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Sweden's Food Supply after Radioactive Fallout:

Five Loaves and an Entire Popullation

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Sweden has lost parts of its capability to deal with crises where radioactive fallout is an issue. In a situation involving the unthinkable, where Sweden is attacked with tactical nuclear weapons, this would be brought to a head and place major strains on all parts of society. An attack with tactical nuclear weapons, apart from direct destruction and damage, would have major consequences for Sweden's food supply. The ability to predict where fallout settles, measure the activity of radionuclide deposits, determine uptake into food and calculate the radiation dose that would result from consuming the contaminated food must be strengthened. Decision-makers must dare to consider this scenario and once this thought has been thought, ask themselves what form of decision support they would need in order to act. The capacity to deal with such a scenario needs to be assured through appropriate measures, training and exercises.

A TRADE-DEPENDENT FOOD SUPPLY

Sweden imports approximately half of all the food that is consumed in the country. This applies to most of the fruit and vegetables and more than half of all meat. For certain products, such as tea and coffee, it relies entirely on imports. On the other hand, the proportion of dairy products and grain that is imported is small. If the pattern of trade with other countries changes, this affects the selection available in grocery stores. This was noticeable during the cold snap that affected the Mediterranean in the winter of 2016. Suddenly, certain vegetables were missing from the produce section and the price of many of those still available increased substantially.

Fruit and vegetables are special in that respect, since many have a short shelf life and cannot be stored if supply is suddenly reduced. For many other foodstuffs, stockpiling can resolve a temporary shortfall in production or imports. During the Cold War, Sweden's agricultural policy made us almost completely self-reliant in food. There were also stocks of food, as part of crisis preparedness. In the early 1990s, however, agricultural policy was reformed to make it market-driven, and the last food stocks were dismantled at the beginning of the 2000s.

Storage is expensive for both states and shop owners. It is more efficient and profitable to sell an item immediately after it is delivered to the store. The problem is that this gives rise to vulnerability; when deliveries cease, the food disappears. If, however, neither the nation nor the grocery store has any stocks that can cover a short-term disruption: who should have? In the spring of 2017, the Swedish Civil Contingencies Agency (MSB) working with the County Administrative Boards and the municipalities conducted an information campaign to increase Sweden's crisis preparedness. One message, for example, was that all citizens were encouraged to maintain their own supplies – a 'crisis box' to help them manage during a brief interruption in food imports.

Notwithstanding the seriousness of cold spells or transport strikes, there are also more serious threats. What would be the effect, for example, of a war in Sweden's neighbourhood combined with radioactive fallout over Swedish agriculture? How long would citizens' stocks of food last in such a situation? What could be done before clean-up measures and a reorganisation of production restored domestic food supplies?

A WORSENED SECURITY SITUATION

The security situation in Sweden's neighbourhood has deteriorated and the conflicts in Georgia and Ukraine demonstrate that the threshold for armed violence has been lowered. To the image of a generally worsening security situation should be added the fact that the USA and Russia are continuing to develop the capabilities of their nuclear weapon systems. France and the UK have also committed major resources to maintaining their nuclear capabilities. Even had the Comprehensive Nuclear Test-ban Treaty fully entered into force, there is no agreement that forbids the use of nuclear weapons to

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achieve tactical or strategic goals in an armed conflict. The use of nuclear weapons is part of Russia's defence doctrine as both a tactical and a strategic tool. Russia regularly conducts exercises with its nuclear weapons units and it is reasonable to assume that a rational nuclear-weapon state would consider the use of nuclear weapons if the situation required it. An attack using tactical nuclear weapons in a regional or local conflict is a genuine threat. This has been pointed out in the joint understanding between the armed forces and the MSB on cohesive planning for total defence.[1] The military-strategic doctrine of 2016 also discusses the threat from tactical nuclear weapons and concludes that our defence must be prepared for such a threat. It is therefore important that such situations are dealt with within the framework of crisis and defence planning.

If the unthinkable were to happen

Let us consider a situation in which a limited attack using remote weapon systems against military targets, including its logistics functions, took place in Sweden. The fortunes of Sweden's enemy have quickly turned and as a result it feels under pressure to guarantee the outcome of the attack. Thus, in addition to conventional weapons, a small number of tactical nuclear warheads are detonated against these targets. Apart from the initial radiation, and the shock and heatwaves as well as the ensuing firestorms, a large amount of soil is thrown into the air and radioactive particles of varying sizes are formed. Depending on the size of the particles, some will fall to the ground close to the site of the detonation, while others will be transported on the wind. Certain particles will be thrown high into the atmosphere and spend decades there before falling back to earth.

An attack of this kind would plunge Sweden into the following crisis:

- Food imports would almost entirely cease because of the conflict and its impact on logistics;
- Locally, people will have received serious injuries due to the immediate effects of the nuclear detonation. Caring for them will consume a significant part of society's resources;
- Large segments of the rest of the population will have managed to find provisional shelter in a cellar, bunker or similar; some of these will have complied with the MSB's appeal to maintain a supply of food at home. They will therefore be equipped to survive the first few days;
- Domestic transport of foodstuffs and other supplies will be hampered by a shortage of transport and fuel, as well as by damaged infrastructure. Radiation levels in the affected areas are also likely to create problems. Not even the threat of impending starvation will bring all agricultural land back into production. Near the detonation site, radiation doses will be so high that it will not be possible to stay there. Farmers will not be able to work in their fields.

One uses what one has

To continue the scenario, storage shelves will be emptied and that part of the population that has not complied with the MSB's request, or that does not habitually keep dry foodstuffs in the pantry, will go hungry. Soon the entire population will face a situation of hunger. Domestic food production will be affected by radioactive fallout to varying degrees and there will be many questions: What proportion of agriculture survived the attack? Is it possible to use the affected land? Is the fodder fit for livestock to consume? Can the grain and meat be eaten? Is the milk drinkable?

Because, for logistical reasons, a sizable percentage of imports have been cut off, after some time only Swedish commodities will be available in the shops. A proportion of these will not even be "second-class fresh", to quote Michail Bulgakov's classic description of the quality of foodstuffs in post-war Moscow in *The Master and Margarita*. The crops that grow in the fields (if they grow) will be so contaminated that they will not be marketable or suitable as fodder, according to the limits that the EU contemplates imposing after radioactive fallout. On the other hand, they may be edible under the threat of starvation. In addition, it might be possible to clean the harvested commodities of surface contamination and keep them in storage while waiting for the decay of radioactive substances with short half-lives.

1 *Sverige kommer möta utmaningarna* [Sweden is going to meet the challenges], FM2016-13584:3/MSB2016-25.

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Difficult choices require good decision support

In this situation, decision-makers must decide what level of radiation dose it is acceptable from the ingestion of food. Sweden has a certain level of preparedness for radiation protection and radiation medicine in the event of a nuclear reactor accident, as well as a certain capacity for mapping fallout and measuring radiation doses in humans, and performing laboratory measurements on samples from pasture, commodities and food. This capacity is in all probability not sufficient for dealing with a nuclear weapons scenario, which requires data in the form of contamination measurements and radiation dose calculations, as well as medical examinations to set priorities for medical treatment. Even the capacity for measuring whether the contamination of food is within established limits or clearance levels would be inadequate in a situation where examining affected people will be prioritized higher than measuring foodstuffs.

There is currently no national plan for rapidly organising sufficiently large capacity for measuring radioactive substances in food. Peacetime responsibility for demonstrating that a foodstuff is within EU safety limits lies with those who distribute or sell the product. It is safe to assume that if there are difficulties in importing food during a crisis, then other imports such as of instruments for carrying out radionuclide measurements would also be affected. Constructing new certified measurement laboratories and providing the personnel and measuring equipment capable of handling fundamental metrological quality criteria would be no simple task. High metrological quality will be essential if decision-makers – and in the end the population – are to depend on the measurements to form the basis for decision making on whether land can no longer be deemed dangerous.

The absence of a national plan will probably mean that the few resources that are available will be used for spot checks on food, commodities and land. The primary aim would be to validate predictions on levels of contamination in commodities and food, and calculate the resulting internal radiation dose for the population. These predictions would be based on the meteorological conditions at the time of the detonations and knowledge of how plants capture and retain radioactive substances in their tissues. It is exactly these theoretical models that are likely to provide decision-makers with the most complete basis for planning countermeasures and measurement operations, but they are only partially available nationally. In addition, because the nuclear weapon threat has long been assessed as low, methodologies have not been devised to function in this kind of scenario.

The limited capacity to either predict or actually determine the radiation dose obtainable from food after a nuclear attack will lead to difficulties in judging the safety of foodstuffs. Unsafe contaminated food will probably be consumed while edible foods are discarded by mistake. The authorities will have a difficult task making decisions on temporary clearance levels that will be much higher than the consumer has previous experience of. It is important that society has a mental preparedness for a situation such as this. It will also be crucial to find ways to deal with such a situation, to establish resource and quality standards for conducting national measurements and to develop forecasting tools and principles for making decisions. We must be able to weigh the respective consequences of malnutrition and hunger or high radiation doses from food against each other. It is reasonable to expect that the results of such considerations should be on the table well before a situation involving radioactive fallout might arise.

Five loaves and an entire population

Even if society were to decide to allocate the means to build a capability to operationally assist with the types of tangible capabilities that enable good decision support, many challenges would remain. Planning tools must be improved, in part because of the risks that could arise and the need to communicate them to the population in a credible manner, and in part to ensure a sufficient metrological capacity as well as priorities for food distribution. If this fails, there is a great risk that everything, from food shortages to starvation, will lead to a loss of confidence in the authorities and other decision-makers. At worst, this would lead to mass migration from the city to the countryside, and to tensions between those who have and those who do not.

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Further Reading

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