

QA32 – Evaporated Milk as Substitute for Infant Formula

QUESTION:

Is a recipe available for infant formula using evaporated milk? What reference could I find it in? Is it appropriate to still recommend this recipe if a mom INSISTS on changing to whole milk (I've even had a caregiver put an infant on powdered milk) before child is 6 months of age because she said her child could not tolerate ANY formula.

ANSWER:

It would be unusual for an infant who did not tolerate ANY formula to tolerate an evaporated milk based formula. Evaporated milk formula was common in the US from the 1920's until commercial infant formulas were developed in the 1950's.

The formula is made by mixing 13 oz evaporated milk with 19 oz water (to make a quart) plus 2 tablespoons sugar. Another recipe was for 13 oz. evaporated milk, 18 oz of water, and 2 tablespoons corn syrup, but corn syrup is not usually recommended today. This formulation dilutes the protein and minerals by adding extra water, then adds a carbohydrate source to bring the energy up to 20 kcal/oz. Families using this formula need clear instructions on using evaporated whole milk (non evaporated low fat or skim milk; and certainly not condensed milk which is sweet). Sanitation is also critical in making the formula.

Although an evaporated milk formula would certainly be better than whole milk for a young infant (under 6 months), there are still significant risks, including:

- 1) High renal solute load (RSL)
(39mOsm/100kcal—evaporated milk formula, 46mOsm/100kcal—whole milk versus 20mOsm/100kcal - milk-based formula, 24-26.6mOsm/100kcal - soy-based formulas, and 14mOsm/100kcal—Human Milk).

When an infant is well, and consuming an adequate amount of milk/formula (including evaporated milk formula), she can excrete solutes and maintain water balance well. There can be problems when an infant has a febrile illness or diarrhea and/or is not able to consume adequate formula, or when she has decreased renal concentrating ability. In these cases, an infant can become dehydrated much more quickly if she is receiving a formula with a high renal solute load.

Hypernatremic dehydration in infants was fairly common between the 1930's and 1950's when evaporated milk formula was widely used in this country;

Fomon and Ziegler theorize that there was a relationship between use of evaporated milk formula and increased incidence of hypernatremic dehydration. As the use of commercial formulas increased and the use of evaporated milk formulas decreased, the incidence of hypernatremic dehydration in infants decreased. In the United Kingdom, formulas with a RSL only slightly lower than evaporated milk formula were fed until 1974. At that time, health authorities strongly recommended using commercial formulas with lower RSL. The recommendations were well accepted by the public, and a decrease in hypernatremic dehydration followed.

- 2) The protein in commercial formulas has been modified to be more easily digested, by decreasing the size and “tension” of the curd. While the heat treatment of evaporated milk may do this to some degree, the protein in evaporated milk formula may be more difficult for infants to digest and absorb.

If a caregiver absolutely insists on using a formula made from evaporated milk, it needs to be supplemented with vitamin C and iron (e.g. Tri-vi-sol with iron). One would need to be very alert for signs of decreased intake due to illness, or increased water needs due to fever or diarrhea.

References:

- 1) Fomon and Ziegler. Renal Solute Load and Potential Renal Solute Load in Infancy. *J Pediatrics*, vol 134:11-14 1999.
- 2) Pipes, Peggy, Infant Feeding and Nutrition. In *Nutrition in Infancy and Childhood*, 6th Ed, edited by C. Trahms and P. Pipes, WCB/McGraw-Hill, 1997, Ch.4 pp98-129.