

White paper



Mother & Childcare

For Professionals

# Infant feeding solutions

For healthcare professionals



# Helping mothers **breastfeed** **longer**

At Philips Avent, we are dedicated to helping mothers breastfeed longer because we recognise the importance of breastfeeding for the healthy development of the infant and the health of the mother.

To give babies the healthiest start in life, we support the WHO recommendations [1] and the recently reaffirmed AAP guidelines [2] to help mothers aim for 6 months of exclusive breastfeeding and continued breastfeeding onwards while other foods are being introduced. We provide parents with educational materials, online forums, professional support and

evidence-based products; and we work with healthcare professionals to support them in helping parents achieve breastfeeding success.

Ever since Avent started 32 years ago, we have been combining professional expertise with consumer understanding in working with scientific experts, clinical researchers, healthcare professionals and parents alike to research breastfeeding and to develop and evaluate our products and services, as shown through our extensive collection of research and network of experts.

# Understanding mothers' desires and struggles around breastfeeding longer

Philips Avent has been talking with mothers to understand their desires, needs and struggles when it comes to initiate and sustain breastfeeding as long as possible and to help overcome barriers they may face.

To understand expectations and experiences of mothers with breastfeeding, the Philips Center for Health and Well-being has conducted a worldwide survey among 3,994 women, 18–40 years of age, in the US, Brazil, the UK, Egypt, South Africa, China and India in 2011 [3,4]. The most important and most positive conclusions are that virtually all mothers (94%) want to start breastfeeding and that they want it for the health of their baby. Unfortunately, despite their awareness and aspiration to breastfeed, once the baby has arrived, mothers start struggling with breastfeeding, such that 41% of mothers either never started at all or stopped within the first six months. We found significant variations among the countries; for example, reported breastfeeding rates after 6 months were lowest in the UK (27%) and highest in India (90%).

The main reasons mothers reported for ceasing breastfeeding were: perceived insufficiency of milk supply (40%), the baby no longer wanting to nurse (24%), painfulness (15%), time needed to breastfeed (14%) or to pump (7%), the need to go back to work (10%), and feeling awkward to breastfeed outside of home (9%).

Philips Avent has been sharing and discussing this knowledge with healthcare professionals to increase their awareness and identify possible solutions to reduce these barriers. In particular, we have presented our findings at conferences [5,6] and initiated round-table conversations [7] and on-line forums [8] to enrich the results with the perspectives and experiences of experts.

From both the survey and these conversations, it became apparent that each of the identified

barriers may be reduced by improving professional support and educational programs for parents to prepare them for breastfeeding, as well as through an increased acceptance of breastfeeding in the workplace and in public [4].

In addition, to support mothers in achieving their breastfeeding goals, Philips Avent provides a comprehensive range of breastfeeding solutions that will also help in addressing several of these issues. For example, breast pumps may help in increasing lactation by additional pumping in-between regular feeds or to build stock to address potential insufficiency of supply, they may enable expressing breast milk when the mother is away from the baby when going back to work, and they may allow other family members to help with breastfeeding through bottle feeding the expressed milk to free up time from the mother. When breastfeeding is at risk of becoming painful, breast care accessories may be helpful, such as thermopads to soothe tender breasts, breast shells to relieve engorgement or to protect cracked nipples and help them heal more quickly, and nipple protectors to protect sore or cracked nipples during breastfeeding.

Thus, at Philips Avent we understand the barriers mothers face in breastfeeding as long as possible, we work with professional organisations towards reducing some barriers and provide breastfeeding solutions to help overcome other barriers.

# Understanding the **physiology** of lactation: milk expression and infant suckling

At Philips Avent, we continue to advance our knowledge about how breastfeeding works because we have experienced that a greater understanding of breastfeeding mechanics will result in better solutions to help mothers breastfeed longer.

## **More comfort, more milk**

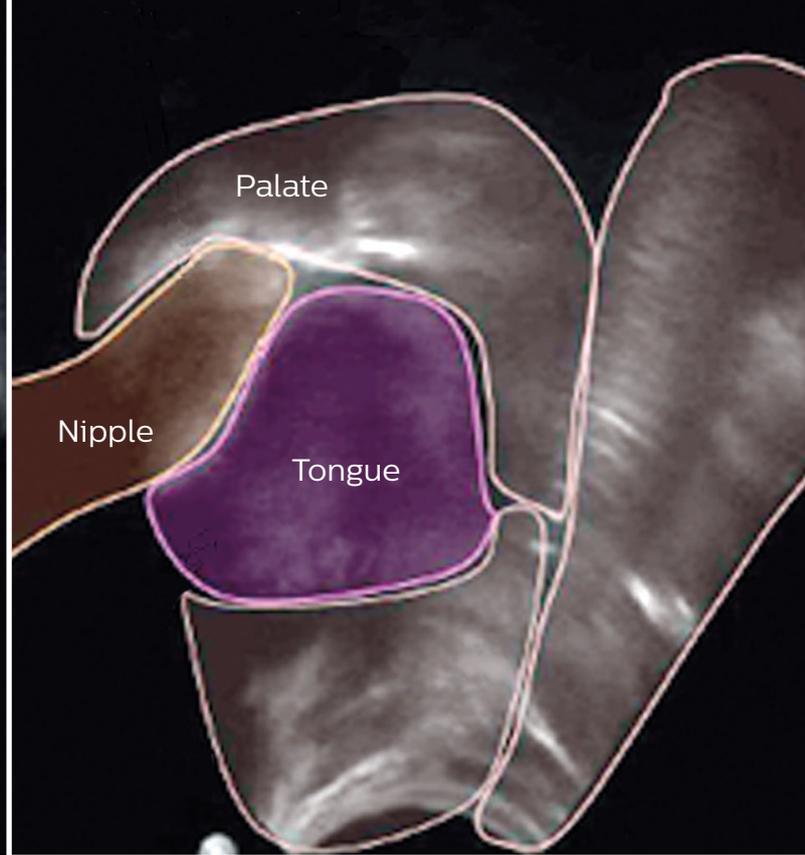
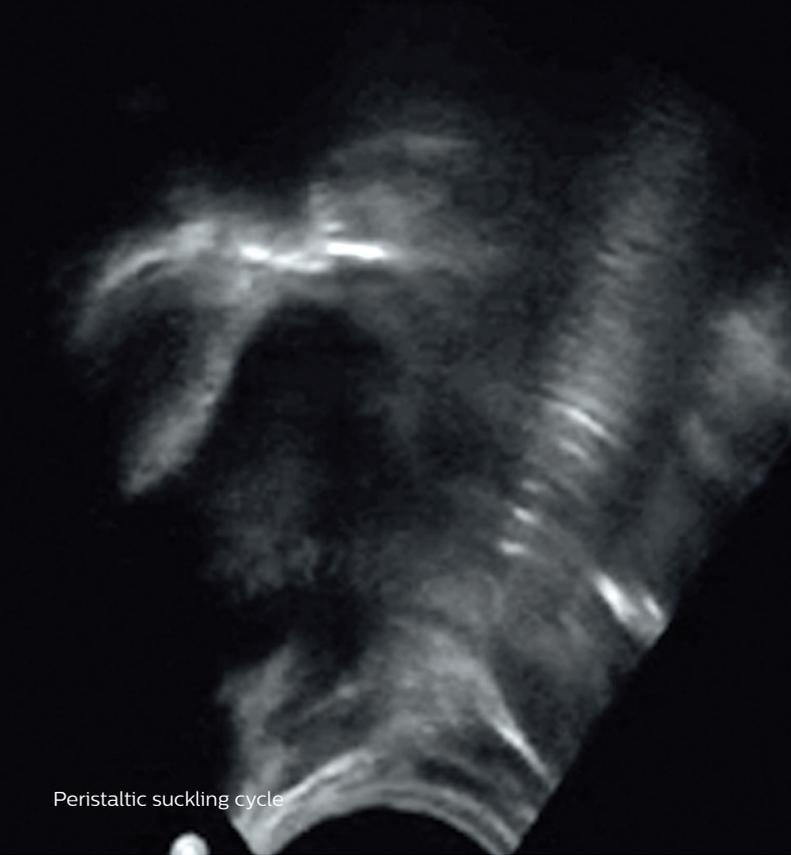
Published research has shown that when a mother feels stressed, breastfeeding is more difficult because stress inhibits milk ejection and decreases milk volume [9-11]. Conversely, it has been postulated that for an adequate let-down response, psychological relaxation is necessary: the more comfortable a mother feels, the more relaxed she will be, and the easier the milk will start and continue to flow. Only a few studies have investigated this in a hospital setting and the results indicate that relaxation improves milk expression [12-14]. Our most recent clinical study on evaluating the efficacy and preference of electric breast pumps with mothers of pre-term babies strengthen these results: we found that the subjective evaluation of comfort in using a breast pump was a significant predictor of milk production, with higher comfort ratings associated with greater milk volume, irrespective of the breast pump used [15,16]. We also found that ease-of-use was positively associated with greater milk volume.

With Philips Research, we have investigated the hypothesis that greater relaxation results in greater milk flow by commissioning a clinical study evaluating the effect of relaxation on the efficacy of milk expression [17]. In this study, 48 lactating mothers were asked to express milk with a breast pump on two occasions in a randomized order: once directly after a relaxation exercise and once without this exercise. Milk volume, the extent of relaxation and the extent of feeling comfortable were measured, such that changes in relaxation and comfort could be compared to

changes in milk volume. The results demonstrated that when mothers were more relaxed they felt more comfortable and were able to express significantly more milk. This confirms that for greater milk flow mothers would need to be as relaxed and comfortable as possible while expressing.

Thus, to minimise anxiety with breastfeeding and to enhance relaxation, breast pumps should be designed such that they are most comfortable to use, so that milk ejection and milk flow are promoted. In working with mothers we have identified that critical aspects of overall comfort include a relaxed expressing position, ease of use, and a gentle experience while expressing.





### Peristaltic infant suckling

It has long been agreed that infants remove milk from the breast predominantly by drawing the nipple into their mouth and performing a cyclic wave-like compression of the nipple with their tongue – referred to as peristaltic action [18]. This compression creates a ‘positive pressure’ within the milk ducts to force out the milk. Secondary to this compression, the movement of the tongue also creates a negative pressure (‘suction’ or ‘vacuum’) in the mouth to further facilitate milk removal. Thus, milk extraction seems to be reliant on two synergistic activities, compression and suction, originating from the peristaltic action of the infant’s tongue.

To further examine the physiology of milk extraction and the importance of peristaltic action, Philips Avent has commissioned two independent clinical studies using advanced ultrasound imaging [19–22].

In one study, Dr. Mike Woolridge and colleagues from the University of Leeds used 2D ultrasound imaging to investigate infant suckling mechanics in 45 feeds by 29 mother-baby pairs [19–20]. Results confirmed that peristaltic tongue movements are the core mechanism in milk removal, and the sole mechanism by which milk is moved into the oro-pharynx for swallowing. It was also found that localized tongue depression to generate increased suction pressure was present yet it could only be superimposed on tongue peristalsis at specific points in the suck cycle, and not occur in isolation. This contrasts with other research findings concluding that

tongue depression causing suction is the sole mechanism for physiologic milk extraction [23]. This discrepancy may be understood from the other study Philips Avent commissioned. In this study, Prof. Alan Lucas and co-workers from the UCL Institute of Child Health in London used real-time 3D ultrasound imaging to render a more detailed picture of suckling behavior in 15 mother-infant pairs, confirming the consistent occurrence of peristaltic tongue movements and a lesser involvement of tongue depression in milk removal [21,22]. Instances in which a ‘traditional’ 2D perspective showed a less peristaltic pattern or only tongue depression could be explained by the 2D field of view being off the medial/mid-sagittal plane thus only capturing a portion of the central tongue movement: in these instances, reconstructing the 3D perspective revealed the presence of peristaltic tongue movements.

The outcomes of these two studies, thus, strengthened the evidence and confirmed that babies employ peristaltic tongue movements to strip the milk from the breast in combination with suction to maximize milk expression from the breast. Infants do not have a unitary, inflexible style of sucking, but a dynamic range of options which they employ flexibly to maximize milk transfer [20]. In other words, babies are able to apply a variety of peristaltic compression/suction patterns throughout a feed to stimulate milk release and to accommodate the breasts varying supply on being emptied, showing the innate versatility of babies to respond to variable flow rates while suckling at the breast.

# Developing evidence-based products

At Philips Avent, our products are created with extensive knowledge of breastfeeding and the physiology of milk expression since we have been collaborating with leading scientists and healthcare professionals for over 25 years. We have confirmed the efficacy and safety of our products in several clinical studies and we have conducted consumer research with more than 15,000 mothers worldwide.

## Breast pumps



Philips Avent Comfort manual breast pump



Philips Avent Comfort single electric breast pump



Philips Avent Comfort double electric breast pump

Since the introduction of our (ISIS) breast pump in 1997, we have been incorporating our knowledge about the peristaltic action into the development of our breast pumps. Our unique massage cushions have soft petals that gently compress the breast in synchronization with the pump's suction to conveniently stimulate and promote milk expression. The efficacy of our manual and electrical breast pumps has been evaluated in three clinical studies which have shown that our unique combination of compression with vacuum has resulted in similar amounts of expressed milk volume when compared to hospital-grade electrical breast pumps [15,16,24,25]. Additionally, in these studies, mothers have consistently rated our products higher on several aspects, notably

on comfort.

### What makes the new Philips Avent Comfort breast pump range unique?

A recent study commissioned by Philips Avent has proven that there is a clear correlation between comfort and milk flow during expressing [17]. Mothers who are relaxed, feel more comfortable and express significantly larger volumes of milk more easily. We have identified that key aspects of comfort include a relaxed expressing position, ease of use, and a gentle experience while expressing. Other independent studies have confirmed that infant suckling is a synergistic combination of breast compression and intra-oral vacuum, originating from the peristaltic action of the infant's tongue [19-22]. The new Philips Avent Comfort breast pump range is based on exactly those insights.



Philips Avent Classic manual breast pump



New Philips Avent Comfort manual breast pump



1

### Unique, natural expressing position

The new Philips Avent Comfort breast pumps have a unique compact breast shield design with a shorter, integrated funnel. This allows mothers to sit in a comfortable position when expressing with no need to lean forward. Sitting up straight will still allow the milk to flow directly from the breast into the milk container. This improved expressing position helps mothers to be more comfortable and as a result express more milk.



2

### Clinically proven to be effective

The breast pumps mimic the baby's natural peristaltic suckling behaviour by combining breast compression with gentle suction. They achieve this through our clinically proven massage cushion with soft petals that gently compress the areola and surrounding breast to stimulate milk flow [15,16,24,25]. New to the Comfort breast pumps, this cushion now has a distinctive, velvety texture which feels warm on the breast, further helping mothers to relax while expressing.

In addition, with the Comfort double electric breast pump, simultaneous pumping at both breasts is proven more efficient and may even boost the ability to produce breastmilk [26].



3

### Effortless expressing

The new breast pumps are especially compact and lightweight, and the manual breast pump features an ergonomically shaped handle for effortless fingertip control. This allows mothers to easily create and maintain a tight seal on the breast, making pumping considerably less tiring. Together, this has made expressing much more comfortable and will result in unparalleled performance of the new Philips Avent Comfort breast pumps – our most comfortable breast pumps yet.



4

### Simple settings

When switched on, the electric pump automatically starts in gentle stimulation mode to help trigger the let down. The mother can choose between three pumping settings to make the milk flow most comfortable and effective for her.



## Natural feeding teats and bottles

The research on peristaltic drinking has shown that babies are very flexible and can easily adapt their suckling behaviour throughout a single feed from the breast [20]. This might explain why babies appear no longer prone to nipple confusion after proper breastfeeding has been well-established (usually in 3 to 4 weeks after birth [29]), as confirmed in a recent systematic review [30]. Nonetheless, to further minimise the likelihood for nipple confusion and to facilitate easy transitions when artificial teats need to be introduced to combine bottle with breastfeeding, feeding teats should be designed to mimic the breast shape, sensation and response as closely as possible.

Thus, recognising that expressed breast milk needs to be fed to the baby in a most convenient and natural way, Philips Avent has developed their new Natural teat to respond to the baby's normal suckling behaviour to more closely mimic drinking from the breast.

### How the Natural teat and bottle work

Our Natural teat has been designed to allow the baby to employ its normal peristaltic tongue movement to both strip the teat and create an intra-oral vacuum to extract the milk from the bottle, similar to what has been observed in clinical studies on breastfeeding. This was achieved through various means.



### Natural latch-on

The wide breast-shaped teat promotes natural latch-on similar to the breast making it easy to combine breast and bottle feeding. The size and shape of the Natural teat more closely resemble the breast to encourage a wide open mouth, as would be needed at the breast, for a more proper latch-on. This will encourage babies to continue using a peristaltic tongue movement to maintain the natural suckling behaviour needed to extract milk from the breast.

Breastfeeding

New Philips Avent  
Natural feeding bottle

## Combining breastfeeding and feeding breast milk



### Unique comfort petals

Petals inside the teat increase softness and flexibility while avoiding teat collapse to allow an uninterrupted milk flow, such that the baby will enjoy a more comfortable and contented feed. The choice of materials and the uniquely designed petals provide the teat with sufficient flexibility such that it is soft yet firm, like a breast, and conforms sufficiently to the touch of the baby's mouth and tongue to extract the milk. The firmness of the teat minimizes teat collapse from the baby sucking too fiercely and allows for an uninterrupted milk flow as long as the baby is actively suckling, just like with breastfeeding. Additionally, with less teat collapse and interruption, the baby is less likely to swallow air inadvertently, which helps reduce the occurrence of colic and discomfort.



### Advanced anti-colic system

An innovative twin valve design reduces colic and discomfort by allowing air to flow into the bottle, replacing the milk at the baby's own suckling rhythm. This reduces air ingestion by the baby which can cause the discomfort, crying and fussing associated with colic. Air valves have been demonstrated to reduce colic and fussing: in two clinical studies we have shown that air valves incorporated into the Philips Avent Classic bottles resulted in less fussing and colic – when compared to alternative systems [27,28]. To maintain that benefit, the two anti-colic valves in the new Natural bottles are designed to open at the same vacuum conditions of the Classic bottles. Moreover, the valves have been integrated in the Natural teat for greater reliance to further reduce the likelihood of the baby ingesting air instead of milk.



### Ergonomic design

Due to the unique shape, the bottle is easy to hold and grip in any direction – even for the baby – for maximum comfort. Clear markings on the bottle ensure accurate measurements and make it easier to determine how much breast milk the baby has been fed.

Thus, in those circumstances that feeding from the breast is temporarily not possible, our newly designed Natural teat and bottle make it easier to combine breast and bottle feeding as it allows the baby to closely continue its natural suckling behaviour and receive expressed breast milk as long as needed before returning to successful breastfeeding.



# Summary

## **Philips Avent provides the best start to set the stage for healthy futures**

Philips Avent is committed to help mothers breastfeed longer, because we recognise that breastfeeding is simply the best for both baby and mother. We also realise that some mothers on certain occasions may not be able to feed their baby from the breast, for example while working, and thus need to express their milk and feed it to their baby in a different way. This is when mothers need to rely on comfortable and effective breast pumps and convenient breast milk storage containers with natural feeding teats to feed their baby intermittently with continued breastfeeding. Our new Natural range and breastfeeding accessories deliver on those needs.

### **“More comfort, more milk.”**

The new Comfort breast pumps mimic natural infant suckling behaviour through comfortable massage cushions and their compact designs provide for a more comfortable expressing position, thus enhancing the overall comfort while expressing, as confirmed by mothers who have been using these pumps. Research indicated that greater comfort results in easier and greater milk flow.

### **“The natural way to bottle feed.”**

The new Natural bottle helps mothers to make feeding breast milk easier and more natural for their baby. The new Natural teat more closely resembles the size, shape and softness of the breast which allows babies to closely continue

their natural breastfeeding behaviour and receive expressed breast milk as long as needed. The unique petals and integrated valves avoid teat collapse and ensure an uninterrupted milk flow as long as the baby is actively suckling.

### **“Helping mothers breastfeed longer.”**

The Philips Avent Natural range is supported by extensive clinical and consumer research as well as laboratory tests, so healthcare professionals can confidently recommend these products to mothers who want to combine breast and bottle feeding: the Natural range is an integrated feeding system that makes it easier to breastfeed as long as possible. The Natural bottles and Comfort breast pumps integrate fully, so mothers can pump, store and feed with the same Natural feeding bottle – without the need to transfer milk. This preserves the nutrients of breast milk which can be lost each time milk is transferred. Simply by replacing the Natural teat with a sealing disc, mothers can enjoy convenient, reliable storage for their breast milk.

### **Conclusion**

Thus, in those circumstances that feeding from the breast is temporarily not possible, our new Natural range makes it easier to combine bottle with breast feeding as it allows babies to closely continue their natural breastfeeding behavior, and mothers to express their milk when and where possible.

# References

1. World Health Organization. Infant and young child nutrition – Global strategy on infant and young child feeding. A55/15, Fifty-fifth World Health Assembly, 2002. [http://www.who.int/nutrition/publications/gi\\_infant\\_feeding\\_text\\_eng.pdf](http://www.who.int/nutrition/publications/gi_infant_feeding_text_eng.pdf)
2. American Academy of Pediatrics. Policy Statement: Breastfeeding and the use of human milk. Pediatrics 2012. <http://pediatrics.aappublications.org/content/early/2012/02/22/peds.2011-3552>
3. Philips Center for Health and Well-being. Philips Mother & Child Care report–global outlook on breastfeeding 2011. <http://www.philips-thecenter.org/>
4. Jager M de, Hartley K, Terrazas J, Merrill J. Barriers to Breastfeeding – A global survey on why women start and stop breastfeeding. European Obstetrics & Gynaecology 7 (Suppl. 1): 25–30, 2012. <http://www.touchobgyn.com/articles/barriers-breastfeeding-global-survey-why-women-start-and-stop-breastfeeding>
5. Jager M de. Global breastfeeding experiences – Lecture at the 2011 Excellence in Pediatrics Conference. <http://www.excellence-in-paediatrics.org/content/189/global-breastfeeding-experiences>
6. King's Fund Delivering Better Maternity Care conference. Breakfast Workshop – Health and well-being beyond birth: Why do UK mums have among the worlds' highest drop-off rates for breastfeeding? [http://www.kingsfund.org.uk/events/past\\_events\\_catch\\_up/maternity\\_care.html#tab\\_2](http://www.kingsfund.org.uk/events/past_events_catch_up/maternity_care.html#tab_2)
7. Expert reflections on global breastfeeding. Joint expert group discussion between EPA and Philips Avent at the 2011 Excellence in Pediatrics Conference. <http://www.epa-unespa.org/sites/default/files/KOL-session-Global-BF-survey.pdf>
8. LinkedIn Innovations in Health. Various Philips-initiated discussions around breastfeeding.
9. Lau C. Effects of stress on lactation. *Pediatr Clin North Am* 48: 221–234, 2001.
10. Newton M, Newton NR. The let-down reflex in human lactation. *J Pediatr* 33: 698–704, 1948.
11. Ueda T, Yokoyama Y, Irahara M, Aono T, Influence of psychological stress on suckling-induced pulsatile oxytocin release. *Obstet Gynecol* 84: 259–262, 1994.
12. Feher SD, Berger LR, Johnson JD, Wilde JB. Increasing breast milk production for premature infants with a relaxation/imagery audiotape. *Pediatrics* 83: 57–60, 1989.
13. Hauck YL, Summers L, White E, Jones C. A qualitative study of Western Australian women's perceptions of using a Snoezelen room for breastfeeding during their postpartum hospital stay. *Int Breastfeed J* 3: 20, 2008.
14. Keith DR, Weaver BS, RN, Vogel RL. The Effect of music-based listening interventions on the volume, fat content, and caloric content of breast milk – Produced by mothers of premature and critically ill infants. *Adv Neonatal Care* 12: 112–119, 2012.
15. Data on file, 2011.
16. Burton PM, Kennedy K, Ahluwalia J, Nicholl R, Lucas A, Fewtrell M. Breast pump design and milk production: A randomised control trial. Poster presentation at the American Academy of Pediatrics National Conference & Exhibition, October 2010.
17. Data on File, 2012.
18. Woolridge MW. The 'anatomy' of infant sucking. *Midwifery* 2: 164–171, 1986.
19. Monaci G, Woolridge M. Ultrasound video analysis for understanding infant breastfeeding. 2011 18th IEEE International Conference on Image Processing (ICIP): 1765–1768, September 11–14, 2011. doi: 10.1109/ICIP.2011.6115802
20. Woolridge M. The mechanics of breastfeeding revised – New insights into how babies feed provided by fresh ultrasound studies of breastfeeding. Abstract SMO3.1. Presented at the 5th Europaediatrics Conference, 23–26 June 2011, Vienna. *Evid-Based Child Health* 6 (Suppl. 1): 46, 2011.
21. Deng J, Burton P, McDonald D, Yates R, Fewtrell M. 4D ultrasound of tongue movements during breastfeeding – would the findings lead to prenatal studies? Abstract P23.04 Presented at the 21st World Congress on Ultrasound in Obstetrics and Gynecology, Los Angeles, USA, 18–22 September 2011.
22. Data on file, 2012.
23. Geddes DT, Kent JC, Mitoulas LR, Hartmann PE. Tongue movement and intra-oral vacuum in breastfeeding infants. *Early Human Development* 84: 471–477, 2008. <http://www.ncbi.nlm.nih.gov/pubmed/18262736>
24. Fewtrell M, Lucas P, Collier S, Lucas A. Randomized study comparing the efficacy of a novel manual breast pump with a mini-electric breast pump in mothers of term infants. *J Hum Lact* 17: 126–131, 2001.
25. Fewtrell MS, Lucas P, Collier S, Singhal A, Ahluwalia JS & Lucas A. Randomized trial comparing the efficacy of a novel manual breast pump with a standard electric breast pump in mothers who delivered preterm infants. *Pediatrics* 107: 1291–1297, 2001.
26. Jones et al. A randomized controlled trial to compare methods of milk expression after preterm delivery. *ADC* 2001; 85: F91.
27. Lucas A, St-James-Roberts I. Colic, crying, fussing, and feeding. In: *Colic and Excessive Crying*. Report of the 105th Ross Conference on Pediatric Research. Columbus, Ohio: Ross Products Division, Abbott Laboratories, 68–77, 1994.
28. Fewtrell MS, Kennedy K, Nicholl R, Khakoo A, Lucas A. Infant bottle design, growth and behaviour: a randomised trial. *BMC Research Notes* 5: 150, 2012.
29. See Ref. [2] which includes this statement (p9/17): Mothers of healthy term breastfed infants should be instructed to delay pacifier use until breastfeeding is well-established, usually about 3 to 4 wk after birth.
30. O'Connor NR, Tanabe KO, Siadaty MS, Hauck FR. Pacifiers and breastfeeding: a systematic review. *Arch Pediatr Adolesc Med* 163: 378–382, 2009.



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