

Commercial vs. home-made baby foods – how do they match up nutritionally?

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An adequate diet in early life is necessary for optimal growth and development and can influence short- and long-term health (BNF 2013; WHO 2016). The advice from the World Health Organization (WHO) and the Department of Health (NHS Choices 2015) is that infants should be exclusively breastfed up to 6 months of age after which pureed, mashed and semi-solid complementary foods (including soft finger foods) should be introduced. Variety in tastes and textures should be increased gradually, with the aim that by 12 months children are eating family foods in the normal consistency. There is a widespread perception, not just amongst the general public but also health professionals, that meals cooked at home from scratch are an automatically healthier choice for infants than commercial baby foods; although the latter are tightly regulated by EU legislation to limit levels of sodium (salt), added sugars and fat, and there are restrictions on the amounts of micronutrients which can be added (European Commission 2006). According to the 2011 *Diet and Nutrition Survey of Infants and Young Children* (DNSIYC) (Lennox *et al.* 2011), which looked at dietary intake, anthropometrics and nutrient status amongst 2683 children aged 4–18 months in the UK, 33% of children aged 7–9 months ‘always’ or ‘almost always’ ate a meal prepared by, but different from, their parents, whereas 23% of children aged 7–9 months, ‘always’ or ‘almost always’ ate a commercially prepared baby or toddler meal for the main meal of the day.

The nutritional adequacy of home-cooked infant meals has been called into question by media reports recently (*The Mail Online* 2016a; *The Mail Online* 2016b; *The Guardian* 2016; *The Mirror* 2016). These headlines were based on the results of a UK study carried out by the University of Aberdeen, which compared the nutritional composition of commercially available complementary meals to meals featured in

55 best-selling recipe books for feeding infants and young children (Carstairs *et al.* 2016). Commercial complementary foods were matched on meal type (*e.g.* spaghetti bolognese) with the ‘home-cooked’ (*i.e.* recipe) meals, resulting in a final sample size of 261 commercial and 243 ‘home-cooked’ meals. Nutritional composition, based on information from food labels, manufacturers’ websites and, for the ‘home-cooked’ meals, output from dietary analysis software, plus the price, was calculated per 100 g of the meal. The analysis revealed that while ‘home-cooked’ meals were cheaper than commercial meals, they were more energy dense, mostly due to their higher total fat and saturated fat contents. On average, the ‘home-cooked’ meals also contained more carbohydrate, protein, sugars, salt and a lower variety of vegetables than their commercial equivalents, but did contain a wider variety of red meats and fish. The authors suggested that commercial infant foods contain less protein due to the higher cost of protein-rich foods, such as meat and fish. Micronutrient contents were not examined. The ecological validity of this study is questionable considering that the frequency of use of the recipes within the UK population was not reported and is likely to be low. Furthermore, even if the recipe books are owned and used regularly by a substantial number of households, cooking practices and choice of ingredients (for example cooking fat) vary greatly, with some individuals preferring to adapt recipes to suit their own preferences, and this could significantly affect the nutritional composition of a dish. Therefore, the conclusions that can be drawn from this study are limited.

The *Dortmund Nutritional and Anthropometric Longitudinally Designed* (DONALD) study provides detailed data on the diets of infants and young children in Germany (Kroke *et al.* 2004). In two recent papers, data derived from 3-day weighed diet diaries relating to almost 300 children at 6–9 months, 3–4 years and then 6–7 years of age were analysed to look at the relationship between intake of commercial complementary foods and dietary quality in infancy and later childhood (Foterek *et al.* 2015; 2016).

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Infants who had not been introduced to solid food by the age of 6 months were excluded. In the analysis, complementary foods were defined as all semi-solid, pureed or mashed foods fed using a spoon during infancy (6–9 months). Snacks, such as biscuits and cereal bars, were not included. Fruit and vegetable intake was defined as fresh, dried, frozen, canned, juice, and fruit and vegetable components of composite foods comprised at least 50% fruit and vegetables by weight. The median intake of commercial foods in infancy was ~58% of the diet. About 5% of infants consumed no commercial complementary foods at all whereas ~3% consumed solely commercial complementary foods.

The first study reported that higher intake of commercial baby foods was significantly associated with lower vegetable intake in infancy (Foterek *et al.* 2015). In boys but not girls, this relationship remained into later childhood (both at 3–4 years and 6–7 years of age). In girls, higher intakes of commercial complementary foods were positively associated with fruit juice intake in infancy. There was no association between commercial complementary food intake and variety of fruit and vegetables in the diet during infancy or in later childhood (Foterek *et al.* 2015).

In the second paper, the added sugars content of home-made and commercial complementary foods was examined (Foterek *et al.* 2016). The definition of added sugars used in this study was the same as the UK Scientific Advisory Committee on Nutrition (SACN) definition of ‘free sugars’ (*i.e.* sugars and syrups added to foods and drinks during home preparation or processing, not including milk sugars and sugars intrinsically present within whole fruit and vegetables) (SACN 2015). Median added sugar intake during infancy (6–9 months) in the group as a whole was 4 g/day [interquartile range: (IQR) 0.7–8.1], which contributed 2.3% of dietary energy (IQR 0.5–4.6%), with 12% of infants reportedly consuming no added sugars at all. Corresponding intake at pre-school age (3–4 years) was 34.2 g/day (IQR 26.9–42.6) or 11.9% of energy (IQR 9.4–14.7), and intake at primary school age (6–7 years) was 49.7 g/day (IQR 38.9–63.2) or 13.4% of energy (IQR 10.9–16.7). Significantly more added sugars in the diet came from commercial vs. home-made complementary foods [median values 0.6 g/day (IQR 0–2.8 g) vs. 0.1 g/day (IQR 0–1.4 g)]. Higher intakes of commercial complementary foods significantly associated with higher total added sugars intake (defined as >4.6% of energy and 8.1 g/day) in infancy and with higher added sugars intakes at pre-school (3–4 years) and primary

school (5–6 years) age. In addition, infants in the top tertile of commercial baby food consumption had a 10% higher relative added sugars intake than those in the bottom tertile. Limitations of this study include the lack of dietary data from caregivers and potential under-reporting of consumption of foods which contain added sugars. Furthermore, families who took part in the DONALD study were of a high socio-economic status, which may account for the relatively low added sugars intake in the group as a whole since socio-demographic factors have been linked to diet quality (Brazionis *et al.* 2012). Overall, the results of this study may not be generalisable to the UK population, where food provision to infants may differ to that in Germany.

There is a trend for commercial baby foods to be relatively sweet in taste due to fruit- or sweet-tasting vegetables, such as carrot and sweet potato, being present as the main ingredients and green vegetables being included much less commonly (García *et al.* 2013; Garcia *et al.* 2015). For example, an analysis of commercial baby food products available in the UK, found that 18% had added fruit juice; fruit featured in the names of commercial baby food more often than vegetables; 75% of foods marketed as suitable from 4 months were fruit-based; and the types of vegetables that were included were predominantly sweet (Garcia *et al.* 2015). Considering that dietary preferences developed during infancy have been shown to track through to later childhood and possibly beyond (Nicklaus & Remy 2013; LioRET *et al.* 2015), providing mainly sweet-tasting foods during complementary feeding could potentially promote enhanced preference for foods with a sweet flavour (Ventura & Mennella 2011; Mennella 2014) and discourage acceptance of those that are less sweet, such as certain vegetables. Repeatedly offering a variety of less sweet foods, such as vegetables, from the start of complementary feeding, when children are relatively receptive to most new flavours, may help to establish liking for these foods and increase intake throughout childhood (Chambers 2016).

In 2013, a study was widely reported in the media (BBC News 2013) in which the composition of baby foods commercially available in the UK had been compared with breastmilk and examples of home-made foods (García *et al.* 2013). The results suggested that commercial foods tended to be soft (‘spoonable’), had a lower nutrient density than home-made foods and supplied no more energy or iron than breast and formula milk. The authors suggested that this indicated that commercial baby foods are nutritionally

inadequate as, at around the age of 6 months, infants have increased requirements for energy and particular nutrients, including iron (Agostoni *et al.* 2008). In addition, as it is known that increasing the texture complexity of the diet during complementary feeding is important for later food acceptance and also for developmental reasons (Northstone *et al.* 2001; Coulthard *et al.* 2009), the authors suggested that a wider variety of textures could be achieved by cutting and mashing home-prepared foods than by offering commercial foods, which are often completely smooth. A major limitation of this study is that the authors self-selected foods, which they considered to be representative of home-made family foods, based on recommendations from the Scottish government, as opposed to examining actual consumption data.

Data from 6065 parent–infant dyads of the *Avon Longitudinal Study of Parents and Children* revealed that higher Complementary Feeding Utility Index scores, indicative of greater adherence to complementary feeding guidelines (from Australia, New Zealand, North America and the UK), and a higher infant diet quality were associated with lower exposure to commercial baby foods (Golley *et al.* 2012). Conversely, a similar study of the diets of 1152 infants aged 12–18 months from the 2011 *DNSIYC* reported that low PANDiet scores (indicating a lower infant diet quality) were related to low intake of commercial infant food (Verger *et al.* 2016). In addition, commercial baby food consumption was not associated with a smaller chance of meeting nutritional recommendations for non-milk extrinsic sugars (NMES) and sodium, nor with having a diet lacking in variety.

There appears to be no definitive answer as to whether commercial or home-made baby foods are nutritionally superior due to the limitless diversity in the meals that can be provided to infants at home. Assuming an appropriate level of nutritional knowledge, preparing infant meals from scratch seems more desirable as this allows full control over the nutritional composition as well as the variety of flavours being offered, with scope to, for example, introduce bitter vegetables and sour fruits and a variety of textures, and to omit sources of free sugars (such as fruit juice) and salt – as recommended by weaning guidelines (Agostoni *et al.* 2008; British Dietetic Association 2016). Home-made meals are also often cheaper to prepare and can be made in bulk and stored in the freezer. However, potential barriers to cooking meals from scratch include lack of caregivers' time, perhaps exacerbated by a perception that separate meals should be prepared for infants rather than adapting

family foods (*DNSIYC* reported that only 26% of infants aged 7–9 months 'always' or 'almost always' ate the same food as their parents), lack of cooking skills, confidence and confusion around what should and should not be provided. Furthermore, it is perfectly plausible that home-made foods could be less healthy than pre-prepared foods as the composition is entirely dependent on the awareness and beliefs around food and nutrition held by the caregiver. Indeed, data from the *Avon Longitudinal Study of Parents and Children* indicate that inappropriate foods are being given to some infants in the UK (Cribb *et al.* 2012). Lack of reliable information and support for parents in this area may be an issue. The Department of Health offers information on complementary feeding through its NHS Choices and *Start4Life* websites (nhs.uk/start4life), and the British Nutrition Foundation (BNF; nutrition.org.uk) and the Infant and Toddler Forum (infantandtoddlerforum.org) also provide practical tips on feeding infants and toddlers, including a portion size resource for feeding children aged 1–3 years developed by BNF (BNF 2014; BNF 2015). Also, some local councils offer cookery lessons and weaning classes. Training for health visitors may help to improve knowledge amongst parents. BNF offers an online course covering complementary feeding and the development of obesity for health professionals (BNF 2016).

In the UK, there is a reasonable amount of choice of commercial baby food products. When choosing which to buy, labels can be used to select products containing lower amounts of salt and sugars and to identify the variety and proportion of ingredients present, especially as the names of products may be misleading (*e.g.* meat dishes containing low amounts of meat or vegetable dishes which are actually based more on fruit). Words which indicate the presence of free sugars such as honey, dextrose, fructose, sucrose, glucose, maltose, high-fructose corn syrup, fruit juice concentrate, corn syrup, molasses, isoglucose, crystalline sucrose, nectars and molasses are worth looking out for.

At present, SACN is currently undertaking a review of complementary and young child feeding recommendations, to ensure that guidance is in line with the most recent scientific evidence. This report is eagerly anticipated and infant feeding advice may need to be updated in the light of the findings of the review.

Conflict of interest

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