

Feeding Healthy Term Infants Resource Manual

Section C. Introduction of Other Fluids

C.1 Whole Cow's Milk

Recommendations

- a) Pasteurized whole cow's milk (3.25% milk fat) can be introduced at 9–12 months of age if the child is eating a variety of solids and adequate iron-containing foods.
- b) Unpasteurized or raw milk should not be given to an infant as it can cause food-borne illness.
- c) When an infant is completely weaned from formula and/or breast milk, whole milk should be offered at a minimum of 500 mL (16 ounces) per day and a maximum of 750 mL (24 ounces) per day to ensure adequate intake of solids.
- d) Pasteurized whole cow's milk should be continued until 2 years of age.
- e) Whole cow's milk is not suitable for infants:
 - with cow's milk allergy
 - <9 months old
 - with galactosemia
 - with lactose intolerance

Evidence

- National guidelines recommend that cow's milk should not be introduced before 9–12 months of age.¹ Current Canadian guidelines recommend exclusive breastfeeding as the optimal nourishment for infant growth from birth to 6 months and beyond, with the introduction of nutrient-rich complementary foods at 6 months.^{1,2} [*Level A Evidence*]
- The use of cow's milk, especially in the first 6 months of life, has been associated with small amounts of blood in the stool.^{1,3} The mechanism by which cow's milk causes gastrointestinal bleeding is not known. The substance in cow's milk that causes gastrointestinal blood loss is inactivated by heat treatment.⁴ Ziegler and colleagues found that the response in intestinal blood loss to cow's milk introduction disappeared entirely by 12 months.⁵ [*Level B Evidence*]
- The iron content of cow's milk is low and is poorly absorbed. The iron concentration of cow's milk ranges between 0.2 and 0.3 mg/L. Although the iron content of breast milk is lower, it is 45–100% absorbed.³ These factors have the potential to contribute to iron deficiency anemia in infants fed cow's milk before 9 months of age. [*Level B Evidence*]
- Cow's milk may displace other foods that are sources of other nutrients not found in milk. For this reason, cow's milk intake should not exceed 750 mL/day for young children.¹ In addition to iron, fibre intake could be negatively affected, potentially leading to constipation.^{1,6}
- Cow's milk has a higher renal solute load than breast milk or infant formula. This may not be a problem for healthy infants, but those who have increased water losses caused by diarrhea and decreased intake from vomiting may become dehydrated.^{7,8} [*Level C Evidence*]

- Healthcare providers should consider that there are likely varying appropriate ages, determined by multiple factors (e.g. maternal prenatal nutritional status, gestational age and socioeconomic conditions), when counselling caregivers about the introduction of whole cow's milk.^{9,10} [Level C Evidence]
- It is illegal to sell unpasteurized milk in Canada. Unpasteurized cow's milk (raw milk) should never be offered to infants due to the risk of food-borne illness from pathogens such as *Salmonella*, *Escherichia coli*, *Campylobacter*, and *Listeria monocytogenes*.^{1,11}

References

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Client Resources

- *Feeding Your Breastfed Baby Solid Foods: 6 Months to 1 Year*. Winnipeg, MB: Healthy Child Manitoba, Healthy Start for Mom & Me, Winnipeg Regional Health Authority, Dial-a-Dietitian; 2014. Available at: <http://www.gov.mb.ca/healthyliving/hlp/docs/nutrition/breastfed.pdf>.
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- *Start Solid Foods at ... 6 Months*. Winnipeg, MB: Healthy Start for Mom & Me, Winnipeg Regional Health Authority; 2011. Available at: <http://www.hsmm.ca/wp/wp-content/uploads/start-solid-foods-at-6-months-feb-2011.pdf>.
- *Feeding Your Child: 8 Months to 2 Years Old. A Guide for Parents and Caregivers*. Winnipeg, MB: Winnipeg Regional Health Authority; 2009.

C.2 Low-fat Cow's Milk

Recommendations

- a) Consumption of pasteurized low-fat cow's milk (1% or 2% milk fat) is not recommended during the first 2 years of life.
- b) If pasteurized low-fat milk is consumed by children <2 years of age, it should be limited to 750 mL (24 ounces) per day.
- c) Pasteurized skim milk is inappropriate for children <2 years of age.
- d) Low-fat cow's milk is not suitable for infants:
 - with cow's milk allergy
 - <2 years old
 - with lactose intolerance, unless treated with lactase enzyme
 - with galactosemia, glycogen storage disease or certain other inborn errors of metabolism

Evidence

- Pasteurized whole cow's milk may be an important component of a varied infant diet after 9 months of age,¹ contributing energy as well as several key nutrients.
- During infancy, a high-fat diet (approximately 50% of energy from fat) helps to ensure an adequate intake of energy and fatty acids for growth and development.² [Level C Evidence]
- Cow's milk, especially skim and lower-fat milk, has very low levels of essential fatty acids.^{2,3} [Level C Evidence]
- Skim milk, which contains 0.36 Kcal/mL, is very low in energy density.^{2,3}
- There has been no clear documentation of negative effects to infants fed low-fat cow's milk before 2 years of age; however, there is a theoretical risk of essential fatty acid deficiency and decreased growth.² [Level C Evidence] If pasteurized low-fat milk is introduced before an infant is 2 years old, intake should be limited to 750 mL (24 ounces) per day.³

References

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- *Making Connections: Your First Two Years with Baby*. Winnipeg, MB: Healthy Child Manitoba, 2009. Available at: http://www.gov.mb.ca/healthychild/healthybaby/hb_makingconnections.pdf.
- *Feeding Your Child: 8 Months to 2 Years Old. A Guide for Parents and Caregivers*. Winnipeg, MB: Winnipeg Regional Health Authority; 2009.

C.3 Goat's Milk

Recommendations

- a) Pasteurized goat's milk is not recommended as an alternative to breastfeeding in infants <9 months, as it has low iron and folic acid content, and low levels of essential fatty acids.
- b) Pasteurized whole goat's milk fortified with folic acid and vitamins A and D can be introduced at 9–12 months of age if the infant is eating a variety of solids and adequate iron-containing foods.
- c) When the infant is completely weaned from formula and/or breast milk, fortified whole goat's milk should be offered at a minimum of 500 mL (16 ounces) per day and limited to 750 mL (24 ounces) per day to ensure adequate intake of solids, especially those high in iron.
- d) Goat's milk is not suitable for infants:
 - <9 months old
 - with lactose intolerance unless treated with lactase enzyme
 - with galactosemia, glycogen storage disease or certain other inborn errors of metabolism
 - with confirmed cow's milk allergy

Evidence

- Pasteurized goat's milk is not recommended as an alternative to breastfeeding before 9 months because it has low iron content and folic acid and low levels of essential fatty acids.^{1,2}
- When infants are 9-12 months of age, full-fat goat's milk fortified with vitamin D and folic acid is a suitable whole cow's milk alternative.³ [*Level C Evidence*] Unlike cow's milk, goat's milk may or may not be fortified with vitamin D (fortification will be indicated on the label).
- Because of cross-reactivity due to similarities in milk protein sequences, infants who are allergic to cow's milk protein are also likely to have an allergic reaction to goat and sheep's milk.³ [*Level C Evidence*]
- Goat's milk has a higher renal solute load than breast milk or infant formula. This may not be a problem for healthy infants, but those that have increased water losses caused by diarrhea and decreased intake from vomiting may become dehydrated.^{2,4} [*Level C Evidence*]
- Both cow's and goat's milk contain lactose. Goat's milk has smaller fat droplets which may be easier to digest but this is unproven.^{5,6}

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C.4 Soy, Rice and Other Plant-based Beverages

Recommendations

- a) Soy (except soy infant formula), rice, almond, hemp, coconut or other plant-based beverages (whether or not they are fortified) are inappropriate alternatives to breast milk, infant formula or whole cow's milk in the first 2 years of life.^{1, 2}
- b) Children <2 years of age who are not breastfeeding, consuming a cow's milk-based formula or whole cow's milk, should consume a soy-based commercial infant formula rather than plant-based beverages.²
- c) Full-fat, fortified, unflavoured, unsweetened soy beverage may be offered occasionally as a complementary food, in addition to breast milk or whole cow's milk as the main milk source.²
- d) Children <2 years of age who are consuming soy, rice, almond, hemp, coconut or other plant-based beverages should be followed by a doctor or dietitian to ensure they are meeting their nutritional needs.

Evidence

- Whether or not they are fortified, soy, rice and other plant-based beverages, are not appropriate alternatives to breast milk or infant formula. They are nutritionally incomplete for infants and consuming them may result in failure to thrive.¹
- Whether or not they are fortified, soy, rice, almond, hemp, coconut or other plant-based beverages are not appropriate as the main milk source for a child <2 years. Other than soy beverage, plant-based beverages are not nutritionally comparable to homogenized (3.25% M.F.) cow's milk. Most are low in energy, fat and often protein. Some may not contain adequate amounts of several vitamins and minerals.²
- Rice and almond-based beverages are especially low in protein. This is a concern for infants, since they obtain most of their protein from their milk source. Rice beverage has been linked to severe malnutrition when given to infants and young children. Coconut 'milk' is very high in calories, with most of the calories coming from fat, and very low in calcium.²
- Limited case reports have identified kwashiorkor and rickets in infants fed rice, nut or soy beverages. An additional concern is the potentially high levels of arsenic in rice beverages.³
[Level C Evidence]
- Although fortified plant-based beverages have comparable amounts of calcium and vitamin D as fortified cow's milk, they do not contain the amounts of vitamins and minerals naturally present in cow's milk (with the exception of fortified soy beverage, which after fortification is similar, but not equivalent to cow's milk). The most likely vitamins and minerals to be compromised in fortified version of these beverages are magnesium, zinc, vitamin A, riboflavin, vitamin B6 and iodine. Unfortified versions are also low in vitamins A, D, B12, riboflavin, calcium, zinc and protein.^{3,4}

- Manganese has also been found to be high in soy and rice beverages compared to soy and cow’s milk-based infant formula. If consumed as the sole source of nutrition, infants receiving soy or rice beverages would approach the Tolerable Upper Intake Level of manganese for children 1-3 years old (there is no UL for manganese for infants). This would increase the risk of adverse neurological effects in infants.^{3,5} [Level C Evidence]

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C.5 Water

Recommendations

Amounts of water

- a) Water is not needed in the first 6 months of life for healthy infants fed breast milk or infant formula.
- b) Infants can be breastfed or formula-fed more often in hot weather to prevent dehydration.
- c) Water is not generally needed to quench thirst in infants 6–12 months of age, as breast milk, infant formula and complementary foods will provide adequate fluid to meet requirements. However, parents and caregivers may choose to offer water in a cup after 6 months of age to help infants learn to drink from a cup.
- d) Water should not replace breast milk, infant formula or whole cow's milk.
- e) From one year of age, encourage parents and caregivers to offer water frequently to satisfy thirst rather than fruit juice.

Types of water

- f) Winnipeg municipal tap water from the cold tap is safe for infants. Let the tap run until the water turns cold before drinking or using to prepare infant formula. This will flush out contaminants (e.g. copper) built-up in the pipes.
- g) Winnipeg home built before the mid-1950s may have lead service lines and homes built before 1989 may have other sources of lead in their plumbing system. Advise clients living in older homes to flush the plumbing system before using any water for drinking, cooking or boiling to prepare infant formula if water has been standing in the pipes for more than 6 hours (e.g. overnight, after a work day). Plumbing systems can be flushed by flushing the toilet, taking a shower, or starting a load of laundry. For more information, including how to determine whether a home has a lead service line, visit the City of Winnipeg website: <https://winnipeg.ca/WaterAndWaste/water/lead.stm#tab-water>
- h) Well water that meets safety standards is safe for infants. Test well water at least twice per year. (Health Canada states that well water should be tested for nitrates, fluoride and coliform bacteria. Water should have less than 45 mg/L nitrates and no more than 1.5 mg/L fluoride). For further information on testing well water, visit: http://www.gov.mb.ca/conservation/waterstewardship/odw/public-info/fact_sheets/pdf/pr_5a_well_water_factsheet_2_how_to_test_well_water.pdf or call Winnipeg Regional Health Authority Health Links at 204-788-8200.
- i) Commercially bottled water (except carbonated and mineral waters) is safe for infants.

Evidence

- Infants exclusively fed breast milk from birth to 6 months of age do not require extra water.^{1,2} This is true not only during mild climate conditions, but also in hot and humid climates.³ It is also true for term infants with low birth weight.⁴ [*Level C Evidence*]
- Infants between 7 and 12 months of age obtain water from the combined sources of breast milk, infant formula, complementary foods and drinking water for a total of approximately 0.8 L/day. Approximately 0.6 L of this amount is from fluid.^{1,5} [*Level C Evidence*]
- Water used in feeding infants, either for drinking and/or in the preparation of food and other beverages must be clean and free from bacterial and chemical contamination. Tap water (only from the cold water tap), well water that meets safety standards, and commercially bottled water (except carbonated, mineral or flavoured waters) are generally suitable for infant feeding.^{2,5} [*Level C Evidence*]
- Water from the hot water tap may contain more lead and other non-biological contaminants because hot water can dissolve them more easily.⁶
- Contaminants such as lead and copper may accumulate in water pipes when water has been standing in the plumbing system for a long time (e.g. overnight, during the work day). Letting the tap run until it turns cold will flush out any build-up of copper and contaminants other than lead.
- Homes in Winnipeg that were built before the mid-1950s may have lead service lines. Other older homes may have lead solder connections or water taps made out of brass and chrome-plated brass. Before 1989, lead solder was widely used to connect water pipes. Flushing the plumbing system by flushing the toilet, taking a shower or starting a load of laundry will flush out any build-up of lead.⁶ Recommendations vary for how long to run water, if using this method to flush the plumbing system. The amount of time recommended to run water ranges from 2-5 minutes⁷ up to 10 minutes.⁶
- Caution is indicated when using well water for infant feeding because it may contain naturally high concentrations of nitrates, nitrites, arsenic, fluoride or other heavy metals. If well water is used, testing for these substances, as well as coliform bacteria, is recommended at least twice a year.⁷ Water containing more than the maximum acceptable concentration of nitrate (45 mg/L) or 10 mg/L nitrate-nitrogen is a health hazard for infants.² Nitrates are not eliminated by boiling water.
- Water containing in excess of 1.5 mg/L of fluoride may cause dental fluorosis and should not be used.²
- There are no clear indications for the use of distilled water.²

References

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Updated July 9, 2019

C.6 Fruit Juice

Recommendations

- a) Fruit juice is not recommended for infants younger than six months of age. There is no nutritional benefit to introducing fruit juice in the first year of life.^{1,2}
- b) Infants do not need fruit juice and it should not be offered even after 6 months of age. However, if it is offered it should:
 - be infrequent
 - be offered not more than once per day
 - not exceed 125 mL per day
 - be offered as part of a meal or snack in an open cup (not a sippy cup or bottle); and
 - be pasteurized, 100% juice (i.e. avoid fruit “beverages”, “drinks”, or “punches”).
- c) From 1 year of age, encourage parents and caregivers to offer water frequently to satisfy thirst.
- d) Encourage parents and caregivers to offer vegetables and fruit to infants and children instead of juice.

Evidence

- The American Academy of Pediatrics recommends that fruit juice not be offered to infants less than 6 months of age as there is no nutritional benefit to doing so.¹
- Offering fruit juice to infants before solid foods are introduced into the diet could risk having juice replace breast milk or infant formula.¹
- Health Canada advises that after six months of age, juice should be offered infrequently or not at all and should be limited to once or twice a day for a total daily amount of 125-175 mL/day. This amount of juice also applies to children aged 1 to 6 years.^{2,3,4}
- For children older than 6 months of age, fruit juice intake can displace intake of breast milk and may contribute to inadequate intakes of nutrients from solid foods. Young children have small stomachs and fill up quickly on beverages.³
- Excessive fruit juice consumption has been associated with early childhood tooth decay, malnutrition (over and under nutrition), gastrointestinal symptoms (e.g. diarrhea, flatulence, abdominal distention) and decreased calcium.^{2,3} [*Level B Evidence*]
- Drinking juice has been associated with dental decay in young children.³ The sugars found in fruit juice (sucrose, glucose, fructose) promote dental caries and can easily demineralize enamel and dentin,⁵ leading to tooth decay and nursing bottle syndrome.^{6,7}
- Allowing children to carry a bottle, 'sippy' cup, or juice box around throughout the day encourages constant consumption and over exposure of the teeth to sugar. Offerings should be limited to no more than one or two times per day at meals or snacks in an open cup.^{2,3} [*Level C Evidence*]

- Unpasteurized fruit juice may contain bacteria (*E. coli* O157:H7, *Salmonella*, *Cryptosporidium*) and some viruses that can cause illness and possibly death.^{1,2} [Level B Evidence]
- Fruit juice lacks the fibre of whole fruit. Fruits and vegetables should be emphasized instead of juice as recommended in Canada's Food Guide. Only 100% fruit or vegetable juice should be offered.³
- There is no clear evidence to support diluting juice for healthy children, although this is a common practice.²

References

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C.7 Herbal Teas and Products

Recommendation

The use of herbal teas and products is not recommended for infants or young children.¹

Evidence

- There is limited scientific evidence regarding the effectiveness and safety of herbal teas and products.¹
- Due to the lack of standards and regulations regarding herbal teas and products, there is concern regarding quality control. The composition of herbal teas varies considerably among products.^{1,2}
- “Natural” does not necessarily mean “safe” or “harmless.”²
- There are risks to using herbal teas and related products as they may have pharmacologic actions causing potentially harmful side effects.^{1,3}
- Herbal teas often contain sugar and alcohol, potentially interfering with breastfeeding.¹
- Tea could decrease an infant’s intake of breast milk, infant formula or whole cow’s milk, depending on the amount of tea that may need to be consumed, resulting in inadequate intake of nutrients.³
- Herbal tea, containing a mixture of herbs, has been shown to eliminate colic in some infants. However, the use of herbal teas to treat colic is not recommended for several reasons, including the lack of standardization of strength and dosage of herbal products and the multiplicity of products available.³ [Level B Evidence]

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C.8 Open Cups and Sippy Cups

Recommendations

- a) Infants should be encouraged to learn to drink from an open cup at 6 months when solid foods are introduced. Open cups support the development of mature drinking skills.
 - The infant should be seated in a highchair. A small, open cup one-third full can be placed on the infant’s lower lip and a small amount tipped into the infant’s mouth. The infant’s head should be in a neutral, aligned position. Care should be taken that the neck is not hyper extended (tilted backwards) to reduce the risk of aspiration. The infant should be sitting straight, not leaning back or forward.
- b) Straw cups are acceptable for use by infants and may be used when an open cup is inappropriate due to the risk of spills.
 - Straw cups should not be filled with sugar containing beverages such as juice.
 - Milk should only be offered in a straw cup at meals or snacks.
 - Infants should not be allowed to carry the cup with them throughout the day.
- c) Sippy cups are not recommended for use after 12 months. They do not support mature oral development or drinking skills.
- d) Parents who choose to use sippy cups for their infants should be cautioned as follows:
 - Offer it during a meal or snack while the infant is seated. Infants should not be allowed to carry the cup with them throughout the day.
 - Do not use a sippy cup for juice or sugar sweetened beverages.
 - Clean the valve well and often to prevent bacterial growth.
 - Discontinue use by 12 months.

Evidence

Open Cups

- At 6 months, an infant’s lip and tongue movement are more independent of his/her jaw movement. This improves his/her readiness to drink from an open cup.¹
- As the infant learns to drink from an open cup, he will develop a coordinated sucking action and begin to hold his jaw in a stable open position. He will gradually learn to pace his intake and control his breathing and swallowing. The use of an open cup allows for the development of mature drinking skills and promotes mature oral development.²
- Using an open cup for infants older than 6 months reduces prolonged bottle feeding and therefore may decrease the risk of dental decay and excess calorie consumption from liquids.²

Straw Cups

- When used properly, straw cups are an acceptable alternative to sippy cups as they do not inhibit oral motor development. Drinking from a straw encourages a mature tongue position, allowing the tongue to lift to the palate.¹

- The straw should sit on the lips of the infant or young child and should not be too far back in the mouth. Otherwise, it would be similar to drinking from a sippy cup.¹
- To reduce the risk of dental decay, straw cups should not be filled with sugar containing beverages such as juice. Milk should only be offered in a straw cup at meals or snacks and children should not be allowed to carry the cup with them throughout the day.

Sippy Cups

- A no-spill sippy cup is a cup with a lid and valve to prevent spills and leakage. Many are equipped with valves that prevent leakage even if the cup is turned upside down.³
- To drink from a sippy cup with a valve, a child's mouth has to be in the suckling position, with the tongue out and over the lip, similar to the position used for bottle-feeding.⁴
- Sippy cup use promotes an immature drinking and swallowing pattern similar to a bottle. During a mature swallow, the tip of the tongue rises to the alveolar ridge behind the top front teeth. This mature swallow is normally present around 12 months. Sippy cup use can impede the development of this process. The tongue-tip lifting process is important for mouth clearing (important for oral hygiene), sophisticated oral motor patterns (tongue and jaw moving independently) and for mature speech development (production of sounds in which the tongue tip rises, e.g. t, d, n, l).^{1,5}
- An immature swallow pattern can be associated with oral hygiene problems, significant orthodontic problems (e.g. overbite, gaps between teeth) and speech problems (e.g. lisps, r and l distortion).^{1,5}
- Frequent use of a sippy cup can increase the risk of dental decay, if the infant/child uses it consistently throughout the day.^{1,3}
- Dentists advise that sippy cups should be used in moderation. They should only be offered at meal and snack times, and not while riding in a car or stroller.³ Furthermore, an infant should never be put to bed with juice or milk, because the liquids will "pool" around his/her teeth, causing tooth decay.⁶
- Sippy cups should be cleaned regularly. The valve needs particular attention, as it may harbour bacteria.⁴
- Prolonged bottle use (and similarly sippy cup use) can lead to excess calorie consumption and may increase the risk of obesity.⁷

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