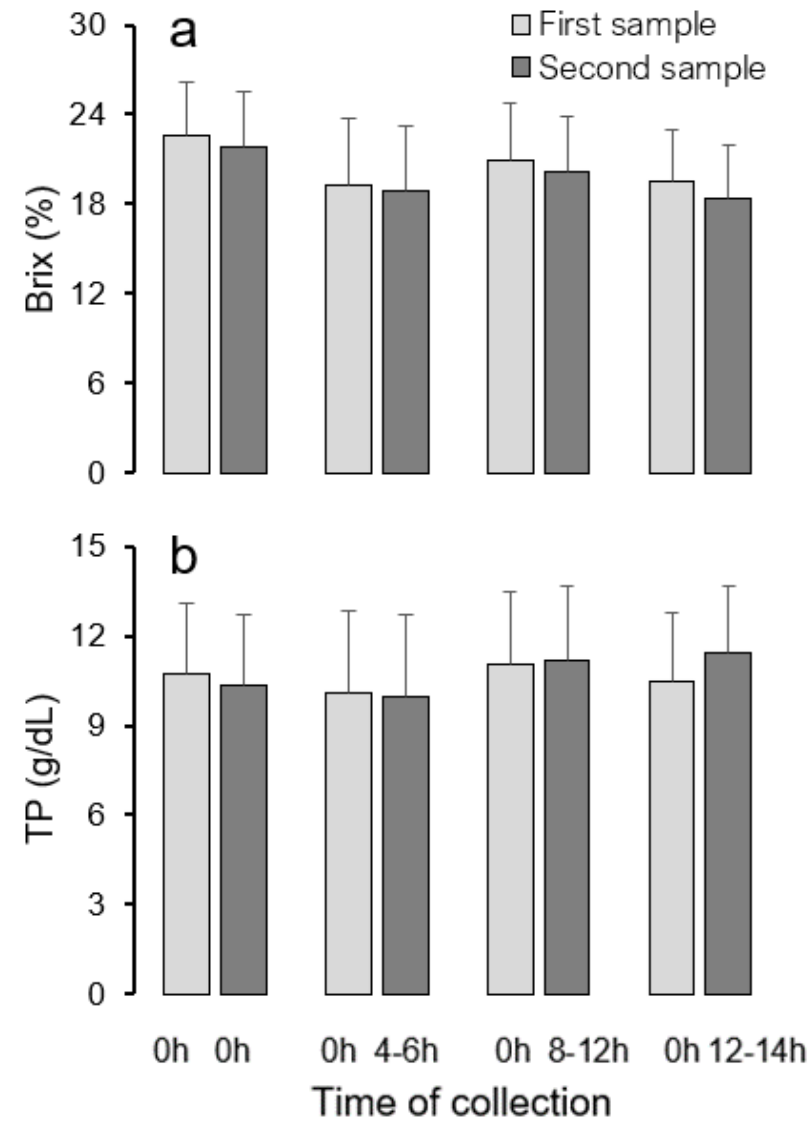
- 12-14h
- 8-10h
- 4-6h
- 0h

Variable	Mean	SD	CV (%)	Min.	Q1	Q3	Max.
First sample							
IgG (g/L)	56	22.5	41	7	38	74	111
TP (g/dL)	22	5.1	24	10	18	25	35
Brix (%)	11	2.9	25	4	9	14	16
Second sample							
IgG (g/L)	51	22.6	44	2	37	67	115
TP (g/dL)	21	4.5	22	11	18	25	36
Brix (%)	12	2.9	25	5	10	13	19

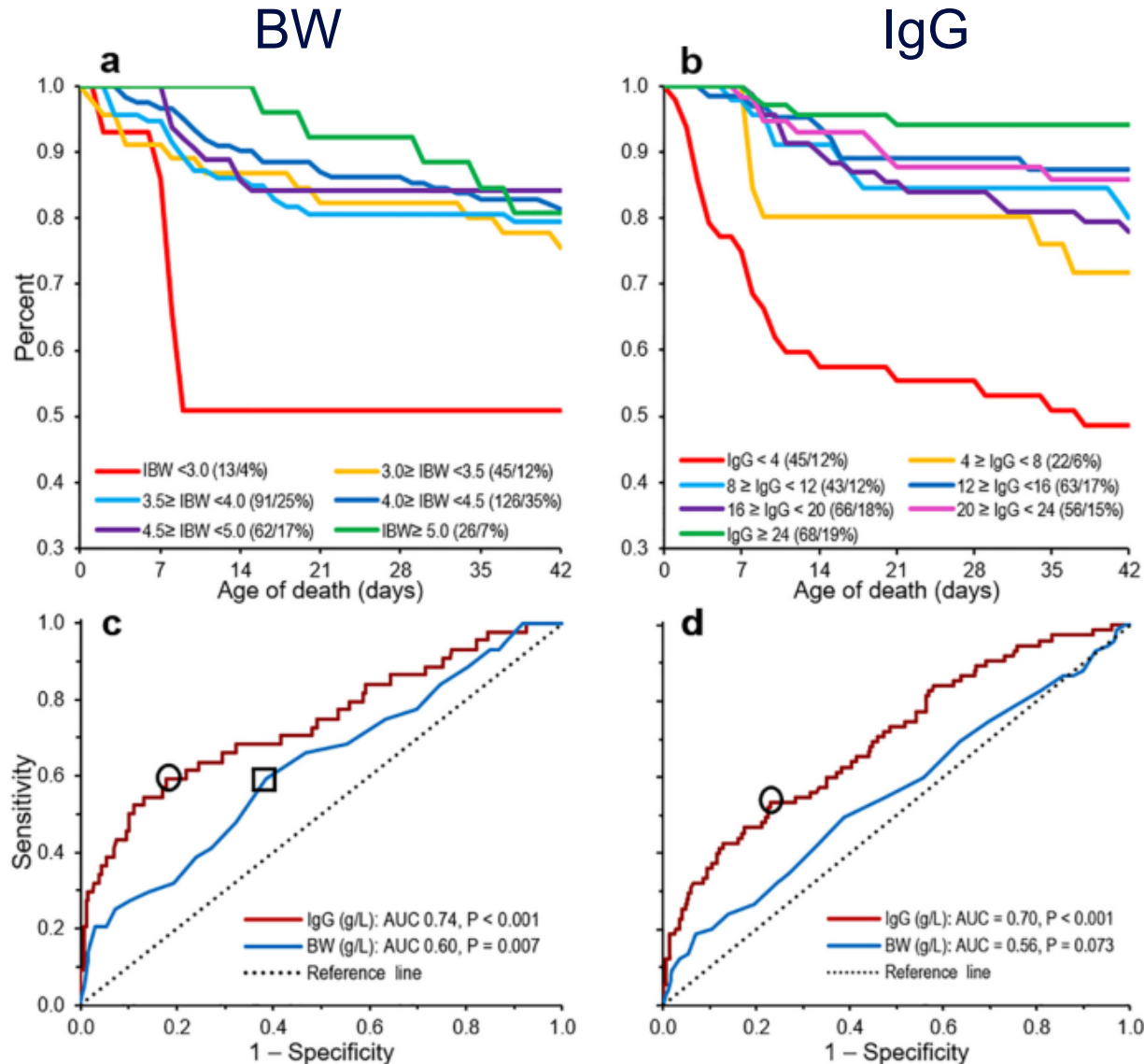
No impact of delayed collection (0-14h) on colostrum quality

IgG – 42 – 58 g/L
Brix – 18 – 23 %
TP – 10.0 – 11.4 g/dL

High variability may have masked time differences



BW & IgG thresholds



↑ BW = ↑ survival (Zamuner et al. 2023)

Improving immune status can overcome this

IgG-24 h < 8.0 g/L

BW < 3.0 kg

= 77% of deaths <14d after birth

IgG-24 h & BW critical thresholds that best predicted preweaning mortality:

<14d = 10.1 g/L & 3.95 kg

<42d = 11.4g/L

Prebiotics & probiotics

Prebiotics = Food for gut microbiota

– gut health & immune function

Probiotics = direct fed live microbials

In goats yeast:

↓ NEFA & BHB

↑ glucose



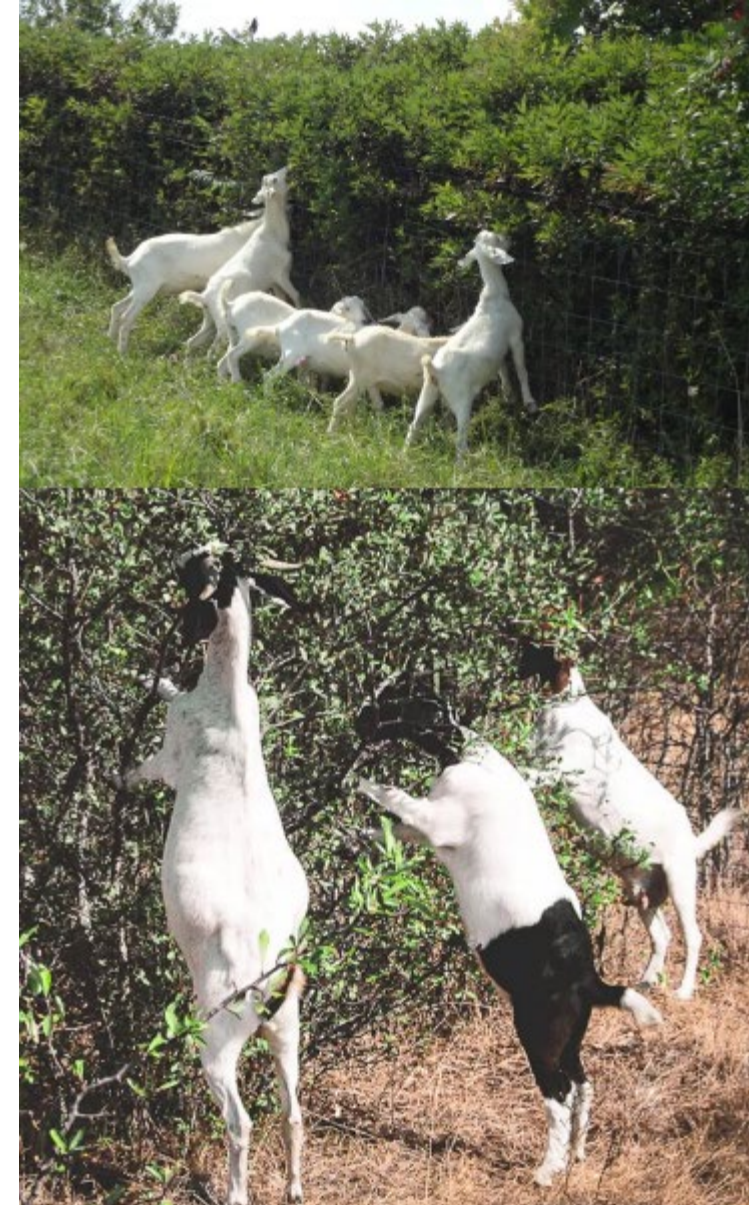
Plant based products

Phytochemicals

- phenolics, flavonoids, tannins, alkaloids, terpenoids and sulfur-containing oils, herbs, etc.

Oregano leaves ↑ intestinal health & have antioxidant effects (Reyes-Becerril et al. 2021)

Limited clear published data to date



Others

- Enzymes
- Antimicrobial peptides
- Targeted antibodies & vaccines
- Organic acids
- Bacteriophages
- Metals



Conclusions & Recommendations

Kids require:

- 10% of BW colostrum (Bélanger-Naud and Vasseur, 2021),
- mean plasma volume of 6% of BW (Smith and Sherman, 2009)
- Plasma IgG >12 g/L (Zamuner et al., 2023a)

→ colostral IgG = 29-55 g/L

Delaying colostrum collection ≤ 14 h doesn't impact quality

- IgG, Brix & total protein

Colostrum collection schedules can be more flexible

Nutritional interventions are likely to improve colostrum quality and kid BW



Thank you



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