

Meat as a First Complementary Food for Breastfed Infants for Improved Zinc and Iron Status



Objective

Assess the feasibility and effects of consuming either pureed beef or iron-fortified infant cereal as the first complementary food for infants.

Summary

Breast milk gives 9-month-old infants just 10 percent of the iron and zinc they need. Therefore iron-fortified cereal is often recommended to prevent iron deficiency. However, this solution does not account for infants' zinc needs. Nancy F. Krebs, M.D., M.S. and her team at the University of Colorado School of Medicine conducted research to identify foods that infants would accept and that would help meet their iron and zinc needs. They found that pureed meat was accepted by infants and improved their zinc and iron levels. Published in the February 2006 *Journal of Pediatric Gastroenterology and Nutrition* ("Meat as a first complementary food for breastfed infants: Feasibility and impact on zinc intake and status"), this study adds to a growing body of evidence encouraging pureed meat as a first food.

Method

In the randomized-feeding trial, 88 exclusively breastfed infants were fed either pureed beef or iron-fortified infant cereal as their first complementary food from 5 to 7 months of age. After that time, all food choices were left to the parents' discretion. But, until then, infants in the beef and cereal groups exclusively ate beef or cereal, respectively. Measures of zinc and iron status were taken at 9 months, and dietary, anthropometric and developmental data were taken up to 12 months.

Key Findings

The study found that giving pureed beef to infants as their first complementary food is both practical and a better way to improve zinc intake than using iron-fortified cereals.

- At 5 and 7 months, infants in the pureed beef group had significantly higher zinc and protein intake, while infants in the fortified-cereal group had significantly higher iron intake at 7 months.
- Infants accepted both the cereal and pureed meat, but at 7 months, infants in the meat group were consuming 90 percent of the Estimated Average Requirement (EAR) for zinc. Those in the cereal group were getting less than half of the EAR.
- Adjusting for variables, the only significant difference between the beef and cereal groups was the increase in head circumference during the 7- to 12-month interval for the beef group. Intakes of both zinc and iron at 7 months were predictors of head growth.
- By 9 months, 2 months after the intervention concluded, there were no differences in iron and zinc intake, but protein was still somewhat higher for the meat group.



Meat: A Smart First Food

Iron and zinc are important for the growth and development of infants and young children. Inadequate consumption of these nutrients can have long-lasting negative effects on children's learning, behavior and development. Breastfed infants 9 months of age and older get just 10 percent of the iron and zinc they need from breast milk, so they must rely on complementary foods for these nutrients. A study in the February 2006 *Journal of Pediatric Gastroenterology and Nutrition* found that the modest intake of zinc from the typical early complementary foods before 7 months (cereals, fruits and vegetables) provides only 30% of the EAR. Introducing babies 5 months or older to pureed beef while they continued to breastfeed was an effective way to provide the iron and zinc they need.

Why are Iron and Zinc Important for Infants?

Because most breastfed infants 6 months of age and older don't get enough iron and zinc, the Institute of Medicine (IOM) has identified iron and zinc as "priority nutrients." The IOM and the American Academy of Pediatrics encourage the introduction of complementary foods rich in iron and zinc, such as beef, to ensure that breastfed infants consume adequate amounts of these important nutrients.



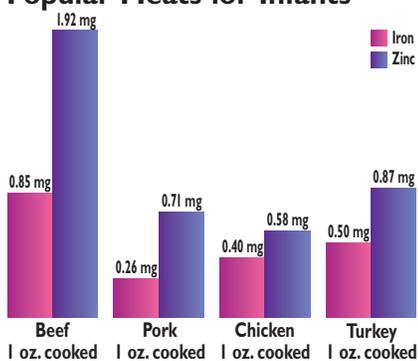
Iron

A child's growth and development depends on iron, which helps to make red blood cells that carry oxygen from the lungs to muscles and the brain. **Studies show that inadequate iron intake can have long-term consequences on learning, attention span and behavior.** Most babies are born with enough iron stores for the first 6 months of life; after 6 months, infants need a diet rich in iron to meet their needs. Animal products provide heme iron, a different form of iron than the non-heme iron found in plant and fortified foods. Heme iron is best absorbed by the body. As children progress through the feeding stages, serving beef along with plant and iron-fortified foods helps children absorb more of the non heme iron than if they ate these foods alone.

Zinc

Zinc is essential for growth and development. It is involved in the creation of DNA and helps the body break down carbohydrates, fats and proteins so they can be used for energy. Zinc boosts immunity and also helps the body heal wounds and maintain normal blood glucose levels. **Research suggests that zinc also has a role in improving recall skills, reasoning and attention.** The zinc content of breast milk gradually decreases over time, so it's important to introduce foods rich in zinc when infants progress to solid foods. Animal and plant foods supply zinc, but as with iron, zinc is better absorbed from meat and other animal products. Beef is the number one food source of zinc in the American diet.

Iron and Zinc Content of Popular Meats for Infants



Sources:

1. Krebs NF, Westcott JE, Butler N, Robinson C, Bell M, Hambidge KM. Meat as a first complementary food for breastfed infants: Feasibility and impact on zinc intake and status. *Journal of Pediatric Gastroenterology and Nutrition* 2006; 42: 207-214.
2. Lozoff B, Jimenez E, Smith J. Double burden of iron deficiency in infancy and low socioeconomic status. *Archives of Pediatric and Adolescent Medicine* 2006; 160: 1108-1113.
3. The Institute of Medicine. *WIC Food Packages: Time for a Change*. December 2005.
4. American Academy of Pediatrics. *Pediatric Nutrition Handbook*. Fifth Edition. American Academy of Pediatrics. 2004.
5. Mahan LK, Escott-Stump S. *Krause's Food, Nutrition, & Diet Therapy, 11th Edition*. Saunders/Elsevier. 2004.
6. Ward, E. *The Complete Idiot's Guide to Feeding Your Baby and Toddler*. Alpha Books. 2005.
7. U.S. Department of Agriculture, Agricultural Research Service. 2006. USDA Nutrient Database for Standard Reference, Release 19. Nutrient Data Laboratory Home Page, <http://www.ars.usda.gov/ba/bhnrc/ndl>. Beef, NDB No: 13364; Pork, NDB No: 10093; Chicken, NDB No: 05126; Turkey, NDB No: 05168.

HOW MUCH IRON AND ZINC DO CHILDREN NEED?

Age	Iron Recommended Dietary Allowance/ Adequate Intake*	Zinc Recommended Dietary Allowance/ Adequate Intake*
0-6 months	0.27 mg/day	2 mg/day
7-12 months	11 mg/day	3 mg/day
1-3 years	7 mg/day	3 mg/day
4-8 years	10 mg/day	5 mg/day

*= Adequate Intake (AI). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of almost all individuals in a group. For healthy breastfed infants, the AI is the mean intake.