

Supplementation: A Goldilocks Dilemma - outline

90 minutes

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Indicators for adequate milk intake

None of these indicators should be considered in isolation. Even excess weight loss in the first week is not an automatic indicator for supplementation, but rather an indicator for additional infant evaluation.

- Weight changes. Weight is the most accurate indicator of adequate milk intake.

Age	Typical Weight Change for a Breastfed Baby
Birth to 4 days	Lose up to 10% of birth weight*
14 days	Return to birth weight*
14 days to 3 months	About 1 ounce (30 g) per day 5-10 ounces (150-300 g) on average per week based on low weight, usually day 3 or 4

[West & Marasco, 2020]

*Birth weight is typically the first weight taken after birth, but if significant amounts of fluids were given intravenously during labor, then consider the weight at 24 hours as baby's adjusted birth weight since by then baby will have urinated those excess fluids.

- Diaper output. Stools are much more indicative of milk intake than urination

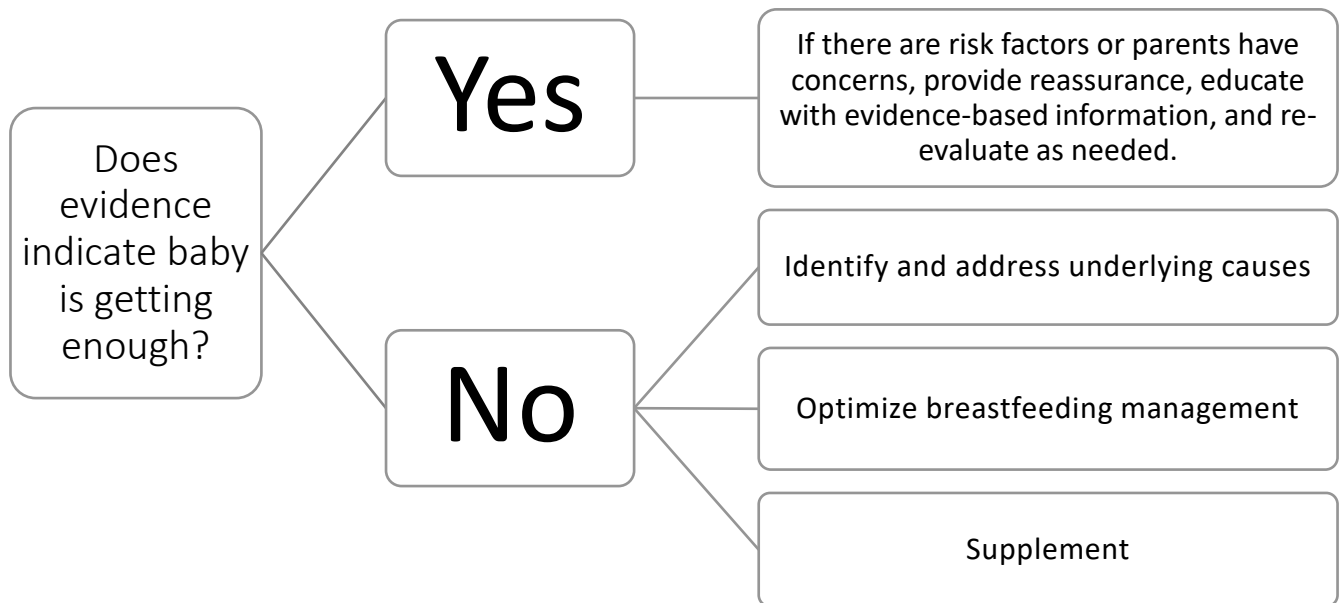
Age	Number of Stools per day
Day 1	1 black meconium stool
Day 2	2 black meconium stools
Day 3	3 transitional brown/green stools
Day 4	4 transitional brown/green or yellow stools
1 week	4-6 yellow stools "about the size of a credit card"
2 weeks	5-6 yellow stools "about the size of a credit card"
1 month	4 larger yellow stools
2 months	2-3 large yellow stools
3-12 months	2 large yellow stools*

[West & Marasco, 2020]

*Some babies older than 5 weeks will stool less frequently and have adequate intake.

- Nursing behavior
 - Periods of slow (about one per second) rhythmic sucking with periodic pauses.
 - Baby has limp hands and an unfurrowed brow expression most of the time.
 - Baby stays latched throughout the feeding without shaking head side-to-side.

- Newborn babies have about 10 minutes of active suck/swallowing per breast. Older babies may nurse more efficiently.
- Most feedings are less than 40 minutes.
- Disposition between feedings
 - Baby is content after the feeding or gently falls asleep after a period of active suckling.
 - Baby is not fussy or excessively sleepy between feedings.
 - Baby is not consistently crying to feed again less than an hour after finishing the previous feeding. (Exception: One 2-3 hour period each day of cluster feeding.)



The self-fulfilling prophecy of supplementation:
 Supplementation when not necessary can reduce parent confidence and breastfeeding frequency, ultimately resulting in lower milk production.

Inappropriate reasons for supplementation according to the Academy of Breastfeeding Medicine

- Belief that colostrum is inadequate before secretory activation
- Prevention of weight loss or dehydration
- Prevention of hypoglycemia
- Belief that breastfeeding increases risk of jaundice
- Lack of time providing breastfeeding education

- Use of medication in the lactating parent (in most cases)
- Inadequate diet in lactating parent
- To quiet a fussy baby
- Frequent breastfeeding
- Need for rest or sleep in lactating parent
- To improve nipple soreness by taking a break from breastfeeding

When baby is not getting enough milk

Identifying and addressing underlying causes

- If baby is not getting enough milk and the parent expresses less than $\frac{1}{4}$ - $\frac{1}{2}$ ounce (7-15 ml) of milk per breast using a pump right after breastfeeding, that indicates baby is breastfeeding effectively, but parent has **insufficient lactation**.
- Otherwise, **baby is unable to effectively transfer milk from the breast**.
- Insufficient lactation may also be present if amount expressed is less than amount required for supplementation.
- Potential causes of insufficient lactation
 - ✓ Lack of milk removal, potentially caused by inadequate transfer of milk from the breast
 - ✓ Hormonal imbalance
 - ✓ Insufficient glandular tissue (IGT)
 - ✓ Breast/chest surgery or injury
 - ✓ Spinal injury
 - ✓ Induced lactation or relactation
 - ✓ Mastitis
 - ✓ Anti-galactagogue herb or medication
 - ✓ Pregnancy
 - ✓ Illness in parent
- Potential baby-related causes of baby unable to effectively transfer milk from the breast
 - ✓ Weak or uncoordinated suck
 - ✓ Tethered oral tissue: tongue-tie, lip-tie, etc.
 - ✓ Restricted muscular or connective tissue
- Potential parent -related causes of baby unable to effectively transfer milk from the breast
 - ✓ Poor management, such as limiting time at breast
 - ✓ Impaired milk ejection

- Once the causes of baby not getting enough while breastfeeding are identified, they can be addressed with the support of an IBCLC.
- Sometimes, milk production can be increased enough to meet babies' needs and supplementation is needed in the short-term only.
- Other times, milk production cannot be increase enough to meet babies' needs and supplementation is needed long-term.

Optimizing breastfeeding management

- During a feeding
 - ✓ Undress baby down to diaper, or at least uncover hands while nursing.
 - ✓ Pull down on baby's chin
 - ✓ Position baby to facilitate head extension
 - ✓ Align baby's head and torso: "tummy to mummy"
 - ✓ Feed from both breasts at each feeding
Alternate which breast to start with
Feed from the first breast until sucking slows, then compress breast to provide more flow and encourage baby to resume active sucking. Once baby is no longer actively sucking despite breast compressions, then burp and switch to second breast before baby falls asleep.
 - ✓ Switch nurse: return to the first breast after breastfeeding from both breasts
- Between feedings
 - ✓ Skin-to-skin
 - ✓ Baby in close proximity to nursing parent to facilitate early response to infant feeding cues
- Frequency of feedings
 - ✓ Feed according to baby's cues not the clock.
 - ✓ Breastfeeding less than 7 times per day is associated with reduced milk production
 - ✓ If a baby receives less milk at a feeding, baby will be more likely to cue to feed sooner than a baby who received more milk at a feeding
 - ✓ "When in doubt, whip it out!"
 - ✓ Feeding more often can increase total daily intake.
 - ✓ With at least 2 ounces (60 ml) per feeding, parent may increase breastfeeding frequency to ensure adequate intake without supplementation.

Supplement

Defining supplementation

Supplementation is providing supplemental human milk or formula to a baby feeding from the breast.

- Parent's expressed milk
- Donor milk
- Infant formula

Includes only babies who are safe to feed orally: clinically stable and able to coordinate suck-swallow-breathing

Excludes alternative feeding required due to separation of breastfeeding parent and baby

Different from Academy of Breastfeeding Medicine's definition of Supplementary Feedings which does not include parent's expressed milk but may include other milk substitutes such as glucose water.

Determining the "just right" amount

- The Goldilocks Dilemma: not enough supplementation, too much supplementation, and just right supplementation
- Indications of inappropriate amount of supplementation
 - Not enough supplementation:
 - Inadequate weight gain
 - Low diaper output (during newborn period)
 - Fussiness during breastfeeding
 - Cuing to feed "all the time". Note: Healthy exclusively breastfed babies nurse up to 18 times per day
 - Too much supplementation
 - Excess weight gain
 - Cuing to feed less than 8 times per day
- Determine the "just right" amount to supplement. Choose a starting amount and adjust from there.

Approach 1: Required milk intake per feeding – Estimated actual milk intake per feeding = Supplementation amount

Baby's age	Typical Intake During a Feeding based on 8-10 feedings per day*	
First 24 hours	Approx 1 tsp.	2-10 ml.
24-48 hours	1-3 tsp.	5-15 ml.
48-72 hours	½-1 oz.	15-30 ml.
72-96 hours	1-2 oz.	30-60 ml.
2 weeks	1.5-2 oz.	45-60 ml.
3 weeks	2-3 oz.	60-90 ml.
1 – 6 months	3-4 oz.	90-120 ml.

[Mohrbacher, 2020]

Estimate baby's milk intake:

- Weigh baby before and after a breastfeed using a scale designed to measure milk intake (sensitive to 2 grams)
- Express milk at a missed breastfeed (only informative if baby feeding effectively)

Approach 2: Total amount to supplement = 2 x Previous week's deficit

Baby's age	Approximate weekly weight gain for babies in the 25 th -75 th percentiles	
Week 2	Regain birth weight	Regain birth weight
Weeks 3-4	8-9 oz	240-270 g
Month 2	7-10 oz	210-300 g
Month 3	5-7 oz	150-210 g
Month 4	4-6 oz	120-180 g
Month 5	3-5 oz	90-150 g
Month 6	2-4 oz	60-120 g

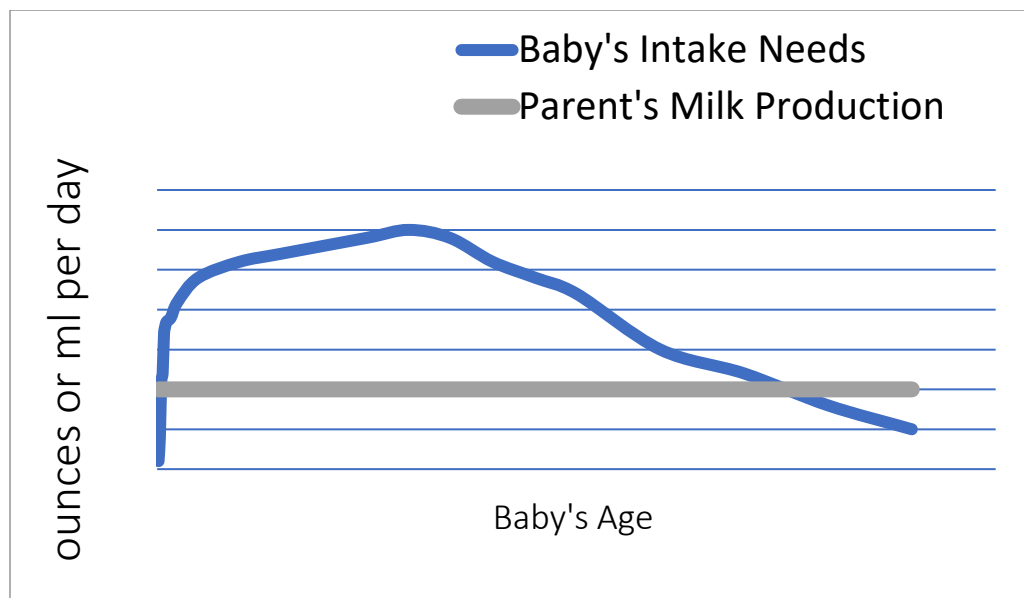
[West & Marasco, 2020]

When to supplement. Milk production varies throughout the day.

- Milk production is highest during the **night and the first morning feeding**. Sometimes supplementation may be eliminated during times of higher milk production.
- Milk production is often lowest in the **late afternoon or evening**. Sometimes milk expressed after first morning feeding may be used to supplement late afternoon/evening feedings.

How long to continue supplementation

- May be short term: days or weeks
- May be long term: months
- If baby weans naturally, supplementation can eventually be eliminated.



Choosing a supplementation device

- Bottle
- Special needs feeder
- Nursing supplementer
- Finger-feeder
- Cup or spoon
- Syringe or dropper
- Drip/drop
- Nursing supplementer

“An optimal supplemental feeding device has not yet been identified, and may vary from one infant to another. No method is without potential risk or benefit.” - Academy of Breastfeeding Medicine

How baby is supplemented matters

- Accessibility of the device
- Ease of use
- Cleaning
- Social acceptance
- Impact on baby’s ability to breastfeed
- Impact on milk production

Choice of supplementation device is influenced by culture. In a roundtable discussion of professionals from Palestine, Sri Lanka, Sweden, Taiwan, and the United States, “alternative feeding methods” used in the hospital setting varied considerably.

Bottle

Benefits

- Readily available
- Familiar and easy to use
- Easy to clean
- Can be administered by a caregiver other than the nursing parent

Risks

- Baby may prefer bottle-feeding over breastfeeding particularly when there is less flow from the breast
- Faster flow may result in more supplementation than needed
- Baby may be spending less time breastfeeding potentially resulting in lower milk production unless milk is expressed for every bottle given

Minimizing Risks

- Manage breast/bottle based on baby’s milk intake during breastfeeding

Lower intake



“Breast for dessert”

1. Bottle-feed
2. Offer breastfeeding
3. Express milk

Moderate intake



Triple-feed

1. Breastfeed
2. Bottle-feed
3. Express milk

Higher intake



Increase frequency of breastfeeding

1. Breastfeed
2. Breastfeed
3. Breastfeed
4. Offer bottles only when frequent breastfeeding is not meeting baby’s needs



**Triple-feed
alternative:
Wearable
pump**

1. Breastfeed
2. Bottle-feed and express milk



**Triple-feed
alternative:
Parallel pump**

1. Breastfeed and pump
2. Bottle-feed

Dr. Kathleen McCue explains that Parallel Pumping is “more than alternative” to triple feeding. For babies with difficulty stimulating a milk release due to being small for gestational age (SGA), preterm, jaundice, tongue-tie or other reason, the pump can provide adequate stimulation to aid milk release especially for parents conditioned to pumping. Additionally, the bi-lateral stimulation may also increase prolactin. [personal communication, K McCue, Feb 2023]

Use bottle-feeding techniques that reinforce breastfeeding

- Skin-to-skin
- Slow flow teat
- Bottle horizontal
- Wait for an open mouth before inserting bottle
- Use a teat that encourages a wide-open gape and fits completely into baby’s mouth
- Delay the flow
- Face baby in both directions

Special Needs Feeder

Benefits

- Assists feeding for a baby who is unable to transfer from the breast or typical bottles due to cleft palate, low muscle tone, or other difficulties
- Can be administered by a caregiver other than the nursing parent

Risks and challenges

- Does not meet baby's need to suck. Uses compression rather than suction to deliver milk or formula
- More complicated assembly than typical infant feeding bottles

Avoidance of artificial nipples (bottles, pacifiers) increases likelihood of successful breastfeeding

Finger-Feeder

Benefits

- Skin-to-skin
- Flow may be closer to breastfeeding
- Can be administered by a caregiver other than the nursing parent

Challenges

- Expensive
- Time-consuming to assemble, fill, clean
- Uncomfortable to use in public

Addressing challenges

- Practice by filling with water, assembling, and cleaning
- Purchase more than one device and prefill enough for the day
- Partner support

Cup or spoon, Syringe or dropper, or Drip-Drop may be more appropriate for short-term supplementation needs.

Cup or spoon

Benefits

- Easy to clean
- Familiar device
- Safe for preterm infants
- Baby controls feeding pace
- Does not meet baby's need to suck
- Encourages tongue extension

Challenges

- May result in excess spillage
- Slow

Syringe or dropper

Benefits

- Familiar device

Challenges

- Slow
- Difficult to supplement larger quantities

Drip-drop

Supplemental milk or formula dripped from a spoon, cup or bottle in a small stream into the corner of baby's mouth while breastfeeding

Benefits

- Easy to clean
- Familiar device
- Reinforces breastfeeding
- Encourages skin-to-skin
- Allows entire feeding to take place at the breast
- If baby has an effective suck, milk production is stimulated. Additional milk expression no longer necessary

Challenges

- May result in excess spillage
- Slow
- Requires some practice and a second person

May be used in the short-term, either because supplementation is only needed short-term or as a bridge to using a nursing supplementer.

Nursing supplementer

Also known as

- at-breast supplementer
- feeding tube at breast
- supply line
- supplemental nursing system (SNS)
- nipple tube
- supplementary suckling technique (SST)
- supplemental feeding tube device (SFTD)

A bag or bottle containing supplemental milk or formula delivered to the nipple via a tiny feeding tube.

Serves as an “external milk duct.”

Commercial and homemade devices are available.

Benefits

- Reinforces breastfeeding
- Encourages skin-to-skin
- Allows entire feeding to take place at the breast
- If baby has an effective suck, milk production is stimulated. Additional milk expression no longer necessary

In one clinical study, use of a nursing supplementer supported preterm babies in transitioning from orogastric/nasogastric tube or cup/spoon feeding to direct breastfeeding

In another clinical study, over half of mothers fully relactated by breastfeeding with a nursing supplementer alone.

Challenges

- Difficult to use, cumbersome, unfamiliar
- Uncomfortable to use in public
- Lumps of powdered formula stuck in feeding tube
- Expensive
- Time-consuming to assemble, fill, clean
- Tubing as a distraction for older babies
- Baby sucking tubing like a straw
- Leakage

Addressing Challenges

- Difficult to use, cumbersome, unfamiliar
 - Peer and/or professional support
 - Start with drip-drop as a transition
 - Give it 5-7 days
 - See Guidelines for Use
- Uncomfortable to use in public
 - Wear under clothing prior to leaving home
 - Offer ‘snacks’ without the supplementer
 - Peer and partner support

As well as general strategies used by any parent breastfeeding in public:

- Plan ahead to identify a private place, such as a dressing room

- Identify safe, supportive environments such as at a friend or family member's home
- Use another feeding device
- Feeling more comfortable with experience
- Lumps of powdered formula stuck in feeding tube
 - Liquid formula
 - Mix powdered formula using a protein shake blender bottle
- Expensive
 - Consider cost savings of producing more milk
 - Value of preserving the breastfeeding relationship difficult to quantify
- Time-consuming to assemble, fill, clean
 - Fill enough supplementers for the day and store in refrigerator. See Guidelines for Use
- Tubing as a distraction for older babies
 - Place supplementer on the side of the breast instead of above or between breasts
 - Consider alternatives such as bottles or cups
- Baby sucking tubing like a straw
 - Latch first then slip tubing into baby's mouth. See Guidelines for Use
 - Tape tubing closer to the nipple
 - Tape tubing on underside of breasts where baby's tongue is placed
- Leakage
 - Check for proper assembly
 - Switch to a supplementer less prone to leakage
 - Ensure feeding tube deep enough into baby's mouth

Get partner support

In an informal online survey of adoptive parents inducing lactation, partner support was found to be by far the most important key to success using a nursing supplementer.

Guidelines for use

- Choosing a supplementer device commercial disposable bag, commercial hard storage container, homemade tube and syringe/bottle. Consider:
 - Availability
 - Convenience
 - Comfort
 - Impact on milk production
 - Cost
 - Use in public
 - Appropriateness for babies with sucking difficulties

- Preparing to use

Before baby arrives

- Practice filling with water, assembling, cleaning
- Suck water through feeding tube or have partner suckle breasts with supplementer filled with water. Partner suckling involves the partner and supports milk production!

Daily routine. Prepare for the day ahead by pre-filling and storing in refrigerator

Overnight routine

- Avoid trips to the kitchen in the middle of the night
- Cooler of filled and assembled supplementers near breastfeeding location
- Thermos of warm water for warming supplementer if desired

- Latching

Approach 1: Latch baby onto the breast first, then insert feeding tube into corner of baby's mouth

Approach 2: Latch baby onto the breast and feeding tube together. Attach feeding tube with wide, cloth medical tape, band-aid/plaster with adhesive strip cut away, or triangle of nursing bra or tank.

- Starting the flow

If baby unable to start the flow from the supplementer or baby is unwilling to wait for the flow to start, flow can be initiated by parent sucking the feeding tube or compressing the storage container (with some devices)

No or lower flow
from the breast



Supplement from start

Offer about ½
supplement at each
breast

Moderate flow
from the breast



Supplement once active suck/swallowing slows

Consider using
supplementer on
second breast only

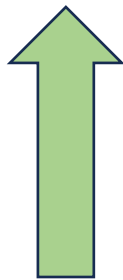
Higher flow from
the breast



Supplement on the second breast as needed

1. Breastfeed
2. Breastfeed
3. Breastfeed
4. Use nursing
supplementer only
when frequent
breastfeeding is not
meeting baby's
needs

- Adjusting the flow

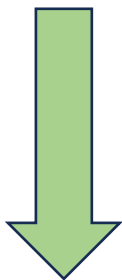


Increase flow if:

- Feedings take more than 20 minutes per breast
- Baby showing signs of fatigue or frustration
- Baby's growth is slow

To increase flow:

- Raise container
- Increase diameter of tubing (if available)
- Add second tube (if available)
- Squeeze container (if available)



Decrease flow if:

- Feedings take less than 10 minutes per breast
- Baby overwhelmed with flow: choking, sputtering, unlatching
- Baby's growth is fast

To decrease flow:

- Lower container
- Decrease diameter of tubing (if available)
- Choose a supplementer with slower flow

- Using with a nipple shield
Help babies with difficulty latching
Hold tubing in place: thread tubing from the outside in through a hole in nipple shield
- Cleaning
Use guidelines established for sanitizing and cleaning pump parts

When to sanitize: Before first use

When to wash then sanitize: At least once daily for babies less than 3 months, born preterm, or with weakened immune systems

When to wash: After each use

Sanitizing

Boil. Place parts in clean pot lined with a towel. Fill with water to cover parts. Bring to boil and continue boiling for 5-15 minutes. Air dry covered with a clean towel

Dishwasher with sanitize setting if safe for device. See supplementer device instructions

Steam. See instructions with commercial steam sanitizing bags or container

Washing

Wash with hot, soapy water. Push hot, soapy water through the feeding tube with a syringe.

Rinse with hot water. Push hot water through the feeding tube with a syringe.

Air dry.

	Bottle	Special needs feeder	Finger-feeder	Cup or spoon	Syringe or dropper	Drip-drop	Nursing supplementer
Accessibility of the device	Positive						
Ease of use							
Cleaning							
Social acceptance	Neutral						
Impact on ability to breastfeed	Negative						
Impact on milk production							

Bottle versus nursing supplementer

For every use of bottle-feeding per day, breastfeeding rates at 4 weeks was decreased by 30%. The use of a nursing supplementer did not impact breastfeeding rates at 4 weeks.

When surveyed, IBCLC’s reported

- The nursing supplementer “best preserves the breastfeeding relationship”
- The nursing supplementer was their “preferred method of supplementation”
- Bottle-feeding was the most commonly used method for supplementation in the United States, Australia, South America and Canada
- Supplementation method was most often chosen by parent and other health care providers rather than the IBCLC