

LONG-TERM HEALTH EFFECTS OF EARLY NUTRITION

AGOSTINI, BASELLI AND MAZZONI "[EARLY NUTRITION PATTERNS AND DISEASES OF ADULTHOOD: A PLAUSIBLE LINK?](#)"

LE HUEROU-LURON, BLAT AND BOUDRY "[BREAST- V. FORMULA-FEEDING: IMPACTS ON THE DIGESTIVE TRACT AND IMMEDIATE AND LONG-TERM HEALTH EFFECTS](#)"

FORMULA VS. BREAST MILK

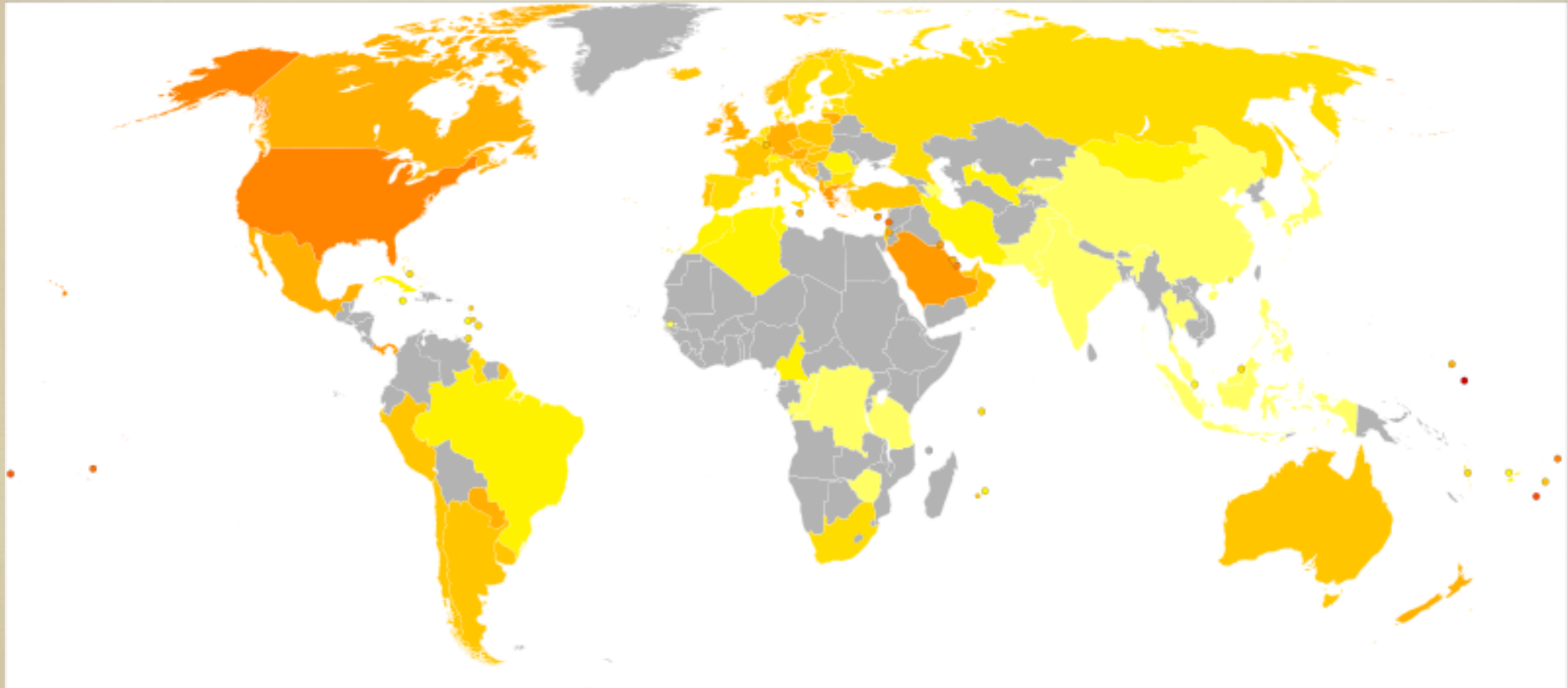


LONG-TERM HEALTH BENEFITS

- LOWER RISK OF OBESITY
- LOWER RISK OF HYPERTENSION
- LOWER LDL AND TOTAL CHOLESTEROL
- LOWER RISK OF TYPE 2 DIABETES
- INCREASED OUTCOME OF NEURODEVELOPMENT

COUNTRY	BREASTFEEDING 6 WEEKS	BREASTFEEDING 6 MONTHS
ESTONIA	86%	55%
SWEDEN	97%	65%
FRANCE	50-75%	5%
GERMANY	45%	21%
UK	50-75%	7%
USA	50-75%	30%
CANADA	72%	30%
BRASIL	62%	13%

WORLD MAP OF OBESITY



BREASTMILK COMPOSITION

CONTENTS	COLOSTRUM	MATURE MILK
ENERGY (KCAL)	55	67
FAT (G)	2.9	4.2
LACTOSE (G)	5.3	7.0
PROTEIN (G)	2.0	1.1
IGA (G)	0.5	0.1
LACTOFERRIN (G)	0.5	0.1
CASEIN (G)	0.5	0.4
CALCIUM (MG)	28	30
SODIUM (MG)	48	15
VITAMIN A (UG)	151	75
VITAMIN B1 (UG)	2	14
VITAMIN B2 (UG)	30	40
VITAMIN C (UG)	6	5

Nutrition Information

Average Quantity Per 100mL of Prepared Feed

Energy	70kcal
	293kJ
Protein	1.4g
	Whey 60%
	Casein 40%
Carbohydrate	8.0g
Fat	3.6g

Omega LCPs⁴

Arachidonic Acid (AA)	11mg
Docosahexaenoic Acid (DHA)	11mg

Minerals

Calcium	50mg
Phosphorus	29mg
Sodium	21mg
Potassium	71mg
Chloride	50mg
Magnesium	5.8mg

Iron	0.78mg
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Zinc	0.50mg
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Iodine	13µg
Manganese	10.8µg
Copper	49µg
Selenium	2.4µg

Vitamins

Vitamin A	58µg-RE
Vitamin D3	0.74µg
Vitamin E	1.1mg α-TE
Vitamin K1	5.1µg
Thiamin (B1)	52µg
Riboflavin (B2)	109µg
Vitamin B6	44µg
Vitamin B12	0.27µg
Niacin (B3)	0.46mg
Pantothenic Acid (B5)	0.36mg
Biotin	2.6µg
Folic Acid	11µg

Vitamin C	7.3mg
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Others

Choline	16mg
Taurine	6.2mg
Inositol	4.2mg
L-Carnitine	2.1mg

Nucleotides

Cytidine 5' - monophosphate	1.1mg
Uridine 5' - monophosphate	0.81mg
Adenosine 5' - monophosphate	0.68mg
Inosine 5' - monophosphate	0.43mg
Guanosine 5' - monophosphate	0.24mg

Prebiotics

GOS ¹	0.72g
Ic Polyfructose ²	0.08g

Important for infant growth and development.

Play an important role in brain, eye and nervous system development, and the immune system.

Vital for growth, energy and brain development.

Assists in making red blood cells and maintaining the immune system.

Important for growth, development and immune function.

Found in foods such as red meat, wholegrains, chicken, cheese and eggs.

Important in supporting the immune function and it also helps in the absorption of iron.

Found in a variety of fruits and vegetables including citrus fruits, kiwi fruit, strawberries and tomatoes.

Part of the building blocks of DNA.

Food for the good bacteria (e.g., bifidobacteria) found in the gut which nutritionally support the immune system.

Found naturally in a variety of fruits and vegetables including bananas, chicory and onions.

INGREDIENTS: 35.5% CORN MALTODEXTRIN, 17.5% CASEIN HYDROLYSATE (DERIVED FROM MILK), 14.5% SUGAR (SUCROSE), 9.7% HIGH OLEIC SAFFLOWER OIL, 9.5% MEDIUM CHAIN TRIGLYCERIDES, 8.0% SOY OIL; **LESS THAN 2% OF:** C. COHNII OIL*, M. ALPINA OIL†, CALCIUM PHOSPHATE, DATEM, POTASSIUM CITRATE, XANTHAN GUM, MAGNESIUM CHLORIDE, MONOGLYCERIDES, SODIUM CHLORIDE, ASCORBIC ACID, L-CYSTINE DIHYDROCHLORIDE, CALCIUM CARBONATE, L-TYROSINE, POTASSIUM CHLORIDE, CHOLINE CHLORIDE, FERROUS SULFATE, L-TRYPTOPHAN, TAURINE, m-INOSITOL, ASCORBYL PALMITATE, dl-ALPHA-TOCOPHERYL ACETATE, ZINC SULFATE, L-CARNITINE, NIACINAMIDE, MIXED TOCOPHEROLS, CALCIUM PANTOTHENATE, CUPRIC SULFATE, VITAMIN A PALMITATE, THIAMINE CHLORIDE HYDROCHLORIDE, RIBOFLAVIN, PYRIDOXINE HYDROCHLORIDE, FOLIC ACID, POTASSIUM IODIDE, POTASSIUM HYDROXIDE, PHYLLUQUINONE, BIOTIN, SODIUM SELENATE, VITAMIN D₃ AND CYANOCOBALAMIN.

Manganese 25 mcg Chloride 62 mg

INGREDIENTS: 42.6% CORN SYRUP SOLIDS, 14.7% SOY PROTEIN ISOLATE, 11.5% HIGH OLEIC SAFFLOWER OIL, 10.1% SUGAR (SUCROSE), 8.4% SOY OIL, 7.8% COCONUT OIL, 2.4% CALCIUM PHOSPHATE; **LESS THAN 2.0% OF:** C. COHNII OIL†, M. ALPINA OIL‡, POTASSIUM CITRATE, SODIUM CHLORIDE, MAGNESIUM CHLORIDE, ASCORBIC ACID, L-METHIONINE, POTASSIUM CHLORIDE, CHOLINE CHLORIDE, TAURINE, FERROUS SULFATE, ASCORBYL PALMITATE, m-INOSITOL, ZINC SULFATE, MIXED TOCOPHEROLS, L-CARNITINE, NIACINAMIDE, d-ALPHA-TOCOPHERYL ACETATE, CALCIUM PANTOTHENATE, CUPRIC SULFATE, THIAMINE CHLORIDE HYDROCHLORIDE, VITAMIN A PALMITATE, RIBOFLAVIN, PYRIDOXINE HYDROCHLORIDE, BETA-CAROTENE, FOLIC ACID, POTASSIUM IODIDE, POTASSIUM HYDROXIDE, PHYLLUQUINONE, BIOTIN, SODIUM SELENATE, VITAMIN D₃ AND CYANOCOBALAMIN.

CONTAINS SOY INGREDIENTS.

*© Contains no dairy ingredients. Manufactured on dairy equipment.
†SOURCE OF DOCOSAHEXAENOIC ACID (DHA) ‡SOURCE OF ARACHIDONIC ACID (ARA)

ROSS PRODUCTS DIVISION
ABBOTT LABORATORIES
COLUMBUS, OHIO 43215-1724 USA

INGREDIENTS: ORGANIC REDUCED MINERALS WHEY, ORGANIC NONFAT MILK, ORGANIC LACTOSE, ORGANIC GLUCOSE SYRUP SOLIDS, ORGANIC PALM OIL OR ORGANIC PALM OLEIN, ORGANIC COCONUT OIL, ORGANIC HIGH OLEIC (SAFFLOWER OR SUNFLOWER) OIL, ORGANIC SOY OIL, ORGANIC WHEY PROTEIN CONCENTRATE, AND **LESS THAN 1%:** MORTIERELLA ALPINA OIL*, CRYPTHECODINIUM COHNII OIL**, VITAMIN A PALMITATE, BETA-CAROTENE, VITAMIN D (CHOLECALCIFEROL), VITAMIN E (dl-ALPHA TOCOPHERYL ACETATE), MIXED TOCOPHEROL CONCENTRATE, VITAMIN K (PHYTONADIONE), ASCORBYL PALMITATE, THIAMINE HYDROCHLORIDE, RIBOFLAVIN, PYRIDOXINE HYDROCHLORIDE, CYANOCOBALAMIN, NIACINAMIDE, FOLIC ACID, CALCIUM PANTOTHENATE, BIOTIN, ASCORBIC ACID, CHOLINE CHLORIDE, INOSITOL, CALCIUM CHLORIDE, CALCIUM HYDROXIDE, FERROUS SULFATE, ZINC SULFATE, MANGANESE SULFATE, CUPRIC SULFATE, MAGNESIUM PHOSPHATE, POTASSIUM BICARBONATE, POTASSIUM CHLORIDE, POTASSIUM IODIDE, POTASSIUM HYDROXIDE, SODIUM SELENITE, SODIUM CITRATE, TAURINE, SOY LECITHIN, NUCLEOTIDES (ADENOSINE-5'-MONOPHOSPHATE, CYTIDINE-5'-MONOPHOSPHATE, DI-SODIUM GUANOSINE-5'-MONOPHOSPHATE, DISODIUM INOSINE-5'-MONOPHOSPHATE, DISODIUM URIDINE-5'-MONOPHOSPHATE).

CONTAINS: SOY and MILK. Good Manufacturing Practices are used to prevent introduction of undeclared allergens.

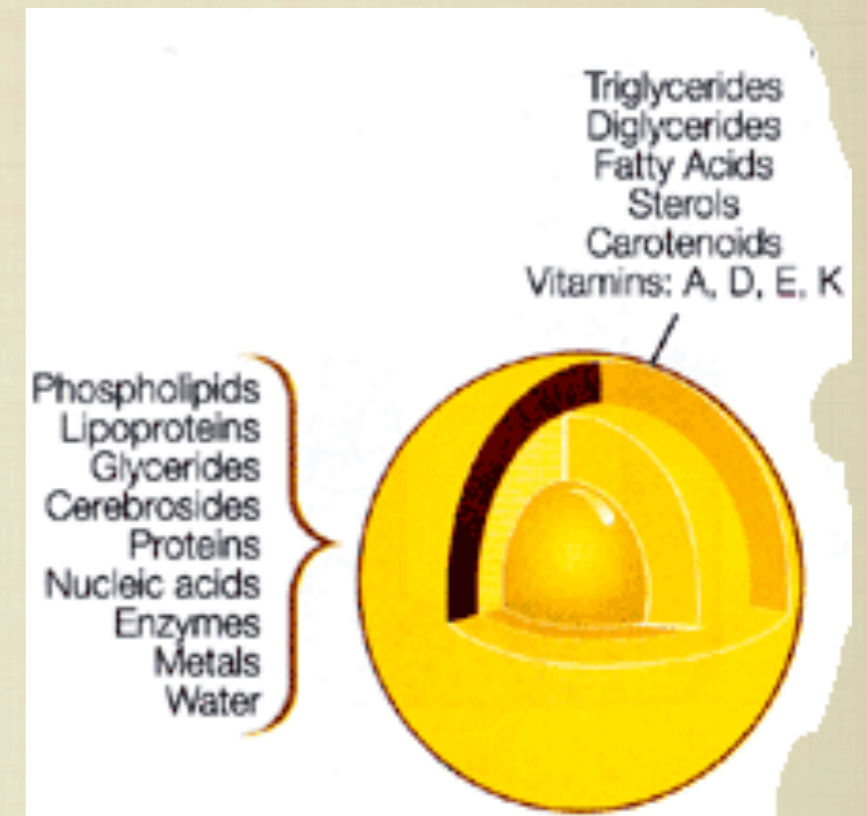
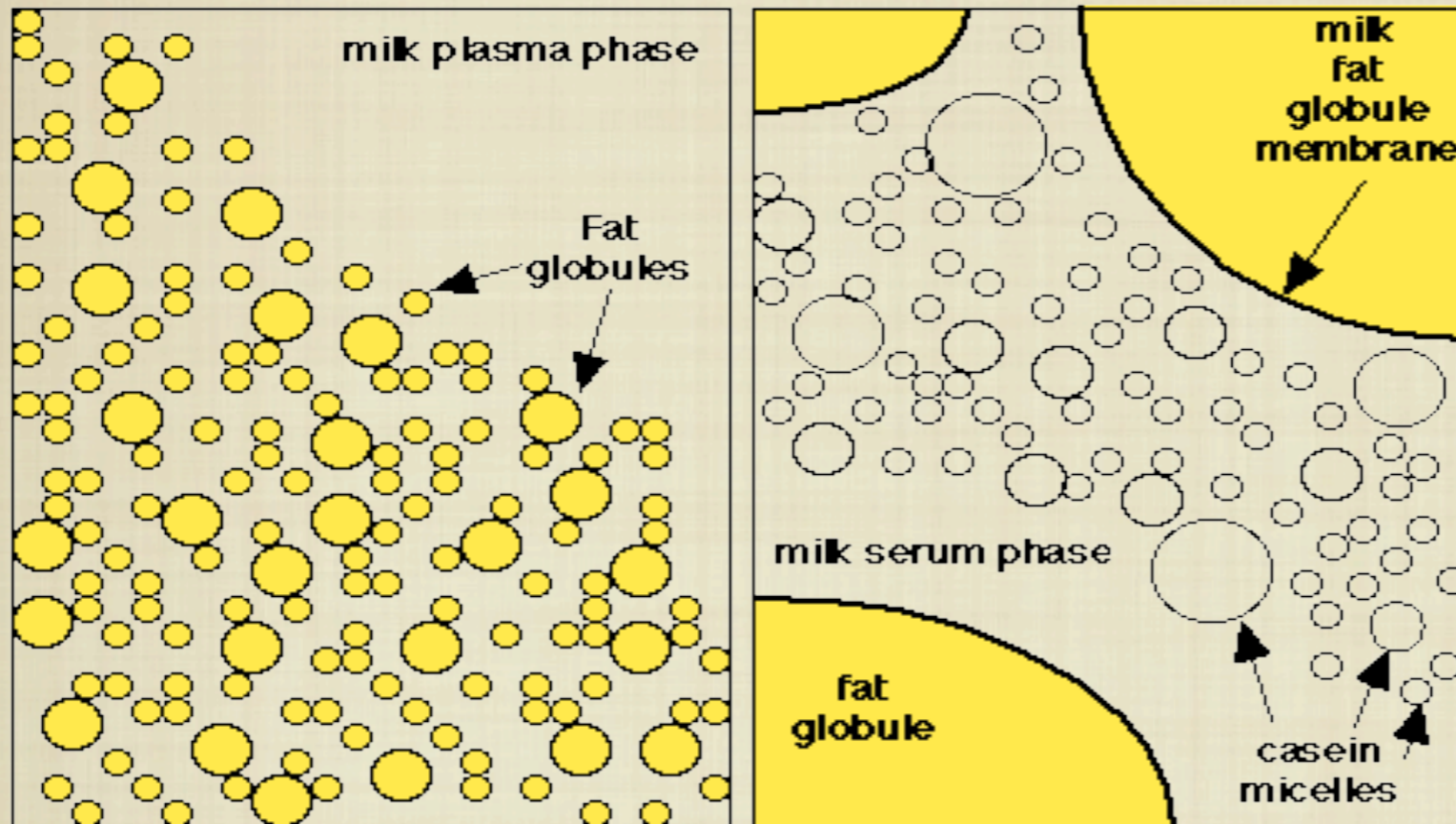
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Melville, NY 11747 USA

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Filled by weight, not by volume; some settling may occur.

* A SOURCE OF ARACHIDONIC ACID (ARA)
** A SOURCE OF DOCOSAHEXAENOIC ACID (DHA)

FAT GLOBULES IN MILK



FAT GLOBULES IN MILK

- PHOSPHOLIPIDS, CHOLESTEROL, SPHINGOLIPIDS
ESSENTIAL FOR CELL GROWTH
- MICRO ELEMENTS IN FAT GLOBULE MEMBRANE (I, SE,
CU)
- FAT-SOLUBLE VITAMINS IN EASILY DIGESTIBLE FORM
(A, D, E, K)
- HUNDREDS OF PROTEINS IN FAT GLOBULE MEMBRANE
THAT REGULATE FAT METABOLISM, IMMUNE SYSTEM
DEVELOPMENT AND GROWTH

PROTEINS IN BREAST MILK

- **27% A-CASEIN THAT IS :**

- ✦ **EASILY DEGRADABLE INTO AMINO ACIDS**

- ✦ **HAS REGULATORY PEPTIDES FOR DIGESTION**

- ✦ **CASEIN MICELLES CONTAIN MOST OF CALCIUM AND PHOSPHOROUS IN MILK**

- **27% A-LACTALBUMIN**

- **18% LACTOFERRIN**

INFANT FORMULA AND FAT

- **CONTAIN PLANT FATS ONLY**
- **NO CHOLESTEROL**
- **NO FAT GLOBULE MEMBRANE PROTEINS**
- **ADDED MICRO ELEMENTS IN LESS EASILY OBTAINABLE FORM**
- **SOME HAVE ADDED PUFA (DHA)**

NUTRITIONAL CHARACTERISTICS BREASTFED VS FORMULA-FED

- SUPERIOR ABILITY TO SELF REGULATE THE SENSE OF HUNGER AND SATIETY
- REDUCED ENERGY INTAKE AND LOWER PROTEIN INTAKE
- THE QUALITY OF FAT - HIGH CONTENT OF LC-PUFA AND CHOLESTEROL IN BREAST MILK
- UP TO 30% OF NON-DIGESTABLE CARBOHYDRATES THAT ACT AS A SUBSTRATE FOR BENEFICIAL GUT BACTERIA (LACTOBACILLI AND BIFIDI) IN BREAST MILK

INFANT FORMULA AND PROTEINS

- **WHEY PROTEINS (MAINLY B-LACTOGLOBULIN)**
- **SOY PROTEINS HAVE DIFFERENT AMINO ACID COMPOSITION, INCREASED AMOUNT**
- **HYDROLYZED MILK PROTEINS - NO REGULATORY PEPTIDES RELEASED**
- **NO REGULATORY PROTEINS FOUND IN FAT GLOBULE MEMBRANE**
- **ADDED LACTOFERRIN, SOMETIMES**

COMPLEMENTARY FEEDING

- MAINTENANCE OF BREASTFEEDING 6-12 MONTH PERIOD INCREASES THE HEALTH BENEFITS
- EARLY USE OF MEAT HAS NUTRITIONAL AND NEURODEVELOPMENTAL ADVANTAGES
- DELAYED INTRODUCTION OF POTENTIALLY ALLERGENIC FOODS IS NOT SUPPORTED

PROTEINS IN COMPLEMENTARY FOOD

- PROTEIN FRACTION INCREASES FROM 5% OF TOTAL ENERGY TO UP TO 20% (3 TIMES HIGHER THAN NEEDED)
- SOME EVIDENCE THAT TOO MUCH PROTEIN (ESPECIALLY DAIRY PROTEIN) INCREASES BODY WEIGHT AND OBESITY RISK
- AVOID UNNECESSARY ELEVATED INTAKE

FAT IN COMPLEMENTARY FOOD

- **FATS REPRESENT MAIN SOURCE OF ENERGY OF HUMAN MILK**
- **LC-PUFA SUPPLEMENTATION OF FORMULA FOOD HAS BENEFITS FOR BRAIN DEVELOPMENT AND BLOOD PRESSURE**
- **CHOLESTEROL LEVELS IN FORMULA-FED INFANTS IS LOWER BUT INCREASES WHEN COMPLEMENTARY FOOD CONTAINING CHOLESTEROL IS GIVEN**
- **QUALITY OF FATS IS MORE IMPORTANT THAN THE QUANTITY**

CARBOHYDRATES AND FIBER

- HUMAN MILK CONTAINS 10-25% OF NON DIGESTABLE CARBOHYDRATES AND 75-90% LACTOSE
- WHOLE CEREALS, NON-STARCHY VEGETABLES, FRUITS AND LEGUMES ARE RECOMMENDED IN COMPLEMENTARY FOOD.
- RESTRICTING REFINED SUGAR SEEMS JUSTIFIED

TAKE HOME MESSAGE

- **FORMULA FEEDING INCREASES SHORT-TERM AND LONG-TERM HEALTH RISKS**
- **EARLY NUTRITION HAS LIFE-LONG EFFECTS (NUTRITIONAL PROGRAMMING)**
- **EARLY UNPHYSIOLOGICALLY HIGH INTAKE OF PROTEINS IS ASSOCIATED WITH LATER ADIPOSITY RATHER THAN HIGH FAT INTAKE**