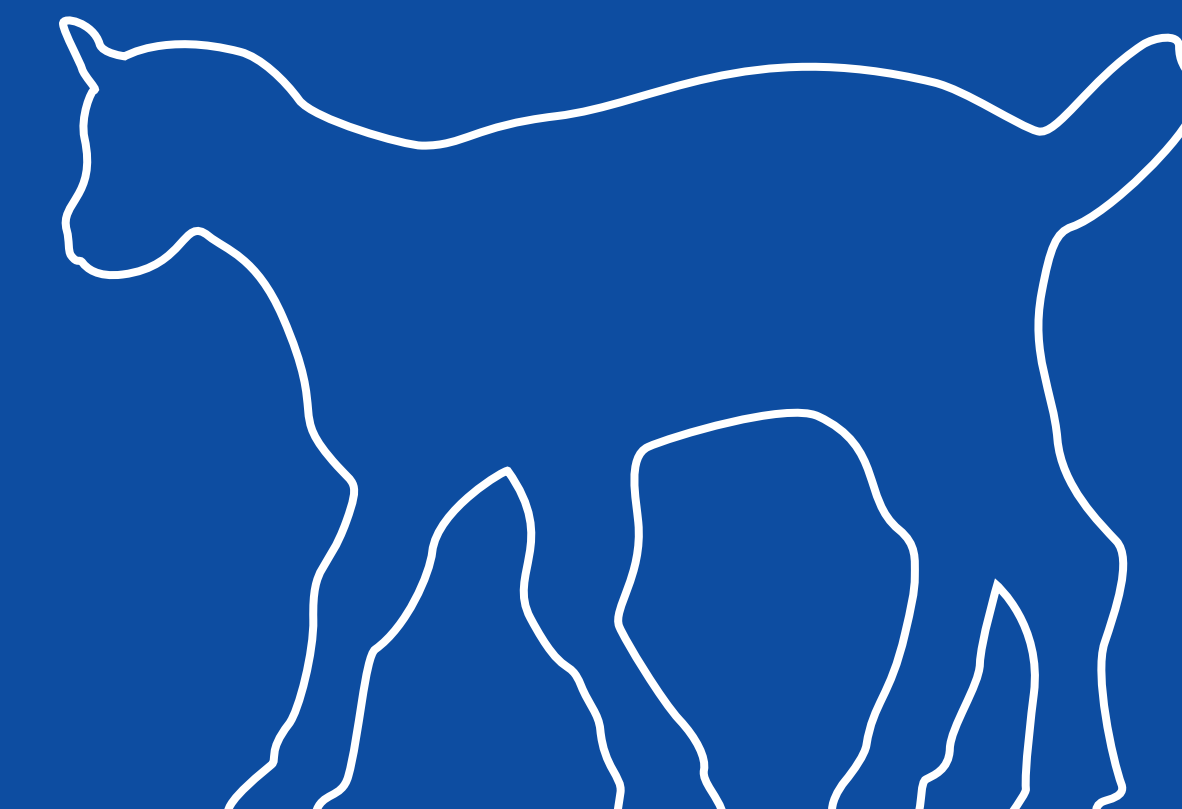


The effect of goat milk oligosaccharides on infant intestinal microbiota composition and activity



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Although breast milk is considered the gold standard for infant nutrition, many infants depend on infant formula for their growth and development. Infant formulas have been based on cow's milk for decades. Currently, also milk derived from other mammals is used, for example goat milk. Goat milk has a 6-10 times higher content of oligosaccharides (*gMOS*), than cow's milk. Over 40 *gMOS* structures are known of which at least 5 are identical to human milk oligosaccharides (*hMOS*) structures (Chatziioannou et al. 2021). 2'-FL, the major *hMOS* is also present in the mixture of *gMOS*. It is known that the complex mixture of *hMOS* supports a healthy gut microbiome in infants. However, little is known about the effects of the mixture of *gMOS* on the microbiota of infants.

Objective: To study the effects of the natural mixture of *gMOS* on infant intestinal microbiota compared to single synthetic oligosaccharides.

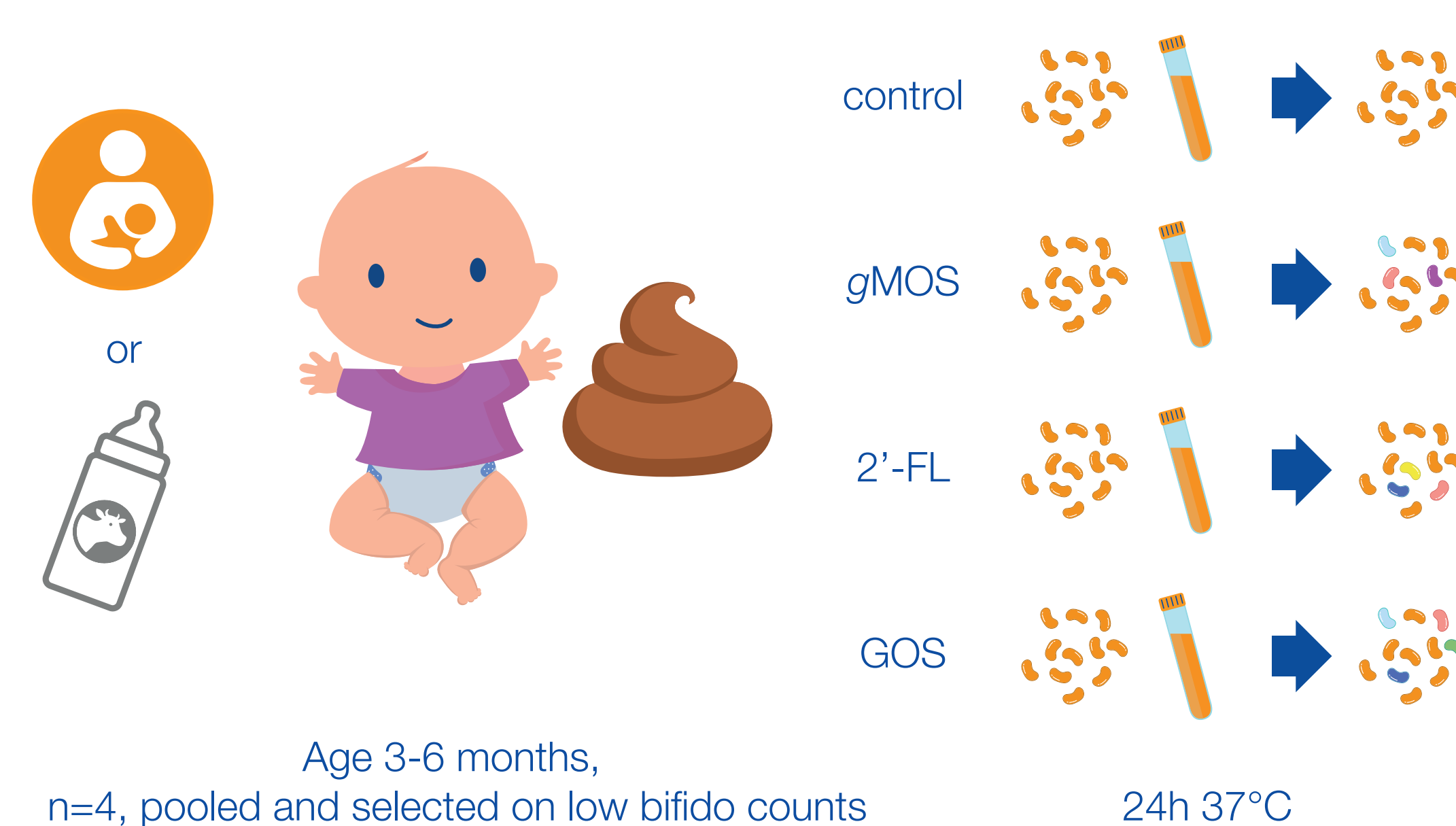


Figure 1. Schematic representation of material and methods (i-screen).

Results

Figure 2. Composition of pooled fecal microbiota of breastfed infants and formula fed infants after 24 hours at 37°C.

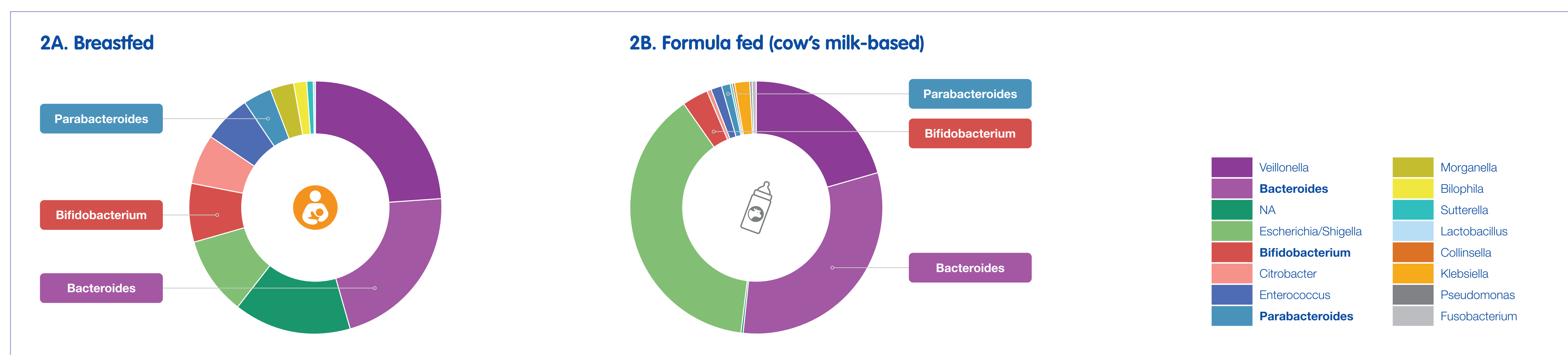


Table 1. Overview of three bacterial species after 24h at 37°C in mixed culture (control), with *gMOS*, 2'-FL or GOS in percentage of total bacterial counts.

	Breastfed				Formula fed			
	Control	<i>gMOS</i>	2'-FL	GOS	Control	<i>gMOS</i>	2'-FL	GOS
Bifidobacterium	7.6%				3.2%			
Bacteroides	21.5%				29.9%			
Parabacteroides	3.4%				0.23%			

Proportion of total microbiota (%)

- Strong decrease
- Mild decrease
- No increase - No decrease
- Mild increase
- Moderate increase
- Strong increase

Conclusion & discussion

Our natural mixture of *gMOS* stimulates Parabacteroides and to lesser extent Bacteroides, while 2'-FL and GOS stimulate Bifidobacterium sp. Unlike 2'-FL and GOS, *gMOS* consist of a mixture of complex structures like the mixture of oligosaccharides in human milk and has a high percentage of sialylated oligosaccharides (~80%) (Van Leeuwen et al. 2020). Bacteroides and Parabacteroides are present in healthy breastfed infants microbiota and are known degraders of complex sugars and prefer sialylated *hMOS*. This presence of Bacteroides and Parabacteroides was also observed in infants fed goat milk infant formula (Tannock et al. 2013). These results are in line with a recent consensus paper stating that a complex mixture oligosaccharides does not lead to a similarity with a single synthetic oligosaccharide (Bührer et al. 2022).

Goat milk-based formula may offer promising novel means for directing infant microbiota development in early life.

