

# Sheep milk nutrient bioavailability and digestive comfort: a randomised control trial

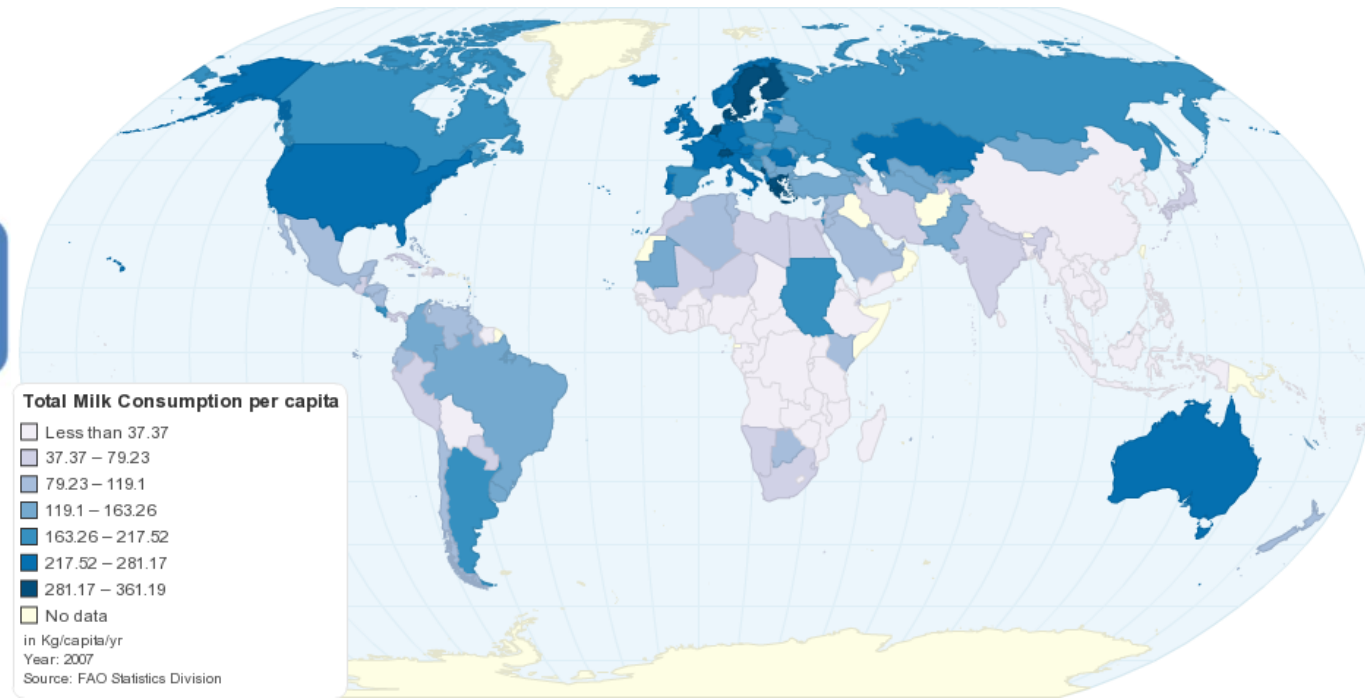
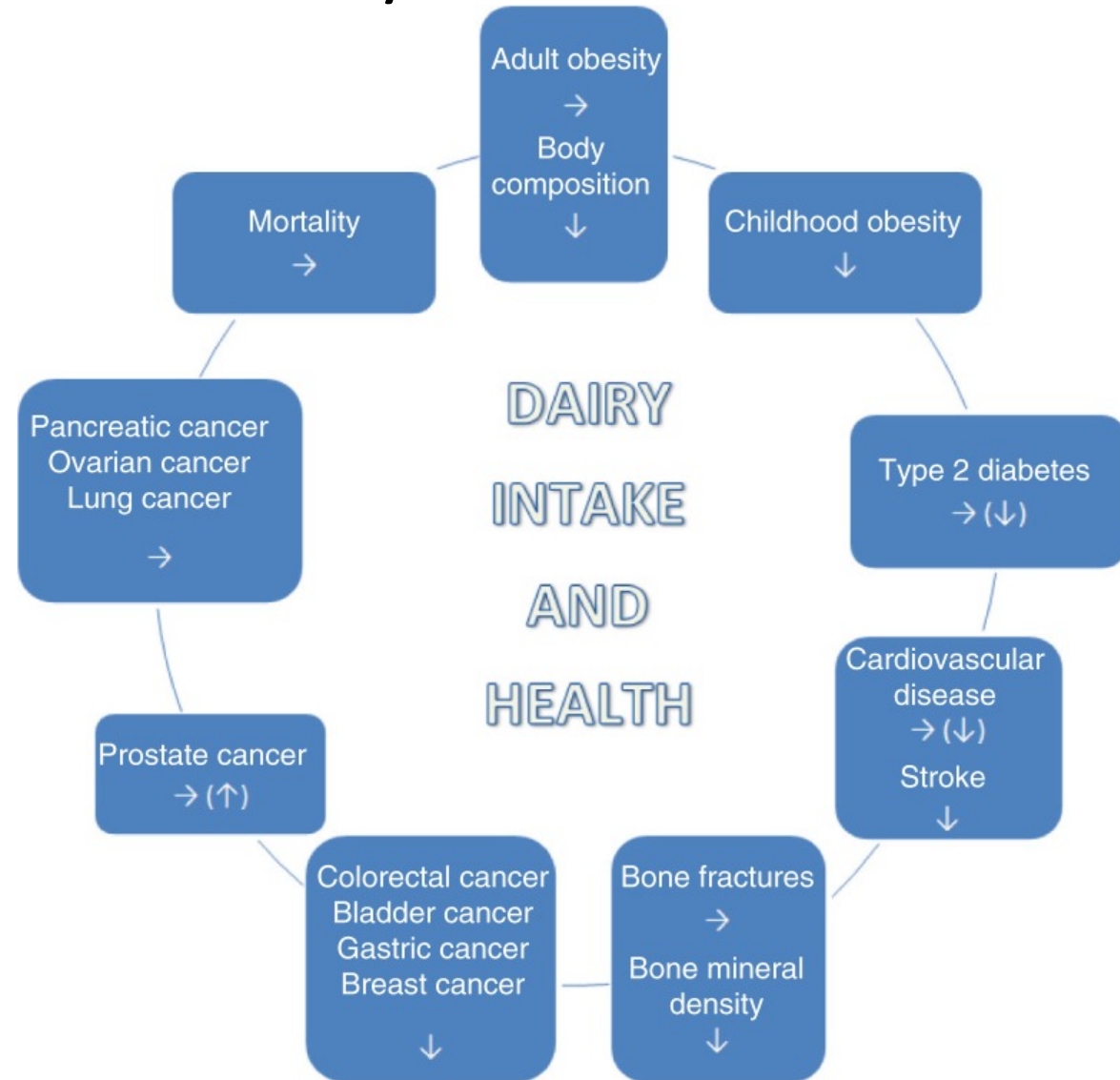
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2019 SheepMilkNZ Conference

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# Dairy in human health



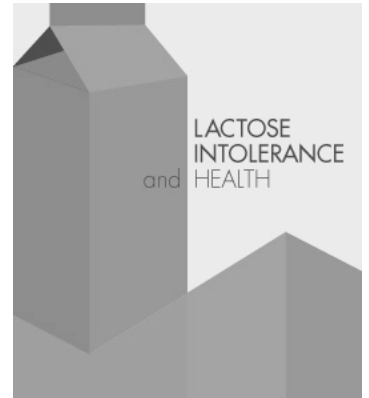
# Dairy avoidance: a dangerous trend?

- Quality of life
- Nutrient deficiency risks
- 1 in 6 Australian women avoid



“Many individuals with real or perceived lactose intolerance avoid dairy and ingest inadequate amounts of calcium and vitamin D, which may predispose them to decreased bone accrual, osteoporosis, and other adverse health outcomes.

In most cases, individuals do not need to eliminate dairy consumption completely.”



# Alternatives just as good?

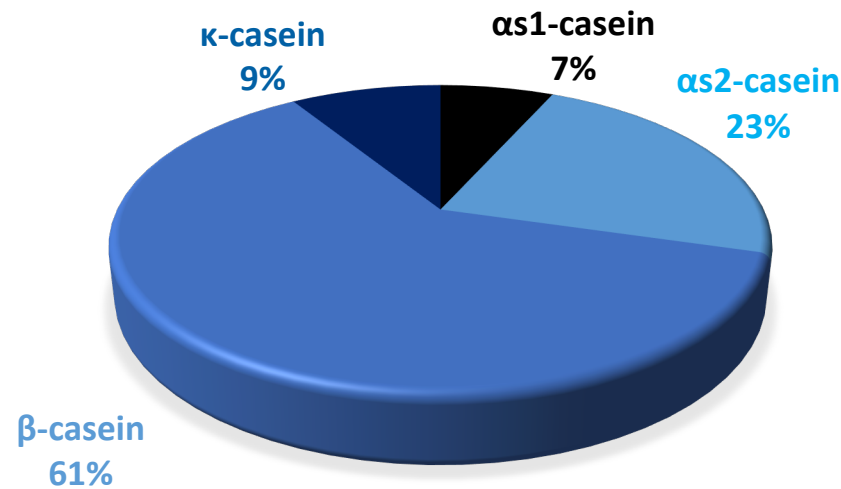
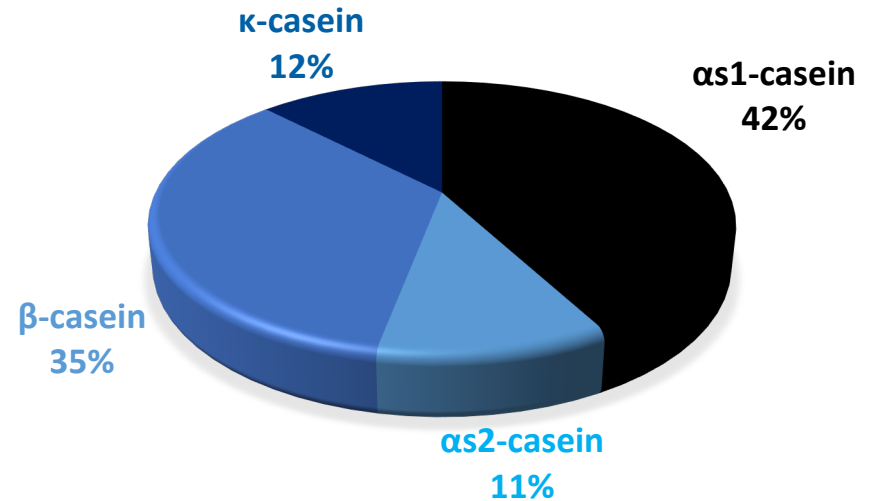
- WHY?
- WHAT?
  - Plant/animal?
- Variability in animal milks?
  - Nutritional profile
  - Digestion?
  - Impact on health and digestive comfort?





# Sheep versus cow

Parameter	Sheep milk	Cow milk
Moisture (g/100 g)	82.9 ± 1.4	87.9 ± 0.5
Fat (g/100 g)	5.9 ± 0.3	3.3 ± 0.2
Ash (g/100 g)	0.9 ± 0.1	0.7 ± 0.0
Lactose (g/100 g)	4.8 ± 0.4	4.7 ± 0.4
Protein (g/100 g)	5.5 ± 1.1	3.4 ± 0.1
Casein (g/100 g)	4.7 ± 0.5	3.0 ± 0.1
$\alpha$ s1-casein (%) <sup>b</sup>	6.7	39.7
$\alpha$ s2-casein (%) <sup>b</sup>	22.8	10.3
$\beta$ -Casein (%) <sup>b</sup>	61.6	32.7
$\kappa$ -Casein (%) <sup>b</sup>	8.9	11.6



# Aims

- To investigate the digestion and nutrient absorption characteristics of the sheep milk compared to cow milk.
  - Sheep milk will deliver essential protein more efficiently than cow milk.
  - The metabolic response (fat, glucose) will be different between sheep and cow milk.
  - Sheep milk will be more easy to digest (less discomfort and malabsorption) than cow milk.

# Study Design

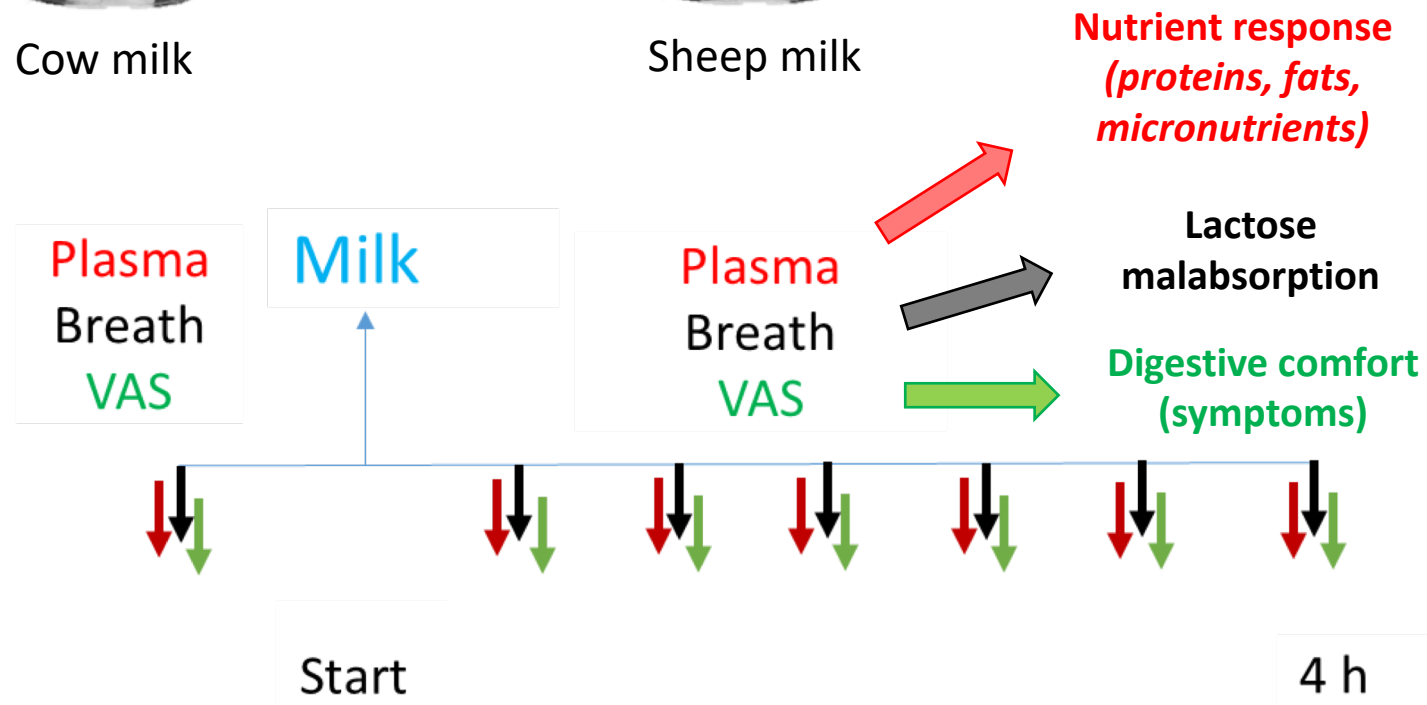


Cow milk

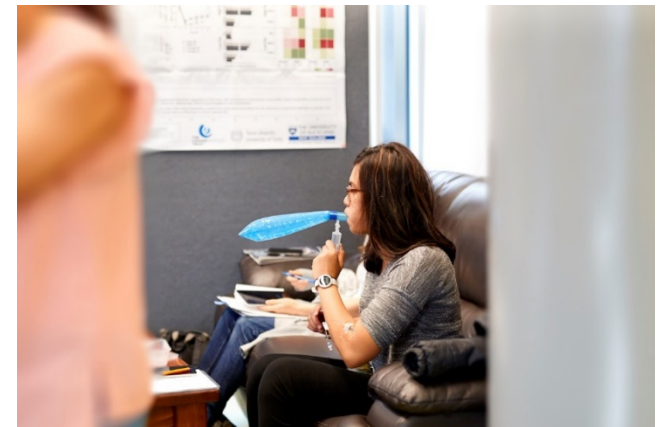
Dose: 650 ml  
20 & 35 g protein  
21 & 38 g fat



Sheep milk



Female 'dairy avoiders' (n=30)  
Cross-over design



# Study Design



Cow milk



Sheep milk

Dose: 650 ml  
20 & 35 g protein  
21 & 38 g fat

Plasma  
Breath  
VAS

Milk

Plasma  
Breath  
VAS

Nutrient response  
(proteins, fats,  
micronutrients)

Lactose  
malabsorption

Digestive comfort  
(symptoms)



Start

4 h



Chromatographic and  
mass spectrometry  
techniques

Amino acids  
Fatty acids  
Lipidomic species  
Vitamins/minerals

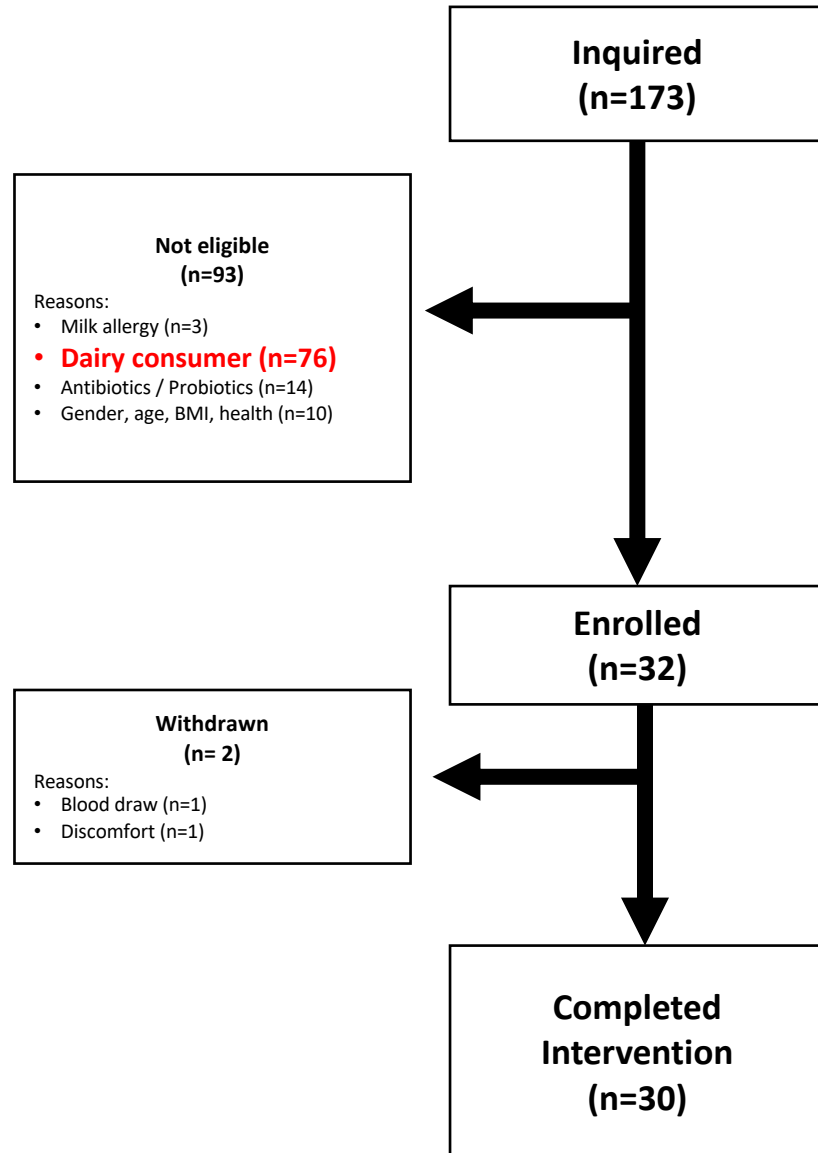


Hydrogen  
(marker bacterial  
fermentation)



Pain  
Distention  
Faecal urgency  
Nausea  
Belching  
Reflux  
Cramping  
Rumbling  
Bloating  
Flatulence

# Who avoids dairy: the participants



## “Dairy avoiders”:

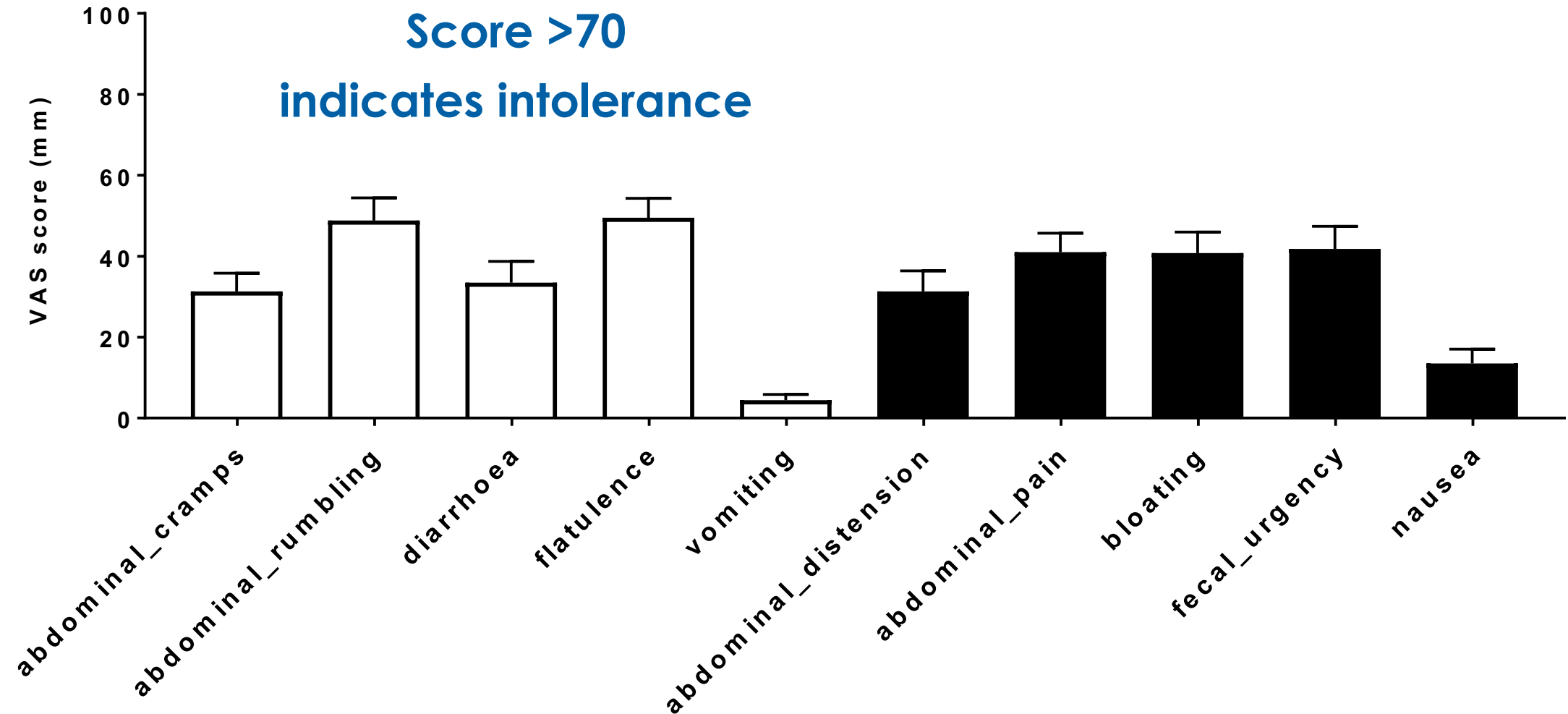
- Self-described avoidance of dairy
- With or without dairy symptoms
- Female
- 20 - 40 years
- BMI 18 - 28 kg/m<sup>2</sup>

## Assessed:

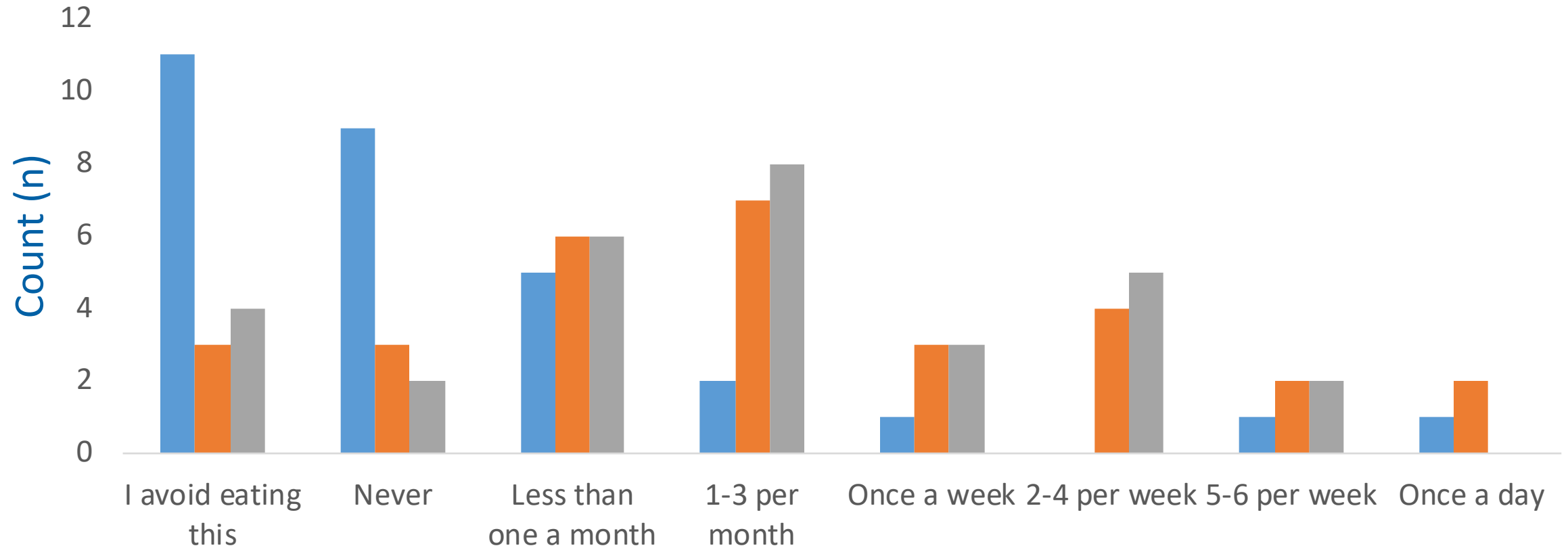
- Dairy consumption patterns
- Perceived dairy symptoms



# Perceived symptoms with milk



# How often do you consume...?



Frequency (low → high)

■ milk drink



■ yogurt

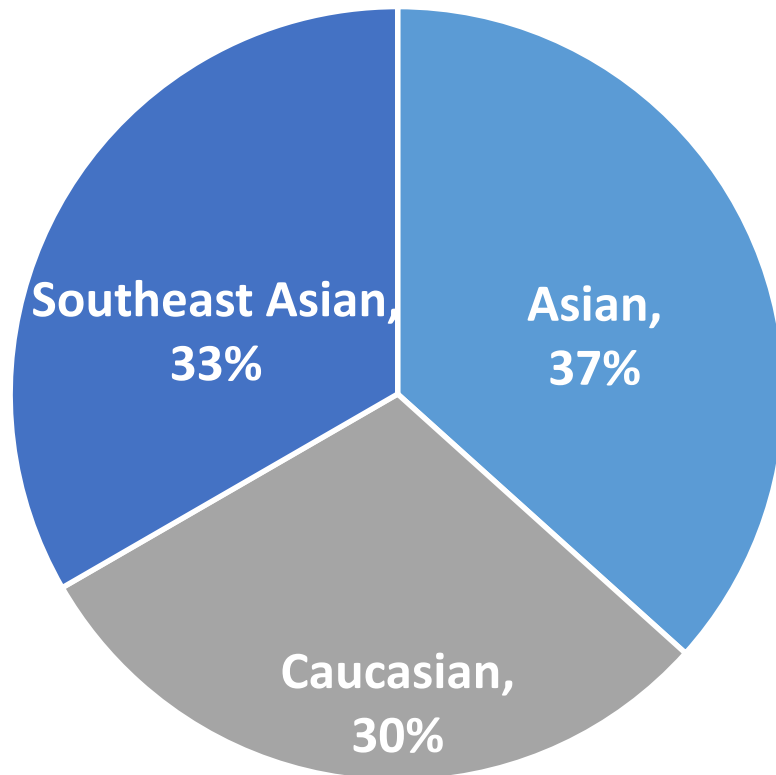


■ standard cheese

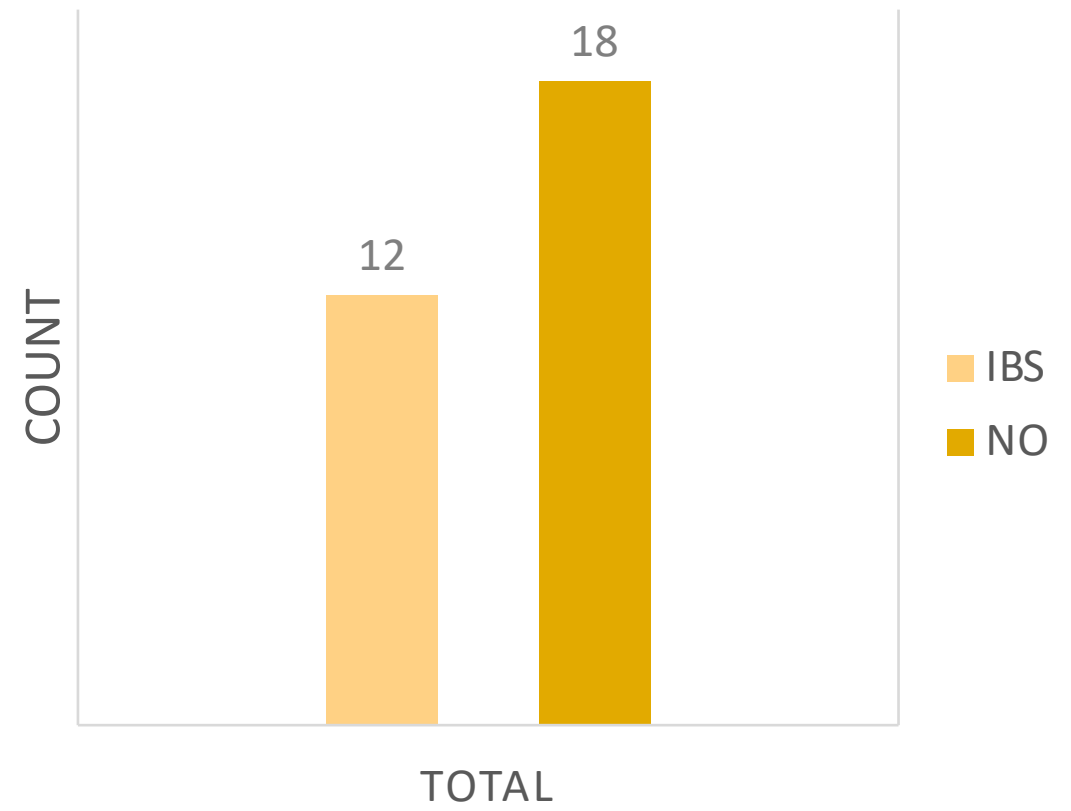


# Demographics

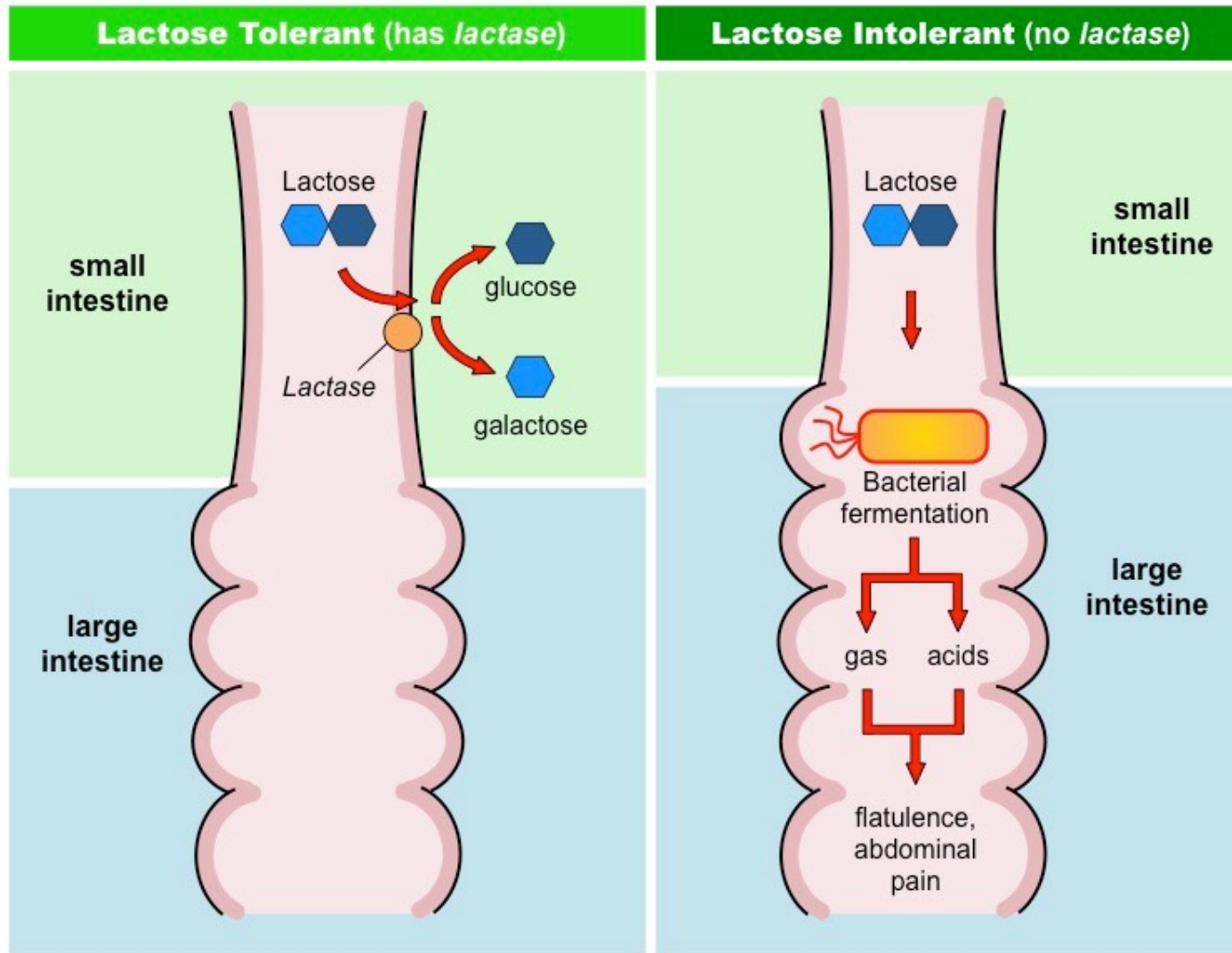
ETHNICITY



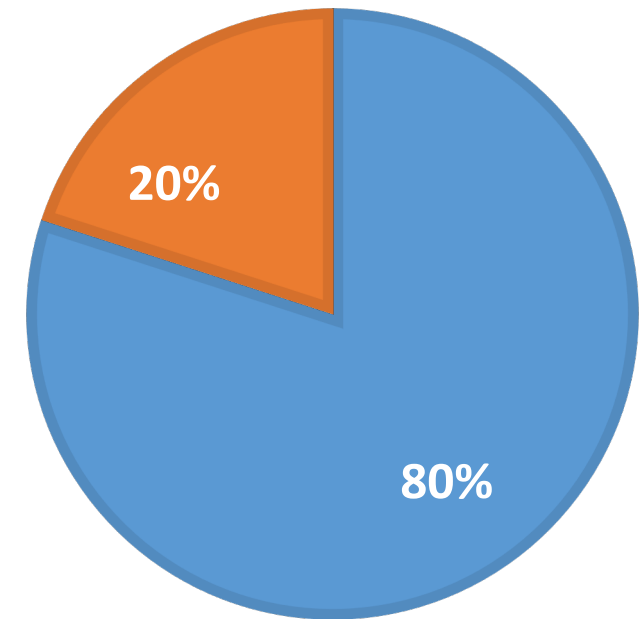
IRRITABLE BOWEL SYNDROME



# Lactose malabsorption?



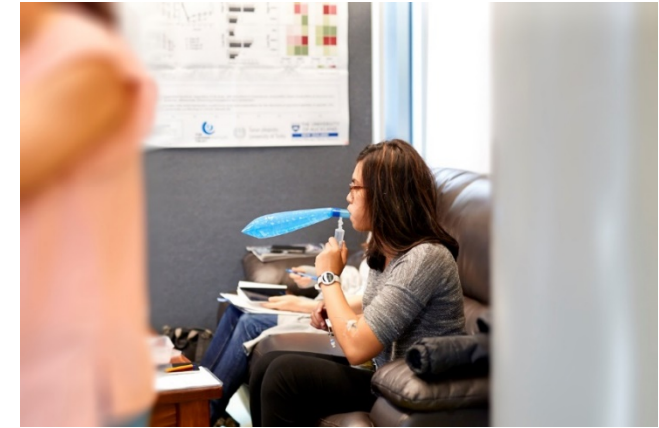
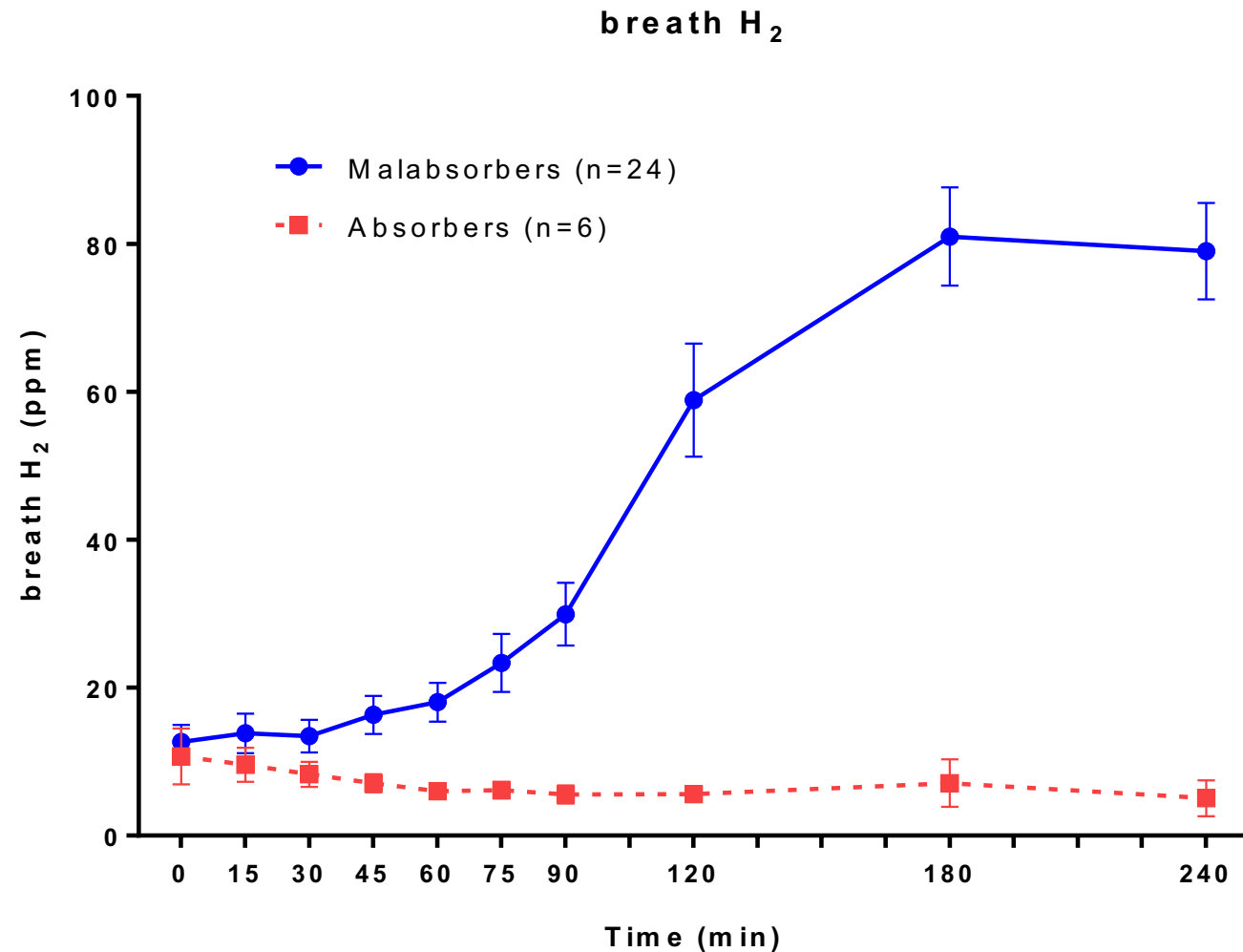
BREATH HYDROGEN



■ Malabsorber (>20ppm)

■ Absorber (<20ppm)

# Breath Hydrogen – lactose malabsorption

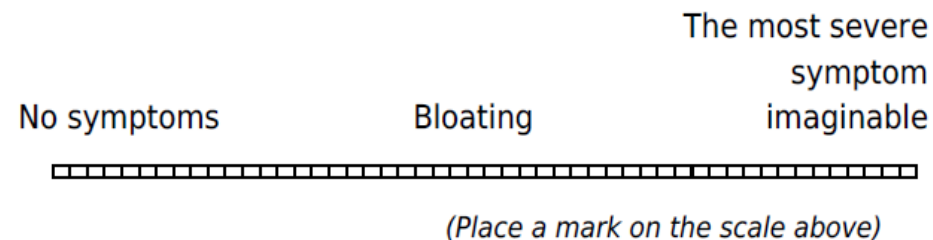
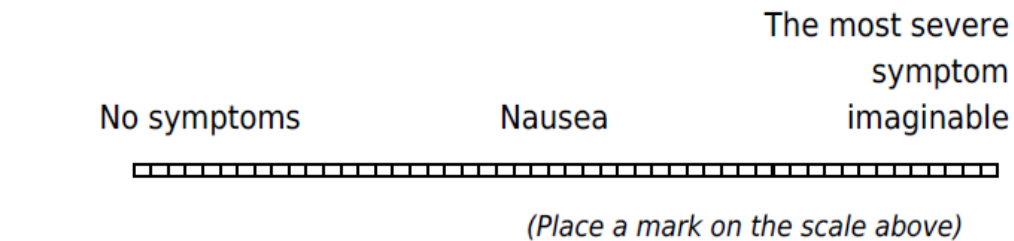
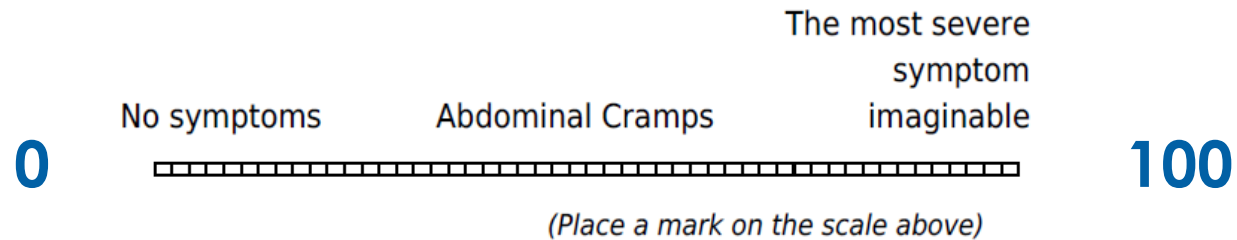




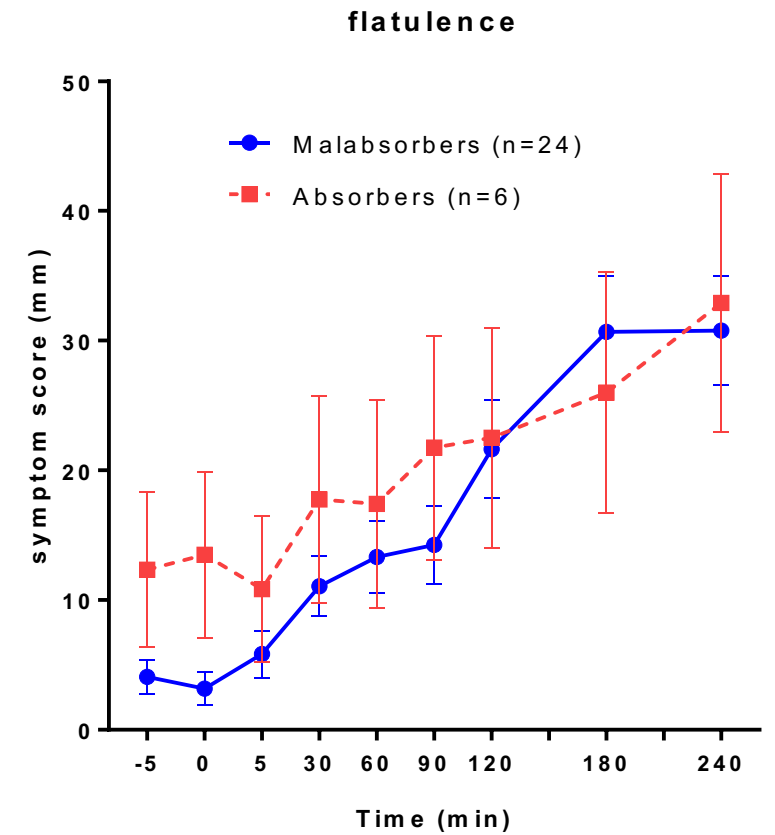
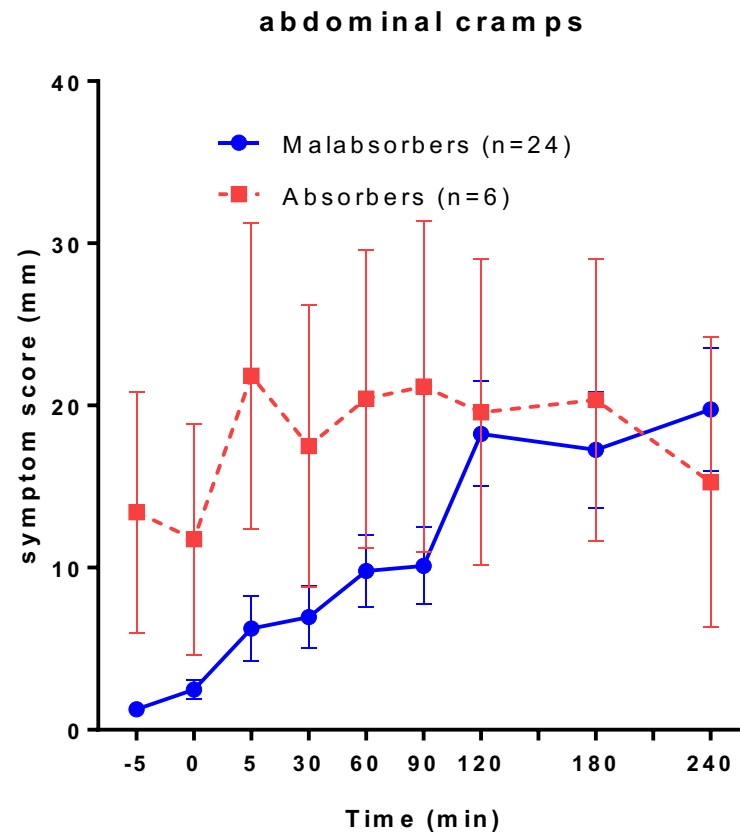
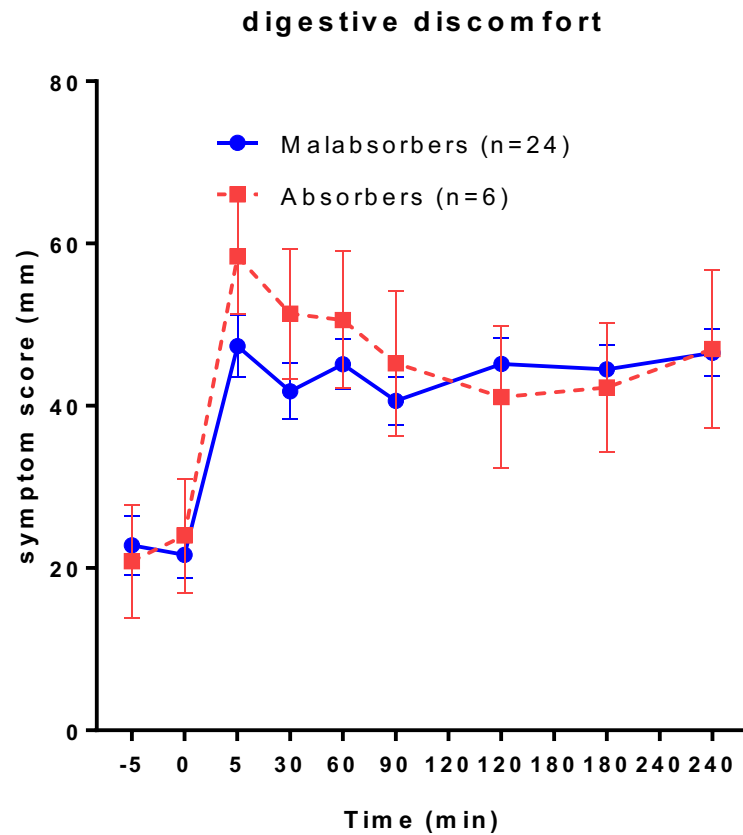
# How do you feel?

For each scale, click bar above and then drag to set response which applies to you at this moment.

Please describe the degree to which you feel the following symptoms.



# Symptoms – variation among subjects



## Watch this space...

- Awaiting protein and lipid data
  - Breakdown and metabolism of sheep vs. cow
- Response differences: sheep vs. cow
  - Comparisons of malabsorption & symptoms
- Understanding whether those who avoid (or are intolerant to) milk have measureable differences in sheep milk digestibility

# Acknowledgments



## Clinical Research Team & Support

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## Thank you Participants!

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## Institutional Affiliations



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