

## Milk Production – What All Breastfeeders Need To Know

by Maureen Minchin

“The basics: hormonal stimulation + emptying of milk from breast. Obviously you need to allow baby to feed as needed. And feeding must be effective and no obstacles put in the way of milk drainage.

Stimulation creates and maintains a basal level of prolactin, essential to getting increases in supply from birth, and later if supply has dropped. (But by three months a happily breastfeeding mum’s basal prolactin levels are comparable to a non-lactating mum – it is the repeated bouts of sucking-stimulated prolactin level rises that does the job of enabling lactose and so milk production, with prolactin returning to baseline in between if intervals allow).

Initially breasts overproduce, and then supply drops down to the level of milk taken on a daily basis. Lactation is energetically expensive, and throughout human history women have never been able to afford to waste energy. So volume is regulated by need, and responds rapidly to change in demand. How?

Regulatory controls are within the breast itself. If a feedback chemical (FIL) reaches a certain level in the breast, it signals that milk is not needed and secretion is inhibited, and eventually stops.

The second internal down-regulator is high pressure. If enough pressure flattens the rectangular-ish secreting cells, then they stop work; over time they regress and disappear. That can be a local or a whole breast pressure. So habitual finger pressure that prevents drainage from one area, or an underwire bra that sticks into a particular spot, or surgical scarring, or a tight crop top, can have an effect. As can over-distension because of too long a gap between feeds from a breast. Or from sleeping/lying on one’s stomach, OK for some mums, hopeless for others (check out massage, might be best not to be too long facedown, and much massage can be done seated). If pressure gets high enough, it not only squashes the secretory cells, it can cause milk from the ducts and cells to leak into surrounding tissues and trigger inflammation. (mastitis) (SO feed before massage, time appt for the afternoon preferably; be prepared for some leakage. Towels and large absorbent pads in bed can be useful, save bed changes..)

Milk is made continuously, and is mostly water based, with about 7% cream. (The most variable component of milk, and babies drink less by volume of a high fat milk.) The watery part of the milk flows out of cells rapidly, the fat has to be extruded, sort of squeezed out by the cell into that aqueous fluid. The oxytocin contracts tiny muscles around those cells and pushes milk out into the ducts (the let down). A vacuum in the baby’s mouth is created when the baby’s jaw drops, and baby sucks. The seal needed for vacuum is created by tongue, cheek pads, and upper gum ridge etc. The vacuum – lower pressure area – allows milk to flow out from the breast – higher pressure area with letdown pushing milk out.

The relative amount of cream in milk varies over a feed, between feeds, between breasts, over the day, over time, following the general rule that the emptier the breast and the more letdowns it has been exposed to, the higher the fat levels. So after an interfeed interval, milk from the start of the first breast is ‘waterier’ than the milk at the start of the second breast will be, because the second breast has had oxytocin squeezes while the first is being fed from. And swapping back to the first breast after the second can mean an even richer milk again. Babies can be trusted to know when they are satisfied, and it sometimes takes the extra cream of a ‘third’ breast to do so.

Once lactation is established, the interfeed intervals are heavily influenced by the interaction between breast storage volume, and infant stomach volume. Over a day a baby takes about 750mL. A breast with storage capacity of 800mL could theoretically mean one feed a day, except that a baby's stomach capacity won't allow that! SO: a breast with very small storage volume will mean more frequent feeds at shorter intervals. So too does a small tummy. A baby with a big tummy capacity means fewer feeds per day if the mum's storage capacity allows that tummy to be filled up (it can even get down to 3-4 feeds in 24 hours in some thriving babies under 6 months old.) They say the size of the baby's stomach is roughly the size of its fist, but it can be distended comfortably. (If over-distended the baby will blurt back the extra – sometimes too much comes up, so yet another feed is indicated to settle things.) Being creamy, sometimes only a few extra mouthfuls are needed to get bub to drop off drunk.

Rates of milk synthesis vary over the day, and are governed by the degree of breast fullness. When the breast is close to its residual baseline (it's never truly empty), synthesis rates are faster. When breasts are fuller, synthesis rates are slower. The small breast that empties quickly also refills quickly.

During the night sleep, longer intervals and higher-at-night prolactin levels combine to produce a full breast by morning. Take out a single feed then, and refilling will be slow: the 600mL capacity breast might have dropped to 500mL, but there's still plenty there, so no rush to refill. By the next feed volume might be back to 540mL, and drop down to 450 after that feed. Over the day, by evening you can come close to running on empty, with baby staying at breast and drinking pretty much as you produce it. That milk may move from the stomach on into the small intestine at much the same rate, so baby doesn't get that satisfactory FULL STOMACH feedback signal and fall off looking drunk, or else will sleep for a short time but wake up and want more. [There's stuff that could be said here about gastric hormones and signalling, but no need.]

But take out a lot of milk in the am, by feeding on one side and pumping the other breast, then letting baby have the second side for as long as wanted, and milk synthesis rates speed up to replace milk in both breasts. SO this is the ideal time to express milk for storage or as a reserve. (Don't be persuaded to think about expressing after every feed unless it's for a medical reason: it creates too much work, keeps breasts cold, and is a pain.) And while you would freeze that extra expressed morning milk, it can be stored in the fridge during the day till it's clear there's enough been made to keep baby full that day; if not, you can pour off some and feed it to baby by spoon, cup, syringe, whatever.

I developed this strategy to deal with what I called six o'clock starvation, when I just could not satisfy baby with a full feed. Before I tried this, I had to keep baby at breast for hours, contentedly getting small dribs of milk but refusing to leave or drop off to sleep. Topping baby up in the evening with some of the morning milk meant she went off to sleep, my empty breasts refilled before she woke again a few hours later, and in between I got my other two kids to bed and cleaned up. This was where the Kaneson pump came in handy, as it's a simple silent no-strain one-handed pump: draw back the outer cylinder a tiny bit to create the slight suction needed to relax the ring of muscle around the nipple and milk pours out of the second breast when oxytocin hits both breasts and triggers letdown). But not until mums are comfortably feeding and can multi-task should they think about trying this. Getting position and attachment right and baby feeding well and breasts producing well is the first priority. When mums can feed and drink a cuppa they can do this no trouble. If they want to get milk to store. Or to give an older child a glass, or make breastmilk ice blocks. Or whatever it's needed for.

Breasts being peripheries, they are colder than other parts of the body. They need to be warm for blood circulation to bring in nutrients for milk making. Simple things like hotpacks or having a small patch of wool,

silk or fleece to tuck into the bra around the breast not in use can make a difference to refilling rates. So can an afternoon nap. I never ran dry on days when I snuggled down with a baby and had a full-body after-lunch rest. I always did if I worked through the day and only sat down for feeds. Some mums can cope with strenuous exercise and still lactate successfully; others can't. (Babies don't like the taste in milk of lactic acid created by exercise, but it disappears after about 30 minutes.)

So increasing milk production means increasing sucking stimulus, and frequency, increasing synthesis rates by breast emptying, and decreasing any competing activities. In short, go to bed with baby and sleep and feed feed feed, and (optional) express first thing in the am. After 2 days of more frequent feeding, basal prolactin levels rise – they may have fallen too far – and milk-making increases. A babymoon it's sometimes called. Not possible for many mums with children and dogs and household tasks. Using drugs to increase prolactin has its risks and in any case will not work if the problem is insufficient breast emptying and natural feedback down-regulation of supply.

Decreasing milk production is equally simple. Increase intervals between feeds, for example by one-breast feeding with only short times on the second breast, back to the emptier first breast for a couple of hours, monitoring the unsuckled breast and expressing only to comfort and to avoid mastitis. Within 24-48 hours of one-breast feeding supply will drop, sometimes catastrophically. It's disaster to suggest this to new mums with oversupply, as many hospital-based midwives have done. The mums go on for more than 24-48 hours and then wonder why their milk has gone. Lying face down compressing boobs, wearing a tight crop top or bra, creating pressure feedback, and you may achieve the same outcome via mastitis. (In a breast with no skin damage, most mastitis starts with milk leaking into breast tissue where it shouldn't be, under pressure.)

Mums need to know what an efficient working breast feels like: soft and flexible even when heavy with milk, filling up, softening again after a feed; maybe tight and tense to touch if the interval is too long but immediately relieved by milk removal. Warm but not heated, not reddened skin. Not lumpy, even up in the armpits where there is some glandular tissue in many women. There's always a reason for any change and thinking though exactly what's happened can find it, and prevent recurrences.

There is a lot more in Breastfeeding Matters 1998 edition that would be of interest and relevance, in chapters on milk supply, nipple problems and mastitis. Breastfeeding is a skill that has to be learned, and without early practical support and understanding of how supply is regulated, women struggle."

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