Veterinary Physiology
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Effects of individual colostral composition on postnatal immune and metabolic adaptation in calves

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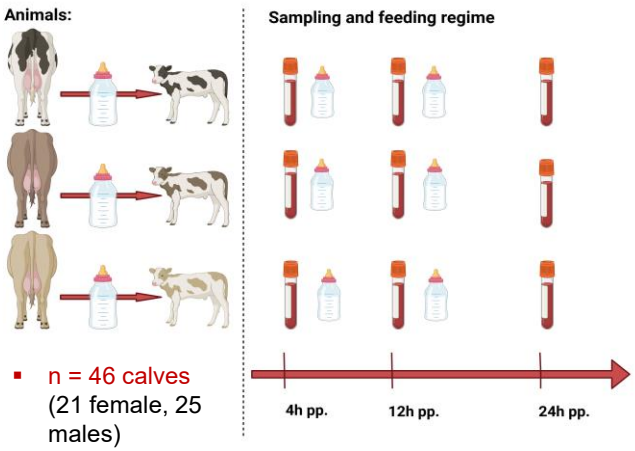
Introduction

For the postnatal calf, the initial 24-hour period is likely to represent a pivotal turning point in digestive physiology, marking the transition from uteroplacental nutrition via the dam to the digestion of nutrients within the gastrointestinal tract (GIT). It can be reasonably deduced that the metabolism of colostrum plays a pivotal role in ensuring the energy supply and maturation of the neonatal organism.

Materials and Methods

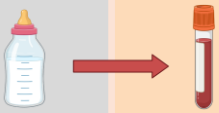
Animals

Sampling and feeding regime



- n = 46 calves (21 female, 25 males)
- Each calf reseaved individual colostrum of its dam

Colostrum and blood analysis



Colostrum:
- Fat
- Protein
- Lactose
- IgG
- Insulin
- Adiponectin
- IGF -1

Blood:
- IgG
- Total Protein
- Glucose
- NEFA
- Triglycerides

Statistical analysis

- SAS (V 9.4): mixed model for evaluation of changes over time
- Pearson correlation coefficients between colostrum and blood variables
- Significance was assumed at $P < 0.05$.

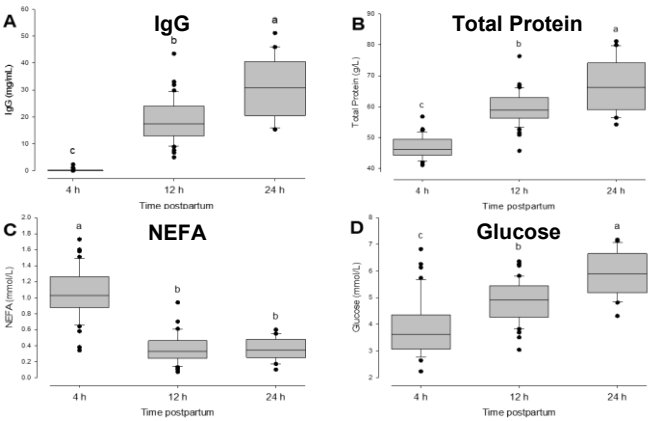
Conclusions

- Lactose, which is present in lower quantities in colostrum, may influence IgG absorption
- The study indicate that insulin and adiponectin may also exert a notable impact on Total Protein and IgG absorption
- Colostral and serum IgG concentration in calves are closely related

Objectives

Impact of various colostral ingredients on the postnatal immune and metabolic adaption in calves

Results



Figures A, B, C and D show the development of serum concentrations of IgG, Total Protein, NEFA and glucose in newborn calves in the first 24 h postpartum.

Table 1. Correlations between colostral components and changes in calf serum parameters after first colostrum intake.

Table 1	Colostrum parameters					
Serum Parameters (delta)	Nutrients			Non Nutrients		
	Fat	Protein	Lactose	IgG	Insulin	Adiponectin
IgG	r = -0.08 p = 0.61	r = 0.24 p = 0.11	**r = - 0.26 p = 0.08**	**r = 0.26 p = 0.08**	**r = 0.52 p < 0.001**	**r = 0.37 p = 0.08**
Total protein	r = 0.05 p = 0.74	**r = 0.45 p < 0.01**	**r = - 0.45 p < 0.01**	r = 0.18 p = 0.24	**r = 0.40 p < 0.01**	**r = 0.51 p = 0.01**
Glucose	r = -0.01 p = 0.93	r = 0.18 p = 0.23	r = -0.17 p = 0.26	**r = 0.27 p = 0.07**	**r = 0.42 p < 0.01**	r = 0.20 p = 0.36
NEFA	**r = 0.28 p = 0.06**	r = 0.09 p = 0.57	r = -0.06 p = 0.68	**r = 0.28 p = 0.07**	**r = -0.27 p = 0.07**	r = 0.17 p = 0.43
Triglycerides	**r = 0.51 p < 0.01**	r = -0.19 p = 0.20	r = 0.12 p = 0.43	r = -0.07 p = 0.64	r = -0.24 p = 0.12	**r = 0.46 p = 0.03**

Table 2. Correlations between colostral components and changes in calf serum parameters after second colostrum intake.

Table 2	Colostrum parameters					
Serum Parameters (delta)	Nutrients			Non Nutrients		
	Fat	Protein	Lactose	IgG	Insulin	IGF-1
IgG	r = -0.10 p = 0.67	**r = 0.56 p < 0.01**	**r = - 0.42 p = 0.06**	**r = 0.62 p < 0.01**	**r = 0.40 p = 0.07**	r = 0.11 p = 0.63
Total protein	r = 0.04 p = 0.86	**r = 0.49 p = 0.02**	**r = - 0.50 p = 0.02**	**r = 0.54 p = 0.01**	**r = 0.44 p = 0.05**	r = -0.05 p = 0.83
Glucose	r = 0.19 p = 0.42	r = 0.28 p = 0.22	r = -0.28 p = 0.23	r = 0.37 p = 0.10	**r = 0.48 p = 0.03**	r = -0.12 p = 0.61
NEFA	r = 0.13 p = 0.57	r = 0.18 p = 0.44	r = -0.37 p = 0.10	r = 0.26 p = 0.26	r = -0.30 p = 0.19	r = 0.20 p = 0.39
Triglycerides	**r = 0.54 p = 0.01**	r = -0.22 p = 0.34	r = -0.20 p = 0.39	r = -0.24 p = 0.30	r = -0.09 p = 0.70	r = 0.005 p = 0.98

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