Use of Peanut Based, Probiotic Foods to Manage Diarrheal Diseases among Children in the Developing World

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RESEARCH QUESTION
- Is it possible to use value-added, peanut-based foods to improve gastrointestinal health and prevent diarrheal diseases among children in the developing world?

COUNTRIES AND SITES
- The United States and Ghana

PEANUT CRISP THRUSTS
- Utilization thrusts
  - Identification of new market opportunities and development of new products to meet market needs
  - Development and transfer of appropriate, low-cost technologies to use peanut in traditional and new food, fuel, and fiber products
- Global thrusts
  - Increasing the value and safety of peanuts to consumers

IMPACT AREAS
- Nutrition and health

BACKGROUND
- Globally, approximately 10.6 million children younger than 5 years of age died between 2000 and 2003
- 42% of these deaths occurred in Africa, with various countries reporting anywhere from 10% to 40% of the world's population
- 72% of the deaths occurred in Africa are due to six causes:
  - Pneumonia (19%)
  - Diarrhea (18%)
  - Malaria (16%)
  - Neonatal pneumonia or sepsis (15%)
  - Preterm delivery (10%)
  - Asphyxia at birth (9%)
- Diarrheal disease
  - One of the leading causes of mortality and morbidity of children in sub-Saharan Africa
- Mickey Chopra, Chief of Health at UNICEF
  - “All attention has gone to three neglected diseases such as AIDS and malaria...
  - ‘Diarrhea is a forgotten disease’

CURRENT INTERVENTION FOR DIARRHEA DISEASE
- Vaccine for diarrhea diseases
  - Not available
- Antibiotic regimen
  - Some delay normal intestinal flora
  - Other induce diarrhea
  - For diarrhea caused by Shiga toxin-producing E. coli and enterotoxigenic E. coli
  - Increased risk of hemorrhagic-encephalitic syndrome
  - Racial failure

POSSIBLE INTERVENTION STRATEGIES
- Clean drinking and gaming water
- Sanitizing sewage system
- Good living environments
- Better nutrition and prevention

PROBIOTICS AND HEALTH BENEFITS
- Live microorganisms benefiting human health
  - Prevent diarrhea
  - Manage lactose intolerance
  - Prevent colon cancer
  - Lower blood pressure
  - Improve immune function and prevent infections
  - Reduce inflammation
  - Improve mineral absorption
- Treat ischaemic bowel syndrome and colitis

USES OF PROBIOTICS TO MANAGE DIARRHEA DISEASES
- Infectious diarrhea
  - Prevent and treat various forms of gastroenteritis
  - Reduce the length of illness and treatment frequency
- Antibiotic induced diarrhea
  - Reduce the incidence and severity

MAJOR TECHNICAL STEPS
- Select probiotic cultures from a wide range of choices (five cultures/mixtures used: A-E)
  - Develop full/reduced fat probiotic peanut butter
  - Monitor probiotic survival and efficacy during a 12-month storage period at 4°C, 25°C, and 37°C

WHAT WILL WE DO IN THE NEXT FIVE YEARS
- Probioctic peanut based confectionary foods
- Survival of probiotic organisms in simulated gastrointestinal flora
- Efficacy in the prevention/relief of diarrheal symptoms
- Effects in the prevention/relief of diarrheal symptoms
- Effect on the permeability of diarrhea pathogens
- Effects on the permeability of diarrhea pathogens
- Fecal shedding of pathogens and probiotic organisms
- Intestinal colonization of pathogens and probiotic organisms
- Clinical studies that...
  - Monitor fecal pathogens
  - Monitor fecal coliforms
  - Monitor major enteric pathogens such as Salmonella and Shigella
- Conduct survey on diarrhea episodes
- Use of peanut-based products for other vaccine deliveries

![Images of probiotic peanut butter containers, meat and nitrogen tank, probiotic peanut butter processing, processed probiotic peanut butter (A-E), probiotic peanut butter in containers, probiotic peanut butter sampling scene, probiotic bacteria on an agar plate]

![Graphs showing survival of probiotic bacteria in a full fat product and survival of probiotic bacteria in a reduced fat product]

![Table 1: Results of statistical analysis. Means (log CFU/g) within the same category not followed by the same letter are significantly different (p < 0.05).]

![Graph showing survival of probiotic bacteria in a reduced fat product]

![Figure 3: Ranking of different probiotic bacterial spp. in one of the products during storage. P. r. Lactobacillus rhamnosus; E. coli. Bifidobacterium, C/ct. Staphylococcus.]

![Bar chart showing survival time (h) for different probiotic bacteria in storage]

![Image of children with probiotic peanut butter]