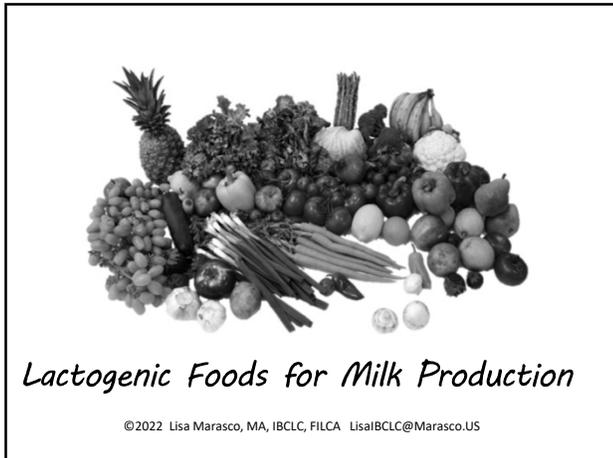


Lactogenic Foods for Milk Production



No disclosures of financial or conflicts of interest to make.

1. Define the term *functional foods*
2. List at least 3 nutrients essential for good milk production
3. Name 2 foods that have research support for their galactogogue properties

The Assumptions:

Today's parent is so well-nourished that we don't have anything to worry about

Good nutrition is good for lactation but it isn't *that* important

Nutrition: a historical approach



Most traditional societies view foods as part of their health strategy

Cultures have always had traditional foods for milk production

Experience based- less research

Foods vs Herbs

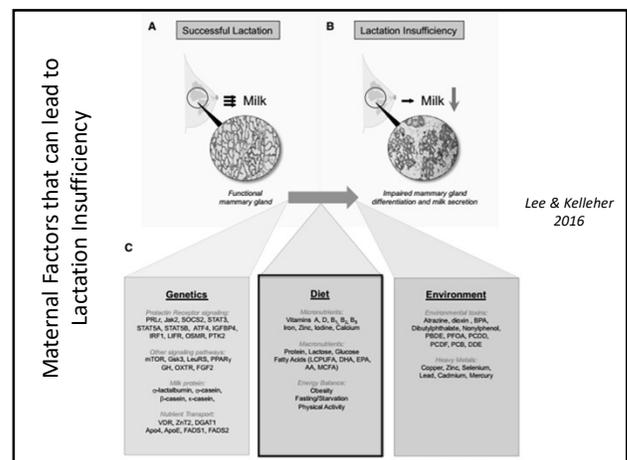
Wisdom of the ages...



"It is well known that diet has a profound effect on lactation and that the satisfactory secretion of milk is only possible in the presence of certain known dietary factors in adequate quantities." – Folley, 1938

"The only way to improve lactation in postpartum women is measures aimed at improving maternal nutrition. Diet therapy is the main method for maintaining maternal health, prevention of lactation insufficiency..." – Kuznetsov 2017

"Insufficiency of food must produce insufficiency of milk." –Routh, 1879



Lactogenic Foods for Milk Production

"It has long been assumed that once lactation is successfully initiated, the primary factor regulating milk production is infant demand. Thus, most interventions have focused on improving breastfeeding education and early lactation support. However, in addition to infant demand, increasing evidence from studies conducted in experimental animal models, production animals, and breastfeeding women suggests that a diverse array of maternal factors may also affect milk production and composition... modifiable factors, such as diet...on reproductive endocrinology, lactation physiology, and the ability to successfully produce milk."

Functional Foods

Foods that have a potentially positive effect on health..... are generally considered to offer additional benefits that may reduce the risk of disease or promote optimal health...

-MayoClinic.com

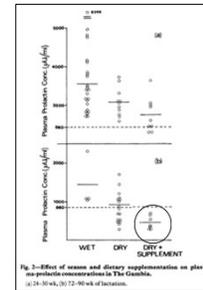
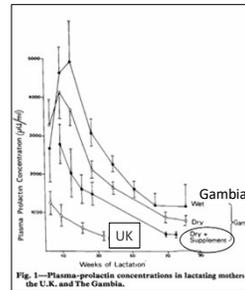
Front door vs Back door evidence

Some diagnoses are made by exclusion:

What happens if nutrient X is missing?



Lactation Under conditions of good vs poor nutrition



"The better the nutritional status, the lower the prolactin levels..."

Lunn, Austin, Prentice & Whitehead. (1980). Influence of maternal diet on plasma-protein levels during lactation. *The Lancet*

Nutrition: Wisdom from the dairy



Guidelines:

- Check herd for subclinical or clinical mastitis
 - Check are current levels of protein, zinc, selenium, and vitamins A and E.
- Adequate... and effective fiber to maintain normal rumen function and milk production.
- Serious ration deficiencies or imbalances in energy, protein, calcium, phosphorus, magnesium, sulfur, and salt can contribute to reduced peak milk.
- Severe or persistent anemia can adversely affect production. Causes include deficiencies in protein, iron, copper, cobalt, or selenium.
- Check both pre- and post-calving rations for a calcium or protein deficiency
- Ingestion of toxic weeds, mycotoxins, or any item that may greatly reduce dry matter intake can cause a sudden, drastic drop in milk.
- Overfeeding grain and/or excessive amounts of fat, starch, and nonstructural carbohydrates in the ration can upset rumen function and metabolism.
- In some rare instances a vitamin B12 deficiency may be the cause
- A lack of water intake either because of the system or quality problems can be a potential cause.

Adams, R. S., Hutchinson, L.J. and Ishler, V.A. (1998). Trouble shooting problems with low milk production. *Penn State Dairy and Animal Science Fact Sheet 98-16*.

Wisdom: Trouble shooting problems



Governing Rationales

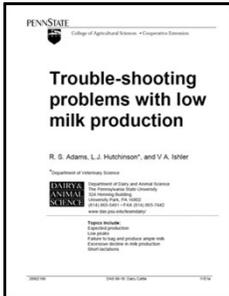
Poor diet affects gut health → nutrient uptake → inadequate substrates → decreased production

Poor diet affects gut health → immune system → infections/mastitis → decreased production

Adams, R. S., Hutchinson, L.J. and Ishler, V.A. (1998). Trouble shooting problems with low milk production. *Penn State Dairy and Animal Science Fact Sheet 98-16*.

Lactogenic Foods for Milk Production

Nutrition: Wisdom from the dairy



Mastitis Recommendation:
“Nutritional parameters to check are current levels of protein, zinc, selenium, and vitamins A and E. Examine and screen the ration or individual feeds for molds and mycotoxins.”



National Eye Institute [CC BY 2.0 (creativecommons.org/licenses/by/2.0)]

Nutrients research

Gbadamosi and Okolosi (2013) analyzed ten botanical galactagogues for their chemical constituents and antimicrobial activities finding that they had high protein, fiber, iron and calcium content, and antibacterial activity.

Gbadamosi & Okolosi. (2013). Botanical galactagogues: nutritional values and therapeutic potentials. Monteban, M. (2017). Maternal Knowledge and Use of Galactagogues in Andean Communities of Cusco, Peru.

Nutrients associated w/ good milk production & composition



Protein
 Iron
 Iodine
 Omega-3 fatty acids
 B-vitamins
 Calcium
 Zinc



B complex	Iron	Calcium	Omega-3 (good fats)	Grains	Zinc
Spinach	Red meats	Sesame seeds	Wild salmon	Oatmeal	Red meat
Prunes	Dried beans	Chicken soup	Olive oil	Millet	Legumes
 Nuts	Nuts & seeds	Almonds	Flaxseed & Flaxseed oil	Barley	 Nuts
Brewer's yeast	Red beet juice	Peas	Borage oil	Rice	Seeds
Sweet potato	Black strap molasses	Bok choy	Butter	Corn	Poultry
Iodine	Green leafy veggies	Green leafy veggies	Coconut oil	Quinoa	Seafood
Seaweed, Seafood	Chlorophyll supplement	Broccoli	Sesame oil	Amaranth	Eggs

Proteins

ESSENTIAL BUILDING BLOCKS

A “weak but significant” association between the parent’s intake of protein and “shorter lactation” has been observed

Torris et al. Duration of lactation, maternal metabolic profile, and body composition in the Norwegian EBBA I-study. *Breastfeed Med.* 2013;8(1):8-15.

Protein deficiency to sufficiency

“...Supplement was fed to lactating women to raise the protein content of their energy adequate diet from 25 or 50m to 100mg/d.... Amount of milk secreted... increased significantly.”

Edozien JC, Khan MAR, Waslien CI. Human Protein Deficiency: Results of a Nigerian Village Study. *J Nutr.* 1976;106(3):312-328.

Lactogenic Foods for Milk Production

Proteins

Achalapong	Breast milk volume at 48 hours postpartum (mL)	95% CI	P	Breast milk volume at 72 hours postpartum (mL)	95% CI	P
Regular diet (mean±SD)	5.2±6.7			19.6±18.7		
Egg supplement (mean difference)	+3.8	-6.8, 14.5	0.477	+19.6	-2.5, 41.7	0.082
Milk supplement (mean difference)	+7.5	-3.1, 18.1	0.163	+4.1	-17.9, 26.0	0.715
Egg and milk supplement (mean difference)	+14.6	3.8, 25.4	0.008	+41.1	18.8, 63.5	<0.001

Laosirirat, T. (2012). Effect of egg supplementation for breast milk production at 48 hour postpartum. *Thai Journal of Obstetrics and Gynaecology*, 19(2), 45-50.

Achalapong, J. (2016). Effect of Egg and Milk Supplement on Breast Milk Volume at 48 and 72 Hours Postpartum: A Randomized-Controlled Trial. *Thai Journal of Obstetrics and Gynaecology*, 24(1), 20-25.

Buntuchai-- "some kinds of protein... including egg tofu, chicken, fish, and seafood"

Iron: Anemia a risk factor for IMS

Henly et al, Birth, 1995. "study results suggest that anemia is associated with the development of insufficient milk...."

Toppare 1994: Women with poor milk production could have low iron even though their hemoglobin was normal.

Rioux 2006: Mothers with hemoglobin levels below 9.5 g/dL did not breastfeed as long as those who had higher levels.

Salahudeen 2013: Low hemoglobin was identified as a risk factor for slow onset of milk production after birth

Clues from rat research



Lower fat content of milk →
needed more milk to compensate

O'Connor 1988. Impact of maternal iron deficiency on quality and quantity of milk ingested by neonatal rats.

Fat, Calories and Dieting



We need at least 1500-188 calories on a regular basis

Listening to the parents



"Dropping too many calories too fast negatively affected my milk production."

"What I found was that on the days when I de-cided to restrict what I was eating to lose weight, my output dropped."

Observations:

The most "successful" nursing parents were eating 50% more than normal... one who was eating 1950 calories/day had to double her intake before they could eliminate supplementation... Whichelow 1975, 1979

Thai study found a relationship between caloric intake and milk volume in Thai nursing parents... Buntuchai 2017

Buntuchai. (2017). Traditional Galactagogue Foods and Their Connection to Human Milk Volume in Thai Breastfeeding Mothers. *JHL*
Whichelow, M. J. (1975). Letter: Calorie requirements for successful breast feeding. *Arch Dis Child*, 50(8), 669.
Whichelow, M. J. (1979). Breast feeding in Cambridge, England: factors affecting the mother's milk supply. *J Adv Nurs*.

Lactogenic Foods for Milk Production

High Carbohydrate vs High Fat diet

60% carb, 25% fat, 15% protein =1780 kcal

30% carb, 55% fat, 15% protein =1780 kcal

Milk fat concentration & content less

Greater infant weight gain

Milk fat conc ↑13%
Milk fat content ↑15%
Higher calorie milk

Mohammad, Sunehag, & Haymond, (2009). Effect of dietary macronutrient composition under moderate hypocaloric intake on maternal adaptation during lactation.

Calories

	Median (Q1-Q3)	r	p
Energy (kcal) ^a	1,638.6 (1,457.4-1,799.2) [72.8 (64.8-80.0)]	.319	.029
Carbohydrate (g)	239.1 (205.3-260.8)	.327	.026
Fat (g)	49.0 (36.6-60.4)	.105	.271
Protein (g) ^b	67.8 (57.1-77.8) [88.1 (74.2-101.0)]	.229	.089

Note. The mean (standard deviation) milk volume was 598.7 (182.4) ml/day, which was tested for the correlation with energy and nutrient intake by using Pearson product-moment correlation.
^aData in brackets are expressed as median (Q1-Q3) of % Thai dietary reference intake.

- ✓ Mean energy intake 72% of dietary reference intake
- ✓ 56% carb 27% fat 17% protein (=higher carb)
- ✓ Maternal energy & carb intake were related to milk volume

Buntuchai, et al. (2017). Traditional Galactagogue Foods and Their Connection to Human Milk Volume in Thai Breastfeeding Mothers.

"How to raise the fat content of your milk"

joyfulabode.com/how-to-raise-the-fat-content-of-breastmilk/

Website recommendation:
Sunflower lecithin
"1200mg QID"

Is it time to listen and look into these anecdotes?

B-Complex: building blocks of milk synthesis

Sure, B. Dietary requirements for fertility and lactation, J of Nutr, 1941. Rat study: "Lactation factor...may properly be described as associated with B complex."

Grace 2012 Dairy: "unlikely to improve the milk production of grazing cows when concentrations of vitamin B₁₂ in serum are >128 pmol/L."

Lee & Kelleher: B₂ & B₃ are critical for energy metabolism and B₁₂ for DNA synthesis...

B-12

Russian mothers given B₁₂ injections for the first 2 weeks after birth had higher milk volumes the first week than those who didn't get them.

Chubukov AS, Belentseva PN, Makarov EI. [Effect of vitamin B12 on lactation]. *Akush Ginekol (Mosk)*. 1973;49(8):61-62.

Who's at risk?

GO VEGAN

Lactogenic Foods for Milk Production

Calcium

"The evidence that Ca^{2+} has an important role in PRL release is impressive... in normal anterior pituitary cells, decreasing Ca^{2+} or exposing the cells to Ca^{2+} channel blockers decreases PRL release in a manner similar to that caused by exposure to dopamine..."

Lamberts, S. W., & Macleod, R. M. (1990). Regulation of prolactin secretion at the level of the lactotroph. *Physiol Rev*, 70(2), 279-318.

"These observations indicate that Ca^{2+} may be the primary intracellular mediator in the control of prolactin secretion..."

Merritt, J. E., & Brown, B. L. (1984). An investigation of the involvement of calcium in the control of prolactin secretion: studies with low calcium, methoxyverapamil, cobalt and manganese. *J Endocrinol*, 101(3), 319-325.

Low calcium diet?



Rats: Lower milk volumes in those fed low-calcium diets

Weisstaub et al. Influence of maternal dietary calcium levels on milk zinc, calcium and phosphorus contents and milk production in rats. *Journal of trace elements in medicine and biology : organ of the Society for Minerals and Trace Elements (GMS)*. 2006;20(1):41-47.

Calcium



Calcium/Magnesium

- ✓ When supply seems to dip around time of period
- ✓ May be related to lower calcium levels
- ✓ 1500mgCa/750mgMg daily
- ✓ Start mid-cycle, continue through period



~Patricia Gima IBCLC

Zinc

...a key modulator of mammary gland biology, critical for successful lactation- Lee & Kelleher 2016

Plays a role in regulating lactocyte renewal

Regulates functional differentiation of alveoli into secreting cells

Is critical for activities that are required for milk synthesis and secretion.

Zinc

"Zinc deficiency during lactation rapidly reduced maternal blood plasma zinc concentration and caused an impairment in milk production which was specifically due to the lack of zinc rather than to inanition."



Mutch, P. B., & Hurley, L. S. (1974). Effect of Zinc Deficiency during Lactation on Postnatal Growth and Development of Rats. *J. Nutr.*, 104(7), 828-842.

Zinc

Study of 514 pregnant parents in Central Russia

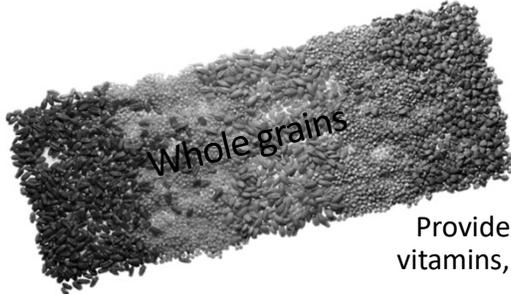
Zinc deficiency defined as $<13\mu\text{mol/L}$

77% had reduced zinc levels, 21% on "critical edge"

"In women with zinc deficiency, early post-natal hypogalactia developed 1.4 times more often."

Scheplyagina, (2005). Impact of the mother's zinc deficiency on the woman's and newborn's health status.

Lactogenic Foods for Milk Production



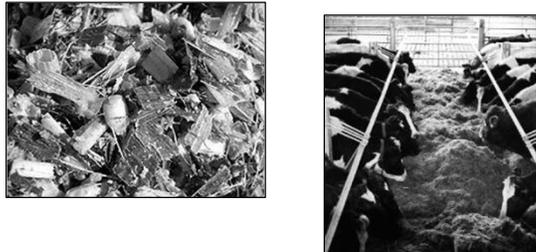
Whole grains

Provide iron, vitamins, fiber

"Moreover, we also observed that longer lactation was associated with slightly higher energy intake, a significantly higher intake of protein and fiber, and a higher level of physical activity."

Torris, C., Thune, I., Emaus, A., Finstad, S. E., Bye, A., Furberg, A. S., ... Hjeltnes, A. (2013). Duration of lactation, maternal metabolic profile, and body composition in the Norwegian EBBA I-study. *Breastfeed Med*, 8(1), 8-15. doi: 10.1089/bfm.2012.0048

Nutrition: More Wisdom from the dairy



Roughage

-Manipulated for milk volume, cream content



Barley *Hordeum vulgare*

Galactagogue property found in polysaccharide* in barley plant, appears to increase prolactin

Koltecko 2000; Bingel, 1994

*Nguyen, US patent 4948785, 3/14/90. Plant polysaccharide fractions inducing prolactin in mammals

Barley seeds also contain tocopherols...



Along with sitosterol (phytoestrogen) increases uterine contractions in rats—oxytocic?

Javan 2017

Cultural mentions of Barley Leaf

Plant	Recommended dosage	Study design	Extract	Reference
<i>Medicago sativa</i> L.	A total of 60 mL of extract from <i>Carum corvifolium</i> , <i>Fragaria foeniculifera</i> , and <i>M. sativa</i> twice a day (morning and night) for 8 weeks	In vivo/cows	Extract from <i>C. corvifolium</i> , <i>F. foeniculifera</i> , and <i>M. sativa</i>	71
<i>F. foeniculifera</i> L.	A total of 20 to 320 µg/mL	In vitro/MCF-7 cells	Chloroform extracts of fenugreek seeds	53
	Two doses of ginseng, 1 and 10 µg/100 µL, show immunoreactivity from 12,000 to 16,000 hours	In vitro	Fenugreek seed extract as a plant protein after significant	74
<i>Cicer arietinum</i> L.	Intragastric gavage three different doses (20, 50, or 100 mg/kg/day) for 5 weeks	In vivo/rats	Isolavones extracted from chickpea sprouts	57
	Chickpeas in the concentrate mixture: 100%, 50%, 25%, and 0-260 g/kg for 12 weeks in three groups	In vivo/Chios ewes	Chickpea meal	72
	Chickpeas at 0%, 50%, and 100% of concentrate dry matter from week 4 to week 16 postpartum for lactating Holstein cows	In vivo/cows	Dry chickpeas as a dietary supplement	73
<i>Hordeum vulgare</i> L.	A total of 50 and 200 µg/mL of barley leaf extract	In vitro	Green barley leaf extract	62

Breastfeeding: A Review of Its Physiology and Galactagogue Plants in View of Traditional Persian Medicine. Javan, Javadi & Feyzabadi (2017). *Breastfeeding Medicine*.

Barley leaf extract research

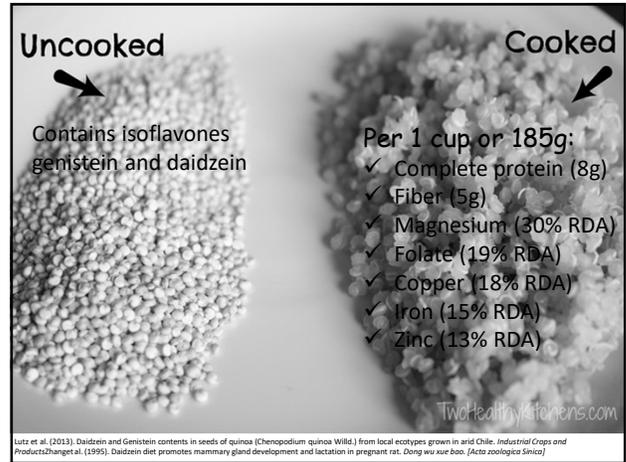
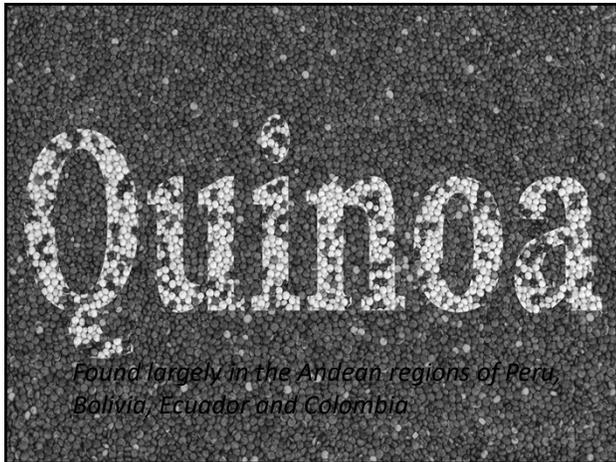


Vitamin E analog (α -tocopherol succinate) from the extract stimulated release of Prolactin and/or Growth Hormone in rat pituitary cells

alibaba.com/product-detail/Low-price-pure-leaf-extract-green_60692640345.html

Badamchiani et al. (1994). Isolation of a vitamin E analog from a green barley leaf extract that stimulates release of prolactin and growth hormone from rat anterior pituitary cells in vitro.

Lactogenic Foods for Milk Production



Quinoa

"Eaten by 10% of nursing mothers in Peru for milk production" - Ayala 2003

"Special soaked grain preparations of high mineral content--particularly millet and quinoa--were fed to lactating women to increase milk supply." - Fallon, 1999

Quinoa, uncooked				
0.25 cup				
185.00 grams				
222.00 calories				
Nutrient	Amount	DV (%)	Nutrient Density	World's Healthiest Foods Rating
manganese	1.17 mg	58.5	4.7	very good
tryptophan	0.10 g	31.2	2.5	good
magnesium	118.40 mg	25.6	2.4	good
phosphorus	281.20 mg	28.1	2.3	good
fiber	5.18 g	20.7	1.7	good
folate	77.70 mg	19.4	1.6	good
copper	0.36 mg	18.0	1.5	good

World's Healthiest Foods Rating	Rule
excellent	DV >= 75% OR Density >= 7.0 AND DV >= 10%
very good	DV >= 50% OR Density >= 3.4 AND DV >= 5%
good	DV >= 25% OR Density >= 1.5 AND DV >= 2.5%

http://www.whfoods.com/genpage.php?dbid=142&name=foods/nutrition/nutritionalprofile

Quinoa in soup

"Women who have just given birth are served a broth of quinoa if they have problems with their milk." - Froemming, 2006

Suggested dosage: 45g daily (Nice 2015)

QUINOA
the superfood you need to eat

http://www.whfoods.com/genpage.php?dbid=142&name=foods/nutrition/nutritionalprofile



Lactogenic Foods for Milk Production

Chickpeas (garbanzo beans)

Plant	Recommended dosage	Study design	Extract	Findings	References
<i>Medicago sativa</i> L.	A total of 60 mL of extract from <i>Carum corvii</i> , <i>Fragaria vesca</i> , <i>gracum</i> and <i>M. sativa</i> twice a day (morning and night) for 8 weeks	In vivo/cows	Extract from <i>C. corvii</i> , <i>T. foenum-graecum</i> , and <i>M. sativa</i>	Increase of daily milk, prolactin, and insulin levels of control cows had a 20-40%, 12-25.2%, and 3-17% increase, respectively, in comparison with those of placebo	70
<i>T. foenum-graecum</i> L.	A total of 20 to 320 µg/mL	In vitro/MCF-7 cells	Chloroform extract of fenugreek seeds	Fenugreek seeds stimulated the proliferation of MCF-7 cells, and by binding to ER acted as an agonist for ER	71
	Two doses of genistein, 1 and 10 µg/100 µL dose intracerebroventricularly from 12:00 to 16:00 hours	In vitro		Plasma prolactin concentrations during and after genistein infusion were also significantly higher than the control	74
<i>Cicer arietinum</i> L.	Intragastric gavage three different doses (20, 50, or 100 mg/kg/day) for 3 weeks	In vivo/rats	Isoflavones extracted from chickpea sprouts	Estrogenic activities in ovariectomized rats	77
	Chickpeas in the concentrate mixture (100:0, 90:10, and 80:20 kg/ton) for 12 weeks in three groups	In vivo/Chios ewes	Chickpea meal	No differences in average milk yield, or milk composition in Chios ewes; effect in growing lambs	72
	Chickpeas at 0%, 50%, and 100% of concentrate dry matter from week 4 to week 16 postpartum for lactating Holstein cows	In vivo/cows	Dry chickpeas as a dietary supplement	Higher milk yield for cows fed 100% chickpeas than 0% chickpeas as dietary supplement	73

- ✓ Same family as fenugreek
- ✓ Estrogenic activity in rats
- ✓ Mentioned in Javan 2017, Nice 2015

Lentils

Bnouham, M. (2010). Medicinal Plants with Potential Galactagogue Activity Used in the Moroccan Pharmacopoeia. *Journal of Complementary and Integrative Medicine*, 7(1), 52.



cookingchanneltv.com/recipes/aarti-sequeira/mums-everyday-red-lentils-1921913

Piechulek, H., Aldana, J. M., Engelsmann, B., & Hasan, M. N. (1999). Dietary management during pregnancy, lactation and common childhood illnesses in rural Bangladesh. *Southeast Asian J Trop Med Public Health*, 30(2), 299-306.

High in fiber, protein, iron, B-1, folate, magnesium

Mung Beans

Osofski 2003- Coumestans are found in legumes, particularly food plants such as sprouts of alfalfa and mung bean



Mentioned for lactation in Sojaili 2013 (Iran) Nice 2015

Brewer's Yeast New Review Jia 2021



- ✓ *Saccharomyces cerevisiae* yeast= (SCY) used for brewing ale versus
- ✓ *Saccharomyces cerevisiae* yeast supplement= (SCYS) inactive form of SCY, typically used as human dietary supplement

[What Is the Difference Between Baker's Yeast and Nutritional Yeast? | culinarylore.com](https://www.culinarylore.com)

- ✓ Reportedly high in protein, B vitamins, minerals, beta-glucan (immune system modulation), mannan oligosaccharides, organic chromium (better digestibility)

Jia, Brough, & Weber (2021). *Saccharomyces cerevisiae* Yeast-Based Supplementation as a Galactagogue in Breastfeeding Women? A Review of Evidence from Animal and Human Studies. *Nutrients*, 13(3).

Sources of SCYS:



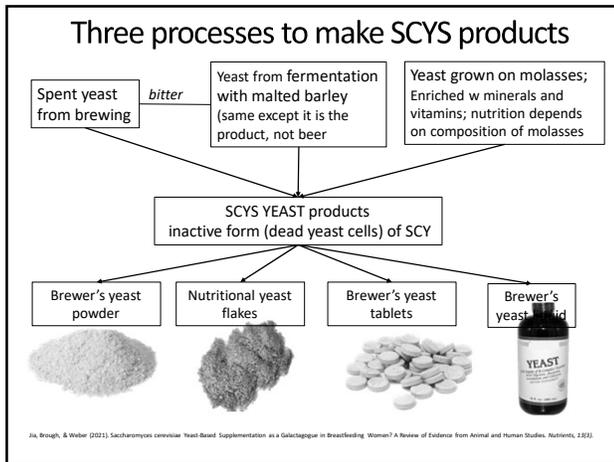
"brewer's yeast" or "nutritional brewer's yeast" { Spent yeast from brewing
Yeast from fermentation with malted barley

Sources of SCYS:



"nutritional yeast" or "brewer's type yeast" { Yeast grown on molasses

Lactogenic Foods for Milk Production



Nutritional content of selected products

Table 2. Description of B vitamin and mineral concentrations in a selection of commercially available *Saccharomyces cerevisiae* yeast-based supplements (SCYS).

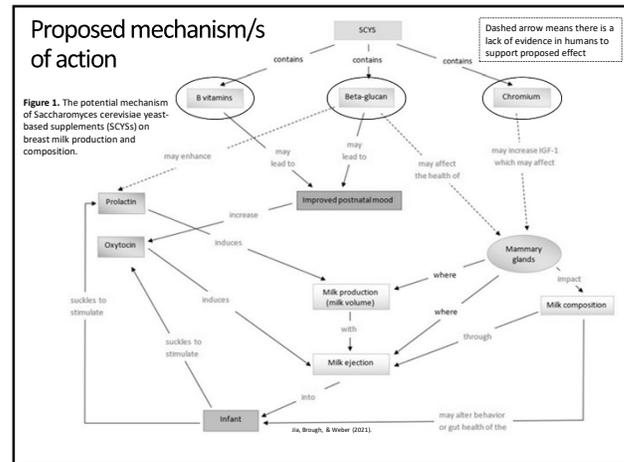
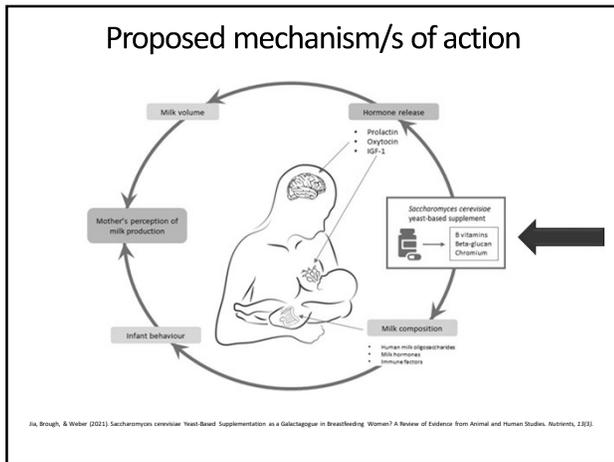
Nutrients	Content* µg/g Dry Yeast				
	Product 1* Brewer's Yeast Powder	Product 2* Brewer's Yeast Powder	Product 3* Brewer's Yeast Powder	Product 4* Nutritional Yeast Flakes	Product 5* Nutritional Yeast Flakes
Thiamin	10	30	20	666.7	1600
Riboflavin	30	60	60	666.7	5
Niacin	190	333.3	380	3555.6	1000
Vitamin B6	5	30	10	666.7	666.7
Vitamin B12	-	-	-	1.6	-
Folate (DFE)	11.4**	14.2	13.3	75**	-
Pantothenic acid	-	100	-	-	2333.3
Biotin	-	0.3	0.3	-	1
Calcium	-	1500	733.3	666.7	1733.3
Iron	20	40	40	55.6	466.7
Zinc	-	166.7	-	-	2000
Selenium	-	2.2	-	-	1.4
Chromium	-	0.43	-	-	0.3

DFE, dietary folate equivalent. *Product numbers match the numbers in Table 1. Nutrition information was accessed on 4 June 2020. **On websites, the values were provided as folic acid; we calculated DFE as 1 µg DFE = 0.6 µg folic acid [19].

Differences in nutritional content vary by:

- ✓ Different strains
- ✓ Fermentation process
- ✓ Growing medium
- ✓ Any enrichment

Jia, Brough, & Weber (2021). Saccharomyces cerevisiae 'Yeast-Based Supplementation as a Galactagogue in Breastfeeding Women? A Review of Evidence from Animal and Human Studies. Nutrients, 13(2).



Selected dosages found on internet

Table 3. A selection of information found on the internet about taking *Saccharomyces cerevisiae* yeast-based supplements (SCYS) to increase breast milk production*.

Author or Source	Product Information	Dose (g/Day)	Format of the Supplement	Ingestion Method	Claimed Benefits
Anne Smith, IBCLC ¹	Brewer's yeast	2.7 (900 mg tablet) or 4.5 (900 mg tablet)**	Tablets	3 tablets taken with meals 3 times per day	Increase milk production, contains B vitamins
Donna Murray RN Reviewed by Meredith Shurt, MD ²	Brewer's yeast	No information	Tablets or powder	No information	Increase milk supply, improve mood and baby blues. Anecdotally increases milk supply, improves acne, improves glucose tolerance in diabetes, considered as a nutritional supplement for B vitamins and selenium
Robit Games, RSC Reviewed by Briana Violand, IBCLC ³	Brewer's yeast (used in brewing and making bread, but different from baker's yeast)	30 g***	Recommended using: 1. 1/2 tsp of tablets, 2. 1/2 tsp of powder, 3. 1/2 tsp of tablets	Add to cookies or wafers 3 tablespoons per day, can increase the quantity by half-a-teaspoon a day if not seeing any improvement	
Kelly Winder, doula ⁴	Brewer's yeast (not substitutable with baker's yeast or nutritional yeast)	Unclear****	Powder or flakes	As an ingredient in lactation cookie recipe: 1 to 2 tablespoons per recipe, 2-3 cookies per day	Boost breast milk supply
Medela, breast pump manufacturer ⁵	Brewer's yeast	Unclear****	Powder	As an ingredient in lactation cookie recipe: 3 tablespoons per recipe, no information on how many cookies to take per day	Increase breast milk supply
Cystal Karpov, RDN, IBCLC ⁶	Brewer's yeast (can be substituted by nutritional yeast)	Unclear****	Powder	As an ingredient in lactation cookie, 4 tablespoons per recipe, 2 cookies per day	Naturally help support milk supply, offer a boost of B vitamins, iron and other minerals

Jia, Brough, & Weber (2021). Saccharomyces cerevisiae 'Yeast-Based Supplementation as a Galactagogue in Breastfeeding Women? A Review of Evidence from Animal and Human Studies. Nutrients, 13(2).

- ### Theoretical safety issues
- ❑ Nutrient variations- too much of a high nicotinic or folic acid product could be problematic
 - ❑ Possible contamination with mycotoxins
 - ❑ May contain large amounts of tyramine- interact with monoamine oxidate inhibitors (MAOIs)
 - ❑ Could aggravate inflammatory bowel diseases like Crohns
 - ❑ Occasional minor complaints like skin rash, constipation, decreased appetite
- Jia, Brough, & Weber (2021). Saccharomyces cerevisiae 'Yeast-Based Supplementation as a Galactagogue in Breastfeeding Women? A Review of Evidence from Animal and Human Studies. Nutrients, 13(2).

Lactogenic Foods for Milk Production

Oats

- High in iron, fiber
- Listed as a galactagogue in botanical surveys

Properties:

- Antidepressant
- Antianxiety
- Diuretic
- Thyroid/pituitary supportive

Abu-Rabia, 2005: *Herbs as a Food and Medicine Source in Palestine*

Acharya 2010: *Traditional Knowledge on medicinal plants used for the treatment of livestock diseases in Sarkikhola VDC, Kaski, Nepal*

Monteban 2017: *Maternal Knowledge and Use of Galactagogues in Andean Communities of Cusco, Peru. Ethnobiology Letters, 8(1), 81-89.*

Cultural Favorites



Oats/Oatmeal (proteins, vitamins, minerals and trace elements)



14 LACTATION COOKIE RECIPES
a biscuit to help boost and maintain a breastfeeding mothers milk supply
A Hot Trend

CHOCOLATE CHIP LACTATION COOKIES

Lactation Cookies

Lactation Cookies

theorganisedhousewife.com.au/recipes/lactation-cookie-recipes

com/recipes/14-lactation-cookies

APPLE PIE LACTATION GRANOLA TO INCREASE MILK SUPPLY WITH BREASTFEEDING OR PUMPING

Granola!

Lactogenic ingredients

- ✓ Oats
- ✓ flaxseed meal
- ✓ Brewer's yeast
- ✓ Ginger
- ✓ Coconut oil

Apple Pie Lactation Granola - (hollybaking.com)

The secret ingredient:
Almond meal
high in calcium

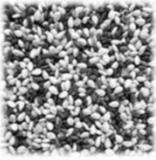
Almond milk smoothies- another option

Lactogenic Foods for Milk Production

Cultural Favorite Foods



Tahini
SESAME SEED PASTE



Sesame seed
(ajonjolí)

Source of calcium



Halva
Ergol 2016



LECHE DE SESAMO

Palm Dates



Contain

- iron
- protein
- fiber
- glucose
- vitamins
- biotin
- niacin
- folic acid
- calcium
- potassium

Yulinda 2017; Tafrihi 2020

Sakka 2014, Egypt Palm dates vs fenugreek

N=75 recruit @ birth, no prob

1. Group 1: 1 cup (2g) fenugreek seed tea TID
2. Group 2: 10 palm dates TID
3. Control: nothing

Duration???

Compared milk volume day 3, Infant weights day 3, 7, and 14

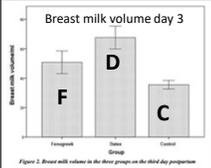


Figure 2 Breast milk volume in the three groups on the third day postpartum

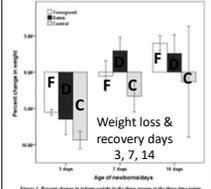


Figure 3 Percent change in infant weight in the three groups at the three time points

	Fenugreek		Dates		Control		F ratio	p
	Mean	SD	Mean	SD	Mean	SD		
Percent change of weight after 3 days	-5.5	0.9	-6.5	5.1	-9.3	2.9	8.404	0.001
Percent change in weight after 7 days	-0.5	5.1	2.9	4.5	-3.3	5.2	10.05	<0.001
Percent change in weight after 14 days	4.0	2.3	2.9	6.2	-1.9	18.1	1.903	0.156
Breast Milk volume (ml)	50.8	18.8	67.6	18.8	35.5	7.0	25.592	<0.001

Ginger



- N=63, 30 ginger, 30 placebo
- 500mg BID x 7 from day 3.
- Used “1 hr production”
- Checked prolactin
- Higher day 3 milk volume but not day 7

Paritakulet al. (2016). The Effect of Ginger on Breast Milk Volume in the Early Postpartum Period: A Randomized, Double-Blind Controlled Trial. *Breastfeed Med.*

Fenugreek, Ginger & Turmeric

N=50 healthy exclusively bfg parents 1 mo pp, age 20-40
Manual pump for baseline, week 2, & 4



200mg fenugreek,
120mg ginger,
100mg turmeric

TID

X 4 weeks

Burrungpert et al. (2018). Effects of Fenugreek, Ginger, and Turmeric Supplementation on Human Milk Volume and Nutrient Content in Breastfeeding Mothers: A Randomized Double-Blind Controlled Trial. *Breastfeed Med.* 13/10.

Fenugreek, Ginger & Turmeric

Time	Milk volume (mL/day)			Milk volume (% change)		
	Herbal supplement (n=25)	Placebo (n=25)	p	Herbal supplement (n=25)	Placebo (n=25)	p
Week 0	710±216	736±179	0.425	—	—	—
Week 2	1,030±264*	805±181	0.003	49±32*	11±20	<0.001
Week 4	1,399±312*	896±185	<0.001	103±38*	24±22	<0.001

*Significant differences at p<0.05.

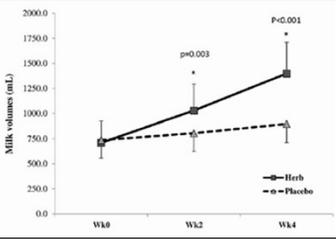


FIG. 2. Milk volume before and after consumption of herbal supplement or placebo. *Significant differences at p<0.05.

Legend: — Herb (solid line), — Placebo (dashed line)

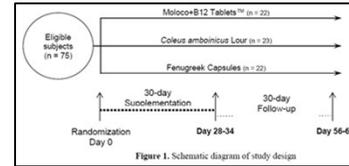
Lactogenic Foods for Milk Production



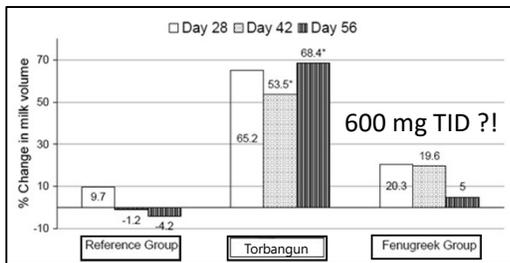
Torbangun research (*Coleus amboinicus* Lour)

Damanik, R. (2006). Lactagogue effects of Torbangun, a Bataknese traditional cuisine.

Three randomized groups of 25 each
 Moloco+B-12 (placental extract 15mg, B-12 20µg) 1 TID
 Torbangun soup- 150g leaves/day of soup
 Fenugreek capsules – 1 x 600mg cap TID
 30 day supplement started day 2, 60 day tracking



Torbangun



At day 28: Moloco group up ↑ 10%
 Torbangun ↑ 65%
 Fenugreek group ↑ 20%

Chicken soup!



Brotto, L. D., Marinho, N. D. B., Miranda, I. P., Lima, E. d. F. A., Leite, F. M. C., & Primo, C. C. (2015). Use of galactagogues in breastfeeding management: integrative literature review. *Revista de Pesquisa: Cuidado é Fundamental Online*, 7(1), 2169-2180.

Ergol et al. (2016). A review of traditional knowledge on foods and plants supposed to increase lactation in pregnant women; a descriptive study. *African Journal of Traditional, Complementary & Alternative Medicines*, 13(3), 27-32.

Monteban, M. (2017). Maternal Knowledge and Use of Galactagogues in Andean Communities of Cusco, Peru. *Ethnobiology Letters*, 8(1), 81-89.



Pork Leg Soup Xu 2000



Lactogenic Foods for Milk Production

Cultural Favorite drinks

Green drinks- reputed to increase fat in milk

May include barley-grass, malt, alfalfa leaf, kelp, spirulina, oat-straw

Atole con avena, arroz, maize
Or how about sésamo, quinoa



Beer: Cultural Favorite drinks

Myth or Fact?

Grossman, E. (1988). Beer, breast-feeding, and the wisdom of old wives. *JAMA*, 259(7), 1016.

Koletzko, B., & Lehner, F. (2000). Beer and breastfeeding. *Adv Exp Med Biol*, 478, 23-28.

Mennella, J. A., & Beauchamp, G. K. (1993). Beer, breast feeding, and folklore. *Dev Psychobiol*, 26(8), 459-466.

Milligan, S. R., Kalita, J. C., Heyerick, A., Rong, H., De Cooman, L., & De Keukeleire, D. (1999). Identification of a Potent Phytoestrogen in Hops (*Humulus lupulus* L.) and Beer. *J Clin Endocrinol Metab*, 84(6), 2249-.

Sawagado, L., & Houdebine, L. M. (1988). Identification of the lactogenic compound present in beer. *Ann Biol Clin (Paris)*, 46(2), 129-134.



Beer:

Barley, Malt, Brewer's yeast, Hops (B-complex)

 Alcohol



How Mother and Baby "Picked Up"

A case of Blatz Beer in your home means much to the young mother, and obviously baby participates in its benefits.

malt in the beer supplies nourishing elements that are essential at this time and hops act as an appetizing, stimulating

Main 2400

BLATZ
MILWAUKEE
Always the same good old Blatz

~NON-ALCOHOLIC ACCEPTABLE~

MOBI favorite: Barley water

½ cup barley in 3 cups water overnight
Or Boil 20 min

Strain

Pour 1 cup over 1 tsp fennel seeds & steep 30 min

Can sweeten with cinnamon



Interesting parent reports...



MALUNGAY/MORINGA *Moringa oleifera*



Seed Pods



Flower



The Miracle Tree
or
The Tree of Life

Also known as drumstick, horseradish tree, kelor

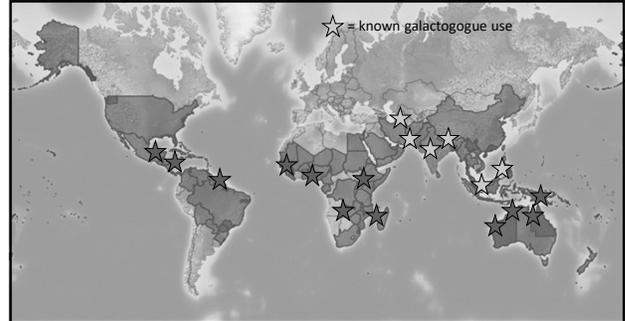
Lactogenic Foods for Milk Production



MORINGA

Ethnobotanical:

Grown and used in the Philippines, Africa, Ghana, Malaysia and elsewhere as a food. Specially valued in the Philippines for lactogenic properties; Filipino families plant in backyards during pregnancy.



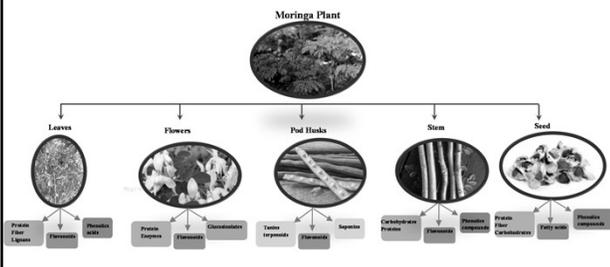
CABI, 2021. *Moringa oleifera*. In: Invasive Species Compendium. Wallingford, UK: CAB International. <https://www.cabi.org/isc>

Moringa oleifera

India, sub-Himalayas, Pakistan, Bangladesh, Afghanistan. Tropics: Malaysia, Philippines, Indonesia. Grows in northern Australia, considered a minor weed. Also found in Africa, Central & South America

MORINGA

Composition in bioactive compounds of vegetative structures of Moringa oleifera plant



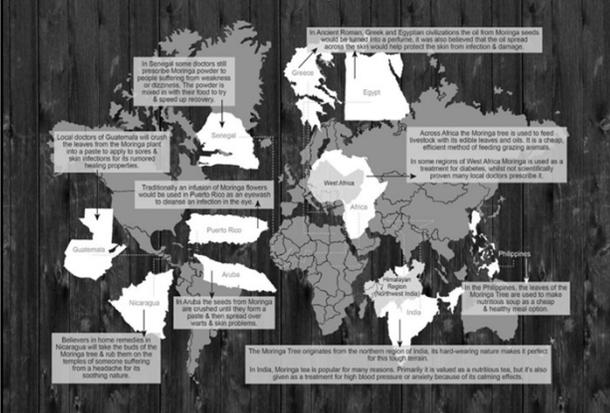
Milla, Peñalver & Nieto (2021). Health Benefits of Uses and Applications of Moringa oleifera in Bakery Products. *Plants (Basel)*, 10(2).

Properties:

- ✓ Anti-diabetic
- ✓ Anti-oxidant
- ✓ Anti-inflammatory
- ✓ Anti-cancer
- ✓ Anti-thyroid (rats)
- ✓ Nutritive functional food

Ma et al. (2019). Evaluation of phytochemical and medicinal properties of Moringa (*Moringa oleifera*) as a potential functional food. *South African Journal of Botany*. Tahiliani, P., & Kar, A. (2000). Role of Moringa oleifera leaf extract in the regulation of thyroid hormone status in adult male and female rats. *Pharmaceutical Research*. Photo by Judgeriara CC BY SA-4.0

The Global Story of Moringa



Gram per Gram Comparison*

<https://www.tentree.com/blog/benefits-of-the-moringa-oleifera-tree/>

Lactogenic Foods for Milk Production

MORINGA

Side-effects:

- ✓ None reported
- ✓ Caution for use of supplement form if hypothyroid
- ✓ Caution if taking warfarin

Safety:

Humphrey A, BSH n/a

Rat study found no overt adverse reactions in acute and subacute studies.

Asiedu-Gyekye et al. (2014). Micro- and Macroelemental Composition and Safety Evaluation of the Nutraceutical Moringa oleifera Leaves. *J Toxicol*, 2014, 786979.

Indications

- ✓ Nutritional deficiencies
- ✓ GDM/ Insulin resistance
- ✓ Great general galactagogue!



Forms & Dosages

- ✓ Fresh leaves: 10g per day for pregnancy and lactation
- ✓ Tincture: ML 4-6 caps/d
- ✓ Powder:
 - ¼ tsp = 350mg capsule
 - ¾ - 1 tsp 2-3x/day
- ✓ Capsules: 1-3 350mg caps 2-3x/day
- ✓ Tea: 3-5 cups/day



Applications of Moringa oleifera in the bakery industry

Milla, Peñalver & Nieto (2021). Health Benefits of Uses and Applications of Moringa oleifera in Bakery Products. *Plants (Basel)*, 10(2).

Moringa products

Capsules, powder for nutritional supplement & lactagogue



Lactogenic Foods for Milk Production

And thyroid effects?

Study	Subjects	Dose	Human equiv dose 150 lbs	Result
Tahiliani, 2000A Moringa oleifera	Male & female rats	Moringa 175mg/kg/d x 10 days Aqueous leaf extract	68kg x 175mg = 11.9g/350mg = 34 capsules	Reduced T4 to T3 conversion in female rats only
Tahiliani, 2000B Moringa oleifera	Female rats only	Moringa 350mg/kg/d X 10 Aqueous leaf extract	68kg x 150mg = 23.8g/350mg = 68 capsules	Reduced T4 to T3 conversion similar to 175mg dosage

Tahiliani, P., & Kar, A. (2000). Role of Moringa oleifera leaf extract in the regulation of thyroid hormone status in adult male and female rats.

Is there any galactagogue research? Lots of it!



So how come it doesn't show up in any of the galactagogue reviews?

Study	Subjects	Form & Dose	Start & Duration	Outcomes	Results
Chairani 2017 Indonesia	N=24 PIMS 4-arm study	250mg, 350mg, or 450mg TID	Unknown 10 days	Perceived milk volume	All dosages helped, higher helped more
by 2012 Philippines	N=17 excl bfg mothers, term infant, 2wks-6mo	250mg cap moringa powder BID; 10mg domperidone TID	Enrollment 7 days	Change in milk volume- 24 hour extrapolated	Malunggay increased more than with domperidone, but overall change considered nonsignificant
ispinosa-Kuo 2005 Philippines	N=82 term healthy mothers	2 350mg caps moringa powder daily vs placebo	DOL 3 8 days	Change in pumped milk volume, ea breast at least 5 min q 4hrs	Malunggay 96->236ml Placebo 78->151
Briton-Medrano 2004 Philippines	N=52 healthy pregnant women	2 350mg cap moringa powder or placebo TID	35 wks gest Until delivery	Time to onset of sign. >10mls and adequate >30mls production/ Milk volume DOL 1,2 Most 7-14d	Time to >10mls= 21hrs mor vs 33 pl Time to >30mls= 33hrs mor vs 41 pl Volume moringa 9.2-9.37mls Volume placebo 3.4-9.17mls
to 2002 Philippines	N=40 preterm mothers <37 wks, milk <100mls DOL2	Moringa 250mg TID Domperidone 10mg TID; metoclopramide 10mg TID	DOL 3 14 days	Milk volume, prolactin DOL 7, 14. Pump q4hrs 10-15 min x 2 wks, Gerber battery	Milk volume: Malunggay 20->180->205 Domperidone 16->335->391 Metoclopramide 43->285->321
Balahibo 2001 Philippines	N=60 healthy term mothers 4-arm	Moringa 250mg either once or twice daily; placebo same	DOL1 8 weeks	Compare dosages Infant length & weight	Infant weight gain significantly higher in moringa BID group, followed by moringa daily, placebo
Estrella 2000 Philippines	N=68 preterm mothers <37 wks	Moringa 250mg BID Or placebo BID	DOL 3-5	Milk volume Pump q4hrs	Moringa 114% Placebo 72% Milk vol Moringa 324->485->495 Milk vol placebo 245->335->355
Fabes-Alimirante 1996 Philippines	N=30 hypertensive mothers	Moringa 250mg BID Or placebo	Delivery 4 mos	Prolactin 6h, 48h, 4mo Infant wt birth, week 1, 2, 4 and 4 mos Milk volume mo 1, 2, 4	PRL moringa 4302->5669->3304 mIU PRL placebo 5804->3478->810 Infant wt gain birth to 4 mos: Moringa 114% Placebo 72% Milk vol Moringa 324->485->495 Milk vol placebo 245->335->355
Fabes-Alimirante 1996 Philippines	N=116 normal term mothers	Moringa 250mg BID	Delivery 4 mos	Prolactin 6h, 48h, 4mo Infant wt birth, week 1, 2, 4 and 4 mos Time to engorgement 24, 48, >48hrs; time to letdown 48, 72, 96 hrs	Prolactin: moringa 5808-5236-2389; placebo 5134-3398-504 mIU Time to engorgement, letdown, same. Infant wt 124% mor vs 74% pl

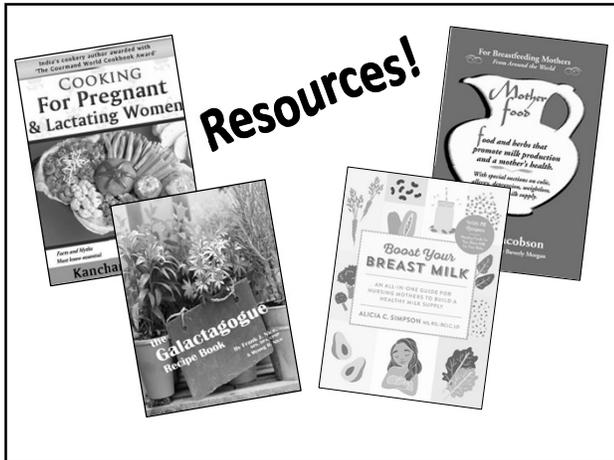
Proactive thinking!

Thaweekul P, et al. (2014). The efficacy of hospital-based food program as galactagogues in early period of lactation. *J Med Assoc Thai, 97(5), 478-482.*

Hot basil, lemon basil, sweet basil, banana blossom, garlic, garlic chives, ginger, pepper.

	Galactagogue	Control
Breast fullness/heaviness @48hrs	72%	57%
Wt loss >7% within 48hrs	15%	24%

Lactogenic Foods for Milk Production



Resources!

Conclusion

- First line of defense for milk production is frequent & effective milk removal
- Lactogenic Foods support milk production in the context of good management
- *Lactogenic Foods are NOT a substitute for good management*
- Lactogenic foods can help increase milk supply for lactating parents
- Lactogenic foods are low risk and nutritively beneficial

Key References

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