THE ROLE OF APPETITE IN EXTENDED FORMULA- FEEDING: QUALITATIVE AND QUANTITATIVE
Transition from primarily milk-based diet to family food should occur by 12 months of age

‘Infant formula, follow-on formula or growing-up milks are not needed’ (WHO, 2005; Dept of Health, 2008)

DNSIYC: 39% 12-18 month olds (Lennox et al., 2011)

Lack of evidence for beneficial effects
Background

Parental feeding behaviours responsive to child characteristics. (Hendricks et al., 2006)

Could formula be compensating for perceived insufficient nutrition?
Aims

- Test the hypothesis that appetite would be poorer, and food intake lower, among children consuming formula at 21 months of age.

- Explore associations between extended formula feeding at 21 months of age and concurrent weight and weight gain up to age 5.
Method

Design
Mixed – methods

Sample
The Gemini Twin cohort
(n=2402 twin pairs, 4804 children)

1897 children
35 mothers
Method

Measures

- Child Eating Behaviour Questionnaire (Wardle et al., 2001) - 16m

- ‘Food approach’
  - Food responsiveness: “My child is always asking for food”
  - Enjoyment of food: “My child enjoys eating”

- ‘Food avoidance’
  - Satiety responsiveness: “My child gets full up easily”
  - Slowness in eating: “My child takes more than 30 minutes to finish a meal”
  - Food fussiness: “My child refuses new foods at first”
Method

Measures

- 3 day diet diaries - 21 months
- Anthropometrics - 2-5 yrs
- Semi-structured interviews - 6 yrs
Method

Analysis

• CSGLMs & multi-level modelling
  • IV: Formula consumption (yes/no)
  • DVs: energy intake, appetite and growth
    – Adjusted for sex, age, 2 year weight, birth weight and gestational age

• Content analysis
Formula Consumption

Average 2x per day

250 (13%) formula consumers

Average daily energy intake from formula 198 kcals

Max daily energy intake from formula 482 kcals

Maximum 5 x per day
Results

Appetite & formula consumption

Formula consumers scored significantly lower on food approach traits:

- Food responsiveness \( (p<0.001) \)
- Enjoyment of food \( (p<0.001) \)
Results

LEAST FOOD RESPONSIVE

1

FORMULA CONSUMERS (2.02)

2

NON-CONSUMERS (2.22)

3

4

MOST FOOD RESPONSIVE

5
Results

Appetite & formula consumption

Formula consumers scored significantly higher on food avoidance traits:

- Satiety responsiveness ($p<0.001$)
- Slowness in eating ($p<0.001$)
- Food fussiness ($p<0.001$)
Results

LEAST SATIETY RESPONSIVE

1 2 3

NON-CONSUMERS (2.64)

FORMULA CONSUMERS (2.89)

MOST SATIETY RESPONSIVE

4 5
Results

Formula consumption & food intake

Formula consumers had significantly lower daily energy intake from food

Formula consumers
723 kcals

Formula non-consumers
764 kcals

P=0.004
Results

- No difference in daily energy intake between consumers and non-consumers

- Formula milk given instead of, not as well as food

  - Formula consumers: 1024 kcals
  - Formula non-consumers: 1039 kcals

  \( p = 0.344 \)
Results

- **No difference** in weight at 2 years of age

  - Formula consumers: 12.3 kg
  - Formula non-consumers: 12.3 kg
  - $p=0.792$

- **No difference** in growth rate (2-5yrs) ($p=0.491$)
Results: Qualitative

1) Supplemented the child’s diet
2) Concern for weight
3) Soothing
4) Recommendations
5) Beneficial nutrients
6) Unable to drink cow’s milk
Supplemented the child’s diet

“Because he was a very poor eater. His solid intake was very poor.”

“Bearing in mind that they could spend an hour mucking around over half a piece of toast, they could drink eight ounces of milk and it would be gone so it was a good way of making sure they actually got some food in them”
Discussion

- Extended formula feeding is surprisingly common
- Child-responsive parental feeding
- Formula beyond 12m substitutes for, rather than adds to, solid food
- No impact on weight trajectories in early childhood
- May be beneficial for some children who might otherwise fail to thrive but future implications??
Acknowledgements

Gemini families

Supervisors:
- Professor Jane Wardle
- Dr Clare Llewellyn
- Dr Ellen van Jaarsveld

Funders
- MRC & Nutricia Ltd