Importance and Role of Isotopes to Agricultural Research and Programs

DOE Workshop on the Nation’s Needs for Isotopes

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USDA Radiation Safety Staff

John Jensen, Director
George Washington Carver Center
5601 Sunnyside Ave
Beltsville, MD  20705

301-504-2440

www.rss.usda.gov
USDA RADIOISOTOPE USAGE

- 225 PERMITS/PRIMARY USERS
- 955 SECONDARY USERS
- 6 USDA AGENCIES
- 100 LOCATIONS/FACILITIES
- 3 INTERNATIONAL LOCATIONS

- Does not include funded research and programs
USDA RADIOISOTOPE TYPES

- RADIO-LABELED CHEMICALS
- SEALED SOURCES
  - Irradiators
  - Portable Gauges
  - Electron Capture Detectors
  - X-ray Fluorescence Analyzers
AGRICULTURAL RESEARCH SERVICE

- RADIO-LABELED CHEMICALS
  - HUMAN NUTRITION
  - ANIMAL STUDIES
  - PLANT STUDIES
ANIMAL and PLANT HEALTH INSPECTION SERVICE

- RADIO-LABELED CHEMICALS
  - PEST MANAGEMENT
- SEALED SOURCES
  - PESTICIDE TESTING
  - INSECT STERILIZATION
FOREST SERVICE

- RADIO-LABELED CHEMICALS
  - PLANT and SEED STUDIES
- SEALED SOURCES
  - CONSTRUCTION QA
- SAMPLE TESTING
NATURAL RESOURCES CONSERVATION SERVICE

- SEALED SOURCES
  - WATER MANAGEMENT
  - CONSTRUCTION QA
FOOD SAFETY
INSPECTION SERVICE

- SEALED SOURCES
  - FOOD SAMPLE ANALYSIS
AGRICULTURAL MARKETING SERVICE

- SEALED SOURCES
  - FOOD SAMPLE ANALYSIS
RADIO-LABELED CHEMICALS – Annual Activity (mCi)
 SEALED SOURCE TYPES

IRR | GAUGE | ECD | OTHER
---|------|-----|-----
21 | 140  | 135 | 4   
FUTURE NEEDS

- RADIO-LABELLED CHEMICALS
  - NO INCREASE IN DEMAND
  - HIGH PURITY
  - AVAILABILITY
  - LOWER COST
FUTURE NEEDS

- SEALED SOURCES
  - NO INCREASE IN DEMAND
  - SECURITY ISSUES
USDA Human Nutrition Program
Mission Statement

To define the role of food and its components in optimizing health throughout the life cycle for all Americans by conducting high national priority research.
USDA Human Nutrition Program
Primary Research Focus Areas

- Nutrition Monitoring and the Food Supply
- Scientific Basis for Population Nutritional Standards and Dietary Guidelines
- Prevention of Obesity and Related Diseases
- Life Stage Nutrition
- and Metabolism
Stable Isotopes – Examples of Uses in Department of Agriculture Human Nutrition Research

- **Obesity Prevention** - $^{18}$O and $^2$H labeled water to estimate energy expenditure in humans to understand food and physical activity energy balance

- **Bioactive Food Components** - C-13 labeled organic compounds in plant foods for human feeding trials to measure absorption and bioavailability. Example: labeled anthocyanins in strawberries

- **Human nutrient metabolism studies** - tracing compounds of interest via the ICP-MS analysis of enriched stable isotopes to understand nutrient metabolism and utilization. Examples: Fe-57, Fe-58, Zn-67, Zn-70, C-13, N-15, Ca-42, Ca-47, Mg-25, Mg-26