REMOVING FOOD PROTECTION COUNTERMEASURES: THE USE OF LIVE MONITORING TO DERESTRICT MUCH OF THE CHERNOBYL-AFFECTED AREA IN CUMBRIA

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INTRODUCTION

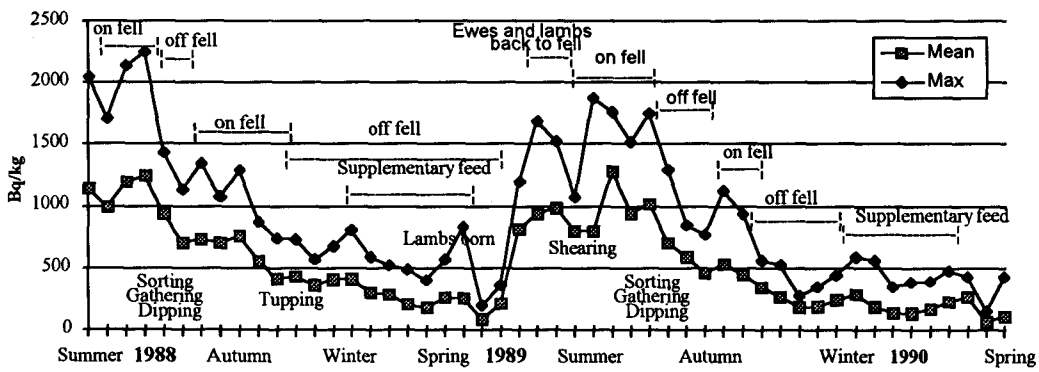
After the passage of the Chernobyl plume across Britain in 1986, some upland areas with peaty soil were significantly contaminated with Cs-137. The main effect on agriculture was the persistence of radiocaesium in sheep grazing these areas. A limit of 1000Bq/kg of total Cs in sheepmeat was introduced to protect consumers, and a system of live-monitoring known as mark-and-release has been applied successfully ever since, ensuring that no animal above this level of contamination could enter the food-chain (1). The level of contamination in the animals has fallen only slowly because of the nature of the soil (2), but over the years it has been possible gradually to reduce the area held under restriction. This paper describes the approach used to determine whether restrictions could be lifted on a farm-by-farm basis in England; similar methods have been used in other parts of the United Kingdom.

METHOD

The essence of all live monitoring is that animals are tested in the field using a hand-held, portable instrument; the calibration curve was established from comparison of live monitoring and accurate determination of activity levels in samples taken from animals after slaughter (3, 4). When animals are destined for the market, in the autumn, farmers in the restricted area are required to present them for monitoring before they leave the area; only those which are below the limit may be moved. A safety margin to bring them within the 97.5% confidence level is applied, because of the natural scatter of the calibration. Failures are then kept on low-lying land where the caesium levels are much lower and within a few weeks can go on to market. The number of animals failing this test in recent years has been minute, less than ten out of tens of thousands monitored each year, partly because farmers generally do not present their animals for testing until they are confident of passing, and partly because of the gradual reduction of radiocaesium in vegetation in the area.

Before removing controls on any farm in the area, it is necessary to be confident that no animal will be contaminated above the limit when it goes to market. A programme of derestriction monitoring has been carried out in the summer of each year since 1989; since 1990 every animal within a selected area was live monitored at a time corresponding to the annual peak of activity. Detailed studies have shown that the peak is reached between June and September each year (Fig 1) (4, 5).

Figure 1. Live monitoring at a single farm in the Cumbrian restricted area (1988-1990)



For this survey, farmers present their animals within 24 hours of bringing them down from the fells, which they can do as part of their summer clipping routine . This approach ensures that the true peak activity in the flesh is measured,as activity falls rapidly once the animals leave the fell, and so if every animal in a flock is below the limit (again with a suitable margin for counting uncertainty) levels will be well below the limit at market time.

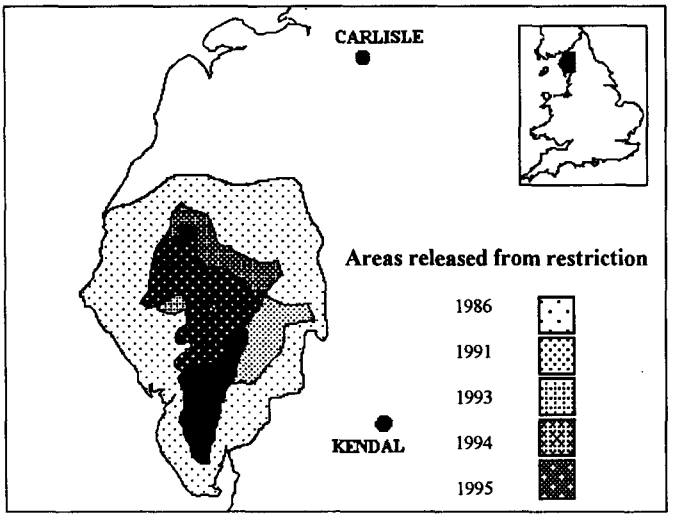
SELECTION OF AREA FOR DERESTRICTION MONITORING

This method is very resource intensive and it would not have been possible to cover the entire restricted area in a single survey. Parts of the area were only selected as candidates for derestriction when there was good reason to believe that many of the holdings tested would pass. Results of each year's mark-and-release monitoring have been an indicator of possible success, but these are mostly a reflection of farming practices. The best indicator has been the soil. Research over several years following the Chernobyl accident showed that within the broad class of organic and peaty soils there are significant differences in caesium retention properties between different soil types (see, eg, 2). Although caesium is recycled and reappears in vegetation each year on many fell soils, the peak level in vegetation falls annually at different rates. These results suggested only deep peat was likely to continue to be a problem in the longer term. Very detailed maps of the soil composition are available (6), and these enabled parts of the restricted area to be selected each year in the expectation that few farms would be likely to show failures.

RESULTS

Figure 2. Sheep grazing areas in Cumbria affected by Chernobyl fallout

In Cumbria, an area of some 197,000 hA, comprising 1670 holdings and containing some 867,000 sheep, was originally restricted in June 1986 on the basis of very cautious assumptions, but1520 holdings with 697,000 sheep were derestricted by September 1986. Fig 2 shows the area covered, and also shows how it has been reduced in recent years following the annual derestriction surveys.



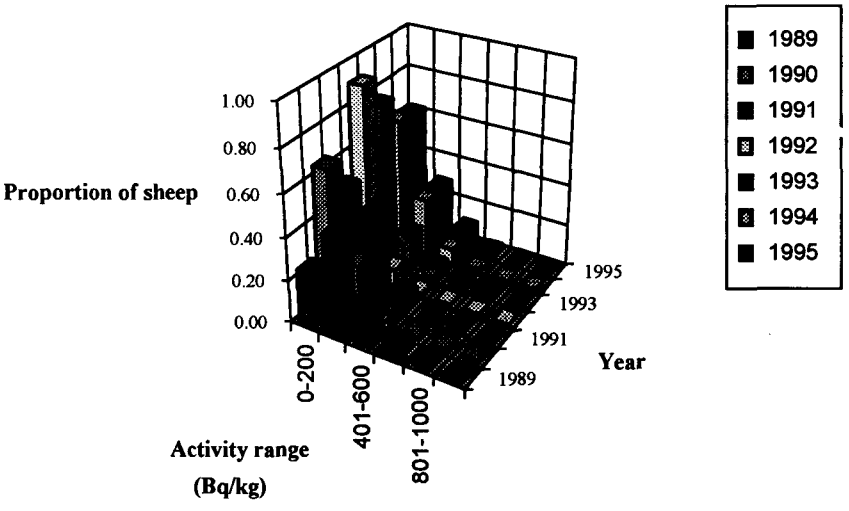
The Table shows how the numbers of holdings under control and the numbers of animals involved have been reduced, up to January 1995. In the summer of 1995 all the remaining area was surveyed; analysis of the latest results is still under way but it is hoped that the number of holdings remaining under control can be reduced to below 20. It is important to recognise that the whole approach is extremely conservative, and a single animal above the limit is sufficient to keep a holding under control. In all cases the vast majority of the animals show very low levels of activity.

Holdings and sheep in Cumbria affected by Government restrictions

Year	Number of Holdings	Number of Sheep
June 1986	1670	867,000
October 1986	150	170,000
December 1991	138	120,000
January 1993	126	110,500
January 1994	112	100,000
January 1995	66	68,819
January 1996	<20	≤ 20,000

Figure 3 shows the distribution of activity measurements for each survey in the last 7 years; although tens of thousands of animals have been below 200 Bq/kg, even at the peak time, the few results above 1,000 Bq/kg have been enough to keep the affected holdings under restriction and require the continuing use of the mark-and-release system.

Figure 3. Activity distributions of sheep in derestriction surveys



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