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LEVELS OF Cs¹³⁷ IN NORWEGIAN LAMB AND SHEEP 1964—1965

By

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In two previous papers (*Madshus et al.*, 12; *Madshus & Strømme*, 5) the present authors have published data concerning the Cs¹³⁷ concentrations in fresh lamb's meat.

MATERIAL AND METHODS

During the late fall of 1964, 26 samples, and in the late fall of 1965, 23 samples of fresh meat from 5—6 months old lambs were collected. The same was done with 24 samples of fresh meat from adult sheep in the late fall of 1965. All samples were collected from public slaughterhouses, the locations of which are shown in Fig. 1.

As before, all the samples were taken from the same part of the animal, i.e. the semitendinous muscle. This is a precaution taken in order to obtain comparable samples, because the Cs¹³⁷ concentration may vary from muscle to muscle in the same animal (*Kummeneje*, 2).

Each fresh meat sample weighed approximately 1 kg after the removal of bone and fat. The meat was cut and dried at 100°C for several hours after the addition of distilled water and up to 20 % Na₂CO₃. This mixture, in which the fatty acids and sodium combined to make a dry powder, was ground and then measured by γ -spectroscopic methods using an \varnothing 2½" \times 3" NaI (Tl) crystal and a multichannel "kicksorter". At these levels of concentration, the standard error in the Cs¹³⁷ determination was generally considered to be less than \pm 2 %.

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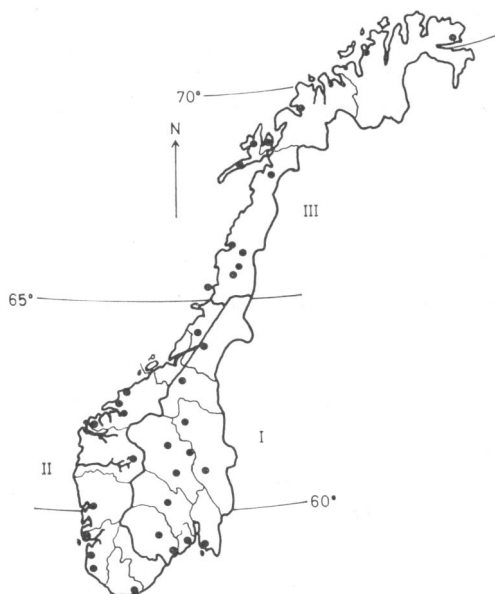


Figure 1. Map of Norway with the eighteen counties and the three zones. The location of the slaughterhouses.

RESULTS AND DISCUSSION

The single observations are presented in Table 1. In a previous paper (9) the authors have shown that Norway can be divided into three zones in which statistically significant correlations between the precipitation one year and the Cs^{137} concentration in milk the following spring can be found. The same division into the three zones can apparently also be made with regard to cow's meat (4), potatoes (6), and carrots (7). These zones are shown in Fig. 1.

In Table 2 the mean, maximum and minimum concentrations of Cs^{137} in fresh meat samples taken from the three zones and the whole of Norway are presented. It is evident that no constant ratio between the Cs^{137} concentration in lamb's meat from the same slaughterhouse from fall 1964 to fall 1965 can be found. Similarly, no constant ratio can be found between the Cs^{137} concentration in meat from lamb and sheep taken from the same slaughterhouse during fall 1965.

Two points of interest can be noted from Table 2. The first is the high Cs^{137} concentration in meat from lamb as well as in meat from sheep, especially in Zone II and in Zone III. Milk has

Table 1. The concentration of Cs¹³⁷ in nCi per kg fresh meat from lamb, late fall 1964, lamb, late fall 1965, and sheep, late fall 1965.

	Lamb 1964	Lamb 1965	Sheep 1965
Zone I:			
Sarpsborg	10.9	15.3	—
Tønsberg	17.4	5.8	2.5
Hamar	1.6	0.4	1.4
Gjøvik	—	2.2	3.7
Otta	2.3	0.8	1.0
Oppdal	4.7	—	0.8
Steinkjer	16.9	1.3	0.7
Gol	2.9	2.8	1.6
Tynset	3.2	2.9	1.2
Skien	3.7	4.9	10.2
Lillehammer	4.3	—	—
Notodden	5.6	—	—
Zone II:			
Kristiansand S.	23.7	6.4	9.3
Sandnes	13.4	—	0.8
Haugesund	2.4	4.4	—
Sogndal	6.6	0.4	3.5
Egersund	14.5	18.3	2.6
Nordfjordeid	5.4	15.5	3.6
Sunnalsøra	—	—	10.6
Bergen	—	15.8	—
Ålesund	3.9	—	—
Kristiansand N.	9.6	—	—
Zone III:			
Vadsø	4.5	2.7	—
Namsos	7.4	4.0	14.9
Harstad	5.2	7.0	—
Tromsø	—	—	3.5
Mosjøen	7.6	5.4	—
Bodø	10.7	4.9	5.1
Mo i Rana	4.0	6.1	14.3
Brønnøysund	8.7	—	12.3
Narvik	—	8.3	4.1
Sortland	—	10.1	2.3
Leknes i Lofoten	14.7	—	—
Fauske	13.3	—	3.3

generally been considered (*Anderson, 1*) as being the source of about half the Cs¹³⁷ body burden, but as shown by the present authors (11, 8, 10), there are several groups of people for whom other parts of the diet are more important in this respect. This

Table 2. The mean, maximum and minimum concentration of Cs¹³⁷ in nCi per kg fresh meat from lamb 1964, lamb 1965 and sheep 1965.

	Lamb 1964			Lamb 1965			Sheep 1965		
	mean	max.	min.	mean	max.	min.	mean	max.	min.
Zone I	6.7	16.9	1.6	4.0	15.3	0.4	2.6	10.2	0.7
Zone II	9.9	23.7	2.4	10.1	18.3	0.4	5.1	10.6	0.8
Zone III	8.5	14.7	4.0	6.1	10.1	2.7	7.5	14.9	2.3
All Norway	8.2	23.7	4.0	6.3	18.3	0.4	4.9	14.9	0.7

is, for instance, the case in several districts in Norway (3) where up to several pounds of meat from lamb or sheep are consumed by adult persons every week.

The next point of interest to be noted from Table 2 is the decrease of the Cs¹³⁷ concentration in lamb's meat from 1964 to 1965, a decrease which coincides with the observed decrease of the average Cs¹³⁷ body burden in man and the decrease of the average Cs¹³⁷ concentrations in milk and other foodstuffs.

It may be noted, too, that the Cs¹³⁷ concentrations in meat from lamb seem to be considerably higher than the Cs¹³⁷ concentrations in meat from sheep, an observation which at present can not be accounted for.

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SUMMARY

The concentrations of Cs¹³⁷ in meat from lamb in the falls of 1964 and 1965 and in meat from sheep in the fall of 1965 have been determined. The results are given and discussed with regard to the geographical variations, the decreasing concentrations from 1964 to 1965 and to the different concentrations in lamb and sheep.

ZUSAMMENFASSUNG

Die Cs¹³⁷-Mengen in norwegischen Lämmern und Schafen.

Die Cs¹³⁷-Konzentrationen in Fleisch von Lämmern und Schafen von der Ernte 1964 und der Ernte 1965 und in Fleisch von der Ernte 1965 sind bestimmt worden. Die Ergebnisse werden beschrieben und diskutiert in bezug auf die geographischen Variationen, die fallenden Konzentrationen von 1964 bis 1965 und in bezug auf die verschiedenen Konzentrationen in Lämmern und Schafen.

SAMMENDRAG

Cs¹³⁷ hos norske lam og sau.

Man har bestemt konsentrasjonen av Cs¹³⁷ i kjøtt fra lam og sau fra høsten 1964 og høsten 1965 og i kjøtt fra høsten 1965. Resultatene er angitt og diskutert m. h. til geografiske variasjoner, de avtagende konsentrasjoner fra 1964 til 1965 og m. h. til de forskjellige konsentrasjoner i lam og sau.

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