

# Fruit and vegetable based purées in pouches for infants and young children



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By Susan Westland and Dr Helen Crawley

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## Acronyms

|               |  |
|---------------|--|
| <b>EFSA</b>   | European Food Safety Authority                   |
| <b>LCA</b>    | life cycle analysis                              |
| <b>NCD</b>    | non-communicable disease                         |
| <b>NHANES</b> | National Health and Nutrition Examination Survey |
| <b>SACN</b>   | Scientific Advisory Committee on Nutrition       |

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# Executive summary and recommendations



**T**here is a growing interest in the role of diet quality in early childhood as a determinant of later eating habits and adiposity, and there is growing evidence that food intake patterns and dietary behaviours established in infancy and early childhood ‘track’ into later childhood. Poor-quality diets are of concern as they are associated with weight gain and increased risk of non-communicable diseases (NCDs). Dental diseases are the most prevalent NCDs globally and can have a significant impact on quality of life, and reducing intakes of free sugars and a preference for sweet tastes in infants and young children are currently recommended.

Early childhood is a critical time for establishing food preferences, and the tastes infants are exposed to at an early age have long-lasting effects on their liking of specific tastes. Developing healthy eating behaviours during infancy and in the early years may therefore have a positive influence on preventing obesity and other diet-related NCDs.

Fruit and vegetable based purées have been marketed for infants since commercial production of baby food began, and these foods are traditionally seen as suitable ‘first foods’ for infants when they start solids. The use of puréed food for older children (and for adults) is a more recent innovation and is linked to packaging changes and a desire for ever more convenient foodstuffs. Puréed fruit and vegetable based foods marketed in non-recyclable pouches are now ubiquitous in the baby food aisles of supermarkets.

Processing fruits and vegetables may alter both their energy density and physical structure, which may have an impact on satiety and energy intake. High-fibre foods such as fruits and vegetables generally have high nutrient density and low energy density. It has been suggested that removing or disrupting the fibre from foods can result in faster and easier consumption, decreased satiety and overeating, which, if it happens regularly, may lead to later chronic disease.

Processing of fruits and vegetables may also result in changes in the quantity and bioavailability of nutrients and phytonutrients in foods. Losses of total fibre, glucosinolates and heat-sensitive nutrients such as vitamin C have been reported in the literature.

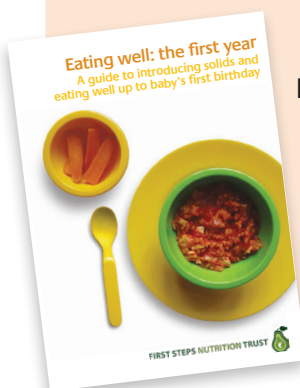
Fruits and vegetables are traditionally seen as suitable ‘first foods’ for infants, and pouches offer convenience to the consumer. However, fruit-based purées are high in free sugars and can contribute a significant amount of free sugar to the diets of infants and young children. Many fruit and vegetable based purées for infants and young children are based on apple and pear purée and sweeter vegetables, and pouches often contain combinations of different fruits and vegetables. This makes it difficult for infants to recognise the flavours, texture and appearance of individual fruits and vegetables and may therefore reduce the likelihood that these will be accepted by infants when the fruit and vegetables are served individually in family meals.

Baby food marketed in pouches offers a more transport- and space-efficient packaging option for manufacturers, and a pouch allows more space for attractive graphics without showing the contents of the pouch inside. However, the pouches are predominantly destined for landfill, the style of the product encourages children to suck food directly from the pouch through the nozzle provided (which may damage young children’s teeth), and buying baby food in pouches is not a cost-effective way for families to introduce their infants and young children to the unique tastes and textures of a range of fruit and vegetables.



# Recommendations

- Families should be discouraged from buying puréed fruit and vegetables in pouches. There should be clear public health messages that these foods can be very high in sugar, are expensive, and do not offer infants and young children the authentic tastes of fruit and vegetables they need to get accustomed to before moving on to healthy family foods.
- Manufacturers should support public health guidance in the UK and ensure all baby food is marketed for infants from 6 months.
- Messaging on pouches (and any other packaging they are in) and in public health communications should be clear that sucking purées directly from pouches may damage young children’s teeth and does not support the development of healthy eating habits.
- Honest naming of puréed food in pouches on the label is needed to ensure that the front-of-pack name of the product reflects the main ingredients.
- Traffic-light front-of-pack nutrition labelling on fruit and vegetable pouches marketed as baby and toddler foods should aid parental choices by relating the sugar content per pouch to intake recommendations for young children.
- Foods marketed for infants and young children with more than 5g free sugar per pouch should carry a ‘high in sugar’ health warning.
- Labelling regulations should prohibit the use of statements and graphics linked to ‘healthiness’ on packaging of foods for infants and young children, to ensure consumers are not misled.
- Manufacturers should consider the environmental cost of packaging baby food purées into individual pouches and the consequent waste of resources, and should commit to reducing packaging going to landfill.
- Public health departments should train appropriate health and social care workers to offer families practical support to prepare simple, home-prepared, cost-effective food for infants and young children.



For advice on how to support infants to eat well, see the report *Eating Well: The First Year*.

For advice on how to support children aged 1-4 years to eat well see: <https://www.firststepsnutrition.org/eating-well-early-years>



# 1 Introduction

**H**ealth authorities across the world recommend that we eat a wide variety of fruits and vegetables to help reduce our risk of developing cardiovascular disease and cancer (NHS, 2018a; World Health Organization, 2004). In the UK it is recommended that we eat at least 5 portions of a variety of fruits and vegetables daily (NHS, 2018a). Increasing intakes of vegetables is seen as a public health priority. As well as providing micronutrients, a broad range of phytochemicals, and dietary fibre, fruits and vegetables generally have high nutrient density and low energy density. They therefore play an important role in the diet, helping us to meet nutrient requirements while not exceeding our energy needs. Encouraging children to enjoy eating vegetables and fruit from an early age is therefore essential. Public health guidance encourages the use of a wide range of simple, minimally processed vegetables and fruits as first complementary foods (along with a range of other foods such as meat, fish, eggs, pulses, dairy products and cereals) alongside breastmilk (or infant formula) from 6 months of age (NHS Start4Life, 2018).

Manufacturers of food for infants and young children produce a wide range of fruit and vegetable based purées marketed both for infants in the first year of life and for young children under the age of 5 years. There has been an increasing trend towards marketing baby food in pouches rather than in glass jars, and the number of manufacturers producing baby food pouches for sale in the UK has grown. In the 2017 report *Baby Foods in the UK* it was reported that many commercial baby foods were soft and sweet-tasting and likely to have a high free sugar content (Crawley and Westland, 2017). This is of concern as high free sugar intake is linked to poor oral health, may accustom infants to very sweet tastes, and may contribute to overweight in later childhood. For a definition of free sugars, see Appendix 2.

The World Health Organization has outlined the role of free sugars in the development of obesity and chronic disease and has made recommendations that adults and children reduce their consumption of free sugars to less than 10% of total energy or to less than 5% for additional health benefits (World Health Organization, 2015). Other expert committees – such as the Scientific Advisory Committee on Nutrition (SACN) 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 (Scientific Advisory Committee on Nutrition, 2015). SACN has also recently recommended that,

• in view of high intakes of free sugars in infants, there is a need to re-emphasise the risks associated with free sugars in foods given to infants during the complementary feeding period, and to keep reported intakes under review (Scientific Advisory Committee on Nutrition, 2018). The American Heart Association has recommended that no added sugars (equivalent to free sugars) should be given to infants under 2 years of age (Vos et al, 2016).

• Dental diseases are the most prevalent non-communicable disease (NCD) globally and can have a significant impact on quality of life, causing pain, anxiety, functional limitation (including poor school attendance and performance in children) and social handicap through tooth loss (World Health Organization, 2015). A high free sugar intake at the age of 3 years has been shown to increase the risk of developing dental caries at the age of 6 years (Karjalainen et al, 2001). Reducing intake of free sugars and reducing a preference for sweet tastes in infants and young children are currently recommended.

• There is a growing interest in the role of diet quality in early childhood as a determinant of later eating habits and adiposity, and there is growing evidence that food intake patterns and dietary behaviours established in early childhood ‘track’ into childhood (Golley et al, 2013). Poor diet in infancy has also been shown to track into toddlerhood (Lioret et al,



2013). The UK Government has outlined its ambition to halve childhood obesity rates by 2030 and, as part of its work to reduce the free sugar content of food and drinks, they are reviewing the scope for

- reformulation of product ranges aimed at babies and young children (Department of Health and Social Care, 2018).
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### The aim of this report



The report *Baby Foods in the UK* (Crawley and Westland, 2017) looked at all the foods in jars and pouches on the UK market for infants up to 12 months. This report extends that work.

It:

- reviews all the commercial fruit and vegetable based purées in pouches marketed for both infants and young children in the UK in July 2018
- considers the impact of processing on fruit and vegetable foods made into purées – including the impact on sugar content, dietary fibre content, vitamin content and glucosinolate content
- highlights how consumption of these foods may undermine public health, and
- considers environmental challenges to reduce packaging waste.



## 2 Background

Commercial baby foods have been produced since the turn of the 20th century and marketed to families as convenient and appropriate alternatives to home-produced food. In the 21st century, innovation in the baby food sector has seen a shift towards new product developments linked to changing global food preferences and designed to appeal to parents who seek out food varieties and flavours common to their own food choices. It is suggested that most baby foods are not geared to the child, or based on compositional recommendations, but rather are ‘aspirational’ dishes parents might enjoy, in a format they have historically been used to seeing (Mintel, 2016). Fruit and vegetable based purées have been marketed for infants since commercial production of baby food began, and these foods are traditionally seen as suitable ‘first foods’ for infants when they start solids. The use of puréed food for older children (and for adults) is a more recent innovation and is linked to packaging changes and a desire for ever more convenient foodstuffs.

The biggest revolution in packaging of baby foods in recent years has been the move from glass jars to pouches. In the 2017 report *Baby Foods in the UK*, it was reported that buying baby food in pouches was significantly more expensive than buying baby food in jars or trays (Crawley and Westland, 2017). Pouches are lighter and easier to transport, they mask the actual baby food inside, and the purées in them attain a halfway status between baby food and other foods, extending the perceived time frame in which these foods are used. The pouch also allows fun and aspirational graphics and images to be used on brightly coloured packaging. Pouches come with an integral nozzle, which means the food can be directly sucked from the pouch.

Early childhood is a critical time for establishing food preferences, and the tastes infants are exposed to at an early age have long-lasting effects on their liking of specific tastes (Birch et al, 1998; Mura Paroche et al, 2017). Developing healthy eating behaviours during the weaning period may therefore have a positive influence on preventing obesity and other

- diet-related non-communicable diseases (NCDs).
- Introducing babies to single foods, and repeated exposure to the same food, have been shown to favour acceptance (Birch et al, 1998; Mura Paroche et al, 2017). Liking for vegetables is thought to be linked to serving individual unmixed vegetables to infants, rather than hiding savoury and bitter flavours in sweeter foods (Remy et al, 2013). Combining flavours may therefore make it difficult for children to recognise the colour, texture and flavour of single vegetables or fruit, and may reduce the likelihood that these flavours will be recognised and accepted by children when offered individually in family meals. Children will accept and like vegetable tastes if exposed to them repeatedly, but Garcia et al (2015) conclude that feeding commercial vegetable-based purées will not help children develop a taste for vegetables as the taste of processed foods is dissimilar to home-prepared foods. Garcia et al (2015) also note that manufacturers are under commercial pressure to produce instantly palatable foods, and therefore sweet foods are likely to make up a large proportion of their product offer.

## Key advantages of preparing home-made fruit and vegetables

- **They will have less added sugars.** Highly processed fruit and vegetable purées are high in free sugars since the sugars have been fully liberated from the cell walls during maceration and heat-treating. Preparing your own simple mashed fruits and vegetables will not concentrate the sugars in the same way.
- **The taste and colour will be authentic.** Many of the highly processed fruit and vegetables in pouches have a taste and colour dissimilar to fresh products, and lack natural variation in flavour.
- **The cost will be much lower.** For example, if you mash your own organic carrots, 70g would cost 14p, while 70g of Ella's Kitchen 'Carrots Carrots Carrots' (which are 82% carrots) costs 90p.
- **The consistency of the food can be prepared to suit an infant's needs.** Many babies at 6 months are able to have thicker, smooth foods or mashed foods on a spoon, and should be offered soft finger foods such as cooked carrot sticks. Older infants and toddlers should be encouraged to have the same healthy food as the rest of the family, with food mashed or chopped as needed.
- **The amount of a fruit or vegetable you need at each occasion can be prepared and offered.** This will minimise food waste and reduce the need to store opened packets of food safely.
- **A baby can eat the same foods as the rest of the family** and learn to recognise the smell, sight and taste of family foods.
- **Packaging waste is minimal.** Baby food pouches are resource-intensive and contribute to landfill.

The current intake of free sugars in infants and young children is of concern because of the association of high-sugar diets with poor dietary quality, obesity and risk of NCDs including tooth decay (World Health Organisation, 2015). A heightened preference for sweet-tasting foods and beverages during infancy and childhood is a global public health phenomenon and intakes of free sugars have risen consistently over recent years (Tedstone et al, 2015). The Government's definition of free sugars has recently been clarified (Swan et al, 2018) and the sugars in fruit and vegetable based puréed baby foods are now defined as 'free sugars'.

### What about the sugars in home-made fruit and vegetable-based baby food?

Sugars in processed fruit and vegetable purées are classified as free (added) sugars, since the sugars will have been fully liberated from the cell walls of the fruit or vegetables used (Swan et al, 2018). In contrast, foods that are made at home and mashed are likely to maintain much of the sugar in the structure of the fruit or vegetable. By simply tasting many of the fruit and vegetable purées in baby food ranges, it is obvious that they are considerably sweeter than a home-made equivalent. This is likely to be because the more intense macerating and heat treatment during processing liberates the sugars from the cell walls more effectively.

New products coming onto the market for infants and young children have a greater emphasis on organic and healthy ingredients and many are based mainly on fruits and vegetables. Very few manufacturers now market foods for infants that are not organic. Two of the main baby food companies in the UK – Cow & Gate and Heinz – do not use organically sourced ingredients but use the term ‘baby-grade’ to describe their ingredients. The term ‘baby grade’ has no official meaning, but is used by manufacturers to communicate the strict nature of the standards they employ for the ingredients in their products. All baby food manufacturers must comply with regulations to ensure a low content of pesticide residues and other harmful contaminants in foods marketed to infants.

## 2.1 Regulations governing baby food composition

The current regulations for baby foods in England are the Processed Cereal-based Foods and Baby Foods for Infants and Young Children (England) Regulations 2003. These Regulations implement Commission Directive 2006/125/EC on processed cereal-based foods and baby foods for infants and young children (as amended). (Scotland, Wales and Northern Ireland currently have similar legislation.)

Regulations for the composition of baby foods were revised as part of the Foods for Specific Groups legislation, but in January 2016 the European Parliament rejected the revised compositional regulations for baby foods over concerns about the high sugar content allowed and pesticide residue limits. The European Food Safety Authority (EFSA) has been asked to review the composition and labelling of baby food to inform a revised delegated act for the Foods for Specific Groups Directive. It is not currently known when the new regulation will be debated and, in the meantime, the current regulations remain in place.

Current regulations consider the use of specific ingredients and nutritional substances, maximum

amounts of some nutrients, the pesticide levels permitted, restrictions on the presence of some substances, and labelling requirements. A summary of the key points can be found in Appendix 1. The full regulation can be accessed at: [https://www.legislation.gov.uk/uksi/2003/3207/pdfs/uksi\\_20033207\\_en.pdf](https://www.legislation.gov.uk/uksi/2003/3207/pdfs/uksi_20033207_en.pdf). Manufacturers who market baby foods labelled as organic must be registered with one of the organic control bodies and products labelled as organic must also comply with EU organic standards legislation.

It is important to note that the regulations do not specify what the composition of baby foods should be; they just set minimum or maximum amounts for some ingredients and nutrients. This in itself is not sufficient to determine whether or not the food is health-promoting or appropriate for the consumer.

## 2.2 What do we know about fruit and vegetable based purées in pouches for infants and young children?

In the 2017 report *Baby Foods in the UK* (Crawley and Westland, 2017), 343 baby food products marketed for infants were reviewed from the four main manufacturers of jars and pouches of baby foods available on the UK market between August and October 2016 – Cow & Gate, Ella’s Kitchen, Heinz and Hipp Organic. This survey reported that just under half (48%) of all products marketed were either purées of fruit and/or vegetables, or sweet dishes. Of the 77 fruit and vegetable only dishes, 74 were aimed at infants from 4 months of age and these were predominantly based on fruits and sweet-tasting vegetables.

A number of other studies have reported on the high proportion of sweet-tasting baby foods marketed. Garcia et al (2013) collected nutritional information on baby foods available on the UK market in 2010/2011 from Cow & Gate, Heinz, Hipp Organic, Ella’s Kitchen, Boots and Organix. They found that just under a half (223) of the foods in the study

were sweet foods, with 80% including fruit in the name. Around a half of fruit-based foods (44%) were aimed at infants from 4 months of age, and almost two-thirds (65%) of foods aimed at this age group were sweet foods. A further study by Garcia et al (2015) reported that a large proportion of UK commercial baby food was sweetened with fruit or sweet-tasting vegetables. Fruit, and sweet vegetables such as carrots, were used predominantly in 329 manufactured baby foods available in the UK, with bitter vegetables such as spinach or broccoli used much less frequently. The authors suggest that there is commercial pressure to produce instantly palatable foods, which dissuades manufacturers from using more bitter vegetable flavours.

Dunford et al (2015) found a similar predominance of fruit-based sweetened food available in Australia. In a survey of 186 manufactured baby foods in Canada (Elliott, 2011), a large proportion of foods contained more than 20% of their calories from sugar, both from derived fruit and as added sugars (for example, corn syrup, brown sugar or dextrose). Further work by Elliott and Conlon (2014) on the sugars content of baby food reported that babies are “*immersed in a sweeter foodscape than any previous generation*”, with 45% of foods in their study having a high sugar profile.

Data collected by Moding et al (2018) in the US looked at vegetable-containing baby foods marketed in the USA. Of the 548 vegetable products considered, only 52 (9.5%) were single-vegetable products and none of these contained dark green vegetables, beans or peas. Red and orange vegetables most often appeared as the first ingredient in 23.7% of products, and fruit was the first ingredient in 37.8% of products.

In their survey of UK infant foods, Crawley and Westland (2017) found that many fruit and fruit and vegetable based puréed foods in pouches marketed in the UK have a very high proportion of apple or pear purée (Crawley and Westland, 2017). Across all of the fruit-based products in the survey, 75% had apples

or pears as the main ingredient and of these 30% did not feature apples or pears as the leading named ingredient. Of the mixtures of fruit and vegetables reviewed, 68% had apples or pears as the main ingredient, and 48% of them did not feature apples or pears as the leading named ingredient. There may be a number of reasons for using a high proportion of apple and pear in baby foods: apples and pears are easy to source; they help to bulk out products where other ingredients are more expensive; they offer a sweet taste which may encourage acceptance in infants; and they are easy to make into smooth purées in processing.

Garcia et al (2013; 2015) also reported that many of the fruit and vegetable purées intended as first tastes and first foods are sweet, and use combinations of fruits and vegetables to mask bitter flavours and individual flavours. Eighteen per cent of baby foods in their study contained added fruit juice, and frequently three or more different fruits and vegetables were used in a purée, which, as they point out, is not ideal for flavour-learning. The authors suggest that there is a risk that parents will think they are offering healthy vegetable tastes to their children, but are instead reinforcing preferences for sweet tastes. Combining flavours makes it difficult for children to recognise the colour, texture and flavour of single vegetables or fruit, and may reduce the likelihood that these flavours will be recognised and accepted by children when offered individually in family meals. Whilst it has been argued that mixing sweet flavours with vegetables would increase acceptance, Remy et al (2013) found that repeated exposure to a novel vegetable was not improved by adding a sweet component.

In their survey of UK infant foods, Crawley and Westland (2017) reported that 46% of foods marketed for infants at 4 months had carrot as the main vegetable ingredient, as did 36% of those marketed for infants at 6 months + and 34% of those marketed for infants from 9 months +. A survey of German baby foods reported that the range of

vegetables typically used in savoury baby meals was limited, with a high proportion of carrot used in many foods (Mesch et al, 2014). Carrots and sweet potatoes were the vegetables used in the greatest quantities in both vegetable-only and combined fruit and vegetable preparations in infant food marketed in the UK (Crawley and Westland, 2017). Many other meals had tomato, parsnip, sweet potato, pumpkin, butternut squash or sweetcorn in combination with carrot, giving the majority of savoury baby food a sweet and soft texture. The single-vegetable baby foods in this survey were also based on sweet-tasting vegetables. More bitter-tasting vegetables were usually combined with sweeter-tasting ones, and overall only 9% of meals marketed at 4 months +, 6 months + and 9 months + included cauliflower, broccoli or courgette not combined with a sweet vegetable.

## 2.3 The impact of processing on the nutrient content of fruit and vegetable based purées

Food production can cause changes in the amount and bioavailability of nutrients and phytonutrients in foods. A large number of studies have evaluated the impact of processing on foods, but results are not consistent between studies and the majority focus on specific nutrients and specific processing stages.

Also, very few evaluate the net impact of the whole manufacturing process on the complete nutrient and phytonutrient profile of fruits and vegetables. Whilst we could find only one study that directly compared the impact of industrial processing techniques to those that might be used domestically, there are several studies that provide some insight into the stages of industrial processing that have the greatest impact on the nutrient content and bioavailability of processed fruits and vegetables.

### 2.3.1 The impact of processing on the sugar content of fruit and vegetable based purées

Evidence suggests that some processed fruit and vegetable purées may have a much greater sugar content than would be expected to be present based on the ingredients used. Analysis of sugars in processed fruit and vegetable based purées based on baby foods in the US, has reported that the amount of analysed sugars was significantly greater than that reported on the label (Clifford et al, 2014). Some of the differences in the products analysed are shown in Table 1.

These data suggest that the maceration of foods for purées, heat treatment, and potentially storage, may mean that these foods are much higher in free sugars

**Table 1: Analysed versus labelled amounts of sugars in a selection of purées marketed in the US**

| Baby food                        | Analysed sugar content (%)<br>(Based on fructose, glucose and sucrose content) | Reported total sugar content (%) | % greater sugar content analysed compared to reported value |
|----------------------------------|--|----------------------------------|---|
| Apple purée                      | 11.2%  | 9.7%                             | +15%  |
| Green bean purée                 | 3.4%   | 2.7%                             | +26%  |
| Raspberry purée                  | 12.1%  | 9.2%                             | +32%  |
| Green bean and pear purée        | 11.5%  | 7.5%                             | +53%  |
| Apple and butternut squash purée | 11.6%  | 7.5%                             | +55%  |
| Banana, peach and coconut purée  | 17.9%  | 10.0%                            | +79%  |
| Banana, peach and mango purée    | 16.7%  | 9.2%                             | +82%  |
| Corn and butternut squash purée  | 11.8%  | 2.7%                             | +337%   |

Source: Clifford et al, 2014.



than would be suggested from the ingredients on the label. Similarly, Walker and Goran (2015) found that the sugar content in commercial baby food differed significantly from nutrition labels. The authors concluded that many products marketed to, and consumed by, infants and young children, contain sugars that are far in excess of what is considered nutritionally beneficial and/or are different from that stated on nutrition labels. This is of concern, as even relatively small amounts of added sugars in manufactured foods can make a significant contribution to overall intake in the diet of an infant.

### 2.3.2 The impact of processing on the dietary fibre content of fruit and vegetable based purées

Fibre is an important part of a healthy, balanced diet and can help prevent heart disease, diabetes, weight gain and some cancers, and can also improve digestive health (NHS, 2018b). There are two different types of fibre – soluble and insoluble – and intact fruits and vegetables are a good source of both. However, industrial processing can modify the fibre content of fruits and vegetables. Colin-Henrion et al (2009) evaluated the net effect of the industrial processing of apple into apple sauce in a five-stage process including sorting, cooking, refining, sugaring and pasteurisation stages. The samples were examined for their insoluble, soluble and total fibre content using the AOAC method.

The net effect of processing resulted in a 30% loss in total dietary fibre on a fresh-weight basis and the soluble fraction increased from 28% to 39% of the total fibre content. The most significant changes occurred at the refining stage where mechanical treatment resulted in the separation of seeds, skin and carpels, and at the sugaring stage where apple sauce (purée) was held for 30 minutes in a flow regulatory tank at 85°C. This thermal treatment resulted in some pectin solubilisation. The solubilisation of pectin during thermal processing has also been observed in other studies of fruit purées

which were produced by a process of washing, stoning, pulping, heating at 95-97°C for 2-3 minutes, concentration at 85°C for apples and 75°C for apricots, followed by sterilisation at 102-103% (Sivam et al, 2013).

### 2.3.3 The impact of processing on the vitamin content of fruit and vegetable based purées

It is currently widely understood that the net concentration of some vitamins is reduced during food processing. Heat-sensitive nutrients such as vitamin C may be degraded by thermal treatment (Francisco et al, 2010; Verkerk et al, 2001) and by mechanical shear treatments (chopping, blending and high-pressure homogenisation (HPH) processes), causing plant cell wall disruption, which may increase the activity of endogenous enzymes and oxidation due to the introduction of air (Francisco et al, 2010). The extent to which this occurs when changing the order of the heating and blending stages used in the production of carrot, tomato and broccoli purées has been evaluated by Lopez-Sanchez et al. The results of their study showed that the order of processing can have a profound effect on the nutrient retention of tomatoes, carrots and broccoli in purées (Lopez-Sanchez et al, 2015). In this study, batches of vegetables were prepared by washing and cutting and then either blending in a kitchen blender for three minutes and then heating at 90°C for 40 minutes, or heating at 90°C for 40 minutes and then blending for three minutes.

The concentration of vitamin C was found to be significantly lower in the foods that were blended and then heated than in those that were heated and then blended. Vitamin E and lutein were significantly lower in the blend-first tomato and carrot samples than in the heat-first samples. In broccoli the concentration of  $\beta$ -carotene was 41% lower in the blend-first sample than in the heat-first sample, but in carrot and tomato,  $\beta$ -carotene was significantly higher in the blend-first samples. This suggests that the

effect of blending-heating order on  $\beta$ -carotene level may be dependent on the vegetable matrix, whilst the processing effect on vitamins C, E and lutein is consistent between the three vegetables.

The beneficial health effects of carotenes are thought to be due to their role as antioxidants. Their limited bioavailability from fruit and vegetable matrices occurs as a result of their low bioaccessibility as they are bound by both physical and chemical interactions with the indigestible polysaccharides of cell walls. Heat and maceration treatments change the microstructure of cell walls, increasing the bioavailability of carotenes in some vegetables (Palafox-Carlos et al, 2011).

In a trial sponsored by Gerber (Nestlé), the bioavailability of  $\alpha$ - and  $\beta$ -carotene from a commercial carrot purée, boiled and mashed carrots and fresh grated carrots was investigated. It was reported that the amounts of  $\beta$ - and  $\alpha$ -carotene absorbed intact by healthy human subjects were greater from the carrot purée than for boiled, mashed carrot. The amount of  $\beta$ -carotene absorbed from the fresh grated carrots was intermediate to those of the two cooked versions. The authors suggest that the greater carotene availability from the purée relative to the boiled, mashed carrots may have been the result of greater maceration and greater exposure to heat or a combination of both factors. Despite these differences in reported bioavailability, the mass of assimilated vitamin A was not significantly different between treatments. The authors speculated that the larger particle size of the grated carrot compensated for the reduced bioavailability by means of lower gastro-intestinal transit time and prolonged particle digestion (Edwards et al, 2002). It is also noteworthy that to make the mashed carrot, the carrots were boiled for 40 minutes and ‘mashed’ using a domestic food grinder. This is a much longer period of time than one would expect to cook vegetables for domestically and the authors noted that the colour of the cooking water suggested that a particularly

bioavailable subfraction of carotene may have been lost to cooking water. The results of this study cannot be generalisable to all vegetables, as Lopez-Sanchez et al have shown that, whilst  $\beta$ - carotene levels may increase when carrots and tomatoes are first blended and then heated, this was not the case for broccoli (Lopez-Sanchez et al, 2015).

### 2.3.4 The impact of processing on the glucosinolate content of fruit and vegetable based purées

Glucosinolates are sulphur-containing metabolites found in *Brassica* vegetables such as cabbage, cauliflower, broccoli and Brussels sprouts. Glucosinolates and their breakdown products including isothiocyanates are understood to offer a protective effect from some cancers in humans (Padilla et al, 2007).

*Brassica* vegetables are commonly chopped before cooking. The majority of studies examining the fate of glucosinolates during processing – including blanching, steaming and leaching into cooking water – focus on the loss of total glucosinolates. Lopez-Sanchez et al reported a significantly greater loss of total glucosinolates when broccoli samples were blended before heat treatment compared to when they were blended after heat treatment (Lopez-Sanchez et al, 2015). Verkerk et al reported that when some *Brassica* vegetables, particularly white cabbage, were chopped and stored at ambient temperature in open containers, there was an increase in some of the glucosinolate breakdown products (Verkerk et al, 2001). It is interesting to note that they also reported that:

*“mechanical homogenisation (pulping) of cabbage results in a much higher degree of glucosinolate degradation. The extent of physical damage and therefore the release of the constituents can explain these differences.”* (Verkerk et al, 2001)



## 2.4 Fruit and vegetable based purées and satiety

Processing fruits and vegetables may alter both their energy density and physical structure, and the impact that this may have on satiety and energy intake has been the subject of considerable research. It has long been suggested that the impact of disrupting and/or removing the fibre from foods can result in faster and easier consumption, decreased satiety and overeating, and it was suggested over 40 years ago that if this occurs regularly it might lead to later chronic disease (Haber et al, 1977). Studies have shown that high-fibre foods contribute to the maintenance of energy balance by increasing feelings of satiety, which results in a subsequent decrease in energy intake (Howarth et al, 2001). Studies using apples, oranges, grapes and carrots have shown that, following disruption and depletion of fibre by puréeing and juicing respectively, both the quantity of fibre and its physical structure affect satiety. Intervention studies in adults have reported that whole fruits or carrots were generally more satisfying than puréed foods, which in turn were more satisfying than juice (Haber et al, 1977; Bolton et al, 1981; Moorhead et al, 2006; Flood-Obbagy and Rolls, 2009).

A number of additional mechanisms have been proposed to explain the reported greater effect on satiety of whole fruit compared with juice and purée.

Whole fruit requires a greater amount of chewing than puréed foods, which can be swallowed without any chewing. Increased chewing has been shown to initiate cephalic-phase responses involved in digestion and metabolism that could affect food intake (Lavin et al, 2002; Hogenkamp and Schiöth, 2013). Rates of consumption may also affect energy intake and satiety (Zijlstra et al, 2008). The removal of fibre from food, and also its physical disruption, can result in faster and easier ingestion, decreased satiety, and disturbed glucose homeostasis, which is probably due to inappropriate insulin release. These effects favour overnutrition and, if often repeated, might lead to diabetes mellitus (Haber et al, 1977).

Prospective cohort studies in children examining different forms of fruit intake and overweight and obesity are rare and inconclusive. Those that are available are generally from the US and often include fruit and fruit juice but not fruit purée. One study that does include fruit purée uses data from the US National Health and Nutrition Examination Survey (NHANES) 2003-2010. This study reported that children aged 2-18 years consuming whole apples were 30% less likely to be obese than non-consumers, but no significant differences were seen when comparing any measures of overweight or obesity between consumers and non-consumers of apple sauce (purée) or apple juice (O'Neil et al, 2015).



# 3 Fruit and vegetable based purées in pouches for infants and young children currently on the market in the UK

We have reviewed the UK market of purées made predominantly from fruit and vegetables, packaged in pouches and aimed at infants and young children. We have defined fruit and vegetable purées as those that contain at least 60% fruits and vegetables or fruit and vegetable juices and purées. Many foods are simply fruit or vegetable based but some products also contain grains or grain products, yoghurt, herbs, spices, oils, gums, gels or starches. All of the products we have included, with the exception of Savsé products, have been processed using thermal treatments. Savsé products are high pressure produced (HPP), which is a cold pasteurisation process, and these products must be kept chilled. Some products are marketed for infants or children with specific ages marked on the front of pack, while others are less explicit about the age on front of pack but may say ‘suitable from 6 months’ on the back of the pack. Some carry no indication of the suitable age of consumers on pack, but we have included in our review products where we considered that the marketing or product presentation was aimed at toddlers or young children.

We identified 191 products from 21 companies being marketed in the UK in July 2018 through supermarket and other retailer websites and in stores. The majority (57%) of products contain only fruits. A further 16% contain fruits and vegetables, whilst 12% are made only from vegetables. The remaining 16% of products contain combinations of fruits, vegetables, yoghurt, grains and grain products. Some products contain ingredients from coconut, which we have included in the fruits category for this report.

A list of the brands of fruit and vegetable baby foods sold in pouches in the UK, the ages the food is marketed for, and the product mix is given in Table 2. It is important to note that, since the data were collected for this report, some of the products have changed their names, or composition, and new products have become available as this is a very dynamic market. Names and composition data are correct as of July 2018.

## Kiddylicious products and frozen baby purées

Kiddylicious have five products made predominantly from puréed vegetables in their ‘Little Bistro’ range, which they market for infants from 4 months of age. We have not included these products in this report as they are sold in pouch-like packaging, but not in individual pouches with a nozzle.

Frozen cubes of puréed fruits and vegetables have also recently appeared on the UK market. We have not included these products in this report as they are sold in pouch-like packaging, but not in individual pouches with a nozzle.

**Table 2: Brands of fruit and vegetable baby foods sold in pouches in the UK, the ages the food is marketed for, and the product mix**

| Manufacturer<br>(Total number of products included in this review) | Age   | Number of products | Organic | Number of fruit, vegetable or mixed products   |
|--|---|--------------------|---------|--|
| Aldi Mamia (9)   | (Stage 1)<br>4 months +   | 5                  | ✓       | 3 fruit<br>2 fruit and vegetable   |
|  | (Stage 1)<br>6 months +   | 4                  | ✓       | 3 fruit with yoghurt<br>1 fruit with yoghurt and grains  |
| Annabel Karmel (10)  | (Stage 1)<br>Around 6 months  | 10                 | ✓       | 8 fruit<br>2 fruit and vegetable   |
| Asda Little Angels (7)   | 6 months +  | 7                  | ✓       | 6 fruit<br>1 fruit and vegetable   |
| Babease (5)  | (Stage 1)<br>First tastes from around 6 months / Suitable from 4 months | 5                  | ✓       | 3 vegetable<br>2 fruit with grains   |
| Cow & Gate (14)  | 4-6 months +  | 8                  | ✗       | 8 fruit  |
|  | 6 months +  | 6                  | ✗       | 3 fruit with grains<br>3 fruit with yoghurt and grains   |
| Del Monte (3)  | 3-8 years   | 3                  | ✗       | 3 fruit  |
| Ella's Kitchen (44)  | 4 months +  | 37                 | ✓       | 13 fruit<br>9 vegetable<br>8 fruit and vegetable<br>6 fruit with grains<br>1 fruit and vegetable with grains |
|  | 6 months +  | 7                  | ✓       | 7 fruit  |
| Fruitypots (3)   | Not stated  | 3                  | ✗       | 3 fruit  |
| Gogo Squeez (3)  | 3 years +   | 3                  | ✗       | 3 fruit  |
| Googly Fruit (5)   | 12 months +   | 5                  | ✓       | 2 fruit<br>3 fruit and vegetable   |
| Heavenly Organic Superfoods (2)                                    | 6 months +  | 2                  | ✓       | 2 fruit  |
| Heinz by Nature (12)   | 4 months +  | 12                 | ✗       | 9 fruit<br>2 fruit and vegetable<br>1 vegetable  |
| Heinz Fruitz (3)   | 3-8 years   | 3                  | ✗       | 3 fruit  |

Continued on the next page.

| <b>Manufacturer</b><br>(Total number of products included in this review) | <b>Age</b>              | <b>Number of products</b> | <b>Organic</b> | <b>Number of fruit, vegetable or mixed products</b>  |
|---|-------------------------|---------------------------|----------------|--|
| Hipp Organic (10)   | 4 months +              | 9                         | ✓              | 6 fruit<br>1 vegetable<br>2 fruit with grains  |
|   | 6 months +              | 1                         | ✓              | 1 fruit  |
| Kubus Mousse (3)  | Not stated *            | 3                         | ✗              | 2 fruit<br>1 fruit and vegetable   |
| Lidl Lupilu (4)   | 4 months +              | 3                         | ✓              | 2 fruit<br>1 fruit and vegetable   |
|   | 5 months+               | 1                         | ✓              | 1 fruit with grains  |
| Little Freddie (8)  | (Stage 1)<br>4 months + | 6                         | ✓              | 5 fruit<br>1 fruit and vegetable   |
|   | (Stage 1)<br>6 months + | 2                         | ✓              | 1 fruit with grains<br>1 fruit and vegetable with grains   |
| Naturelly (3)   | 2-8 years               | 3                         | ✓              | 3 fruit  |
| Piccolo (24)  | Around 6 months         | 24                        | ✓              | 8 fruit<br>4 vegetable<br>6 fruit and vegetable<br>2 fruit with grains<br>2 fruit with yoghurt and grains<br>1 fruit and vegetable with yoghurt<br>1 fruit and vegetable with yoghurt and grains |
| Sainsbury's Little Ones (10)  | 4 months +              | 10                        | ✓              | 5 fruit<br>5 vegetable   |
| Savsé (5)   | 4 months +              | 5                         | ✓              | 2 fruit<br>3 fruit and vegetable   |
| Tesco Slurpers (4)  | For kids                | 4                         | ✓              | 4 fruit  |
| <b>Total number of products included in this review</b>                   |                         | <b>191</b>                |                |  |

\* Included as a product for 12 months +

### 3.1 What age of infants or young children are products marketed for?

EU regulations allow foods to be marketed for infants from 4 months of age. This was most recently reviewed as a safety issue by the European Food Safety Authority in 2009 (European Food Safety Authority, 2009). However, global and national public health guidance recommends exclusive breastfeeding (or infant formula) for the first six months of life (Scientific Advisory Committee on Nutrition, 2018; World Health Organization, 2003).

Whilst in labelling terms it may be legal to market foods as for use from 4 months, it is contradictory to other health guidance and policy in the UK. The European Food Safety Authority is reviewing regulations relating to baby food as part of the revision of the delegated act on baby food composition, and labelling regulations may change. In the meantime, many brands are moving to labelling foods as for use from 6 months.

Manufacturers often also use ‘stages’ to describe different products. This is left over from historical advice about ‘the stages of weaning’, which is no longer used. Current advice is that, if you start introducing solids at about 6 months, babies will move through different textures at their own pace, and it is infant development that should dictate this, not age (Scientific Advisory Committee on Nutrition, 2018).

At the time of writing this report (2018), all four main manufacturers of baby foods in the UK – Heinz, Cow & Gate, Hipp Organic and Ella’s Kitchen (data based on Mintel, 2016) – market a range of foods in pouches as suitable from 4 months or for 4-6 months of age. Many of the smaller manufacturers of fruit and vegetable based baby foods in pouches, including some supermarket own brands, also market their products as suitable from 4 months of age. A number of brands have always marketed foods from 6 months and some who had previously marketed

products for infants under 6 months of age have re-introduced products as suitable from 6 months of age, perhaps reflecting companies taking note of public health recommendations.

Most products are clear on the age they are marketed from. Babiase products carry front-of-pack text that states: “First tastes from around 6 months” surrounded by “suitable from 4 months” in smaller text, which is slightly confusing. Fruit and vegetable pouch-based products for older infants are marketed as suitable for 6 months +, or carry no specific indication on pack of the suitable age of consumers. Throughout this report we have put products into three age groups:

- 4 months + (This includes products from 5 months +)
- 6 months +
- 12 months + (This includes products for children over 1 year of age.)

Many of the products marketed for children from 6 months are likely to be used by infants and young children.

Over half (58%) of all the fruit and vegetable mixtures we have reviewed that are marketed for infants in the first year are labelled as suitable for infants less than 6 months old. This figure rises to 79% if only products from the four main baby food manufacturers in the UK (all of whom market some of their foods as suitable from 4 months) are considered. Of the 14 manufacturers we have identified as making foods for infants in the first year of life, five market their products from 6 months of age, equating to 36% of the products reviewed in this report. Table 3 summarises products by age and type. More than half of all purées marketed to children from 4 months are fruit-only products, with only 17% being vegetable-only. Of the products marketed from 6 months +, 47 are fruit-only and 10% vegetable-only. Eighty-five per cent of the products marketed for children over the age of 12 months are fruit-only products.

**Table 3: Summary of fruit and vegetable purées by manufacturer, age and category**

| Age         | Category  | Manufacturers  |
|-------------|---|--|
| 4 months +  | Fruit only                                      | Aldi Mamia<br>Cow & Gate<br>Ella's Kitchen<br>Heinz<br>Hipp Organic<br>Lidl Lupilu<br>Little Freddie<br>Sainsbury's Little Ones<br>Savsé |
|             | Fruit and vegetables                            | Aldi Mamia<br>Ella's Kitchen<br>Heinz<br>Lidl Lupilu<br>Little Freddie<br>Savsé  |
|             | Vegetables only                                 | Ella's Kitchen<br>Heinz<br>Hipp Organic<br>Sainsbury's Little Ones   |
|             | Fruit and/or vegetables with grains             | Ella's Kitchen<br>Hipp Organic<br>Lidl Lupilu  |
| 6 months +  | Fruit only                                      | Annabel Karmel<br>Asda Little Angels<br>Ella's Kitchen<br>Heavenly Organic Superfoods<br>Hipp Organic<br>Piccolo                         |
|             | Fruit and vegetables                            | Annabel Karmel<br>Asda Little Angels<br>Piccolo  |
|             | Vegetables only                                 | Babease<br>Piccolo   |
|             | Fruit and/or vegetables with grains             | Babease<br>Cow & Gate<br>Little Freddie<br>Piccolo   |
|             | Fruit and/or vegetables with yoghurt            | Aldi Mamia<br>Piccolo  |
|             | Fruit and/or vegetables with yoghurt and grains | Aldi Mamia<br>Cow & Gate<br>Piccolo  |
| 12 months + | Fruit only                                      | Del Monte<br>Fruitypots<br>Gogo Squeez<br>Heinz<br>Kubus Mousse<br>Naturelly<br>Tesco Slurpers   |
|             | Fruit and vegetables                            | Googly Fruit<br>Kubus Mousse   |



# 4 The fruit and vegetable content of fruit and vegetable based purées in pouches

## 4.1 Single-flavour fruit and vegetable purées

Of the 191 fruit and vegetable based meals in pouches reviewed for this report, 28 (15%) are based on a single fruit or vegetable flavour. Single fruit or vegetable varieties are generally marketed as being suitable for the first stage of complementary feeding. Of the 28 single fruit or vegetable based meals, 22 (79%) are marketed for infants from 4 months of age, 4 (14%) from 6 months of age and 2 (7%) for children aged from 3 years of age or, less specifically, for 'kids'. Of the 28 products, 22 are single fruit

- flavours and 6 are single vegetable flavours prepared from carrots, parsnips, peas or sweet potatoes.
- Fruit-based meals often contain a small amount of lemon juice or ascorbic acid as an antioxidant. Hipp Organic single fruit flavour pouches also contain some cooked baby rice. As vegetable-based meals must be cooked prior to being puréed, they may also contain water. One fruit-only product based on prunes also contains some water. Where stated, the amount of water in final products varies between 17% and 50%.
- There are no single-flavour pouches based on more bitter tasting vegetables. Table 4 shows the range of flavours included in single-flavour purées.

**Table 4: Range of flavours included in single-flavour fruit or vegetable purées**

| Fruit        |            |             | Vegetables   |            |
|--------------|------------|-------------|--------------|------------|
|              | 4 months + | 6 months +) |              | 4 months + |
| Apple        | 5          |             | Carrot       | 2          |
| Banana       | 3          | 1           | Parsnip      | 2          |
| Peach        | 1          |             | Pea          | 1          |
| Pear         | 2          | 1           | Sweet potato | 1          |
| Plum         |            | 1           |              |            |
| Prune        | 2          |             |              |            |
| Mango        | 3          | 1           |              |            |
| <b>Total</b> | <b>16</b>  | <b>4</b>    | <b>Total</b> | <b>6</b>   |

## 4.2 Combinations of fruits and vegetables in purées

Overall, 162 (85%) products in this review were based on two to six different fruits or vegetables. We have included ingredients from coconut as fruits. All those products based on two different fruits or vegetables contain either two fruits or two vegetables, with the exception of Ella's Kitchen 'Mighty Grains Squash and

- Apple' which contains apples (74%), squash (23%) and quinoa flour (3%). Where meals are based on three, four, five or six different fruits or vegetables, some unusual combinations of both fruits and vegetables are used. For example, 'Cucumber, Kiwi, Kale, Spinach, Apple and Banana', 'Sweet Potatoes, Pumpkins, Apples and Blueberries' and 'Sweet Potato, Parsnip and Mango'. Some examples of unusual combinations are given in Table 5.

**Table 5: Some unusual combinations of fruit and vegetable purées**

| Manufacturer            | Product name                                     | Ingredients   |
|-------------------------|--|---|
| <b>From 4 months +</b>  |  |   |
| Aldi Mamia              | Sweet Potatoes, Pumpkins, Apples and Blueberries | Organic apple purée 52%, organic sweet potato purée 23%, organic pumpkin purée 20%, organic blueberry purée 5%, lemon juice     |
| Ella's Kitchen          | Sweet Potatoes, Pumpkins, Apples and Blueberries | Apples 52%, sweet potatoes 23%, pumpkin 20%, blueberries 5%, lemon juice (a dash)   |
|                         | Plums, Pears, Parsnips and Swedes                | Plums 36%, pears 28%, parsnips 24%, swedes 12%, lemon juice concentrate (a dash)  |
| Heinz by Nature         | Sweet Potato, Parsnip and Mango                  | Sweet potato 40%, parsnip 30%, water, mango 5%, parsley   |
| Lidl Lupilu             | Butternut Squash, Apples, Carrots and Prunes     | Organic apples 39%, organic carrots 25%, organic butternut squash 20%, organic prunes 16%, organic lemon juice from concentrate |
| Little Freddie          | Tender Spinach, Peas and Apples                  | Apple 82%, spinach 12%, peas 6%, lemon juice concentrate 0.1%   |
| Savsé                   | Cucumber, Kiwi, Kale, Spinach, Apple and Banana  | Apple 35%, banana 16%, spinach 16%, cucumber juice 11%, kiwi 11%, kale 11%, lemon juice   |
| <b>From 6 months +</b>  |  |   |
| Annabel Karmel          | Butternut Squash, Carrot, Apple and Prune        | Apple 37%, carrot 31%, butternut squash 16%, prune 16%, organic lemon juice concentrate <1%                                     |
| Piccolo                 | Mango, Pear and Kale with a Dash of Yoghurt      | Pear 26%, apples 24%, mango 20%, kale 20%, whole yoghurt 10%, lemon juice   |
| <b>From 12 months +</b> |  |   |
| Googly Fruit            | Apple, Sweet Potato and Clementine               | Apple 60% sweet potato 25% clementine 15%   |

### 4.3 Predominance of apple and pear in fruit and vegetable based purées

Many of the fruit and vegetable based products are predominantly apple-based or pear-based. Across all of the products based on fruits only, 67% (89) had apples or pears as the main ingredient, and of these 4% (3) did not feature apples or pears as the leading named ingredient. Seven of these products failed to mention apple or pear anywhere in the product name, and nine were generically named as, for example, 'Fruit mix', 'Tropical Fruits' or 'The Green One'. The proportion of products combining fruit

- with vegetables that had apples or pears as the main
- ingredient was 74% (26), and 81% (21) of these did
- not mention apple or pear as the leading ingredient
- in the product name. Overall, across all of the fruit
- and fruit and vegetable based products, 68% (115)
- had apples or pears as the main ingredient, and of
- these 48% (55) did not feature apples or pears as the
- leading ingredient in the product name. Products
- for infants aged from 4 months were more likely
- to contain apple or pear as the main ingredient
- (69%) than products for infants aged from 6 months
- (57%), and almost all products (93%) marketed for
- young children from 12 months + were apple-based.



However, this was more likely to be reflected in the product name than in products for younger children, with only 12% (3) of products in this age band failing to mention apple as the leading ingredient in the product name. Some products are not clear about the amount of apple purée present. For example, Cow & Gate ‘Mango and Spelt with Greek Style

Yoghurt’ says on the ingredients panel that it has 78% of fruit, but only declares 11% mango and does not give the percentage of apple which is the first ingredient and is likely to be more than 50% of the product. Table 6 shows some examples of products where apple and/or pear are the main ingredients.

**Table 6: Products with a high proportion of apple and/or pear purée**

| Age         | Product name  | Manufacturer       | Ingredients  |
|-------------|---|--------------------|--|
| 4 months +  | Pear, Pea, Apple and Spinach                              | Savsé              | Apple 58%, pear 30%, spinach 7%, pea 5%  |
|             | Tender Spinach, Peas and Apples                           | Little Freddie     | Apple 82%, spinach 12%, peas 6%, lemon juice concentrate 0.1%  |
|             | Broccoli, Pears and Peas                                  | Ella’s Kitchen     | Pears 79%, peas 14%, broccoli 7%, lemon juice concentrate (a dash)   |
|             | Mighty Grains Squash and Apple                            | Ella’s Kitchen     | Apples 74%, squash 23%, quinoa flour 3%  |
|             | Strawberry, Banana, Raspberry and Apple                   | Heinz by Nature    | Apple 79%, strawberry 8%, banana 8%, raspberries 5%, lemon juice vitamin C   |
|             | Apple, Peach, Blueberry and Raspberry                     | Hipp Organic       | Apple 73%, peach 16%, blueberry 6%, raspberry 5%, antioxidant ascorbic acid  |
|             | Carrots, Apples and Parsnips                              | Aldi Mamia         | Apple purée 68%, carrot purée 22%, parsnip purée 10%, lemon juice  |
| 6 months +  | Organic Squeezy Fruit Apple and Strawberry                | Asda Little Angels | Apple 80%, strawberry 20%, lemon juice   |
|             | Pears, Broccoli, Peas and Quinoa                          | Little Freddie     | Pears 76%, broccoli 16%, peas 5%, quinoa 3%, lemon juice 0.1%  |
|             | Apples and Apricots                                       | Piccolo            | Apples 76%, apricots 24%, cinnamon   |
|             | The Green One   | Ella’s Kitchen     | Apples 59%, bananas 20%, pears 15%, kiwi%, lemon juice (a dash)  |
|             | Strawberry, Banana and Apple                              | Annabel Karmel     | Apple 61%, strawberry 25%, banana 14%, organic lemon juice concentrate <1%   |
|             | Apple and Apricot with Millet                             | Cow & Gate         | Fruit (86%) (apple (53%), apricot (18%), banana), water, millet flour (4%), rye bran (contains gluten) (2%), vitamin C, concentrated lemon juice |
|             | Pear, Mixed Berries, Coconut Water, Brown Rice and Quinoa | Babease            | Pear 41%, coconut water 20%, blueberries 7%, raspberries 7% brown rice 5%, quinoa 3%   |
| 12 months + | Apple and Banana Mousse                                   | Kubus              | Apple (88%), banana (6%), apple juice (6%) from concentrate, vitamin C   |
|             | Apple, Blueberry and Purple Carrot                        | Googly Fruit       | Apple 84%, blueberry 12%, purple carrot 4%   |
|             | Apple Mango   | Gogo Squeez        | Apple 72.1%, mango 23%, concentrated apple juice, concentrated lemon juice (if necessary to regulate the acidity)                                |
|             | Squeezie Apple, Strawberry and Blueberry                  | Del Monte          | Apple 70%, strawberry 15%, blueberry 15%   |

#### 4.4 Predominance of sweet vegetables in fruit and vegetable based purées

In this review, 65% of all products containing any vegetables contained carrots, or sweet potatoes, or both carrots and sweet potatoes. Carrots were the predominant vegetable in 45% of products for infants from 6 months of age and in 39% of products for infants from 4 months of age. Sweet potatoes were also used in 40% of products for infants aged 6 months +, and in 27% of products for infants aged 4 months. Carrots, sweet potatoes and pumpkin were the only vegetables used in products marketed for young children from 12 months of age or for 'kids'. Many other products had, as the predominant vegetables, parsnip, pumpkin, butternut squash or peas in combination with carrot, giving the majority of vegetable or fruit and vegetable pouches a sweet and soft texture.

Overall, the number of fruit and vegetable based foods that had a more bitter vegetable as the main vegetable ingredient was limited. Cauliflower, broccoli, spinach, kale or courgette was the main bitter vegetable present in 13% of meals marketed for infants aged 4 months +, and in 12% of meals marketed at 6 months +. In most dishes, however, sweet vegetables were also added in amounts that would sweeten the taste. Overall, only one meal, Sainsbury's 'Broccoli, Pea, Spinach and Kale' for infants from 4 months of age, contained cauliflower, courgette, broccoli, kale or spinach in amounts greater than the sweeter vegetables in the purée. Table 7 shows all the fruit and vegetable products reviewed that contain cauliflower, broccoli, spinach, kale or courgette.



**Table 7: Products containing cauliflower, broccoli, spinach, kale or courgette**

| Manufacturer            | Product name  | Ingredients   |
|-------------------------|---|---|
| <b>4 months +</b>       |   |   |
| Ella's Kitchen          | Broccoli, Pears and Peas  | Pears 79%, peas 14%, <b>broccoli 7%</b> , lemon juice concentrate (a dash)                              |
|                         | Spinach, Apples and Swedes                                      | Apples 55%, <b>spinach 34%</b> , swedes 11%, lemon juice concentrate (a dash)                           |
|                         | Peas, <b>Broccoli</b> and Potatoes                              | Peas 41%, water 30%, potatoes 16%, <b>broccoli 14%</b>  |
|                         | Carrots, Peas and <b>Kale</b>                                   | Carrots 31%, peas 31%, water 30%, <b>kale 9%</b>  |
|                         | Pumpkin, <b>Broccoli</b> and Sweetcorn                          | Sweetcorn 37%, pumpkin 33%, water 20%, <b>broccoli 10%</b>  |
|                         | Sweet Potatoes, <b>Broccoli</b> and Carrots                     | Sweet potatoes 48%, carrots 30%, <b>broccoli 22%</b> , lemon juice (a dash)                             |
| Hipp Organic            | Parsnips, Sweet Potato and <b>Broccoli</b>                      | Parsnips 35%, water, sweet potato 20%, potato 8%, <b>broccoli 8%</b> , rapeseed oil 1.6%                |
| Little Freddie          | Tender <b>Spinach</b> , Peas and Apples                         | Apple 82%, <b>spinach 12%</b> , peas 6%, lemon juice concentrate 0.1%                                   |
| Savsé                   | Cucumber, Kiwi, <b>Kale</b> , <b>Spinach</b> , Apple and Banana | Apple 35%, banana 16%, <b>spinach 16%</b> , cucumber juice 11%, kiwi 11%, <b>kale 11%</b> , lemon juice |
|                         | Pear, Pea, Apple and <b>Spinach</b>                             | Apple 58%, pear 30%, <b>spinach 7%</b> , pea 5%   |
| Sainsbury's Little Ones | Parsnip, Butternut Squash and <b>Cauliflower</b>                | Parsnip 34%, butternut squash 27%, <b>cauliflower 21%</b> , water                                       |
|                         | <b>Broccoli</b> , Pea, <b>Spinach</b> and <b>Kale</b>           | <b>Broccoli 35%</b> , peas 26%, water, <b>spinach 16%</b> , <b>kale 4%</b>                              |
| <b>6 months +</b>       |   |   |
| Babease                 | Sweet Potato, Carrot and <b>Cauliflower</b>                     | Sweet potato 60%, carrot 23%, <b>cauliflower 17%</b>  |
|                         | Butternut Squash, Carrot and <b>Broccoli</b>                    | Butternut squash 55%, carrot 30%, <b>broccoli 15%</b>   |
| Little Freddie          | Pears, <b>Broccoli</b> , Peas and Quinoa                        | Pears 76%, <b>broccoli 16%</b> , peas 5%, quinoa 3%, lemon juice 0.1%                                   |
| Piccolo                 | Spring Greens, Pear and Apple                                   | Pears 35%, apples 35%, peas 15%, <b>courgette 10%</b> , <b>spinach 5%</b> , lemon juice, mint           |
|                         | <b>Courgette</b> , Pea and Leek                                 | <b>Courgette 39%</b> , pea 35%, vegetable stock 15%, leek 8.5%, lemon juice, olive oil mint             |
|                         | <b>Kale</b> , Kiwi, Peas and Pear                               | Pear 53%, <b>kale 22%</b> , pea 13%, kiwi 12%, basilic powder 0.01%, lemon juice concentrate            |
|                         | Glorious Greens   | Apples 30%, pears 24%, <b>kale 20%</b> , <b>spinach 16%</b> , coconut milk 10%, basil                   |
|                         | Mango, Pear and <b>Kale</b> with a Dash of Yoghurt              | Pear 26%, apples 24%, mango 20%, <b>kale 20%</b> , whole yoghurt 10%, lemon juice                       |

## 4.5 Use of grains in fruit and vegetable based purées

Cereal grains and grain flours, particularly rice and oats, have commonly been used as thickeners and sources of energy in complementary foods. However, more recently, a growing number of manufacturers have been adding very small amounts of less traditional grains and grain products such as spelt and quinoa to their products, and featuring them in their product names. The grains themselves are often added as grain flour. Ella's Kitchen say their quinoa

flour is made from the whole grain. However, it is not known whether health benefits associated with the intact whole grains remain due to the disruption and/or loss of fibre during commercial processing. Ella's Kitchen have three products which are called 'Mighty Grains' but which have 5% or less of cereal flours added.

Table 8 shows some of the products that include grains, and illustrates the small amount of grains used in products even when they are highlighted in the product name.

**Table 8: Examples of fruit and vegetable purées that include grains**

| Age        | Product name  | Manufacturer   | Ingredients   |
|------------|---|----------------|---|
| 4 months + | Mighty Grains Squash and Apple                            | Ella's Kitchen | Apples 74%, squash 23%, <b>quinoa flour 3%</b>  |
|            | Mighty Grains Raspberry and Apple                         | Ella's Kitchen | Apples 77%, raspberries 20%, <b>buckwheat flour 3%</b>  |
|            | Mighty Grains Peach and Mango                             | Ella's Kitchen | Peaches 63%, mango 32%, <b>amaranth flour 5%</b>  |
|            | Apple and Banana  | Lidl Lupilu    | Apple 53%, apple juice from concentrate 35%, banana 12%, <b>wholemeal spelt flour 3.5%</b>  |
| 6 months + | Apple and Strawberry with Spelt                           | Cow & Gate     | Fruit (86%), (apple (42%), strawberry (20%), banana, blueberry), water, <b>wholegrain spelt flour 4%</b> , <b>rye bran 2%</b> , vitamin C, concentrated lemon juice |
|            | Apple and Apricot with Millet                             | Cow & Gate     | Fruit (86%) (apple (53%), apricot (18%), banana), water, <b>millet flour (4%)</b> , <b>rye bran (2%)</b> , vitamin C, concentrated lemon juice                      |
|            | Cherry and Yoghurt with Wholegrain Oats                   | Piccolo        | Apples 43%, whole milk yoghurt 30%, cherries 24%, <b>wholemeal oat flour 3%</b> , vanilla powder  |
|            | Pear, Mixed Berries, Coconut Water, Brown Rice and Quinoa | Babease        | Pear 41%, coconut water 20%, blueberries 7%, raspberries 7%, brown rice 5%, <b>quinoa 3%</b>  |
|            | Pears, Broccoli, Peas and Quinoa                          | Little Freddie | Pears 76%, broccoli 16%, peas 5%, <b>quinoa 3%</b> , lemon juice 0.1%   |

#### 4.6 Do the names of fruit and vegetable based purées reflect the ingredients present?

Asda, Babease, Del Monte, Gogo Squeez, Googly Fruit and Hipp Organic predominantly name their products in line with the ingredients present. However, many products have amounts of ingredients that are not reflected in the front-of-pack name of the product. Of the 188 products with full ingredients lists available, 10 (5%) did not mention the main ingredient at all in the product name, and 57 (30%) did not name the main ingredient first in the product name. Ingredients that were present at less than 5% of the

total ingredients featured in the product names of 23 (12%) products. Of these products, 10 featured cereal grains in their product names. Graphics and images used on the front of pack also frequently misrepresent the proportions of ingredients used. Ingredients found in smaller quantities quite often appear in the product name in a larger font size than the main ingredients. Images of fruits and vegetables are also shown in sizes that do not reflect the relative quantities in which they are present in the product. Some examples of fruit and vegetable purées with names that do not accurately reflect the ingredients list are shown in Table 9.



**Table 9: Examples of fruit and vegetable purées with names that do not accurately reflect the ingredients list**

| Manufacturer                | Product name                                    | Ingredients   |
|-----------------------------|---|---|
| <b>4 months +</b>           |   |   |
| Ella's Kitchen              | Mighty Grains Squash and Apple                  | Apples 74%, squash 23%, <b>quinoa flour 3%</b>  |
| Savsé                       | Cucumber, Kiwi, Kale, Spinach, Apple and Banana | Apple 35%, banana 16%, spinach 16%, <b>cucumber juice 11%</b> , kiwi 11%, kale 11%, lemon juice   |
| Heinz by Nature             | Sweet Red Pepper, Tomato and Carrot             | Carrot 40%, sweet potato 32%, tomato 17%, <b>red pepper 7%</b> , water  |
| Little Freddie              | Tender Spinach, Peas and Apples                 | Apple 82%, <b>spinach 12%</b> , peas 6%, lemon juice concentrate 0.1%   |
| Aldi Mamia                  | Strawberries and Apples                         | Apple purée 79%, <b>strawberry purée 21%</b> , lemon juice  |
| Lidl Lupilu                 | Butternut Squash, Apples, Carrots and Prunes    | Organic apples 39%, organic carrots 25%, <b>organic butternut squash 20%</b> , organic prunes 16%, organic lemon juice from concentrate   |
| <b>6 months +</b>           |   |   |
| Annabel Karmel              | Strawberry, Banana and Coconut Milk             | Apple 30%, banana 30%, <b>strawberry 25%</b> , coconut milk 15%   |
| Heavenly Organic Superfoods | Coconut Squishies, Mango, Apple and Banana      | Banana 32%, apple 30%, mangoes 23%, <b>coconut milk 15%</b> , lemon juice (a dash)  |
| Piccolo                     | Cherry and Yoghurt with Wholegrain Oats         | Apples 43%, whole milk yoghurt 30%, <b>cherries 24%</b> , wholemeal oat flour 3%, vanilla powder  |
| Cow & Gate                  | Mango and Spelt with Greek Style Yoghurt        | Fruit (78%) (apple, <b>mango (11%)</b> , banana), Greek-style natural yoghurt (milk) (10%), water, wholegrain spelt flour 3%, oat flakes 3%, milk minerals concentrate, vitamin C, concentrated lemon juice                                 |
| Aldi Mamia                  | Berry Greek Style Yoghurt                       | Greek style yoghurt 34%, apple 31%, banana 22%, <b>blackcurrant 7%</b> , <b>blueberry 5%</b> , rice starch, lemon juice   |
| <b>12 months +</b>          |   |   |
| Fruitypots                  | Jelly Squeeze Strawberry Flavour Jelly          | Apple juice from concentrate, gelling agents (carrageenan, locust bean gum), <b>strawberry flavouring</b> , acidity regulators (citric acid, malic acid, sodium citrate, potassium citrate), natural colour (anthocyanin, beta-carotene)    |
| Naturelly                   | Jelly Juice Summer Fruits                       | Apple juice (60%), water, apple puree (8%), <b>strawberry juice (1%)</b> , <b>raspberry juice (1%)</b> , <b>blackcurrant juice (1%)</b> , thickener: gellan gum, natural flavouring, acidity regulator: malic acid, antioxidants: vitamin C |

## 4.7 Vegetable and fruit portions in purées

Current guidance on the amount of fruit and vegetables that should be included in the diet suggests that, from 1 to 4 years, children should have five different fruits and vegetables a day, with portions of about 40g (First Steps Nutrition Trust, 2018; Action for Children, 2017). There are no specific national guidelines for infants on what constitutes a ‘portion’. Some manufacturers choose to make claims on the product packaging around the quantity of fruits and vegetables in their baby foods. Heinz and Cow & Gate make claims for the quantity of fruits and vegetables in their products for infants from 4 months of age, whilst Ella’s Kitchen and Heavenly Organic Superfoods make claims for their fruit pouches for infants from 6 months of age. Del Monte, Gogo Squeez, Googly Fruit, Heinz and Tesco all make claims for the quantity of fruits and vegetables in their products for toddlers and young children from 12 months of age.

Different manufacturers use different methods of describing the fruit and vegetable content of their meals. Cow & Gate describe the quantity of fruit and vegetables in their pouches simply by stating the number of portions contained, for example, ‘1 portion of fruit’. All other manufacturers refer to

- the number of portions of fruit and/or vegetables in their products by reference to the UK Government’s 5-A-Day campaign. Claims based on the number of portions of fruits and vegetables in a meal are not the same as claims relating to the UK Government’s 5-A-Day campaign. If a claim is made simply for the number of portions of fruit or vegetables in a meal, this could be calculated by dividing the total weight of vegetables in the meal by the stated portion size. However, if reference is made to the UK Government’s 5-A-Day campaign, the calculation should be more complex, as further criteria must be considered to ensure that the recommendation to eat five different fruits and vegetables is included.
- In order to promote a consistent approach across manufacturers, the IGD (Institute of Grocery Distributors) provides best-practice guidance to industry on how to calculate and communicate the number of fruit and vegetable portions in composite meals (IGD, 2014). The differences between claims made by manufacturers, and the absence of complete information on the quantity of each ingredient on some product labels, make it difficult to establish if this guidance has been followed. Inconsistencies in approach may make it difficult for consumers to make informed decisions when choosing food for their baby.





# 5 The sugar content of fruit and vegetable based purées

## 5.1 Carbohydrates in baby foods

Sugars are carbohydrates, and currently the EU baby food composition regulations have restrictions only on the maximum total carbohydrate content of fruit-only dishes and desserts and puddings:

*“The quantities of total carbohydrates present in fruit-only dishes, and desserts or puddings shall not exceed:*

- 20g/100g for fruit-only dishes
- 25g/100g for desserts and puddings.”

Only three products appear to slightly exceed this figure. Ella’s Kitchen’s ‘Bananas, Bananas, Bananas’ and ‘Bananas and Apples’ have 20.2g/100g and 20.6g/100g of carbohydrates respectively, and Cow & Gate’s ‘Banana and Strawberry’ has 21.2g carbohydrate/100g.

## 5.2 Sugars in fruit and vegetable based purées

Public Health England (PHE) has set a definition for free sugars in the UK (Swan et al, 2018) and defines these as:

*“All added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.”*

This therefore means that the sugars in fruit and vegetable purées are defined as free sugars.

Sugars appear on food labels as ‘sugars’ or ‘total sugars’ which is the sum of all sugars present in a food, and can include both sugars present in milk, dairy products, fruit and vegetables as well as added sugars such as sucrose or sugars from fruit and vegetable juices and purées. It is important to know

where sugars originate from as it is the added sugars, as opposed to those enclosed in the cell structure of foods such as fruit, that have a detrimental effect on long-term health (Scientific Advisory Committee on Nutrition, 2015). The Public Health England definition of free sugars excludes the sugars in puréed sweet potatoes (Swan et al, 2018) but in this report the sugars in puréed sweet potatoes have been defined as free sugars as they are predominantly used as a vegetable and not a starchy food, and are frequently used to add sweetness to baby foods. Sweet potatoes contain a similar amount of sugar to other sweet-tasting vegetables including peas, carrots and parsnips, and therefore it is logical to include the sugars in these products as free sugars. Coconut milk can be made with or without added sugars such as fruit juice and sucrose. As the ingredients labels on products do not specify the composition of coconut milk used, we have not considered coconut milk sugars as free sugars.

The values for sugars listed on product labels are those given by the manufacturer. They may be the result of direct analysis of sample products within batches, or be theoretical values based on calculations using data from established food composition databases and/or details provided by suppliers. Previous work that has analysed the sugar content of baby foods has provided evidence that the declared values on baby food labels may actually underestimate the sugars present (Walker and Goran, 2015; Clifford et al, 2014). (See section 2.3.1.)

Most of the products (78%) reviewed in this report are purées containing only fruits and/or vegetables. All of the sugars listed on the label will therefore be free sugars since they will have been fully liberated from the cell walls of the fruit or vegetables used. The remaining 22% of products contain small amounts of yoghurt, grains, potato or coconut milk. The sugars contained in these ingredients are not considered to be free sugars and so have been excluded from estimates of free sugar content. The sugars listed on



the labels of these products will be mostly free sugars from the fruits and vegetables they contain.

Table 10 shows the mean and range of values for sugars in the products reviewed in this report. The average sugar content for products containing only fruit is almost four times greater than the average sugar content of products containing only vegetables, across all age bands. The addition of vegetables, grains, and yoghurt to fruit mixtures reduces the proportion of total sugars. Where vegetables are included in the product, the addition of water or

stock to some products as a cooking ingredient contributes to the reduction in the proportion of total sugars. Across all products, Cow & Gate's 'Banana and Strawberry' contains the most sugar at 20.2g per 100g, and Ella's Kitchen's 'Peas, Peas, Peas' contains the least at 0.6g/100g (but this product is 50% water). Statements relating to the sugar content of products appear on some brands. Many products state 'no added sugar' on the front of pack. As sugars in puréed fruit and vegetable products are classified as free sugars, this statement is misleading.

**Table 10: Free sugars in fruit and vegetable purées**

| Age         | Category  | Mean free sugar content g/100g | Range of free sugar content g/100g | Mean free sugar content per portion | Range of free sugar content per portion |
|-------------|---|--------------------------------|------------------------------------|-------------------------------------|---|
| 4 months+   | Fruit only                                      | 11.7g                          | 6.3-20.2g                          | 11.4g                               | 5.9-21.7g                               |
|             | Fruit and vegetables                            | 7.7g                           | 3.7-10.2g                          | 8.7g                                | 3.7-12.2g                               |
|             | Vegetables only                                 | 3.2g                           | 0.6-6.3g                           | 2.9g                                | 0.4-7.6g                                |
|             | Fruit and/or vegetables with grains             | 10.3g                          | 6.7-17.1g                          | 11.2g                               | 5.8-20.5g                               |
| 6 months +  | Fruit only                                      | 12.2g                          | 8.9-18.0g                          | 11.9g                               | 6.9-17.3g                               |
|             | Fruit and vegetables                            | 7.0g                           | 3.9-9.9g                           | 6.9g                                | 3.9-9.9g                                |
|             | Vegetables only                                 | 3.2g                           | 1.7-5.4g                           | 3.2g                                | 1.7-5.4g                                |
|             | Fruit and/or vegetables with grains             | 10.3g                          | 6.8-13.0g                          | 10.2g                               | 6.8-13.0g                               |
|             | Fruit and/or vegetables with yoghurt            | 9.1g                           | 8.2-9.9g                           | 8.4g                                | 7.4-8.9g                                |
|             | Fruit and/or vegetables with yoghurt and grains | 9.4g                           | 7.4-11.7g                          | 9.3g                                | 7.0-11.7g                               |
| 12 months + | Fruit only                                      | 12.4g                          | 7.2-19.9g                          | 11.8g                               | 7.2-18.9g                               |
|             | Fruit and vegetables                            | 10.3g                          | 9.2-11.5g                          | 10.3g                               | 9.2-11.5g                               |

### 5.3 Potential impact of commercial fruit and vegetable based purées on free sugars intake in young children

The Scientific Advisory Committee on Nutrition recommends that the free sugars intake in children aged from 2 years does not exceed 5% of energy intake (SACN, 2015). Whilst there is no specific recommendation for children aged 1-2 years, advice is to minimise free sugars intake and it would seem logical that intakes not exceeding 5% of energy would be prudent in this group. The estimated average requirement for energy in children aged 1-4 years is 1,041kcal/day (based on the estimated average energy requirement for children 1, 2 and 3 years of age) and 5% of total energy equates to around 13.9g of free sugars. Consuming just one pouch of some of the products included in our review would result in children exceeding or coming close to their recommended intake of free sugars. Even products that might appear to be savoury as they contain vegetables can make a significant contribution to free sugars intakes.

Figure 1 provides some examples of the potential contribution that fruit and vegetable based purées in pouches

make to the free sugars intake of children aged 1-4 years. We have included some products marketed from 6 months + in this illustration as many of these have a quite distinct presentation style in terms of the smaller packaging size and multipack format, and product names which differentiate them from other fruit and vegetable based products in manufacturers' ranges and suggest that they are also being marketed for older children. They are also marketed on manufacturers' websites as snacks and, although the packaging may state that they are suitable from 6 months +, they may also be selected by product selection tools on the manufacturers' website for infants aged 6 months +, 7 months +, 10 months +, and 12 months +.

We believe that commercial fruit and vegetable purées that contain more than 5g free sugars per pouch should carry a health warning, as this represents about 35% of the recommended free sugar intake for a child aged 1-4 years. Clear labelling is required which uses front-of-pack traffic-light labels to highlight the free sugar content relative to the recommended intakes of a young child.



**Figure 1: Contribution of free sugars in fruit and vegetable based purées in pouches to recommended intakes of free sugars in 1-4 year olds**

| Product name   | Ingredients   | Total free sugars per pack | Energy from free sugars as % of recommended daily amount for a 1-4 year old * |
|--|---|----------------------------|---|
| Fruitypots Jelly Squeeze Orange Flavour Jelly 95g      | Apple juice from concentrate, gelling agents (carrageenan, locust bean gum), orange flavouring, acidity regulators (citric acid, malic acid, sodium citrate, potassium citrate), natural colour (capsanthin)                    | 18.9g                      | 136%  |
| Annabel Karmel Banana, Pear and Peach 100g             | Banana 56%, pear 24%, peach 20%, organic lemon juice concentrate <1%  | 17.1g                      | 123%  |
| Tesco Apple and Strawberry Slurper (for kids) 90g      | Apple purée (69%), strawberry purée (21%), concentrated apple juice (9%), concentrated blackcurrant juice, antioxidant (ascorbic acid), flavouring  | 14.5g                      | 104%  |
| Ella's Kitchen The Yellow One 90g                      | Bananas 45%, apples 33%, mangoes 15%, apricots 7%, lemon juice (a dash)   | 13.7g                      | 99%   |
| Ella's Kitchen The Purple One 90g                      | Bananas 53%, apples 29%, blackcurrants 12%, blueberries 6%, lemon juice (a dash)  | 13.6g                      | 98%   |
| GoGo Squeeze Apple 90g                                 | Apple 94.2%, concentrated apple juice, concentrated lemon juice   | 11.7g                      | 84%   |
| Kubus Apple, Banana, Carrot and Strawberry Mousse 100g | Banana (30%), apple (28%) and strawberry (27%), juices from concentrates from: apple (10%) and carrot (5%)  | 11.5g                      | 83%   |
| Del Monte Squeezie Apple and Mango 100g                | Apple 80%, mango 20%  | 9.6g                       | 69%   |
| Googly Fruit Apple, Pear, Carrot and Pumpkin 100g      | Apple 63%, pear 20%, carrot 11%, pumpkin 6%, lemon juice a dash   | 9.6g                       | 69%   |
| Heinz Fruitz Strawberry and Banana 100g                | 1 apple, 1 strawberry (10%), 1/10 banana (10%), 1 raspberry, 12 blackcurrants, a sprinkle of vitamin C  | 9.5g                       | 68%   |
| Naturelly Jelly Juice Tropical Fruits 100g             | Apple juice (38%), water, orange juice (22%), apple purée (8%), pineapple juice (2.5%), passion fruit juice (0.5%), thickener: gellan gum, natural flavouring, acidity regulator: malic acid, antioxidants: vitamins A, C and E | 7.7g                       | 55%   |
| Piccolo Olympic Oranges 90g                            | Sweet potato 32%, peach 30%, apple 23%, pumpkin 15%, all spice 0.01%, cinnamon 0.01%, lemon juice   | 5.9g                       | 42%   |



## 6 Cost of fruit and vegetable based purées in pouches for infants and young children

**A**cross all products included in this review, the most expensive are generally those from smaller manufacturers who specialise in pouched baby foods, followed by the four main manufacturers of baby foods in the UK, with the least expensive products coming from supermarket own brands.

The majority of manufacturers now only produce organic baby foods. Cow & Gate and Heinz are the only manufacturers producing products made with conventionally grown fruit and vegetables (suitable for use in baby foods), marketed for infants under 12 months of age. The most expensive organic products tend to be those from smaller manufacturers who specialise in pouched baby foods, followed by Hipp Organic and Ella's Kitchen, with the least expensive products coming from the supermarket own brands.

There are very few fruit and vegetable based products in pouches marketed specifically for children over 12 months of age. Those that are available tend to be less expensive than products for younger children and the only organic brand is more expensive than most other products in this age category. The average cost of products by manufacturer, organic status, average cost and average cost per 100g are shown in Figure 2.

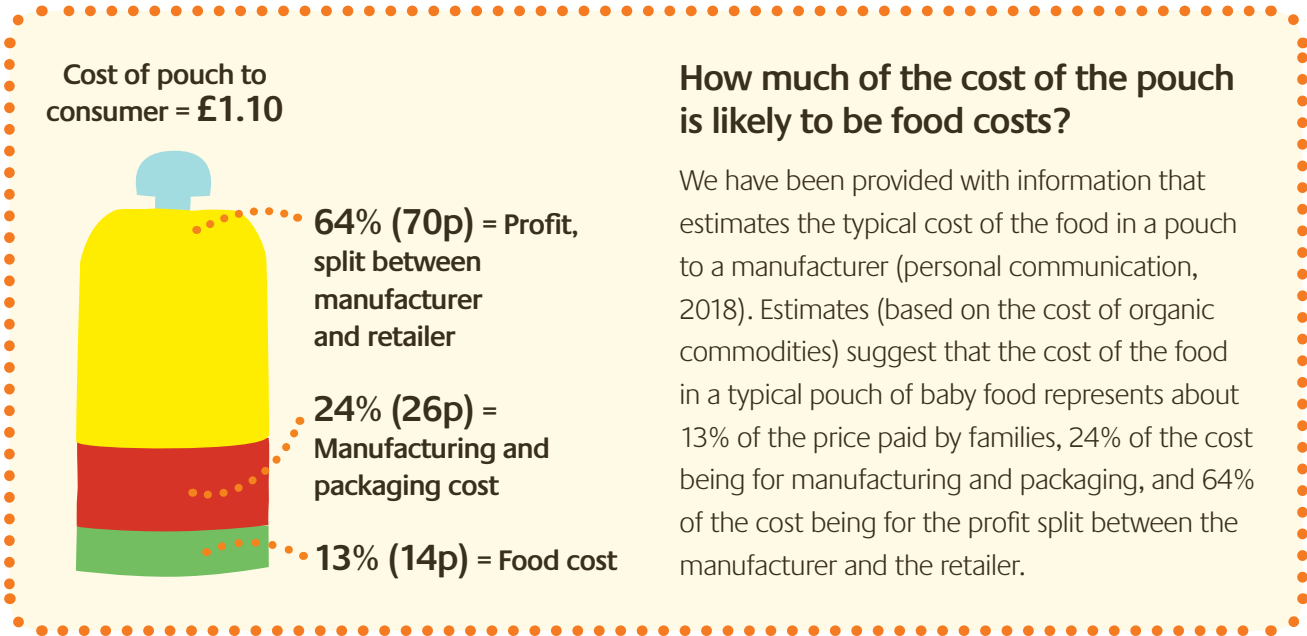


**Figure 2: Cost of pouched fruit and vegetable purées, July 2018<sup>1</sup>**

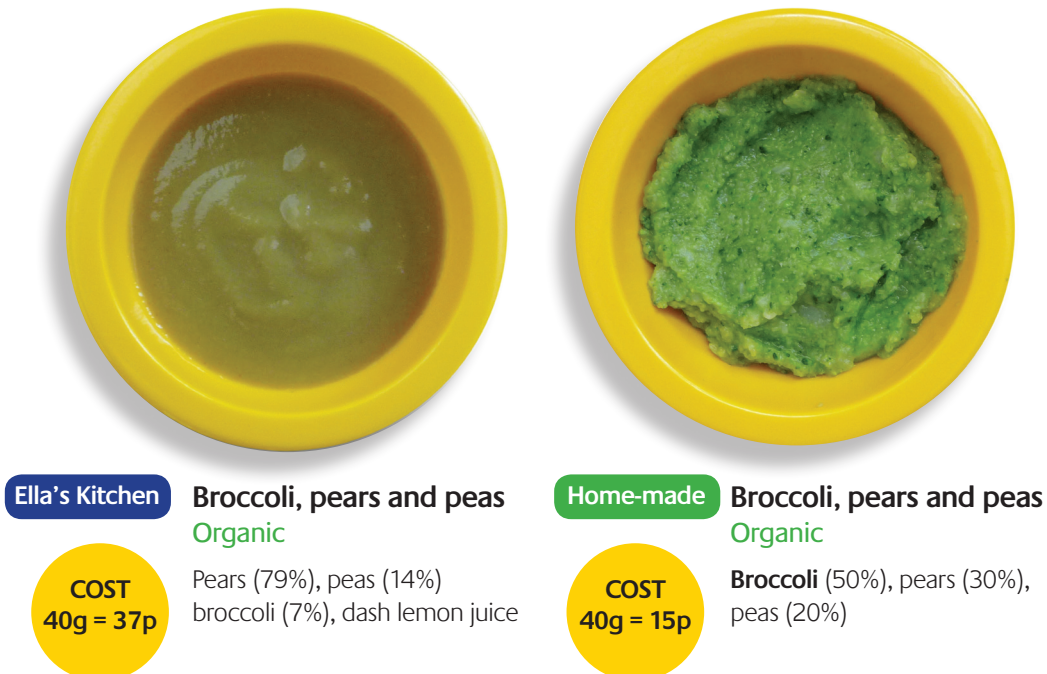
| Brand                       | Organic | Product weight | Average cost | Average cost per 100g |
|-----------------------------|---------|----------------|--------------|-----------------------|
| <b>4 months +</b>           |         |                |              |                       |
| Little Freddie              | ✓       | 70g            | £1.05        | £1.50                 |
| Savsé                       | ✓       | 100g           | £1.49        | £1.49                 |
| Ella's Kitchen              | ✓       | 70g            | 90p          | £1.29                 |
| Little Freddie              | ✓       | 100g           | £1.25        | £1.25                 |
| Hipp Organic                | ✓       | 70g            | 80p          | £1.14                 |
| Hipp Organic                | ✓       | 100g           | £1.10        | £1.10                 |
| Sainsbury's Little Ones     | ✓       | 70g            | 70p          | £1.00                 |
| Cow & Gate                  | ✗       | 100g           | 99p          | 99p                   |
| Heinz                       | ✗       | 100g           | 99p          | 99p                   |
| Ella's Kitchen              | ✓       | 120g           | £1.10        | 92p                   |
| Sainsbury's Little Ones     | ✓       | 100g           | 80p          | 80p                   |
| Aldi Mamia                  | ✓       | 90g            | 69p          | 77p                   |
| Lidl Lupilu                 | ✓       | 90g            | 39p          | 49p                   |
| Lidl Lupilu                 | ✓       | 120g           | 53p          | 44p                   |
| Aldi Mamia                  | ✓       | 120g           | 49p          | 41p                   |
| <b>6 months +</b>           |         |                |              |                       |
| Piccolo                     | ✓       | 70g            | £1.00        | £1.43                 |
| Little Freddie              | ✓       | 100g           | £1.25        | £1.25                 |
| Babease                     | ✓       | 100g           | £1.19        | £1.19                 |
| Heavenly Organic Superfoods | ✓       | 90g            | £1.05        | £1.17                 |
| Piccolo                     | ✓       | 90g            | £1.00        | £1.11                 |
| Piccolo                     | ✓       | 100g           | £1.10        | £1.10                 |
| Annabel Karmel              | ✓       | 100g           | £1.08        | £1.08                 |
| Cow & Gate                  | ✗       | 100g           | 99p          | 99p                   |
| Ella's Kitchen              | ✓       | 90g            | 79p          | 88p                   |
| Aldi Mamia                  | ✓       | 90g            | 69p          | 77p                   |
| Aldi Mamia                  | ✓       | 100g           | 65p          | 65p                   |
| Asda Little Angels          | ✓       | 100g           | 43p          | 43p                   |
| Asda Little Angels          | ✓       | 120g           | 52p          | 43p                   |
| <b>12 months +</b>          |         |                |              |                       |
| Naturelly                   | ✗       | 100g           | £1.19        | £1.19                 |
| Googly Fruit                | ✓       | 100g           | £1.00        | £1.00                 |
| Gogo Squeez                 | ✗       | 90g            | 64p          | 71p                   |
| Kubus                       | ✗       | 100g           | 65p          | 65p                   |
| Heinz                       | ✗       | 100g           | 64p          | 64p                   |
| Tesco                       | ✗       | 90g            | 50p          | 55p                   |
| Fruitypots                  | ✗       | 95g            | 50p          | 53p                   |
| Del Monte                   | ✗       | 100g           | 50p          | 50p                   |

<sup>1</sup> Costs were taken from Boots the Chemist or, where the product was not available there, from Tesco, Sainsbury's, Asda, Morrisons or Ocado, or from the appropriate supermarket for own-brand products.

**Figure 3: Breakdown of the typical cost of a pouch of fruit or vegetable based purée**



**Comparison of the cost of a commercial vegetable purée, and a home-made version**



Source: *Baby Foods in the UK* (2017) First Steps Nutrition Trust.





## 7 Other issues related to fruit and vegetable based purée products in pouches

As part of this study, we posed a series of questions to the manufacturers of the fruit and vegetable based puréed products highlighted in this resource. We were unable to make contact with the Polish manufacturers of Kubus Mousse. All other companies were contacted by letter and wherever possible followed up at least twice by email or through social media, or using an email contact we had been given. Not all the companies responded to our questions in the time available. We would like to thank Aldi, Annabel Karmel, Cow & Gate, Ella's Kitchen, Googly Fruit, Heinz, Hipp Organic, Little Freddie, Naturelly, Piccolo, Sainsbury's Little Ones, Savsé and Tesco for their responses. Some of the information from the answers to those questions has been used in the sections below, which discuss some other issues relating to these products.

### 7.1 Feeding methods from pouches

Pouches of food marketed for infants and young children nearly always contain an integral spout with a valve that means the contents can be directly sucked from the pouch itself. It is common to see children do this, and families may see giving the children the pouch to eat directly from as a 'mess-free' option for infant feeding, without the need for spoons, bowls and washing up. Most manufacturers indicate that food in pouches should be transferred to a bowl for serving, or be served on a spoon, but this information is often in small letters on the back of a pack.

We asked manufacturers:

***"What is your advice to parents about children sucking the product directly from the pouch? Do you offer serving advice?"***

Manufacturers of products marketed for infants from 4 or 6 months of age were more likely to offer serving advice than those manufacturing products for children from 12 months of age. Cow & Gate, Heinz and Hipp Organic responded to the effect that their advice is to decant the product onto a spoon or into a bowl to serve, and their products carry this advice on pack. Annabel Karmel also recommended decanting

the product onto a spoon or into a bowl, but this advice does not appear on pack. Sainsbury's offer similar serving advice on pack and on their 7 months + pouches they add:

*"... do not allow your baby to suck food directly from the pouch in order to properly develop feeding skills."*

Some Lidl Lupilu products also carry a warning on the back of the pack:

*"... do not allow children under 36 months to feed directly from the pouch."*

Aldi products also state on the back of the pack:

*"... do not allow children under 36 months to feed directly from the pouch."*

Ella's Kitchen responded that:

*"... we advise that babies under 12 months of age should avoid eating directly from the pouch and are instead fed from a spoon."*

This information does not appear on Ella's Kitchen packs and we found that pouches marketed for different age groups carried different serving advice. Fruit and vegetable based pouches for infants from 4 months of age state *"squeeze me into a bowl or straight onto a spoon"*, while those marketed as suitable for infants from 6 months of age state: *"... shake me, squeeze me and slurp me up."*

Piccolo does not provide direct advice on pouch versus spoon, but encourages use of the spoon wherever possible. Little Freddie offers feeding tips on their website, but none of these relate specifically to serving food from pouches, and no advice is offered on pack. Savsé do not offer any advice.

Manufacturers of products aimed at young children aged from 12 months were less likely to offer serving advice. Tesco Slurpers state on pack *"no spoon required"*. However, when asked if this meant that they encouraged children to suck the product directly from the pouch, Tesco replied that: *"This symbol is only used to highlight the ease of use while 'on the go'."* Naturelly and Googly Fruit offer no serving advice on pack.

## Why allowing infants to suck from the pouch is not recommended

- 1 Sucking from a pouch does not encourage the learning of, and use of, chewing skills.
- 2 Children cannot distinguish what it is they are eating, and cannot see or smell the food easily.
- 3 Children who are given smooth foods in pouches for longer periods may become fussier eaters.
- 4 Children develop fine motor skills when picking up food or playing with it.
- 5 Puréed fruit and vegetables in pouches are high in free sugars, and sucking these foods across the teeth may contribute to tooth decay.
- 6 There is no portion control if food is eaten directly from the pouch, and there may be considerable food waste.

### 7.2 The impact of sucking food from pouches on oral health

Baby teeth should be protected from the development of tooth decay as soon as they start to come through. The latest oral health survey of 3 year old children in England found that 12% of participants had experienced dental caries (Public Health England, 2014). Infant feeding practices and delayed or poor dental hygiene may be associated with caries development and recommendations around prevention therefore focus on both of these areas (SACN, 2018). Current national guidance is that from 6 months of age, infants should be introduced to drinking from a free-flow cup or beaker, and from the age of 12 months they should be discouraged from drinking from a bottle (Public Health England, 2017). Open-topped cups or cups with spouts that are free-running rather than valved are recommended so that there is no need to 'suck'. Drinking from a bottle teat or spout means the drink spends more time in contact with the teeth and this can lead to dental problems. It is also recommended for all age groups that the frequency and amount of sugary foods and drinks consumed should be reduced (Public Health England, 2017).

• We asked manufacturers:

• *“Do you offer any advice on packets or on your website about protecting children’s teeth if they eat fruit and vegetable purées?”*

• Only Hipp Organic and Cow & Gate offer advice on dental hygiene on pack.

• Hipp Organic replied that:

• *“On every fruit pouch label we inform about the risk of tooth decay: ‘Frequent sucking of fruit puree may cause tooth decay. To protect teeth, avoid prolonged exposure with fruit puree and brush them regularly.’”*

• Cow & Gate responded:

• *“Yes, on each pack the following statement is labelled: ‘For good dental hygiene, clean your baby’s teeth regularly, especially before bedtime.’”*

• Ella’s Kitchen responded:

• *“While we are aware that older children may consume our products directly from the pouch we advise that little ones don’t do this frequently throughout the day as fruit is an acidic food that isn’t kind to little teeth. We advise that little ones have their teeth brushed twice a day in line with dentists’ recommendations.”*

• This information does not appear on pack.



### 7.3 Environmental issues

The materials used for pouches are generally plastic layers with an aluminium core. This form of packaging is attractive to manufacturers because it delivers product stability in a package that is lightweight and space-efficient. Less fuel and fewer trucks are therefore required for transport. There is, however, no currently available, widespread, recycling scheme for these pouches and little available published data about the health and environmental consequences of this type of packaging from production to disposal.

An example of how pouches of baby food might be prepared is provided by an American packaging site ([www.packworld.com](http://www.packworld.com)). Pouches are shelf-stable after a hot-fill process as the heat of the product sterilises the inside of the pouch. If they are made with a cold press process they will need to be refrigerated.

It is estimated that a pouch would occupy about 1/14th the amount of space in the landfill compared with a glass jar. However, glass is recyclable and in most areas doorstep collections will take glass products for recycling. Life cycle analysis may simply compare pouches with glass jars in terms of their impact on carbon emissions, or may reflect on the whole process and suggest areas where the environmental impact can be reduced. As the number of foods marketed in pouches increases, an analysis of the environmental impact of this type of product packaging in the UK is recommended.

It should be considered that baby food pouches contain relatively small amounts of food so consideration should also be given to environmental impact relative to nutritional impact of a product.

We asked manufacturers:

***“Has any life cycle analysis (LCA) to determine net carbon impact of your pouch packaging been carried out? Do you have a pouch recycling scheme for your products?”***

None of the manufacturers could provide lifecycle analysis for their products. The majority of manufacturers we asked were keen to demonstrate that they were committed to improving the environmental credentials of their packaging and some including Ella’s Kitchen and Sainsbury’s have signed up to WRAP’s The UK Plastics Pact (WRAP, 2018), which means that they have committed to ensure that 100% of their packaging is recyclable, reuseable or compostable by 2025. Aldi have made a similar commitment to ensure that all of their own-label packaging will be 100% recyclable, reuseable or compostable by 2025. Others appear to have embedded all or elements of this commitment into their corporate social responsibility programmes including Tesco’s ‘Every Little Helps’ plan and Heinz’s ‘Growing a Better World’. Ella’s Kitchen has a sustainability strategy – ‘Our Dream’ – with a target to reduce the carbon footprint of packaging, whilst making it fully recyclable or compostable, by 2024. Other manufacturers including Googly Fruit, Piccolo and Little Freddie indicated that they were making independent efforts to improve the environmental credentials of their product packaging.

Only Ella’s Kitchen currently offers a free-to-use recycling scheme in partnership with Terracycle, which involves parents using the website to identify and deliver used pouches to a recycling point. Naturelly recommends Terracycle but has no ongoing partnership with them. Naturelly also: *“promote reuse, by washing out and refilling with water or other [drinks] on days out.”*

Annabel Karmel, Cow & Gate, Hipp Organic and Sava’s indicated that they had not had a life cycle analysis carried out, and did not indicate that they had made a commitment to improving the environmental credentials of their packaging.

## 7.4 How are the nutrient values of products given on the back of pack determined?

All of the manufacturers included in this survey were asked:

*“How do you calculate the sugar content of your products? Is it by direct analysis of the final product or by calculation using data from food composition databases?”*

Of those manufacturers that responded, the majority indicated that some analysis of their final products was carried out at some stage. Aldi, Heinz, Little Freddie, Naturelly, Sainsbury’s and Tesco use analysis only to determine nutritional values, while Cow & Gate, Ella’s Kitchen, Googly Fruit, Hipp Organic and Piccolo use analysis to verify theoretical calculations from food composition databases and/or information from suppliers. Ella’s Kitchen has stated that they do both calculations from food databases and analyse some batches of products, and Googly Fruit refer to periodic analysis. Hipp Organic replied that:

*“As we have natural variations in the nutrients of our raw materials, we use data from food composition databases for labelling. At regular intervals we analyse the nutrients of our raw materials to validate the nutritional values.”*

Only Annabel Karmel and Savsé indicated that currently no analysis is carried out and the declared values are calculated from food table data.

## 7.5 Where are baby foods made?

It is interesting to note where baby foods marketed in the UK are made, as discussions around leaving the EU may mean that imported foods face higher tariffs. We asked the companies:

*“Where are your products made?”*

Annabel Karmel and Naturelly said their products are made in England and Scotland, but most companies said their products are made in Europe. Aldi products are currently made in the UK and Europe. Little Freddie products are made in England and the EU, Cow & Gate and Savsé products in Spain, Tesco products in France, Googly Fruit products in Spain, Italy and Germany, and Hipp Organic products in Austria. Ella’s Kitchen and Heinz said products are made *“in Europe”*. Piccolo and Sainsbury’s did not disclose where their products are made.



## 8 Discussion

The impact of food processing depends on many factors including the processing stages involved, the order of processing, and the length and conditions of storage. Processing does not affect different fruits and vegetables in the same way, and it is therefore difficult to predict the net impact of processing on the nutrient and phytonutrient profile of processed foods. The studies in this review suggest that home-made foods, foods that are minimally processed, and heating for as short a period of time as possible prior to being mashed or chopped and consumed soon after preparation are likely to retain more nutrients, and be lower in free sugars, than those that have been industrially processed using methods that involve shear treatments followed by prolonged cooking and/or thermal storage.

Mechanical pulping, puréeing, homogenisation or blending of fruits and vegetables reduces the particle size, may introduce oxygen to the system, causes the release of intercellular components, and provides a larger surface area for reactions to occur. Depending

- on the food matrix involved, this kind of processing in combination with thermal treatment can have several effects including enzymatic or oxidative degradation of nutrients and phytonutrients, reductions in total fibre and redistribution between soluble and insoluble fibre.
- Snacking on commercially processed fruit and vegetable purées should not be encouraged, as children may benefit more from the higher levels of nutrients and lower free sugars content of whole, unprocessed or minimally processed fruits and vegetables prepared at home by steaming or lightly boiling and mashing gently with a fork. We do not believe that there is any need for manufacturers to produce simple mashed fruit or vegetables, as families can easily, and cheaply, prepare these themselves.
- Further research on the impact of processing on fruit and vegetable based foods and the impact on the micronutrient content is needed. Companies should be encouraged to be transparent about the nutritional information they hold for their products.





# Compositional regulations for baby food

*This Appendix contains key points from the Processed Cereal-based Foods and Baby Foods for Infants and Young Children (England) Regulations 2003. The full version can be accessed from: <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=URISERV:I21101a&from=EN>*

Regulations for the composition of baby food sit in official guidance ('delegated act') within the Foods for Specific Groups regulations that came into force in July 2016 (EU 2016/127). However, the delegated act within these regulations which relates to baby foods was not agreed by the EU Parliament due to concerns over the sugar content of baby food, the pesticide limits and the age that foods are marketed from. Processed cereal-based foods and baby foods for infants and young children therefore remain covered by Commission Directive 2006/125/EC, adopted under the old legislative framework of Directive 2009/39/EC. It sets out rules on the composition and labelling of processed-cereal based foods and other baby foods. It gives criteria for the composition (protein, carbohydrate, fat, mineral substances and vitamins) of weaning foods including, where necessary, minimum and maximum levels.

## Labelling regulations

Labels must include:

- The age from which the product may be used, which must not be less than four months. Products recommended for from the age of four months may indicate that they are suitable from that age unless persons having qualifications in medicine, nutrition etc. advise otherwise.
- The presence or absence of gluten if the indicated age from which the product may be used is below six months.
- The available energy value (in kJ and kcal) and the protein, carbohydrate and lipid content (in numerical form) per 100g or 100ml of the product as sold and, where appropriate, per specified quantity of the product as proposed for consumption.

- The average quantity of each mineral substance and of each vitamin governed by a specific level in Annex I and Annex II respectively, expressed in numerical form, per 100g or 100ml of the product as sold and, where appropriate, per specified quantity of the product as proposed for consumption.
- Instructions for appropriate preparation, when necessary, and a statement as to the importance of following those instructions.

The labelling may include the following non-mandatory particulars:

- The average quantity of the nutrients set out in Annex IV (in numerical form) per 100g or 100ml of the product as sold and, where appropriate, per specified quantity of the product as proposed for consumption.
- Information on vitamins and minerals shown in Annex V (as a percentage of the reference values given therein) per 100g or 100ml of the product as sold, and where appropriate, per specified quantity of the product as proposed for consumption, provided that the quantities present are at least equal to 15% of the reference values.

## Compositional regulations

The requirements concerning nutrients refer to the products ready for use, marketed as such or reconstituted as instructed by the manufacturer are found in Annex 2 of the document below.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0125&from=EN>

### 1. Protein

- 1.1.** If meat, poultry, fish, offal or other traditional source of protein are the only ingredients mentioned in the name of the product, then:
  - the named meat, poultry, fish, offal or other traditional protein source, in total, shall constitute not less than 40 per cent by weight of the total product,

- each named meat, poultry, fish, offal or other traditional source of protein shall constitute not less than 25 per cent, by weight, of total named protein sources,
- the total protein from the named sources shall not be less than 1.7g/100kJ (7g/100kcal).

**1.2.** If meat, poultry, fish, offal or other traditional source of protein, singularly or in combination, are mentioned first in the name of the product, whether or not the product is presented as a meal, then:

- the named poultry, fish, offal or other traditional protein source, in total, shall constitute not less than 10 per cent by weight of the total product,
- each named meat, poultry, fish, offal or other traditional source of protein shall constitute not less than 25 per cent by weight, of total named protein sources,
- the protein from the named sources shall not be less than 1g/100kJ (4g/100 kcal).

**1.3.** If meat, poultry, fish, offal or other traditional source of protein, singularly or in combination are mentioned, but not first, in the name of the product, whether or not the product is presented as a meal, then:

- the named meat, poultry, fish, offal or other traditional protein source, in total, shall constitute not less than 8 per cent by weight of the total product,
- each named meat, poultry, fish, offal or other traditional source of protein shall constitute not less than 25 per cent, by weight, of total named protein sources,

- the protein from the named sources shall not be less than 0.5g/100kJ (2.2g/100kcal),
- the total protein in the product from all sources shall not be less than 0.7g/100kJ (3g/100kcal).

**1.4.** If cheese is mentioned together with other ingredients in the name of a savoury product, whether or not the product is presented as a meal, then:

- the protein from the dairy sources shall not be less than 0.5g/100kJ (2.2g/100kcal),
- the total protein in the product from all sources shall not be less than 0.7g/100kJ (3g/100kcal).

**1.5.** If the product is designated on the label as a meal, but does not mention meat, poultry, fish, offal or other traditional source of protein in the name of the product, the total protein in the product from all sources shall not be less than 0.7g/100kJ (3g/100kcal).

**1.6.** Sauces presented as an accompaniment to a meal shall be exempt from the requirements of points 1.1 to 1.5 inclusive.

**1.7.** Sweet dishes that mention dairy products as the first or only ingredient in the name shall contain not less than 2.2g dairy protein/100kcal. All other sweet dishes shall be exempt from the requirements in 1.1 to 1.5.

**1.8** The addition of amino acids is permitted solely for the purpose of improving the nutritional value of the protein present, and only in the proportions necessary for that purpose.

## 2. Carbohydrates

The quantities of total carbohydrates present in fruit and vegetable juices and nectars, fruit-only dishes, and desserts or puddings shall not exceed:

- 10g/100ml for vegetable juices and drinks based on them,
- 15g/100ml for fruit juices and nectars and drinks based on them,
- 20g/100g for fruit-only dishes,
- 25g/100g for desserts and puddings,
- 5g/100g for other non-milk-based drinks.

## 3. Fat

- 3.1.** For products referred to in point 1.1: If meat or cheese are the only ingredients or are mentioned first in the name of a product, the total fat in the product from all sources shall not exceed 1.4g/100kJ (6g/100kcal).
- 3.2.** For all other products, the total fat in the product from all sources shall not exceed 1.1g/100kJ (4.5g/100kcal).

## 4. Sodium

- 4.1.** The final sodium content in the product shall be either not more than 48mg/100kJ (200mg/100kcal) or not more than 200mg per 100g. However if cheese is the only ingredient mentioned in the name of the product, the final sodium content in the product shall not be more than 70mg/100kJ (300mg/100kcal).
- 4.2.** Sodium salts may not be added to products based on fruit, nor to desserts or puddings except for technological purposes.

## 5. Vitamins

Vitamin A shall not be added to baby foods other than vegetable juices.

Vitamin D shall not be added to baby foods.



# Public Health England definition of free sugars

## Appendix 2

### Free sugars definition: summary of inclusions and exclusions (Swan et al, 2018)

#### Included in the definition of free sugars

All added sugar in whatever form, including honey, syrups and nectars whether added to products during manufacture or by the consumer during cooking or at the table. This includes ingredients such as malt extract and glucose syrup.

Lactose and galactose added as an ingredient to foods or drinks, including lactose in whey powder added as an ingredient.

All the sugars naturally present in fruit and vegetable juices, concentrates, smoothies, purées, pastes, powders and extruded fruit and vegetable products.

All sugars in drinks except for milk and other dairy-based drinks. Including:

- All sugars in unsweetened fruit and vegetable juices, fruit and vegetable juice concentrates and smoothies;
- All sugars in alcoholic drinks;
- All sugars naturally present in dairy-alternative drinks such as soya, rice, oat and nut-based drinks.

#### Excluded from the definition of free sugars

- Ingredients not included in the definition of sugar used for nutrition labelling, that is, monosaccharides and disaccharides.
- Maltodextrins, oligofructose and sugar substitutes such as polyols (sorbitol) are excluded from the definition.
- Lactose and galactose when naturally present in milk and dairy products including milk powder.
- All the sugars naturally present in fresh and most types of processed (dried, stewed, canned and frozen) fruit and vegetables (including beans and pulses) except for juices, smoothies, purées, pastes, powders and extruded products.
- Sugars naturally present in puréed and powdered potatoes and other starchy staples.
- Lactose and galactose naturally present in milk and other dairy-based drinks.
- All sugars naturally present in cereal grains including rice, pasta and flour regardless of processing (other than cereal-based drinks).
- All sugars naturally present in nuts and seeds regardless of processing (other than nut-based drinks).



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