The transfer of tritium and carbon-14 along the food chain to man is quite different in some aspects from that of other radionuclides. This results from the fact that stable hydrogen and carbon occur widely in nature and make up an important fraction of the organic material in cells and tissues of all living organisms, including man. It may be expected that the radioisotopes of hydrogen and carbon will accompany the stable molecules. The question to be answered is to what extent there exists a constant ratio or specific activity between tritium and hydrogen, and between carbon-14 and stable carbon. The experiments reported here provide an answer to some of these questions.

The experiments have been carried out mostly on milk-producing animals since milk formation is an activity which is representative for the synthesis of proteins, carbohydrates and fats by the animal organism. In the case of carbon-14, the concept of a constant specific activity (pCi 14C/g of carbon) appears to be valid in the case of milk formation by a cow. Results will be presented for an
experiment in which corn silage labelled with $^{14}$C was fed to a lactating cow for 33 days. These results show that, at equilibrium, a constant specific activity was found for milk protein, milk fat and carbohydrate although the actual $^{14}$C levels were much higher in milk fat than in the other organic compounds.

The consequence of this finding for emergency situations is that a suitable product should be selected for prediction purposes in which this specific activity can be determined. Milk may be a valuable compound for this purpose because the total activity can be measured very easily and the specific activity can be readily determined in milk fat.

The situation for tritium, insofar as it is known, is not quite the same. Firstly, tritium is usually released as tritiated water (THO) which may be converted into organically bound tritium (OBT) by plants. Animals may ingest tritium either as THO or as OBT.

The metabolism of THO is well documented [1]. In man, THO turns over with a half-life of around 12 days. A small fraction of the THO becomes incorporated into organic material [2]. Our knowledge of the metabolism of OBT is much less complete. This will be illustrated by reporting some experiments on lactating animals which were kept on feed, the organic fraction of which was labelled with tritium. The feeding period lasted from about four weeks to about six months. At equilibrium, a substantial fraction of the ingested OBT was converted into THO in the animal cells and passed on to the body water pool. Another part of the OBT was used for synthesis of new proteins and fats but at different specific activities as judged by the $^3$H activity in casein and milk fat. The carbohydrate fraction was labelled to only a limited extent but this may be different in monogastric animals. The newly synthesized proteins and fats may have a relatively long residence time in the animal and they may be used eventually for the synthesis of proteins and fats to be secreted into milk or to be incorporated in foetal tissues and organs when the animal becomes pregnant.

In the case of accidental release of tritium, and after determination of the THO activity, it is important to examine the question if, and to what extent, conversion of THO into OBT will occur. Subsequent measures should be taken on the basis of these findings.

REFERENCES
