Linear Accelerators Termed Best High Energy Source for Food Use

CAMBRIDGE, ENGLAND.—A British atomic energy scientist has advised the food industry to bank on linear accelerators, not fission products, as sources of ionizing radiation in the next 10 years. William Wild, deputy chief scientific officer at Harwell, Britain's atomic center expressed this view during a symposium on Preservation of Food with Ionizing Radiations, held here Feb. 10.

Wild listed four types of electronic generators now commercially available: the Van de Graaff generator, cascade resonant transformer, capacitron, and the linear accelerator. The linear accelerator now being built by a British firm produces a pulsating current of about 500 pulses per second. It is a four million electron volt machine. Although present models have a power of only 500 watts, it is expected that the power will be stepped up to between four and 10 kilowatts within the next 10 years.

The energy range to be considered for food sterilization is from 10 million electron volts downwards. Above this figure there is the danger of producing lasting radioactivity. The cost of food sterilization, according to Wild, would approximate five cents per pound. Using a 500-watt instrument at four million electron volts, the running cost (including amortization) would approximate £5,000 ($14,100) per year. Wild predicted that technological improvements in the next three to four years would cut sterilization costs to as low as one halfpenny per pound.

The Harwell scientist called attention to fission products as potentially enormous gamma sources. It has been predicted that, should the entire British electric power load be assumed by nuclear reactors, 17 tons of fission products would be available per year. Wild asked the food industry representatives what price per curie they are willing to pay for food sterilization by fission products. Intensive research is under way at Harwell, aimed at better handling techniques and more complete utilization of available energy, but Wild believed it would be 10 years before widespread use of the fission products by the food industry is commercially feasible.

Irradiation Effects. Cytoplasmic damage is one of the indirect effects of irradiation, pointed out Miss M. D. Davis, Cambridge University. Named as factors affecting sensitivity of organisms were: method of culture, age of culture, pre- and postirradiation heating, oxygen and water content, protective compounds, pH, and freezing.

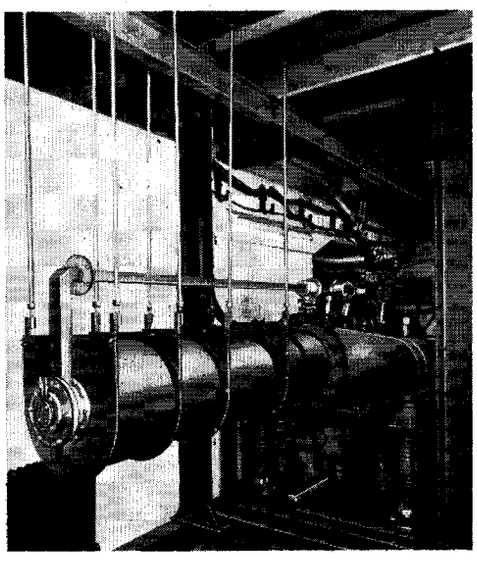
Meats can be sterilized at a dose between two and three million roentgen equivalent physical, said R. S. Hannan, Low Temperature Research Station, Cambridge. In the case of meats, the situation is complicated, due to the fact that the surface sections exist in aerobic conditions while the interior portions of the meat exist in anaerobic state. Browning and development of a "goaty" flavor frequently follow irradiation of meat. The addition of ascorbic acid has been suggested as a protective treatment by previous investigators and the Cambridge workers have recently completed tests along this line. Ascorbic acid in concentrations of between 0.1% and 0.5% gave a definite improvement to irradiated meat flavor. As the ascorbic acid content was increased, however, the protective compound itself developed an undesirable flavor as a result of irradiation.

Turning to the question of irradiation of fats, Hannan pointed out that bleaching and some flavor change inevitably takes place. He warned that antioxidants are usually destroyed, with a resulting deterioration of storage properties. Vegetables usually showed no marked changes, but bleaching and some change in texture (equivalent to partial cooking) were frequently noted.

Hannan advised caution when considering acceptability of irradiated foods for human consumption. He called attention to two hazards—the production of radioactive compounds in the food and chemical changes causing the destruction of minor constituents such as vitamins, or the formation of undesired compounds, such as carcinogens.

The Cambridge symposium was sponsored jointly by the Food and Microbiology Groups of the Society of Chemical Industry.

Linear accelerator manufactured by Metropolitan Vickers Electrical Co. Ltd. capable of delivering 8 million electron volts



Microbiological Assay Saves Time, Animals in Protein Evaluation

NEW YORK.—An assay based on the measurement of microbiologically available lysine resulting from the enzymatic hydrolysis of whey powder which offers great savings over conventional assay methods for milk protein. This was reported at the recent meeting-in-miniature of the New York Section of the AMERICAN CHEMICAL SOCIETY.

The flavor and nutritive value in dried whey and other dried milk products is often adversely affected by the so-called Maillard reaction, a form of oxidation involving sugars and amino acids or proteins. Previous methods of assay of these products have usually required animal feeding tests, costly in time and animals.

The enzymatic assay method reported by Robert M. DeBaun and William M. Conners of the National Dairy Research Laboratories is based on the measurement of the lysine liberated from the whey powder following digestion with a crystalline form of the enzyme trypsin. Digestion with a series of digestive enzymes, trypsin, chymotrypsin, carboxypeptidase, did not give a good correlation with the animal feeding tests.

DeBaun reported that the enzymatic digestion technique yields results which are in good agreement with animal feeding tests and that although the technique is reported for whey powder it is also applicable to other dried milk products. The researchers at National Dairy plan