International Conference on Applications of Radiation Science and Technology
24th to 28th April 2017, Vienna, Austria

Radiation Processing in Ghana: Achievements, Prospects and Challenges

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OUTLINE OF PRESENTATION

- ✓ Institutional profile
- ✓ Achievements:
  - ➢ Developing infrastructure for technology
  - ➢ Ensuring sustainable human resource
  - ➢ Effective regulation of technology
  - ➢ Providing irradiation services
  - ➢ Regional and international collaboration
- ✓ Prospects
- ✓ Challenges
- ✓ Conclusions

INSTITUTIONAL PROFILE

- **Ghana Atomic Energy Commission (GAEC) was established in 1963**

- **GAEC has established 5 Institutes**
  - National Nuclear Research Institute
  - Radiation Protection Institute
  - Biotechnology and Nuclear Agriculture Research Institute
  - Radiological and Medical Sciences Research Institute
  - Ghana Space Science and Technology Institute
  - Nuclear Power Institute

ACHIEVEMENTS

Developing infrastructure for technology

- **Laboratory scale experiments: 1970 -1993**

- ✓ **Gamma cell 220**
  - IAEA Technical Cooperation Project
  - Acquired from AECL, Canada
  - Max. activity: 25 kCi

- ✓ **Determination of Irradiation doses for local foods**

ACHIEVEMENTS

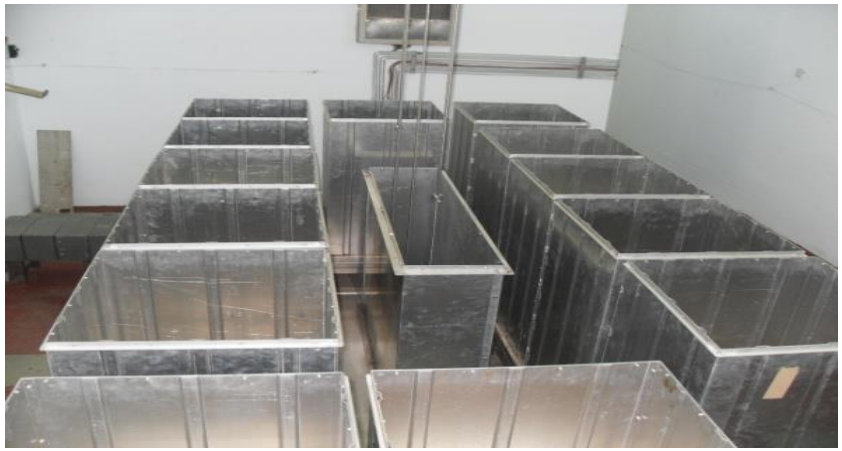
Developing infrastructure for technology

- **Pilot scale studies: 1994-2009**
  - ✓ Gamma Irradiation Facility
    - IAEA Technical Cooperation Project
    - Co-60 irradiator, category IV wet storage
    - multipurpose, batch-operated, cylindrical source
    - initial activity = 50 kCi
  - ✓ Irradiation parameters for local foods established

ACHIEVEMENTS

Developing infrastructure for technology

- **Successful upgrading for full scale commercial operations: 2010 to date**
  - IAEA assistance in training
  - Export Development and Investment Fund
  - Transport system
  - Change from cylindrical to flat source module



ACHIEVEMENTS

Ensuring sustainable human resource development

- Graduate School of Nuclear and Allied Sciences
- Established in 2006 by GAEC and the University of Ghana
- Department of Nuclear Agriculture and Radiation Processing
  - ✓ M.Phil./PhD in Radiation Processing
- 24 postgraduates (M.Phil. Radiation Processing) since 2007
- Over 200 research articles in the field of radiation processing

ACHIEVEMENTS

Effective regulation of technology

- **Licensing and safety inspection by Nuclear Regulatory Authority**
- **Standards developed by the Ghana Standards Board**
  - ✓ Food Technology- Specification for Irradiated F
  - ✓ (GS 210:2007) 2nd Edition
  - ✓ Dosimetry – Standard Practice for Dosimetry
  - ✓ in Gamma Irradiation Facilities for Food and
  - ✓ Non-Food Processing (GS 928: 2008)
- **International Standards**
  - ✓ Code of Good Irradiation Practice
  - ✓ Codex General Standard for Irradiated Foods

ACHIEVEMENTS

Providing irradiation services

- Sterilisation

- ✓ Single-use medical items
  - Cotton wool
  - Bandages
  - Gauze
  - Theatre clothing
- ✓ Pharmaceutical items
  - Raw materials
  - bottles
- ✓ Laboratory items
  - Petri dishes

ACHIEVEMENTS

Providing irradiation services

❖ **Food Irradiation:**

- ✓ Fruits and vegetables → phytosanitary, delaying ripening
- ✓ Roots, tubers, bulbs → sprout inhibition
- ✓ Cereals & pulses → decontamination, disinfestation





ACHIEVEMENTS

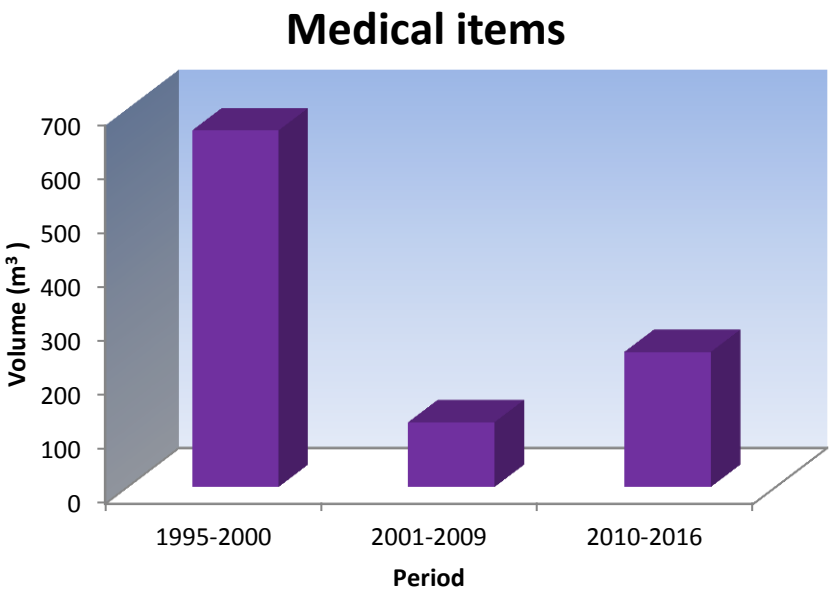
Providing irradiation services

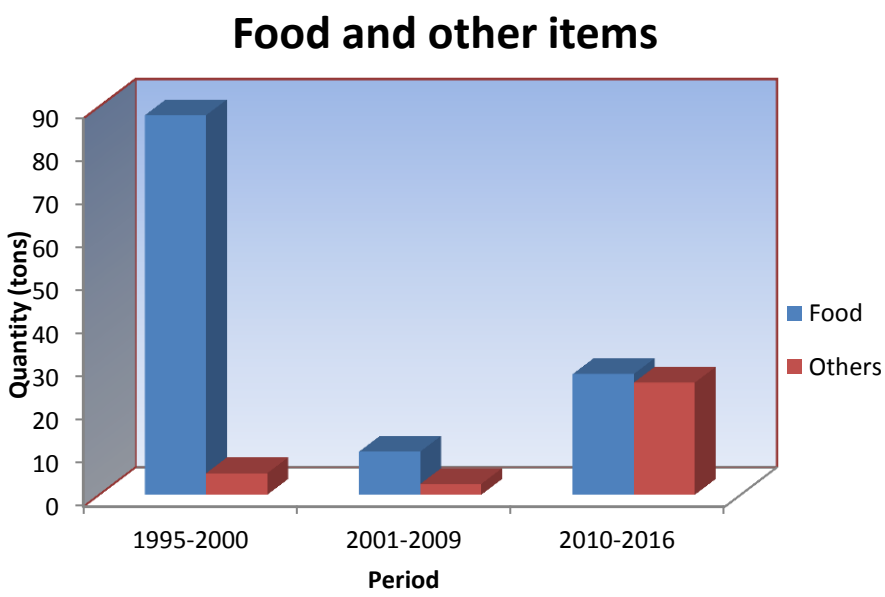
- **Food Irradiation:**
  - ✓ Spices → decontamination and disinfestation
  - ✓ Fish and meat products → decontamination, disinfestation
  - ✓ Herbal products → decontamination
  - ✓ Miscellaneous foods → decontamination

ACHIEVEMENTS

Providing irradiation services

- Output of irradiator (1995 – 2016)





ACHIEVEMENTS

Regional and international collaboration

- Training of scientists and technologists through IAEA fellowship programmes and scientific visits
- Hosting of IAEA workshops and training courses
- Participation in IAEA coordinated research projects

PROSPECTS

- Domestic, Regional and International markets

✓ Food sector
  - cereals, fruits and vegetables, indigenous foods

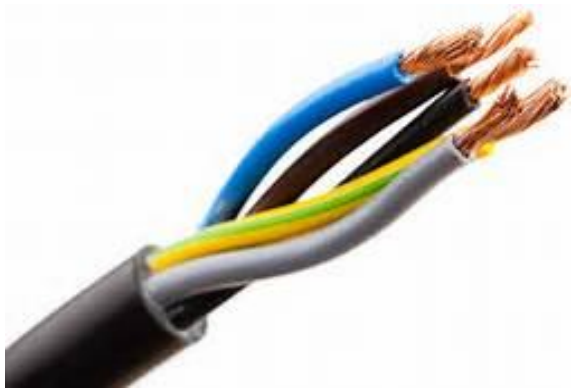
✓ Medical, Pharmaceutical and cosmetic sectors
  - single use items, bottles, raw materials

PROSPECTS

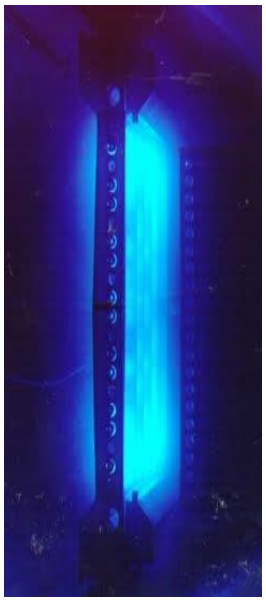
- Domestic, Regional and International markets

  - ✓ herbal and food supplement sector
  - ✓ dried herbal products

- Miscellaneous applications
  - ✓ wood, peat, artifacts, industrial products



CHALLENGES



- Low strength of Co^{60} source
- Difficulties in attracting investment from the private sector
- Difficulties in seeking accreditation

CONCLUSIONS

- Infrastructure has been developed for radiation processing.
- Regulation by national authorities has promoted safe operations.
- Provision of irradiation services has improved the quality of medical and agricultural products for domestic and export markets.
- Collaboration and cooperation at the regional and international levels have promoted the development of the technology.
- Despite challenges of insufficient Cobalt-60 and low investment, efforts are on-going to use the technology to harness emerging prospects for socio-economic development.

THANK YOU