



# **Arsenic Mitigation in Foods and Ingredients**

Cheryl Callen, MS

Gerber Products Company/Nestlé Nutrition

[Cheryl.callen@us.nestle.com](mailto:Cheryl.callen@us.nestle.com)

# Conflict of Interest Statement

I am an employee of Gerber Products Company



# Objectives

- Nutrient intakes for infants and young children
  - Usual Nutrient intakes folate and vitamin B12
  - Food sources of key nutrients
  - Composition of infant cereals in market
- Arsenic Mitigation
  - Internal and external standards
  - Recipe Design
  - Ingredient sourcing
  - Education and variety



# Nutrient Intakes from FITS—One of the Largest Dietary Intake Surveys of Children 0-48 Months

*Collectively, nearly 10,000 parents and caregivers have been surveyed and over 50 peer-review publications are available*



- Cross-sectional survey of ~3,200 caregivers of US children from birth up to 47.9 months
- 3 studies completed (2002, 2008, 2016)
- Data weighted to be nationally representative

## The Study & Participants

- Lifestyle behaviors and feeding practices
- 24-hour dietary recall of all foods, beverages, and dietary supplements
- Second recall on a random subsample

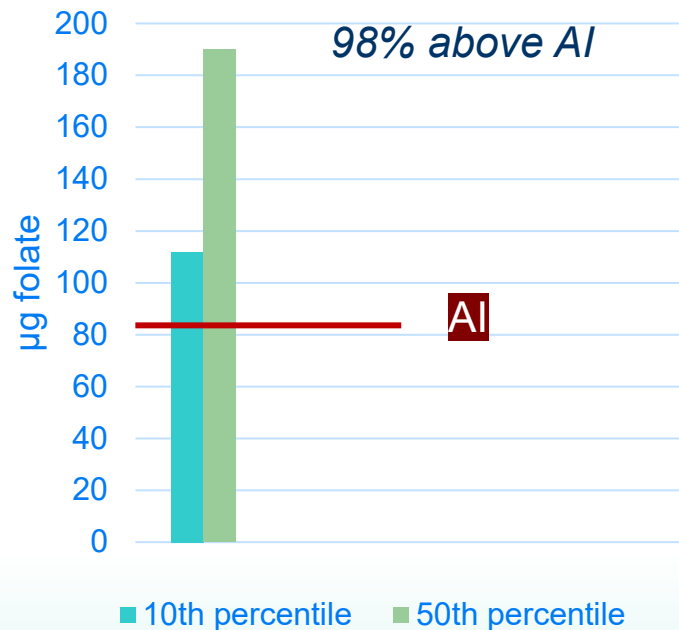
## Instruments

- Collect detailed data on:
- Infant feeding practices
  - Nutrient intakes
  - Food intakes
  - Dietary patterns
  - Lifestyle behaviors

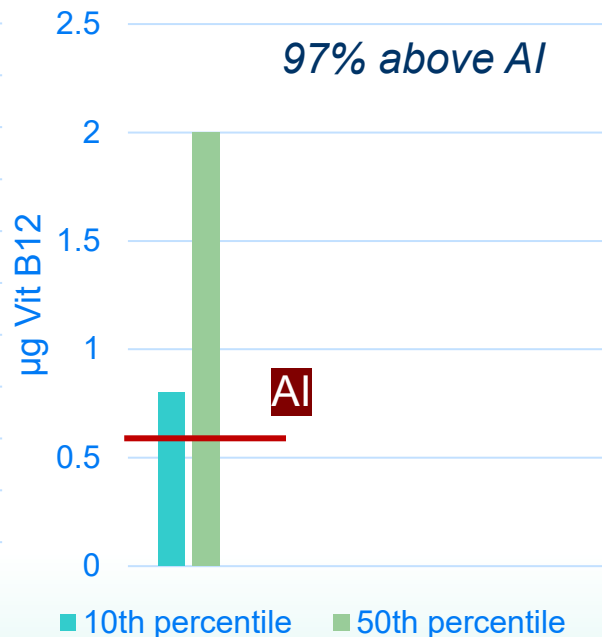
## Study Aims

# Usual Nutrient Intakes: Infants 6-11.9 Months

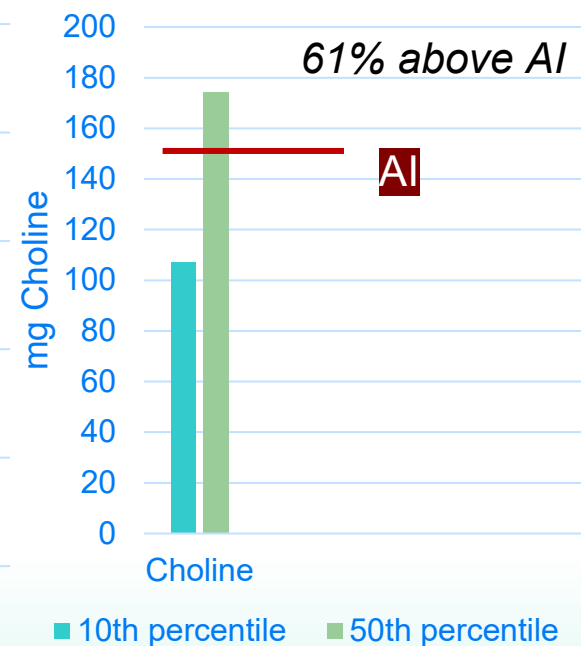
## Folate Intake



## Vitamin B12 Intake



## Choline



Bailey et al 2016

AI=Adequate Intake



# Infant Cereal is the Top Food Source of Folate and Vitamin B12 for Infants 6-11.9 Months

## Folate Sources

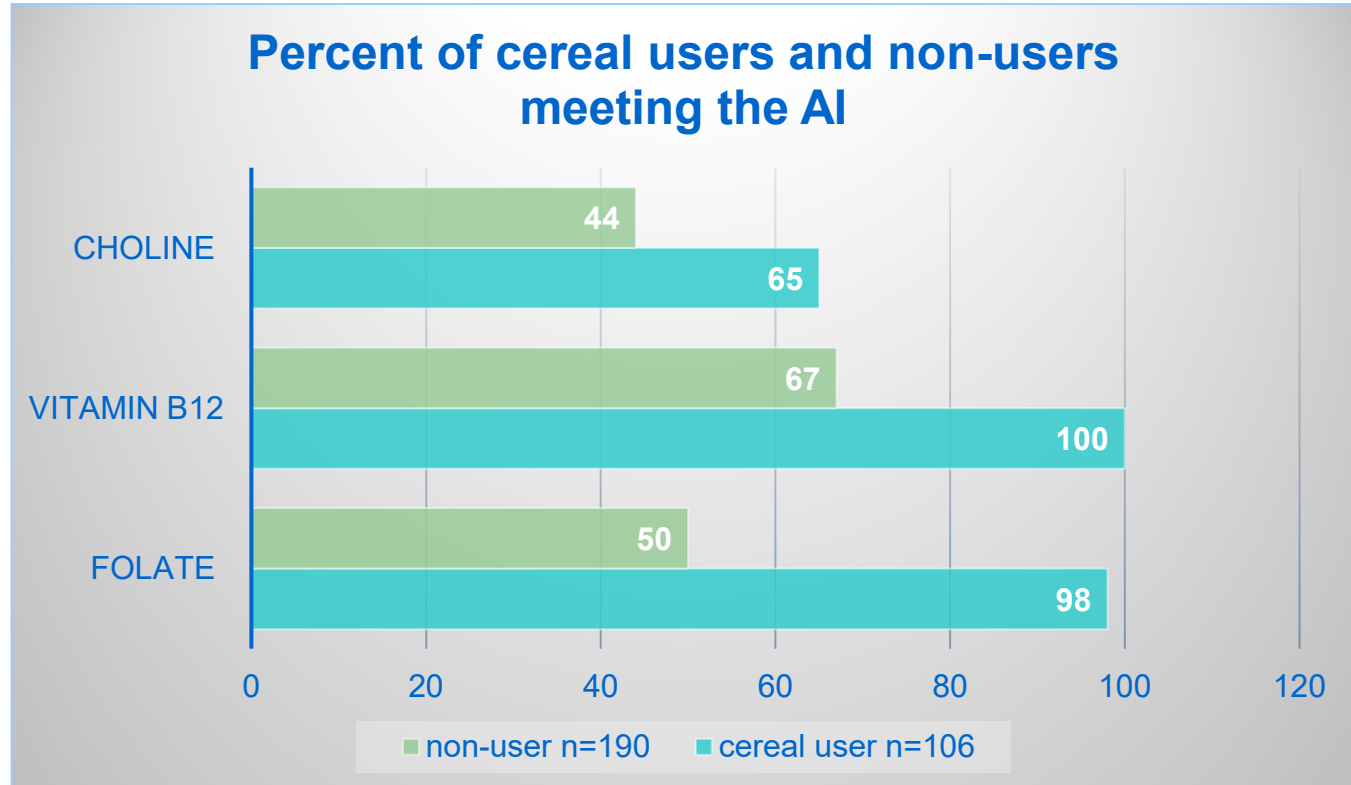
Age 6-11.9 months		
Rank	Food Group	% of Total Intake
1	Infant formula	40
<b>2</b>	<b><i>Infant cereal</i></b>	<b>13</b>
3	Non-infant cereals (ready-to-eat/hot)	11
4	Mixed dishes (includes baby food varieties)	6
5	Breast Milk	5
6	Baby food vegetables	5
7	Baby food fruit	3
8	Fruit	3
9	Vegetables	2
10	Meats and protein sources (includes eggs, legumes)	2
11	Breads, rolls, biscuits, bagels, tortillas	2
12	Pasta and rice	2

## Vitamin B12 sources

Age 6-11.9 months		
Rank	Food Group	% of Total Intake
1	Infant formula	50
<b>2</b>	<b><i>Infant cereal</i></b>	<b>16</b>
3	Cow milk	7
4	Non-infant cereals (ready-to-eat/hot)	5
5	Meats	4
6	Yogurt and cheese	3
8	Eggs/egg dishes	2

# Fortified Infant Cereal Improves Adequate Nutrient Intake - Especially for Breast Fed Infants

*Breastfed infant cereal users more likely to have adequate intakes than non-users*



# Infant Cereals Do Not Have a Required Composition\*

## Comparison of Select Nutrients in Commercial Infant Cereals†

Nutrients	Infant Cereal Example A	Infant Cereal Example B	Infant Cereal Example C	Infant Cereal Example D
	% Daily Value per serving			
Iron	60%	60%	60%	45%
Folate	15%	15%	25%	---
Vit B12	25%	25%	25%	---
Zinc	30%	30%	25%	---
Choline	---	10%	---	---



\*To be included in the USDA Women Infants and Children program infant cereals must have 45 mg iron/100g dry cereal

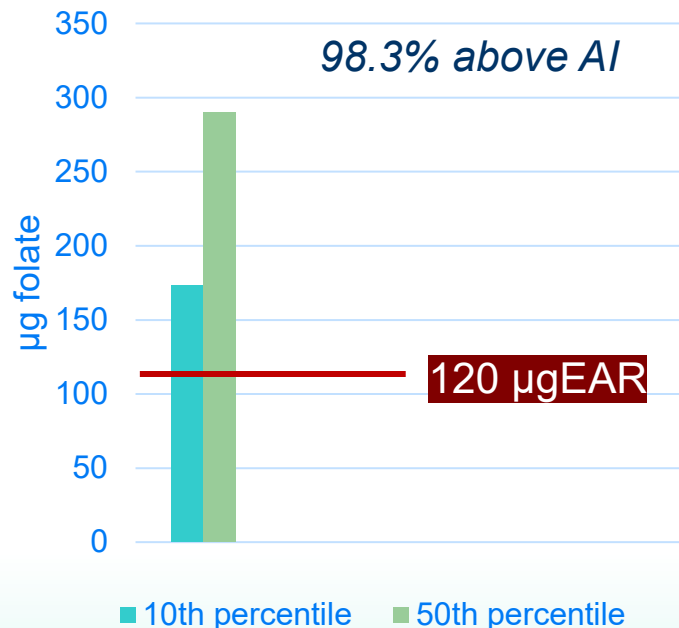
† Label values from manufacturer's website 11.07.2021



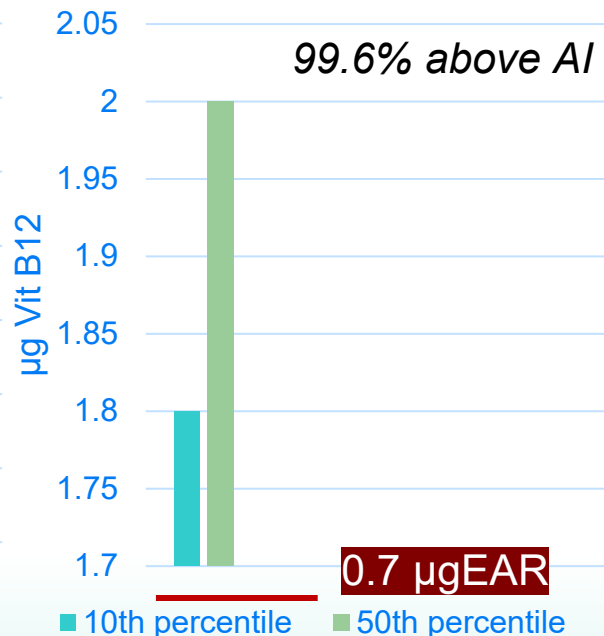


# Usual Nutrient Intakes: Children 12-23.9 Months

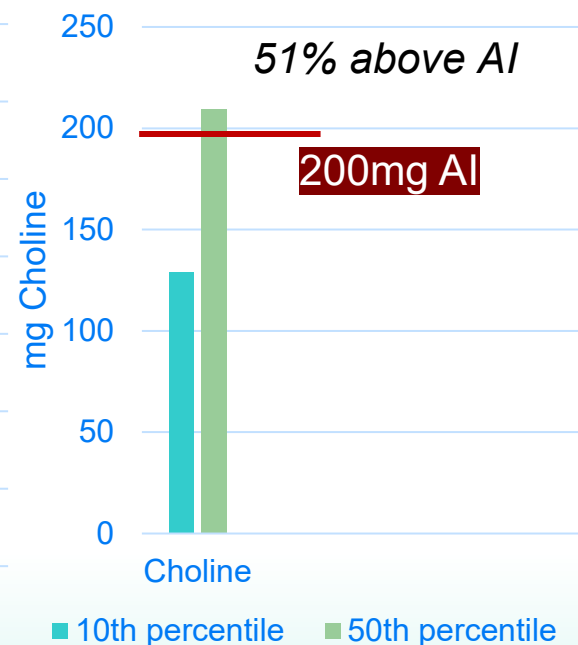
## Folate Intake



## Vitamin B12 Intake



## Choline



Bailey 2016 / FITS 2016 unpublished



# Non-Infant Cereal and Milk Are the Top Food Sources of Folate and Vitamin B12 for Infants 12-23.9 Months

## Folate Sources

Age 12-23.9 months		
Rank	Food Group	% of Total Intake
1	<b>Non-infant cereals (ready-to-eat/hot)</b>	<b>27</b>
2	Cow Milk	6
3	Vegetables	6
4	Breads, rolls, biscuits, bagels, tortillas	2
5	Fruit	5
6	Crackers, pretzels, rice cakes	4
7	Pasta and rice	4
8	Meats	3
9	Pancakes, waffles, French toast	3
10	Sweet bakery and cereal/nutrition bars	3
11	Eggs/egg dishes	2
12	Dried beans, peas, legumes	2
13	Infant cereal	2
14	100% fruit juice	2
15	Pizza	2
16	Sandwiches	2

## Vitamin B12 sources

Age 12-23.9 months		
Rank	Food Group	% of Total Intake
1	<b>Cow Milk</b>	<b>47</b>
2	Meat	11
3	Non-infant cereals (ready-to-eat/hot)	9
4	Yogurt and cheese	7
5	Eggs/egg dishes	6
6	Yogurt and cheese	3
8	Pancakes, waffles, French toast	3
9	Infant cereals	2

# Arsenic Mitigation

# Considerations for Establishing Internal Standards

- Regulatory standards including action levels, both final and proposed
  - Markets where products will be sold—US and Export
  - Where no standard exists in market—consider global standards such as European Union
  - Monitor scientific literature for emerging or changing findings
- Starting 2010, Nestlé has adopted an internal global standard covering a broad list of contaminants based primarily on EU regulation. These limits are in addition to local (US) regulatory limits.



# Comparison of FDA, EU, and Baby Food Safety Act

Product Category	US FDA Guidance or Limits	EU Limits for Infants and Young Children	Baby Food Safety Act Levels
Apple Juice (ready-to-drink)	10 ppb	NA	10 ppb
Other Juices (ready-to-drink)	NA†	NA	10 ppb
Infant Rice Cereal	100 ppb	100 ppb‡	15 ppb
Infant cereals, non-rice	NA†	NA	15 ppb
Fruit/Vegetable Purees	NA†	NA	5 ppb
Grain Based Snacks	NA†	100 ppb‡	5 ppb

†FDA conducts testing of foods and can take enforcement action if a food is deemed to be adulterated based on high levels of lead, arsenic, cadmium, or mercury.

\* total arsenic

‡applies to rice ingredient not finished product.

Parts per billion (ppb)

# Managing Contaminants via Recipe Design

## *Nutrition vs. Toxicology*

*recipe amounts  
consider contaminant  
levels of ingredients*

### *The nutritionist picks:*

- Whole grain brown rice
- Apple juice for sweetening
- Sweet potatoes
- Spinach
- Beets

### *The toxicologist picks:*

- Rice starch
- Cane sugar
- White potatoes
- Iceberg lettuce
- Green Beans



# Other Recipe Considerations



## Fortification

Fortification to address nutrient gap/  
maintain intakes

Example—premixes and minerals such as  
calcium



## Water sourcing and testing

Local water supply and testing  
RO water/other treatments



## Processing

Washing and peeling of fresh produce  
Loss of moisture and concentration of  
contaminants

# Ingredient Selection and Sourcing

- Specifications for ingredients and finished products
- Consider relevant contaminants and requirements
- Work directly with suppliers to meet requirements
- Supplier audits and testing of ingredients
  
- For Gerber:
  - Work directly with growers at the farm and field level
  - Annual grower conferences led by our agronomy experts
  - Agricultural research to minimize contaminants at the field level





# Factors Affecting Soil Contaminants

## 1) Use of arsenical pesticides (associated with cotton/tobacco)

Lead Arsenate was banned in 1988 in the US and in the EU around this same time). After applications on citrus were eliminated in 2009, no food uses of MSMA remained in the US.

## 2) Arsenic and chicken feed

Arsenic was introduced to chicken feed in the 1940s to improve muscle growth, fight disease, and make the meat pinker. Most of the arsenic is excreted, but some ends up in the chicken meat.

Arsenic laden manure is applied to soil as fertilizer, resulting in a buildup of arsenic levels over time

## 3) Naturally occurring heavy metals

Associated with weathering rock due to volcanic activity

## 4) Geographic location

Ratio of total to inorganic arsenic can vary by geographic location



# Factors that May Affect Contaminant Uptake by Crops, but More Research is Needed

Soil levels

Environmental conditions

Soil pH and organic matter

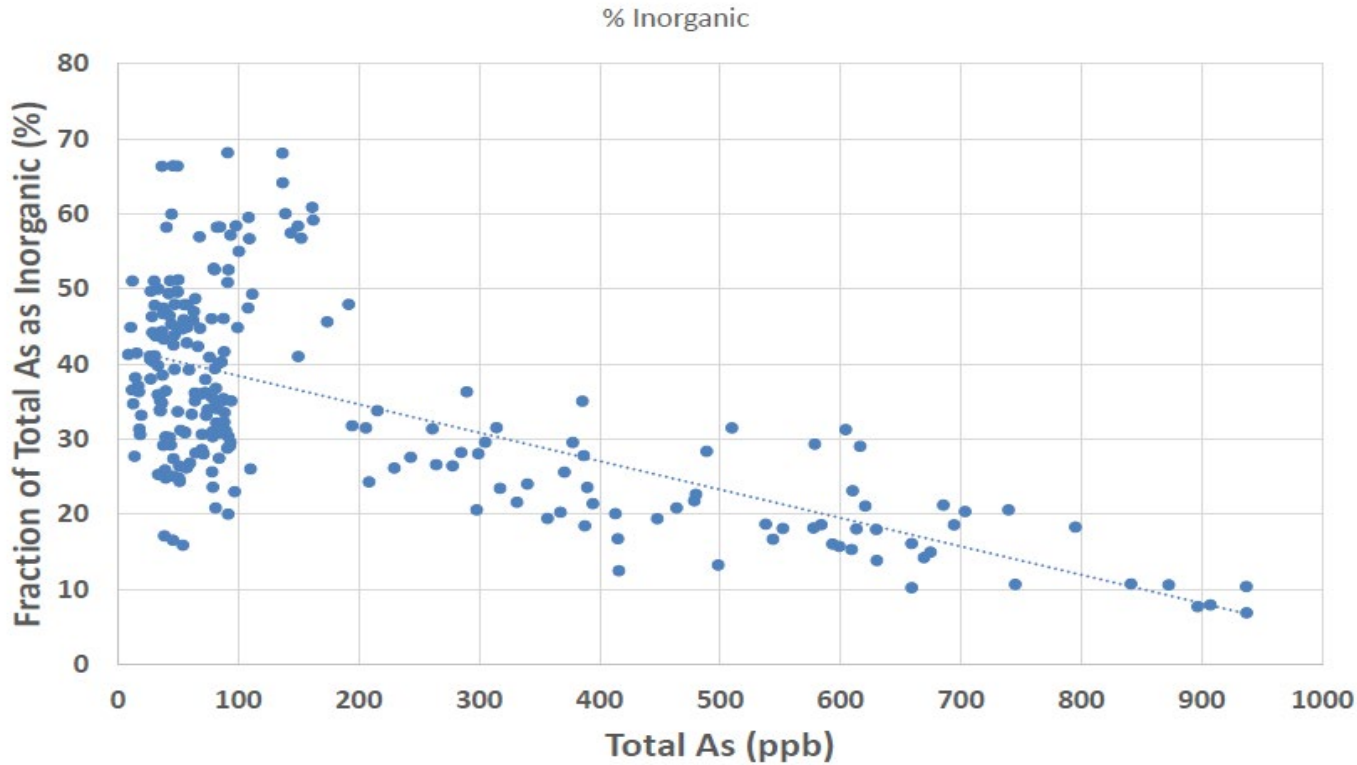
Other

For Rice, irrigation plays a role

## Impact of irrigation practices

- In standard flood conditions: Arsenic is high and cadmium is low
- In non-flood conditions: arsenic levels decrease but cadmium tends to increase

# Lowering Total Arsenic May Not Result in a Comparable Drop in Inorganic Arsenic Levels



University of Arkansas  
Study, Trenton Roberts



# Gerber Sourcing for Infant Rice Cereal

- Rice ingredient is from a long-term strategic supplier
- Rice mill works directly with their grower members to source rice and maintain identity to the grower
- Growers are incorporating different irrigation strategies to reduce the amount of water used and to reduce the arsenic levels in the grain
- Identity preservation is maintained throughout supply chain

1) from the grower, 2) through the mill, 3) to the Gerber cereal factory



# Education and Variety: Important Tools to Help Minimize Contaminant Exposure

American Academy  
of Pediatrics



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U.S. FOOD & DRUG  
ADMINISTRATION

## What You Can Do to Limit Exposure to Arsenic

*Tips to limit exposure to Arsenic*

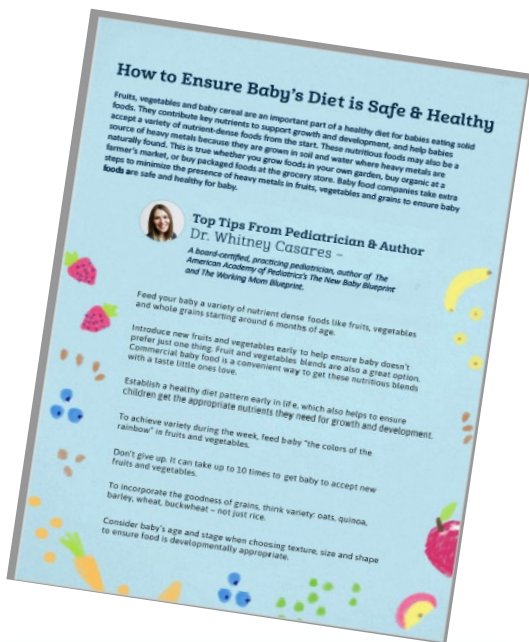
### Check your well water

If your drinking water comes from a well, test your water in the spring or early summer to make sure arsenic levels do not exceed 10 parts per billion (.01 milligram per liter), the federal standard for safe drinking water. Visit <https://www.epa.gov/privatewells> (<https://www.epa.gov/privatewells>) for information on private well testing.

### Eat a varied and nutritious diet



Consumers should eat a varied, well-balanced diet both for good nutrition and for food safety. This approach helps to promote the intake of important nutrients, as well as minimize potential adverse consequences from consuming an excess of any one food.



**Gerber unbranded  
educational materials**

To help reduce arsenic in your baby's diet:

- Offer infant cereal grains like oatmeal, barley and multigrain. Rice cereal does not have to be the first cereal or first food given to infants, according to the AAP. Other first foods can include pureed vegetables and meats.
- Avoid processed foods containing brown rice sweetener, and do not use rice milk instead of cow's milk.
- Cook brown rice in extra water (six to 10 parts water to one part rice) and drain the extra water to reduce the arsenic.
- Feed your baby only breast milk for the first six months of life.
- If your child has a swallowing disorder (dysphagia) or gastroesophageal reflux disease and needs cereal thickeners added to formula or breast milk, the AAP suggests using oatmeal. Also, talk with your child's pediatrician or a feeding specialist. Find details about oatmeal thickeners on the AAP Healthy Children website: <http://bit.ly/22TIG23>.



SOT FDA Colloquia on Emerging Toxicological Science Challenges in Food and Ingredient Safety

# Acknowledgments

- Trenton Roberts, PhD—University of Arkansas
- Todd DeKryger, PhD—Regional Manager, Sustainable Agricultural Development, Nestlé North America
- Kristin Finn, MS RD—Nutrition Scientist, Gerber Products Company
- Susan Pac, MS RD—Regulatory and Scientific Affairs, Gerber Products Company

