Breastfeeding Your Baby

By: Ann Marie G. Pobutsky
University of Guam
HE 490
Cooperative Extension Service
Date: 1983

Breastfeeding Your Baby:
A Nutritional and Healthful Plus

Ann Marie G. Pobutsky

University of Guam

HE 490: Health and Nutrition

"In 1978, over 50 percent of newborn babies in the United States were breastfed. While this is an excellent trend with newborns, it is to be hoped that very soon similar statistics might be reported from all over the world and include older babies. In any part of the world, no single pediatric measure has such widespread potential for child health as the return to breastfeeding."

Derrick B. Jelliffe, M.D.

Professor of Pediatrics and of Public Health,
Head, Division of Population, Family and International Health,
University of California at Los Angeles
(quoted in Brewster,1981, p.xix).

Why Breastfeed Your Baby? There Are Many Reasons!

BREAST MILK IS PURE, FRESH, AND PERFECTLY SUITED TO YOUR BABY. Artificial formulas are made from processed cow's milk and added artificial ingredients. No formula can duplicate the exact balance of nutrients in mother's milk. The composition of breast milk changes to meet your growing baby's changing needs—something formula cannot do.

BREASTFEEDING IS A SOURCE OF IMPORTANT IMMUNITIES. A breastfeeding mother manufactures antibodies against the germs that threaten her baby and passes them on to the baby through her milk. Breast milk also contains living cells that act against bacteria in the infant's stomach.

BREASTFED BABIES HAVE FEWER ALLERGIES. When compared with formula feeding, total breastfeeding for six months results in a lower incidence of allergies. Breast milk protects against sensitization to common allergens.

BREASTFED BABIES HAVE FEWER RESPIRATORY ILLNESSES. They even have fewer colds. Bottle-fed babies are more likely to contract serious diseases like bronchitis and pneumonia.

BREAST MILK CONTRIBUTES TO OPTIMAL BRAIN GROWTH. Taurine, an amino acid present in breast milk in large amounts, is important to the development of the central nervous system. Cow's milk formulas contain only minimal amounts of taurine.

BREAST MILK PROTECTS AGAINST ILLNESS. Breastfed babies have less diarrhea, less vomiting, fewer ear infections, and fewer hospital admissions than bottle-fed infants.

BREASTFED BABIES HAVE FEWER SKIN DISORDERS. They are less likely to be troubled by eczema and diaper rash.

BREASTFEEDING ENCOURAGES BONDING. Breastfeeding reinforces baby's and mother's need to be together. Frequent breastfeedings mean lots of skin-to-skin contact and lots of time spent getting to know one another.

BREASTFEEDING MOTHERS TALK TO, TOUCH, AND INTERACT MORE WITH THEIR BABIES. Studies show that they also respond more quickly to their babies' cries and are more affectionate toward their babies.

BREASTFED BABIES USUALLY CRY LESS. The frequent contact with their mothers keeps them happy and content. Because breast milk is easily digestible, they are less likely to be bothered with gas and stomach upsets.

BREAST MILK HELPS PREVENT TOOTH DECAY. Research has shown that breastfed children are less susceptible to dental caries than their bottle-fed counterparts and are less likely to need orthodontic corrections.

BREASTFED BABIES DO NOT GET CONSTIPATED. Although they may go several days without a bowel movement, the baby who receives nothing but breast milk has soft stools. Formula-fed babies are sometimes troubled by painful bowel movements.

BREAST MILK NEEDS NO PREPARATION. It is always at the right temperature and needs no refrigeration or sterilization.

La Leche League International, Franklin Park, Illinois, 1981

Breastfeeding Your Baby: A Nutritional and Healthful Plus

Introduction

Time and time again, physicians, pediatricians, nurses, nutritionists and other health professionals, along with breastfeeding mothers, have stated that breastfeeding is best for infants. Breastmilk provides valuable immunities to an infant and is a viable food source that is perfectly and especially designed for infants. These facts are not new. Breastfeeding was taken for granted for centuries, diminished with the availability and onset of commercially produced milk formulas in bottles, but is now reemerging in the United States. Although breastfeeding has diminished on Guam and in the other islands of Micronesia for the same reasons, it should be encouraged to reemerge, also.

One of the most important reasons why breastfeeding is having a comeback after a generation or so of bottlefeeding is because breastfeeding has been found to be nutritionally superior to formula made from cows milk, soy protein or meat based formula; breastmilk cannot be duplicated. Human breastmilk, in addition to providing essential nutrients, supplies hormones and very important immunities, as well as other live biological properties directly to the growing infant. Since human breastmilk is perfectly suited to the infants' digestive system and has the right amounts of essential nutrients, it is not surprising that it is easily digested and assimilated by infants. The purpose of this paper is to describe how breastmilk is best for infants by explaining specific scientific information on the nutritional qualities of breastmilk, by way of comparison to cows milk formula, and explaining how breastmilk supplies immunities to the infant. The advantages and disadvantages of breastfeeding will be discussed, along with ways to encourage breastfeeding on Guam. A source for readings and additional information on local organizations that encourage breastfeeding will be provided.

Historical Background

As mammals, women possess skin glands referred to as mammary glands. The mammary glands secrete nutritious milk that can provide nourishment for young during their initial period of rapid postnatal growth (Vaughan, 1972, p.7). In the past, prior to the industrial revolution, in all parts of the world, breastfeeding was a taken for granted fact of life; that is how babies are fed. Today in most parts of the world, breastfeeding is still a taken for granted fact of life and hopefully, will remain this way. In the "western" world today, breastfeeding is a choice that most women find enjoyable for themselves and healthful for their babies.

For the motherless babe of the past, or for the woman who could not breastfeed, there was the substitute of another breastfeeding mother, or animal milk (usually goats or cows). Later on, with the industrial revolution and the necessity of women working in factories, bottles (of a sort) were developed (La Leche League International (LLLI), 1981,p. 324). Within the last 50 years, modern science and technology managed to develop formulas from animal milk that could be used to feed infants. In recent years, since many infants develop problems with these cows milk formulas, other formulas made from meat, soy or vegetable protein have been manufactured for infant feeding. The question is how the people of the "western" world and the United States managed to turn that which should have been the exception of infant feeding (bottles) into the norm for numerous generations..."by all logic, formula and the baby bottle should have remained an acknowledged second choice, to be used in emergency situations (LLLI, 1981, p. 324)".

Today in the United States and on Guam, women have a choice whether to breastfeed or bottlefeed their babies. Since our culture is only begining to support a return to breastfeeding, this paper may assist in providing information to women on Guam who are considering this choice. It will be helpful to explain recent scientific research that shows how breastmilk is the superior food source for infants.

Nutrition: Breastmilk versus Cows Milk Formula

The breastmilk of all mammals consists of water, protein, lactose, fats, vitamins, minerals, salts and hormones. Even so, the milk of different mammals differ for different purposes. For example,

> ...it is now known that over 100 interacting constituents are present in (human) breastmilk in proportions and chemical composition that are quite different from the equally complex composition of milks of other mammals. Infant formulas are only approximate imitations of the main known ingredients of human milk. Producing a formula "just like human milk" is literally impossible,
>
> (Jelliffe, quoted in Brewster, 1981,p.xviii).

The breastmilk of water mammals such as dolphins and whales contain a large amount of fats, yet this is appropiate for keeping their young warm in the cold sea and for the development of a thick layer of fat for the same purpose. The breastmilk of cows is very high in protein, and this is appropriate for the calf is on its feet soon after birth. In contrast, human breastmilk is very high in lactose (milk sugar) and this is appropriate since rapid brain development is the characteristic of humans, and lactose may contribute to brain and central nervous system development (LLLI, 1981, p. 287). Due to the differing proportions of the components of mammalian milk, there are tremendous possibilities for differences, especially in regard to the the proportions and amounts of vitamins, minerals, enzymes, phosphates, lipids (butterfat), peptones, nitrogeneous bases and gases, to name a few (Raphael, 1973, p. 73).

Although cows milk and human breastmilk weigh in at the same kcaloric value - an average of twenty kcalories to an ounce - the proportions of the various components are different (LLLI, 1981,p. 283). In the manufacturing of formula made from cows milk, the attempt is made to adjust the amounts of these components of cows milk to approximate human breastmilk. This attempt however, falls short since human breastmilk cannot be duplicated.

> Like the pieces of a jigsaw puzzle, human milk and the infants digestive system mesh. On the other hand, while the baby can assimilate enough cow's milk to keep it healthy, many extra 'puzzle' pieces, resulting from the different molecular structures (of human vs. cows milk) just don't fit and are left over, (Raphael, 1973,p. 72).

We can look at a Table of comparison of cows milk and human milk and their respective components and then note the differences; what this means in the manufacturing of formula and compare the nutritional qualities of both. The following Table illustrates these differences.

Comparison of Contents of Cow and Human Milk *

Composition	Human milk	Cows milk
Water, 100ml	87.1	87.3
Energy, kcal	75	69
Total Solids	12.9	12.7
Protein	1.1	3.3
Fat	4.5	3.7
Lactose(sugars)	6.8	4.8
Ash	0.21	0.72
Proteins, % of total		
Casein	40	82
Whey	60	18
Ash, major components		
Calcium, mg	340	1,250
Phosphorus, mg	140	960
Vitamins per liter		
Vitamin A, IU	1,898	1,025
Thiamin	160	440
Riboflavin	360	1,750
Niacin	1,470	940
Vitamin C, mg	43	11
(Reaction	Alkaline	Acid)

* From Gyorgy, Paul "Biochemical Aspects". The American Journal of Clinical Nutrition 24: August 1971, p. 971. Found in Raphael, 1973, p.73).

As will be pointed out, human breastmilk has been found to be nutritionally superior to formula made from cows milk. In addition to utilizing this Table to provide estimates of the components of cows milk and human breastmilk, information is provided by recent research of the

American Academy of Pediatrics - Committee on Nutrition, as reported as a Commentary In celebration of the Year of the Child, 1979.

Protein

As can be noted in the Table, the proportion of protein in cows milk is three times that of human milk. In the manufacturing of formula, this over abundance of protein must be reduced by the addition of water to the formula however, mothers who bottlefeed must also provide extra water for their babies to ease the strain on their kidneys to digest the cows milk protein. Cows milk and formula have a larger amount of casein protein that is harder for the baby to digest; this is why a bottlefed baby stays 'full' longer than a breastfed baby. Mothers milk contains the chief protein lactalbumin which is easy for the baby to digest (Whitney and Hamiliton, 1981,p. 543). Mothers milk also has more whey protein than cows milk and formula, and whey protein has a higher nutritive value than casein protein (LLLI, 1981, p. 283). The breastfed baby does not need extra water, yet needs shorter more frequent feeding (as on a demand schedule).

Proteins break down into amino acids, 'the building blocks of body tissue'. These amino acids

> ...must be present in certain amounts and proportions if they are to work well individually and collectively. When there is an excess of some amino acids and a depletion of others, the baby must work to get rid of the excess and suffers from a depletion of which he can do nothing (LLLI, 1981, p. 285).

Human breastmilk contains an assortment of nucleotides that provide nonprotein nitrogen that may play a role in anabolism and growth of the infant (American Academy of Pediatrics, 1979, p. 3). In addition, human milk provides more cystine than cows milk or formula (as opposed to methionine) of the sulfur amino acids, thus

> ...the amino acid composition of human milk is particularly suited to the metabolic peculiarities of the newborn infant, especially those of the preterm infant, whose liver is inefficient in converting methionine to cystine and in metabolizing tyrosine. There are notable differences between the plasma amino acid patterns of preterm infants fed human milk and those fed cows milk-based formula...(American Academy of Pediatrics, 1979, p. 2).

Proteins are very important for a growing baby, since the first year is a critical growth period for the brain cells and the central nervous system. Although cows milk formula is being manufactured with a casein/whey protein ratio that is similar to human milk, there is still too much we do not know about the importance of other amino acids and properties that are found in human milk and are either not found in cows milk or are present in different amounts.

There are, however, proteins in human milk that cannot be found in cows milk formula; there are proteins in human breastmilk that act as immunoglobulins and proteins that destroy harmful bacteria. These are very important for the health of a very young baby and will be dealt with in a later section.

Fats

Fats in foods break down into fatty acids to be utilized by the body with other chemical properties. Mothers milk has lipase, a fat digesting enzyme which aids in the digestion of lipids and fats in the breastmilk. In addition,

> unlike the predetermined fat content in a bottle of formula, the amount of fat in mothers milk varies from feeding to feeding and from week to week, but over a period of time it meets the needs of the infant (LLLI, 1981, p.285).

It has been estimated that these linoleic acid or polyunsaturated fat acid levels in breastmilk vary from 8% to 20% of the fat depending on the fats that the mother eats. The average level is considered to be about 14% (American Academy of Pediatrics, 1979, p.2). The polyunsaturated fatty acid level in formulas tends to be higher. The butterfat of cows milk is replaced with vegetable oils and vitamin E to aid in fat absorbtion, and most of the cholesterol is removed. Breastmilk, however, contains cholesterol. According to one view, "although adults may have problems with high levels of a particular type, babies need cholesterol for the process of myelination (the covering of nerves to permit muscular coordination), (LLLI, 1981,p. 286)". According to another view, "exogeneous cholesterol for the formation of nerve tissue or for synthesis of bile salts may be useful to the infant...and the ingestion of cholesterol during infancy may induce

enzymes that can subsequently better metabolize cholesterol and thereby result in lower serum cholesterol levels early in life (American Academy of Pediatrics, 1979, p.2)".

Lactose (milk sugar)

Lactose is referred to as milk sugar. Mother's milk has a higher amount of lactose than cows milk, thus cows milk formulas are manufactured with other sugars(usually sucrose) to make up for the lost kcalories. This large amount of lactose goes hand in hand with a decreased supply of sodium and minerals in breastmilk (Whitney and Hamiliton, 1981, p. 543). Lactose or milk sugar breaks down and releases energy in the form of glucose at a slower and steadier pace than with sucrose usually used in formulas. This avoids the ups and downs of blood sugar levels (LLLI, 1981,p.286). Lactose also "enhances the absorbtion of certain minerals - especially calcium(for bone and tooth development), (LLLI, 1981,p. 287)". In addition,

> ...milk sugar promotes the growth of a select group of bacteria, mainly lactobacillus bifidus, which thwart the development of the undesireable bacteria that are responsible for severe diarrhea in the young. The bifidus factor aids in this process...mother milk has much more bifidus factor than cows milk or formula (LLLI, 1981, p. 287).

Vitamins and Minerals

Vitamins and minerals are important for nutrition, growth and health. Some vitamins and minerals must be available daily, such as Vitamin C, because they are continuously used or passed out of the body. Breastmilk contains all of the essential vitamins and minerals in the right amounts for babies (untill they reach the age of @ 6 months and need to begin solid foods for their increased needs). For example, bottle fed babies more prone to iron deficiency anemia than breastfed babies, despite the addition of iron to formula. This is the result of the fact that breastmilk although low in iron like all mammalian milk, is better digested, thus the iron is better absorbed by the infant, up to 50%, (American Academy of Pediatrics,1979,p.

> It has been postulated that the better availability of iron in human milk as compared to cows milk , may be the result of the lower content of protein and phosphorus and the higher levels of lactose and Vitamin C (American Academy of Pediatrics, 1979, p. 3).

Breastmilk provides other benefits in conjunction with iron. There are two "bacteriostatic" properties or proteins in human milk that lose their "bacteriostatic properties when saturated with iron (American Academy of Pediatrics, 1979, p. 3)"; these are lactoferrin and transferrin. There is much more lactoferrin in human milk than in cows milk and "the small amount in milk used to make formulas is denatured, and its bacteriostatic properties have been lost in the processing the formula (American Academy of Pediatrics, 1979, p. 3)". These two specialized proteins in human milk,

> lactoferrin and transferrin pick up and bind iron from the infants intestinal tract. In scooping up this iron, they stop harmful bacteria in their tracks. The bacteria, including the dangerous E.coli, which may cause diarrhea, are deprived of the iron they need for growth, (LLLI, 1981, p.289).

Calcium, phosphate and Vitamin D, although available in breastmilk in lesser amounts than in cows milk, are in the right amounts for babies. In breastfed infants, fat is well absorbed (thus preventing calcium loss) and the calcium, phosphate and Vitamin D are in good balance (Whitney and Hamiliton, 1981, p. 543).

The amount of zinc in breastmilk , although in lesser amounts than in cows milk, is better absorbed by babies.

Taurine, an amino acid found in good supply in mothers milk and almost non existent in cows milk, join with bile acids that are aids to digestion. This is a recently discovered fact and the infant cannot manufacture taurine on its own yet, so is dependent on his food supply for this amino acid, (LLLI, 1981, p.290).

If a mother who is breastfeeding has an adequate diet, Vitamin C is in plentiful supply for her baby. Mothers milk also contains fluoride, and the baby will not need supplements untill the baby is starting on solids, at @ 6 months of age.

Mothers milk contains Riboflavin and Vitamin B_6. In addition, mothers milk has a certain protein that can bind Vitamin B_{12} similar to the action of the previously mentioned lactoferrin by depriving bacteria the sources to grow in the intestinal tract (LLLI, 1981, p. 291).

This recent research provides insight on the nutritional qualities of breastmilk and more research is being conducted. However, there is still much we do not know.

> Any attempt to make an accurate comparison of mother's milk and cow's milk is premature. The reason is quite simple. The dairy industry is spending millions of dollars to analyze everything about the cow - from the amino acid content and fat molecules in her milk to the kind of music that produces the most contented cows with the highest milk yield. Nothing comparable to this amount of research is being done on human mothers and their milk, (Raphael, 1973,p. 78).

In recent years, with the increase of breastfeeding in the United States and other "western" countries, more money has become available for research on mothers milk. Perhaps we will even find out what music (feelings, food, or whatever) will produce the most contented mothers with the highest milk yield. What we do know now is that mothers who breastfeed should eat an adequate diet similar to the same good foods that they ate while pregnant and increase their fluid intake. Nursing mothers should keep taking their prenatal vitamins and iron also. The most familar advice to nursing mothers is to drink plenty of milk (hopefully about 5 cups or about 1 quart daily) since "milk makes milk". This is good advice since cows milk, or other dairy products, soy milk or greens will provide the needed nutrients that a nursing mother needs (Whitney and Hamiliton, 1981, p.546).

In addition to eating the right foods and drinking plenty of fluids and milk, Chammorros recommend that nursing mothers eat plenty of chicken soup. This is very good advice since chicken soup is a liquid and provides a good protein source.

It is also very important for a nursing mother to establish her "let-down" reflex; the "let-down" reflex is the tingling sensation that some women feel that allows the milk to be produced and flow out of the breast. According to Dana Raphael, an anthropologist who has studied breastfeeding practices in many cultures around the world, in order to establish the "let-down" reflex and the rhythm of sucking and letting

the milk flow in the first, crucial early weeks, we must "mother the mother":

> the common denominator for success in breastfeeding is the assurance of some degree of help (and support) from some specific person for a definite period of time after childbirth, (Raphael, 1973, p.41).

Breastmilk is perfectly and especially suited to an infants' system; it is easily digested and assimilated and contains the right nutrients in the right amounts for the infant.

> Cows milk is not always well tolerated by humans. Many babies have serious allergic reactions, while a great many more only tolerate it, having vague problems such as stomach discomfort, constipation and rashes. The more serious reactions include gastrointestinal disturbances, respiratory illness, stomach bleeding, growth retardation or central nervous system damage. (Brewster, 1981, p.72).

Therefore, in addition to providing the best food source for infants breastmilk contains important immunoglobulins and other live biological properties to protect infants against illness.

Health Benefits of Breastmilk: Immunological Properties

After a baby is born, before the breastmilk comes in on the second or third day, the breasts secrete a creamy fluid that is very high in protein and low in carbohydrates and fats. This fluid is very high in immunities, it is called colostrum. The immunities are in their highest supply immediately after birth; this is why it is a good reason to put the baby to the breast as soon as possible after birth. The colostrum helps the infant by providing

> antibodies and bacteria ingesting cells that are found in higher concentration than in true milk. They give the newborn immunity to various diseases such as measles, bronchitis, and pneumonia, as well as other respiratory infections, (Raphael, 1973,p.80).

When a woman is pregnant, she provides immunities to the infant through

the placenta. These immunities have been produced by her own immune system throughout her life. These antibodies are really specialized proteins that are provided to the infant as a temporary source of immunity until the baby develops his/her own immune system. Colostrum and breastmilk assist in this process by helping the infant during the early days and months that follow since by providing antibodies

> nursing the baby definitely prolongs the period of natural immunity to many viral diseases, including mumps, measles, polio, herpes, hepatitis, some kinds of pneumonia, and [illegible] other respiratory infections...nursing protects against a number of bacterial diseases, (LLLI, 1981,p. 293).

The protective factors of human milk are many and varied. These factors act at a number of different sites and at different levels in the infants body. These protective factors include "physicochemical properties, iron-binding proteins, immunoglobulins, interferon, polymorphonuclear leukocytes, macrophages, lymphocytes and others, (Chandra, 1978,p.267)". We have already mentioned the action of the iron-binding proteins and the lactobacillus bifidus factor found in human milk

At birth, babies have the antibody Immunoglobulin G (IgG), however, colostrum and milk provide both Immunoglobulin A (IgA) and Immunoglobulin M (IgM) as well as complement component C3, and complement C4.

> In colostrum and breastmilk, secretory IgA is the dominant immunoglobulin. It is resistant to proteolysis and confers passive mucosal protection of the gastrointsetinal tract against the penetration of intestinal organisms and antigens (American Academy of Pediatrics, 1979, p.4).

In simpler language, this immunoglobulin and the others work at the sites of the mucus membranes (throat, lungs, intestinal tract) to take care of problematic organisms. The IgA works with the bacteriolytic enyzme lysozyme that has been found to be in plentiful quantity in human milk, as compared to cows milk.

> Colostrum and milk are very rich in sIgA, with the ratio of milk antibodies/serum antibodies ranging from 2.1 to 28.5, with an average of 10.5. Early colostrum contains 20 to 40 mg per milliliter of sIgA. The total amount of IgA produced by the mammary gland appears to be fairly constant in the first two to three months of lactation...Besides the predominant IgA fraction, IgG as well as IgM are present in human milk...Some amount of IgM may be produced locally in the mammary gland, (Chandra, 1978,p.267)

In addition to immunoglobulins, the colostrum provides living white cells (leukocytes); white cells are the bodys' defense against infections. One type of leukocyte, the macrophages, comprise about 90% of these white cells; macrophages synthesize lysozyme and lactoferrin, and work to destroy problematic organisms and bacteria.

The supply of these good cells is at its highest point immediately after birth, yet continued nursing provides ongoing protection against many viral and bacterial organisms (LLLI, 1981, p.297). What is really fascinating is that the "breast can deliver a particular antibody in response to a new threat to the baby by...making antibodies on demand to germs that challenge the fully breastfed baby, (LLLI, 1981, p. 297)". It is a possibility that human breastmilk contains "an absorbable factor that promotes synthesis of immunoglobulins in the infant, (Chandra, 1978,p.269)", thus assisting the infant in his/her immune system development.

These factors that contribute to immunologic protection cannot be provided by heat treated formula, (American Academy of Pediatrics, 1979, p.4), and this may be why "....gastrointestinal and respiratory tract infections are commoner in the bottlefed infants even in industrialized communities with good sanitation, (Chandra, 1979, p.266)". According to one author, the protection from gastrointestinal infection will only be afforded to exclusively breastfed babies; however, another author suggests from data gathered on Truk in the Federated States of Micronesia, that the incidence of serious illness "is lower in those infants offered the breast as well as the bottle than in those offered the bottle alone, (Marshall&Marshall, 1980,p.38)". This study done on Truk also found that the "occurence of illness serious enough to warrant hospitalization was found to be associated with exclusive bottlefeeding in the first year of life, (Marshall&Marshall, 1980,p.33)".

In addition to providing immunities, white cells and other live biological properties to the infant, breastmilk "also spares the gastrointestinal tract from exposure to foreign food antigens at a time when macromolecules may be readily absorbed and may cause a local reaction. Evidence suggests that allergic manifestations later in childhood (such as eczema, rhinitis, and asthma) are more prevalent in bottlefed than breastfed infants, presumably because of the early exposure to cow's milk and other food antigens, (American Academy of Pediatrics, 1979,p.5)".

Breastfeeding: Advantages and Disadvantages

Advantages to the Nursing Mother

> Breastfeeding is advantageous to the mother almost before the birth process is completed. Many physicians suggest putting the infant to the breast right after the baby is delivered. When the infant sucks, it causes contractions of the mothers uterus, which quickens the expulsion of the placenta. These muscle spasms serve also to close the uterus after the delivery, lessening the chance of hemorrhage,
> (Raphael,1973, p.83)

Breastfeeding also helps to put the nursing mother back into shape by helping her lose those extra pounds gained during pregnancy, especially during the early months of breastfeeding. Breastfeeding mothers may also be less likely to get breast cancer later in life (LLLI, 1981, p.319).

Other advantages to the mother include the fact that breastfeeding is less expensive than bottlefeeding; even though the mother needs extra nutrients, formula is still more expensive, (Whitney and Hamiliton, 1981, p. 547).

Breastfeeding is more convenient for the nursing mother because there are no bottles, formula etc. to prepare. This is especially convenient at night feedings since there are no bottles to warm up. There may be more to this than meets the eye in regard to areas around the world that have little or no refrigeration facilities. Bottles that are not prepared for each feeding at a time may develop bacteria growth with adverse affects for the baby. In tropical areas, breastfeeding is an advantage because the milk is raw and fresh and of course needs no refrigeration. On Guam, this is a definite advantage during power outages, water outages, and during typhoons and storms.

Another advantage to the mother is the fact that "breastfeeding may promote maternal-infant bonding, particularly when this (early, prolonged, physical) contact is desired by the mother." Another advantage that every nursing mother knows about is the fact that breastfeeding is a pleasureable experience. A perfect example of the pleasure demonstrated by nursing is the example of another mammal: the cat. After her kittens are born, and they begin to nurse, the mother cat begins to purr and purr. Nursing a baby is a similar experience that some physicians and psychologists refer to as a reciprocal relationship in that the infant needs food, and the mother needs to relieve the engorgement or fullness of her breasts and nursing does just this for both.

Advantages to the Baby

Breastfeeding provides more to a baby than just nutrients and immunities. Breastfed babies have less digestive problems, less colic, and less incidence of minor skin disorders such as rashes and eczema than bottlefed babies.

Other advantages to the baby include less or no chance of acquiring "nursing bottle mouth" which occurs in bottlefed babies in the form of dental caries and tooth decay. In addition, breastfeeding also enhances the development of the facial muscles because it requires stronger sucking on the part of the infant as compared to the easy sucking required with a bottle, (Raphael, 1973,p.81; LLLI, 1981,p.301).

Breastfeeding on a demand schedule is an advantage for the baby since the baby gets an immediate response to his/her hunger cries and prolonged physical contact with the mother.

Disadvantages

The only disadvantage to breastfeeding is the fact that a mother must be with the baby at most times in a demand schedule. Bottlefeeding is convenient for mothers who work. As a matter of fact, this is one of the most important reasons why women choose to bottle feed exclusively or in a combination of breast and bottlefeeding; this allows a mother to be away from her baby for work or other activities. In a study of historical changes in infant feeding practices in Truk, FSM, the researchers found that:

> Mothers of children in all age cohorts indicated that they occasionally needed to be away from their infants for longer than an hour or two and that leaving the baby and the bottle in the care of a female relative allowed them that freedom. A Trukese baby is always offered a nipple (of some sort) whenever it shows signs of distress or discomfort, so a mother who uses no bottles or pacifiers must be in nearly continuous contact with her infant...We found a clearcut statistical association between mode of infant feeding and the employment history and educational acheivement of a mother,(Marshall&Marshall, 1979,p.248).

In our society, with the increase of women working outside the home, it is inconvenient for women to breastfeed on a demand schedule. However, women can breastfeed and work with the aid of a few bottles and a breast pump, though it is recommended that plastic bottles be used instead

of glass bottles since some of the immunological properties will stick to the glass. In addition, in the storage of breastmilk, some of the immunities will be lost during refrigeration and warming (Chandra, 1978, p.268). However, if the mother uses bottles only during the hours she works and still feeds the baby during the morning and evening and at night, (or even takes a lunch break at home) the baby will still get some of these live properties and immunoglobulins.

Other Considerations

Nursing mothers should avoid drugs of all kinds since alcohol, caffeine, nicotine, marihuana, hormones and other prescription drugs are secreted in the breastmilk, (Whitney& Hamiliton, 1981, p.545).

There are also concerns about the affects of noxious environmental substances found in breastmilk (such as DDT and other pesticides). It has been suggested that local conditions should be analyzed to determine the amounts of these environmental contaminants. At this point in time, we do not know the effects of these substances in breastmilk (American Academy of Pediatrics, 1979,p.6). While the restriction of the use of DDT resulted in a decrease in the concentrations found in breastmilk, the banning of PCB's is a recent trend and no change has been found yet (American Academy of Pediatrics, 1979, p.6). Since these compounds are stored in body fat, a nursing mother should not go on a diet.

When infants are fully breastfed, a significant delay in ovulation may occur. Although this is not a reliable means of contraception for the individual mother, it is very significant on a global level (American Academy of Pediatrics, 1979,p.5). This is a fact not a myth, as some people believe. The introduction of solid or supplementary foods at an early age will increase the possibility of ovulation, as will weaning due to the reduction of breastfeeding. It has been found that the newer oral contraceptives do not interfere with lactation, and may even increase it (American Academy of Pediatrics , 1979,p. 5).

Information and Assistance: Breastfeeding on Guam

Department of Public Health - Maternal and Child Health and Family Planning

A number of nurses and other health professionals at Public Health, GMH, and the SDA Clinic have volunteered to provide assistance to women either through their jobs or on their own time. Some of these women are volunteering their time at the hospital to help and support women who are breastfeeding.

The following information is supplied at the hospital and circulated through Public Health:

> ARE YOU WONDERING IF YOU SHOULD BREASTFEED YOUR BABY? OR ARE YOU ALREADY BREASTFEEDING AND RUNNING INTO SOME PROBLEMS OR HAVE QUESTIONS? GIVE US A CALL. ALL OF US ARE EITHER BREASFEEDING NOW OR HAVE DONE SO IN THE PAST. WE CAN GIVE YOU PRACTICAL TIPS WHICH WILL HELP TO MAKE YOUR BREASTFEEDING EXPERIENCE A SATISFYING ONE FOR BOTH YOU AND YOUR BABY. IF YOU CAN'T GET THROUGH ON ONE NUMBER, PLEASE TRY ANOTHER ON THE LIST. WE REALLY WANT TO HELP.
>
> | | |
> |---|---|
> | JUANITA | 632-7126 - Home
734-4192 - Work(Public Health) |
> | LOU | 789-1903 - Home
646-5801 -Ext.144 - Work(GMH) |
> | CINDY | 789-1560 - Home
646-5801 -Ext.157 - Work(GMH) |
> | SHARON | 646-8881-8885 SDA CLINIC |
> | DOTTIE | 362-6225- LA LECHE LEAGUE |
> | FABIOLA | 789-1017 |
> | KAREN | 346-2139 |
> | ANN | 734-4192 - Work(Public health)
646-1640 - Home |

Local volunteers aid new mothers

By ASTRID HERTSLET
Daily News Staff

Although more women are breastfeeding their babies now than five years ago, the number could be increased by giving new mothers more information on the art of old-fashioned motherhood and the advantages of breast milk.

At least that is what three employees from the Department of Public Health and Social Services and one volunteer believe, and that is why they have formed a group taking turns in visiting nursing mothers at the hospital.

Ann Untalan, public health maternal child health administrator and former nursing mother, said there is no substitute for human milk. It contains all necessary vitamins and nutrients for the baby's first six months and is more efficiently and rapidly digested than cow's milk.

"Some women have not enough information on breastfeeding, and we want to help them to at least try it," Untalan said.

Additional volunteers are needed to support nursing mothers at the hospital. Anyone interested in helping out should call Untalan at 734-4192 or Becky Klemm at 789-2225.

Klemm, a mother of four and experienced in breastfeeding, has been seeing nursing mothers at the hospital weekly for the past month, spending about two hours listening to their problems and giving advice.

Klemm said it is important to make the nursing experience at the hospital a pleasant one so that mothers continue to nurse when returning home.

The reasons that mothers fail in breastfeeding vary, including ignorance and old wives' tales, such as small breasts cannot produce milk, Klemm said.

Some women want to do it, but are influenced by relatives and friends who think it is old-fashioned and easier to switch to formula.

Klemm said the most common problems new mothers encounter are engorgement (uncomfortable fullness of the breast) and sore nipples when they breastfeed.

She not only tells them what to do about the problems, but also hands them a booklet on breastfeeding that easily explains how to prevent possible complications.

La Leche League International - Guam

The La Leche League is a non-profit group that was formed in the United States in the late 1950's to assist women who wanted to breastfeed, or who were breastfeeding and having problems. The name "La Leche" means "the milk" , thus the La Leche League is the milk league.

> LA LECHE (lay-chay) is derived from a 15the century Spanish shrine in St. Augustine, Florida, dedicated to "Nuestra Senora de la Leche y Buen Parto," which translates freely "Our Lady of Happy Delivery and Plentiful Milk." ...Symbolically, it means life, love, and the begining of happiness to a baby,
> (La Leche League International, 1981).

On Guam, Dottie Kelly of AAFB is a La Leche League Leader and conducts meetings with the following topics:

1. Advantages of Breastfeeding to Mother and Baby.
2. Art of Breastfeeding and Overcoming Difficulties.
3. Baby Arrives: The Family and the Breasfed Baby.
4. Nutrition and Weaning.

These meetings are usually held on the first Tuesday of the month. However, since Dottie Kelly is leaving the island in February the La Leche League will not have another leader to hold these group meetings. There are however women at the military bases who plan to hold informal meetings and provide information to breastfeeding women on the military bases. This is beneficial yet will not help women who are not part of the military community.

According to my observations over the last two or three years, most of the local women (Chammorro, stateside and Filipino) did not attend these La Leche League group meetings anyway since it involves an adherance to the groups' philosophy. According to Juanita Benavente, the Chammorro women view the La Leche League philosophy as too "militant" and "fanatical" in its approach. However, I realize that the La Leche League can provide valuable and helpful information to breastfeeding women that cannot be provided elsewhere (such as what to do when you have a breast infection or plugged milk duct). With this in mind there are two women who may become La Leche League Information Centers to provide information to the local women. These services will be available in the near future.

Breastfeeding Around The World

In most developing countries around the world, breastfeeding is still the normal mode of infant feeding. In the developed countries, such as the U.S., the recent trend is toward a resurgence of breastfeeding practices. As mentioned earlier, over 50% of newborn babies in the United States are breastfed. In other countries, such as those studied in the World Fertility Survey (see Figures 9 and 10, p.21), the percentage of babies breastfed varies from about 98% in Nepal and Bangladesh to 74% to Malaysia, (Mederios-Kent, 1981,p.29). Around the world,

> The practice of breastfeeding is governed by the availability of convenient substitutes and cultural traditions regarding infant feeding. The process of economic development can affect both these factors because it can mean easier access to breastmilk substitutes and it tends to disrupt traditional norms...both the prevalence and duration of breastfeeding declines as the level of economic development increases, (Mederios-Kent, 1981,p.29).

This trend may be detrimental with regard to the subsequent increase in the birth rate and possible higher infant mortality rates. In the Pacific, some of Guam's neighbors are trying to combat the trend toward bottlefeeding as development and modernization occurs.

> Some countries such as Western Samoa and Kirbati are encouraging longer breastfeeding with the aims of improving infant health and reducing fertility, and Papua New Guinea has strengthened this approach by legally restricting the availability of feeding bottles and teats, (McCarthy, 1982,p.9).

As people realize the importance of the nutritional and healthful aspects of breastfeeding,the practice will be encouraged especially in developing countries where breastfeeding is a contributing factor in fertility rates.

The reemergence and return to breastfeeding is reflected in the far removed lifestyle of royalty; Princess Diana of Great Britain is breastfeeding her son, William with the support of her husband, Prince Charles. That might set a trend in and of itself.

Figure 9. Percent of Women Breast-feeding the Penultimate Child by Urban/ Rural Residence: WFS Countries, Asia

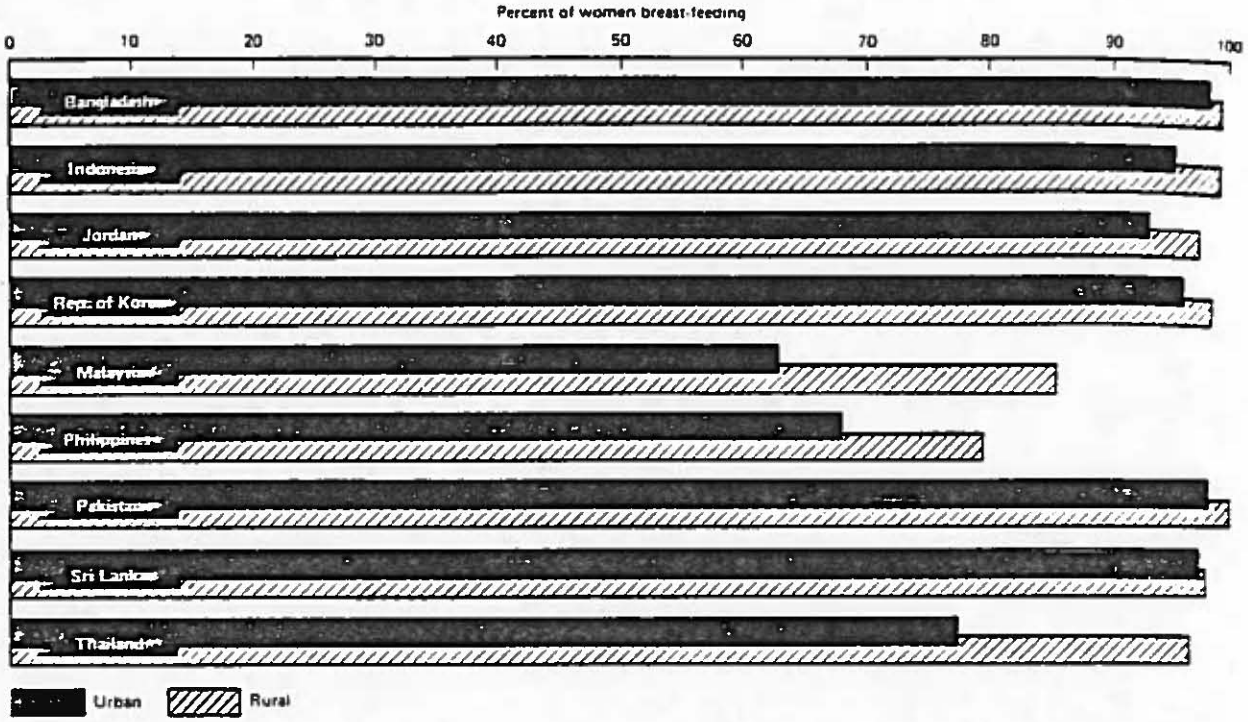
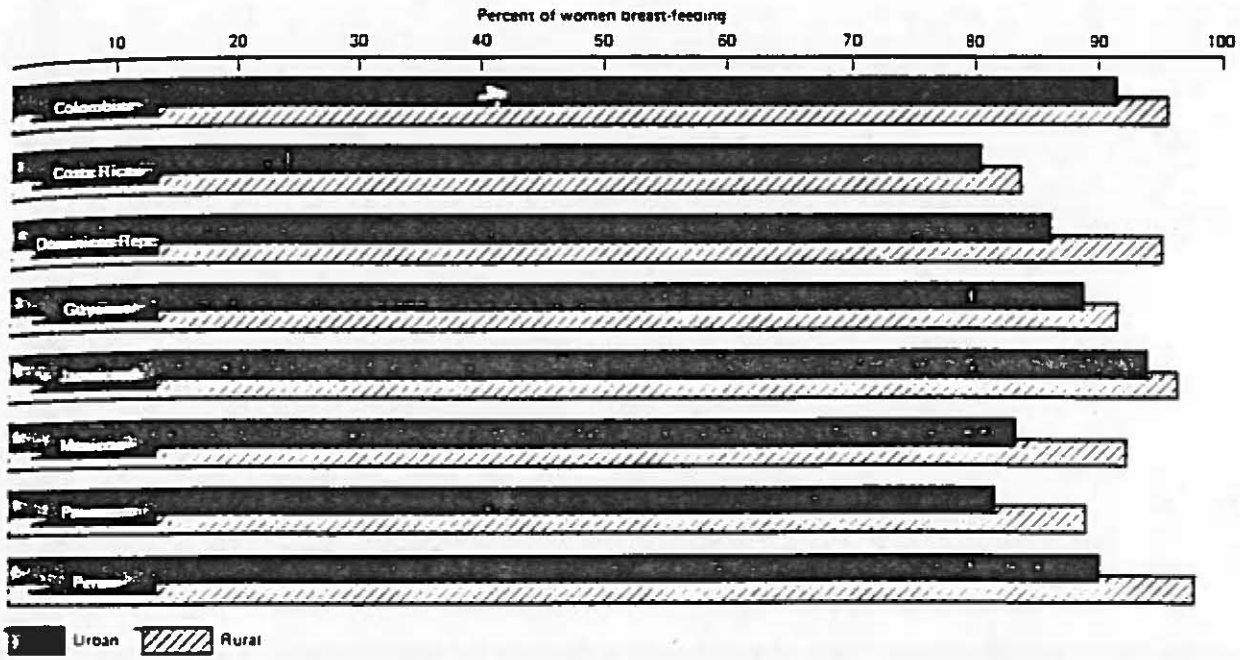


Figure 10. Percent of Women Breast-feeding the Penultimate Child by Urban/ Rural Residence: WFS Countries, Latin America and the Caribbean



From Nederios-Kent, 1981,pp. 28-29.

References

1. American Academy of Pediatrics and the Canadian Pediatric Society, Committee on Nutrition. "Breastfeeding: A Commentary in Celebration of the International Year of the Child,1979. Pediatrics, Vol. 62, No. 4, October 1978.

2. Brewster, Dorothy P. You Can Breastfeed Your Baby: Even in Special Situations. Emmaus, Pa., Rodale Press, 1979.

3. Chandra, R.K., M.D., F.R.C.P.(C.) "Immunological Aspects of Human Milk" in Nutrition Reviews, Vol. 36, No.9, September, 1978.

4. La Leche League International. The Womanly Art of Breastfeeding. La Leche League International, Franklin Park, Ill., 1981.

5. Marshall, Leslie B. and Mac Marshall. "Breasts, Bottles and Babies: Historical Changes In Infant Feeding Practices In A Micronesian Village" in Ecology of Food and Nutrition, Vol. 8, 1979, pp. 241-249.

6. Marshall, Leslie and Mac Marshall. "Infant Feeding and Infant Illness In A Micronesian Village" in Social Science Medicine, Vol. 14B, 1980, pp. 33-38.

7. McCarthy, Wendy. "Problems For Paradise Islands" in People - Asia and the Pacific, Vol. 9, No. 3, International Planned Parenthood Federation, London, England, 1982.

8. Meara, Hannah, Ph.D. "La Leche League In the United States: A Key To Successful Breastfeeding In A Non-Supportive Culture" in Journal of Nurse-Midwifery, Vol. XXI, No.1, Spring, 1976.

9. Mederios-Kent, Mary. Breastfeeding In The Developing World: Current Patterns and Implications For Future Trends. Washington, D.C., Population Reference Bureau, June 1981.

10. Raphael, Dana. The Tender Gift: Breastfeeding. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1973.

11. Vaughan, Terry A. Mammalogy. W.B. Saunders Co., Philadelphia, Pa., 1972.

12. Whitney, Eleanor N. and Hamiliton, Eva May N. Understanding Nutrition. West Publishing Co., St. Paul, Mn., 1981.

Breastfeeding your Baby

AnnMarie G. Pobutsky

1983 University of
Guam Cooperative
Extension Service

BREASTFEEDING

This booklet is designed to give you information on the advantages of breastfeeding for you and your baby. In the United States and on Guam, many women have found out that breastfeeding is the healthier way to feed babies. This is why many women have decided to breastfeed rather than bottle feed their babies, especially in the earlier months. Breastfeeding is the best way to feed babies because breastmilk is made for the baby by the mother. It meets all the baby's nutritional needs until the baby is about 6 months old. Breastmilk cannot be duplicated. Most important, breastmilk provides immunities for the baby from certain illnesses, especially in the early months before immunizations are given. Formula fed infants are more likely to contract serious illnesses.

NUTRITIONAL BENEFITS OF BREASTMILK

Since breastmilk is especially made for a baby by the mother, it is very easy to digest. Breastmilk has all the nutrients, vitamins, and minerals that a baby needs for the first 6 months of life. After 6 months, solid foods are introduced to supplement the breastmilk.

Breastmilk of all mammals is made of water, protein, milk, sugar (lactose), fats, vitamins, minerals, salts and hormones and immunities. But the breastmilk of different mammals differs for different purposes. For example, the breastmilk of dolphins and

whales has more fat than the other mammals so that they can give their young fat to help them keep warm in the cold sea. The breast milk of cows and horses has more protein than the other mammals to help the calves and colts grow fast because they need to stand up and run around soon after birth.

When cows milk is used as a base for formula, an attempt is made to make the formula as close to mothers' milk as possible. The only problem with this is that human breastmilk which has nutrients and hormones and immunities vital to the health of a baby, cannot be duplicated. Formula (from cows milk, or soy protein or meat protein), has different forms of the nutrients and different amounts of the vitamins and minerals. We can actually compare the nutritive quality of breastmilk and cows milk formula to note these differences and what they mean.

Protein — Cows milk and formula are very high in a protein that is very hard for the baby to digest. Other formulas are also difficult for the baby to digest. Mothers' breastmilk contains protein that is easier for the baby to digest because this protein is made for babies. Since the cows milk protein is harder for the baby to digest, (and may even cause an allergy), formula fed babies stay full longer than breast fed babies. Formula fed babies need extra water to help in the digestion of the cows milk protein. Breastfed babies do not need extra water, but they need shorter, more frequent feedings (such as a demand schedule).

Fats — The amount of fat in mothers' milk varies from feeding to feeding depending on the amount of fat the mother eats herself. Also, during a feeding the amount of fat increases the longer the baby nurses. The fat content in formula is always the same.

Milk Sugar — Mothers' milk has more lactose than cows milk so other sugars are used in the manufacture of formula. The milk sugar (lactose) in breastmilk helps good bacteria grow to prevent harmful bacteria from developing. This factor aides in the process that prevents severe diarrhea. Lactose also helps the absorbtion of certain minerals such as calcium.

Vitamins and Minerals — Vitamins and minerals are important for nutrition, growth and health. Mothers' milk has all the vitamins and minerals that a baby needs until about 6 months of age. Most of the vitamins and minerals in breastmilk are found in lesser amounts than in cows milk, but are in the right amounts for babies. For example, phosphate, vitamin D, zinc, vitamin C, calcium, riboflavin, vitamin B_6 and B_{12} are found in breast milk in all the right amounts for babies. Most importantly, the amount of iron in breastmilk is small, but it is better absorbed by the baby (up to 50% absorbed). The availability of vitamin C in breastmilk helps the absorbtion of iron. As a matter of fact, formula fed babies are more prone to iron deficiency anemia (lack of iron). Also, there are two special proteins in breastmilk that pick up iron from the baby's intestinal tract, and this process helps prevent diarrhea.

Breastmilk has all the nutrients that a baby needs until the baby is ready to start solid foods. In order for a baby to get all these nutrients, the mother who breastfeeds needs to eat a good diet similar to the diet she had while pregnant. Breastfeeding mothers need to drink extra fluids and keep taking their prenatal vitamins and iron. Figure 1 shows what breastfeeding mothers should be eating. The most familiar advice to nursing mothers is to drink milk because "milk makes milk". If a woman does not like milk, dark green leafy vegetables like spinach can be eaten, or soy milk, cheese or other dairy products can be used.

Figure 1

ADJUSTMENT OF ONE DAY'S BASIC DIET FOR PREGNANCY AND BREASTFEEDING*

FOOD	BASIC DIET	PREGNANCY	BREASTFEEDING
Milk, whole	2 cups	4 or more cups	4 or more cups
Egg	1	1	1
Meat, poultry fish	4 oz. lean, cooked (no fat)	8 oz. lean, cooked (no fat)	6 oz. lean, cooked (no fat
Enriched rice, bread, and cereals; root vegetables occasionally	4 servings	5-6 servings	6 servings
Vegetable, dark green, leafy, or deep yellow	1/2 cup	1/2 cup cooked 3/4 cup raw	1/2 cup
Vegetable, other	2½ cups	2½ cups	2½ cups
Fruit, citrus	4 fluid ozs. or 1 serving	8 fluid ozs. or 2 servings	8 fluid ozs. or 2 servings
Fruit, other	2 servings	2 servings	2 servings
Butter/Margarine; cooking and salad oils	3 teaspoons	4½ teaspoons	6 teaspoons

NOTE: A serving is 1/2 to 3/4 cup or a usual portion such as 1 slice bread, 1 small banana, 1 small orange, 1 small potato.

This information was taken from "Nutritional Care For the Mother To be", (1980, GovGuam, Department of Public Health and Social Services).

HEALTH BENEFITS OF BREASTMILK

When a woman is pregnant, she gives the baby growing inside her immunities through her blood. The immunities that a mother gives her baby have been produced by her own body throughout her life. These immunities give the baby temporary immunity to certain illnesses until the baby develops his own immune system (starting with the immunizations at 4 months of age).

After a baby is born, before the breastmilk comes, the breast secretes a creamy fluid that is very high in immunities. It is called colostrum. The colostrum is very high in protein and low in carbohydrates and fats. The immunities in the colostrum and breastmilk are in the highest supply right after birth. This is why it is good to put the baby to the breast as soon as possible right after birth (with "rooming in" at the hospital too!). The colostrum helps the baby by providing immunities to illnesses and diseases like:

bronchitis
pneumonia
other respiratory problems

Both the colostrum and the later breastmilk also help the baby by providing temporary immunity to many viral diseases like:

mumps
measles
polio
herpes
hepatitis

Breastmilk also provides white cells that destroy bacteria and other organisms that might cause problems for the baby. Like the

immunities, the white cells are in good supply in breastmilk, yet are in their highest supply right after birth.

THE IMMUNITIES AND WHITE CELLS THAT GIVE PROTECTION TO THE BABY CANNOT BE PROVIDED BY ANY FORMULA. This is why infections of the lungs and respiratory tract, and the gastrointestinal tract are more common in bottle fed than breast fed babies. Plus, bottle fed babies are more prone to allergies.

ADVANTAGE OF BREASTFEEDING FOR THE NURSING MOTHER

- When a baby is put to the breast soon after birth, the sucking motions make the uterus contract and get back to its's normal size by closing the uterus and lessening the chance of excessive bleeding for the mother.
- Breastfeeding helps the mother lose the extra pounds gained during pregnancy because making breastmilk may use up to 1000 calories per day.
- Breastfeeding is more convenient for the mother because there are no bottles or formula to prepare. This is especially convenient at night feedings since there are no bottles to warm up. Breast milk is raw and fresh and warm from the mother's body.
- In tropical areas such as Guam, breastfeeding is an advantage because the milk is always raw and fresh and of course needs no refrigeration at all (unless you are using a breast pump while you are at work). This is a definite advantage during tropical storms and typhoons, and power and water outages.
- Breastfeeding promotes maternal-infant bonding. Breastfeeding is a pleasureable experience for the mother and the baby.

ADVANTAGES OF BREASTFEEDING FOR THE BABY

- Breastfeeding provides more to a baby than nutrients and immunities. Since breastmilk is made especially for babies,

breastfed babies have less digestive problems and colic than bottle fed babies. This is an advantage for the mother too!

- Breastfeeding requires stronger sucking on the part of the baby and this helps in the baby's facial development.

- Breastfeeding on a demand schedule is an advantage for the baby because the baby gets an immediate response to his/her hunger cries and prolonged physical contact with the mother.

- Another advantage for the baby is that breastfed babies have little or no chance of getting "nursing bottle mouth" which is dental caries and tooth decay caused by milk, juice, or soda from a bottle given at night. Totally breastfed babies will not get nursing bottle mouth, even if they nurse before they go to sleep. However, once a baby starts to receive supplemental juice and solid foods, the chance of getting nursing bottle mouth is increased, especially if juice or soda is given instead of the more nutritious breastmilk at night.

WORKING MOTHERS AND STUDENTS

Mothers who work or attend school and want to breastfeed may have problems feedings their baby on a demand schedule. But working mothers and students who want to breastfeed can do it by using a breast pump and a few bottles for the times when they have to be away from their baby. Although some of the immunities will be lost in the refrigeration and reheating process of the stored breastmilk, it is still better than formula for the baby. A working mother or student can nurse the baby when she is at home (and maybe even at lunchtime), and use bottled breastmilk for when she has to be away. The baby will still get all the nutrients and some of the immunities. Some mothers may want to use formula for when the mother has to be away at work or school, and breastmilk at home. However, it is important for the mother to maintain a good supply of breastmilk by

having the baby nurse or use a breast pump during the workday or school day.

If you need to find out how to express and store breastmilk, contact the Health Education Office at the Department of Public Health and Social Services. The Health Education Office has information from the La Leche League for women who want to know how to express and store breastmilk.

OTHER CONSIDERATIONS

One of the most important things to think about when you decide to breastfeed is to have some help around the house in the early weeks so that you can establish the "let down reflex". The let down reflex is how the milk flows from the breast after the baby starts to suck. In order for a new mother to establish the let down reflex, she needs to relax and concentrate her activities around the baby. This is very important during the early weeks. Family and friends need to "mother the mother" so she can breastfeed. Family members and friends can be very helpful during these early weeks if they are supportive of your decision to breastfeed. For working mothers and students, it is a good idea to take some time off from work or school, if possible (even for a few weeks!).

Nursing mother should avoid drugs of all kinds since alcohol, caffeine, nicotine, marijuana, hormones, the "Pill" and other prescription and non-prescription drugs are secreted in the breastmilk and may cause problems for the baby. An occasional

beer, glass of wine or drink is okay (make sure the baby won't want to eat for an hour or so first).

FOR MORE INFORMATION

This booklet was designed to give you information on the advantages of breastfeeding for you and your baby. If you need more information such as "How To Breastfeed" or if you are having problems, you can contact the Cooperative Extension Service, Home Economics Office - 734-2562 - for more information. You can also contact the Health Education Office at the Department of Public Health and Social Services - 734-2964 - for more information. You can contact the La Leche League, a group of women that encourage and enlist breastfeeding mothers. Telephone numbers for these contacts are available at the Health Education Office. You can also get books on breastfeeding at either the local libraries or at one of the bookstores on island.

Issued in furtherance of Cooperative Extension Work, Acts of May 8, and June 30, 1914, in cooperation with the United States Department of Agriculture. Wilfred P. Leon Guerrero, Director, Cooperative Extension Service, College of Agriculture and Life Sciences, University of Guam.