

FOLLOW-ON FORMULA MILKS

The World Health Organisation (WHO) and the Department of Health (DH) both emphasise the benefits of exclusive breastfeeding.^{1,2} In the UK, however, few mothers follow policy recommendations.



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The Infant Feeding Survey (IFS) 2010³ demonstrated that, although the initial breastfeeding rate increased from 76 percent in 2005 to 81 percent in 2010, and that mothers are continuing to breastfeed for longer, the proportion following current guidelines on exclusive breastfeeding for the first six months of a baby's life have remained low since 2005, with only one in a 100 mothers following these guidelines. It is, therefore, essential that continuous improvements are made in infant formulas (IF), including follow-on formula milks (FOFM), to ensure that the high nutrient requirements required by infants are met.

The most recent definition describes FOFM as a 'food intended for use by infants when appropriate complementary feeding is introduced and which constitutes the principal liquid element in a progressively diversified diet of such infants'.⁴

FOFM contains the same ingredients as standard IF, but with higher levels of protein, iron and micronutrients, such as vitamin D. The levels of nutrients are strictly controlled under the European Commission Directive on Infant Formulae and Follow-on Formulae. The Codex Alimentarius of the United Nations Food and Agriculture Organisation (FAO) and the WHO also provide guidance on the

composition of IF, which is used widely internationally (Codex Alimentarius Committee, 2006). The most recent UK legislation was 2007, with amendments made since. In 2014 the EFSA produced its opinion.⁵ This will form the basis of new legislation in due course, as there is presently a review of the Codex standard for FOFM, jointly with the WHO and the FAO, due for completion in July 2016. Issues such as the age range of the intended population, product definition, com-positional requirements, the role of such products in the diet and the need for such a standard will be reviewed.

WHO USES FOFM?

The IFS⁶ has investigated the use of FOFM at different stages. At Stage 2 of the survey (four to 10 weeks old), use was low (nine percent). By Stage 3 (eight to 10 months old), mothers were more likely to be using FOFM (57 percent) as their baby's main source of milk with IF at 35 percent. At Stage 3, 69 percent of all mothers had given their baby FOFM. Most mothers followed the recommendation of not giving their baby FOFM before the age of six months (16 percent had given FOFM when their baby was four months old, increasing to 50 percent at six months). Mothers from routine and manual occupations and mothers

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who had never worked were more likely than average to say that they had given their baby FOFM at an earlier age (18 percent and 27 percent respectively at four months).

THE CHARACTERISTICS OF FOFM

Iron: The case for FOFM was its potential role in preventing iron deficiency anaemia. The health problems associated with iron deficiency anaemia have long been recognised, e.g. immune status alteration, adverse effects on morbidity, delayed behavioural and psychomotor development, below average school achievements and growth retardation.⁷⁻¹²

It was suggested that FOFM is given from six months, when an infant's stores have become depleted (Domellof et al, 2001) and cannot be replaced by breast milk (being a poor source of iron). However, randomised controlled trials have not shown any consistent benefit from the additional iron in FOFM compared to IF, after the age of six months.¹³ There is also evidence that giving extra to those who are already replete in that nutrient could cause long-term damage and have an adverse effect on growth.¹⁴ Infants aged six to 12 months, who already had high iron levels, fed an iron fortified formula (mean 12.7mg/L) versus a low-iron formula (mean 2.3mg/L), scored lower on every 10-year development outcome.¹⁵ Excessive iron intakes may result in a reduced uptake of other trace metals, such as copper and oxidation of lipids, due to the pro-oxidant effects of excess iron.¹⁶

Morley et al 1999¹⁷ found that giving an iron supplemented FOFM to nearly 500 infants and toddlers between the ages of nine to 18 months, had no developmental or growth advantages.

The recent EFSA opinion¹⁸ proposes that the

minimum content of nutrients in IF and FOFM should be the same apart from iron, suggesting that FOFM should have a higher minimum target iron content than first IF. If the same formula is to be suitable for the first year of life, then the EFSA recommend that the minimum iron content should be 0.6mg/100kcal. This is based on the assumption that about 70 percent of daily iron (equivalent to 5.7mg iron per day) could be provided by complementary foods. First IF, however, currently meet this higher level and are therefore appropriate for the first year. The EFSA also noted that, although some data suggest that iron supplementation in iron-replete infants may lead to impaired growth and development and an increased risk of infections, the evidence is limited. Therefore, they have concluded that a maximum iron content in FOFM cannot be recommended.

There is some argument, however, that FOFM should be considered for inclusion in anaemia prevention programmes, especially those aimed at some of the poorest families in the UK,¹⁹ although meat-rich weaning diets and use of commercially prepared baby foods which are iron supplemented, are also discussed as advantageous.⁸

Minerals: FOFM contains higher amounts of calcium and phosphorus because calcium requirement increases in the second six months of life. Infants should begin to consume solid foods at six months and, therefore, additional calcium and phosphorus requirements should be met without difficulty from first IF and food sources.²⁰

Vitamin D: In the UK, all breastfed infants over six months of age, formula-fed babies receiving less than 500ml of formula and all children aged one to five years are recommended to take vitamin drops that contain vitamin D, as a public health policy. However, the uptake of children's vitamin drops is very poor.³ At Stage 1, only seven percent of babies were receiving vitamin drops, increasing to 14 percent at Stage 3.

The more deprived minority groups suffer most from the risk factors for vitamin D deficiency. These include darker skin, covering up, prolonged breastfeeding by ▶

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² Koletzko B et al. Am J Clin Nutr 2009; 89(5):1502S–85.

³ Price per 100g of infant milk powder: HiPP £1.06, Aptamil £1.11. Price per case of 24 infant milk hospital formula: HiPP £8.36, Aptamil £8.84. Prices correct as at April 2015.

Important Notice: Breastfeeding is best for babies. Breastmilk provides babies with the best source of nourishment. Infant formula milks and follow on milks are intended to be used when babies cannot be breastfed. The decision to discontinue breastfeeding may be difficult to reverse and the introduction of partial bottle feeding may reduce breastmilk supply. The financial benefits of breastfeeding should be considered before bottle feeding is initiated. Failure to follow preparation instructions carefully may be harmful to a baby's health. Infant formula and follow on milks should be used only on the advice of a healthcare professional.



Recommendations for the protein content of FOFM used from six months to one year suggest that the protein content should not exceed 2.5g protein/100kcal or about 10 percent of the energy content.

vitamin D deficient mothers and a lack of usage of fortified formula milk.²¹ For these groups, there may be some benefit in the usage of fortified FOFM.

If children are recommended to have vitamin drops and consume fortified milks, high intakes could be consumed, as vitamin D is a category A nutrient in terms of the risk of over-consumption.²² The ESPGHAN Committee on Nutrition, however, noted that reports on vitamin D intoxication are scarce and that there is no agreement on a vitamin D toxicity threshold.²³ Recent intervention studies using doses of up to 25µg vitamin D per day (plus the amount ingested via fortified IF) for up to five months after birth, did not demonstrate that these intakes are associated with hypercalcaemia in infants. An upper level of 25µg vitamin D per day has been established by the European Food Safety Authority NDA Panel.¹⁸

Protein: Formula protein content is another major component that has been extensively studied, especially as current formulations of FOFM have led to higher protein intake. IF contains approximately eight to 12 percent energy from protein, whilst breast milk

contains approximately five to six percent energy from protein.²⁴ This higher content in formulas was intended to compensate for the lower protein quality.

The potential for chronic disease risk attributed to rapid postpartum gain is increasingly being recognised and so the ideal degree of 'catch-up growth' has become controversial. Healthy term infants, when randomised to receive a higher protein formula, displayed higher weight gain velocity, Wt for age Z score, Wt for Length Z score and BMI-Z, but no differences in Length for age Z score by six months compared with controls.^{25, 26} These trends implied a larger fat mass accrual in the high-protein group, a finding that persisted until study termination at two years of age.²⁷ Trabulsi et al²⁸ investigated the effect on infant growth of an IF with a protein content of 1.9g/100kcal compared with an infant formula with a protein content of 2.2g/100kcal. There were no statistically significant differences between the two groups with respect to weight gain, length gain and head circumference at the end of the study at four months of age.

Previous recommendations by the Early Nutrition Academy is that formula high in milk protein should be avoided for infants. Recommendations for the protein content of FOFM used from six months to one year suggest that the protein content should not exceed 2.5g protein/100kcal or about 10 percent of the energy content.²⁹

The EFSA recommends that a minimum protein intake of 1.8g/100kcal from FOFM based

on intact milk protein is sufficient to ensure adequate growth and development. However, there is no scientific data which allows the establishment of precise cut-off values for the maximum protein content in FOFM.

ROLE OF FOFM DURING WEANING

Protein needs are met by breast or formula milk protein, but at the time of weaning, the most suitable protein-to-energy ratio in a milk or formula will depend on the protein-to-energy ratio of the weaning foods available. This will obviously vary, on what is offered and what is available. The protein-to-energy ratio of weaning food in many developed countries is high, reaching 2.5g/100kcal after correction for protein quality.³⁰ Thus, a very-high-protein milk is not needed to achieve satisfactory intakes. However, even modest displacement of breast milk or standard formula milk by low-protein complementary foods can result in inadequate total protein intake. In many developing countries, the only weaning food is maize or rice, which has a low protein-to-energy ratio. When the protein concentration of the weaning food drops below that of milk, i.e. when it is <1.0g/100kcal (such as for cassava), it is impossible to meet total protein needs. The alternative approach to meeting protein needs in situations where complementary foods contain no or low amounts of protein, is to use a FOFM, containing more protein.³¹

CONCLUSION

The growth and development of infants fed FOFM need to be similar to those infants who continue to be breastfed while complementary food is introduced. IF consumed during the first year of life can continue to be used by young children. The recent EFSA panel has concluded that it is not necessary to propose specific compositional criteria for formula consumed after one year of age.

Presently, there is no evidence to support the use of FOFM in infants receiving complementary foods containing adequate protein, carbohydrate, fat and iron.³² The Scientific Advisory Committee on Nutrition³³ stated that: 'There is no published evidence that the use of any follow-on formula offers any nutritional or

From a nutritional point of view, it maybe that FOFM is best considered in relation to the introduction of complementary food and the toddler diet, rather than breast/bottle feeding.

health advantage over the use of whey-based infant formula among infants artificially fed.'

In 2013, the WHO reiterated its position,³⁴ that FOFM is not necessary and is unsuitable as a replacement for breast milk after six months. For this reason, FOFM is not included in the UK Healthy Start Scheme.

There may be nutritional and health advantages to continuing formula milk intake into the second year for those infants considered at high risk of iron deficiency due to poor diet or other difficulties, such as fussy/faddy eating. It is advised, however, that first formula remains the milk of choice during the first year if babies are not breastfed.³²

From a nutritional point of view, it maybe that FOFM is best considered in relation to the introduction of complementary food and the toddler diet, rather than breast/bottle feeding. The medical literature now contains mixed findings on their use when included in the introduction of solids for prevention of iron deficiency anaemia in babies over six months of age and in toddlers. With the 'growth acceleration hypothesis' suggesting that early and rapid growth during infancy programs the infant metabolic profile to be susceptible to obesity and the other components of metabolic syndrome, a review of the protein content of FOFM is quite timely and will lead manufacturers to review their formulations.

For article references please email:
info@networkhealthgroup.co.uk

Questions relating to: *Follow-on formula milks*

Type your answers below and then **print for your records** or print and complete answers by hand.

Q.1	Why is it important for infant formulas (IF) to contain high nutrient levels?
A	
Q.2	What is the most recent definition of follow-on formula milk (FOFM)?
A	
Q.3	Explain the differences between infant formulas and follow-on formula milks.
A	
Q.4	What is the role of FOFM in iron deficiency anaemia?
A	
Q.5	Describe the public health policy on the vitamin D intake for infants.
A	
Q.6	When can FOFM be beneficial in relation to vitamin D?
A	
Q.7	Explain the recommendations on protein content in FOFM.
A	
Q.8	What is the role of FOFM in the weaning process?
A	
Q.9	From a nutritional point of view, when is the use of FOFM best considered?
A	

Please type additional notes here . . .