

Compendium of Breastmilk Substitutes

A Guide for Health Professionals



Compendium of Breastmilk Substitutes

Introduction

Breastfeeding should at all times be actively encouraged and supported. This compendium is intended as a reference for **health professionals** providing information to parents who are feeding their infant(s) commercial formula. *It is not intended to encourage the substitution of infant formulas for breastmilk.* There is an increased risk of adverse health outcomes when breastmilk is replaced by commercial formula. Breastfeeding is the biological norm and the optimal method of feeding infants and should continue for up to two years and beyond.

Most breastfeeding challenges can be overcome with assistance from a professional with specialized training as a Certified Lactation Consultant or Breastfeeding Counsellor. Breastfeeding support groups (such as La Leche League or groups organized through health units) may also be available to help. Contact your local Health Unit for information about services and support(s) in your community.

If a mother is unable to breastfeed or must supplement breastfeeding, pasteurized donor breastmilk should be made available. Pasteurized donor breastmilk is available for those in British Columbia with medical risks. A doctor's order is required (include the child's name, birth date, and reason for donor milk, amount required and length of time required). All donors are screened. Breastmilk is pasteurized prior to distribution. For more information, call the *Children's and Women's Lactation Service and Milk Bank* in Vancouver at 604-875-2282.

To discuss commercial infant formula options, please contact the Community Nutritionist at your local Health Unit.

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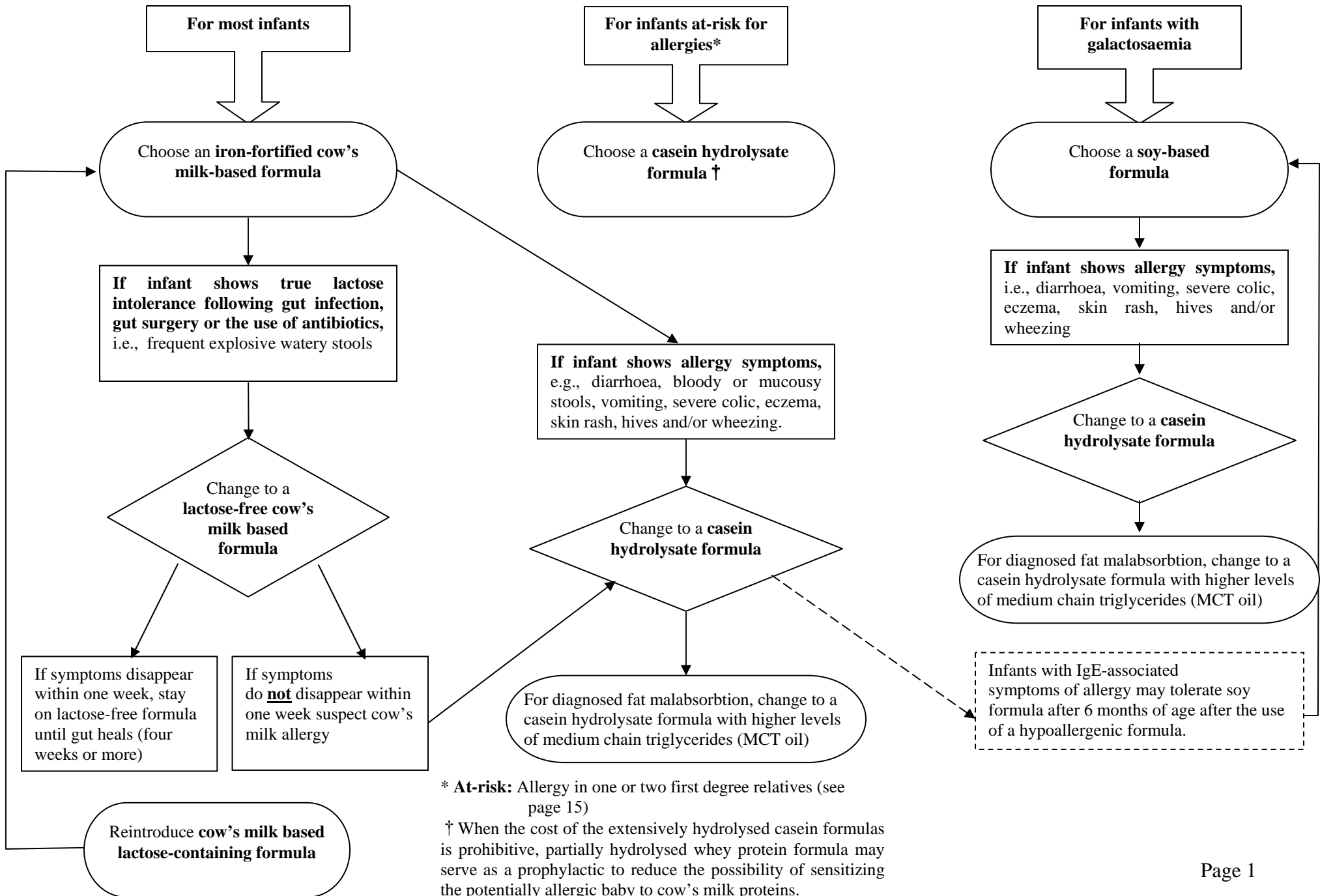
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BC HealthFile 69b *Formula Feeding Your Baby: Safely Preparing and Storing Formula* States: “**Read and carefully follow the directions on how to make and store formula.** Powder infant formula is not sterile and in rare cases has made babies sick. If your baby is **younger than 1 month old, premature, or ill,** use powdered formula only under your doctor’s instruction. Otherwise use liquid formula, which is sterile until the container is opened.”



* **At-risk:** Allergy in one or two first degree relatives (see page 15)

† When the cost of the extensively hydrolysed casein formulas is prohibitive, partially hydrolysed whey protein formula may serve as a prophylactic to reduce the possibility of sensitizing the potentially allergic baby to cow's milk proteins.

Issues That Apply to All Formulas

- This compendium is a reference and is not intended to replace professional advice. All attempts were made to ensure information is accurate but please refer to product labels for current product contents.
- This document discusses formulas in the **retail** market. All product brand names are registered trademarks. Specialized formulas typically used in a hospital setting, (eg. preterm formula, Neocate™) are not included. Specialized formulas may be purchased through the BC Children's and Women's Hospital Special Products Distribution Centre (Lower Mainland: 604-875-3020, Elsewhere in BC: 1-866-727-7759)
- Many commercial infant formulas are available in powder, concentrated and ready-to-feed formats. Powder infant formula is not sterile and in rare cases has made babies sick.⁴ If your baby is **younger than 1 month old, premature, or ill**, use powdered infant formula only under your doctor's instruction. Otherwise, use liquid formula, which is sterile until the container is opened.⁵
- Price and/or brand are not indicators of superior or inferior quality in infant formulas.
- Although the composition of all formulas is tightly regulated,⁶ there are slight differences between formulas, and infants may tolerate some brands or formats better than others.
- Docosahexaenoic acid (DHA) and arachadonic acid (ARA) are long chain polyunsaturated fatty acids (LCPUFA) found in breastmilk in varying amounts depending on the fat composition of the mother's diet.⁷ Optimal levels in breastmilk have yet to be determined. Additional randomized controlled trials are necessary to demonstrate the clinical benefits of LCPUFA supplementation of infant formula, as it cannot be presumed that this supplementation produces the same benefits for the infant as does the LCPUFA naturally present in human milk.
 - LCPUFAs are important in infant brain and vision development.^{7, 8}
 - Differences in plasma and red blood cell lipid composition between infants fed diets with and without preformed LCPUFAs suggest that infants are unable to synthesize DHA from the precursor linolenic acid in sufficient amount to meet accretion needs⁸.
 - The World Health Organization (WHO) states that DHA/ARA, if added, should be added at the percentage of DHA: 0.33 – 0.35% of total fat; and ARA: 0.65 – 0.7% of total fat.
 - Evidence suggests that formula for healthy term infants requires dietary DHA/ARA in amounts equal to WHO recommendations. However, studies have reached different conclusions regarding the benefits of adding DHA/ARA to infant formulas.⁷ It may be advantageous for full term infants.
 - Infants fed infant formula fortified with DHA/ARA at levels lower than WHO recommendations have achieved red blood cell DHA/ARA levels that are comparable with infants fed breastmilk.⁹ Preterm infants may benefit from formula containing DHA/ARA¹⁰
 - The sources of ARA and DHA in infant formula are derived from algae. Mortierella alpina oil is the source of ARA. Cryptocodium cohnii oil is the source of DHA.

- Nucleotides appear to play a role in the development of the infant immune system. Human milk contains nucleotides. Additional randomized controlled trials are necessary to demonstrate the clinical benefits of nucleotide supplementation of infant formula, as it cannot be presumed that nucleotide supplementation produces the same benefits for the infant as do the nucleotides naturally present in human milk.¹¹
- It is controversial whether or not palm olein adversely affects bone mineralization.^{12, 13}
- **Infant formulas targeted to children 0 – 12 months are not appropriate for infants over 12 months of age, as such formulas are inadequate in some nutrients for children of this age (e.g. calcium). Do not feed these formulas to children over age 12 months. For children on extensively hydrolysed formula due to milk protein allergy, the formula may be continued, but the child should be seen by a registered dietitian to ensure adequate nutrient intake from other sources. See page 15.**
- **Formula Preparation and Storage: Always wash hands before any food preparation. Refer to labels for instructions. Instructions and scoop size vary from formula to formula. Ensure that powders and concentrates are mixed well and diluted according to directions on the label. Infant formula is safe to use within two hours of taking it out of the fridge. If formula has been warmed up or partly used for a feed, throw it out after 1 hour. Do not put in the fridge to re-use again. Keep formula prepared from powder in the fridge for no longer than 24 hours. Keep formula prepared from concentrated liquid in the fridge for no longer than 48 hours. Keep ready-to-use formula that has been put in bottles in the fridge for no longer than 48 hours.**¹⁴
- **Water for Formula Preparation^{1, 14}:** Water used for mixing formula must be boiled in a clean open pot for 2 minutes and cooled with the lid on. Boiled water can be stored for two or three days in the refrigerator in a sterilized, tightly closed container, or for 24 hours at room temperature in a sterile closed container. Water used in the preparation of infant formula must be clean and free of microbiological and chemical contamination. Tap water, well water, home-filtered water (e.g. Brita™) and commercially bottled water (e.g. home-delivered bottled water), **once boiled**, are suitable for infant feeding. Water that is **not suitable** for infant feeding includes commercially bottled carbonated water or mineral water. Please refer to BC Health File 69b *Formula Feeding Your Baby – Safely Preparing and Storing Formula*. (The Canadian Pediatric Society, Dietitians of Canada and Health Canada suggest that the practice of boiling water to be used in the preparation of infant formula may be discontinued after infants reach four months of age.¹)

- **BC Ministry of Employment and Income Assistance – Infant Formula Policy:**

Some parents may be eligible for financial assistance to cover the cost of formula. For more information, the client should contact their Financial Aid Worker. The following quote is directly from the Ministry’s Policy manual.

“Employment and Assistance Regulation, Part 5 – Supplements; Division 5 – Health Supplements; 74.1 – Infant Health Supplement:¹⁵

Infant health supplement

74.1 The minister may provide the type of health supplement referred to in section 10 of Schedule C, in accordance with that section, to or for

- (a) a dependent child of a recipient of income assistance under section 4 of the Act,¹⁶*
- (b) a dependent child of a recipient of hardship assistance under section 5 of the Act,¹⁷*
- (c) a dependent child of a person referred to in section 67 (1) (f) or (g) of this regulation,¹⁸ or*
- (d) a child who is a recipient of income assistance under section 6 (2) of this regulation.¹⁹ (B.C. Reg. 155/2005)*

Section 10 of Schedule C:²⁰

Infant Formula

10 The minister may provide infant formula under section 74.1 of this regulation if

- (a) a medical practitioner confirms in writing that*
 - (i) the dependent child for whom a specialized infant formula is to be provided has a medical condition and the specialized infant formula is necessary to treat the medical condition, or*
 - (ii) the dependent child for whom the infant formula is to be provided is at risk of contracting a disease that is transmissible through the mother's breast milk,*
- (b) in the case of a child described by paragraph (a) (ii), the child is under 12 months of age, and*
- (c) the minister is satisfied that the infant formula is medically required to treat the medical condition or respond to the risk referred to in paragraph (a). (B.C. Reg. 155/2005).”*

Cow's Milk-Based Formulas

- Iron-fortified cow's milk-based formulas are the recommended choice for non-breastfed infants who are at low risk for developing food allergies.
- To lower the risk of iron deficiency anemia, do not switch from formula to whole cow's milk until infant is at least 12 months of age and consuming a variety of iron-rich foods.²¹ Cow's milk and goat's milk have a low iron content and the iron is poorly absorbed.²²
- Healthy term infants have adequate iron stores to support hemoglobin synthesis for the first four to six months of life.^{21, 23} However, it is recommended that formula-fed infants receive iron-fortified formula from birth as a precautionary measure.²¹ If an informed parent chooses a low-iron formula for the first three months of life, they must switch to an iron-fortified formula at four months of age, when infant's iron stores may be depleting.
- Iron fortified formulas are fortified at differing levels, from 0.8 mg/100 ml to 1.2 mg/100 ml. When choosing a formula for an infant, the infant's iron status may be worthy of consideration (i.e. choosing a formula fortified to the maximum level may be more appropriate for an infant with low iron status).
- There is no evidence to support the contention that iron-fortified formula is associated with infant constipation.²⁴⁻²⁶ The colour and/or consistency of stools may change when switching from breastmilk to formula or from low-iron to iron-fortified formula.
- The optimal casein/whey ratio is still a point of controversy. While growth rates do not differ between infants fed whey-predominant formula and those receiving casein-predominant formulas,²⁷ more research is needed on other differences, such as differences in health outcomes.

Cow's Milk-Based Formulas											
Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65–0.70% total fat)	DHA mg/100 ml (WHO: 0.33–0.35% total fat)	Nucleotides mg/100 ml	Comments
Enfalac (Mead Johnson)	68	1.42 reduced minerals whey, non-fat milk	3.6 palm olein, soy oil, coconut oil, high oleic sunflower oil	7.4 lactose	0.47 or 1.2	53	41	0	0	2.8	<ul style="list-style-type: none"> • Low iron formulas are not recommended for infants over age 4 months
Enfamil A + with DHA & ARA (Mead Johnson)	68	1.42 reduced minerals whey, non-fat milk	3.6 palm olein, soy oil, coconut oil, high oleic sunflower oil, mortierella alpine oil, cryptocodium cohnii oil.	7.4 lactose	1.2	53	41	23 (0.64 % total fat)	11.5 (0.32 % total fat)	2.8	

Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/ 100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65– 0.70% total fat)	DHA mg/100 ml (WHO: 0.33– 0.35% total fat)	Nucleo- tides mg/100 ml	Comments
Enfamil Thickened A+ (Mead Johnson)	68	1.7 non-fat milk	3.4 palm olein, soybean oil, coconut oil, high oleic sunflower oil, mortierella alpina oil, crypthecodinium cohnii oil.	7.4 rice starch, lactose, maltodextrin	1.2	53	41	23 (0.67 % total fat)	11.5 (0.34 % total fat)	0	<ul style="list-style-type: none"> • Milk-based formula with added rice starch which thickens further on contact with stomach acid. • Limited research available on the ability of “added-starch” formulas to prevent reflux and regurgitation.^{28, 29} • Consider feeding technique and positioning to help prevent reflux and regurgitation. • If allergy-induced reflux is suspected, trial Alimentum or Nutramigen.

Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65–0.70% total fat)	DHA mg/100 ml (WHO: 0.33–0.35% total fat)	Nucleotides mg/100 ml	Comments
Good Start (Nestle)	67	1.5 100% partially hydrolyzed whey	3.4 palm olein, soybean oil, coconut oil, high oleic sunflower/safflower oil	7.2 lactose, corn maltodextrin	1	43	40	0	0	2.6	<ul style="list-style-type: none"> For infants at-risk for allergies, extensively hydrolysed formulas are recommended^{3,30}. See page 1. Good Start is a partially hydrolysed formula. Some research suggests partially hydrolysed whey formula may help reduce the risk of cow's milk allergies in infants at risk for allergies.³¹ Very little research is available that compares the preventive effects of partially hydrolysed and extensively hydrolysed formulas. More research is needed to support prevention-based recommendations for partially hydrolysed formulas.^{3, 32-35} Not recommended for infants with diagnosed allergy to cow's milk protein.³ Not hypoallergenic.^{3, 35} When the cost of the extensively hydrolysed casein formulas is prohibitive, partially hydrolysed whey protein formula may serve as a prophylactic to reduce the possibility of sensitizing the potentially allergic infant to cow's milk proteins.³⁶

Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65–0.70% total fat)	DHA mg/100 ml (WHO: 0.33–0.35% total fat)	Nucleotides mg/100 ml	Comments
Good Start with Omega-3 & Omega-6 (Nestle)	67	1.5 partially hydrolyzed whey protein concentrate	3.4 palm olein, soybean oil, coconut oil, high oleic sunflower/safflower oil, Mortierella alpina oil, Cryptocodium cohnii oil	7.5 lactose, corn maltodextrin	1	43	40	20 (0.59% total fat)	10 (0.29% total fat)	2.6	<ul style="list-style-type: none"> For infants at-risk for allergies, extensively hydrolysed formulas are recommended^{3,30} See page 1 Good Start is a partially hydrolysed formula. Some research suggests partially hydrolysed whey formula may help reduce the risk of cow's milk allergies in infants at risk for allergies.³¹ Very little research is available that compares the preventive effects of partially hydrolysed and extensively hydrolysed formulas. More research is needed to support prevention-based recommendations for partially hydrolysed formulas.^{3, 32-35} Not recommended for infants with diagnosed allergy to cow's milk protein.³ Not hypoallergenic.^{3, 35} When the cost of the extensively hydrolysed casein formulas is prohibitive, partially hydrolysed whey protein formula may serve as a prophylactic to reduce the possibility of sensitizing the potentially allergic infant to cow's milk proteins.³⁶
Kirkland Signature (Costco)	69	1.5 skim milk	3.8 high oleic sunflower oil, coconut oil, soy oil	7.2 lactose	1.2	49	37	0	0	3	<ul style="list-style-type: none"> Lower cost formula.
Life (Shopper's)	67.2	1.5 skim milk, whey protein concentrate	3.6 palm oil or palm olein, high oleic safflower oil or sunflower oil, coconut oil, soybean oil	7.2 lactose	0.8	42	40	9.8 (0.27% total fat)	5.7 (0.16% total fat)	2.4	<ul style="list-style-type: none"> Lower cost formula.

Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65–0.70% total fat)	DHA mg/100 ml (WHO: 0.33–0.35% total fat)	Nucleotides mg/100 ml	Comments
Parent's Choice (Walmart)	69	1.5 skim milk	3.8 high oleic sunflower oil, coconut oil, soy oil	7.2 lactose	0.15 or 1.2	49	37	0	0	3	<ul style="list-style-type: none"> • Lower cost formula. • Low iron formulas are not recommended for infants over age 4 months
Parent's Choice with DHA & ARA (Walmart)	67	1.5 skim milk	3.6 high oleic sunflower oil, coconut oil, soy oil, Mortierella alpina oil, Crypthecodinium cohnii oil.	7.2 lactose	0.8	42	40	9.8 (0.27 % total fat)	5.7 (0.16 % total fat)	2.4	<ul style="list-style-type: none"> • Lower cost formula
President's Choice (Superstore/Extra Foods)	68	1.45 skim milk powder	3.65 high oleic safflower oil, coconut oil, soybean oil	7.2 lactose	0.15 or 1.2	49	40	0	0	3	<ul style="list-style-type: none"> • Lower cost formula. • Low iron formulas are not recommended for infants over age 4 months
President's Choice with DHA & ARA (Superstore/Extra Foods)	67	1.5 skim milk, whey protein concentrate	3.6 palm oil, high oleic safflower oil or sunflower oil, coconut oil, soybean oil	7.2 lactose	0.8	42	40	9.8 (0.27 % total fat)	5.7 (0.16 % total fat)	2.4	<ul style="list-style-type: none"> • Lower cost formula.
President's Choice Organics (Superstore/Extra Foods)	67	1.5 organic skim milk powder, organic whey protein concentrate	3.6 organic palm oil or palm olein, organic high oleic (safflower or sunflower) oil, organic coconut oil, organic soybean oil	7.2 organic lactose	1.2	42	40	22.7 (0.63 % total fat)	12.7 (0.35 % total fat)	2.4	<ul style="list-style-type: none"> • President's Choice Organics products are "certified" by third-party accredited organic certifying bodies as set forth by the National Standard of Canada on Organic Agriculture, the Conseil d'accréditation du Québec and other international accreditation groups.
Safeway Select (Safeway)	68	1.45 skim milk	3.65 high oleic sunflower oil, coconut oil, soy oil	7.2 lactose	0.15 or 1.2	49	40	0	0	3	<ul style="list-style-type: none"> • Lower cost formula. • Low iron formulas are not recommended for infants over age 4 months

Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/ 100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65– 0.70% total fat)	DHA mg/100 ml (WHO: 0.33– 0.35% total fat)	Nucleo- tides mg/100 ml	Comments
Similac Advance with Iron (Abbott Nutrition)	68	1.4 non-fat milk, whey protein concentrate	3.7 high oleic safflower oil, sunflower oil, soy oil, coconut oil	7.3 lactose	1.2	53	41	0	0	7.2	
Similac Advance – Step 1 with DHA & ARA (Abbott Nutrition)	68	1.4 non-fat milk, whey protein concentrate	3.71 high oleic safflower oil, soy oil, coconut oil, Mortierella alpine oil and Cryptocodium cohnii oil	7.2 lactose	1.2	53	41	13 (0.35 % total fat)	5 (0.13 % total fat)	7.2	

Lactose-Free Cow's Milk-Based Formulas

- The terminology used in this document is as follows.³⁷
 - *Secondary Lactose Intolerance* - Lactose intolerance is classified as secondary when it is observed with signs of underlying gastrointestinal disease. Secondary lactose intolerance is usually **temporary**. It can occur following infection, inflammation or other injury in the gastrointestinal (GI) tract, following GI surgery or during/following the use of antibiotics.
 - *Primary Lactose Intolerance* - Lactose intolerance is classified as primary when it is observed with no history or signs of underlying intestinal disease. Onset of this type of lactose intolerance usually occurs **after childhood** and is **permanent**.
 - *Congenital Lactose Intolerance* – Lactose intolerance is classified as congenital when it is present at birth: the histological features of the gastrointestinal mucosa are normal, and brush-border lactase activity is low or completely absent. Congenital lactose intolerance is **extremely rare** and is associated in infants with dehydration and poor weight gain.
- Lactose is the major carbohydrate in breastmilk. It is present in constant concentration regardless of the maternal diet.
- Lactose increases calcium absorption in infants.³⁸ Calcium absorption is less with lactose-free formula, however lactose-free formula contains extra calcium and infants still receive adequate calcium from these formulas.³⁹
- There is no convincing evidence that lactose-free formulas are effective in relieving symptoms of colic.⁴⁰
- Lactose intolerance is suspected only when infant has frequent explosive, watery stools.⁴¹
- An infant may need to stay on the lactose-free formula for as little as a week or, rarely, as long as several months. Continue to feed infant lactose-free formula for a minimum of 4 weeks to give infant's GI tract time to heal and repair. After 4 weeks, re-introduce regular cow's milk-based formula.⁴² If symptoms recur return to feeding lactose-free formula until infant is 12 months old and refer to the Community Nutritionist or other Dietitian.
- If GI symptoms do not clear-up within one week of initiating feeding with lactose-free formula, suspect cow's milk allergy and change to Nutramigen or Alimentum formula (see page 1). Recommend that parent contact the physician to rule out other conditions. If the infant is also breastfeeding, continue to breastfeed and refer to a lactation consultant.
- When weaning a child with congenital lactose intolerance from lactose-free formula, add lactase drops (eg. Lactaid™) to treat whole cow's milk. Commercial lactase-treated cow's milk is made from 2%, 1% or skim milks. These milks are not recommended until 24 months of age due to the lower fat content.¹ If these milks must be used, offer commercial lactase treated 2% cow's milk and add 1 – 1½ teaspoons non-hydrogenated margarine, butter or vegetable oil to toddler's food daily.
- **All asymptomatic infants without congenital lactose intolerance can be weaned to whole cow's milk starting at 12 months.** Hence, all infants can be weaned to cow's milk except those currently experiencing symptoms of lactose intolerance.
- Cow's milk based lactose-free formulas are **not appropriate for babies with galactosemia** because these formulas contain residual galactose.¹

Lactose-Free Cow's Milk-Based Formulas

Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100ml	VitD IU/100ml	ARA mg/100ml	DHA mg/100ml	Nucleotides mg/100ml	Comments
Enfamil Lactose Free (Mead Johnson)	68	1.42 milk protein isolate	3.6 palm olein, soy oil, coconut oil, high oleic sunflower oil	7.4 corn syrup solids	1.2	55	41	0	0	2.8	<ul style="list-style-type: none"> Lactose is replaced with corn syrup solids.
Similac Advance LF (Abbott Nutrition)	68	1.5 total cow's milk protein	3.7 high oleic safflower oil or sunflower oil, soy oil and coconut oil	7.2 corn syrup, sucrose	1.2	57	40	0	0	0	<ul style="list-style-type: none"> LF means "lactose free". Lactose is replaced with corn syrup and sucrose.

Soy-Based Formulas

- Health Canada recommends soy-based formula only if an infant is diagnosed with galactosemia or if an infant is vegan.
- Soy formulas are vegetarian, not vegan, as the vitamin D is derived from animal sources, but they are the most appropriate formulas available for vegan infants.
- Soy formulas are not hypoallergenic. Many infants who are allergic to cow's milk protein are also allergic to soy protein^{3,43} (see page 17.) The American Academy of Pediatrics states that “infants with IgE-associated symptoms of allergy [angioedema, urticaria, wheezing, rhinitis, vomiting, eczema, anaphylaxis] may benefit from a soy formula... instituted after 6 months of age after the use of a hypoallergenic formula.”
- Soy formulas are proven to be of no value in preventing milk protein allergies in healthy or at-risk infants.²
- Soy formulas are not generally recommended to prevent or manage colic.²
- There are no human studies to date confirming that phytoestrogens in soy formula are detrimental to an infant's health⁴⁴. Long term effects of soy formula consumption are currently unproven. More research is pending.
- All soy formulas are lactose-free and iron-fortified and do not contain nucleotides.
- Because of differences in absorption, soy formulas contain more calcium, vitamin B₁₂, phosphorus and zinc than cow's milk formulas. Differences in absorption are due to the presence of phytates and fibre oligosaccharides.
- For infants using soy formula, formula should be offered until an infant is one year of age² (see appendix I, page 32)
- Soy protein-based formulas should not be fed to low birth weight preterm infants.² The newer cow milk protein-based formulas designed for preterm infants are clearly superior.

Soy-Based Formulas

Product (Manufacturer)	Kcal/ 100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100ml	VitD IU/100ml	ARA mg/100ml (WHO: 0.65–0.70 % total fat)	DHA mg/100ml (WHO: 0.33–0.35 % total fat)	Comments
Alsoy with Omega 3 and Omega 6 (Nestle)	67	1.7 soy protein isolate	3.3 palm olein, soybean oil, coconut oil, high oleic safflower/su nflower oil, Mortierella alpine oil, Crypthe- codinium cohnii oil	7.4 corn maltodextrin, sucrose	1.2	70	40	19 (0.58% total fat)	9.5 (0.29% total fat)	
Enfamil Soy (Mead Johnson)	68	1.7 soy protein isolate, L-meth- ionine	3.6 palm olein, soy oil, coconut oil, high oleic sunflower oil	7 corn syrup solids	1.2	71	41	0	0	▪ Sucrose free
Isomil (Abbott Nutrition)	68	1.7 soy protein isolate	3.7 high oleic sunflower oil or safflower oil, coconut oil, soy oil	7 corn syrup solids, sucrose	1.2	70	40	0	0	
President's Choice Soy Formula with Iron, ARA & DHA (Superstore/Extra Foods)	66	1.7 soy protein isolate	3.5 palm oil or palm olein, coconut oil, soybean oil, high oleic safflower or sunflower oil	6.9 corn syrup solids	1.2	70	40	23 (0.66 % total fat)	11 (0.31 % total fat)	

Infants and Allergies: Factors to Consider

Risk for developing food allergy falls into two categories:

- **Not-at-risk:** No history of allergy in parents or siblings.
- **At-risk:** Allergy in one or two first-degree relatives. (Allergy refers to food or non-food allergies)

The *American Academy of Pediatrics* defines infants at high risk for developing allergy as those who are “identified by a strong (biparental; parent, and sibling) family history of allergy.”³ The *European Society for Paediatric Allergology and Clinical Immunology Committee on Hypoallergenic Formulas* and the *European Society for Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition* define infants at high risk for developing allergy as “infants with at least one first degree relative with documented atopic disease.”⁴⁵

Hence, as there is evidence for *either* one or two first degree relatives being used as defining “at-risk”, it is suggested that health professionals use their professional judgment in providing advice to parents, taking into account such issues as the severity of reaction and the number of allergies in the defining relatives.

It is recommended that infants at-risk for allergies be started on casein hydrolysate formula.

Casein Hydrolysate Formulas

These formulas are recommended for:

(a) infants at-risk for allergies. Offer casein hydrolysate formula until infant is one year of age or older.³ *An infant with allergy symptoms requires an assessment by a physician/allergist.*

(b) infants with diagnosed milk allergy. *An infant with allergy symptoms requires an assessment by a physician/allergist, and should be referred to a Dietitian for follow-up to ensure that foods of equal nutrient value are substituted for foods that are restricted from infant’s diet.* Offer casein hydrolysate formula (or soy formula, if appropriate, see below) until infant is one year of age or older.³ The AAP states that symptoms should improve within 2 to 4 weeks of switching formula.³ Dietary progression to cow’s milk may be determined with a medically-supervised oral milk challenge.

Partially Hydrolysed Whey Formula

Partially hydrolysed formula is not intended for the treatment of cow's milk allergy.

When the cost of the extensively hydrolysed casein formulas is prohibitive, partially hydrolysed whey protein formula may serve as a prophylactic to reduce the possibility of sensitizing the at-risk infant to cow's milk proteins.³⁶

Soy Formulas

Soy protein formulas may be appropriate for some infants with cow's milk allergy:

- Soy formula is NOT recommended for infants with severe GI symptoms, such as diarrhea, blood in stools and/or malabsorption.² Choose a casein hydrolysate formula for severe GI symptoms.³
- It is estimated that 8 to 14% of infants with symptoms of IgE-associated cow's milk allergy and 25 to 60% of infants with non-IgE-associated cow's milk allergy, will also react adversely to soy.^{2,3,46}
- The American Academy of Pediatrics recommends that soy formula may be offered for 1 year or longer to milk allergic infants who have ingested soy and have not reacted.^{3,43} After age 1 year, switch to a soy follow-on formula. Fortified soy beverage is appropriate after age 2 years. (see Appendix 1, page 32)
- Most infants with documented IgE-associated allergy to cow's milk protein will do well on a soy formula. (see flowchart, page 1) The American Academy of Pediatrics states that "infants with IgE-associated symptoms of allergy may benefit from a soy formula, either as the initial treatment or instituted after 6 months of age after the use of a hypoallergenic formula... Benefits should be seen within 2 to 4 weeks of switching formulas."³

Symptoms of allergy⁴⁷

(Symptoms of allergy are provided for *information purposes only*, not as a means to diagnose. Diagnoses should be made by a physician.) Infants may also experience a mix of symptoms as their reaction may be both IgE and non IgE mediated. Standard skin and blood testing detects IgE-mediated reactions only.

IgE associated:

- Cutaneous: urticaria/angioedema, atopic dermatitis
- Respiratory: rhinoconjunctivitis, asthma
- Gastrointestinal: oral allergy syndrome, gastrointestinal anaphylaxis, infantile colic, allergic eosinophilic gastroenteritis, infantile, gastroesophageal reflux
- Generalized: systemic anaphylaxis, food-associated or exercised-induced anaphylaxis

Non-IgE associated:

- Cutaneous: dermatitis herpetiformis, contact dermatitis
- Respiratory: food-induced pulmonary hemosiderosis
- Gastrointestinal: food-induced enterocolitis syndrome, food-induced proctocolitis syndrome, food-induced enteropathy syndrome, gluten-sensitive enteropathy (celiac disease), allergic eosinophilic gastroenteritis syndrome, gastroesophageal reflux, dermatitis herpetiformis
- Chronic constipation⁴⁸⁻⁵⁰

Other factors to consider when choosing formulas for allergy management:

- **Parental concerns about financial means:** casein hydrolysate formulas are significantly more expensive than milk-based and/or soy-based formulas. Families on income assistance can check with their financial aid worker to see if medically-necessary formula would be available to them at no cost (see page 4).
- **Infant's acceptance of formula:** infant formulas vary in smell and taste. Some infants may prefer one casein hydrolysate formula over another or may refuse casein hydrolysate formula. Provided symptoms are not life-threatening, parents or caregivers can try gradually mixing more and more of the casein hydrolysate formula into the infant's usual formula over a few days, until infants are consuming 100% casein hydrolysate formula.

Dial-A-Dietitian has a Registered Dietitian specializing in allergy management.

In Greater Vancouver, call (604) 732-9191. Toll free in BC, call 1-800- 667- 3438.

Casein Hydrolysate Formulas (Extensively Hydrolysed Formulas)

- Casein hydrolysate means that the milk protein has been broken down into amino acids and small peptides. These smaller molecules are hypoallergenic, i.e., unlikely to cause allergies. However, 5 – 10% of infants may react to small peptides and require an amino acid based infant formula (e.g. Neocate).
- Appropriate for infants with: diagnosed allergy to milk and/or soy proteins or risk for allergies due to family history,^{3, 30, 32, 33} severe colic,^{3, 51} fat malabsorption (Alimentum or Pregestimil) or protein malabsorption.
- All of these formulas are lactose-free and iron-fortified.
- See previous pages for more information on casein hydrolysate formulas.

Casein Hydrolysate Formulas (Extensively Hydrolysed Formulas)										
Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100ml	VitD IU/100 ml	ARA mg/100ml	DHA mg/100ml	Comments
Nutramigen (Mead Johnson) Available in ready to feed and powder.	68	1.9 casein hydrolysate, amino acids	3.6 palm olein, soy oil, coconut oil, sunflower oil	7.0 corn syrup solids, modified corn starch	1.2	64	34	0	0	<ul style="list-style-type: none"> • Not appropriate for fat malabsorption (no medium chain triglycerides (MCT) oil). • 100% casein. • 50% amino acids; 50% small peptides.
Similac Alimentum (Abbott Nutrition) Available in ready to feed only.	68	1.9 casein hydrolysate	3.8 safflower oil, MCT oil, soy oil	6.9 sucrose, modified tapioca starch	1.2	71	30	0	0	<ul style="list-style-type: none"> • Appropriate for fat malabsorption (33 % MCT oil.) • 100 % casein. • 60% amino acids; 40 % small peptides.
Enfamil Pregestimil (Mead Johnson) Available in ready to feed and powder.	68	1.9 casein hydrolysate, amino acids	3.8 <i>Powder:</i> MCT oil, corn oil, soy oil, high oleic safflower oil <i>Liquid:</i> MCT oil, soy oil, high oleic safflower oil	6.8 Powder: corn syrup solids, dextrose, modified corn starch Liquid: corn syrup solids, modified corn starch	1.2	62	34	0	0	<ul style="list-style-type: none"> • Appropriate for fat malabsorption (55 % MCT oil.) • 100% casein. • May need to be specially ordered.

Post-Discharge Formulas for Premature Infants

- Post-discharge formulas (PDFs) are designed for premature and low birth weight infants upon discharge from hospital. PDFs are nutrient enriched formulas designed to meet the nutritional needs of preterm infants after discharge from hospital. PDFs in general are intermediate in composition between a preterm formula and a term formula.
- PDFs are higher in calories, protein, fat, calcium and vitamin D than formulas for term infants. They contain DHA and ARA which may be beneficial for the development of preterm infants.
- PDFs are new on the market and Canadian Paediatric Society (CPS) has not yet issued a recommendation regarding their use.
- CPS defines preterm infants as infants less than 37 weeks gestation and low birth weight infants as less than 2500 g.
- American Academy of Pediatrics recommends that premature infants, once discharged from hospital, be given post-discharge formula until they are 9 months corrected age.⁵²
- If physician or hospital dietitian has made a formula recommendation that recommendation should be followed. Changes to formula should be discussed with physician.
- PDFs are only available in powder format in the retail market.

Post-Discharge Formulas for Premature Infants

Product (Manufacturer)	Kcal/100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100ml	VitD IU/100ml	ARA mg/100ml (WHO: 0.975–1.050% total fat)	DHA mg/100ml (WHO: 0.66–0.370% total fat)	Nucleotides Mg/100ml	Comments
Similac Advance Neosure (Abbott Nutrition)	75	2.1 nonfat milk	4.1 soy oil, high oleic safflower oil, MCT oil, coconut oil, Mortierella alpina oil, Cryptocodium cohnii oil	7.6 lactose, maltodextrin	1.4	79	53	15 (0.37% of total fat)	6 (0.15% of total fat)	7.2	
Enfamil EnfaCare A+ (Mead Johnson)	74	2.1 whey protein concentrate, nonfat milk	3.9 high oleic vegetable oil, soy oil, MCT oil, coconut oil, Mortierella alpina oil, Cryptocodium cohnii oil	7.7 corn syrup, lactose	1.3	89	59	25 (0.64% of total fat)	12.6 (0.32% of total fat)	3.1	

Formula Marketed for Infants 6 – 18 Months

- The higher amounts of calcium in follow-on formulas have no nutritional advantage over starter formulas for infants up to age 12 months. Starter formulas provide adequate calcium⁵³ for infants up to age 12 months.
- Formula fed infants over 12 months of age should be fed follow-on formulas.

Formula Marketed for Infants 6 – 18 Months											
Product (Manufacturer)	Kcal / 100 ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/10 0ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65– 0.70% total fat)	DHA mg/100 ml (WHO: 0.33– 0.35% total fat)	Nucleo- tides mg/100 ml	Comments
EnfaPro (Mead Johnson)	68	1.7 non-fat milk	3.4 (45% fat calories) palm olein, soy oil, coconut oil, high oleic sunflower oil	7.4 lactose, corn syrup solids	1.2	80	40	0	0	0	
EnfaPro A+ (Mead Johnson)	68	1.76 non-fat milk	3.6 (48% fat calories) palm olein, soy oil, coconut oil, high oleic sunflower oil, Mortierella alpine oil, Cryptocodium cohnii oil	7.1 lactose, corn syrup solids	1.35	132	41	23 (.64% total fat)	11.5 (.32% total fat)	0	
Isomil Step 2 (Abbott Nutrition)	68	1.66 soy protein isolate	3.7 (49% fat calories) high oleic safflower/sunflower oil, coconut oil & soy oil	7 corn syrup solids, sucrose	1.2	90	40	0	0		
Similac Advance Step 2 (Abbott Nutrition)	68	1.4 Non-fat milk & whey	3.7 (49% fat calories) high oleic safflower/sunflower oil, soy oil & coconut oil	7.1 lactose, corn syrup	1.2	80	40	0	0	7.2	

Formula Marketed for Infants 6 – 18 Months

Product (Manufacturer)	Kcal / 100 ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100 ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65– 0.70% total fat)	DHA mg/100 ml (WHO: 0.33– 0.35% total fat)	Nucleo- tides mg/100 ml	Comments
Good Start 2 with Omega-3 & Omega-6	67	1.5 Partially hydrolyzed whey	3.4 (46% fat calories) palm olein, soybean oil, coconut oil, high oleic safflower oil/sunflower oil, Mortierella alpine oil, Cythecodinium cohnii oil	7.5 lactose, corn maltodextrin	1.0	81	40	20	10		<ul style="list-style-type: none"> • Some research suggests whey hydrolysate formula may help reduce the risk of cow's milk allergies in infants at risk for allergies. • Not recommended for infants with diagnosed allergy to cow's milk protein..³¹ • Not hypoallergenic..^{3,35} • Very little research available that compares the preventive effects of partially hydrolysed and extensively hydrolysed formulas. • More research is needed to support prevention-based recommendations for partially hydrolysed formulas^{3,32-35} • When the cost of the extensively hydrolysed casein formulas is prohibitive, partially hydrolysed whey protein formula may serve as a prophylactic to reduce the possibility of sensitizing the potentially allergic infant to cow's milk proteins.³⁶
Follow-up Transition (Nestle)	67	1.7 skim milk powder	2.8 (37% fat calories) palm olein, soybean oil, coconut oil, high oleic safflower/sunflower oil	8.9 corn syrup solids; maltodextrin, lactose	1.3	80	40	0	0	0	
President's Choice Step 2 (Superstore/Extra Foods)	68	1.8 skimmed milk powder, whey protein concentrate	3.7 palm olein, coconut oil, high oleic safflower or sunflower oil, soybean oil	6.9 lactose, corn syrup solids	1.2	81.6	44	23.2 (0.63% total fat)	11.6 (0.31% total fat)	0	<ul style="list-style-type: none"> • Lower cost formula.

Formula Marketed for Infants 6 – 18 Months

Product (Manufacturer)	Kcal / 100 ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100 ml	Calcium mg/100 ml	VitD IU/100 ml	ARA mg/100 ml (WHO: 0.65– 0.70% total fat)	DHA mg/100 ml (WHO: 0.33– 0.35% total fat)	Nucleo- tides mg/100 ml	Comments
Alsoy 2 with Omega-3 and Omega-6 (Nestle)	67	1.9 soy protein isolate	3.3 (44% fat calories) Palm olein, soybean, coconut & high oleic safflower/sunflower oils, Mortierella alpine oil, Cryptocodium cohnii oil	7.2 corn maltodextrin, sucrose	1.3	127	40	19 (0.66% total fat)	9.5 (0.33% total fat)	0	<ul style="list-style-type: none"> • lactose-free.

Products Not Recommended For Infants Under 12 Months of Age

- ❑ **Whole Cow's Milk** (3.25% M.F.) should not be introduced prior to 12 months of age due to high renal solute load, poor iron absorption and potential for GI irritation/bleeding, constipation and allergies.^{1, 22, 23} HealthFile 69c *Baby's First Foods* states: "When your baby is 9-12 months old and taking a variety of solid foods, it is okay to offer small amounts of whole milk. Whole milk may be substituted for breast milk or formula when your baby is 1 year old." Whole cow's milk is the main source of fat in a toddler's diet. This higher fat promotes optimal brain and nerve development. Toddlers between age 12 and 24 months of age require 2 - 3 cups of whole cow's milk per day. **Limit a toddler's milk consumption to 3 cups of milk/day. Children who drink more than 3 cups/day are less likely to eat a wide variety of foods and are more likely to become iron deficient.**⁵⁴
- ❑ **Lower Fat Milks** – 2%, 1% and skim cow's milk are not recommended until 24 months of age due to the lower energy and fatty acid content.¹ HealthFile 69c *Baby's First Foods* states: "Babies and toddlers need fat in their diets for brain development, so choose whole milk until age 2 years. Lower-fat milk can be offered after age 2 years."
- ❑ **Calcium Enriched Cow's Milk** is not necessary, as regular cow's milk contains sufficient calcium.
- ❑ **2% Lactaid Milk™ and Lacteeze™** are not recommended for infants under 24 months of age due to lower fat content. If true lactose intolerance has been diagnosed, continue to offer lactose-free formula until 24 months of age or use Lactaid™ drops to treat whole cow's milk. If parents choose to wean between age 12 and 24 months, offer commercial lactase-treated 2% cow's milk and add 1 – 1½ teaspoons non-hydrogenated margarine, butter or vegetable oil to toddler's food daily.
- ❑ **Acidophilus Milk** is not recommended for infants under 24 months of age due to lower fat content. Acidophilus milk contains lactose and is unsuitable for management of lactose intolerance.
- ❑ **Sweetened condensed evaporated milk** – Should not be fed to infants, but may be used in baking.
- ❑ **Coffee Whitener** – Not recommended.
- ❑ **Whole Goat's Milk** should not be introduced prior to 12 months of age due to high renal solute load, poor iron absorption, low level of folate and potential for GI irritation, constipation and allergies.¹
 - 1/3 of proteins are similar to those in cow's milk, therefore, there is the potential for development of allergy in individuals allergic to cow's milk.^{1, 55, 56}
 - Fats may be more easily digested than cow's milk fats.⁵⁵
 - Choose a goat's milk fortified with vitamin D. Infants need supplements if goat's milk is not fortified.
 - Infants/toddlers should be consuming a wide variety of foods per day (including iron-rich foods) before whole goat's milk completely replaces breastmilk or formula.
- ❑ **Unpasteurized milk** – Milk from any animal must be pasteurized prior to human consumption.

Products Not Recommended For Infants Under 12 Months of Age (continued)

- ❑ **Soy Beverages** - not recommended for toddlers (under 24 months of age) due to lower fat content (see Appendix 1, page 32). If offered between 12 – 24 months of age, choose a fortified soy beverage with 5 grams of fat per 250 ml. Children 12 – 24 months of age require 3 cups of fortified soy beverage per day **AND** add at least ½ teaspoon non-hydrogenated margarine, butter or vegetable oil to toddler’s food daily.
- ❑ **Rice and Potato Base Beverages** – Due to very low fat and protein content, *not* recommended as the main milk feeding. May be used in baking.
- ❑ **Beverages marketed for Toddlers or ‘Picky Eaters’** are not recommended as meal replacements.

Products Not Recommended For Infants Under 12 Months of Age										
Product (Manufacturer)	Kcal/ 100ml	Protein g/100ml	Fat g/100ml	CHO g/100ml	Iron mg/100ml	Calcium mg/100 ml	VitD IU/100ml	ARA mg/100 ml	DHA mg/100 ml	Comments
Whole cow’s milk (pasteurized)	62	3.3	3.34 (49% fat calories)	4.7	0.03	117	44	2.0	2.0	<ul style="list-style-type: none"> • Infants/toddlers should be 12 months of age and consuming a wide variety of solid foods daily (including iron-rich foods) before whole cow’s milk completely replaces breast milk or formula.
2% cow milk (pasteurized)	54	3.6	2.1 (35% fat calories)	5.2	0.05	121	44	1.0	1.0	
1% lactose-reduced milk (pasteurized)	44	3.6	1 (20% fat calories)	4.8	0.03	123	41	1.0	1.0	
Goat’s milk (pasteurized)	75	3.9	4.5 (54% fat calories)	4.9	0.05	138	41	0	0	<ul style="list-style-type: none"> • Use brands fortified with Vitamin D or give a supplement of 200 IU of Vitamin D daily.
Enfagrow (Mead Johnson)	72	3.0 whole and skim milk	3.4 Liquid canola oil, high oleic sunflower oil, corn oil, milk fat Powder: milk fat, high oleic sunflower oil	7.6 lactose, sucrose, corn syrup solids, maltodextrin, modified corn starch	1.14	114	20	0	0	<ul style="list-style-type: none"> • Not an infant formula and not intended for use with infants less than 12 months of age. • Not a meal replacement. • If Enfagrow is the only source of fluid milk, a supplement 200 IU of vitamin D is recommended. • Fortified with iron

Products Not Recommended For Infants Under 12 Months of Age

Homemade evaporated whole cow's milk "formula" or evaporated goat's milk "formula"

- **Not recommended prior to 9 months of age.**
- **Infants receiving these formulas require iron supplementation.**⁵⁷
- If parent insists on using evaporated whole cow's milk, follow these recipes for formulas containing appropriate carbohydrate and essential fatty acid blends (EFA). Infants need essential fatty acids until the diet contains additional sources of essential fatty acids.⁴⁴

Infants 0 - 5 months

- 1 can evaporated whole cow's milk (385 ml)
- 2 cans boiled, cooled water (770 ml)
- 3 Tbsp. white sugar (45 ml)
- 1 ½ tsp (7 ml) soybean oil*

Infants 6 - 12 months

- 1 can evaporated whole cow's milk (385 ml)
- 1 can water (385 ml)
- 1 ½ tsp (7 ml) soybean oil*

* Soybean oil may be difficult to find in retail outlets. Available as Crisco™ oil (Only the Crisco™ in the bottle with *blue cap*) or in health food stores. Until current studies demonstrate its safety in infants, the addition of liquid canola oil cannot be endorsed.⁴⁴

- For infants 6 months and older, a more practical route for adding EFA is to add 1 ½ tsp (7 ml) non-hydrogenated soybean oil margarine or canola oil margarine to cereal or vegetables, and later onto bread or toast.
- For evaporated goat's milk "formula" see evaporated whole cow's milk "formula" recipe (above) and goat's milk comments on page 23.
- If using evaporated goat's milk use brands fortified with vitamin D, vitamin C & folate (eg. Meyenburg™).

Oral Electrolyte Solutions

Product (Manufacturer)	Kcal/ 100ml	Comments
Enfalyte (Mead Johnson)	12.5	<ul style="list-style-type: none"> • Oral Rehydration Solutions (ORS) may be used for infants at risk for dehydration due to diarrhea and/or vomiting. • Further info on ORS may be found in the BC Health Guide, page 119 or at: http://www.bchealthguide.org/kbase/frame/tm281/tm2816/frame.htm • Further information on diarrhea may be found in the BC Health Guide, Page 229 or at: http://www.bchealthguide.org/kbase/topic/symptom/diar3/hometrtr.htm • Further information on vomiting may be found in the BC Health Guide, Page 229 or at: http://www.bchealthguide.org/kbase/topic/symptom/vomt3/overview.htm • The Canadian Paediatric Society discourages the use of homemade oral rehydration solutions:⁵⁸ <i>“Home-made oral rehydration solutions are discouraged since serious errors in formulation have occurred.”</i> If parent insists on using homemade oral rehydration solution, follow this recipe⁵⁹ carefully. Ingredients: <ul style="list-style-type: none"> one level teaspoon of salt eight level teaspoons of sugar one litre of potable water Preparation Method: <ul style="list-style-type: none"> Stir the mixture until the salt and sugar dissolve completely.
Gastrolyte Powder (Aventis Pharma)	7 (Reconstituted)	
Pedialyte (Abbott Nutrition)	10	
Pediatric Electrolyte (Pharmascience)	10	

Appendices

Appendix I – Courtesy of Dial-A-Dietitian
Recommendations for infants 12-24 months who tolerate soy but not cow’s milk
Revised April 2006

Concerns:

- Soy starter infant formulas do not contain enough calcium and vitamin D to meet needs in the second year of life. (footnote 1,2)
- Soy formula is more expensive than fortified soy beverages.
- Fortified soy beverages typically contain less fat than soy infant formulas.

Recommendations:

1st choice: Switch from starter soy infant formula to follow-on soy infant formula

- **recommend 560 mL (2 ¼ cups) per day of Alsoy 2 or 685 mL (2 ¾ cups) per day of Isomil Step 2**

Rationale: To match the nutrients a 12-24 month old would receive in 500 mL (2 cups) whole cow’s milk: **17.2 grams fat**, 616 grams calcium, and 180 IU vitamin D

Isomil Step 2 infant formula (Abbott)	100 mL	500 mL	685 mL 2 ¾ cups
Fat	3.7 g	18.5 g	25.3 g
Calcium	90 mg	450 mg	617 mg
Vitamin D	40 IU	200 IU	274 IU

Alsoy 2 infant formula (Nestle)	100 mL	500 mL	560 mL 2 ¼ cups
Fat	3.3 g	16.5 g	18.5 g
Calcium	127 mg	635 mg	711 mg
Vitamin D	40 IU	200 IU	224 IU

2nd choice: Switch from starter soy infant formula to fortified soy beverage that provides 5 grams fat per 250 mL (1 cup)

- **recommend 500-750 mL (2-3) cups per day.**
- **recommend adding 7.5 (1 ½ teaspoons) of extra fat to the diet if 2 cups are taken(footnote 3)**
- **recommend adding 2.5 grams (½ teaspoon) of extra fat to the diet if 3 cups are taken (footnote 3)**
- add vegetable oil or milk free margarine (if milk allergy) to vegetables like mashed potato, or avocado (1/6th avocado equals 1 teaspoon fat)
- if flax oil is used, limit to ¼ teaspoon maximum per day (footnote4).

Rationale: Continuing with a follow-on infant soy formula may not be possible because of the high cost.

Fortified soy beverage	500 mL	750 mL
fat	10 grams	15 grams
calcium	600 mg (footnote 5)	900 mg (footnote 5)
Vitamin D	200 IU	300 IU

1. Infant Feeding Choices Product Comparison. Nestle Nutrition. March 2005.
2. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine. Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride 1999. Available from: NAP: <http://books.nap.edu/books/0309063507/html/index.html/accessed> accessed 16 January 2006.
3. Letters between Dial-A-Dietitian and Dr. Doris Yuen, Chair, Nutrition Committee, Canadian Pediatric Society. 1999
4. Flax Council of Canada e-mail response January 2003
5. Zhao, Martin, and Weaver. Calcium Bioavailability of Calcium Carbonate Fortified Soymilk is Equivalent to Cow’s Milk in Young Women. J. Nutr. 2005;135:2379-2382.

Appendix II

Suggested Fat Sources for Toddlers Consuming Lower Fat Formulas/Milks/Drinks*

Non Dairy Sources	Dairy Sources	Suggestions for Mixed Foods
Medium or firm tofu Meat/Poultry Oily Fish (salmon, sardines, mackerel, herring, smelts, ooligan) Egg yolks Nut butters ⁺ Peanut butter ⁺ Seed butters ⁺ Avocados Vegetable oils Non-dairy ghee Soy yogurt, full-fat [•] Soy cheese, full-fat [•] Coconut milk Mayonnaise (not homemade)	Cheese 3% M.F. or higher yogurt Butter or non-hydrogenated margarine Cream Whipping cream Regular sour cream (not non-fat) Butter ghee Custard Rice Pudding } Made with whole milk Tapioca } or cream Milk puddings Flavoured fresh cheeses, e.g. Minigo TM , Petit Danone TM .	Mashed potatoes or cooked cereal with butter, cream or margarine added Home-baked goods made with vegetable oil, butter or non-hydrogenated margarine Buttered foods (toast, pasta, vegetables) French toast Scrambled eggs with cheese Home-made macaroni and cheese with extra butter and/or cheese Add grated parmesan or romano cheese to foods. Spread goat cheese and avocado on toast Add whipping cream or coconut milk to cream-based soups

- * Many of these foods may cause allergic reactions
- Soy products which may contain dairy ingredients
- ⁺ choking risk

Protocol for Safe Microwave Heating of Refrigerated Infant Formula

Toddler's First Steps states:

Liquids can heat unevenly, possibly scalding your child's mouth. Glass bottles can get too hot and burn your or your child's hands. Plastic bottles may release chemicals into the hot liquid. It's safer to heat glass or plastic bottles of formula or milk in hot water. If you heat any food or drinks in a microwave, stir the contents well before serving to spread the heat more evenly.

Health File 69b Formula Feeding Your Baby: Safely Preparing and Storing Formula states:

"Do not microwave formula because the uneven heating can burn your baby's mouth."

If a caregiver insists on microwaving infant formula, they must use the following protocol.

Prior to Heating:

- **Use microwave proof plastic bottles that do not require plastic liners.**
- Do not place baby-bottle nipples in the microwave.
- Always heat at least four ounces.
- Heat only formula taken straight from the refrigerator.
- Always leave bottle top uncovered to allow heat to escape.
- Always stand bottle upright with the formula in it. Laying a capped bottle on its side could result in excess heating on top portion.

Heating Instructions:

- Heat 4 oz. of formula at full power for no more than 30 seconds.
- Heat 8 oz. of formula at full power for no more than 45 seconds.

Serving Instructions:

- Replace nipple, invert 10 times (shaking is not necessary).
- Formulas should be cool to the touch; formula warm to the touch is greater than body temperature and may be too hot to serve.
- Always test formula; place several drops on your tongue or on top of your hand (not the inside of your wrist).



Reference: Sigman-Grant, M. et al, Microwave Heating of Infant Formula: A Dilemma Resolved, Pediatrics, Vol. 90, No. 3, Sept. 1992, pp. 412-41

Pictures: Dixon, J.J., et al, Severe Burns Resulting from an exploding teat on a bottle of infant formula milk heated in a microwave oven. Burns, Vol 23, No.3, 1997, pp 268-269

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Compendium of Breast milk Substitutes

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3. Anonymous. American Academy of Pediatrics. Committee on Nutrition. Hypoallergenic infant formulas. *Pediatrics*. 2000;106(2 Pt 1):346-349.
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