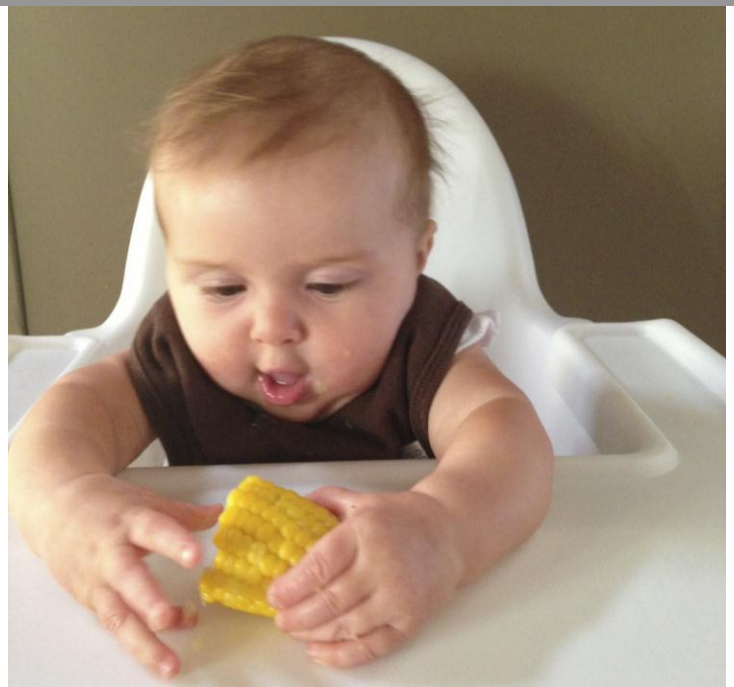
UNIVERSITY OF OTAGO
DEPARTMENTS OF HUMAN NUTRITION and MEDICINE

Over-fed and under-nourished – could a novel, baby-led, approach to infant feeding be protective?

Anne-Louise Heath, Cameron S, Daniels L, Williams S, Taylor B, Wheeler B, Taylor R



Outline

- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

Outline

- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

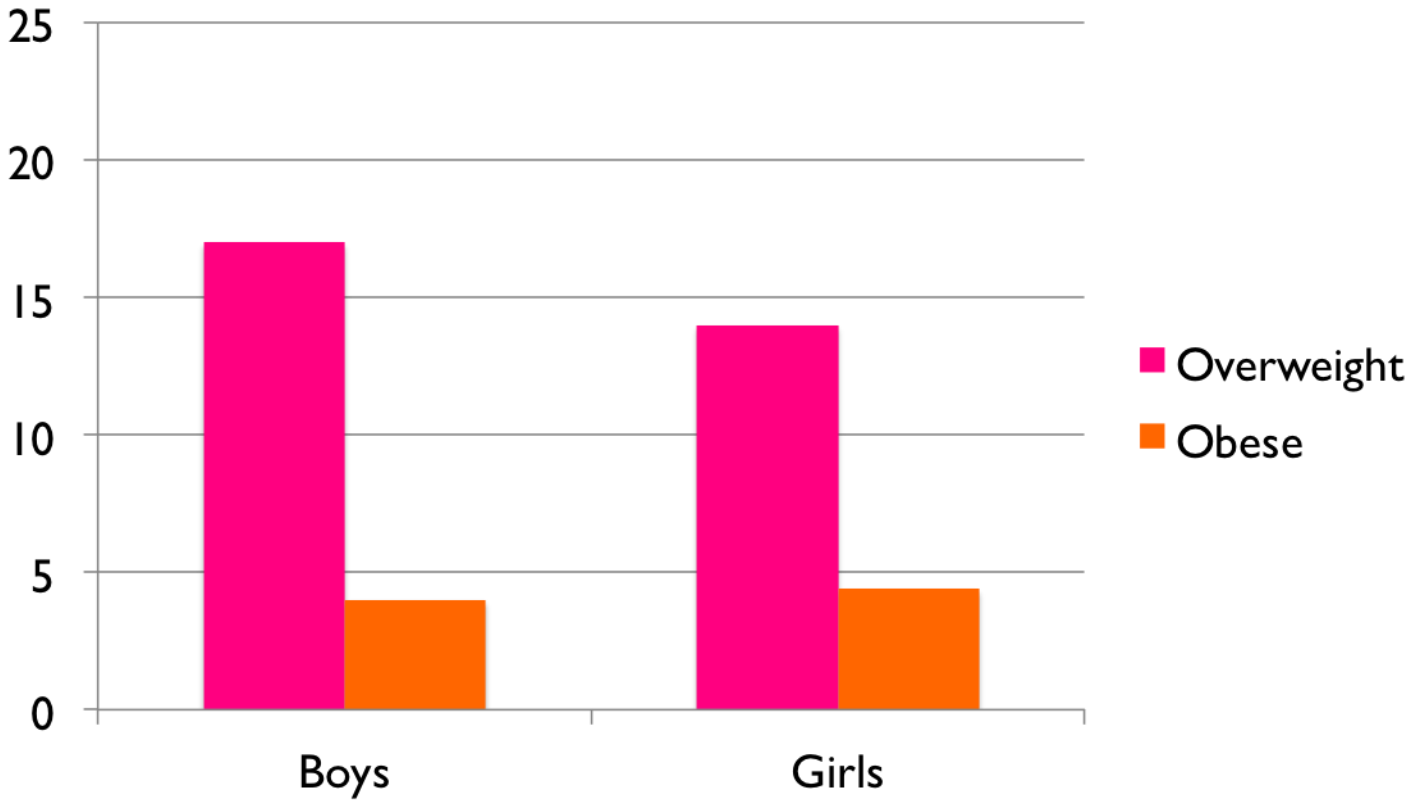
The first 1,000 days

- **Conception to 2 years of age**
- **3.5kg at birth → 12kg on second birthday**
- **Brain ~25% formed at birth → most of remaining 75% formed by 2 years of age**
- **Developmental score at 22 months an accurate predictor of educational outcome at 26 years**

Outline

- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

By 2-3 years of age 1 in 5 are already overweight or obese



(2007 National Children's Nutrition and Physical Activity Survey)

Weight gain 0-2 years a risk factor for later obesity

Cohort		OR [95% CI]	% Weight
Weight gain (0 to 2) and Childhood Obesity			
HAGUENAU (6 years)		2.05 [1.10, 3.82]	18.54
ALSPAC (7 years)		2.84 [1.79, 4.51]	33.78
NSHD (7 years)		2.37 [1.61, 3.50]	47.68
Subtotal (I-squared = 0.0%, *P* = 0.691)		2.46 [1.88, 3.21]	100.00

OR for obesity per 1 z-score increase in infancy weight gain

- Individual level meta-analysis using 10 large cohort studies (n > 47,000)

(Druet et al., 2012)

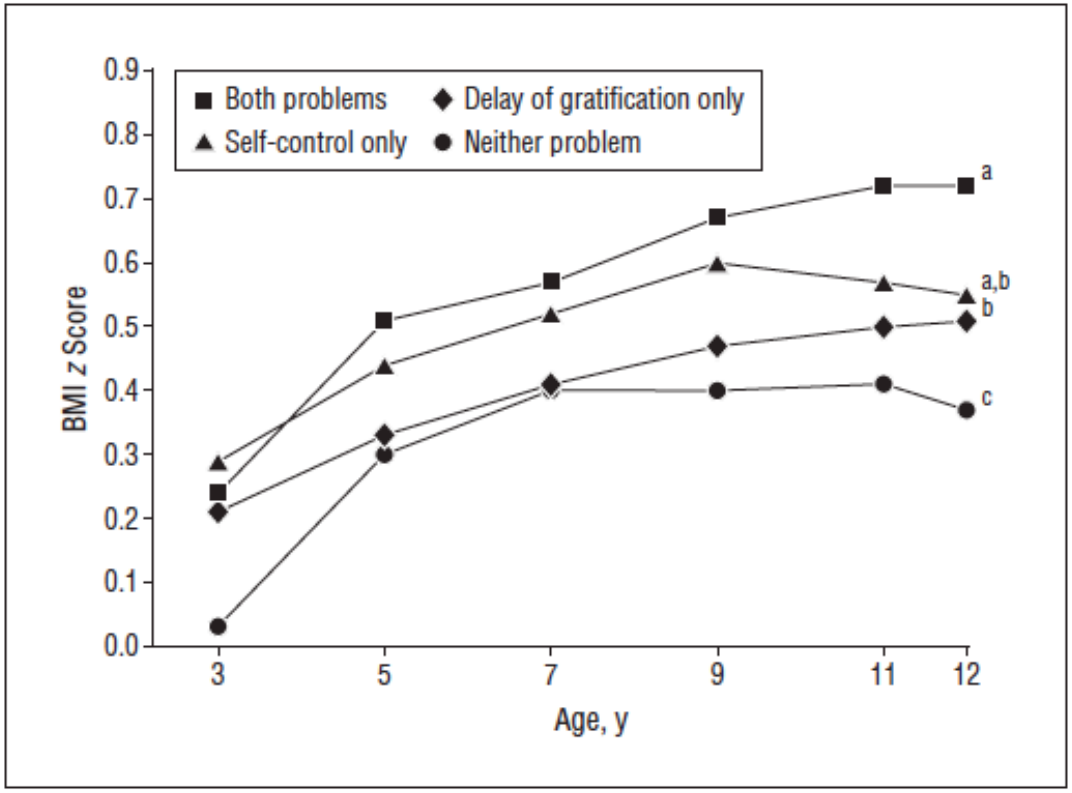
Infants, but not toddlers, eat smaller portions when energy density is high

	Predictors of portion size		
	4-5 months	6-11 months	12-24 months
Number of eating occasions	-0.13*	-0.07*	-0.04*
Number of unique foods	0.0	0.02*	-0.01
Energy density	-0.41*	-0.26*	0.16

* P<0.05

(Feeding Infants and Toddlers Study: Fox et al., 2006)

Poor self-regulation in children is associated with higher BMI



(Francis & Susman, 2009)

Many toddlers are iron or zinc deficient

	12-24 month olds
Iron deficiency	10%
Iron deficiency anaemia	3%
Zinc deficiency	32%

(Zhou et al., 2012)

Many toddlers are iron or zinc deficient

	12-24 month olds
Iron deficiency	10%
Iron deficiency anaemia	3%
Zinc deficiency	32%

	12-24 month olds
Inadequate iron intake	16%
Inadequate zinc intake	3%

(Zhou et al., 2012)

Consequences of iron deficiency

Iron deficiency anaemia is associated with:

- **Poorer cognitive, motor, socio-emotional development**
- **These effects may not be reversible**
- ***May increase morbidity (fever, respiratory infections, diarrhoea)***

(Black, 2012)

Consequences of iron deficiency

Iron deficiency anaemia is associated with:

- **Poorer cognitive, motor, socio-emotional development**
- **These effects may not be reversible**
- ***May increase morbidity (fever, respiratory infections, diarrhoea)***

Non-anaemic iron deficiency may be assoc with:

- **Subtle -ve effects on cognitive function, fatigue**
- **Increased risk of iron deficiency anaemia**

Consequences of zinc deficiency

Zinc deficiency in Australian preschool children has been associated with:

- **Symptoms of respiratory disease**
- **Sore throat**
- **Shorter height-for age**

Other studies have suggested:

- **Poorer cognition**
- **Recurrent infections**

(Saha et al., 1999; Gibson & Heath, 2011)

Outline

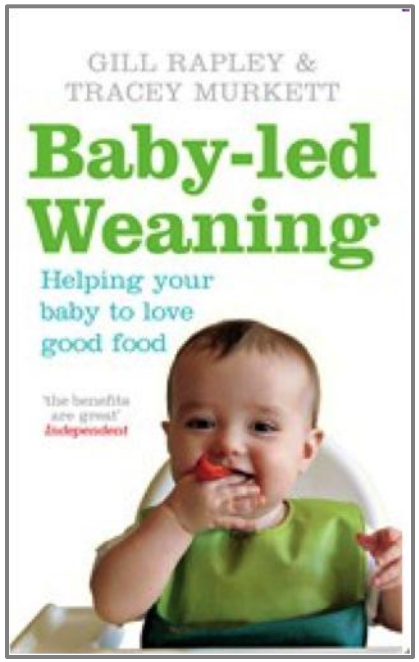
- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

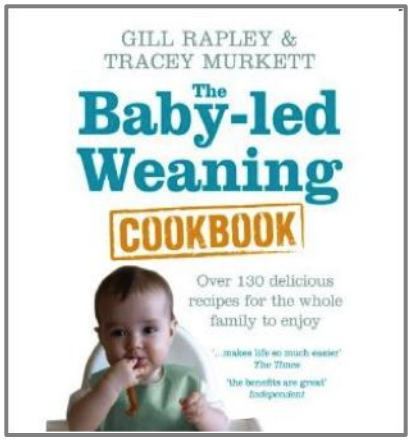
What is Baby-Led Weaning?

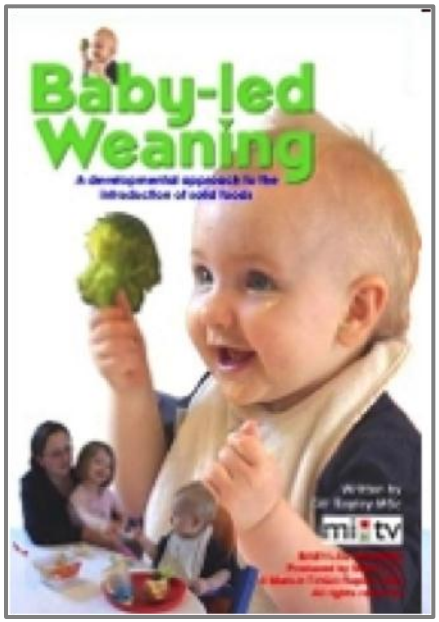
- **Infant self feeds**
- **Stick shaped pieces of food**
- **No spoon feeding**
- **Eating together**
- **Start at 6 months**

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo

Origins







www.baby-led.com

Baby-Led Weaning in action!

http://www.youtube.com/watch?v=ews5ceknSZ4

Possible benefits?

- ↓ Obesity
- ↑ Dietary diversity – texture & flavour
- ↓ Neophobia
- Family meals
- “Makes sense”
- Healthier food

Some health professionals have concerns

BMJ Open

Cameron S et al. (2012) *BMJ Open* doi 10.1136/bmjopen-2012-001542

- **n=31 health professionals**
- **Interviews with semi-structured interview schedule**

- **Identified a number of possible benefits**
- **Specific concerns:**
  - **Choking**
  - **Inadequate energy intake**
  - **Iron deficiency**
- **As a result reluctant to recommend**

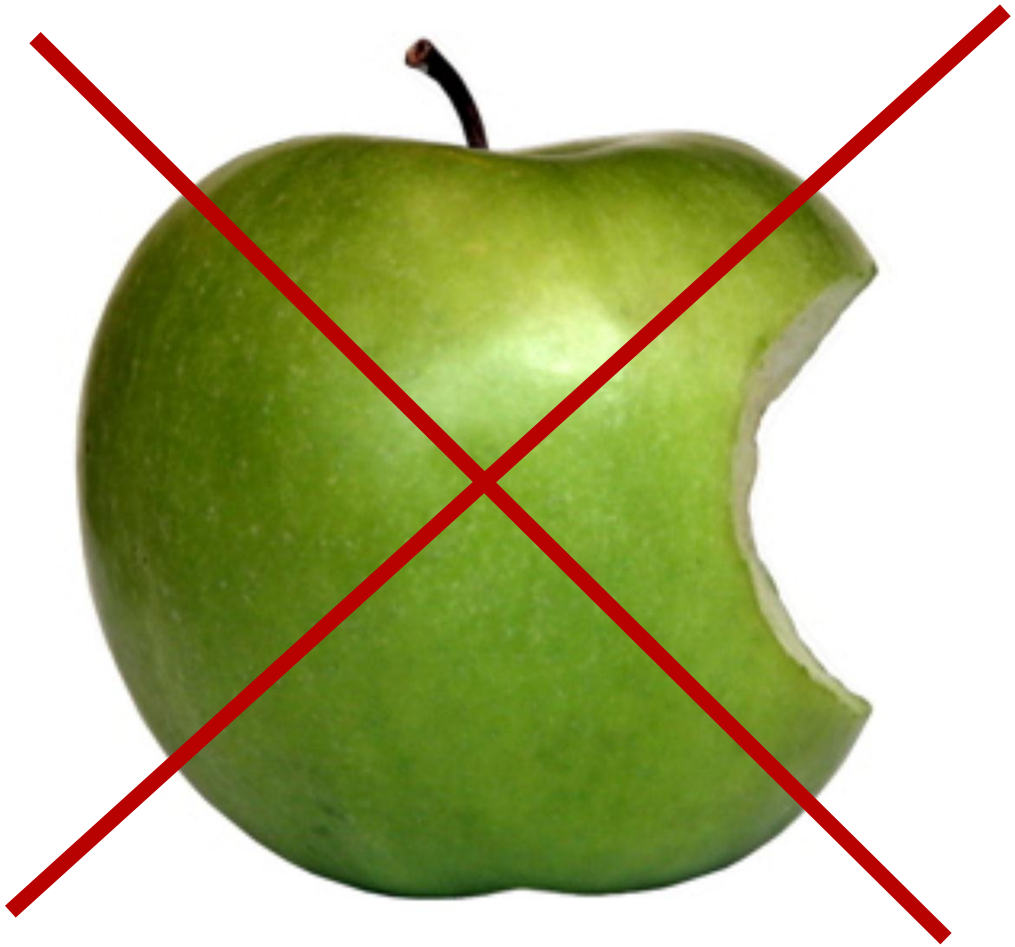
Mothers who have followed BLW much more positive

BMJ Open

Cameron S et al. (2012) *BMJ Open* doi 10.1136/bmjopen-2012-001542

- **n=20 mothers who had followed BLW**
- **Interviews with semi-structured interview schedule**

- **No major concerns**
- **Considered BLW to be:**
  - **Healthier**
  - **More convenient**
  - **Less stressful**
- **BUT … 30% reported "choking"**



(Cameron et al., *BMJ Open* 2012)

BLW is associated with greater satiety responsiveness

pediatricobesity

Brown A & Lee MD (2013) *Pediatric Obesity* doi 10.1111/j.2047-6310.2013.00207.x

- **n=298 mothers of an 18-24 month old (54.7% BLW)**
- **Questionnaire**

- **BLW significantly less food-responsive**
- **BLW significantly more satiety-responsive**
- **Overweight - BLW 8.1% vs SW 19.2%**
- **BUT:**
  - **Outcomes self-reported**
  - **Observational**

Outline

- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

Baby-Led Introduction to SolidS

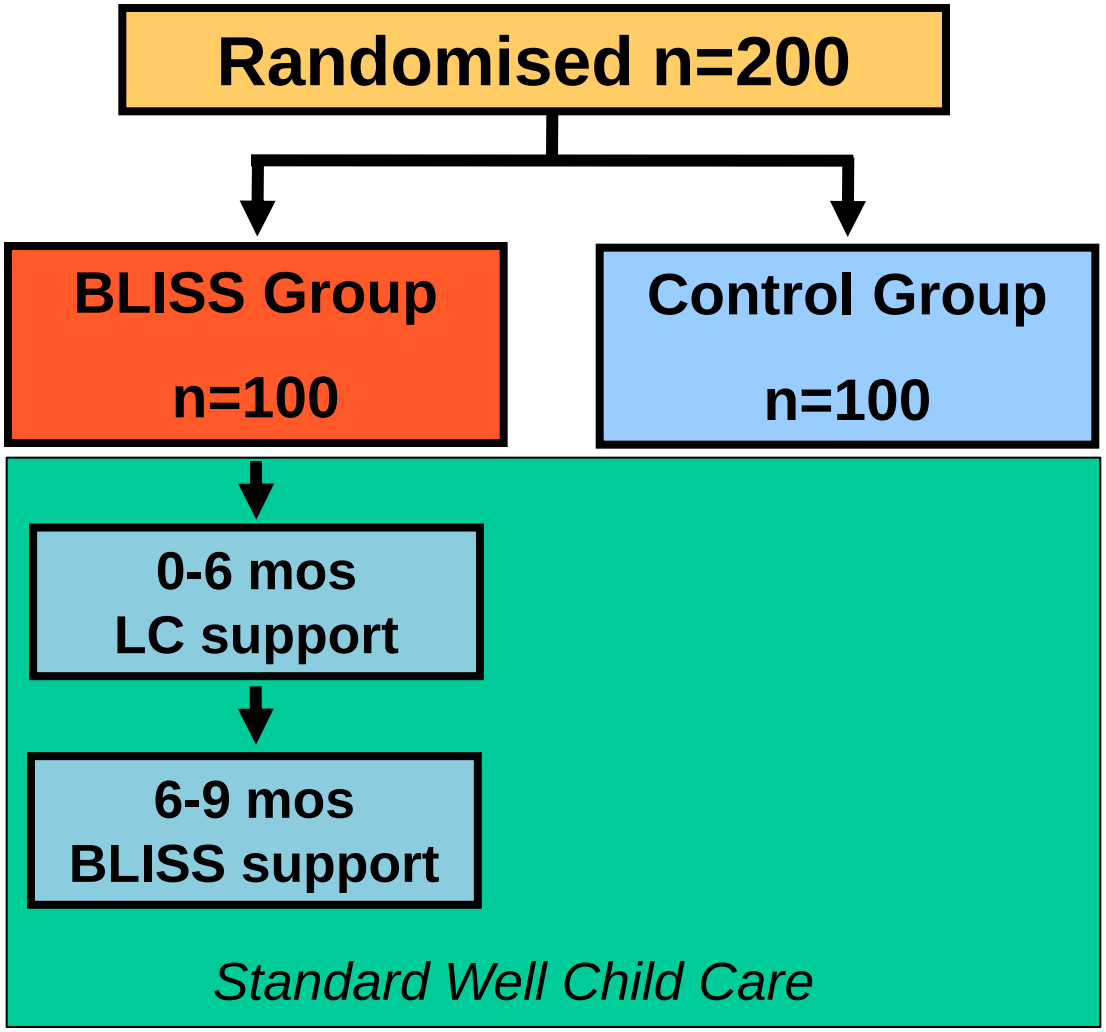
Baby-Led Weaning modified to address:

- **Choking**
- **Iron deficiency**
- **Growth faltering**

BLISS Study

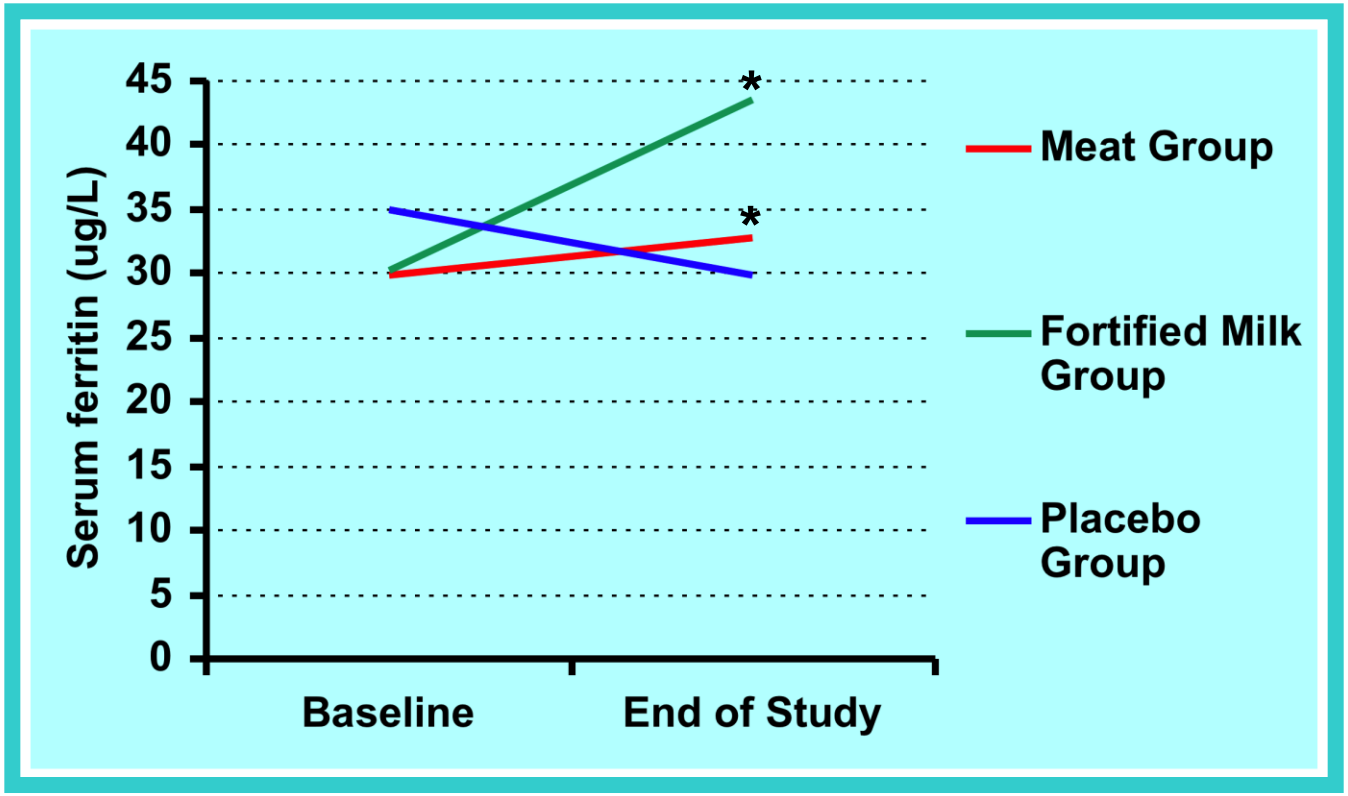
A randomised controlled trial with 200 infants to determine whether a novel approach to complementary feeding using foods that an infant can feed themselves – "BLISS" – can prevent the development of overweight in infants and toddlers without detrimental effects on their iron status or growth.

Randomised controlled trial



- 2-12mos feeding events
- 6-9mos BMI
- 7 & 12mos 3d Diet Record
- 12mos BMI
- 12mos Iron and Zinc status

Red meat improves iron status in toddlers



Adjusted for age, sex, age x sex, infection, education, income, ethnicity
* Significant change compared to Placebo Group $P<0.05$

(Szymlek-Gay et al., 2009)

Study outcomes

When completed, the BLISS study will tell us:

- **Does a baby-led approach prevent obesity in young children?**
- **Can it improve iron and zinc status?**
- **Is it safe?**
- **Should all parents be doing it?**

Outline

- **“First 1,000 days”**
- **Over-fed & under-nourished?**
- **Baby-Led Weaning a solution?**
- **Baby-Led Introduction to SolidS**
- **Some take-home messages**

Take home messages

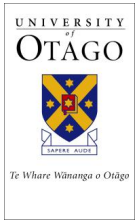
- **Lots of interest in BLW**
- **Very little research**
- **Possible benefits: ↓ obesity, ↑ dietary diversity, ↓ neophobia**
- **Possible risks: iron deficiency, growth faltering, choking**
- **Randomised controlled trial data urgently needed to determine whether BLISS can address over-feeding and under-nutrition of our young children**

Acknowledgements

Liz Fleming
Jen McArthur
Rhondda Davies
Victoria Wood
Maha Hanna

Britt Morison
Liz Williams
Louise Bee
Sabina Bacchus
Ashley Luciano

The participants and their families


UNIVERSITY
of
OTAGO
SAPERE AUDE
Te Whare Wānanga o Otāgo