



# Microbes, diet and host: how do they interact in newborn piglets ?

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## NEOMUNE Centre

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### NEOMUNE

- › Department of Nutrition, Exercise and Sports
- › The Danish Council for Strategic Research

#### Early milk and microbiota to support immunity, gut and brain development

The NEOMUNE centre is a research platform aiming to improve the basic biology and clinical care of newborn infants, particular those born with developmental problems.

We hypothesize that diet and gut microbiota interventions during the first weeks of life promotes immunity, gut and brain maturation, both short and long term. Studies in newborn infants are coupled with studies in newborn animals (piglets, mice).

[Read more](#)



Supplier of public funding



#### Calendar

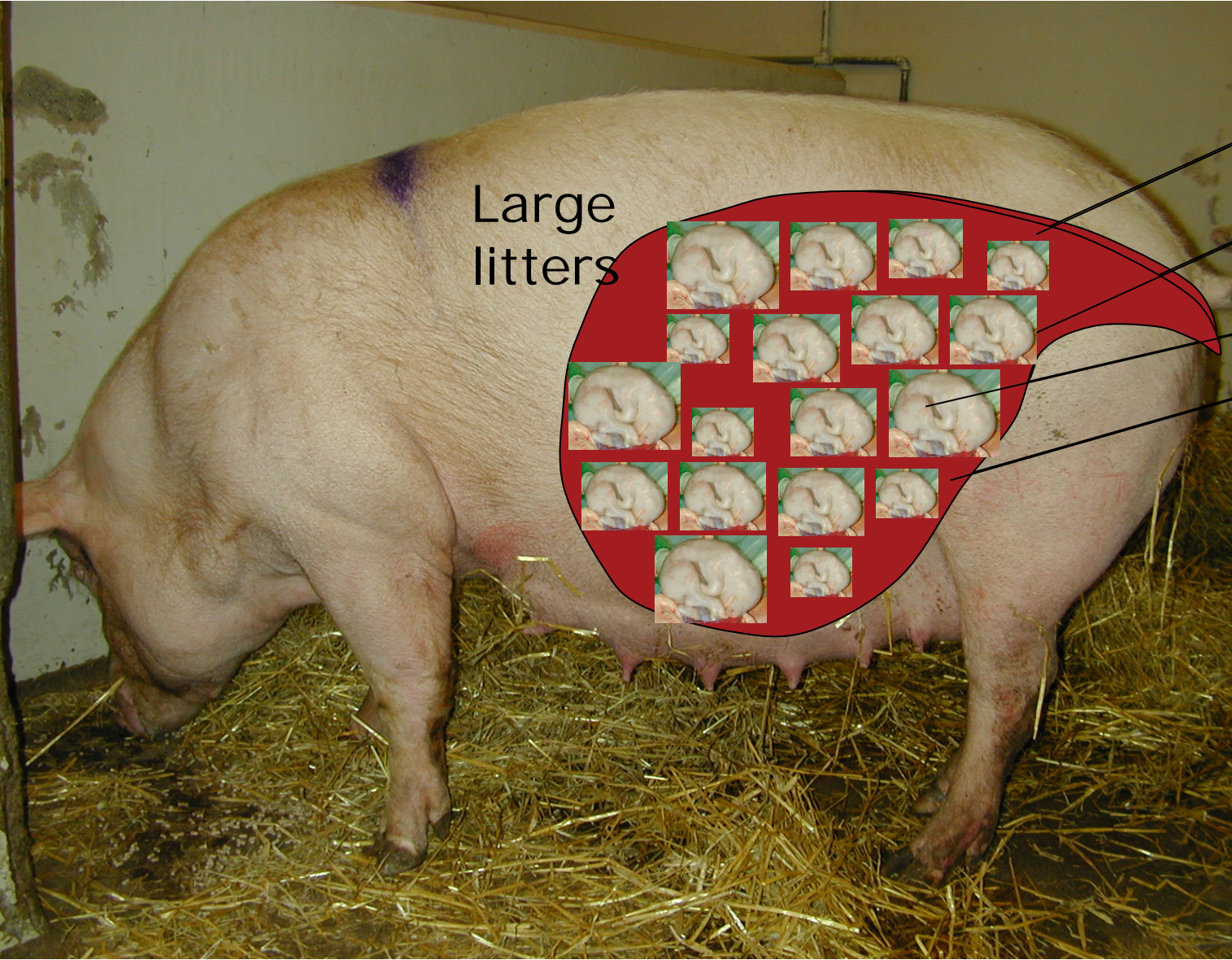
- 20 Sep 2013  
**Meeting for all participants in NEOMUNE**
- 20 September 2013 in Copenhagen. ... >>



[All events](#)



# Variation in maturity at birth ?



Large litters

Optimal timing:

118d

116d

113d

115d

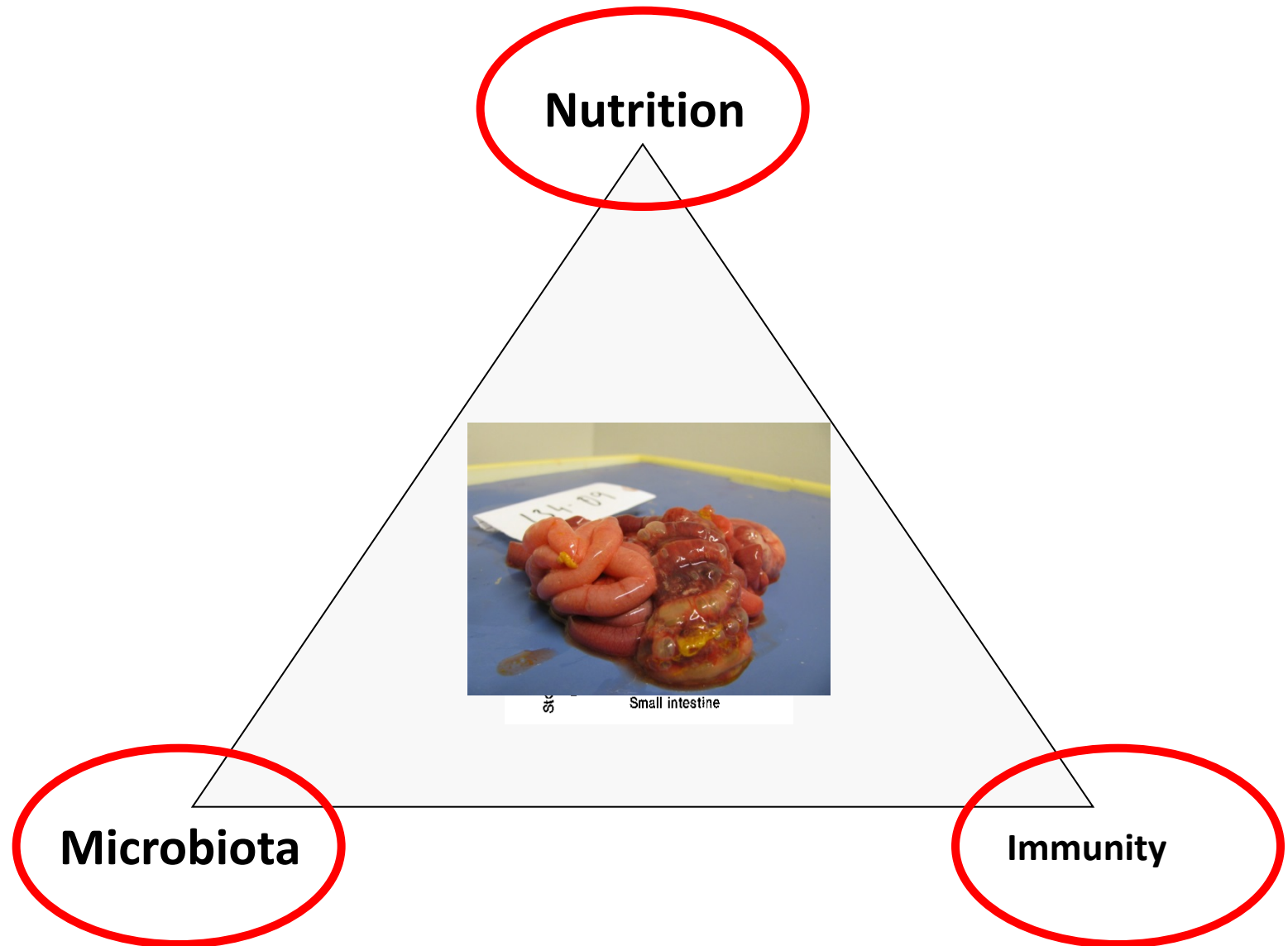


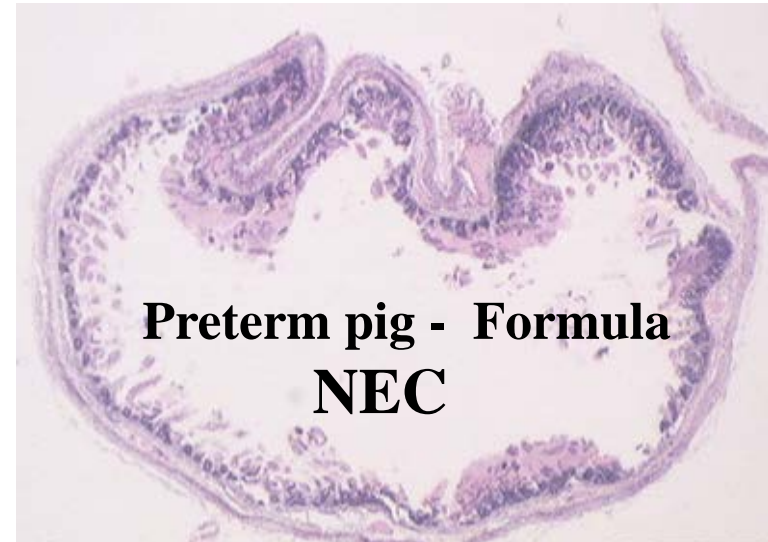
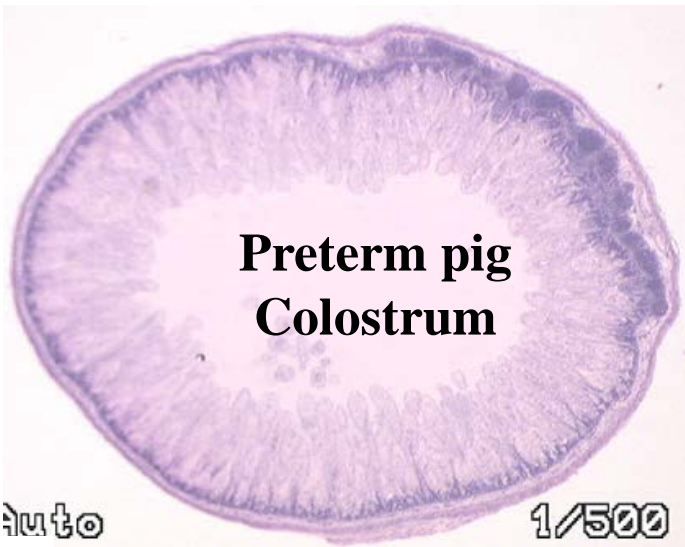
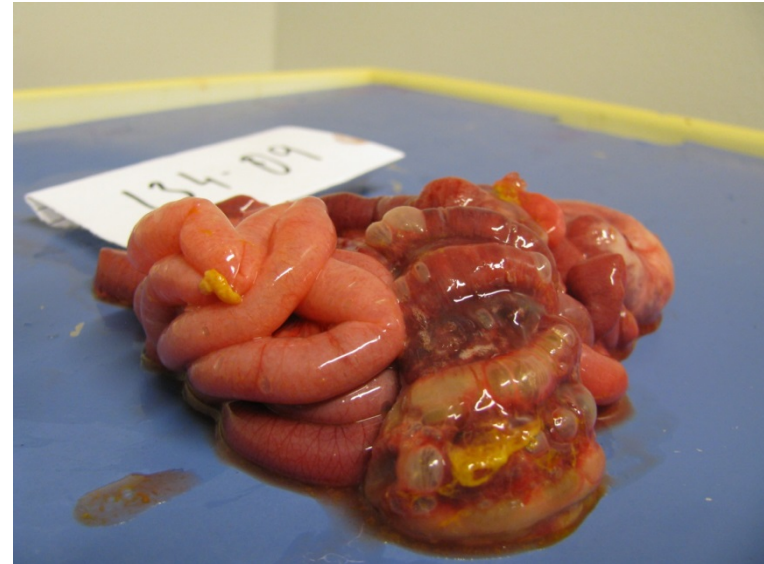
# Preterm Pig Intensive Care Unit

- to help answer difficult questions!



**25 incubators**  
**Respiratory support**  
**Temp./moisture control**  
**Low microbe (germfree)**  
**Parenteral/enteral nutrition**  
**24 hour camera surveillance**

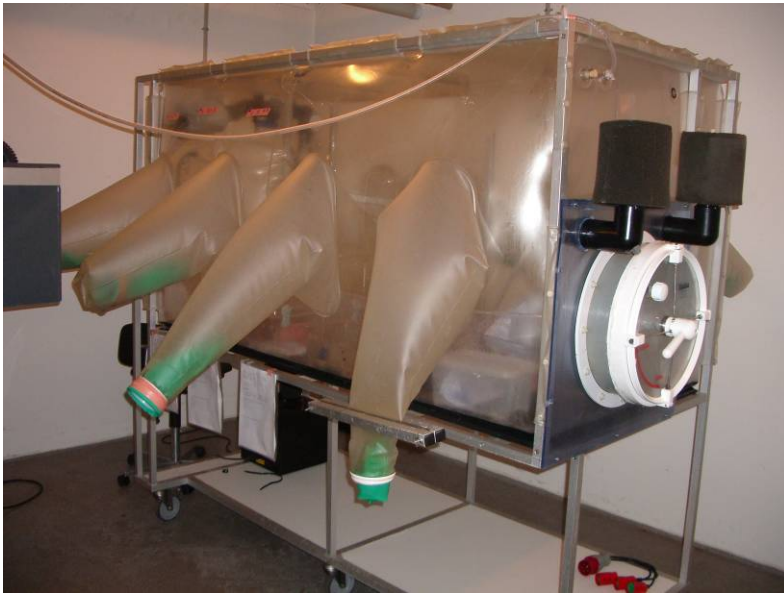




**Main risk factors of necrotizing enterocolitis (NEC):  
Prematurity, formula nutrition and gut colonization**



## Feeding milk replacer under germ free conditions



Trophic effects on the intestine in response to enteral nutrition. No pathological changes.

# Treatment groups

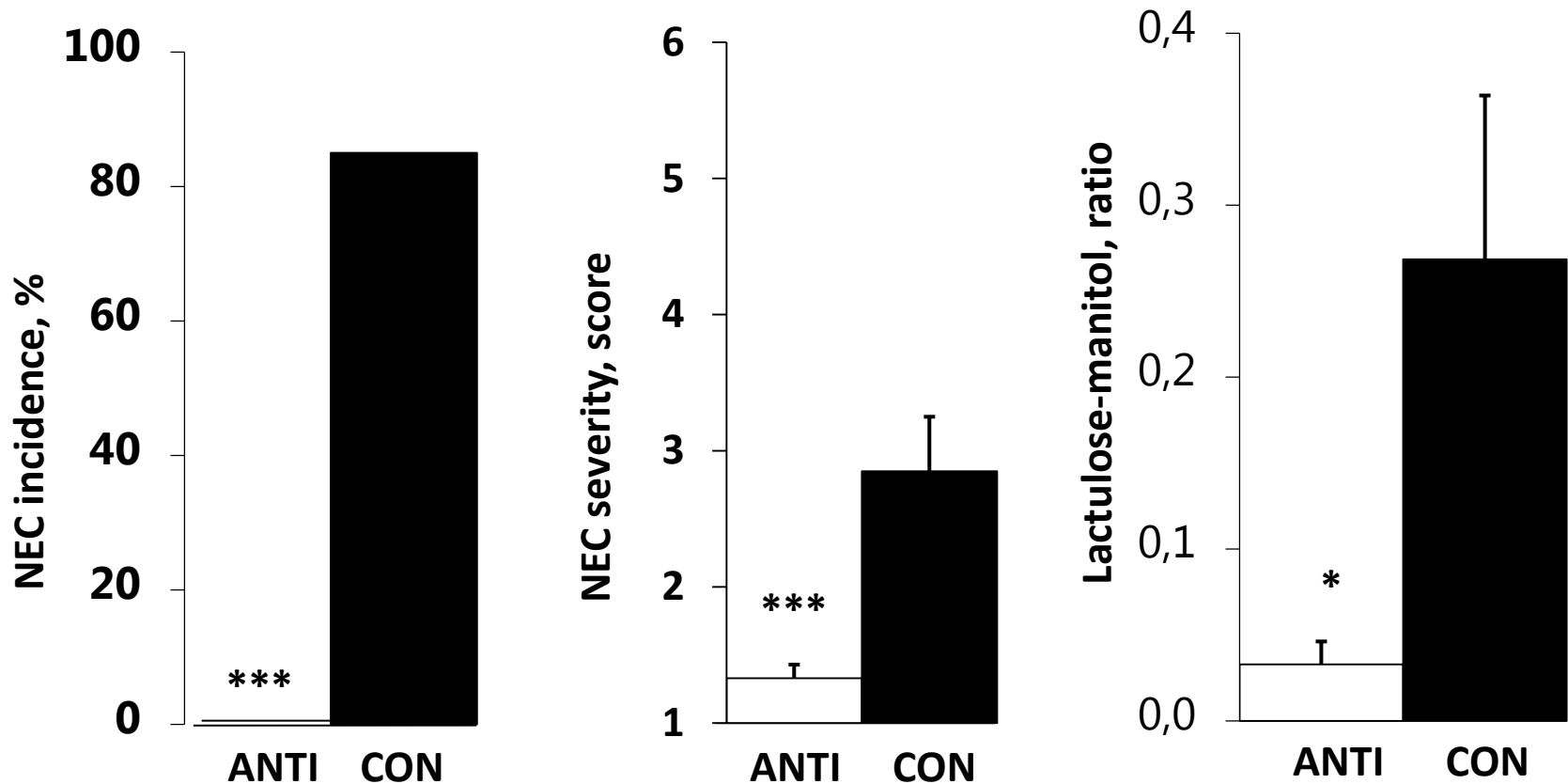
Antibiotic	Dose		Bacteria targeted
	IA anti	PO anti	
<b>Ampicillin</b>	30 mg x kg x 3 daily	30 mg x kg x 3 daily	Gram + (-)
<b>Gentamycin</b>	2,5 mg x kg x 2 daily	2,5 mg x kg x 2 daily	Gram – (+), aerobes, mycoplasma
<b>Mitronidazole</b>	10 mg x kg x 3 daily	10 mg x kg x 3 daily	Anaerobes
<b>Saline</b>			2 mL x 3 daily None



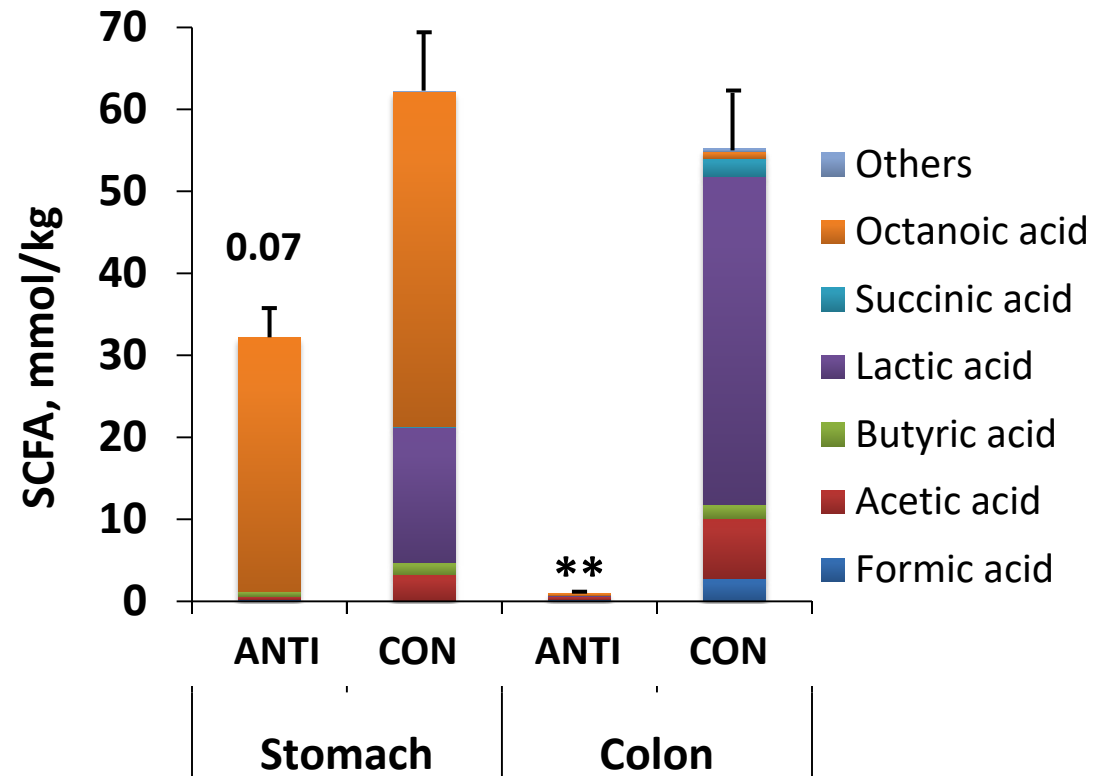
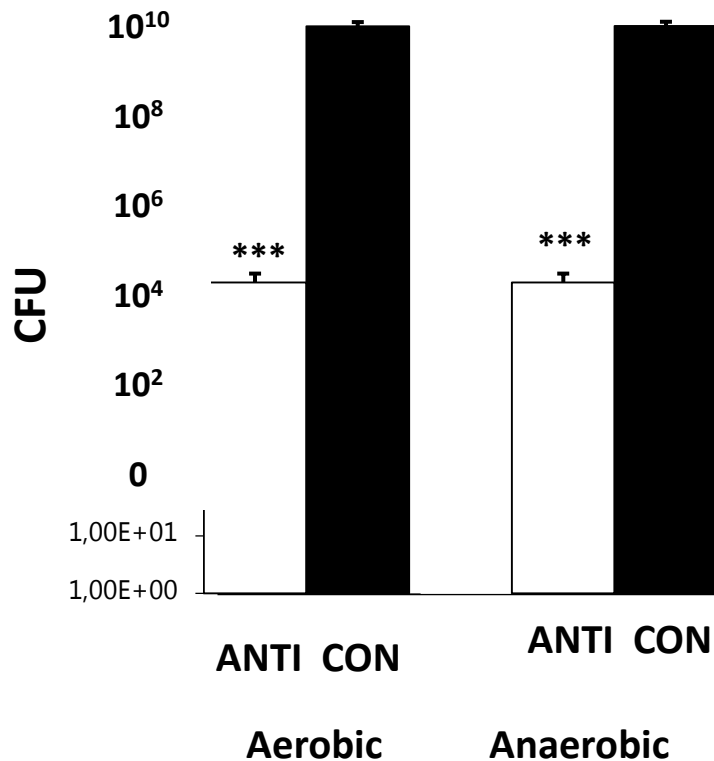
Jensen et al. 2013, Am. J. Physiol

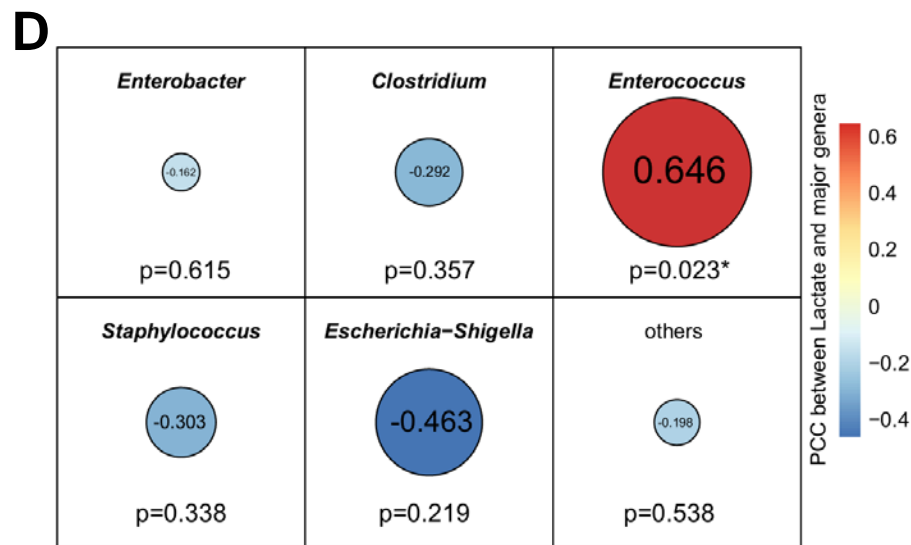
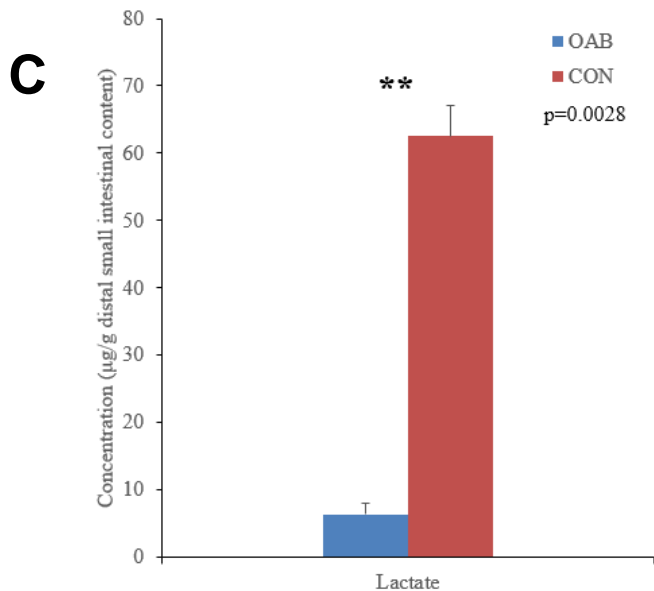
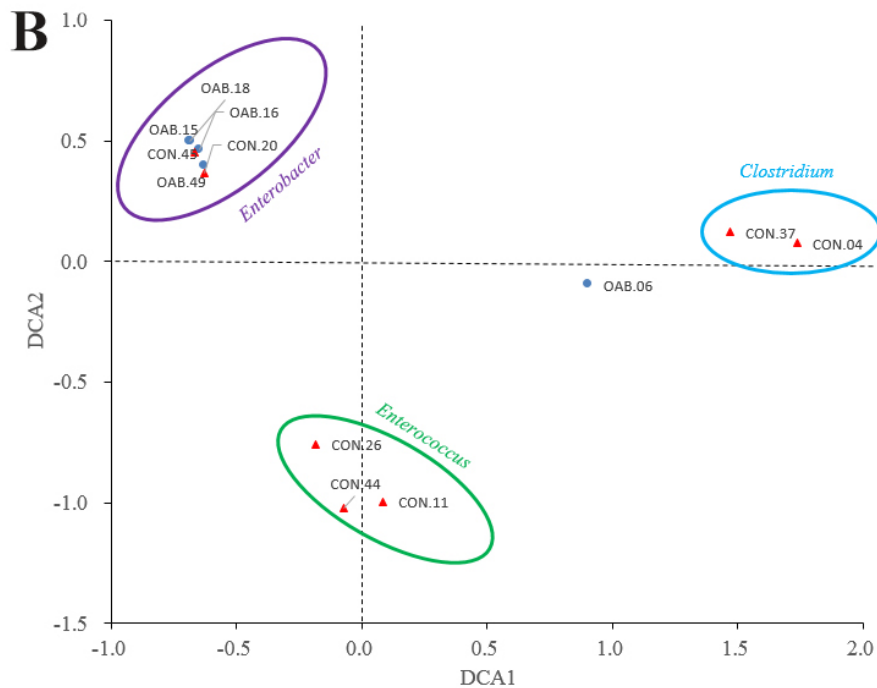
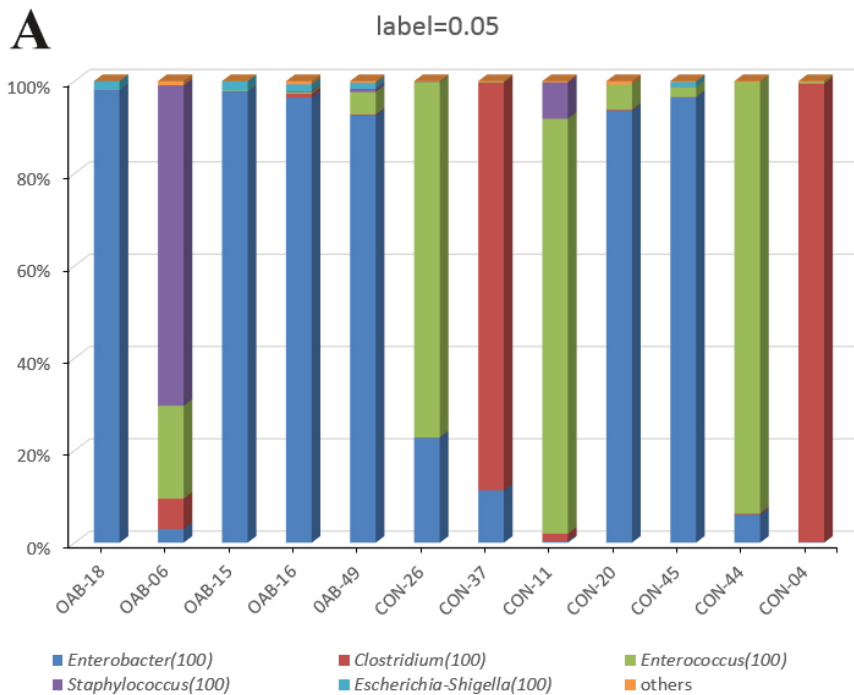


# Reduced incidence, severity and gut permeability



# Markedly reduced CFU and SCFA, MEANS+SEM

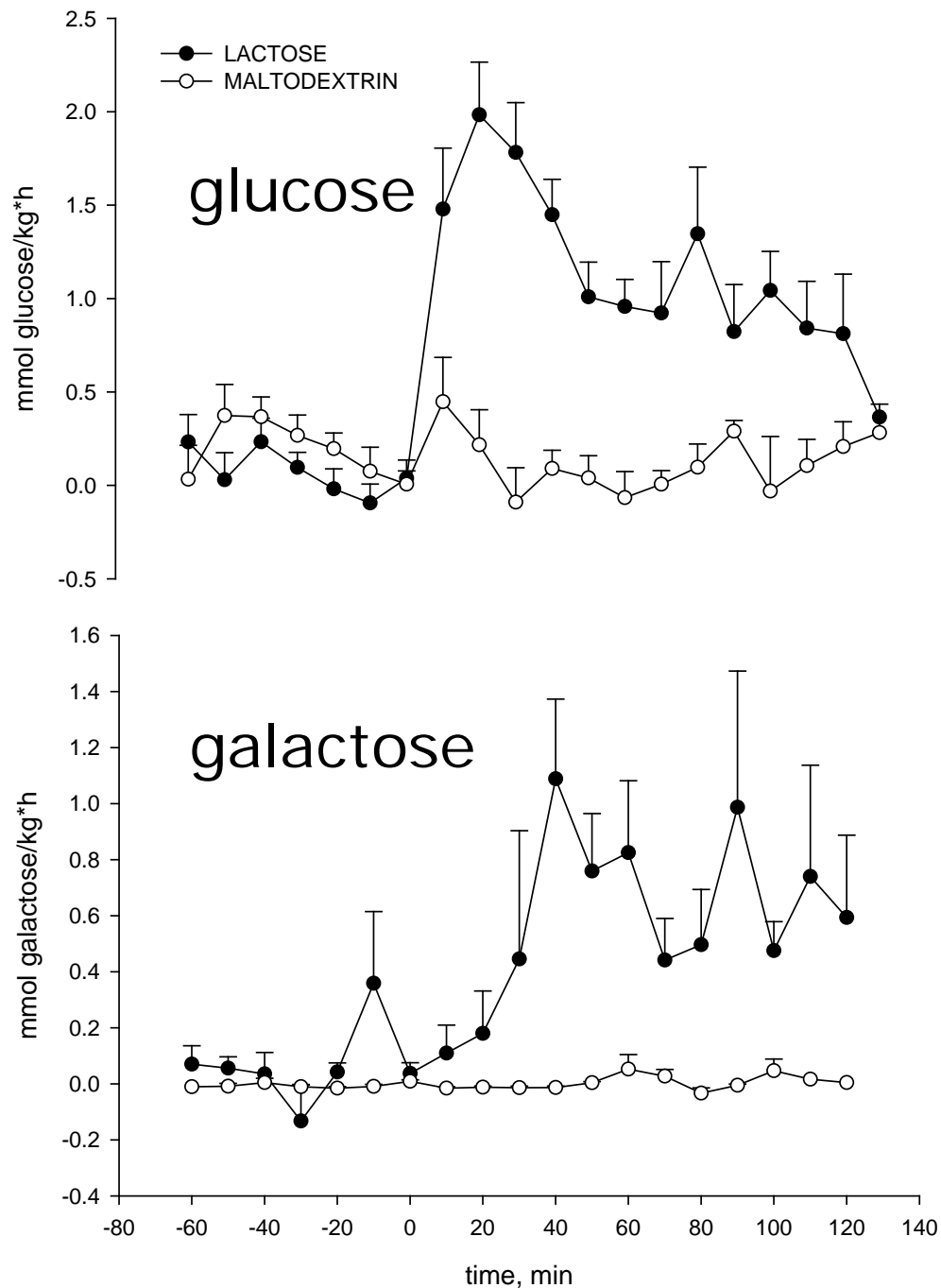
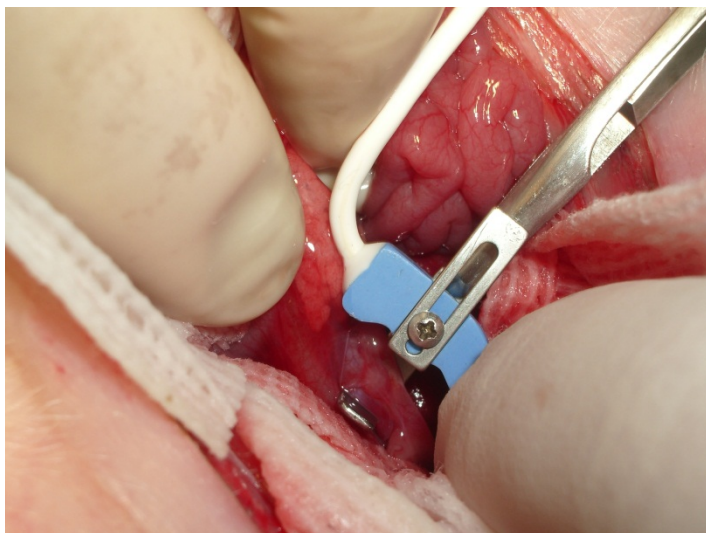
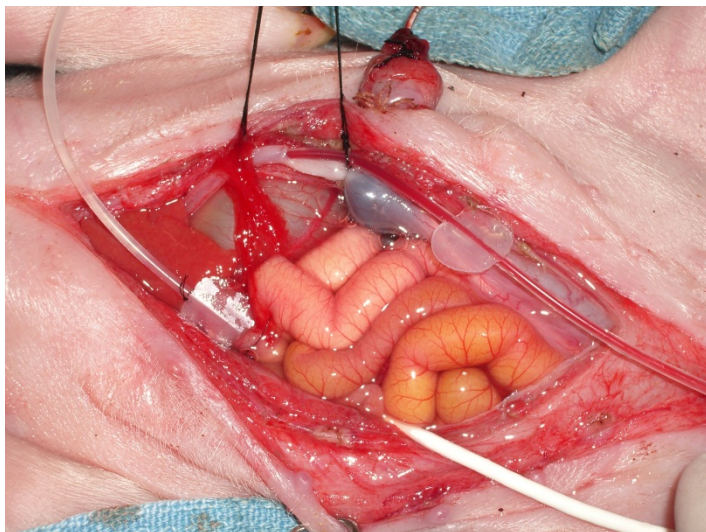




Gao, Nguyen, Birck et al.

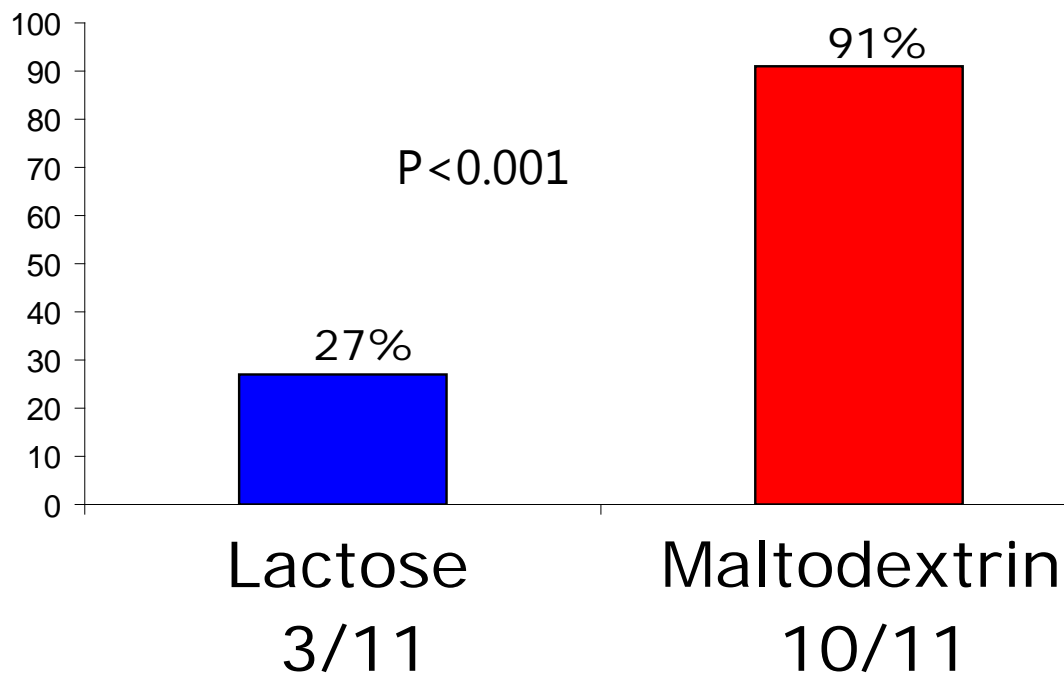


# Direct infusion of lactose or MDX in the jejunum (Burrin & Stoll)

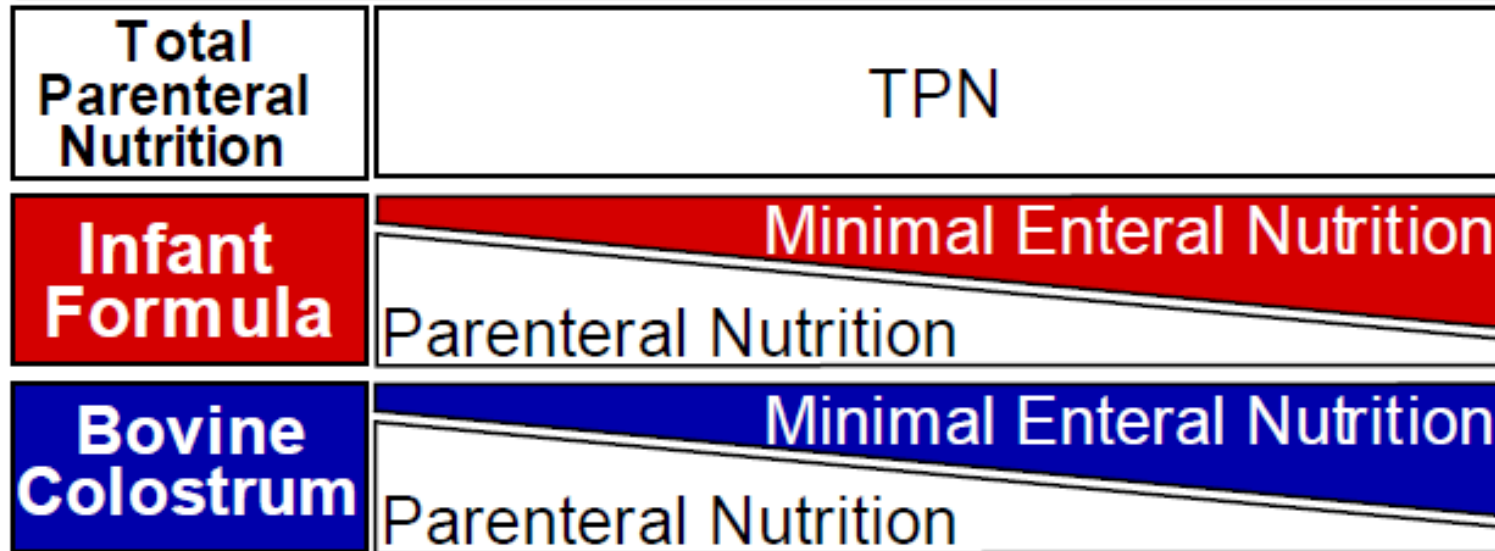




# NEC incidence

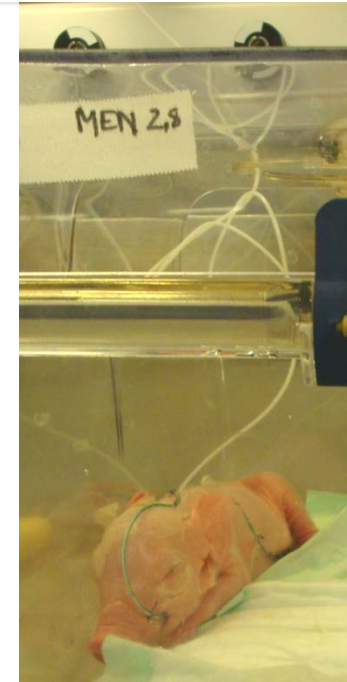


# Slow progression of enteral feeds in preterm pigs



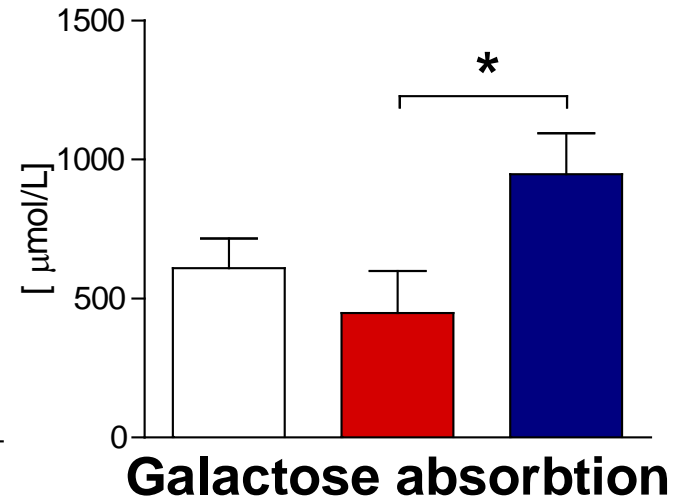
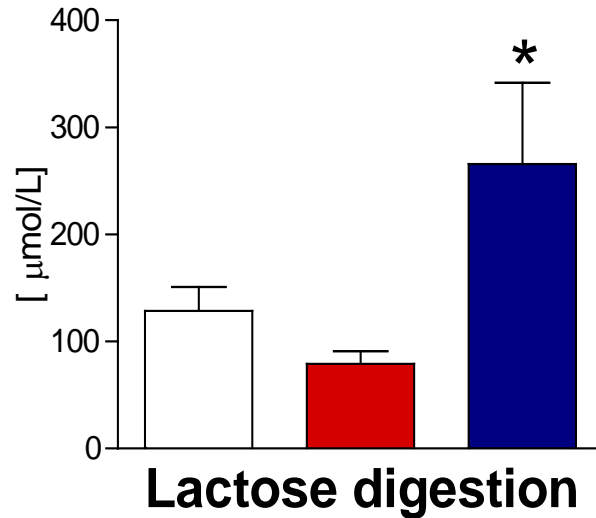
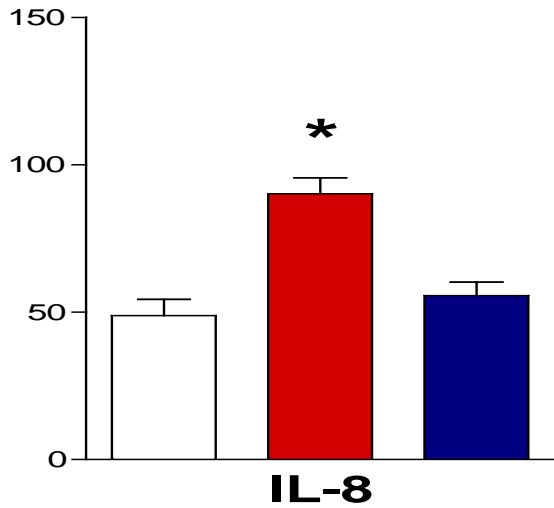
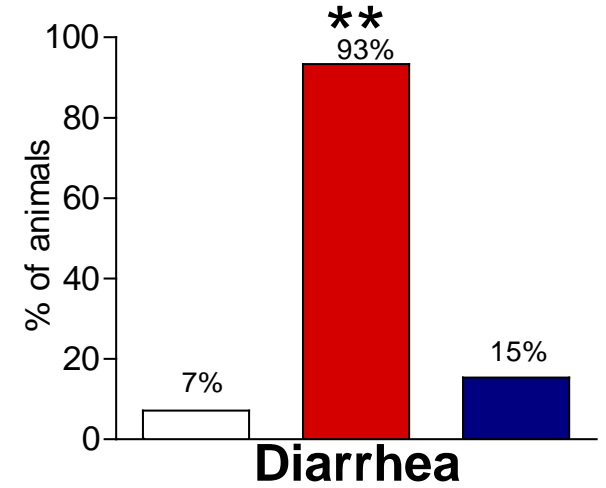
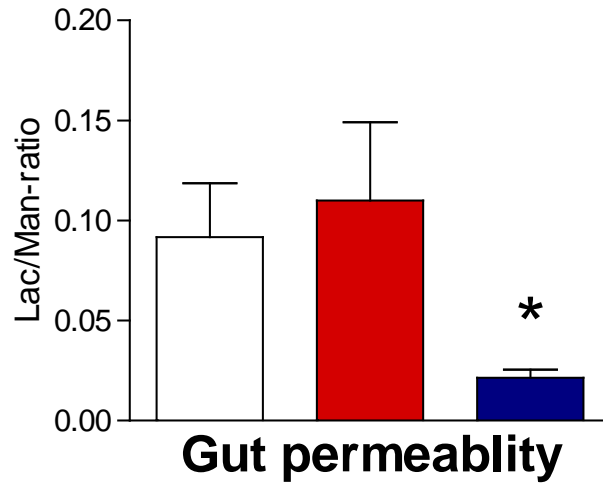
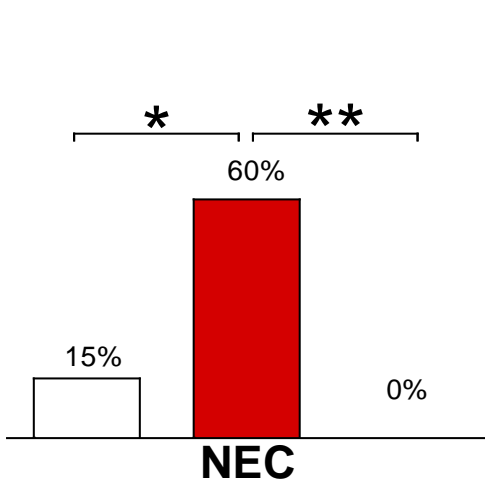
	d1	d2	d3	d4	d5
MEN volume	16	32	48	64	
Total fluid (ml/kg/d)	72	96	144	144	

↑ Cessarian section ~90% gestation (pointing to d1)  
 ↑ Sacrifice & Sampling (pointing to d5)



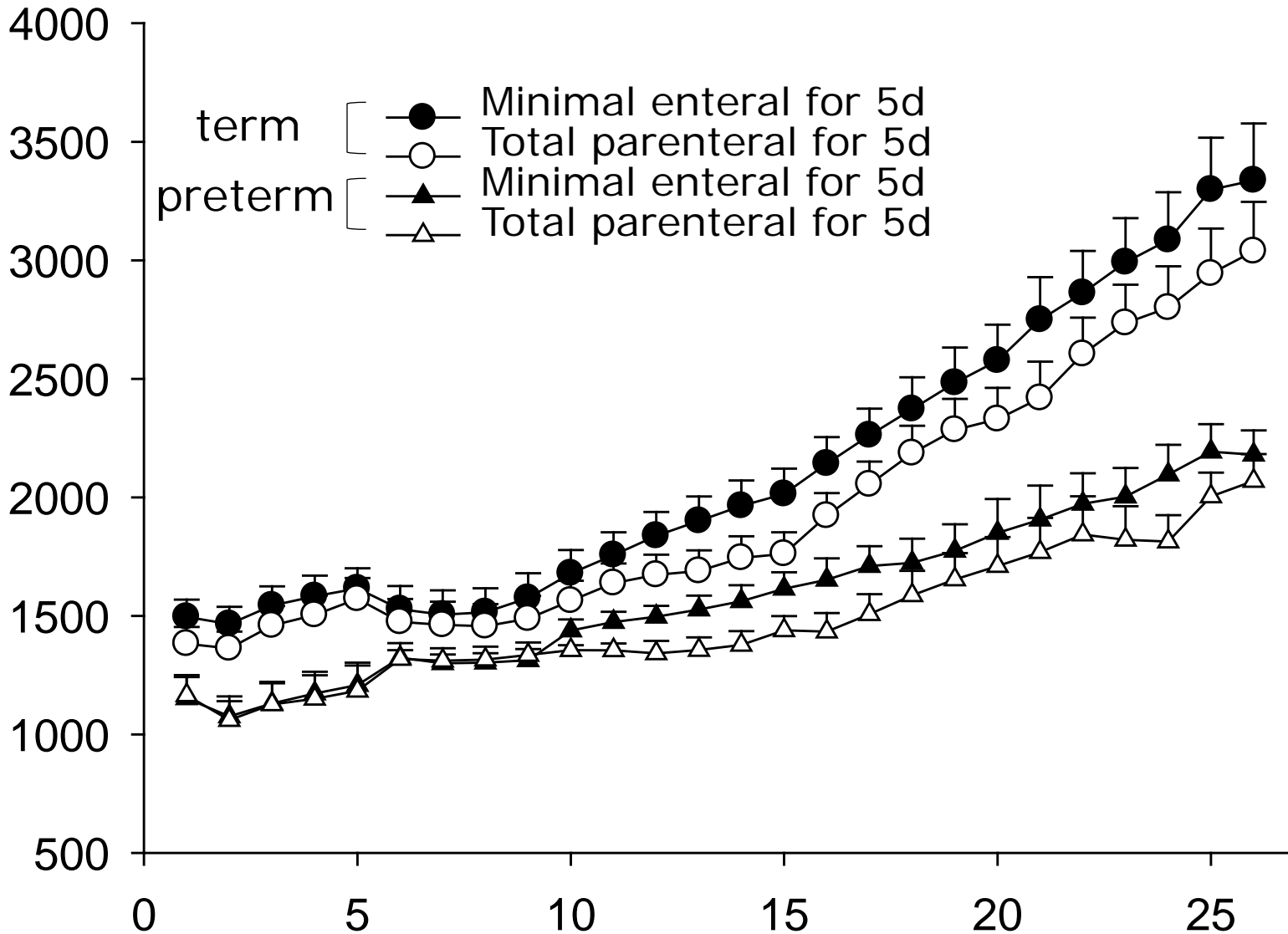


TPN ( $n=6-14$ )
  Infant Formula (IF,  $n=8-15$ )
  Bovine Colostrum (BC,  $n=7-13$ )



# First nutrition after term and preterm birth - What are the long term consequences ?

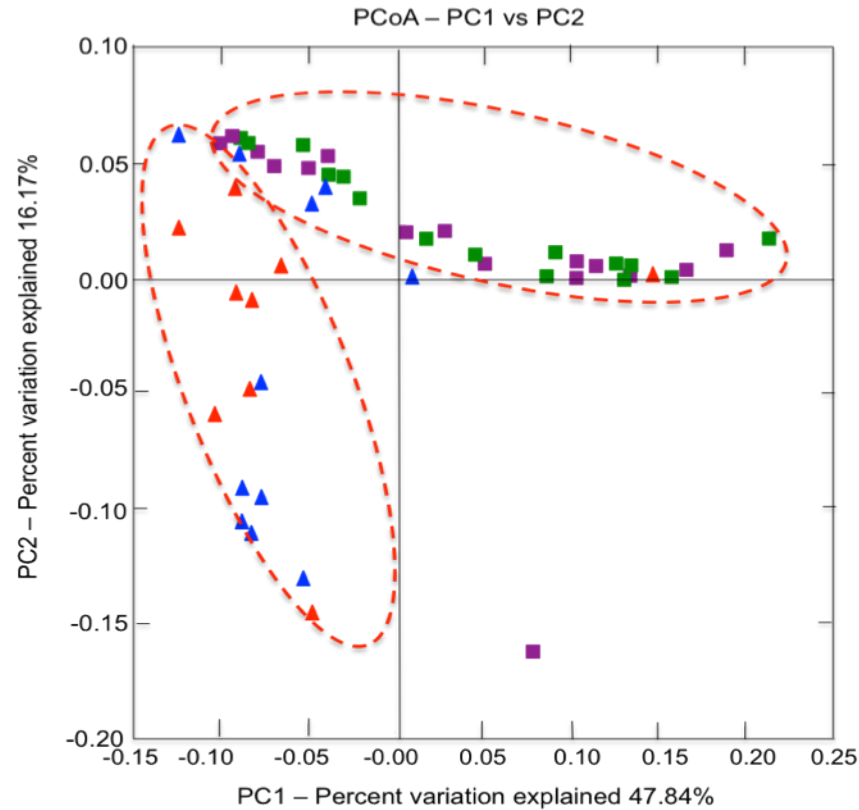
Body weight (g)



Days of life

# PCoA on day 26

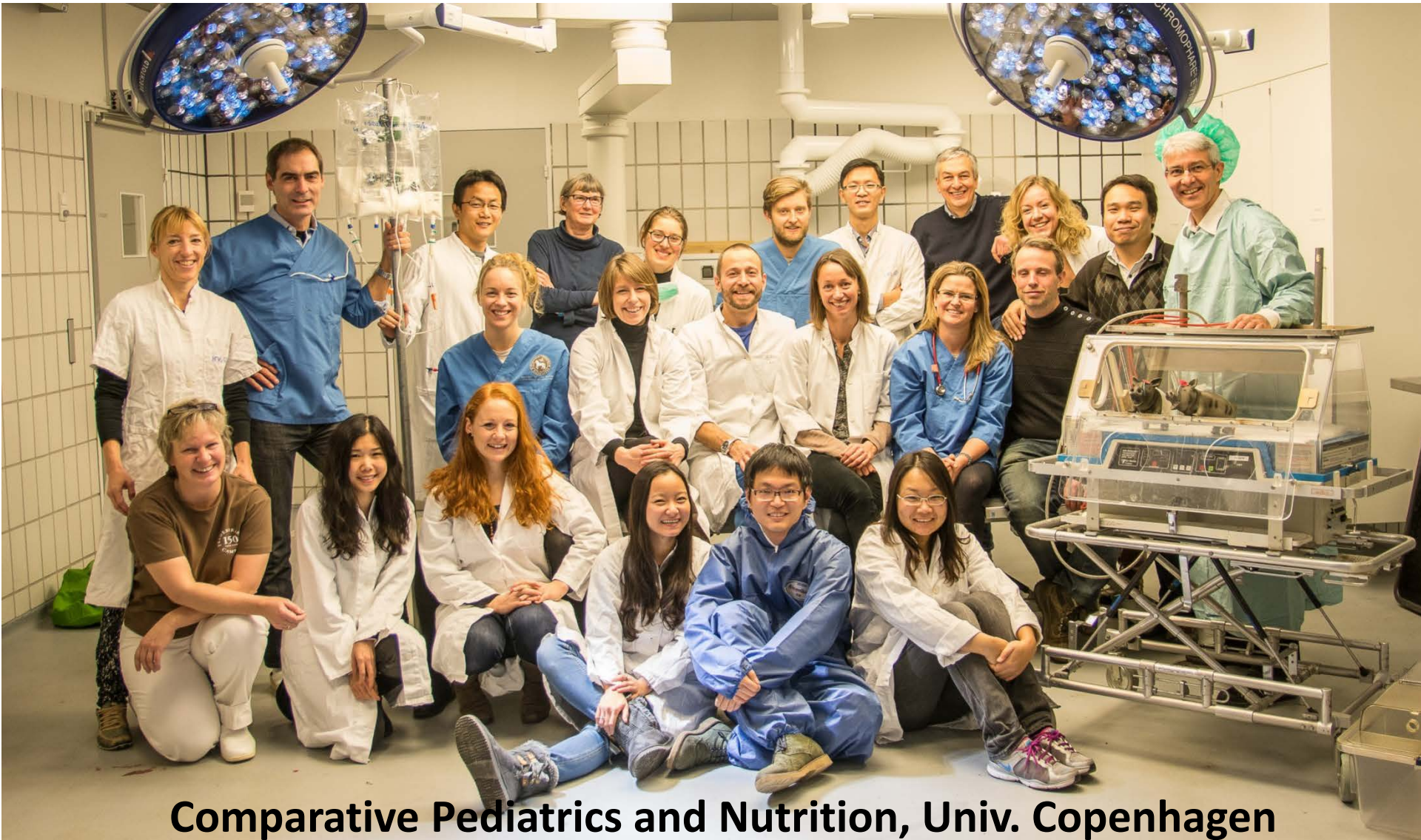
(C)



■ Preterm MEN   ■ Preterm TPN   ▲ Term MEN   ▲ Term TPN



# Milk and Microbiota Effects on Immunity, Gut, Liver and Brain in Preterm Infants



**Comparative Pediatrics and Nutrition, Univ. Copenhagen**

UNIVERSITY OF COPENHAGEN





