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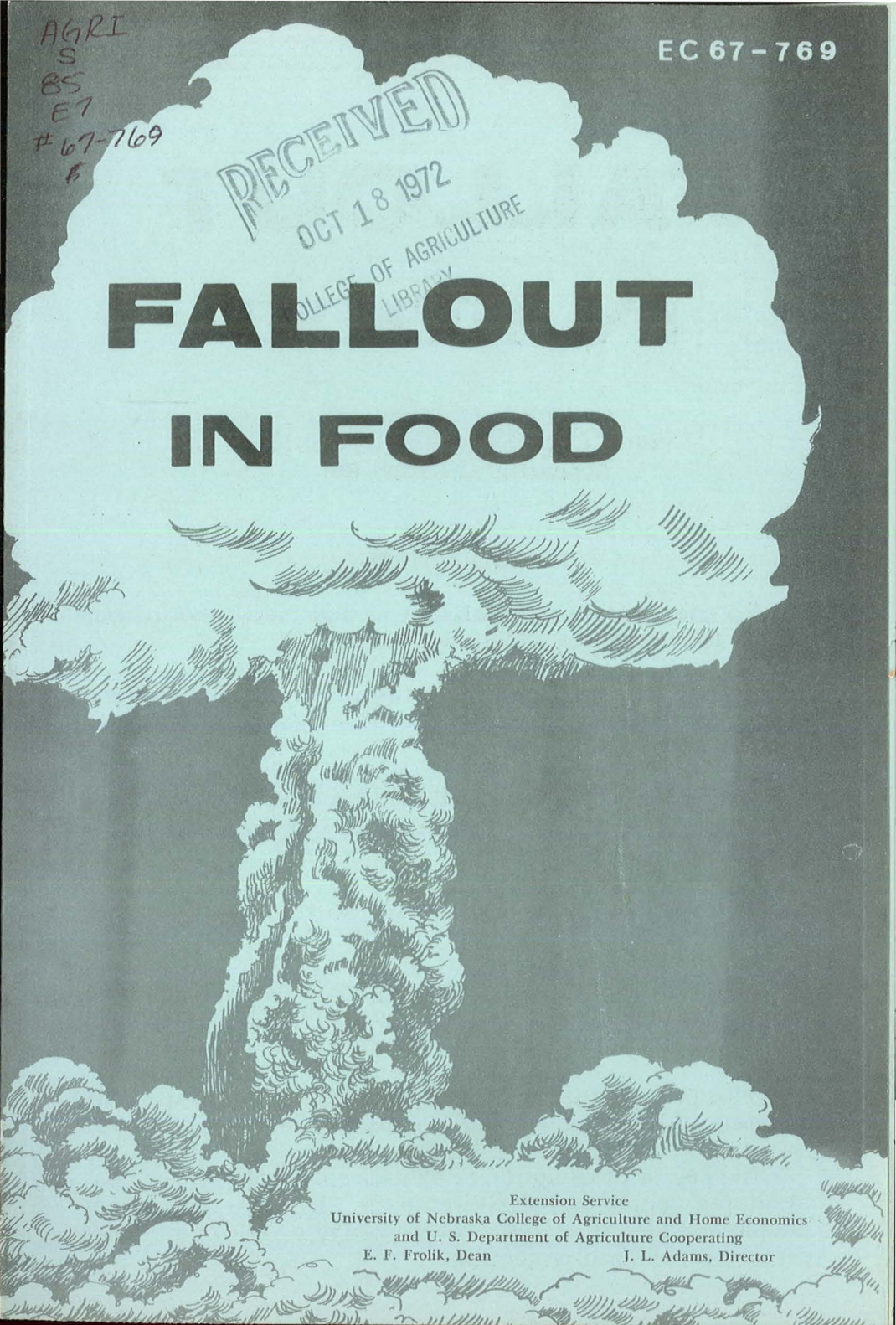
FALLOUT IN FOOD



Extension Service
University of Nebraska College of Agriculture and Home Economics
and U. S. Department of Agriculture Cooperating
E. F. Frolik, Dean J. L. Adams, Director

FALLOUT IN FOOD

By Elvin C. Schultz
Rural Civil Defense Specialist
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INTRODUCTION

No one likes to think about war and the impact of war on our food supplies. Yet, we must.

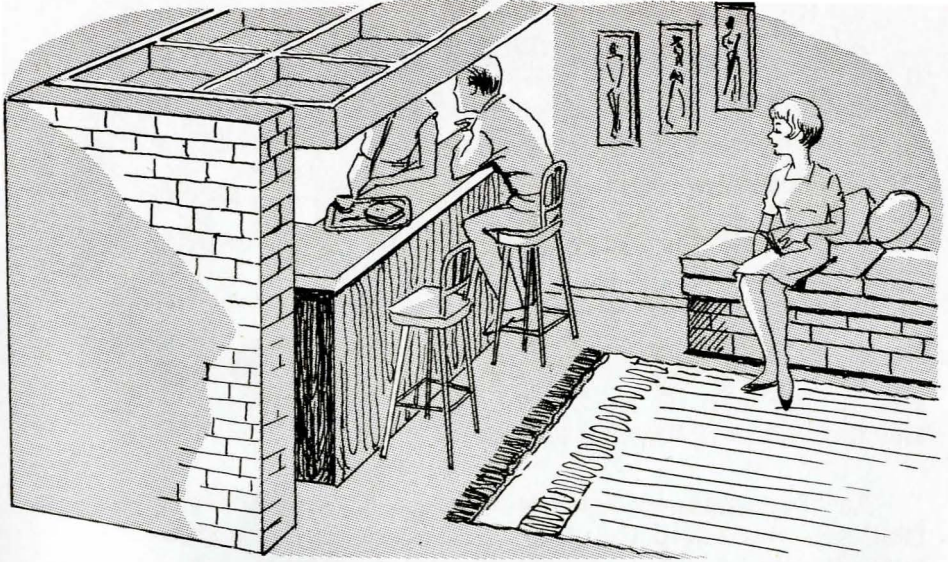
No one wants to undertake the job of planning a food rationing system in these times of abundance. Yet, we must.

Why do we plan? Why do we prepare? A review of recent world history reveals that to be vulnerable is to invite attack.

Is it far fetched to relate ballistic missiles and anti-ballistic missiles to the vulnerability of our food supply? Not at all. We estimate that the blast effects of an all-out nuclear attack on this country may involve about 2% of the continental land mass. The thermal or fire effects could go as high as 10%-at the right time of the year.

The real hazard will be radioactive fallout. The estimate of this hazard is as high as 80% of the land mass.

The key to the solution is shelter before fallout arrives; sheltered people and sheltered food. Decontamination of people and food is a good counter measure, but this cannot replace preplanned protection.



Everyone knows what an explosion is and what a fire is, yet many people have the wrong impression about fallout. Since nuclear weapons testing started and even since it stopped we have been subjected to fallout, but very few people have ever seen it.

WHAT IS FALLOUT?

Many people consider fallout an invisible dust that will invade our homes and even our shelters and kill us. This is simply not true.

We have been subjected to world-wide fallout for many years and this, for all practical purposes, is an invisible dust. These ultrafine particles are carried right up to the stratosphere by a nuclear explosion.

But, this is not the kind of fallout we are talking about. Early fallout particles are visible. In fact, if we think of this as a housekeeping problem, we can use sand as an example. Actually, some of these particles are larger than sand.

It is true, of course, that the dangerous nature of this sand is not detected by our senses, but it is important that we understand the physical nature of the problem. It takes detection instruments to assess the radiation from these particles, but it does not take special skills to know when fallout is present.

RADIATION HAZARD

The radiation hazard in food from fallout comes from exposure to radioactive materials (isotopes) that enter the bodies of animals and human beings.

At first, the principal source of this radiation is external contamination of edible plants when fresh fallout drops on the affected area.

For livestock, this includes forage grasses and legumes. For man, it includes fruits, vegetables, and milk - the last particularly for children.

As times passes and the initially contaminated food and feed are discarded the principal source for internal radiation of man and animals is indirect -- from radioactive isotopes in the soil which are absorbed through plant roots. When meat and dairy animals eat contaminated feed, some radioactive elements are absorbed into their bodies.

Thus, man's food supply of both plant and animal products can become contaminated with radioactivity.

RADIOACTIVE ISOTOPES

Many of the radioactive isotopes created by a nuclear explosion are of minor concern, as far as internal radiation is concerned, because of (1) small amounts involved; (2) their extremely short half lives; (3) the fact that the radioisotope is eliminated very quickly by the body; (4) the fact that they are not incorporated into the food chain and hence do not seriously affect man and animals. (The half life of an element is the time in which half the atoms in the radioactive substance disintegrate and change into another element. This new element may also be radioactive and undergo further disintegration, or it may be stable.)

Among the isotopes taken in the food chain are barium 140, cerium 144, cesium 137, iodine 131, iodine 133, promethium 147, ruthenium 106, strontium 89, and strontium 90. Of these, the most hazardous are barium 140, cesium 137, iodine 131, iodine 133, strontium 89 and strontium 90.

Radioactive iodine, because of its chemical identity with ordinary iodine, accumulates in the thyroid gland in man or animals. However, iodine 131 has a relatively short half life of 8 days. Iodine 131 will not be an important long term fallout hazard, but it is the most hazardous internal radiation emitter during the first 60 days after an attack.

When considering the dosage to the thyroid derived from radioactive iodine the first few days after attack, it is important to consider both iodine 133 and iodine 131.

Iodine 133 has a half life of 22 hours but it occurs in sufficient quantities to make a significant contribution to the thyroid radiation dosage.

Cesium 137 has a long half life of 29.7 years and is chemically similar to the essential nutrient element potassium.

When cesium 137 is consumed and absorbed it is found primarily in muscle tissue and can cause several types of cell damage, including genetic damage. But, this radioactive isotope is not retained long in the body. It continually enters and leaves the system just as does potassium.

Strontium 90, however, with its half life of 27.7 years, is of primary importance. Strontium 89 is chemically identical, but it has a half life of only 50.5 days.

They both behave like the calcium in the soil, plants and animals.

Nuclear explosions produce large amounts of radioactive strontium. It is taken up in biological systems, in plants, is secreted in milk, and collects in bones, where some of the strontium 90 remains for years. Radioactive isotopes of strontium deposited in the bone probably can produce serious consequences, such as bone cancer.

Children are relatively sensitive to radioactive strontium. During early growth periods children require larger quantities of calcium than do adults. Consequently, a greater fraction of ingested strontium is deposited in their bones, and the concentration of strontium is more uniform

throughout their skeletons. And since children have longer life expectancies, there is more time for a slowly developing disease like bone cancer to occur.

Barium 140 behaves similarly to strontium 89 and strontium 90 in that it is deposited in the bones.

However, both the proportion of ingested barium 140 that reaches the skeleton and the half life (12.8 days) are smaller than for radioactive strontium so that barium 140 contributes less to the bone hazard.

Although those materials mentioned above are of special concern in view of the dominance in the food chain, total fission products of fallout have to be considered in the event of food being contaminated directly with the fallout.

While only the group described above passes into the blood stream in significant quantities, the entire material irradiates the gastro-intestional tract as it passes through and can cause serious injury. Results of this damage are among those that appear earliest - nausea, vomitting, and diarrhea.

PROTECTION SIMPLE

The concern in protecting food, feed and water is to prevent consumption of contaminated materials that would subject man and animals to internal radiation hazards.

However, the immediate problem is to protect a sufficient quantity of food from fresh fallout to provide for survival during the critical period.

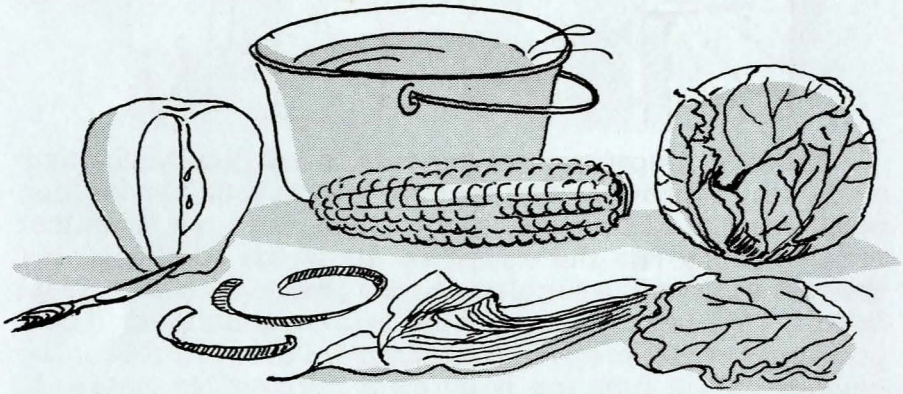
Protecting food, feed, and water from external fallout is simple: Prevent fallout from becoming mixed or incorporated into these materials. If the radioactive particles do not come in actual contact or if the fallout is removed the materials will not be radioactive and thus will be safe to eat or drink.

Methods of preventing radioactive contamination are the same as those for preventing dust from contaminating food or water. Fallout can also be removed in much the same way as dust -- by washing, vacuum cleaning, and brushing.

Precautions should be taken to avoid inhaling or swallowing particles of the material while removing it.

Vegetables and fruits harvested from fallout zones in the first month after attack will require decontamination before they can be used for food.

First, the exposed parts must be thoroughly washed to remove the fallout particles. The vegetables or fruits should be peeled, pared, or the outside otherwise removed in such a way that hands or utensils do not contaminate the parts to be eaten.



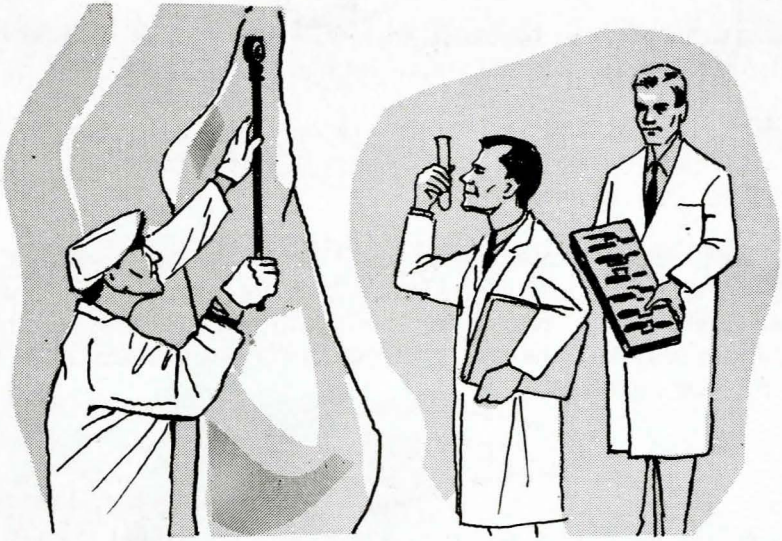
It should be possible to decontaminate almost completely such crops as apples, head lettuce, and cabbage repeated parings, washing hands and washing utensils before each paring.

Since fresh fallout provides only a surface contamination, it should be possible to wash and shell peas and beans or to husk sweet corn in order to remove the contaminated parts.

Cooking will not destroy radioactivity, but research has shown that boiling foods, including meat, will leach radioactive elements from the food. The food itself may be consumed, but not the water it is cooked with.

FOOD INSPECTION NECESSARY

Under conditions expected to prevail in a post attack environment, a high quality of food inspection no longer remains just a desirable goal; on the contrary, it is mandatory.



The U.S. Department of Agriculture and the Department of Health, Education, and Welfare are responsible for food resources and food, respectively. This does not mean that either agency has the manpower to do the total job, but they are responsible for planning the programs on a national basis. They have the responsibility to help State and Local governments in preparing uniform plans to protect the general public from the hazards of radioactive materials which could be incorporated into the food chain.

The actual inspection services will be a combination of all the levels of government working together in the common interest.

The average housewife can do an effective job of protecting her family in food preparation during the immediate post attack period by following the procedures outlined above.

Perhaps the most important thing to remember is that lack of knowledge about the radioactive content of food should never under any circumstances stop anyone from eating. Starvation is never a good solution to the problem of radiation exposure.