



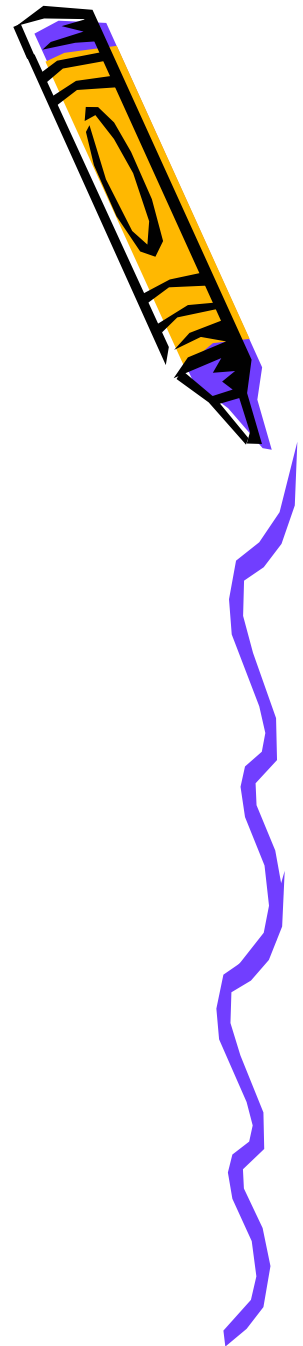
## ***“Feeding Toddlers”***

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We would be delighted if you would like to use this material, but please acknowledge HJ Heinz

# Optimal Nutrition During the Toddler Years

- Description of the toddler environment
- Targeted and emerging nutrients
- Areas of Concern
- Recommendations





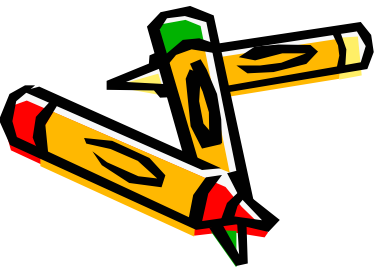
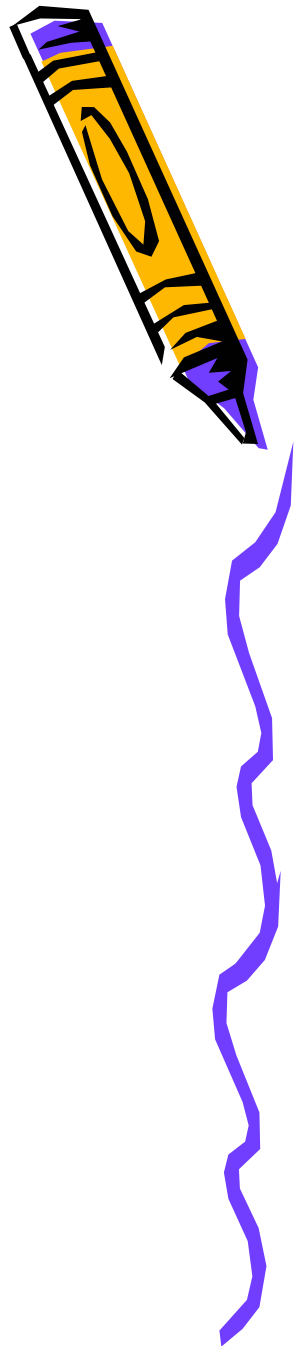
# The Toddler Environment

- Steady growth and development during the second year of life
- Dietary patterns are changing rapidly
- Feeding guidelines not as clear as in infancy
- Motor skills are developing



# Targeted/Emerging Nutrients

- Iron
- Calcium
- Essential fatty acids
- DHA
- Prebiotics & probiotics

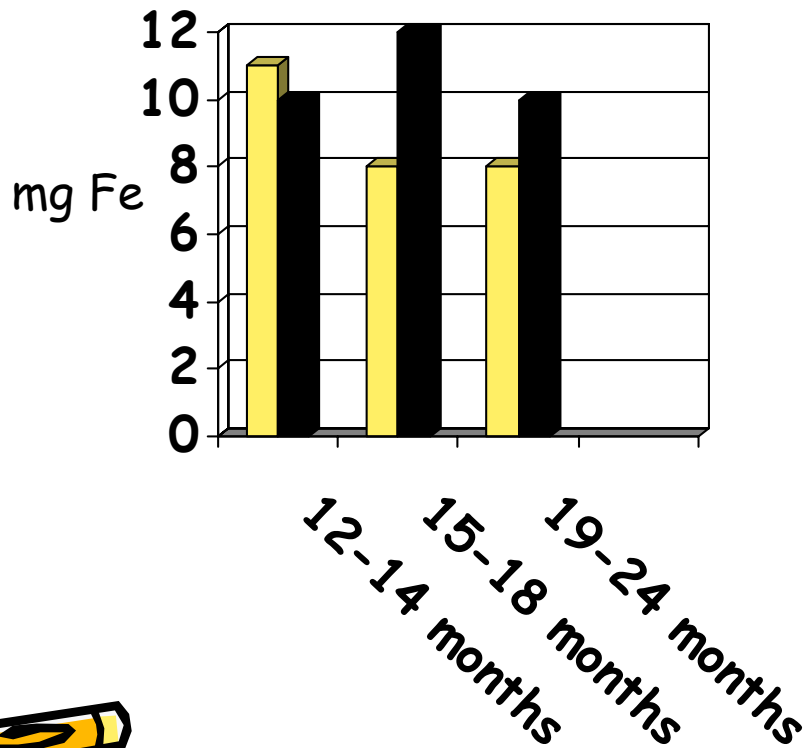


# Iron

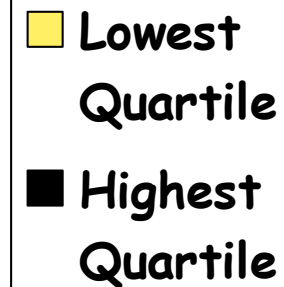
- Iron deficiency is most prevalent during the first 2 years of life
  - NHANES III: 9% of children less than 3 years were iron deficient; 3% anemic
- Severe anemia affects both mental and motor development in children
- Long-term effects of iron deficiency anemia during infancy may be permanent



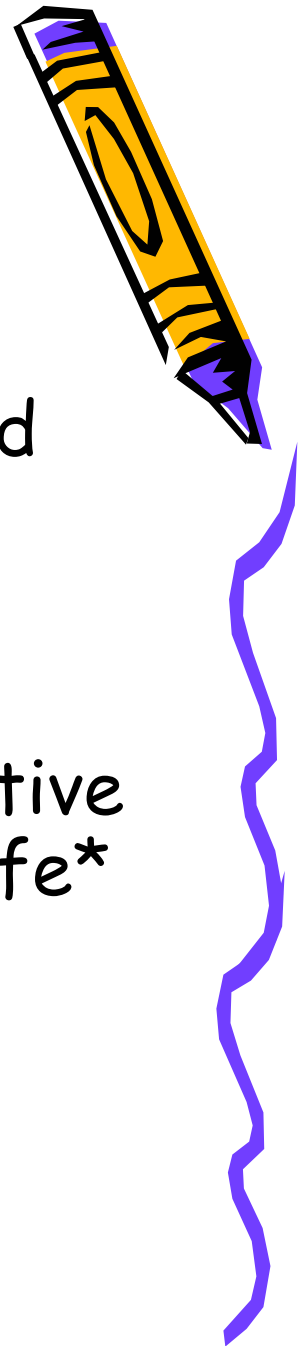
# Iron Intake Patterns



Percent energy from table foods



# Calcium Intake and Bone



- Few studies on bone mineral content and calcium intake
- Longitudinal observational study: bone mineral content associated with cumulative calcium intake during first 5 years of life\*

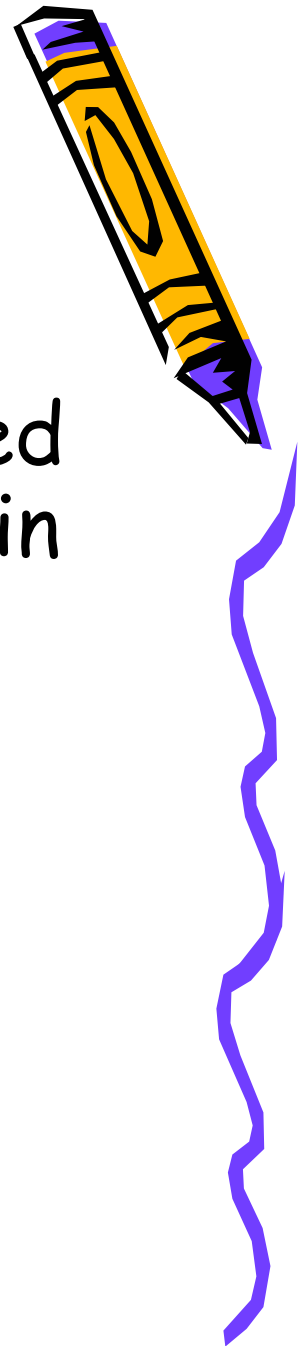
\*Specker B. J Nutr 2004;134:691S-695S



# Calcium Intake Patterns

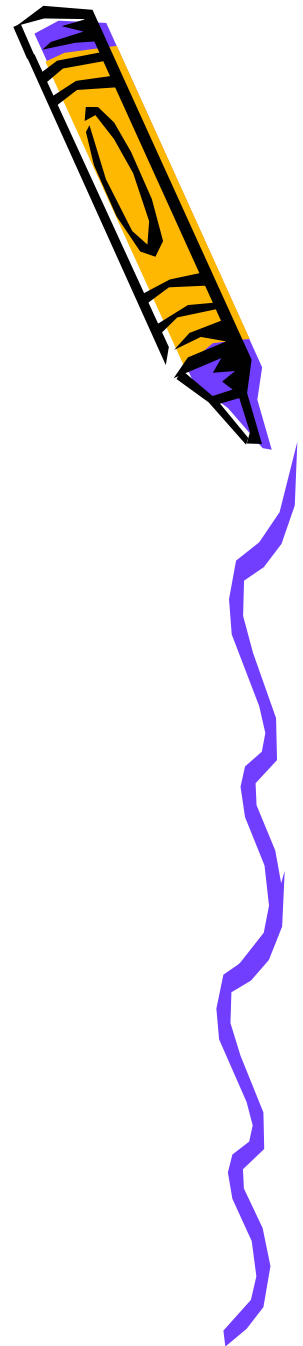
- Juices, fruit drinks, and carbonated beverages appear to displace milk in toddlers' diets\*
  - Lower calcium intakes
  - Food preferences/patterns likely to carry over to older ages

\*Skinner JD et al. J Am Diet Assoc 2004;104:S45-S50.



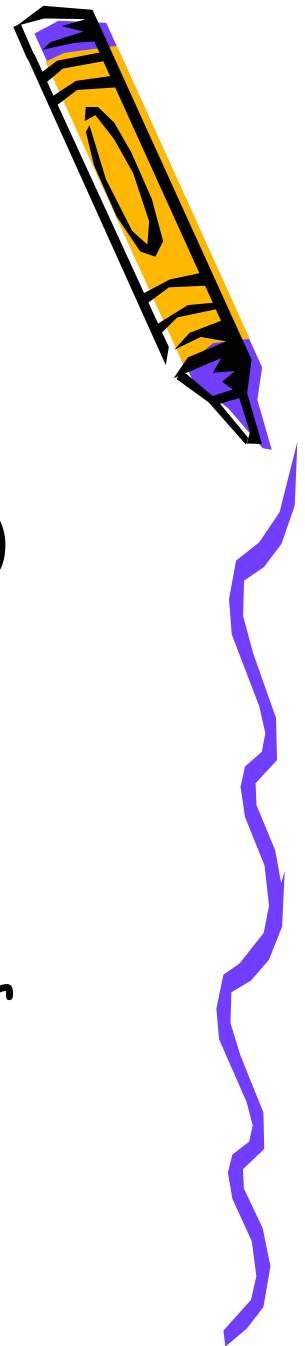
# Essential Fatty Acids

- Linoleic Acid
  - *n*-6 polyunsaturated fatty acid (18:2)
  - Precursor to arachidonic acid
  - Lack: rough, scaly skin, dermatitis, reduced growth



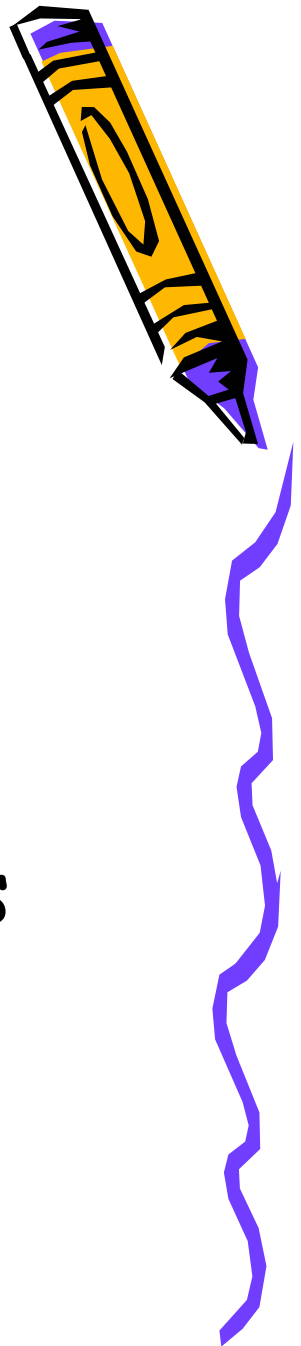
# Essential Fatty Acids

- $\alpha$ -linolenic Acid
  - *n*-3 polyunsaturated fatty acid (18:3)
  - Precursor to EPA, DHA
  - Plays an important role as structural membrane lipid, especially in nerve tissue and the retina
  - Lack: neurological abnormalities, poor growth



# Essential Fatty Acids: Intake Patterns

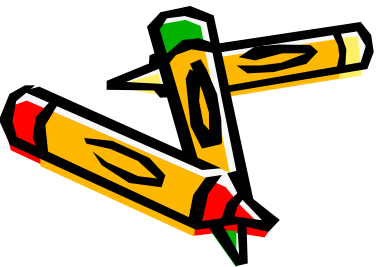
- Cow's milk has very low levels of linoleic and  $\alpha$ -linolenic acids
- National surveys have documented low linoleic acid intakes in toddlers fed cow's milk



# DHA



- DHA most plentiful lipid in the brain
- Normal increase in brain DHA occurs from the 24<sup>th</sup> week of gestation to 2 years and older

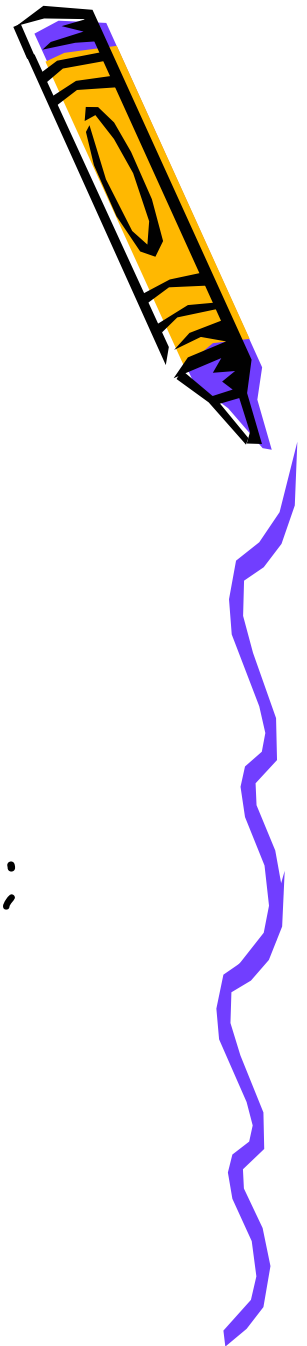


# DHA



- Currently there is concern that infants receiving adequate EFAs may also need a dietary source of the long-chain polyunsaturated products of EFAs: DHA and AA





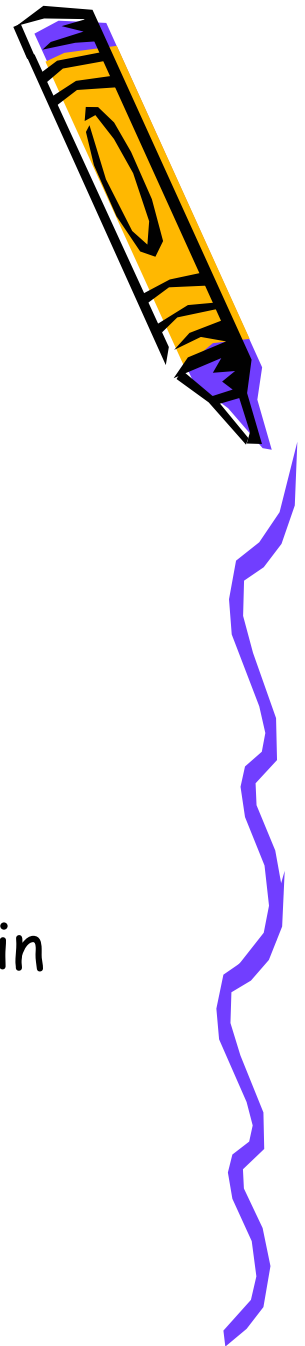
# DHA: Visual Development

- Preterm infants
  - Supplementation results in higher retinal function or visual acuity
- Term infants
  - Mixed results: Sensitivity of method; dose



# DHA: Cognitive Development

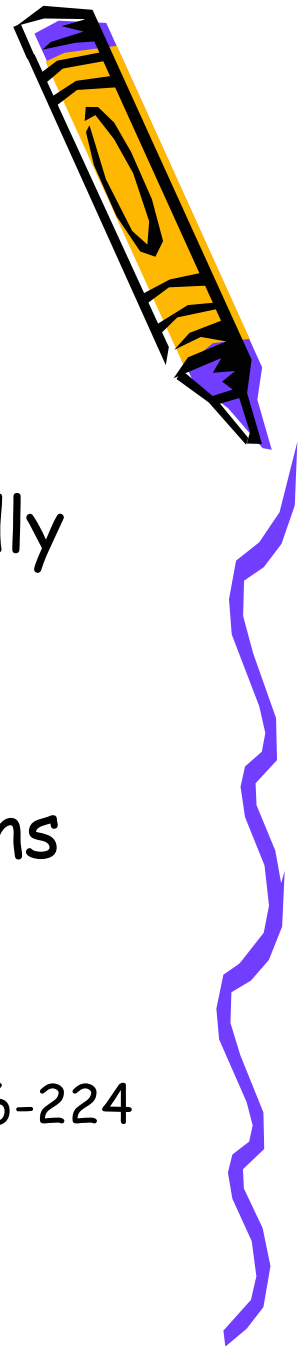
- Results have been mixed
  - Inadequate sample sizes
  - Variable composition of formulas
  - Inappropriate measures of cognition
    - Specific cognitive outcomes such as distractibility in toddlers and attention in preschoolers have been related to DHA intake or DHA in cells/lipids



# Prebiotics

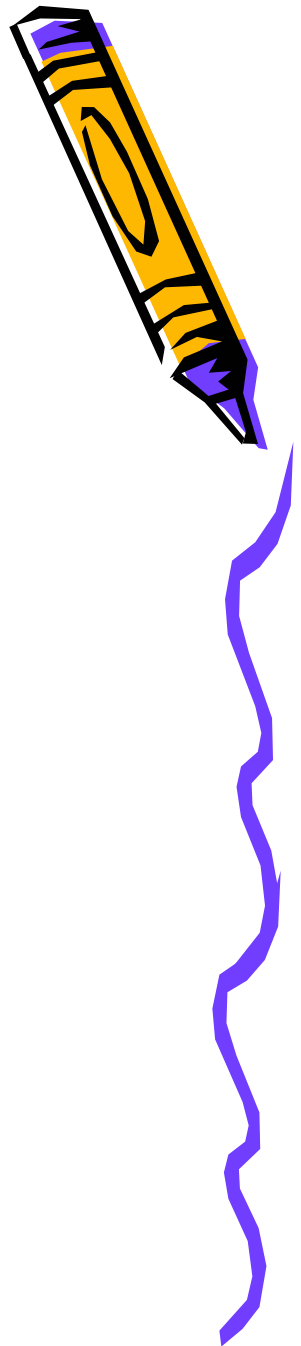
- Nondigestible food ingredients that stimulate the growth/activity of friendly bacteria in the colon
- Inulin, fructose oligosaccharides, pectins

Adiv OE et al. Pediatric Endocrinology Reviews 2004;2:216-224



# Potential Health Effects of Prebiotics

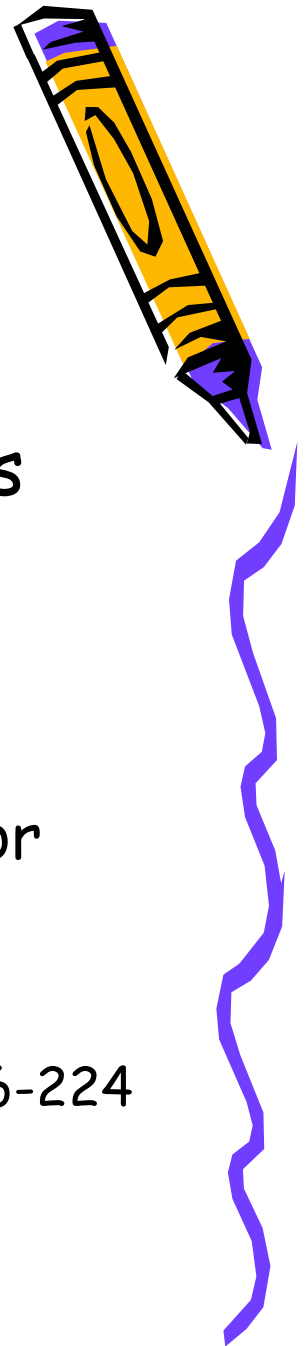
- Bifidogenic effect
- Improvement of bowel function
- Increase in mineral absorption



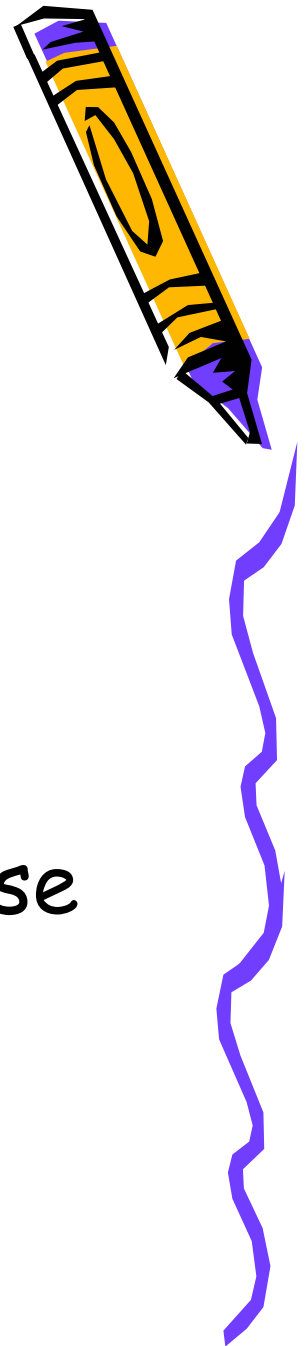
# Probiotics

- Live microorganisms in fermented foods that promote good health through establishing an improved balance in intestinal microflora
  - Principal microorganisms used: lactobacilli or bifidobacteria

Adiv OE et al. Pediatric Endocrinology Reviews 2004;2:216-224



# Health benefit of Probiotics



- Enhancement of mucosal immune defenses
  - Competition with pathogens
  - Production of antibiotic substances
- Clinical studies: significant decrease in the duration of diarrhea



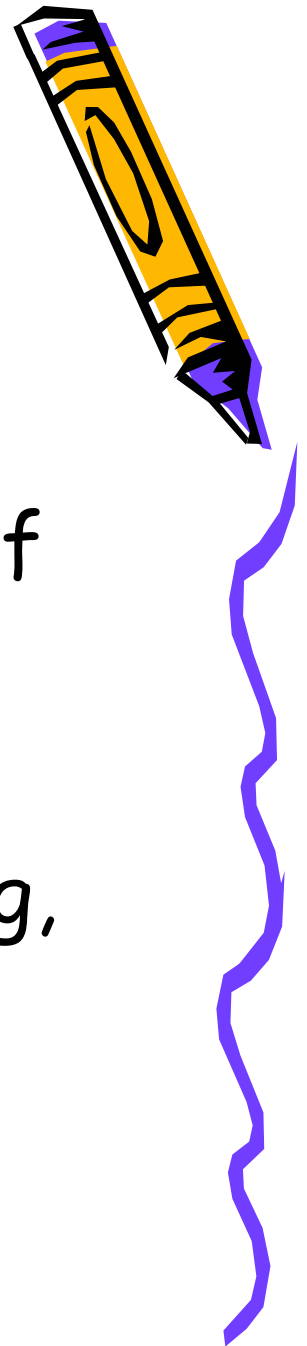
# Areas of Concern

- Allergies
- Vegetable Intake
- Portion Size
- Low Nutrient Dense Foods



# Allergies

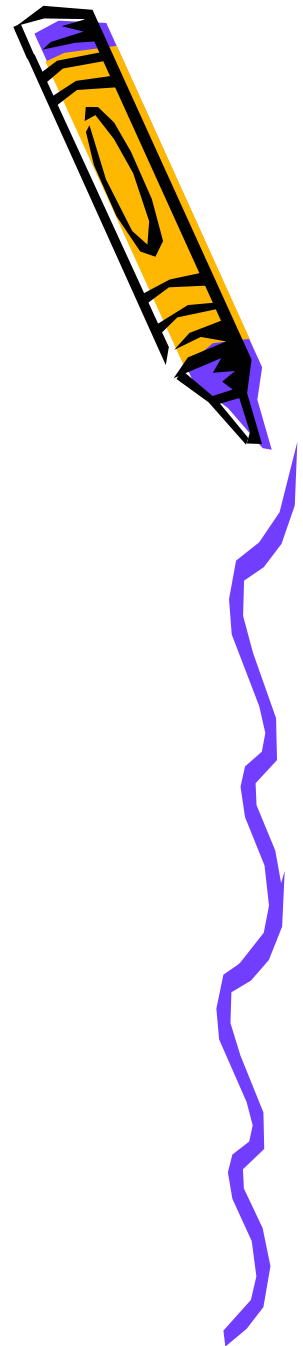
- 6-8% of children develop food allergies within the first 3 years of life
- Most common allergies: peanut, egg, milk



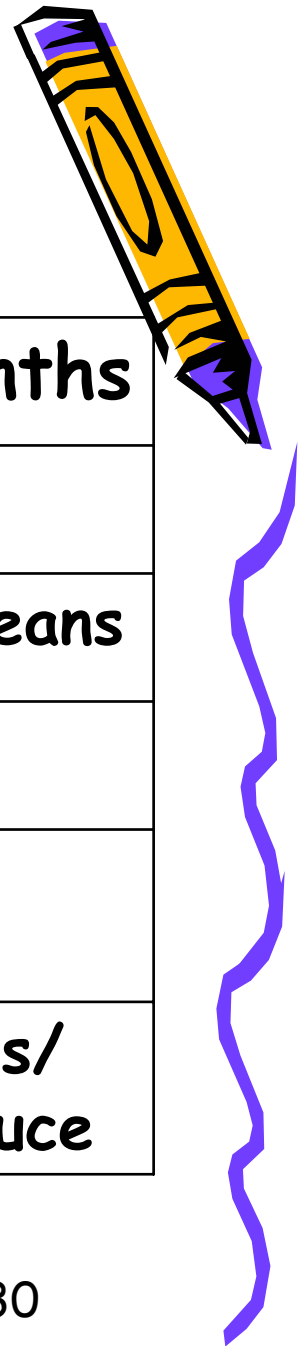
# Allergies

- Children with 2 or more food allergies were shorter than those with 1 allergy
- Lower consumption of calcium, vitamin D, vitamin E

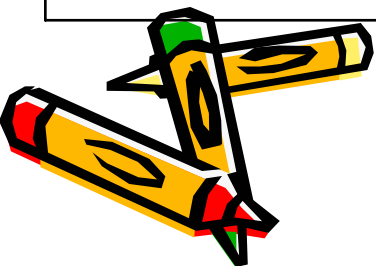
Christie L et al. J Am Diet Assoc 2002;102:1648-1651.



# Variety?



12-14 Months	15-18 Months	19-24 Months
Ckd green beans	French fries	French fries
French fries	Ckd green beans	Ckd green beans
Cooked carrots	Cooked peas	Cooked corn
Mashed/whipped potatoes	Ckd tomatoes/ tomato sauce	Cooked peas
Cooked peas	Mashed/whipped potatoes	Ckd tomatoes/ tomato sauce

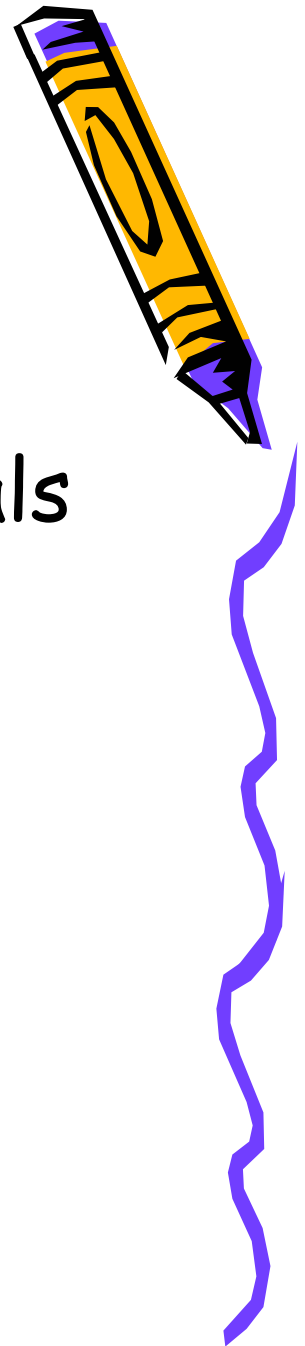


Fox MK et al. J Am Diet Assoc 2004;104:S22-S30

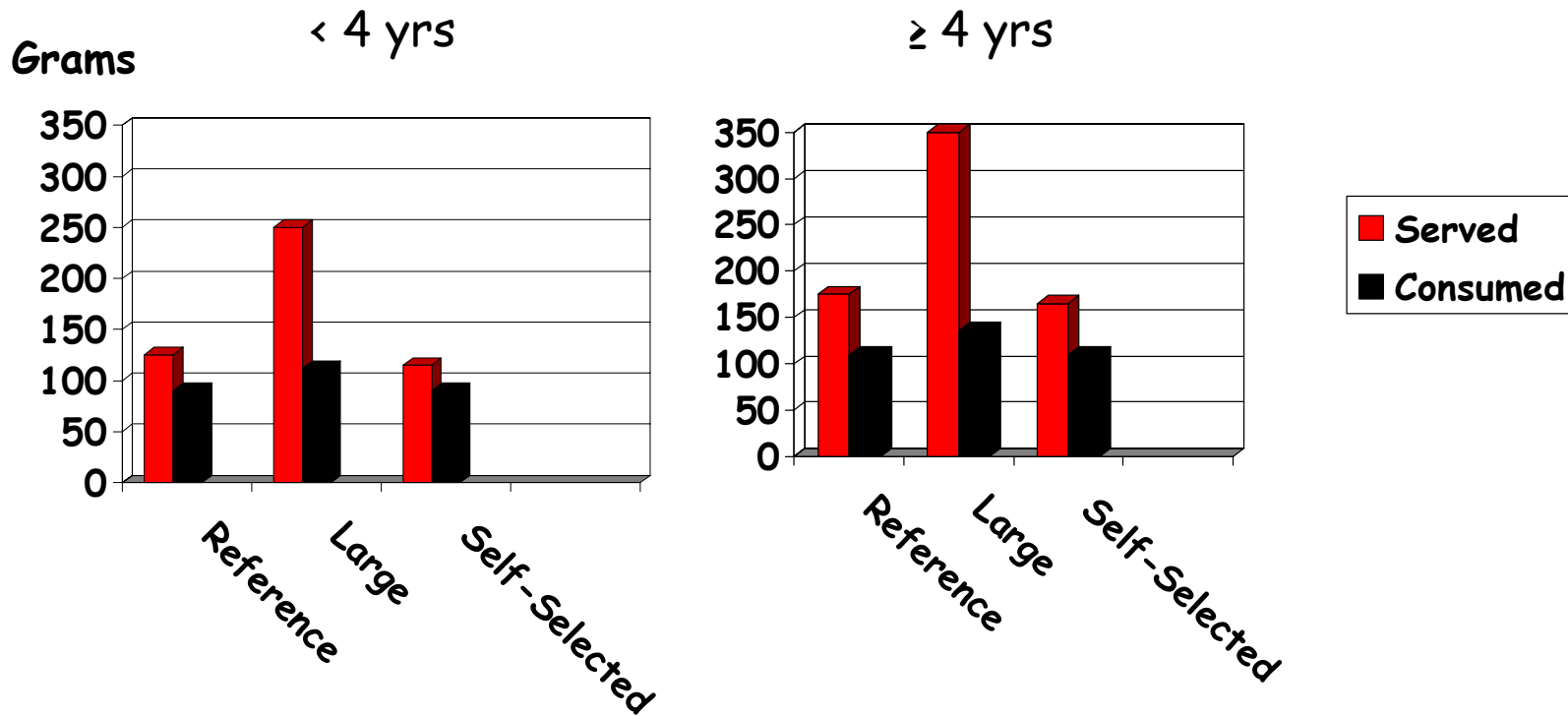
# Kcal Intake

- Children's intake at individual meals highly variable; total daily energy intake constant (Age: 2-5 years)

Birch LL et al. NEJM 1991;324:232-235



# Large Portion Size Promotes Greater Intake

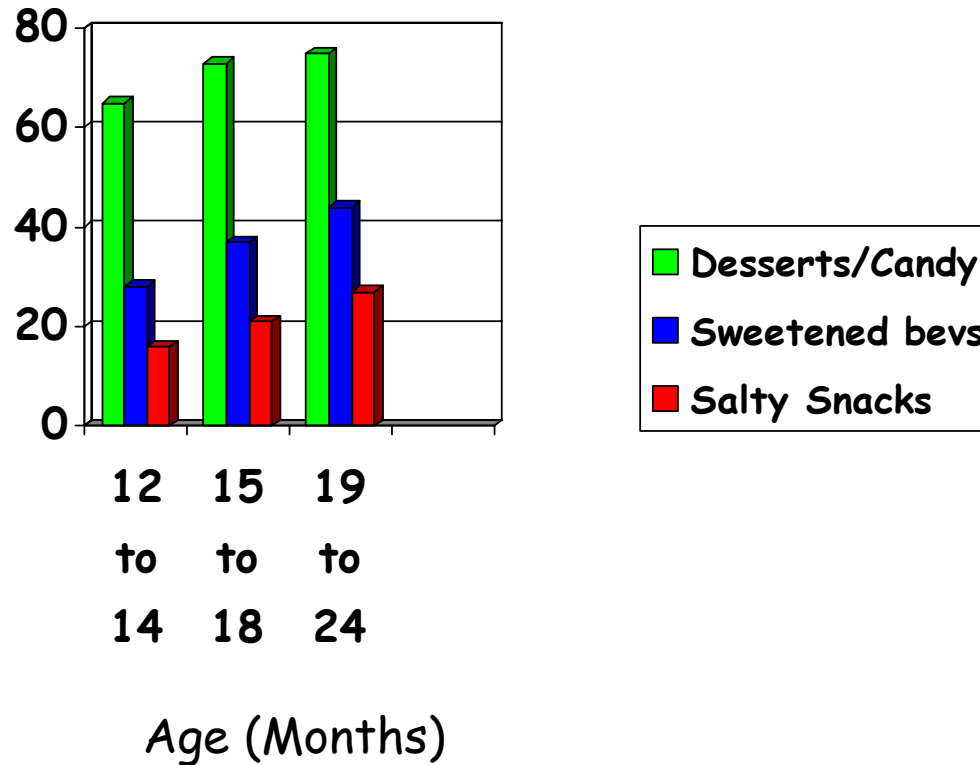


Fisher JO et al. Am J Clin Nutr 2003;77:1164-1170

# Many Toddlers Consume Energy-Dense, Low Nutrient Foods



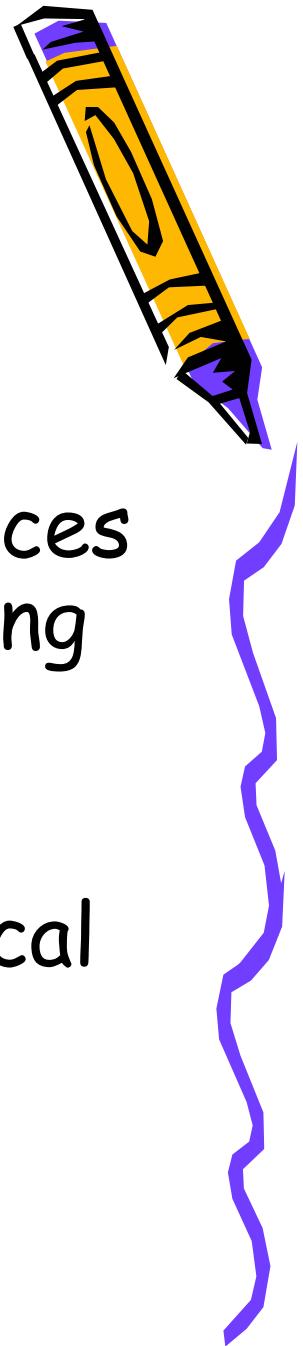
Percent consuming  
At least once/day



Fox MK et al. J Am Diet Assoc. 2004;104:S22-S30

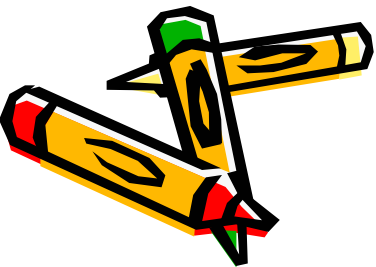
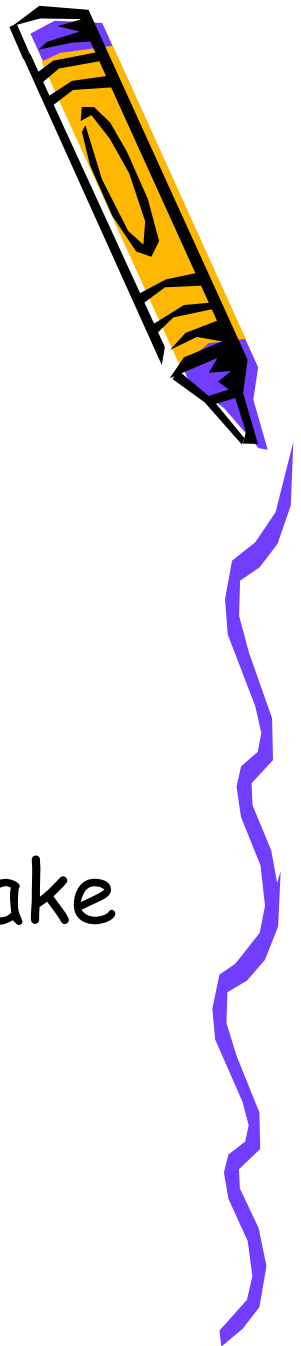
# Recommendations

- Educate caregivers about the importance of early feeding practices in the development of lifelong eating habits
- Encourage foods that deliver critical nutrients and benefits

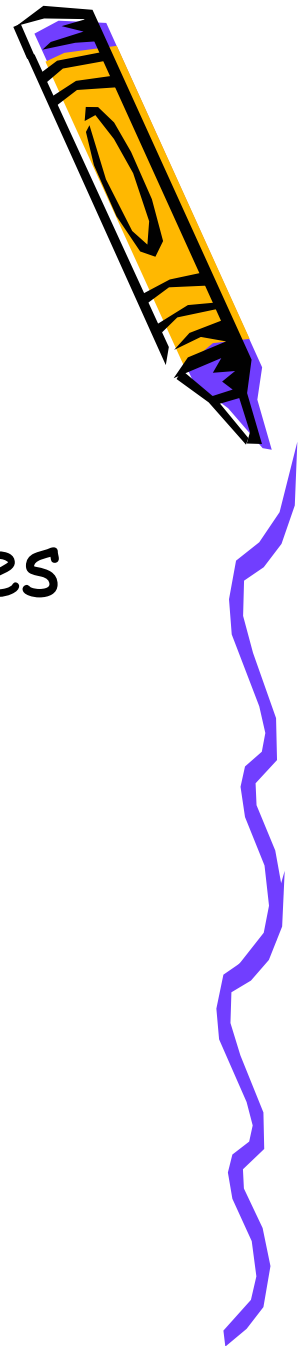


# Recommendations

- For children with allergy, educate parents on alternate sources of nutrients
- Encourage variety in vegetable intake



# Recommendations



- Encourage appropriate portion sizes
- Discourage foods of low nutrient density

