

3.10 Soy protein based infant formula suitable from birth

Key points

Soy protein based infant formula has protein from soya beans, and the carbohydrate source is glucose syrup. It contains no animal protein or lactose.

Concerns have been raised over the potential allergenic effect of soy protein based formula in infants at high risk of atopy and over the effects that the phyto-oestrogens present in soy protein based formula might have on future reproductive health.

Whilst soy protein based infant formula have been shown to support normal growth and development in healthy term infants, the Chief Medical Officer has recommended that soy protein based formula should not be routinely used for infants under 6 months of age who have cows' milk protein allergy or intolerance.

The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) concluded that the high levels of phyto-oestrogens present in soy protein based milks posed a potential risk to the future reproductive health of infants (Committee on Toxicity, 2003).

When the carbohydrate source is glucose rather than lactose, milks have a greater potential to cause dental caries. Parents and carers using soy protein based infant formula are advised to avoid prolonged contact of milk feeds with their baby's teeth and ensure that they clean their baby's teeth after the last feed at night.

Advice in the UK is that parents and carers should always seek advice before feeding their infant soy protein based infant formula.

Soy protein based infant formula combine protein from soya beans with water, vegetable oils, glucose syrup and vitamins and minerals.

The amino-acid profile of soy protein is deficient in sulphur-containing amino acids, and soy protein based formula must therefore be fortified with the sulphur-containing amino acid L-methionine. Soy protein based infant formula are available both over the counter and by prescription and may be used from birth. They have sometimes been used for children who require an alternative to cows' milk based infant milks because they have an allergy or intolerance to cows' milk, or because they have a specific condition such as galactosaemia or galactokinase deficiency.

In a systematic review of clinical studies examining measures of infant health and development and comparing soy protein based infant formula with cows' milk protein based infant formula and/or human milk, Mendez et al (2002) concluded that modern soy protein based formula supplemented with methionine support normal growth and development in healthy term infants during the first year of life.

Soy protein based infant formulas have often been used as an alternative to cows' milk protein based infant milks in children with cows' milk protein allergy (CMPA). In a review of trials comparing the effect of prolonged feeding of soy protein based infant formula and of cows' milk protein based infant formula, meta-analysis found no significant difference in childhood asthma incidence, childhood eczema incidence or childhood rhinitis. The authors concluded that soy protein based formula cannot be recommended for allergy prevention or food intolerance in infants at high risk of atopy (Osborn and Sinn, 2006).

It is recognised that a proportion of children with CMPA are also allergic to soy protein. The Chief Medical Officer has recommended that soy protein based infant formula should not be used as the first line of treatment for infants under 6 months of age who have CMPA or cows' milk protein intolerance, as this is the period when they are most likely to become sensitised to soy protein (Chief Medical Officer, 2004). ESPGHAN recommends that soy protein based infant formula should not be used for infants under 6 months of age and that the use of therapeutic milks based on extensively hydrolysed proteins (or amino-acid preparations if hydrolysates are not tolerated) should be preferred to the use of soy protein formula in the treatment of cows' milk protein allergy (Agostoni et al, 2006).

Soy protein based infant formula contain much higher levels of phyto-oestrogens than formula based on cows' milk protein. Setchell et al (1998) estimated that infants aged 1 to 4 months who were fed soy protein based formula would receive 6-12mg/kg of body weight of phyto-oestrogens per day, compared to 0.7-1.4mg/kg of body weight per day for adults consuming soy protein based products. There has been very little research into the effects of consumption of phyto-oestrogens from soy protein based formula in very young infants. However, research in animals suggests that phyto-oestrogens can have detrimental effects on reproductive function, immune function and carcinogenesis. In a review of the scientific evidence on soy protein based formula, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) concluded that the high levels of phyto-oestrogens present in soy protein based formula posed a potential risk to the future reproductive health of infants (Committee on Toxicity, 2003).

More recent research has looked at potential links between soy infant formula and seizures in children with autism (Westmark, 2014) with a hypothesis that phyto-oestrogens in soy protein based infant formula can contribute to lower seizure threshold. Whilst this study reports links using data from retrospective data collection and therefore cannot confirm an association, it reiterates the need for caution in the use of soy protein based formula in infancy.

The required composition of soy protein based infant formula is different to that of cows' milk based formula for a number of micronutrients including iron and phosphorus due to differences in bioavailability.

Soy protein based formula are suitable for vegetarians but not for vegans.

Advice in the UK is that parents should always seek advice before feeding their infant soy protein based infant formula.

There is now only one soy protein based infant formula on the market – SMA Wysoy – as Cow & Gate Infasoy has been withdrawn from sale. The nutritional composition and ingredients used in SMA Wysoy are given in Table 14.

TABLE 14. The nutritional composition of soy protein based infant formula suitable from birth

Nutrients per 100ml	SMA Wysoy
MACRONUTRIENTS	
Energy kcal	67
Protein g	1.8
Carbohydrate g	6.9
Carbohydrate source	Dried glucose syrup
Fat g	3.6
Fat source	Palm, soya, coconut and sunflower oils
Added LCPs ARA	✓
DHA	✓
LCP source	Fungal/algal oils (vegetable source)
MICRONUTRIENTS	
Vitamins meeting regulations	✓
Minerals meeting regulations	✓
VITAMINS	
Vitamin A µg-RE	75
Vitamin C mg	9
Vitamin E mg	0.74
Vitamin D µg	1.2
Vitamin K µg	10
Thiamin (B ₁) µg	100
Riboflavin (B ₂) µg	110
Niacin µg	500
Vitamin B ₆ µg	60
Vitamin B ₁₂ µg	0.18
Folic acid µg	13
Biotin µg	2
Pantothenic acid µg	370
MINERALS	
Calcium mg	67
Chloride mg	43
Copper µg	30
Iodine µg	12
Iron mg	0.8
Magnesium mg	6.7
Manganese µg	20
Phosphorus mg	50
Potassium mg	72
Selenium µg	1.4
Sodium mg	19
Zinc mg	0.6
ADDED INGREDIENTS	
Structured vegetable oils	x
Prebiotics	x
Nucleotides	✓
Inositol	✓
Taurine	✓

Nutrients per 100ml	SMA Wysoy
Choline	✓
Added antioxidants	✓
Contains soya	✓
Contains fish oil	x
Suitable for vegetarians	✓
Halal approved	✓
Osmolality mOsm/kg H₂O	204

ARA = arachidonic acid DHA = docosahexaenoic acid LCP = long chain polyunsaturated fatty acid