Sugars in fortified milks marketed for children over 1 year.

In recent years there has been a proliferation in the production and marketing of fortified milks for children over the age of 1 year around the world. Despite recommendations that children from 12 months onwards should have the majority of their nutrients from a diverse local diet, alongside continued breastfeeding or, in some areas, the consumption of whole (full-fat) animal milk, these products have created a new market. The marketing of these milks frequently exploit parental concerns about child nutrition, and the marketing of fortified milks by the same companies that produce infant formula allows cross-promotion and brand extension.

The World Health Organisation has outlined the role of sugars in the development of obesity and chronic disease and have made recommendations that adults and children reduce their consumption of sugars to <10% of total energy or to < 5% for additional health benefits (WHO, 2015). Other expert committees such as The Scientific Advisory Committee on Nutrition in the UK have also recommended that average population intakes of 'free sugars' should not exceed 5% of energy for age groups from 2 years upwards (SACN, 2015). High sugar intakes are discouraged in the diets of all toddlers who require nutrient dense diets and it is recommended that added sugars are kept to a minimum (NHS Choices, 2016).

Fortified milks can undermine good nutrition in young children since they are almost universally higher in sugar than a plain animal milk or unsweetened milk alternative and many are flavoured. The potential contribution of higher-calorie, energy-dense milk products to overweight and obesity in children has been suggested (Brand-Miller et al, 2013). Plain animal milk has a composition which may be protective against the development of insulin resistance and chronic disease (Pereira et al, 2002) and therefore if alternatives to this increase risk of chronic disease, this is of concern to public health. The consumption of easily absorbed sugars can stimulate excessive postprandial hypoglycaemia and insulinaemia, which may be linked to risks of obesity, type 2 diabetes and coronary heart disease (Brand-Miller et al, 2013). Measurement of metabolic responses to consumption of a range of fortified milks with added sugars has reported that some of the milks sampled had a glycaemic index that was similar to consuming a sugar-sweetened soft drink (Brand-Miller et al, 2013). (The glycaemic index indicates how quickly the body produces insulin in response to a sugar load.)

Fortified milk with glucose sugars is likely to contribute to higher levels of dental decay in infants and children (Grenby and Mistry, 2000) and the added sugars in many milks may present risk of oral ill-health to older children. Although the evidence is not clear, it has also been suggested that repeated exposure to sweet, flavoured drinks in infancy and toddlerhood might contribute to the development of a preference for sweet drinks in later life. The health risks associated with regular consumption of fortified sweetened milk products by young children could therefore be significant.

Do children aged 1-3 years need fortified milks?

Fortified milks are aimed at toddlers and young children, who should be obtaining the majority of their nutrients from a diverse local diet and, where mothers choose to continue breastfeeding, will also receive nutrients from breast milk. It is generally recommended that toddlers eat a good variety of foods to supply the majority of their nutrients, rather than relying on fortified milk products to

supply them. This guidance is typically given in many developed countries and generally full-fat or whole cows' milk is considered a suitable choice as the main drink for most toddlers from the age of 1 year, alongside a varied diet. The Department of Health in the UK recommends that, from the age of 2 years, children who are growing normally and eating a healthy balanced diet can move on to semi-skimmed cows' milk (Start4life, 2013) and similar advice exists in other countries. New Australian infant feeding guidelines state that:

"Toddler milks and special or supplementary foods for toddlers are not required for healthy children" (Australian Government et al, 2013).

The European Food Safety Agency (EFSA) agrees: in their report in October 2013 they clearly stated:

"*No unique role of young-child formulae with respect to the provision of critical nutrients in the diet of infants and young children living in Europe can be identified, so that they cannot be considered as a necessity to satisfy the nutritional requirements of young children*"

In 2016 the German Federal Institute for Risk Assessment (BfR) clearly stated that fortified milks for children over 1 year are superfluous in a balanced diet for young children, offer no nutritional advantage, and there may be potential risk from an 'uncontrolled increase' in the intake of some nutrients (BfR, 2016). This statement also points out that manufacturers' of fortified milks for toddlers frequently refer to high consumption levels on the product packaging which could lead to high intakes of both macro and micronutrients.

The composition of fortified milks

The basic components of most infant and other milks, regardless of the format (powder or ready-to-drink), are water, proteins, fats, carbohydrates, vitamins and minerals. The majority of fortified milks start with a base of cows' milk (skimmed or full-fat, liquid or powder, or using whey protein concentrates) with added lactose or other sugars and carbohydrates, vegetable and other oils, vitamins and minerals. Other milks may be based on soy protein from soya beans, with added vegetable and other oils and maltose, maltodextrins or glucose polymers. Additional components are then added for which a range of claims are frequently made and some of these ingredients are similar to those used in infant formula. Fortified milks for older children are however significantly less modified than infant formula since regulations on composition are more limited or non-existent. This means that the content of some nutrients is lower than in animal milk equivalents. More information about this, a summary of the components of most infant formula and evidence relating to their efficacy can be found in the regularly updated report *Infant Milks in the UK*, available at www.firststepsnutrition.org.

Legislation for fortified milks for children over 1 year

The Codex Alimentarius Commission standard (Codex Alimentarius, 1987) for follow-up formula is used by some countries as the basis for their follow-up formula milk regulations and it is also the default standard for international trade in follow-up formula. The Codex standard defines follow-up formula as:

"a food intended for use as a liquid part of the weaning diet for the infant from the 6th month on and for young children", where infants are defined as *"a person not more than 12 months of age*" and young children as *"persons from the age of more than 12 months up to the age of three years.*"

The Codex standard is therefore applicable to follow-up formula products aimed at children aged between 6 months and 36 months of age. This Codex standard is currently under review as many countries are unclear as to how to define infant formula, follow-on formula and fortified milks for

older children. Consequently, in some countries there is a lack of specific national regulation for fortified milks marketed to children from the age of 12 months.

If the Codex standard is used then unlike fats and proteins, the addition of carbohydrates is not regulated within specific upper and lower limits. Carbohydrates may be added in quantities that, after accounting for the energy value of the protein and fats added, bring the energy density of the product into the specified range.

" shall contain nutritionally available carbohydrates suitable for the feeding of the older infant and the young child in such quantities as to adjust the product to the energy density in accordance with the requirements set out in Section 3.12" (Codex Alimentarius 1987)

Theoretically, if a fortified milk were to contain the minimum permissible levels of protein and fat, and the maximum permissible energy density, the nutritionally available carbohydrate content could reach 12.4g/100ml or 3.7g/100kJ. This is equivalent to 58% of energy in the product coming from free sugars (where sugar is calculated as providing 4kcal/g). An average 1-3 year old having 5% of their energy intake from free sugars would require only 13.0g free sugar in the diet per day from all sources (SACN, 2011).

There is no provision made in the Codex standard for the type of nutritionally available carbohydrates that may be added to fortified milks. Sugars with a much sweeter taste than the lactose found in cows' milk may be added. Products may also be flavoured, and there is therefore, the potential for very sweet products with high levels of added sugars to be available on the market, even in countries where regulations exist.

Sugars in fortified milks

Lactose is the major carbohydrate of human milk and cows' milk and is the main source of carbohydrate in infant milks. In general, infant milks based on soy protein have glucose, maltose or glucose polymers added as a source of carbohydrate. Maltodextrin, used in some milks, is usually derived from maize (corn) or potatoes and many fortified milks have added glucose, glucose syrups, sucrose or corn syrup, and usually a combination of these to achieve the desired energy intake with an acceptable level of sweetness. Honey is also used in some products as a flavouring.

Carbohydrate fractions are often added in small quantities in milk as a source of prebiotics, and it can be complex to calculate added sugar when only total carbohydrate is given. Manufacturers rarely provide clear data on the added sugar content of their fortified milks in a form which allows the consumer to clearly see how much additional sugar they provide compared with whole animal milk.

Table 1 outlines a selection of fortified milks marketed for children in the 1-3 years age range, the manufacturer and country of sale and the energy and macronutrient content per 100ml as stated or calculated from information on product labels. There is a huge global market for these products and this table simply presents a small range of products currently available in a range of countries. A previous report *'Fortified milks for children'* (First Steps Nutrition Trust, 2013) considered a much greater number of products and can be accessed at www.firststepsnutrition.org.

The aim of this table is to give an overview of some of the products currently on sale and the range of carbohydrate and total energy values represented. The milks named here will be available in a number of countries worldwide and the country of sale shown here for the product relates to where the product information we have used has been sourced in 2016. The products sold under the same brand elsewhere may have similar composition, but this cannot be guaranteed.

Table 1. Total energy and macronutrient content of some example fortified milks suitable for children aged 1-3 years, or for an age group including children of this age, compared with whole cows' milk

	Energy	Protein	Carbohydrate	Fat	Flavour added	Country of sale
Milk name*	kcal/100ml	g/100ml	g/100ml	g/100ml		
Whole cows' milk	**66**	**3.3**	**4.8**	**3.9**	**-**	-
Fonterra Anmum Pediapro 3[1]	66	3.4	6.3	3.1	Vanilla	New Zealand
Danone Aptamil Growing-up milk from 2 years	50	1.3	6.5	1.9	Milk	UK
Cow and Gate Growing-up Milk 2-3 years	50	1.3	6.5	1.9	Milk	UK
Plasmon (Heinz) Latte Junior 4	53	2.1	7	1.8	Vanilla	Italy
SMA Pro Toddler Milk	64	1.5	7	3.3	Vanilla	UK
Nestlé Nido 1+	60	2.5	7.5	2.9	-	USA
Abbott Similac Gain IQ 1+	74	2.8	7.8	3.5	Vanilla	Singapore
Cow and Gate NutriJunior	69	2.3	8.2	NK	Vanilla	Uganda
Hipp Organic combiotic Growing up Milk	66	1.4	8.2	3.0	-	UK
Danone Aptamil Profutura Growing-up milk from 1 year	65	1.6	8.4	3.5	-	UK
Nestlé Nan Pro 3 12 months	67	1.5	8.8	2.9	Vanilla	Australia
Nestlé Mio Latte per la Crescita 1-3 years	70	1.9	8.5	3.1	Vanilla	Italy
Humana Latte di Crescita 3 1-3 years	69	1.5	9.3	2.9	Vanilla	Italy
Freisland Campina Friso Gold Young Explorer 1+	73	2.9	9.5	2.5	Vanilla	Singapore
Mead Johnson Enfagrow A+ 1+	80	3.2	10	3.1	Milk	Canada
Wyeth (Nestle) S-26 Progress Gold 1-3 years	80	2.6	10.4	3.0	Vanilla	Singapore
Mead Johnson Enfagrow A+ 1-3 years	78	2.7	10.4	2.9	Vanilla flavouring	Singapore
Nestlé Ninho Frutti 2-6 years	67	2.0	11.0	1.7	From fruit pulp only	Brasil
Aspen Nutritionals (Pfizer/Nestlé) Infacare Growing-up milk 1-3 years	88	3.2	11.4	3.3	Vanilla flavouring	Uganda
Nestlé Nutren Kids (vanilla) 1-10 years	75	2.2	11.5	2.4	Vanilla flavouring	Brazil

	Energy	Protein	Carbohydrate	Fat	Flavour added	Country of sale
Milk name*	kcal/100ml	g/100ml	g/100ml	g/100ml		
Whole cows' milk	**66**	**3.3**	**4.8**	**3.9**	**-**	-
Dumex (Danone) Dugro 1-3 years	74	1.9	12.2	1.9	Vanilla	Singapore
Abbott Nutrition Pediasure Complete 1-10	100	3.0	13.2	4.0	Vanilla	Singapore
Nestlé Boost Kid Essentials 1-13 years	101	2.8	13.4	3.8	Vanilla	USA
Wyeth PE Promise Gold	100	3.5	13.5	3.5	Vanilla	UAE

* Fortified milks may vary within a brand and by flavour, or whether liquid or powder formulation, so it is difficult to give anything other than examples of products.

[1] The Fonterra Anmum brand claims that it adds no sugars to its formula milks, however the lactose content of the product is higher than that found in cows' milk and it is therefore unclear whether or not the lactose in the product is added. or exists as a result of the whey and protein powders used. This milk has a composition similar to whole cows' milk but it is flavoured, has a slightly lower calcium content than cows' milk, and contains fish oil, making it unsuitable for some population groups.

The added sugar content of some examples of fortified milks currently available

We have calculated total carbohydrate and the amount of added sugars (not including the lactose naturally present in skimmed milk) for some example fortified milks. Tables 2 and 3 show these in comparison with plain cows' milk. We have calculated the added sugar content using all the relevant information we could find (for example, where other carbohydrate components were mentioned but not as a discrete category of dietary fibre, we took this away from the total carbohydrate figure) but we may have been unable to make accurate calculations in some cases.

We are happy to update the table if any of the information is inaccurate, but we recommend that all manufacturers put information on added/free sugars on their nutrition information labels .

Table 2. Added sugar content of some fortified milks suitable for children aged 1-3 years, or for an age group including children of this age, compared with whole cows' milk.

Milk name*	**Sources of sugars added**	**Total carbohydrate** *g/100ml milk*	**Total added sugars (incl. lactose added as an ingredient)** *g/100ml milk*
Whole cows' milk	-	4.8	0
Fonterra Anmum Pediapro 3	Lactose	6.3	1.4**
Danone Aptamil Growing-up milk 2y+	Lactose, maltodextrin	6.5	1.7
Cow and Gate Growing-up Milk 2-3y	Lactose, maltodextrin	6.5	1.7
Plasmon (Heinz) Latte Junior 4	Lactose, fructose, maltodextrin	7	2.3
Nestlé Nido 1+	Sugar,maltodextrin, lactose, honey	7.5	2.3
SMA Pro Toddler Milk	Lactose	7.4	2.6
Abbott Similac Gain IQ 1+	Lactose, sucrose	7.8	2.8
Hipp Organic Combiotic Growing up Milk	Lactose	8.2	3.1
Cow and Gate NutriJunior	Lactose	8.2	3.6
Danone Aptamil Profutura Growing-up milk 1 y	Lactose, maltodextrin	8.4	3.6
Nestlé Mio Latte per la Crescita 1-3 years	Glucose syrup, sugar, lactose	8.5	3.7
Nestlé Nan Pro 3 12 months	Maltodextrin	8.8	4.2
Humana Latte di Crescita 3 1-3 years	Lactose, glucose syrup, sucrose	9.3	4.5
Freisland Campina Friso Gold Young Explorer 1-3years	Glucose syrup, saccharose[1]	9.5	4.7
Mead Johnson Enfagrow A+ 1-3 years	Corn syrup solids, dried glucose syrup, dextrose	10	4.8
Wyeth (Nestle) S-26 Progress Gold 1-3 years	Lactose, maltodextrin	10.4	5.6
Nestlé Ninho Frutti 2-6 years	Sucrose, fruit pulp	11.0	5.6
Dumex (Danone) mamil Gold Toddler 1-3 years	Lactose, glucose syrup solids	12	6.3
Nestlé Nutren Kids (vanilla) 1-10 years	Sucrose, maltodextrin	11.5	6.5
Aspen Nutritionals (Pfizer/Nestlé) Infacare Growing-up milk 1-3 years	Corn syrup solids, sucrose	11.4	6.6
Nestlé Good Start 1-3 years	Maltodextrin, sugar	11.5	6.7
Dumex (Danone) Dugro 1-3 years	Lactose, glucose syrup solids	12.2	7.4
Wyeth Promise PE Gold 1+ years	Maltodextrin, dried glucose syrup, sucrose, lactose	13.5	8.7
Nestlé Boost Kid Essentials 1-13 years	Maltodextrin sugar	13.4	12.4
Abbott Nutrition Pediasure Complete 1-10 years	Hydrolysed corn starch, sucrose	13.2	12.8

Notes

* Fortified milks may vary within a brand and by flavour, or whether liquid or powder formulation, so it is difficult to give anything other than examples of products.

** It is unclear if all of the lactose occurs as a result of the milk solids used or whether additional lactose is added - however, the product still contains more lactose than cows' milk.

[1] Saccharose = sucrose

The contribution to total energy of added sugars in fortified milks

Table 2 shows that fortified milks have a higher sugar content than cows' milk. Current recommendations suggest that a child aged 1-3 years should have 300ml-400ml a day of milk alongside a varied diet. Table 3 shows how much energy would be provided by the free sugars in 400ml of a variety of fortified milks to a 1-3 year old compared to cows' milk.

The total carbohydrate content of the products we have looked at ranges from 6.3g/100ml to 13.5g/100ml (Table 1) and the estimated added sugar content in the example fortified milks shown in these tables ranges from 1.4g/100ml to 12.8g/100ml (Table 2). The average energy requirement for a child aged 1-3 years based on UK data (SACN, 2011) is estimated as 944 kcal/day (based on the average energy requirement of boys and girls, Table 15, p84). Where added sugars are recommended to contribute no more than 5% of food energy, 11.8g of added sugar a day would represent 100% of the daily added/free sugar allowance for a 1-3 year old. For children aged 1-2 years the average energy requirement is 854kcal/day, and 10.7g sugar would represent 100% of the daily added/free sugar allowance recommended.

A typical 400ml per day serving of the milks with the highest added sugar content would provide 51g of added sugars to a child's daily diet, providing around 200kcal from added sugars (19.2% energy) from fortified milks alone (Table 3). Even those milks with an added sugar content of 4-6g/100ml would provide the equivalent of an additional 5 teaspoons of sugar a day and 140g of sugar per week, based on an average 400ml/day serving. We have calculated the energy content of free sugars using the conversion factor 4kcal/g.

Table 3. The contribution of fortified milks for children aged 1-3 years to daily sugars intake.

Milk name* (for full manufacturer details see Tables 1 and 2)	Total energy	Total added sugars	Energy from added sugars	% daily energy from added sugars
	kcal/400ml	g/400ml	kcal/400ml	%
Whole cows' milk	264	0	-	-
Anmum Pediapro 3	264	5.6	22.4	2.4
Aptamil Growing-up milk from 2 years	200	6.8	27.2	2.9
Cow and Gate Growing-up Milk 2-3 y	200	6.8	27.2	2.9
SMA Pro Toddler Milk	256	8.8	35.2	3.7
Plasmon (Heinz) Latte Junior 4	212	9.2	36.8	3.9
Nestlé Nido 1+	240	9.2	36.8	3.9
Similac Gain IQ 1+	296	11.2	44.8	4.8
Hipp Organic Combiotic Growing up Milk	264	12.4	49.6	5.3
Cow and Gate NutriJunior	276	14.4	57.6	6.1
Aptamil Profutura Growing-up milk 1 year+	260	14.4	57.6	6.1
Mio Latte per la Crescita 1-3 years	268	14.8	59.2	6.3
Nan Pro 3 12 months	280	16.8	67.2	7.1
Latte di Crescita 3 1-3 years	276	18	72	7.6
Friso Gold Young Explorer 1- 3years	292	18.8	75.2	8.0
Enfagrow A+ 1-3 years	320	19.2	76.8	8.1
S-26 Progress Gold 1-3 years	320	22.4	89.6	9.5
Ninho Frutti 2-6 years	268	22.4	89.6	9.5
Enfagrow A+ 1-3 years	312	23.2	92.8	9.8
Mamil Gold Toddler 1-3 years	304	25.2	100.8	10.7
Nutren Kids (vanilla) 1-10 years	300	26	104	11.2
Infacare Growing-up milk 1-3 years	352	26.4	105.6	11.3
Good Start 1-3 years	332	26.8	107	11.3
Dugro 1-3 years	296	29.6	118.4	12.5
Promise PE Gold 1+ years	400	34.8	139.2	14.8
Boost Kid Essentials 1-13 years	404	49.6	198.4	21.0
Pediasure Complete 1-10 years	400	51.2	204.8	21.7

* Fortified milks may vary within a brand and by flavour, or whether liquid or powder formulation, so it is difficult to give anything other than examples of products.

What have other studies found?

Studies on a much larger scale have reported similar results. In a study commissioned by the European Commission at the request of the European Parliament to assess the need for special regulatory provisions for fortified milks marketed at children aged 1-3 years, data was collected from 244 products from 62 formula milk companies. The products included in the report were collected across 12 of the 28 European states representing 90% of the EU population. This report found that after the milk sugar lactose, the carbohydrates found in the greatest quantity by weight were maltodextrins and sucrose (EFSA, 2013). The calculated nutrient ranges per 100ml reported are summarised in table 4.

Similarly, Brand-Miller et al, 2013 reported on a sample of 34 Growing-Up Milk powders on the market in Malaysia and Indonesia for children aged 1-3 years, the calculated nutrient ranges reported are summarised in table 4.

Table 4: Data on the sugar content of fortified milks

Authors	Sample	Total Carbohydrates range g/100ml	Total sugars range g/100ml	Calculated added sugars range g/100ml
Data reported here	28 fortified milks marketed worldwide for children aged 1-3 years	6.3 - 13.5	NS	1.4 - 12.8
Brand-Miller et al., 2013	34 fortified milks marketed in Malaysia and Indonesia for children aged 1+,	*5.4 - 13.8	NS	*0 - 8.8
Pérez et al., 2013	244 fortified milks marketed for children in 12 european states for children aged 1-3 years	**5.5 - 11.5	**3.3 - 10.3	NS

* calculated from product information given in study for total carbohydrate (g/100g) of powder and powder per serve (g) and serve size from product details

** calculated from ranges given in study per 100kcal recalculated using estimated energy value of 75kcal/100ml

NS = not stated

Summary and recommendations

Fortified toddler/growing up milks provide unnecessary added sugars to the diets of young children, and in most cases, consuming 400ml per day will mean that these milks provide almost all, or more than, the total free sugars recommended in the diet per day. The majority of these milks are also flavoured, and may encourage young children to prefer sweet tastes and challenge their acceptance of unprocessed and minimally processed nutritious local foods recommended.

We recommend the following:

1. All international and local health agencies should make clear recommendations about how families can ensure good nutrition for their children using local diverse foods and without the need for processed fortified milk products.

2. National infant feeding guidelines should include the statement '*Fortified milks are not necessary in the diets of healthy children over 1 year of age.'*

3. International, regional and national agencies who regulate on food and drink composition should introduce nutritional standards for fortified milks for children aged 1-3 years.

4. Manufacturers should reduce the level of added sugars in fortified milks to match those in whole animal milk and remove flavourings and colourings.

5. All fortified milks should clearly show the amount of added/free sugar and other nutrients they contain per 100ml of milk as consumed, and clearly label whether they are suitable for vegetarians or for those who choose halal products.

6. Fortified milks for young children should not share any branding with infant formula designed for children aged under 1 year, or carry any idealised text or images (for example, pictures of babies, children, toys or animals). In addition, national regulations should enforce the need for clear differences in the packaging design of fortified milks for older children, and ensure clear warning labels remind parents of the importance of breastfeeding and that these milks are not suitable for infants.

7. National regulators should not permit advertising and marketing of fortified milks for children over the age of 1 year because this will undermine public health strategies for that age group.

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