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FOOD IRRADIATION

*Is it for
preserving food or for preserving
the nuclear industry?*

National Health and Welfare Minister Jake Epp's announcement on September 10, 1987, that food irradiation "does not pose a hazard to health" is, like irradiated food itself, difficult for many consumers to swallow. Beyond the natural aversion that many people have to the idea of subjecting food to large doses of radiation, Epp's decision flies in the face of international scientific uncertainty about the safety of irradiated foods.

Those lining up in favour of food irradiation safety include Atomic Energy of Canada Ltd., the Consumers Association of Canada, the U.S. Food and Drug Administration, the American Medical Association, and a Joint Expert Committee made up of representatives from the World Health Organization, the Food and Agriculture Organization and the International Atomic Energy Agency, all specialized agencies within the United Nations. However, other high profile organizations that believe the safety issue is still controversial include the British Medical Association, the Canadian Medical Association, the International Organization of Consumers Unions, and the Toronto Board of Health. In addition, West Germany, Great Britain, New Zealand, and the State of Maine are among the jurisdictions that have prohibited the sale of irradiated foods. And most large grocery retailers in Canada are disinclined to test market irradiated products.

Any proposal that involves the expansion of the nuclear industry (in this case, into worldwide involvement in the food industry) raises a red flag for most environmentalists.

Since the technology relies primarily on the use of radioactive materials, it will lead to more radioactive wastes (for which there are no reliable disposal methods), transportation hazards, occupational health and safety risks, and, undoubtedly, increases in the cost of food. But beyond the issues of environmental and food safety, a more fundamental issue is whether this technology is even necessary. Critics believe that it is intended more for extending the shelf-life of the nuclear industry than that of food.

Last May, after hearing submissions from more than 50 organizations, individuals and government agencies, the federal Parliamentary Standing Committee on Consumer and Corporate Affairs issued a report on the safety and labelling of irradiated foods. The committee (which has addressed such issues as metric conversion and is now looking into the issue of misleading advertising) concluded that too many troubling questions about the process remain unanswered to recommend its expanded use in Canada or its export to other countries.

Canadian regulations already allow the irradiation of wheat, wheat flour, spices, potatoes, and onions, although no commercial food irradiation facilities are currently in use in Canada. According to Health and Welfare Canada, there are no irradiated foods on grocery store shelves in Canada. However, it is impossible to be sure of this fact since grocery store shelves are stocked with foods from around the world, and there is no way of testing whether food has been irradiated.

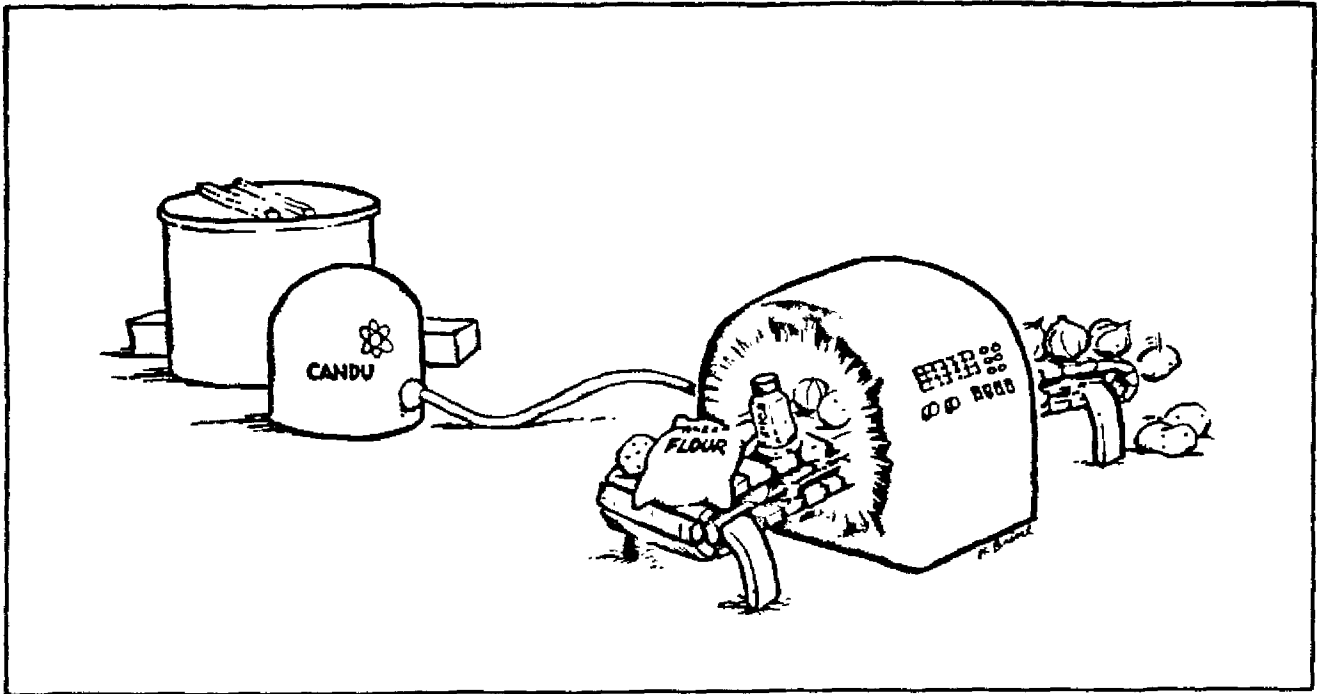
Epp chose to ignore the parliamentary

committee's warning and to instead side with the widely publicized findings of the Joint Expert Committee (noted above), which published a report in 1981 summarizing its review of the scientific literature. That report reached reassuring conclusions about the safety of food irradiation.

However, it is difficult to understand how the findings of this seven-year-old report should carry such weight today, since the reliability of many of the studies done before and after the expert committee's review is questionable. Some published studies have reported findings of adverse health effects in test animals and children fed irradiated foods. Some attempts to replicate these studies have succeeded, some have failed. Reviews discrediting the findings of adverse effects have often been confidential, unpublished or not fully accredited. In short, despite many years of research, it is clear that serious questions remain about the toxicological safety of irradiated foods. As with so many modern technologies, lack of proof of harm cannot be equated with proof of safety.

Debate, then, over the safety of food irradiation stems from controversy about the reliability of existing research, troubling results from some of these studies, and a number of additional uncertainties. The following list covers a number of areas where the debate is hottest:

- controversy exists over the creation, when food is irradiated, of seemingly unique chemical structures in the food which may have negative health effects;
- a controversial study was done in India which found chromosomal abnormalities in malnourished children fed irradiated wheat. While this study is often criticized, animal studies have found similar results;
- a U.S. study found tumours and kidney disease in mice fed irradiated chicken;
- there are concerns about nutritional degradation, especially vitamin loss in irradiated foods over and above that which occurs from cooking, freezing, etc. (These changes in foods may not be a problem in a well-balanced diet, but are of concern when a single food item dominates the diet as often occurs in Third World countries.);
- there is very little information about the effects of irradiation on residues of pesticides and other environmental pollutants that find their way into food;



• and botulism-causing bacteria are highly resistant to irradiation, while other bacteria that would ordinarily help to warn the consumer of spoilage are eradicated. This final concern is minimized only if the food is adequately refrigerated during all post-irradiation storage and handling.

Additional concerns relate to the effect of irradiation on food packaging. Since the process cannot protect against post-irradiation recontamination of food during handling, many foods, such as poultry, will need to be sealed in plastic wrap before irradiation. The effects of irradiation on the many plastic polymers used in food packaging, and on the many additives used in conjunction with the basic polymers, are not fully understood. As well, if plastic wrapping creates an anaerobic (oxygen-free) environment for the food or small oxygen-free pockets in the food itself, irradiation-resistant botulism-causing bacteria may be able to proliferate if the food is not adequately refrigerated.

Finally, since there is no way to detect whether food has been irradiated, there is, therefore, no way to tell whether only the allowable dose of radiation has been applied, or if spoiled food has been irradiated to counterfeits the appearance of freshness.

Epp's favourable response to food irradiation is in keeping with the position of Atomic Energy of Canada Ltd. (AECL), the Crown

corporation that manufactures food irradiation technology and processes cobalt-60, the primary irradiation source. In an extraordinary move last fall, AECL used its publicly funded budget to orchestrate a nuclear industry lobbying campaign aimed at paving the way for the corporation's marketing of irradiation technology in Canada and abroad. Members of the Canadian Nuclear Society and the Canadian Nuclear Association were provided with a "Suggested Letter to Government" written by AECL; it complained of the parliamentary standing committee being "overly influenced by vocal activists."

The "letter," which supporters were encouraged to use as a guide in writing their own letters to government officials, failed to point out that in addition to hearing from proponents and opponents of the technology, the parliamentary committee commissioned an independent toxicological review of the scientific literature. That review concluded that "unless the benefits are significant, it would be prudent to resolve the remaining questions before proceeding with widespread application of the technology." Similar conclusions were reached recently in a report prepared for and endorsed by the Toronto Board of Health. This report noted that the majority of research efforts to date have focussed on (and not yet resolved) the ques-

tion of the toxicological safety of irradiated foods. The board report went on to say that very few studies have addressed the social, economic or political impacts of introducing this technology in Canada and abroad.

When the effects of the technology are addressed in the broader social context, fundamental questions about the need for this technology arise. Both the debate over safety and the push for worldwide investment in food irradiation assume that this need exists. However, it has not been demonstrated.

Proponents of food irradiation argue that it will prevent human deaths from *Salmonella* poisoning. Statistics Canada reports that between nine and 16 people have died each year in Canada from *Salmonella* poisoning, depending on the year. However, one mathematical projection of unproven reliability estimates the actual number of deaths per year at 763. Since the number of deaths actually reported is so much lower than this projection, there appears to be a need to reexamine the data to understand the true picture. In any case, while irradiation of poultry effectively kills 100 percent of the *Salmonella* present, recontamination of poultry by *Salmonella* can occur as readily after irradiation, as after most other food processing methods.

And, as a means of controlling *Salmonella* contamination of poultry, food irradiation has competition from several more economical

and environmentally sound alternatives. An Agriculture Canada study done in 1986 found food irradiation to be one of the least cost-effective options available for *Salmonella* control in poultry. Examples of cheaper and simpler alternatives included education of consumers and people involved in the food processing industry (to prevent recontamination), and adequate cleaning and disinfecting of poultry and poultry crates during transportation and processing.

Food irradiation is also touted as the best food preservation technique for tropical countries where refrigeration is frequently lacking. However, a lack of refrigeration generally coincides with low and unreliable packaging standards and a dearth of efficient transportation systems. Under such circumstances, food from one or more large and centrally located irradiation facilities could be easily recontaminated during redistribution.

Alternatively, if many smaller, decentralized or mobile irradiators are devised, the dispersal of such high technology into Third World society could present serious risks. Only recently, the world heard of the tragedy in Brazil where the release of radioactive cesium from an abandoned cancer therapy machine caused several deaths and widespread environmental contamination.

Proponents of food irradiation also claim that it will reduce pesticide residues on foods, since irradiation is an alternative to post-harvest pesticide preservation methods. This reduction, while desirable, would be minimal since, depending on the foods involved, most pesticide residues on foods result from pre-harvest agricultural practices.

Finally, and perhaps most objectionably, proponents attempt to wrap themselves in the cloak of world saviors and state that food irradiation will help solve world hunger by reducing food spoilage. However, this spoilage generally results from a complex combination of social, political, economic, environmental, and technological conditions that would be encountered after the food leaves an irradiation facility. Food irradiation attempts to offer a simplistic, though expensive, technological "solution" to a problem that is more than just technological.

In addition to the debate over safety and the more fundamental issue of whether the technology is even necessary, concerns arise over the process by which the decision to

allow irradiation is apparently being made. The parliamentary standing committee advised caution. However, the federal government is in the process of changing regulations governing food irradiation, and, despite the fact that the technology is still controversial, Epp, "sees no reason to alter current approved uses of food irradiation or to postpone the case-by-case consideration of any future applications." The decision seems, therefore, to be not whether, but when, as many foods as possible will be irradiated. Consumers may wonder whether the minister of Health and Welfare Canada is properly defending the health interests of the public or whether the health of AECL, a money-losing Crown corporation, is of overriding concern to him and his cabinet colleagues.

The government's cavalier approach to food irradiation is reminiscent of the situation in the U.S. in the 1920s when lead was first added to gasoline. Industry and government scientists discovered a technological breakthrough and saw enormous profit potential. Their forceful arguments carried the day despite warnings from public health experts that not enough was known about the risks to public health of widespread use and dispersal of a known poison.

During the last 20 years, the hazards and expense to society of widespread environmental lead contamination have become well known. However, over the course of the 50 years prior to that, the lead additive industry and the oil refining and automotive industries had become highly interdependent. As a result, the removal of lead from gasoline has been, and in Canada continues to be, a very expensive, politically difficult and slow process despite international consensus about serious health concerns.

If current concerns about food irradiation prove to be warranted, international entrenchment of food irradiation in agricultural, food processing and food marketing industries promises to create similar problems.

Public interest groups in Canada, such as the Vancouver-based Canadian Coalition to Stop Food Irradiation and the Toronto-based Food Chain are concerned that neither the safety of nor the need for this technology has been adequately demonstrated. Accordingly, they intend to organize consumer boycotts of any irradiated foods that find their way to grocery store shelves. In Britain, similar

activity led to a promise from the massive retail chain Marks and Spencer that it will not carry irradiated food products in any of its stores.

Similar reticence was voiced in December 1987 by the multinational grocery retailer A & P following a U.S. radio program on the issue. Food Chain's Linda Pim was interviewed and told listeners of A & P's plans to test market irradiated potatoes in one of its Hamilton, Ontario, stores. A & P vice-president of communications and corporate affairs, Michael Roarke, was greeted at his Monivale, New Jersey, office the next morning by a barrage of concerned callers. By midday the test marketing was cancelled, and A & P stated that it "has no intention of testing irradiated products of any kind."

Such consumer opposition to food irradiation may prove to be a formidable barrier, and the government's green light to food irradiation may not lead to quick implementation here. But that green light may nevertheless have serious impacts abroad.

Our government's approval of food irradiation will pave the way for AECL and the Canadian International Development Agency to expand export of the technology to the Third World. The public in Third World countries does not enjoy the rights that Canadians have to public scrutiny in deciding whether to adopt food irradiation or not. Recipients of our "foreign aid" will likely be the first to participate in a massive experiment with public health.

Despite Epp's assertions that food irradiation is safe, the jury is still out and likely will be for some time. Beyond the safety issue, we have not even begun to investigate the political, economic and cultural implications and repercussions of this technology, or whether it is even necessary. Surely we should be asking and answering a whole range of fundamental questions about the implications of this technology for our society and environment before spending millions of taxpayers' dollars on a nuclear industry that has already drawn heavily from the public purse. ☹

Kathy Cooper is a researcher with the Canadian Environmental Law Association. David Poch is a lawyer and researcher with Energy Probe.

How to store your maize

MAIZE is still the main staple food in Kenya, with an estimated per capita consumption of about 285gm per day.

Of all the maize produced in the country, about 70-80 per cent is grown on small holdings (less than 5 ha), basically for use by the family and a small surplus for sale.

Most of this maize is stored on the farms, using different kinds of methods, which range from the traditional pots and gourds to the modern structures. The problem is that a big percentage of the produce — up to 30 per cent at loss during the storage period using these methods.

Loss of grains occurs in the field as well as in the store. Rodents, birds, insects and moulds easily attack the grains in the field. Some of these may be carried on into the stores where the damage will continue.

Except in specific outbreaks, losses occur in the stores with rodents being the most common pest of the grain, as well as contamination of the produce by their droppings and urine, insects feeding on the carbohydrate grains and contamination with fungi and dust, and moulds developing on the grain so that it becomes unfit for consumption.

Losses in storage can be in terms of quality as well as quantity.

On-site loss: The grains eaten by the rodents and insects will lose weight considerably. This might not be quite noticeable especially in the rural areas where grain trade is by volume as opposed to weight. But if one was to take two equal amounts of grain and grind them into flour, there would be a big difference in the amounts of waste. The infested grain will have less weight than the good ones.

On-site loss: Grain pests feed very selectively, the rodents and insects eat away the germ which contains the proteins as well as the vitamins. Insects on the other hand feed on the endosperm so that in the end the carbohydrate content is greatly reduced hence the loss of nutrients.

On top of all these losses the grains may be contaminated to the extent that they contain mycotoxins in the form of aflatoxins which can be quite dangerous to humans as well as livestock.

The best way to ensure the grains keep good during the storage period is to ensure that all the



rules of storage are followed. The basic requirement for safe storage of grains is a low moisture content. It's important to store the grains at a low moisture content for the following reasons:

① Moulds are more active in grains with high moisture contents (M.C.).

② Insect infestations are also much higher in such grains.

③ Under high moisture content conditions, there are higher incidences of rot, bad odours and discoloration.

It's therefore clear that drying plays a major role in good grain storage. Because this will reduce the M.C. of grains it will obviously reduce infestations by a lot of insects and the field moulds.

To keep loss of grains in storage to a minimum, the farmer needs to do the following:

Early harvesting: Traditionally, most farmers leave their maize to dry naturally in the field until the moisture content decreases to about 18 per cent. The farmers realize such grains are not dry enough for storage, so they give a further drying.

In most cases the farmers cut and stack the maize in the field or harvest the cobs and dry them on mats at home, with or without huts.

This method may sound efficient to farmers, but during this period, a lot of losses can occur — the maize can go mouldy in the field if the weather is wet, thieves could also pick quite a few, the insects also find a suitable time for infestation and of course this is a great opportunity for the rodents.

The best way to get round this host of problems is to harvest the maize early. Maize should be harvested at physiological maturity — this is the period when there are no longer any physiological developments taking place in the maize. By this time, the maize will have a moisture content of about 30 per cent.

To determine physiological maturity, carry out the 'black layer' test — pick ten cobs from different parts of the field and mix them, then break them into

halves. Remove a few grains from the centre of each half and mix all the grains together well. From the pile, pick ten grains, peel back the covering at the base of each grain. If the majority of the grains have a black layer at the point of contact with the cob, the maize is physiologically mature.

Beyond the 'black layer' test when maize has reached that stage, the stalks turn brown and the cobs begin to droop on the stalks. The maize at this stage will also not be sweet for roasting.

After confirming that the maize is physiologically mature, it's best to harvest it and carry out further drying at home, specifically in a well designed store.

That store need not be expensive — the most important factor is that it should have optimum free air circulation during the drying period and then later be able to store the grain.

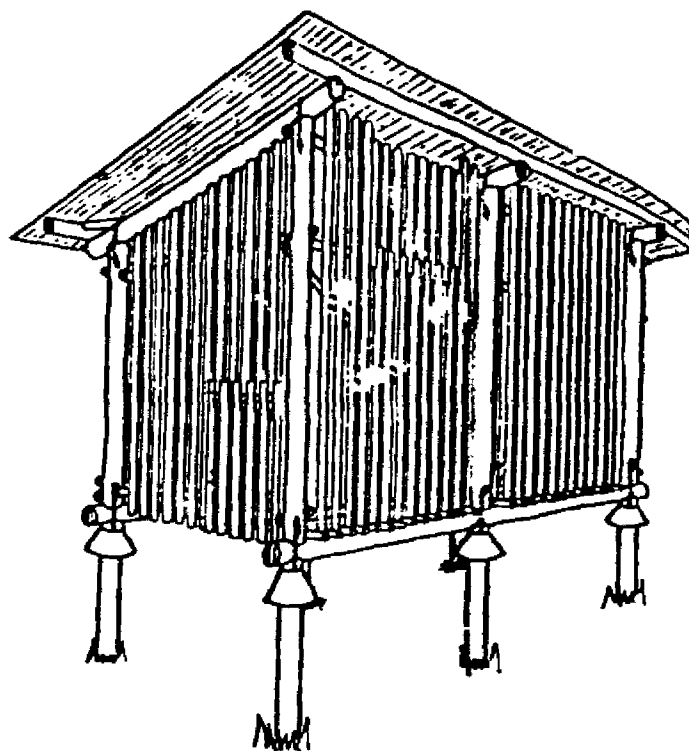
So far the stores with the names given by the Rural Structures Unit and the 'On Farm Grain Storage' project, both of the Ministry of Agriculture.

The stores are not only functional, but are also cheap, because as far as possible, they are made from locally available materials. They are not only easy to build, but are also very easy to use — moreover, the designers have done a lot of work to improve the already widely used round basket granary.

The important features of the store is that it consists of a frame raised 3ft (1m) above the ground. This is important to keep off rodents which can't jump the height. Further more, each leg is fitted with a rat guard to stop the rodents from coming up the legs. The structure is usually 5ft (1.5m) wide, seven store.

Before construction, a suitable site should be selected — the store should be built at the highest point in the compound, far from any buildings, trees or bushes so that it's fully exposed to the prevailing winds, which will then be able to pass right through the store, for better and quicker drying.

Also to facilitate the drying, the walls and floor of the store is made to allow as much air as possible. This is achieved by allowing equal spaces between the slats on the walls and floor. And in case of the basket type cribs, the twigs are



The crib for drying and storing maize.

loosely woven, and no maize is used on the walls.

The structures have two doors, one at the lower portion, for loading and carry off loading and another one at the upper part, for topping up the produce to fill the store to a good level.

The roof is made either of iron sheets or of good thatch using locally available materials. Ensure a good overhang of this, not only to keep the store dry, but also to ensure rain off run water. The overhang must not be too long though, as this will hinder air circulation.

At this stage the farmer should be able to harvest his crop early since he has a good drying facility. Early harvesting will not only secure him more wholesome grain, but will also leave him with better stalks to feed his animals, and of course it should enable him to have more time for early land preparation for the next crop.

Using the structure — First and foremost ensure the crib is clean and in good repair before any maize is loaded in. Kill off the insects by an application of liquid formulated insecticides such as Actellic, using a small hand sprayer. It's especially important to treat the thatched roofs with the insecticide.

During the drying, also cut and remove any growths from near the store, together with any trash from underneath. Once collected, these rubbish should be piled up and burnt for away.

From the sheaves, debulk all the maize and load into the crib. Remove any cobs with visible insect damage or mould attacks, as these can spread but to the clean material.

Leave the crib in the store until they dry to an M.C. of about 13 per cent — this usually takes 45 to 60 days, after which the maize should be removed and stored. Never put cobs in bags and fill with sticks as this breaks a lot of grain.

Once storing is complete, the grain should be treated with a 'Blue Cross' chemical at the rate of 10gm to every 10kg bag of stored maize. It's important to have a uniform adhesion of the chemical in order to obtain maximum insect control.

The easiest and best way to achieve the uniformity is to pour the grain on a clean concrete floor or on a plastic sheet, and then spread the chemical evenly over the heap, then use a shovel or flat piece of wood to shovel it around until it is mixed thoroughly.

Once the treatment is completed, the grain should be re-loaded into the bags. Reload these into the crib, where walls should be that time have been covered with a spraying material to keep off the rain.

Inspect the grain for mould infestations and insect infestations once in a while during the storage period. Any bags with mould should be taken out and the grain

rotted, while those with no damage should be re-treated. To ensure not to apply any chemicals the grain within less than the mould. Grain for immediate use should not be treated again. If this kind of treatment, the grain can be stored for about six months.

The reason the maize should be stored is that it's been proved that when maize is stored in cobs for more than two months, the loss of insects increases at a faster rate. This is especially because it's not possible to give effective treatment to the maize while on cobs. Shelled maize should keep much better.

For more information regarding the construction of a crib, contact the Agriculture Officer in your area, or write: Rural Structures Unit, P.O. Box 470, Nairobi or 'On Farm Grain Storage' project, P.O. Box 466 Kisumu.

Robot milking

soon

AN unmanned robot milking system has been developed by a Swiss company which can be ready for use next year.

In its final version, the autonomous milking system has to wash, milk, feed, heat, check sensors and refrigerate equipment installed in a stable with two milking stalls.

The complete module can be delivered to farms and coupled to existing bulk milk tanks, milking machines and buildings. Each cow is identified by electronic transponder on entry to the milking stall and automatically fed a precise amount of concentrate while the robot arm attaches the milking cluster after test milking.

Control and sensors are mounted by the milk flow, and milk rejected if moisture is present. If cluster is removed when flow is full, the gate opens and the cow is released.

Milk yield is recorded and can be milked several times a day. If they produce themselves a milking more than four or five times a day, entry is delayed automatically.

In trials the milk yield increased 15 per cent on average and the labour was reduced for 50 per cent.

Each milking unit takes about 30 cows, but can be doubled if the company agrees.



Improved 'basket' granary

Mystery disease nears solution

VETERINARY surgeons believe they are close to solving the mysterious disease, bovine spongiform encephalopathy (BSE). Currently diagnosed in over 500 of Britain's 50 million cattle population, BSE was first confirmed in 1986 and could also affect cattle in other countries.

The disease has been linked with changes in processing methods at animal waste rendering plants. Animal feed manufacturers using least-cost ration for

feeding cheaper animal proteins for more expensive fishmeal and soya ingredients.

Rendering plants could try to save money on treatment by using lower temperatures to cut fuel costs.

Chairman of the British Veterinary Association's farm animals committee, Francis Anthony, said: "There is a critical balance between process temperature and the time to kill organisms causing disease."

The agent behind BSE has not been identified yet, but a study to find whether any organisms survive the

rendering process will be started.

A ban on animal proteins in ruminant diets began on 18 July in Britain, and Ministry of Agriculture vets will investigate rendering plant efficiency. A compulsory eradication scheme is being considered.

The link between the disease and feed was observed from the distribution of BSE. No farm that fed straight had an animal with a positive diagnosis.

Symptoms include acute nervousness and fear, and farmers have been urged to report all suspected animals.

Low grain stocks spark food security fears

Bridget Bloom on recent challenges to conventional wisdom about production levels

IT HAS become conventional wisdom over the past few years that the world produces too much grain and that the huge cereal surpluses which have been built up in the rich industrialised world are both costly and unnecessary.

Farmers throughout the European Community are even now being wooed by their governments to accept payment for growing nothing on good arable land, while the prices they will receive for their wheat or maize at the farm gate have been steadily declining as part of a concerted EC effort to reduce production. Yet in the last three weeks, three separate reports, published in Washington, Rome and London, challenge the assumption that the world is producing too much grain.

The most dramatic comes from the Worldwatch Institute, a Washington based research organisation whose director, and author of the report, Mr Lester R. Brown, is a former senior official of the US Department of Agriculture.

Mr Brown outlines the "precipitous decline" in world stocks of grain over the last two years. Reduced from 458m tonnes to 250m tonnes, it is estimated that grain stocks

"will have dropped from the highest level ever to the lowest since the years immediately following World War II." This amounts "to 54 days of consumption, less than the 57 days' supply at the end of 1972 when grain prices doubled."

Worldwatch believes that world food security could well be threatened, because the declining stocks must be set against the background of two alarming trends: the marked decline in the growth of food output over the last four years, and the "warming of the planet" which scientists believe could produce more severe droughts such as that which has cut North American grain production this year by between 25 and 40 per cent.

The potential dangers of lower grain stock levels, if not Worldwatch's longer term judgments, are endorsed by reports from the UN Food and Agriculture Organisation in Rome and the International Wheat Council in London.

In the September issue of its Outlook publication, the FAO says that the severe drought this summer in North America will send cereal stocks below the minimum considered necessary to safeguard world food security. The carry-over of stocks from this present season

into 1988-89 would be 16 per cent of anticipated consumption for the following year, rather than the 17.16 per cent considered safe. "Global cereal output will need to increase by 220m tonnes or 13 per cent in 1989 to bring stocks back to this minimum safety level," the FAO believes.

The International Wheat Council, in a report on the outlook for grain stocks issued at the end of last month, is more cautious though it accepts that consumption in 1988-89 "can only be met by a substantial draw-down of stocks," which are forecast for wheat at 94m tonnes (27 per cent down on the previous year) and 120m tonnes for coarse grains (45 per cent down).

All three reports agree that the principal reason for the declining grain stocks is the North American drought, though the Soviet harvest is also thought likely to be only 200m tonnes against an estimated 255m tonnes, partly due to drought.

Worldwatch, however, also notes recent droughts in China, charts a marked decline in the growth of grain production, particularly in populous countries like India, China and Mexico, once noted for their "green revolutions,"

where production has levelled off since the early 1980s.

While populations continue to increase in the developing world, Worldwatch questions whether production there can keep pace. It believes that there, as well as in industrialised nations like the US, the huge increases in past production have partly been accomplished by "over-ploughing and over-pumping," a process that is bound to slow down production in future as land quality declines.

If farmers had unlimited resources of soil and water they could easily meet the challenges before them, Mr Brown says. However, "the reality is that they will begin the next decade with a cropland base that is no longer expanding, a scarcity of fresh water and no major new technologies... that will lead to the quantum jumps in world food output such as those associated with the spread of hybrid corn, the nine-fold increase in fertilizer use between 1950 and 1984 and the near-tripling of irrigated area during the same period."

Worldwatch believes that even with the warming of the planet which now seems underway the odds are probably against another severe

drought in North America next year. Were it to happen, however, "the world would face a food emergency."

Meanwhile - in case European farmers might interpret these new warnings a potential green light to produce more - a more conventional view of the future was offered by Mr John MacGregor, British Minister of Agriculture, earlier this week. "Is the world cereal surplus a thing of the past and should we now be looking to expand production to meet rising demand?" he asked in a speech to the UK Agricultural Supply Trade Association.

Noting that even with higher world prices as a result of the US drought, the export of wheat was still costing the EC £40 a tonne in subsidies, Mr MacGregor said he thought "such a reaction would be premature."

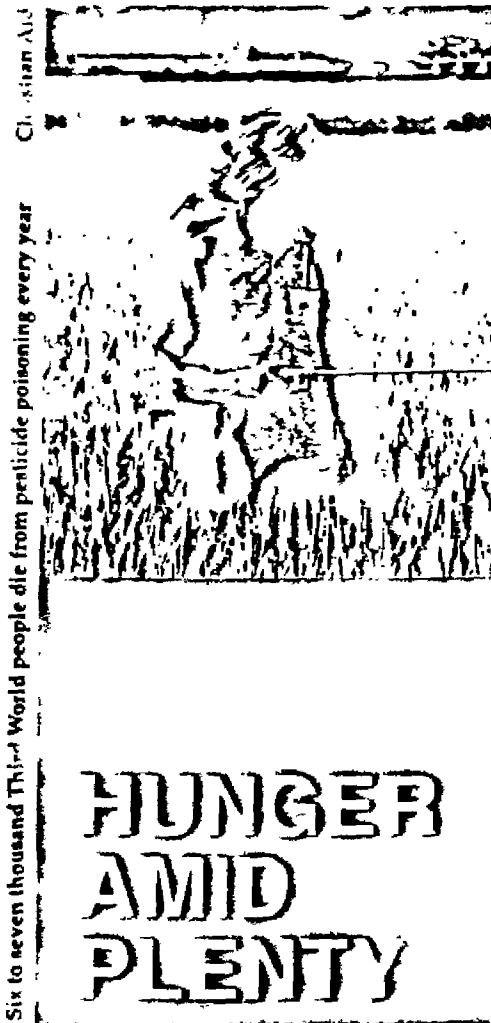
He added that events in the 1970s - when cereal shortages had driven prices and then production up - had shown that it "does not take long for a perceived shortage to turn into an actual surplus."

Worldwatch Paper 85: The Changing Food Prospect: The Nineties and Beyond. Worldwatch Institute, 1716 Massachusetts Avenue, Washington DC. Price \$4.

One quarter of the world's population consume two-thirds of the world's food production.

Between eight hundred million and one billion people are too poor to acquire an adequate diet.

60% of the world's poor live on small farms.



Six to seven thousand Third World people die from pesticide poisoning every year

HUNGER AMID PLENTY

Food consumption is perhaps the most basic of all development issues, for food is an absolute requirement for human life. Agriculture is the means by which most people in the world earn their living (70-80% in low income countries, and 35-55% in middle income countries). Except for Africa, agricultural production has risen in the last decade, but the problems of poverty and hunger remain. Food shortage is not simply a matter of underproduction or 'overpopulation' (Britain has a far greater population density than India). It isn't even a matter of too little food in the world, as the World Bank reassured us recently: "Present output of grain alone could supply every man, woman and child with more than 3,000 calories and 65 grammes of protein per day. Eliminating malnutrition would require redirecting only about 2% of the world's grain output."¹ Food shortage is more a matter of who owns the land, and what it is used for, since it is the people without access to land to grow their own food, or with insufficient income to buy it, who are vulnerable to malnutrition.

Cash Crops

Since the advent of colonialism, production of crops for export has increased at the expense of production of food for the domestic market. Large landowners and foreign companies use the most fertile, flat land, pushing subsistence farmers onto poorer, more mountainous areas.

Traditional farming techniques ensured that the rural population stored adequate food for periods of drought. Cultivation was based on experienced evaluation of soil potential, crop rotation, mixed cropping, terracing, weeding, natural pest control and the use of low technology farming tools. Agricultural surpluses were common, enabling societies to support town life, craftspeople and administrators.

The colonialists altered the pattern of land use by claiming large parts of it, (in South Africa the white settlers, who constituted 15% of the population, took 88% of the land) and establishing plantations of single crops (monoculture) to feed Europe's people and industries. Even without ownership, the Europeans encouraged production for the cash economy. Farmers had to switch production from local foodstuffs to crops for export in order to pay the new taxes which effectively supported the colonial administration and military presence. The remaining money was often insufficient to purchase the expensive food from the company store. In years of poor harvest, the farmers could neither eat the cotton they had grown, nor afford to buy food.

Today, that dependence on the export of a few agricultural products remains for many countries. Senegal devotes over half of its arable land to peanuts. The Philippines use half of their cropland to grow coconut, oil palm and sugar. Prices are set on the commodity markets in the Western world, and have tended to decline relatively over the years (see article on trade, p16).

The Rich and the Poor

Today, large landowners and foreign 'agribusiness' firms continue to monopolise the land. "4% of the world's big land owners control half the world's cropland, while 58% of the world's landholders (the small ones) must make do with 8% of the world's cropland."² Indeed a large chunk of the rural population has no land at all and is forced to seek employment (often temporary or seasonal) on someone else's land, or migrate to the city.

Although small farmers cannot afford modern inputs, their intensive use of labour produces a larger output per hectare (see table). But because their share of land and total output (as opposed to output per

hectare) is small, these farmers are more susceptible to poor harvests. If food runs short the farmer may need to find a job, send the children out to work, or borrow from a moneylender (often a large landowner) at inflated interest rates, using the land as collateral. If the farmer defaults, the land must be sold, or passes over to the moneylender, concentrating ownership in even fewer hands.

Most farmers are Women

Women are the majority of the world's food producers. They make up 60-80% of agricultural workers in Africa, and produce at least 70% of subsistence food crops. But despite the hours worked on the land (in addition to those in the home), women have least access to food, often being the first to go hungry. Few women now have land in their own right. The registration of land in the name of the male "head of the household" disregards women's traditional ownership of land and rights of use of land for food production. Women are given little access to labour saving technologies, receive only 15% of non-formal education and training in agriculture and find it difficult to obtain loans, requiring their husband's consent and collateral. Yet men have been absorbed into the cash economy (the sector that has tended to receive government investment and training), leaving them in control of household income.

"In the fields, all the acres are given to men. The man is the owner of the household. But men are not always in the fields. It is women who do the planting, weeding and harvesting while men drink beer. We women must have our own fields." Women of Kedza, Zimbabwe

The Green Revolution

The 'green revolution' in the 1960s was heralded as the breakthrough which would eliminate food shortages. New high-yield varieties (HYVs) of seeds were expected to lead to higher levels of production.

Where these seeds were used they did increase production, but failed to eliminate food shortages. How can we explain this paradox? Well, quite simply the green revolution did not reverse inequalities. If anything it reinforced them. The new seeds required capital-intensive, rather than labour-intensive agriculture with key inputs such as fertilisers, pesticides and irrigation, which the poor farmers couldn't afford. Their use was restricted to well rain-fed and irrigated regions where more affluent farmers had access to credit. In India total food production increased, but the poor could not afford to buy it! Only in areas with an equitable distribution of resources, including land, could the HYVs increase production for the benefit of all. However,

the green revolution suited the industrial market economies, for the new inputs of chemicals and farm machinery were provided by market hungry western companies. In 1966, United States food aid became conditional on the adoption of green revolution strategies.

Agribusiness

A food system consists of three basic parts, as outlined in the diagram. In the U.S. or the U.K. for example, where only 2 or 3% of the population work in agriculture, large amounts of capital are pumped in at the first stage (about 80% of total costs). This may be profitable, but it is also wasteful, consuming energy, harming the environment and creating unemployment as small farms are swallowed up.

By contrast, Third World agriculture has traditionally laid much emphasis on the second stage, trying to obtain maximum production through the work of the people. The capital-intensive system is inappropriate, for how are the farmers to earn their living if agriculture no longer requires their labour? There are no large factories to go to, as there were in the West where capital-intensive agriculture emerged simultaneously with the large factories of the industrial revolution.

However, it is this capital-intensive system that is spreading as agribusiness firms try to control all the stages of the food system, from the sowing of seeds to the marketing of the final processed product. For example since the late 1960s, U.S. agribusiness firms have bought up 32-35 million hectares of Brazilian land, over 10% of the total (in fact the largest purchaser of Brazilian cattle-grazing land was Volkswagen). These companies are attempting to:

1) use cheap land and labour to produce crops that can be sold in western markets (fruit, vegetables, flowers, cattle for hamburgers etc).

2) sell inputs to local farmers as mentioned above (fertilisers, pesticides etc).

3) sell their processed foods wherever they can make a profit.

New demands are constantly being created through advertising which portrays traditional foods as inferior to imported processed 'junk food'. Teeth-and-gut-rotting coca-cola and pepsi are now consumed all over the world. There is no longer a domestic market and a foreign market, there is only a world market.

Food Security for All

We've seen that the answer to food shortages is not simply the use of high-yield seeds. Nor is it the provision of food aid by the richer countries, for food aid can undermine local production and lead to dependence. Food aid is only justified as emergency relief. Continued food dependence can be dangerous because food has become a weapon of power politics. "To give food aid to countries just because people are starving is a pretty weak reason". Dan Ellerman of the U.S. National Security

Council

- 27 -

The solution to food shortage must be to prioritise labour-intensive agriculture, institute widespread agrarian reform and to provide small farmers with easier access credit. Improvements in agricultural productivity could then be used for the benefit of a The establishment of rural industries and the processing of foodstuffs would further help to develop the economy.

Notes

1. World Bank, *World Development Report 1987*.

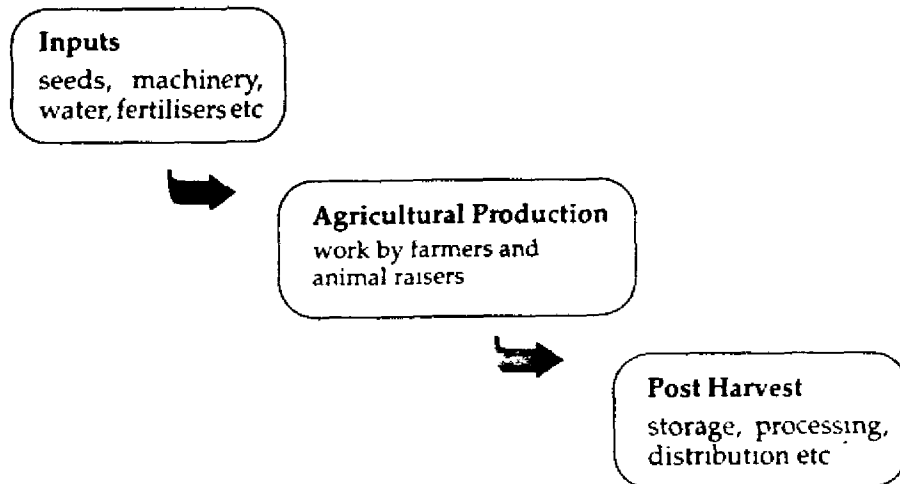
2. Susan George and Nigel Paige, *Food for Beginners*, Writers and Readers, 1982

The Irish Potato Famine (1846-50)

During the famine, there was enough food inside Ireland to feed twice the actual population of eight million, and huge exports of wheat, oats, barley, cattle, pigs, eggs and butter continued routinely. Wheat, oats and barley were, however, what we'd call today "cash crops", grown for export and profit. The Irish peasant never ate them, but grew them for the landlord. Why? Because his rent came first — even if children were crying from hunger. Non-payment of rent meant certain eviction and a death sentence to slow starvation, for alternative wage labour was virtually non-existent. Competition for land was fierce and rents commonly 80-100% higher than in England. During one famine year, £6 million was remitted to England from Ireland, but almost nothing was reinvested by the (absentee) landlords.

George and Paige, *Food for Beginners*.

The Food System



Efficiency of Small and Large Farms in North-East Brazil

Farm size (hectares)	Average holding (hectares per farm)	Capital per labourer (cruzeiros)	Gross output per hectare (cruzeiros)
0-10	4	4,870	769
10-50	27	7,057	362
50-100	72	9,872	291
100-200	141	11,341	288
200-500	299	12,792	192
over 500	1,180	11,625	121

Source: International Broadcasting Trust, Utopia Ltd.

Waging War Against Hunger

Focus on Food Storage and Safety

Massive Efforts Needed to Teach Safety Rules

By Valery Abramov

Valery Abramov of the World Health Organization reports on a meeting held last spring with representatives of 13 countries to explore means of combating critical food safety problems via health education.

As many as 200 million people travel for pleasure every year, and as many as half of them may suffer from diarrhea, most of it either food- or water-borne. But is it solely the problem of the pale-faced tourist who is notorious for a delicate stomach? Let us consider the facts.

It has been estimated that in 1980 there were some 100 million cases of acute diarrhea in children under five years of age in Africa, Asia (excluding China) and Latin America. Contaminated food is increasingly held responsible for a high proportion of diarrheas.

Are we truly aware of the nature, the magnitude and the proportions of food-borne diseases? Do we realize that behavioral changes are urgently needed, as well as massive educational efforts?

At a World Health Organization Consultation on Health Education in Food Safety in Geneva last spring, representatives of 13 countries from Africa, the Americas, Asia and Europe discussed ways to raise awareness of this universal problem. Strange as it may seem, there is a similarity with the deadly AIDS disease; in both cases the objective is to change people's behavior; but while with AIDS there are three precise modes of transmission (sexual, blood and mother to child), in the case of food-borne diseases, the behavior of every individual is concerned in a host of ways—personal hygiene, heating temperatures, safe water, storage facilities, sale conditions, packing, cooking and food handling habits at family level. The list is enormous, with local variations. The WHO Consultation came to the conclusion that this worldwide public health and economic problem is clearly not appreciated at various levels.

Sadly enough, one of the main reasons is lack of hard data. The figures available reflect a gross underestimation of a serious and half-hidden problem.

Unfortunately, too many people associate food-borne diseases with public catering, but contamination can also occur at home. One of the great challenges is to make crystal-

"Illness due to contaminated food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity."

—Joint FAO/WHO Expert Committee on Food Safety



Latin American fishermen prepare their catch for shipment in trucks that will speed the fish directly to markets in the city, reducing greatly the chance for food spoilage.

clear that food and health are closely related and interlinked. It is precisely in this area that the powerful forces of the mass media can make all the difference. Ways and means must be found to make this undramatic subject palatable to the public, a subject which can hardly compete in "popularity" with such topics as AIDS or Chernobyl. But when our fellow human beings die in the millions because of water- or food-borne diseases, aren't the scales tipped a bit unfairly?

How does one reach the burgeoning populations of the developing world, with their own deep-rooted cultural traditions and habits? How does one reach millions of street vendors trading in unsanitary conditions who simply have no access to elementary hygiene such as safe running water and storage facilities?

The answer to these questions lies in all-out concerted efforts and

commitment to mount long-term campaigns in practically all sectors of society: government, industry, commerce, public health and education, tourism, agriculture, consumers, women's, youth, religious and social groups.

A favorable climate has to be created so that everyone, from policymakers at the highest level to consumer at the end of the food chain, are receptive and motivated to accept food safety practices.

Explicit education policies need to be defined in promoting food safety at both national and international levels.

Food safety education should be integrated more fully into all existing health care activities. The obstacles to integration include a lack of awareness—not only by administrators, policymakers and the general public—but also by the majority of health professionals.

Many Countries Still Resist Food Irradiation

Irradiation, the newest technology for preserving food, and one that several studies have shown to be safe, still has not found full acceptance, according to the World Health Organization.

The incidence of food-borne disease has increased dramatically since 1945 and is today one of the most widespread health problems in developing and industrial countries. In addition, a number of food commodities, which are important sources for foreign-exchange earnings, are often rejected by importing countries on the grounds of poor hygienic quality and contamination with pathogens. The economic loss and human suffering due to food-borne disease is enormous.

Old food preservation processes—sun drying, salting and smoking—and new processes—canning, pasteurization, deep freezing and vacuum drying—have worked successfully for many but not all foods. The latest technique is the use of ionizing radiation, in which certain foods are exposed to gamma rays, x-rays or electrons over a limited period of time.

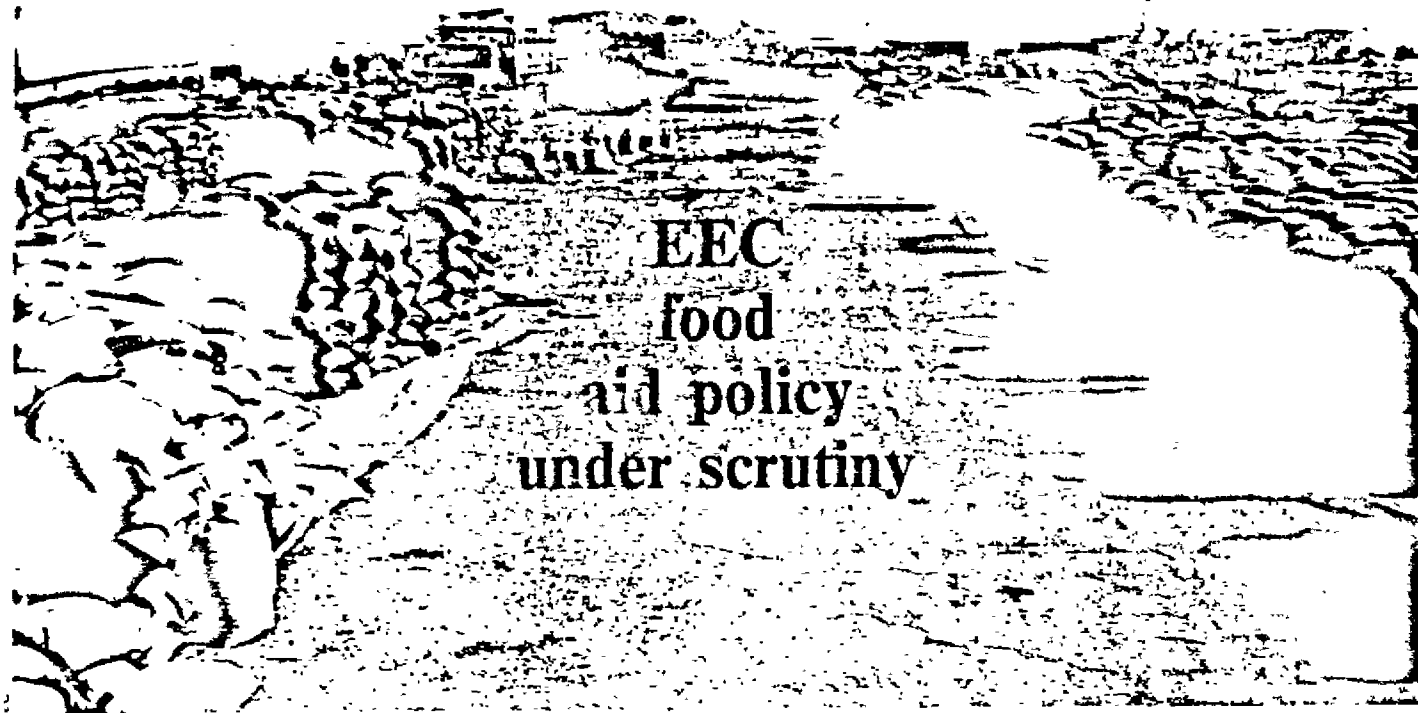
Irradiation has advantages over other processing methods. Foods can be conserved in a fresh state or treated after packaging; they can be kept longer without loss of quality. The costs and energy requirements of irradiation compare favorably with other preservation techniques.

Up to the prescribed dose, tests show that irradiation leaves no residue nor does it change nutritional values any more than other processes. It kills pathogens and pests, thus making the food safer, and prolongs shelf-life, thus increasing the food supply.

Irradiation does not mean the food becomes radioactive, a common misperception that is hampering the use of the technology, often in countries that may benefit most, according to WHO.

Several studies have been conducted by international groups to assure that irradiation poses no toxicological hazard or introduces nutritional or microbiological problems. In addition, an International Consultative Group on Food Irradiation, with 26 countries from among member states of WHO, the Food and Agriculture Organization and the International Atomic Energy Agency, was established in 1964 to continue the evaluation of developments in the field of food irradiation.

To date, more than 30 countries have approved the use of irradiation in processing 30 food items and commodities.



Community food aid at Khartoum airport

The European Community food aid policy came under scrutiny in Rome last October⁽¹⁾ at the 24th session of the Committee on Food Aid (CFA), the international body responsible for reviewing the experience in food aid of donors and recipients alike. At the centre of discussion was a report compiled by the Secretariat of the World Food Programme (WFP) which analysed every aspect of Community policy, from the planning and decision-making process to the flow, direction and uses of Community food aid as well as factors it believed could influence, in the future, its level, composition and direction.

Present in Rome to clarify and debate with the Committee some of the issues raised in the Report, were representatives of the Commission led by the Director-General for Development, Mr Dieter Frisch.

The document makes, among other things, the following points.

Second biggest source of food aid

— The European Community and its Member States account for 15% of global food aid, the second biggest source in the world. Representing about 25% of the total value of all EEC official development assistance

(ODA), all the food aid is in the form of grants. These facts notwithstanding Community food aid constitutes just a small proportion of its production, exports and stocks and "proportionately less in those terms than other major donors". A significant and noteworthy fact is the reduction in recent years in the supply of dairy products from an average of 150 000 tons of dried skim milk (DSM) and 45 000 tons of butter-oil between 1978 and 1982 to 133 000 tons of DSM and 30 000 tons of butter-oil in 1986. The share of dairy products given directly as food aid has correspondingly diminished from an average of about two-thirds to less than half. A larger proportion is now channelled indirectly through such organisations as WFP, the United Nations High Commission for Refugees (UNHCR), the International Committee of the Red Cross (ICRC), the League of Red Cross Societies (LRCS) and other non-governmental organisations (NGOs). About three quarters of Community food aid is given in cereals directly to beneficiary countries. Where the Community gives dairy products directly it is aimed at assisting the recipient country to develop its own dairy industry.

The World Food Programme is the largest single recipient of Community indirect food aid (about 24%) and the Community and Member States are its

biggest donors with pledges over a decade amounting by 1986 to US \$ 1 366 million. The Community, furthermore, contributes, on an annual basis, to WFP's international emergency food reserve.

In terms of regional distribution, Africa, the report says, "has emerged as the largest beneficiary of direct EEC cereal food aid after having overtaken Asia in the late 1970s. Bangladesh and Egypt received between them 40% in 1986".

Attuned to the needs of development

— Claiming that tension had existed between the use of food aid as a conduit for Community surplus production and its use as a significant part of development assistance, the document notes that since the beginning of the 1980s, "a series of regulations and policy resolutions have been adopted that stressed the developmental use of food aid as a flexible resource, and the need to devolve responsibility for its programming and mobilisation to those directly concerned with development assistance in the EEC Commission". Although the decline in the use of dairy products was a result of two factors: criticisms and the general realisation that they are a difficult resource to use effectively.

(1) 19-30 October 1987.

ly, there is "growing consensus within the EEC regarding the use of food aid as a resource genuinely attuned to the needs of development rather than as a conduit for surplus disposal" of Community food production.

— EEC food aid is given in two ways: sales for budgetary and balance-of-payment support or free distribution to target groups such as schools or food-for-work projects. "The sales modality has accounted for the bulk of direct EEC food aid in most of the recipient countries. Of the 40 country food aid programme allocations approved for 1986, a total of 33 involved sales"

The Lomé III Convention

— EEC assistance has traditionally been directed mainly to agriculture and rural development in both ACP and non-ACP countries. This policy has been given a boost, with the vast majority of ACP States choosing to concentrate on rural development in their national indicative programmes under Lomé III Convention. The EEC Commission is engaged in dialogue with each ACP state on joint measures to achieve desired objectives and is coordinating with other aid donors to ensure maximum impact of food aid on the ground.

The document goes on to examine the various facets of EEC food aid. First, the *food strategies* which is a concept through which "policy and investment focus is given to the agricultural sector" with development assistance planned on sectoral programmes rather than on an individual project. The Report gives the results of the pilot strategies carried out in four African countries (Mali, Kenya, Rwanda and Zambia) since 1983 when they were launched—strategies in which food aid from the Community and other donors played a major part. "In Mali food aid from a group of 11 donors, including the EEC, has provided assistance to a food strategy that includes the goals of achieving food security, price stabilisation and the restructuring of cereal marketing. A common fund of local currency has been established from food aid sales for investment in various elements of the food strategy. In Kenya and Rwanda, food aid has been channelled to the main marketing boards to

strengthen their operations. In Zambia, counterpart funds generated from EEC food aid sales cover part of the local costs of rural development projects funded by the European Development Fund". The stage is now set under Lomé III Convention for a wider application of this strategy.

Second, the *triangular transactions*, the system whereby the EEC purchases food in a developing country with a surplus for use in another developing country which has a deficit. This provision, says the Document, "has enhanced the development objective of EEC food aid as well as its flexibility, delinking supplies from EEC surplus stocks". Over 280 000 tons of coarse grain and 45 000 tons of other products have been bought directly by the Commission at a total cost of about ECU 98 million since the system began in 1983.

Thirdly, the *alternative operations* about which the report notes that the Community is the only donor practising them — substituting food aid with financial assistance where it is felt food aid would be counterproductive, like disrupting food markets and output. The system has proved particularly useful for "countries with marked

fluctuations in food production as in sub-Saharan Africa during and after the recent food crisis". In the limited number of countries where the operations have been applied since they began, the finance provided has served mainly to buy fertilisers and local foodstuffs to build up security stocks and to improve storage facilities.

Fourthly, the *emergency food aid*, under which the "EEC and Member States made a significant contribution in 1985 to combat the famine which affected various parts of Africa". The report recalls, in this regard, the meeting of Community Heads of State and Government in Dublin in December 1984 when food aid commitments of 1.2 million tons of grain or equivalent were fixed for 1985 and the Commission embarked on accelerated procedures for delivering them. "EEC emergency food aid, it should be noted, has been provided mainly in cereals in recent years, "although dried skim milk and butteroil have also been supplied, as well as small amounts of beans, high protein biscuits and sugar".

Recommendations

Looking to the future the document recommends among other things: — the strengthening of the Food Aid Specialised Service at the Commission, given the size and complexity of Community's food aid undertakings; — the strengthening of the Community Delegations in the recipient country "in order to implement the strong development focus" of Community food aid policy; — a greater coordination not only of the Community and national actions in food aid, but also between EEC overall actions and "food aid programmes of other donors and organisations"; — increase in the Community food aid programme to "a level commensurate with its economic status, its share of world food trade and size of its food stock"; — the putting into place of "a programme of multiannual commitments on a forward, rolling basis within an annual budget system" which would provide a guaranteed flow of food aid for specific development objectives, and would support recipient governments in their endeavours to implement policy reforms, and facilitate the full integration of food aid into the multiannual assistance programmes



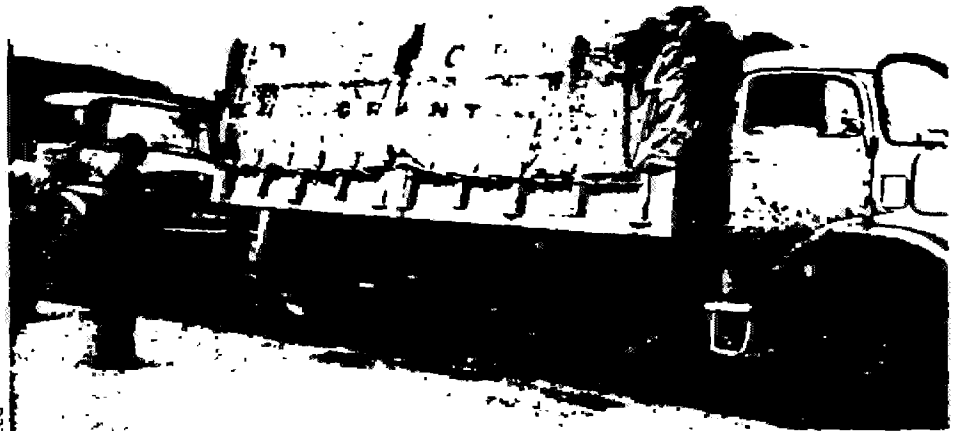
"A significant and noteworthy fact is the reduction in recent years in the supply of dairy products... about three quarters of Community food aid is given in cereals directly to beneficiary countries"

the Community is providing under Lomé III as well as in non-ACP countries, and... make food aid a more effective resource for the implementation of food security and food strategy programmes".

Report criticises the EEC's food aid "short time horizon" which "bases annual programming on a cumbersome process of implementing regulations", a system which results, in some cases, in "unacceptable delays, the practical outcome of which is that food aid is not provided on a haphazardly multi-lateral basis"; recommends the systematic pursuit of more efficient planning, management and use of counter-funds to ensure their impact on development of the recipient countries and stresses the need for a greater attention to the programming and conditions of the triangular transactions and alternative operations. The Report underlines the desirability of adoption of a common code of conduct among donors in the same field, on a pragmatic basis, under the responsibility of the beneficiary

Clarifying issues

Addressing the CFA in Rome, the Director-General for Development, Dieter Frisch, said that food aid was a difficult resource to manage. He, however, pointed out the often contradictory nature of the criticisms levelled at Community food aid policy in recent years. On the one hand, he said critics talk of how shameful it is to have food mountains in the industrialised countries while millions of people suffer hunger and malnutrition in the developing countries. But as soon as regular food aid is supplied, the Community is accused of creating dependence on aid and disrupting local markets. "We are being asked on the one hand to make greater efforts to assist populations in distress but, on the other, to reduce, if not stop entirely, food aid (except in the case of disaster) in favour of more effective development instruments". The very long time that food aid sometimes takes to arrive in the famine areas is another source of criticisms—criticisms which do not take into consideration the difficulties involved in implementing emergency aid like the ab-



EEC emergency aid in Uganda

Criticisms of delays in delivery of Community aid "do not take into consideration the difficulties involved in implementing emergency aid like the absence of logistic support and lack of security"

sence of logistic support and lack of security. Mr Frisch, however, noted that, notwithstanding these difficulties, the Community was able to carry out its emergency operations with speed during the African crisis.

About 80% of all assistance to development is geared towards rural development and food security. For any food strategy to be effective it must be pursued on a regional rather than national level. "One can, in effect, ask if it is possible for neighbouring countries with porous borders to have price policies that are different", said Mr Frisch. With the triangular operations the Community, he felt, has made a small contribution towards the regional approach. Not only do they enable the deficit countries to be supplied with products adapted to their nutritional habits, they contribute to the development of South-South commercial relations and to a system of regional food security.

On the counterpart funds about which the Report advocates more effective planning, management and use, Mr Frisch said the Community was examining its procedures on the constitution of such funds and that it would draw on the experience of other donors and the WFP in this area. "As to the use of the funds themselves, we advocate use in agricultural production programmes, marketing of produce or in development projects in the agricultural and rural sectors or better still—and this is particularly important at this moment—their use in cereal market management".

The Community's integrated ap-

proach and current reforms of policy and management of food aid are aimed at ensuring that the Commission is in complete control of the whole aid operations, from mobilisation to delivery, as against previous practice where responsibilities were dispersed among different organisations whose priorities were different from those of the Commission. "The reforms provide for the management of each operation by professionals mandated by the Commission to ensure that supplies are followed up, that difficulties that can crop up on the way are avoided and that quality and quantity are controlled", said Mr Frisch.

General satisfaction

In the debate that followed, the Committee congratulated the Community in its efforts at integrating food aid into development and for its pioneering, if not revolutionary, initiatives in the form of the triangular and alternative operations. Most members, however, again urged the Community to increase the volume of its food aid to a level commensurate with its stocks. To this, Mr Frisch reiterated that the provision of food aid was not linked to the Community's agricultural surpluses. Although food aid originated from surpluses, the Community has tried to establish a policy that is independent of them and one that has been integrated into its overall development policy. Establishing a link between the volume of stocks and quantity of food aid would be backward-looking, not progress.