



University  
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# Extended colostrum feeding- beyond immunoglobulins

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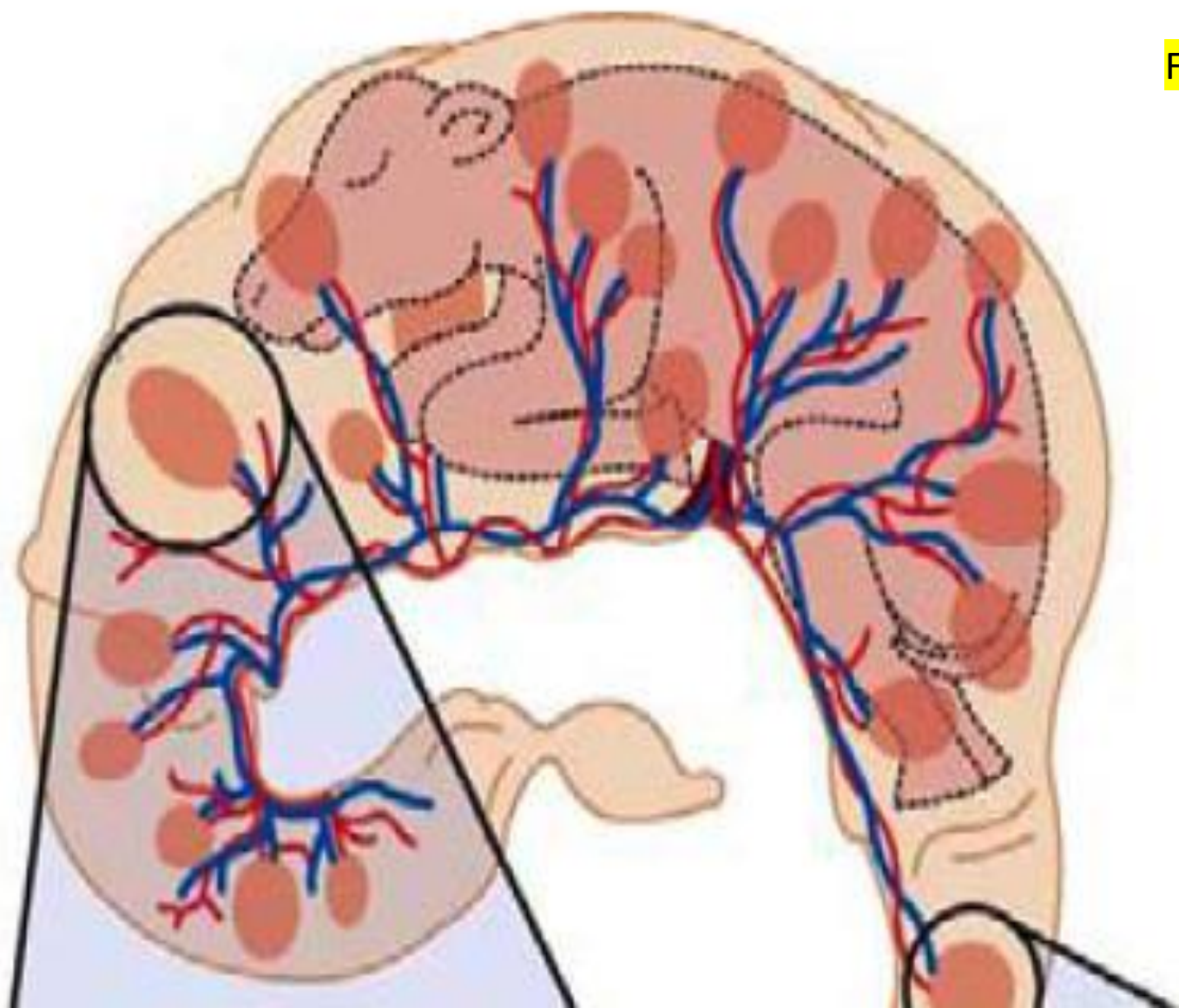


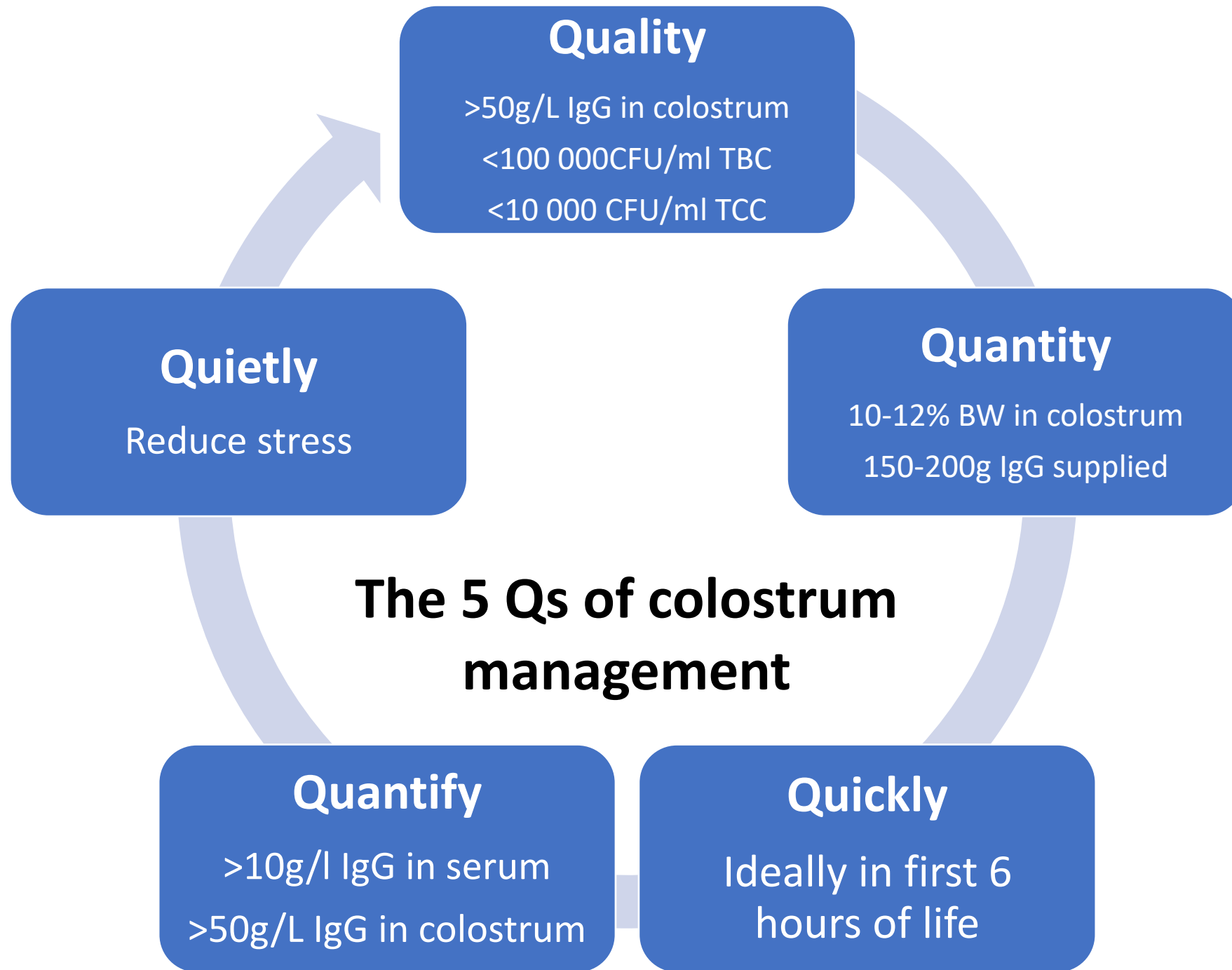


# Road map

- Background and best practice
- What is extended colostrum feeding?
- Benefits of colostrum feeding
- Practical applications and project details

FTPI





# What is extended colostrum feeding?

'Extended colostrum feeding' may involve supplementation of milk replacer or whole milk with 'true colostrum' or may refer to feeding transition milk (second to eighth milking colostrum) in an extended manner.

Alternatively, colostrum supplements and replacements may be added to the milk replacer.

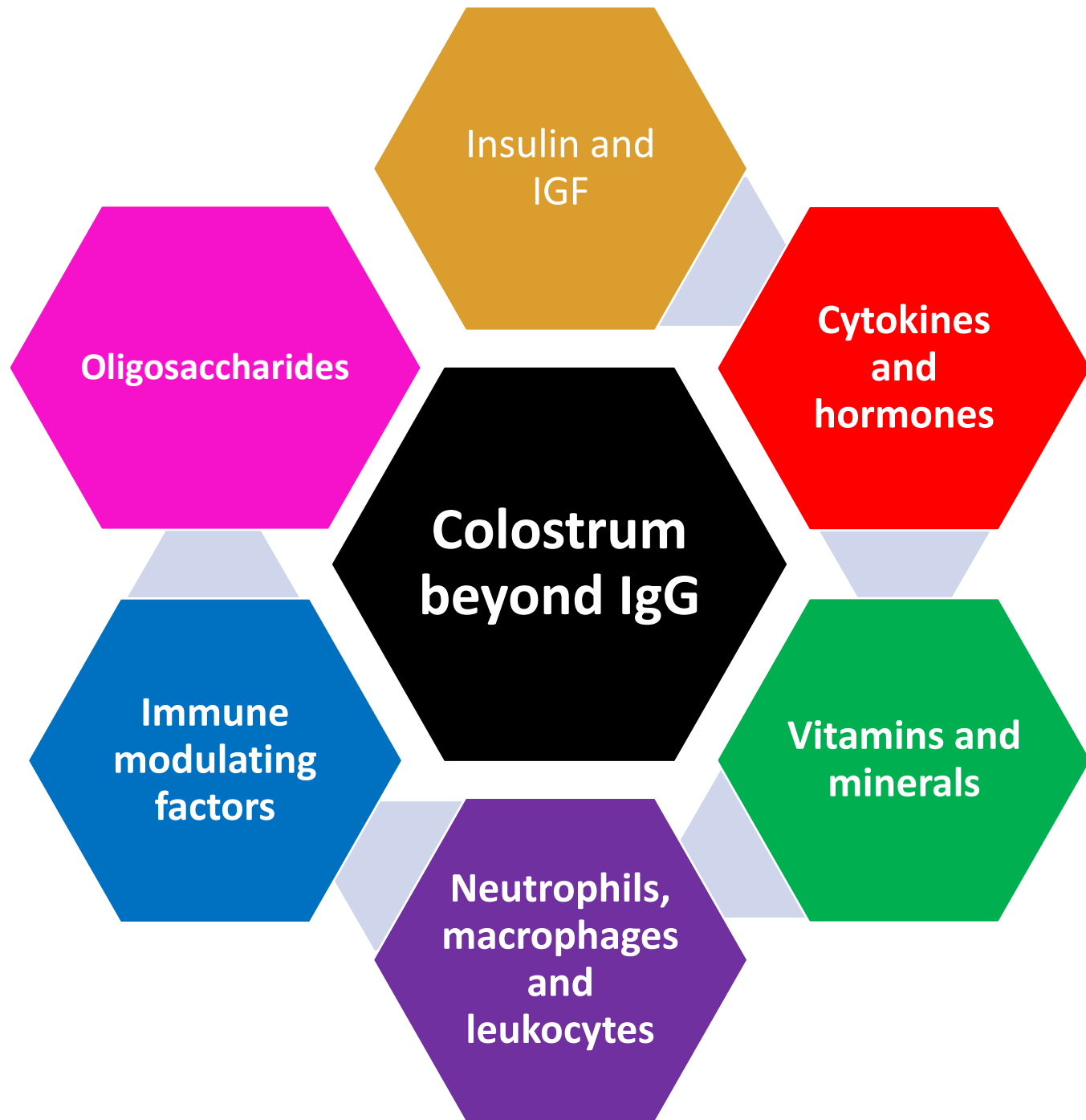


**Colostrum replacers and colostrum supplements are NOT the same thing!**

# Colostrum replacers

- >100g IgG per dose (otherwise they are supplements)
- Valid alternative to colostrum?
- Expensive
- Should not replace maternal colostrum!
- Lower bacterial counts?
- May lack farm specific antibodies
- Whey based- STP threshold lowered







# Other important components

- **Lysozyme**- hydrolyses linkages in cell wall and causes bacterial cell lysis
- **Lactoferrin**- binds to iron inhibits microbial growth, prevents sepsis
- **Lactoperoxidase**- suppresses oxidation in protein groups to inhibit bacterial growth
- **Trypsin inhibitor**- prevents breakdown of IgG



# Extended colostrum feeding- what we know

IgG molecules continue to be of benefit in the gut lumen to provide local immunity against intestinal pathogens such as Rotavirus and *E.coli*

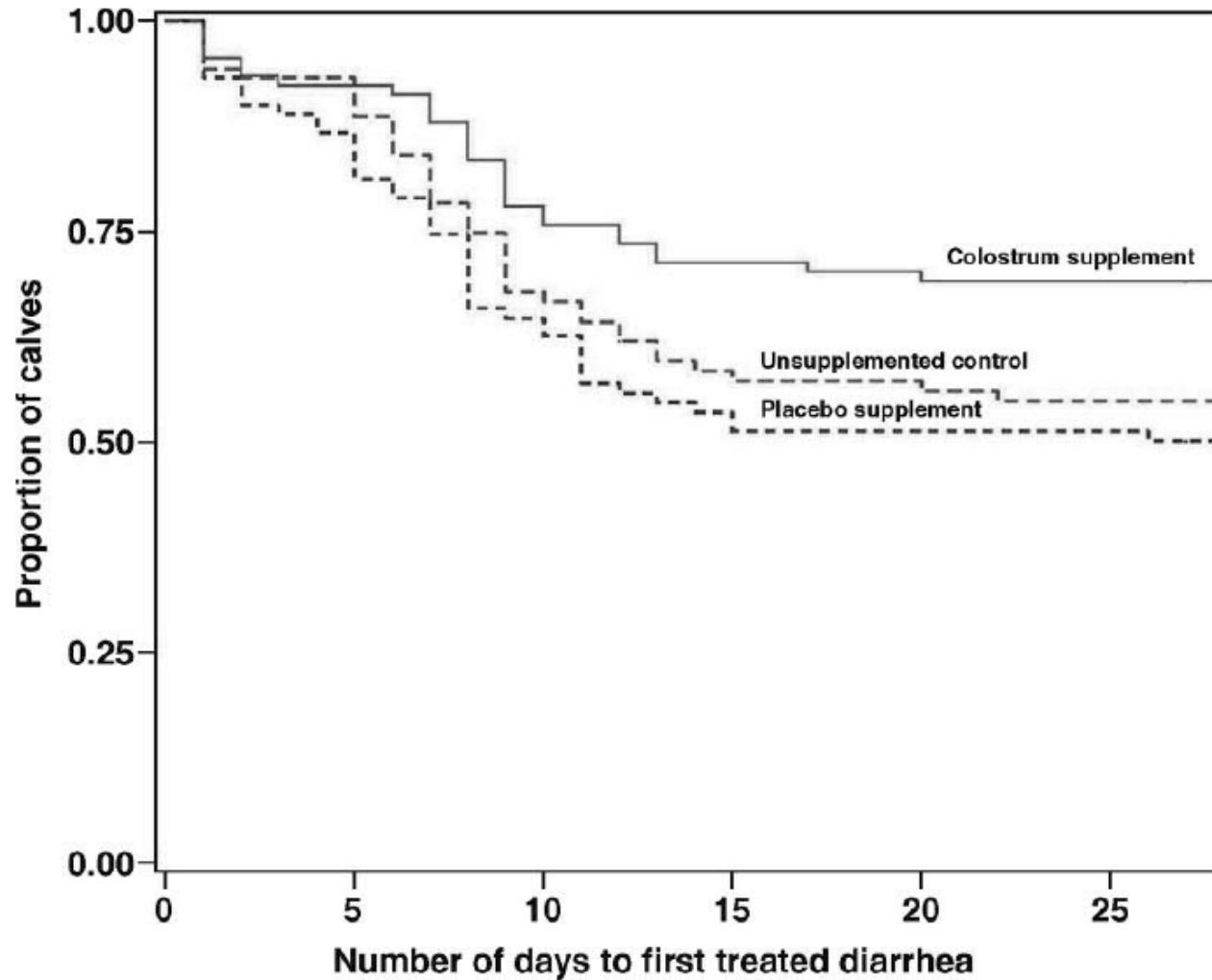
Colostrum is an excellent energy source and provides beneficial nutrients, vitamins and proteins including cytokines and other immune modulating factors

## Growth and health benefits

# Potential benefits to extended colostrum feeding

- Increasing serum IgG concentrations
- Reducing antimicrobial use
- Increasing immune protection for specific dam vaccinated pathogens
- Improving average daily gain
- Promoting intestinal villi development
- Reducing calfhood morbidity and mortality
- Improving reproductive and lactation outcomes.

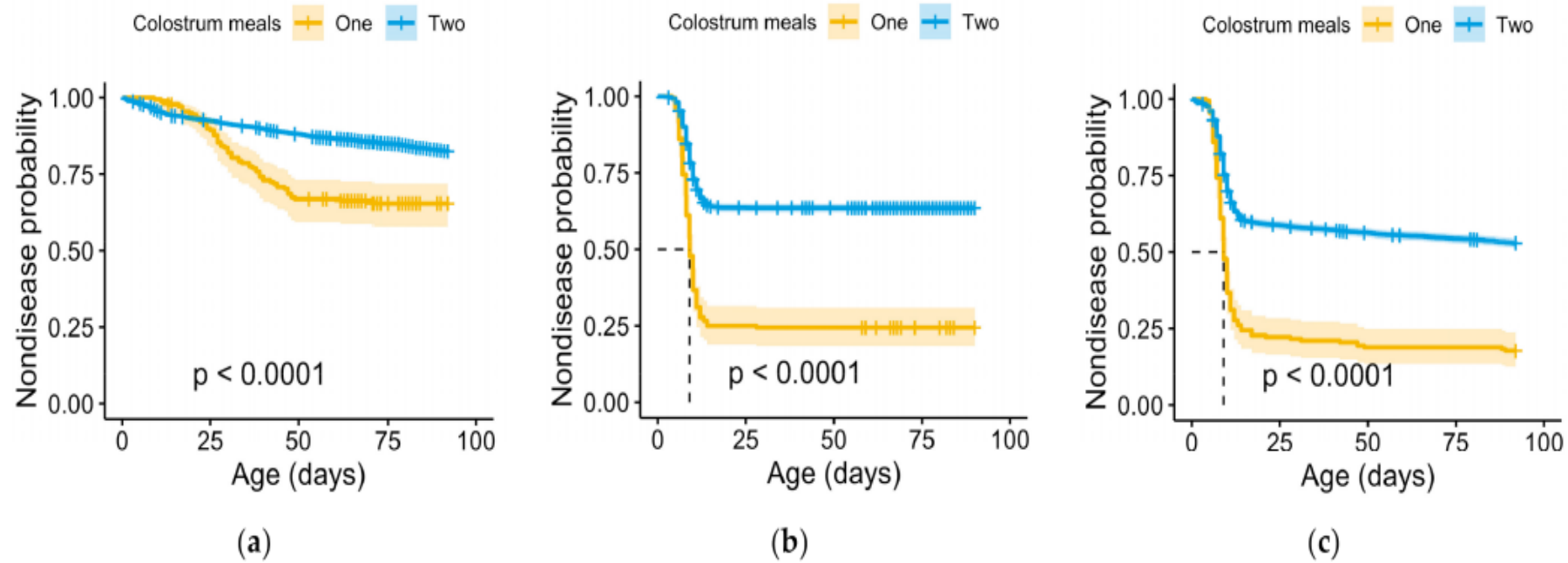




Colostrum supplemented milk replacer- 10g IgG -70g colostrum supplement in milk replacer for 14 days.

Increased weight gain in first month of life

**Figure 1.** Kaplan-Meier plot showing days to first treated diarrhea stratified by treatment group in 3 field trials evaluating the efficacy of feeding a colostrum supplement in milk replacer for 14 d to preweaned calves (Wilcoxon test of equality of strata,  $\chi^2 = 7.53$ ;  $P = 0.02$ ).

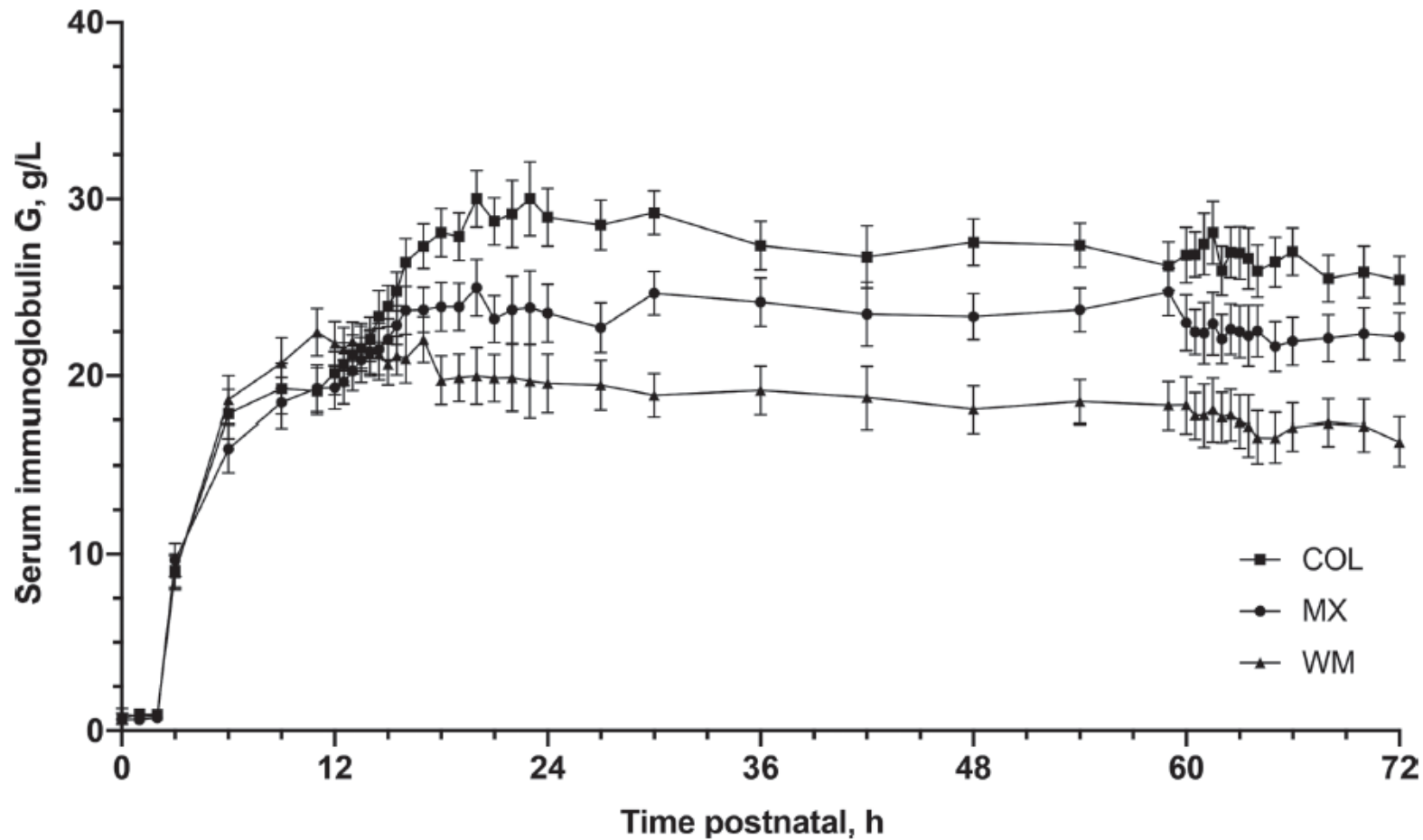


**Figure 2.** Kaplan-Meier survival curve of the non-disease probability of calves dependent on the number of colostrum meals received within the first 24 h of life for (a) respiratory disease, (b) diarrhea, and (c) any disease pre-weaning.  $p$  value based on the log-rank test.

**Table 4.** Comparison of pre-weaning average daily gain, number of inseminations, and 305ME between heifers receiving 1 or 2 colostrum meals after birth. Results reported as estimated means and 95% CI.

	Number of Colostrum Meals		<i>p</i> Value
	Two ( <i>n</i> = 2126)	One ( <i>n</i> = 136)	
Average daily gain (kg/d)	0.86 (0.79–0.93)	0.74 (0.64–0.84)	<0.001
Number of inseminations	1.84 (1.78–1.90)	2.13 (1.88–2.38)	0.066
First lactation 305ME (kg)	16,424 (15,249–18,329)	15,440 (15,067–18,693)	0.081





**Figure 1.** Serum IgG concentrations in calves fed colostrum (COL,  $n = 9$ ), whole milk (WM,  $n = 9$ ), or a 1:1 COL:WM mixture (MX,  $n = 9$ ) from 12 to 72 h after birth after all calves had received an initial colostrum meal at 2 h after birth. Serum IgG concentrations began to diverge (treatment  $\times$  time:  $P < 0.001$ ) after 12 h between COL and MX calves and COL and WM calves but not MX and WM calves. The difference between COL and WM calves was maintained throughout the remaining experimental period, whereas by the end of the experiment, COL and MX no longer differed and MX serum IgG was greater than that of WM. The  $P$ -values for the main effects of treatment and time were both  $P < 0.001$ . Error bars represent SE.

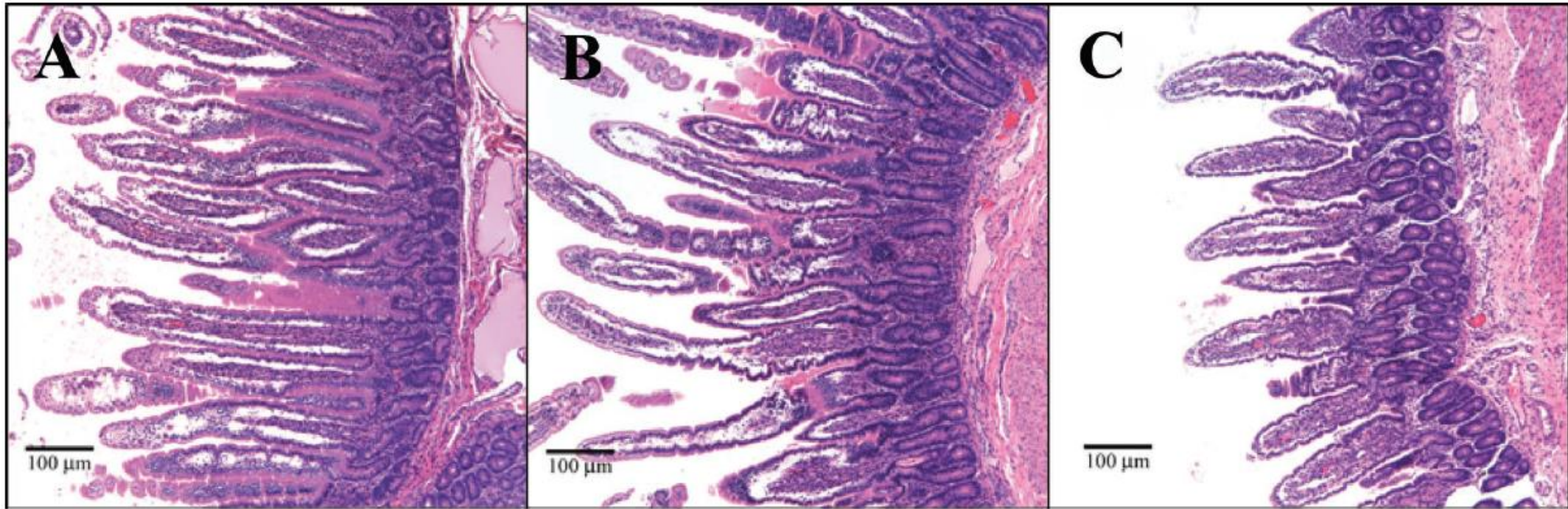
Table 3. Initial BW, weaning weight, and gain for calves fed experimental diets

Variable	Diet <sup>1</sup>			SEM	P-value	
	MR	TM	MCR		MR vs. TM and MCR <sup>2</sup>	TM vs. MCR <sup>3</sup>
Birth weight (kg)	36.8 ± 3.7	37.6 ± 5.3	38.7 ± 4.0	0.75	0.13	0.24
Weaning weight (kg)	68.1 ± 6.8	71.8 ± 5.3	73.0 ± 6.6	1.01	<0.01	0.7
Weight gain (kg)	31.3 ± 5.8	34.2 ± 6.0	34.3 ± 6.2	0.98	0.02	0.9
Preweaning ADG (kg/d)	0.562 ± 0.10	0.616 ± 0.14	0.620 ± 0.11	0.017	0.01	0.9

<sup>1</sup>Diets contained milk replacer (MR), pooled and pasteurized transition milk (TM), or milk replacer supplemented at a ratio of 1:1 with colostrum replacement powder (MCR). Means reported ± SD.









<sup>2</sup>Contrast of MR and treatments TM and MCR.

<sup>3</sup>Contrast of TM and MCR.



**Figure 1.** Brightfield microscopy images (200× magnification) of proximal jejunal tissue from calves that consumed either pooled and pasteurized colostrum (A), a 1:1 colostrum:whole milk mixture (B), or whole milk (C) from 12 to 72 h after an initial meal of colostrum at 2 h postnatal. Jejunal tissue is stained with hematoxylin and eosin for contrast.



Eye scores			
Normal	Small amount of ocular discharge	Moderate amount of bilateral discharge	Heavy ocular discharge
			
Ear scores			
Normal	Ear flick or head shake	Slight unilateral droop	Head tilt or bilateral droop
			

Chamorro et al. 2017- 150g replacer for 14 days- lower morbidity and mortality  
 Conneely et al. 2014- TM- lower odds of worse eye/ear score

# Ideas for supplementing colostrum

- 2-3 large ice cubes of frozen first milking colostrum added to MR feed
- 40-70g colostrum replacer added to MR feed
- Mix TM into pasteurised milk
- Feed TM for 3-5 days
- Use milk replacer with plasma as part of protein profile
- **TRANSITION MILK CONTAINS A GREATER CONCENTRATION OF BIOACTIVE COMPOUNDS COMPARED WITH WHOLE MILK**





## Extended colostrum feeding

- 2 dairy farms, 100 calves in each of 2 groups
- Blood sampled 1-7 days old
- Health scoring every second day
- Birth and weaning weights
- Potassium sorbate preservative
- Colostrum and TM TBC and TCC





<b>Group</b>	<b>Age</b>	<b>Feeding</b>
<b>FC- group</b>	Feed 2 to day 28	3 litres milk replacer twice daily
<b>FC- group</b>	Day 29 to day 70	4-5 litres of milk replacer twice daily
<b>EC- group</b>	Feed 2- feed 10	Second/third milking colostrum 3 litres twice daily
<b>EC-group</b>	Day 6 (feed 11) to day 28	3 litres of milk replacer twice daily
<b>EC-group</b>	Day 29 until day 70	4-5 litres of milk replacer twice daily



Thank you  
for your  
attention!

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