SCOTTISH SANA FACT-SHEET NO. 27

NUCLEAR WEAPONS: FOOD SUPPLIES AND THE RURAL ENVIRONMENT.

Prompt Effects on Farm Animals:

Background: This fact-sheet, prepared by scientists from published information, is one of a series which summarises the effects of nuclear weapons on food supplies and the rural environment. It deals with the prompt effects which can be expected from single or multiple nuclear explosions upon farm animals, whether out-of-doors or under cover. Other fact-sheets (listed at the end) describe the delayed and indirect effects on animals, and deal with farm and fruit crops, forestry and fisheries.

The Principal Causes of Prompt Effects: Nuclear weapons explosions affect living things directly through three forms of rapid release of energy:- by (a) blast, (b) heat and (c) nuclear radiation. In line with the assumptions of the British Government's civil defence exercise 'Square Leg', data are given here for 1 Megaton fission/fusion bombs. These liberate the equivalent of 1 million tons of TNT (0.91 Megatons), and are between 40 and 70 times more powerful than the Nagasaki and Hiroshima fission bombs. In this simulated nuclear attack on Scotland, it was presumed that 24 weapons, each of 1-5 Megatons; exploded at 19 sites, in the air, or near the surface of ground or water.

(A) Blast Injury to Farm Animals: Deaths and severe injuries to farm animals (and indeed to humans and wildlife) would result from:- (1) a sudden 'wave' of extra air pressure (above atmospheric pressure) lasting about 2-4 seconds, and particularly damaging to the lungs; (2) a violent wind, throwing animals against walls, etc.; (3) flying stones, broken glass, etc.

A single 1 Megaton explosion at the ground surface would form a crater 30 acres (12 ha.) in extent, and kill 50-100% of farm animals over 820 acres. What is termed a 'typical air burst' (an explosion at around 6800 feet) would extend the area to 1460 acres. Outside these central zones (which would be about 1-2 miles across), many farm animals would receive sub-lethal injuries from blast, even if they were under cover. For instance, the danger from flying glass fragments would extend up to 8 miles away from the crater.

(B) Heat Injury to Farm Animals: The intense explosion also liberates a pulse of light and heat which is for instance capable of blinding animals up to 50 miles away, if on a clear day their eyes happened to be focussed on this fireball.

50-100% of exposed farm animals would be killed by a 1 Megaton explosion over the following areas:

	moderately clear day	unusually clear day
surface explosion	43,200 acres	66,500 acres
air explosion	67,500 acres	103,800 acres

Animals under cover would be partially protected, but might be subject to burning or asphixiation through spontaneous ignition of dry combustible material such as wood, hay, etc. up to a distance of 5-10 miles from 'ground zero'. Outside these central zones, exposed animals over a larger area would be more or less severely burned.

(C) Nuclear Radiation Injury to Farm Animals: Due to the formation of many intensely radioactive substances, the countryside around a nuclear explosion is also subjected to various types of radiation. For an air explosion of a 1 Megaton device, the initial radiation (received during the first minute) would kill 50-100% of farm animals over an area of 3,730 acres. Because an explosion at the surface sucks up about 10 million tons of soil and other material into the 'mushroom cloud', this becomes radioactive and comes back to the earth's surface as fallout. Where it lands depends on wind speed and direction, rainfall, etc., but fallout has been estimated to result in the death of 50-100% of farm animals over an elliptical area 52 miles by 9 miles, that is to say of the order of 230,000 acres.

This early radiation (received during the first day) is the most severe, causing radiation sickness which involves damage to cell membranes and the loss of fluids from tissues, and failure of normal cell division, affecting particularly the blood system. Farm animals cannot be significantly protected, since much of the radiation penetrates easily, and they would also breathe in and swallow particles of radioactive dust.

The smallest particles continue to fall over many months, those carried into the upper atmosphere eventually reaching quite different parts of the world. The main concern in regions not receiving lethal or severe doses during the first day centres on cancers, abnormal births and possible genetic changes due to accumulation in the body of long-lived radioactive substances (see Fact-sheet no. 30 - Longer-term effects).

Other Effects: Additional direct effects may be anticipated, such as shock and stress symptoms. Indirect effects on farm animals not considered here include contaminated or unavailable water supplies, contamination of grazing and uncovered hay and root crops, damage to buildings and electricity supplies, and spread of disease.

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Summary of Implications: For a single 1 Megaton explosion in the air, damage from heat would be the most severe, killing from half to all the exposed farm animals across as much as 18-22 miles of countryside, depending on weather conditions. With an explosion at the surface, nuclear radiation would be the most damaging, killing from half to all farm animals in an elliptical zone covering about a quarter of a million acres.

There is no way of protecting the countryside and its farms except by adopting policies which reduce, rather than increase the numbers of nuclear weapons and the risks of their being exploded, whether by accident or design, by terrorists or governments, by escalation or deliberate 'first-strike'.

Sources: Campbell, D. Scotland's Nuclear Targets. New Statesman, March 6, 1981, p.11.
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Lewis, K.N. The Prompt and Delayed Effects of Nuclear War. Scientific American, Vol. 24(1), July 1979, pp. 35-47.
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Other Fact-sheets planned in this Series: (* - in preparation, 10/81)

No. 28 - Prompt effects on fisheries
No. 29 - Prompt effects on farm crops
*No. 30 - Long-term effects
No. 31 - Effects on perennial fruits
No. 32 - Effects on forestry
No. 33 - Possibilities of climatic changes
No. 34 - Cancer in farm stock
No. 35 - Contamination of milk
No. 36 - Fallout, grazing and feed-stuffs
No. 37 - Rural water supplies

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