

ABCs of Dietary Guidelines for Americans: Where Do Kids Fit In?

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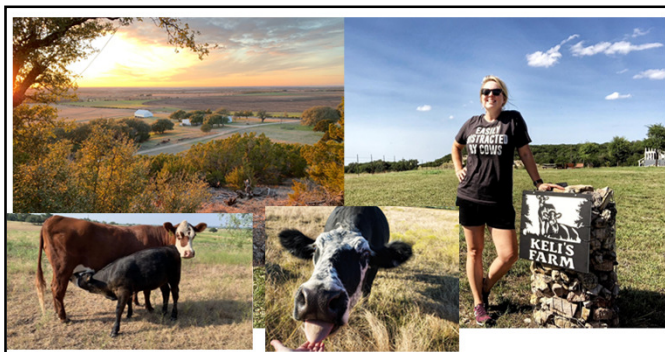
Disclosure



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Today's Objectives

- Identify critical nutrient needs during infancy and early childhood life stages
- Explain current evidence-based dietary pattern and complementary feeding recommendations
- Develop practical nutrition and feeding recommendations for the inclusion of developmentally appropriate foods, including beef, to optimize healthy growth and development

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2020-2025
DGA are first
ever to include
children under
2 years old



DGA Dietary
Guidelines
for Americans
2020 - 2025

Make Every
Bite Count With
the Dietary
Guidelines

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starting solids
when is the best time?
what foods to start with?

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Starting Solids – Recommendations

- **American Academy of Pediatrics (AAP)**
 - Introduce solid foods **around 6 months** of age
 - Expose baby to a wide variety of healthy foods and textures
 - No medical evidence that introducing solid foods in any particular order has any advantage
 - Meats can be offered as an early complementary food
- **WHO and Pan American Health Organization (PAHO)**
 - Introduce **at 6 months** of age
 - Meat, poultry, fish or eggs should be eaten daily or as often as possible
 - Vegetarian diets **cannot** meet nutrient needs at this age unless nutrient supplements or fortified products are used

AAP 2012, WHO 2004

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DGA Recs: Starting Solids

- Start nutrient-dense, developmentally appropriate foods at **about 6 months of age**
- Some infants may show signs of developmental readiness prior to 6 months, but introducing before 4 months is not recommended, nor is waiting until after 6 months.
- Important to introduce allergenic foods along with other complementary foods



DGA 2020
https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

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Developmental Readiness for Starting Solids

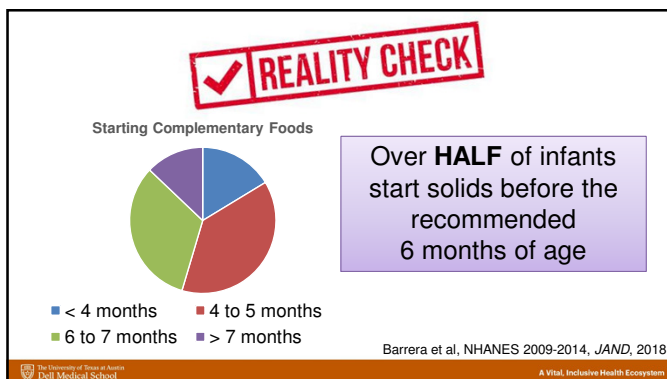
- Being able to control head and neck
- Sitting up alone or with support
- Bringing objects to the mouth
- Trying to grasp small objects, such as toys or food
- Swallowing food rather than pushing it back out onto the chin
- Infants and young children should be given age- and developmentally appropriate foods to help prevent choking
 - Foods such as hot dogs, candy, nuts and seeds, raw carrots, grapes, popcorn, and chunks of peanut butter are some of the foods that can be a choking risk for young children.

DGA 2020

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Why do Parents do this?

- Most common is adding rice cereal to a bottle to fill up their tummy so they will sleep longer
- Inconsistent evidence reported
- Still not recommended by any organizations



Macknin and Maier, Am J Dis Child, 1989
Perkin et al, JAMA Pediatr 2018

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Starting Too Early or Too Late

Why not start before 6 months?

- Higher risk of choking (not developmentally ready yet)
- Increases risk of obesity
- May not get enough nutrients because displacing human milk or formula

What about starting too late?

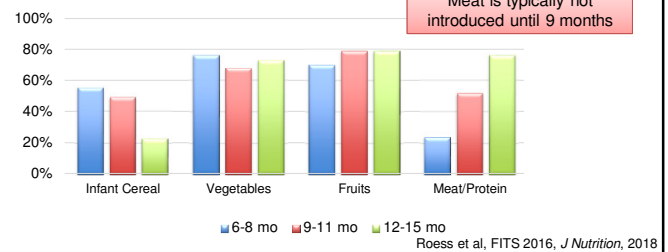
- Slower growth, including brain growth
- Iron deficiency
- Delays oral motor function
- Can cause aversion to solid foods and textures
- Postponing allergenic foods (peanuts, eggs, fish) increases risk of allergy

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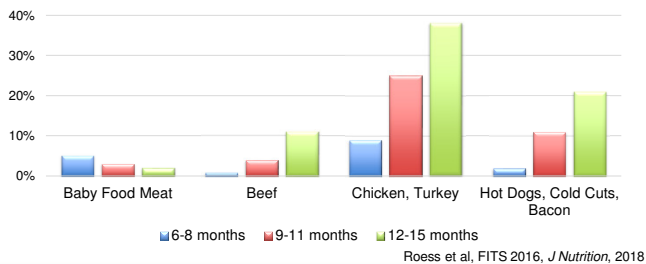
What do 6-15 mo Children in the US eat? (% of infants eating ≥ 1 x/d)

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What do 6-15 mo Infants in the US eat? (% of infants eating ≥ 1 x/d)

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2020 Dietary Guidelines Recommendation

- “For infants fed human milk, it is particularly important to include complementary **foods that are rich in iron and zinc when starting complementary foods**”

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Iron and Zinc Stores in the Body

- Babies born with reserves of iron and zinc stored up in the body (liver) that it taps into to prevent malnutrition in early months
- These stores are used up by 6 months of age
- Have to introduce food sources of iron and zinc at 6 months of life to maintain health
- Compared to adults, babies and small children need more iron and zinc per pound body weight than adults!

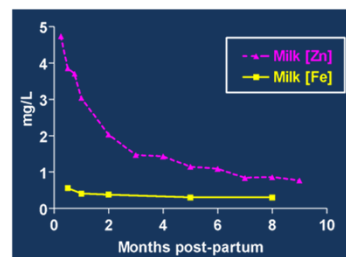
Ziegler et al, Nutrients, 2014

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Iron & Zinc Concentrations in Breast Milk



- Zinc declines over time
- Iron is never very high to begin with but it's quite bioavailable
- Can't increase nutrients in breast milk by mother's diet

By 9 months of age, **90%** of an infant's iron and zinc should be provided by complementary foods

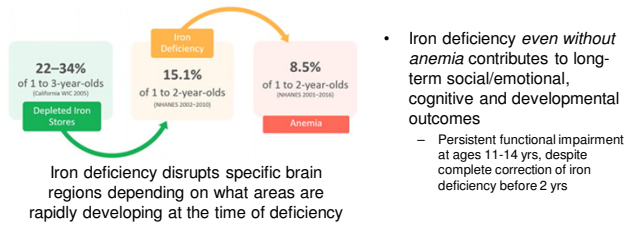
Pan American Health Organization, WHO, Guiding Principles for Complementary Feeding of the Breastfed Child, 2009

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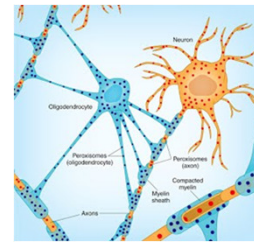
Iron Deficiency and Anemia



Schneider 2005, Gupta 2017, Bailey 2020, Sun 2021

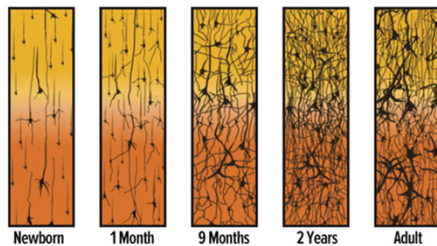
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Iron for Brain Development



- Myelin (the insulating layer around nerves) which form the connections between neurons (brain cells)
- Need **IRON** to make myelin
- Building these connections in the first year of life is critical – brain cell connections are happening faster than ever!

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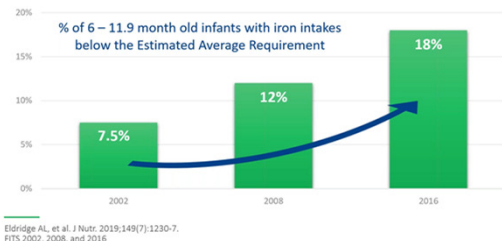


Synapse Density Over Time FIGURE 3

Source: Adapted from Corel, J., The postnatal development of the human cerebral cortex, Cambridge, MA: Harvard University Press, 1975.

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Number of Infants at Risk for Inadequate Iron Intakes has DOUBLED



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2020 Dietary Guidelines: IRON

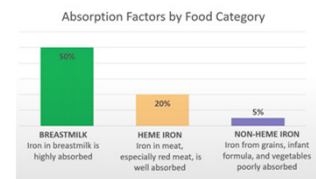
- “In the US, about **77%** of 6-12 month-old infants fed human milk have **inadequate iron intake**, highlighting the importance of introducing **iron-rich foods starting at age 6 months.**”

✓ REALITY CHECK

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Adjusting Iron Intakes to Account for Absorption

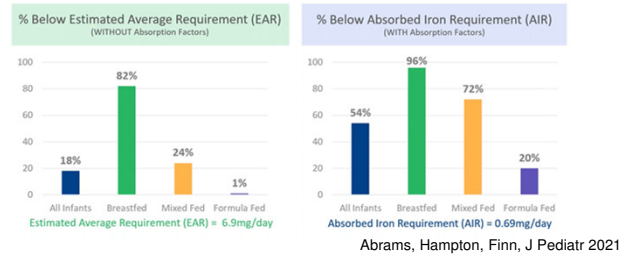
- FITS 2016 data
- Coded as breast milk, heme, non-heme
- Calculated **absorbed** iron intakes from consumed intakes
- Determined the percent below the absorbed iron requirement



Abrams, Hampton, Finn, J Pediatr 2021

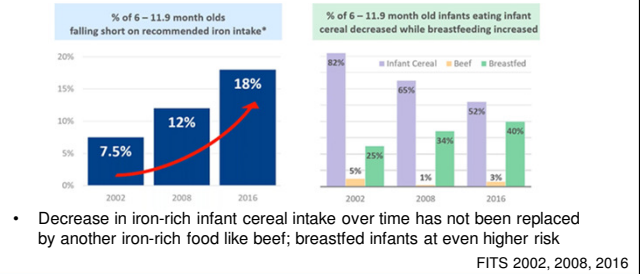
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Infants Are Not Getting Enough Absorbed Iron



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Increasing Risk for Iron Deficiency



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Arsenic and Infant Cereal

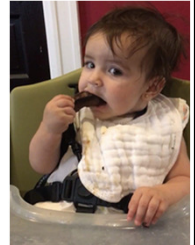
- **Vary your baby's diet.** Rice cereal fortified with iron is a good source of nutrients, but it shouldn't be the only source, and does not need to be the first source. Also include oat, barley, and multigrain cereals.
- **Limit fruit juices.** In 2012, similar questions were raised about arsenic in juice products. For years, the AAP has recommended limited intake of all sweet beverages, including juice. Infants can be encouraged to eat whole fruits that are mashed or pureed. Toddlers and young children can be encouraged to eat whole fruits instead of juice.
- **Avoid brown rice syrup as a sweetener in processed foods for kids.** The arsenic in rice is concentrated in rice syrup, which is sometimes used as a sweetener in toddler snacks or puffs.

AAP News, HealthyChildren.org

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2020 Dietary Guidelines: IRON

- "Iron-rich foods (e.g., meats and seafood rich in **heme iron** and iron-fortified infant cereals) are important components of the infant's diet **from age 6 months old** to maintain adequate iron status, which supports neurologic development and immune function."
- "Infants are typically born with body stores of iron adequate for about the first 6 months of life."
- "By age 6 months, however, infants require an external source of iron apart from human milk."



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Iron-Fortified Cereals

- Common weaning food
- Iron fortification is added to the food – lots of different types of iron to use for this
 - Price, shelf life, rancidity, changes to taste and/or color

Bioavailability of iron from fortified cereals is ~5% compared to that of animal sources which is ~20%



Abrams, Hampton, Finn, J Pediatr 2021

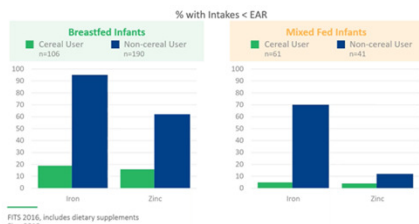
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Not all Baby Foods are Created Equally when it comes to IRON

- Good Source of Iron for Fortification
 - Still not as well absorbed as iron in infant formulas
 - Gerber, Beechnut, Earth's Best Organic, Tasty Baby, PC Organics, Nature's Goodness, Healthy Times Organic (used to not contain any iron)
- Fair Source of Iron for Fortification (less well absorbed than above)
 - Plum Organics, Happy Family
- NO IRON (actually, no fortification at all; marketed as "let us make your baby food for you because you don't have time")
 - Once Upon a Farm (co-founder Jennifer Garner)
 - Wutsup Baby
 - Nurtureme

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Even if lower absorption, infant cereal makes a big impact



- 96% of breastfed infants and 70% of mixed fed infants (6-12 mo old) did not consume infant cereal had inadequate iron intake

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2020 Dietary Guidelines: ZINC

- “About **HALF (54%)** of 6-12 month-old infants in the US fed human milk have inadequate zinc intake.”
- “Prioritizing **zinc-rich foods starting at 6 months of age** to complement human milk feedings will help infants meet their requirement for zinc.”



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2020 Dietary Guidelines: ZINC

- “Zinc-rich complementary foods (e.g., meats, beans, zinc-fortified infant cereals) are important **from age 6 months onwards** to support adequate zinc status, which supports growth and immune function.”
- “Although the zinc content of human milk is initially high and efficiently absorbed, the concentration declines over the first 6 months of lactation and is not affected by maternal zinc intake.”

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Breastfed Infants Are Not Getting Enough Absorbed Zinc

- Absorption factors of 50% for breastmilk and 30% for all other dietary sources were applied to sources of zinc
- Mean absorbed Zn intakes and the percentage of infants falling below the absorbed dietary Zn requirement (836µg) utilized to establish the EAR were calculated
- 91%** of breastfed infants ages 6-9 months old did not receive enough absorbed zinc to meet requirements for optimal growth and development; decreased to **33%** at 9-12 months of age

Abrams, Hampton, Finn, PAS 2021

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Enhancers & Inhibitors of Iron & Zinc

- Inhibitors
 - Phytates inhibit iron and zinc absorption (grains, corn, rice, cereals, soy, nuts, legumes, lentils)
 - Calcium inhibits heme iron, non-heme iron, and zinc
 - Oxalic acid (found in spinach, chard, beans, and nuts) inhibits iron
 - Polyphenols (cereals, some fruits, vegetables) inhibits iron
- Enhancers
 - Vitamin C enhances iron (citrus fruits, dark green leafy vegetables, bell peppers, melons, and strawberries)
 - Heme iron enhances non-heme iron absorption
 - Animal proteins enhance zinc absorption

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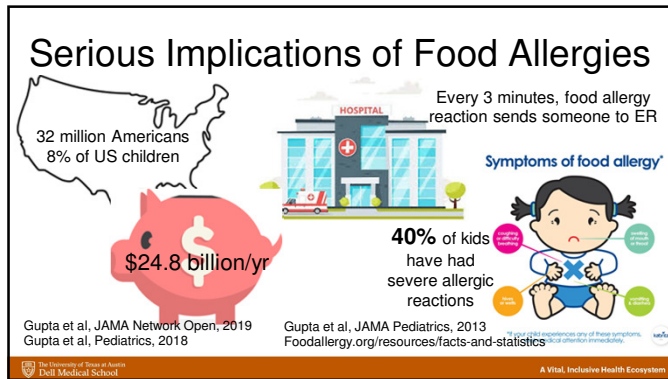


FOOD ALLERGIES ARE A SIGNIFICANT AND GROWING PROBLEM AND ALL BABIES ARE AT RISK



readysetfood.com

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How We Used to Do It

- Historically, prevention of food allergy largely focused on “avoidance” strategies
- In 2000, AAP practice guidelines recommended that allergenic foods (such as egg, cow’s milk, and peanut) be **avoided during the first 1 to 3 years of life**
 - Nursing mothers to eliminate allergens from diet while nursing
 - Pregnant mothers to consider avoiding peanuts

AAP Committee on Nutrition, *Pediatrics*, 2000

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It's All in the Past

- But that didn't help, which is why in 2008 the AAP stopped recommending it, but parents are still confused

Greer et al, AAP Committee on Nutrition, *Pediatrics*, 2008

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EARLY AND SUSTAINED INTRODUCTION REDUCES THE RISK OF FOOD ALLERGIES BY 67-80%

Study	Effect	Reduction
LEAP STUDY	Effect: 80% reduction	Reduction
EAT STUDY	Effect: 67% reduction	Reduction
PETIT STUDY	Effect: 79% reduction	Reduction

NEW NATIONAL GUIDELINES

AAP, NIH, and AAAAI have issued guidelines for the early introduction of peanut and new guidelines are being developed for egg and other allergenic foods.

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Practical Advice to Parents from AAP

- Start solids with individual foods of low allergy risk
 - Pureed meat, infant cereal, pureed fruit, pureed vegetables
 - Give your baby one new food at a time
 - Wait 2 to 3 days before starting another food
 - After each new food, watch for any allergic reactions such as diarrhea, rash, or vomiting
- For moderate and low risk infants: around 6 mo, add allergenic foods after a few other solid foods have been introduced and tolerated
- For high risk infants: start allergenic foods at 4-6 mo, possibly try 1st time in MD office (specifically peanuts)

Healthychildren.org

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Ideas for Introducing **Dairy** Foods for Allergens Protection

- Blend black beans and plain yogurt together (50:50), serve as dipping sauce for steak strips
- Substitutes:
 - Hummus
 - Other beans
 - Sour cream
 - Greek yogurt

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Ideas for Introducing **EGGS** for Allergens Protection

- Reaction to egg white protein
- Scrambled eggs or boiled eggs (same flavor but new textures & shapes)
- Partner with familiar foods
- Advance textures and piece sizes
- Opportunities for colorful plates to stimulate tiny minds

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Ideas for Introducing **Peanut** Foods for Allergens Protection



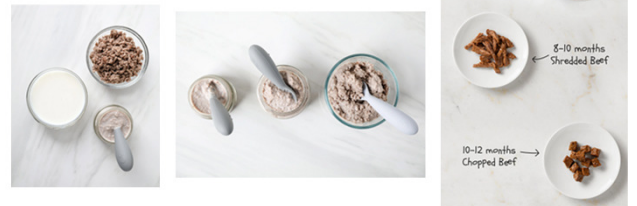
- Blend smooth peanut butter and plain yogurt together (50:50)
- Don't give a spoonful of PB (choking hazard)
- Dipping sauce for fruit, beef kabob pieces, steak slices
- Peanut butter puffs

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Advancing Textures

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What is Baby-Led Weaning?

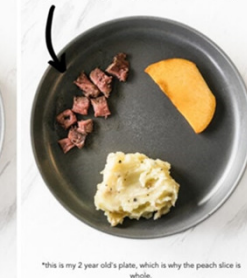
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palmar grasp (6-9 months)

pincer grasp (8+ months)



*this is my 2 year old's plate, which is why the peach slice is whole

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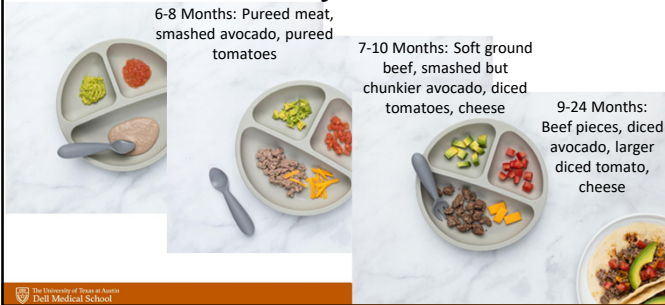
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Taco Tuesday: TEXTURES!

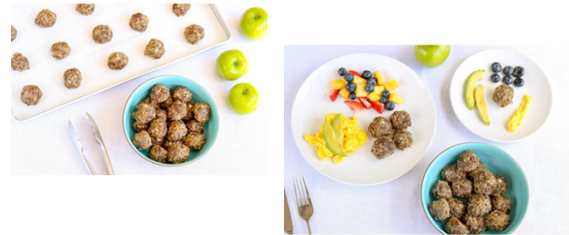
6-8 Months: Pureed meat, smashed avocado, pureed tomatoes

7-10 Months: Soft ground beef, smashed but chunkier avocado, diced tomatoes, cheese

9-24 Months: Beef pieces, diced avocado, larger diced tomato, cheese



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1-2 oz meat/day meets iron & zinc requirements for healthy infants 6-12 months old, up to 2 years of age

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Vegan or Vegetarian Families

- **"Well-planned** vegetarian and vegan eating patterns can be healthful and appropriate for all stages of the lifecycle, including for infants and toddlers." (JAND, Nov 2021)
- Children on vegan diets may have a healthier cardiovascular profile and less body fat than their omnivore peers, but they are also at greater risk of health issues that affect growth, bone mineral content and micronutrient status (AJCN 2021)
- Many case studies reports of injury and death of infants fed unbalanced and strict vegan diet – **education and monitoring are critical**
- Must be vigilant and intentional about making sure baby is getting foods high in iron, calcium and protein like beans, spinach, lentils, tofu, sunflower butter, and vegan-friendly dairy products like almond or oat-based yogurts

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2020 DGA: Limit Certain Foods

- Avoid added sugars and no-calorie sweeteners
 - Avoid flavored milks ages 1-2 yrs (contain added sugars)
- Avoid juice in 1st year of life. Limit to 4 oz/day after 1 year.
- Avoid honey and unpasteurized foods and beverages (unpasteurized milk, cheese, yogurt, juice)
- Avoid cow milk and plant-based milks (soy, almond milk) in 1st year of life
- Water is not needed in 1st 6 months. Small amounts (4-8 oz/d) of plain, fluoridated drinking water can be given to infants at 6 mo

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The Important Stuff to Remember

- Make Every Little Bite Count!
 - Choose nutrient dense foods to provide Big Nutrition for Tiny Tummies
 - New DGA 2020 align with AAP recs and support starting solids around 6 months of age
- Focus on iron and zinc because so many infants have inadequate intakes needed for growth, neurocognitive development and immunity
 - Different forms of iron and zinc are absorbed differently and are not utilized equally by the body
- Introduce potentially allergenic foods also at 6 months
 - Once shown tolerated, repeat feeding 2-3x/wk to continue to prevent allergy; easily in combination with iron and zinc rich foods

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Opportunity is missed by most people because it's dressed in overalls and looks like work.

Thomas Edison

Keli.Hawthorne@austin.utexas.edu



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More Resources

- Books, fact sheets, podcasts, research articles, self-guided study, videos (AAP), and websites



Thank You!



National Cattlemen's
Beef Association