Post-Chernobyl Monitoring and Controls

Report of Scottish Summer Survey 2008

Food Standards Agency Scotland

June 2009

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Scottish Summer Survey 2008

Summary

Following the Chernobyl accident in 1986, restrictions under the Food and Environment Protection Act 1985 were placed on the movement, sale and supply of sheep in areas of the United Kingdom where contamination levels in sheep meat could potentially cause a risk to public health.

In Scotland, as in the rest of the UK, summer surveys of farms placed under restrictions following the Chernobyl accident have been carried out since 1993 to assess whether restrictions could be removed.

During summer 2008, all stocked farms subject to restrictions in Scotland were whole flock tested though none were found to be suitable for de-restriction under the current criteria. This leaves five farms totalling approximately 3000 sheep under restrictions in Scotland.

This report summarises the basis of the summer surveys in Scotland and presents the results of last year's survey. Previous reports since 2000 can be found on the Food Standards Agency website (www.food.gov.uk).

Background

On 26 April 1986, an accident occurred at a nuclear power station at Chernobyl in the Ukraine resulting in the deposition of radioactivity across Europe, including parts of Scotland. Food monitoring indicated raised levels of radiocaesium (primarily caesium 137) in some sheep and in order to protect public food safety a control limit of 1000 Becquerels per kilogram (Bq/kg) in sheep meat was set following the advice of experts appointed under Article 31 of the EURATOM Treaty.

Consequently, statutory restrictions under the terms of the Food and Environment Protection Act 1985 were placed on the movement, sale and supply of sheep from the affected areas. In Scotland, initial restrictions on 2900 farms were put into force on 24 June 1986 and subsequently lifted later that year. During 1987, raised levels of radioactivity were detected in new lambs leading to the re-introduction of restrictions on 73 farms in central and south-west Scotland.

These raised levels were due to the behaviour of caesium in the poorer, peaty upland soils where it remains available for uptake by vegetation and ingestion by sheep. Levels also vary seasonally and tend to be highest in sheep in summer when they are grazing on upland areas and vegetation growth is highest.

In 1991, further monitoring enabled restrictions to be lifted from 10 whole and 3 part farms and since 1993 'summer surveys' have been carried out on farms considered as being potentially suitable for de-restriction (though no survey was done in 2001 due to the Foot and Mouth disease outbreak). This has reduced the number of farms currently under restrictions in Scotland to 5. Restrictions are specified in the Food Protection (Emergency Prohibitions) (Radioactivity in Sheep) Order 1991 (SI 1991/20), as amended. In Scotland,

the Scottish Government Rural Payments and Inspections Directorate (previously the Scottish Executive Environment and Rural Affairs Department) continues to monitor sheep on restricted farms on behalf of the Food Standards Agency Scotland (FSAS).

Monitoring and Summer surveys

Initially it was necessary to slaughter sheep to determine their radiocaesium activity; however a new monitoring technique was quickly developed following the accident. This enabled radiocaesium levels in the muscle tissue of live sheep to be measured using a portable radiation monitor. This live-monitoring technique has been used in all subsequent monitoring including the summer surveys.

The summer surveys measure radiocaesium activity in whole flocks with the aim of assessing whether specific farms are suitable for the removal of restrictions. Whole flock monitoring allows for variability in levels between individual sheep due to differences in grazing location, habit, metabolism, etc.

Strict criteria are set to ensure public food safety is protected: Flocks are monitored in summer and within 24 hrs of leaving upland grazing, as summer is when the activity levels are highest and levels decline rapidly once sheep are removed from contaminated pasture. The live monitoring is based on a 'Working Action Level' (WAL) which allows for variability in monitor response and the field monitoring process to ensure measured radiocaesium levels are within the current 1000Bq/kg limit. If all readings are below the WAL a farm may be considered for release; if less than 5% of readings are above this level but below 1000Bq/kg, the sheep with the 5 highest readings are slaughtered, if available, and meat samples taken for laboratory analysis. Only if all these measured activities are less than 1000Bq/kg can a farm be considered for release.

In Scotland, '40 lamb' tests are usually carried out earlier in the main growing season. This allows the radiocaesium levels to be assessed and the identification of farms where levels may have reduced sufficiently to allow release from restrictions. In 2008, new monitors were introduced and consequently, only one 40-lamb test was completed on each farm and all stocked farms were whole flock monitored to provide baseline data from the new equipment. Four of the five restricted farms in Scotland were stocked and whole flock surveys were completed on these farms during summer 2008. These data; along with past results and those from the statutory 'Mark & Release' ('M&R') monitoring during the main autumn marketing season were considered in deciding each farm's suitability for release from restrictions.

Results for Scottish Summer survey 2008

Results are presented for the four stocked farms on which whole flock surveys were carried out during summer 2008.

Table 1 Activity concentrations of caesium-137 from 2008 whole flock summer survey

Farm no.	number of sheep tested	mean (Bq/kg)	standard deviation (Bq/kg)	maximum (Bq/kg)	number of sheep exceeding 1000 Bq/kg
1	1286	164	173	1022	1
2	145	19	58	302	0
3	375	140	247	1292	9
4	686	50	81	482	0

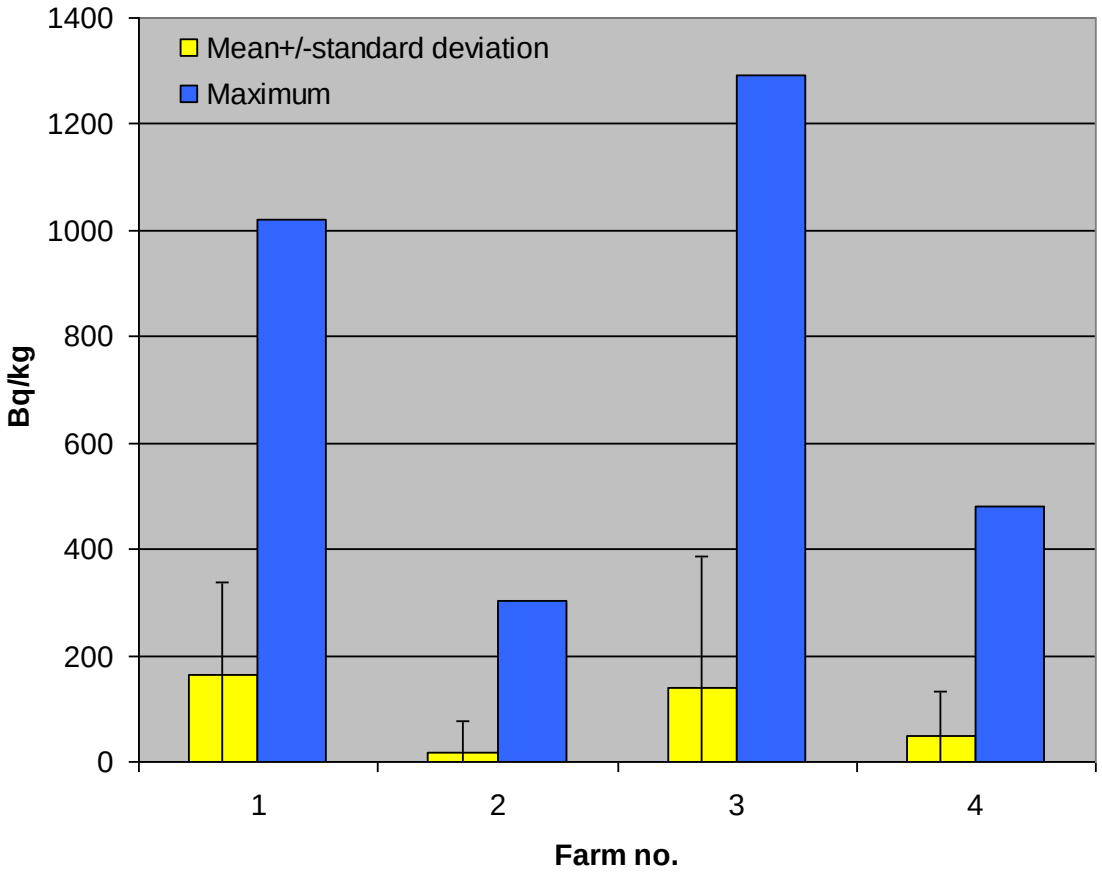

Figure 1 Activity concentrations of caesium-137 from 2008 whole flock summer survey

Whole flock survey – summer 2008

On Farm 1, 1286 sheep were monitored and 1 exceeded the 1000 Bq/kg level, with a maximum of 1022 Bq/kg. The highest reading sheep (4 lambs) were slaughtered and meat samples taken for laboratory analysis. Only the highest reading lamb exceeded the 1000 Bq/kg level, with a laboratory activity of 1060 Bq/kg. During the autumn, 422 sheep were monitored clear under Mark and Release.

Farm 1 remains restricted since the laboratory sample exceeded the 1000 Bq/kg level.

Farm 2 and Farm 3 are adjacent and effectively managed as a single unit. On Farm 2, 145 sheep were monitored and none exceeded the 1000 Bq/kg level, with a maximum of 302 Bq/kg. On Farm 3, 375 sheep were monitored and 9 exceeded the 1000 Bq/kg level, with a maximum of 1,292 Bq/kg for 2 sheep. Since several sheep were high value, pure blackface ewes, only 2 lambs were available for slaughter, giving laboratory activities of 600 and 930 Bq/kg. During the autumn there were no failures under Mark and Release for either Farm 2 or Farm 3.

Farm 2 & Farm 3 therefore remain restricted as insufficient sheep were available for slaughter & there is a possibility that one or more sheep exceeded the 1000Bq/kg level.

On Farm 4, 686 sheep were monitored and none exceeded the 1000 Bq/kg level, with a maximum of 482 Bq/kg. During the autumn, 561 sheep were monitored clear under Mark and Release. Usually such activities would allow the farm to be de-restricted; however consideration had to be given to past results for this farm which have been consistently high. This year's reduction may be a result of recent changes in land management practices and a reduction in stocking density.

Farm 4 remains restricted but will be considered for de-restriction if levels remain consistently low.

Conclusion

The current summer survey methods, along with the Mark & Release statutory monitoring controls continue to protect public food safety whilst allowing established sheep farming practices to continue. Although no farms were identified as suitable for de-restriction and five restricted farms still remain, the results indicate a general decline in radiocaesium levels on restricted farms.

Glossary of Terms

Activity Concentration	The amount of radioactivity within a fixed mass or volume. Generally recorded in units of Becquerels per kilogramme (Bq/kg) or Becquerels per litre (Bq/l).
Becquerel (Bq)	The international standard unit of radioactivity, defined as one nuclear disintegration per second.
In-bye	Low level enclosed (valley) pasture. Levels of radiocaesium are usually much lower in the in-bye land compared to upland areas. Sheep are brought to in-bye land for handling and rearing twin lambs during the summer and for finishing prior to being sold at market.
Control Level	The maximum concentration of radiocaesium allowed in UK sheep meat following the Chernobyl accident. The limit was set at 1000 Bq/kg in 1986, following advice from the European Commission's Article 31 Group of Experts.
40 lamb tests	Live monitoring of 40 lambs from a flock to assess whether a farm may be suitable for a whole flock summer survey. Two 40 lamb tests are generally carried out between mid-June & mid-July and lambs are selected as they tend to have higher readings than other classes of sheep.
Mark & Release (M&R)	See 'Restrictions' below
Restrictions	The statutory controls put on sheep movements from farms affected by the Chernobyl accident, under terms of the Food & Environment Protection Act 1985 (FEPA 1985). These controls require sheep to be monitored before they are allowed to leave a restricted farm. Under a management system known as 'Mark & Release' sheep with an activity concentration above 1000 Bq/kg are prevented from entering the food chain by marking them with indelible paint prior to movement off farm.
Working Action Level (WAL)	The guidance level used for live monitoring of sheep that allows for the inherent variability of field monitoring live animals. The WAL provides a safety margin to account for monitor, operator, sheep and environmental variability. This minimises the likelihood of the live monitor falsely indicating that a sheep is below the 1000 Bq/kg control limit.