

Rats suffering from vitamin B₁ deficiency have an aversion to both carbohydrate and protein⁷ and it is possible that insulin might influence the appetite for fat in B₁ deficiency but we have found the fat appetite less affected than that for carbohydrate in normal rats.

Summary. The administration of protamine zinc insulin which leads to a marked hyperalimentation in normal rats is without effect upon the depressed appetite of rats suffering from vitamin B₁ deficiency. These deficient rats succumb in hypoglycemia without an increase in their food intake when the insulin is administered. When thiamin chloride is given to B₁-deficient rats their appetite responds not only to the vitamin therapy but to protamine zinc insulin as do normal animals.

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Secretion of Radio-Strontium in Milk of Two Cows Following Intravenous Administration.*

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The composition of milk of cows varies markedly and is quickly influenced by the food ingested. To the pediatrician interested in infant nutrition this fact carries great significance. To determine, ultimately, the percentage of ingested calcium that is normally secreted in the milk of cows, the following preliminary experiment was made.

Method. Harold Walke, *et al.*,¹ have shown that the only radio-calcium isotope suitable for biological investigation is ⁴⁵Ca₂₀. However, the poor yield of this isotope and the softness of its emitted radiations prohibit, at the present time, its use as a tracer in large

⁷ Richter, C. P., Holt, L. E., Barelare, B., Jr., and Hawkes, C. D., *Am. J. Physiol.*, 1938, **124**, 596.

* We wish to thank the crew managing the Berkeley cyclotron for producing the ⁸⁹Sr₃₈ used, and Dr. O. W. Schalm of the Department of Veterinary Science, University of California, who secured for us the cows used. The investigation reported here was aided by a grant from the John and Mary R. Markle Foundation for Medical Research.

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¹ Walke, H., Thompson, F. C., and Holt, G., *Phys. Rev.*, 1940, **57**, 177.

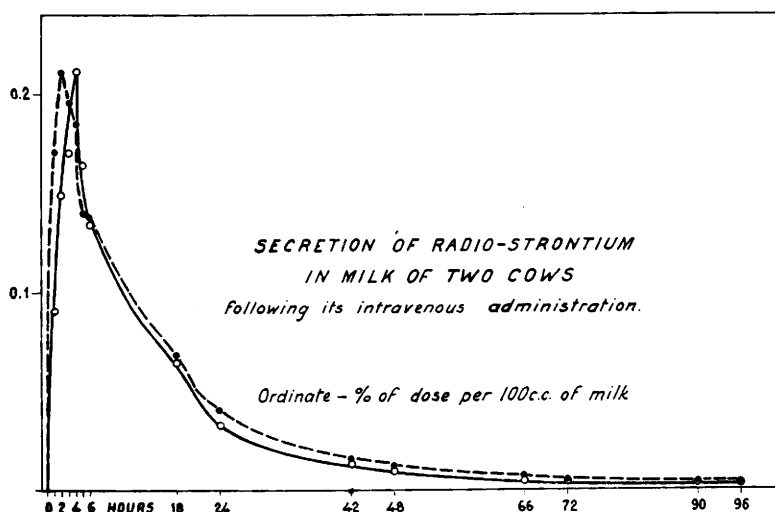
animals. Recently Pecher² has demonstrated a marked similarity in the metabolism of radio-calcium and radio-strontium of mice and rats. This suggested the use of radio-strontium instead of radio-calcium in determining the rate at which alkaline earth ions in the plasma are secreted into milk, since $^{88}\text{Sr}^{89}$ has a half life of 55 days and emits pure beta-particles at energies averaging about 750,000 electron volts. At present there is no significant evidence that living cells can distinguish an element from its radioactive isotope. To avoid the differences in the rates of absorption from the intestines between calcium and strontium, 50 cc of an isotonic solution of a mixture of inert and radioactive strontium lactate (850 mg of strontium) which emitted 11.2 microcuries of beta radiation per cc were given intravenously to each of 2 Holstein cows both in the fourth month of their lactation period and both producing about the same quantity of milk. The milk was obtained hourly the first 6 hours after administration and twice a day for the following 4 days.

Ten cc aliquots of each of the 28 samples were ashed at 400°C. 100 cc portions of the second, fourth, seventh and ninth samples from each cow were placed in 400 cc of ethyl alcohol and agitated at irregular intervals for 10 days. The samples were filtered and the filtrates and precipitates ashed separately. 50 cc of the fifth sample of one cow was placed in a thick collodion bag on which 2 meters of water pressure was constantly applied for 72 hours. The ultra-filtrate and the residue were ashed separately. The various ashed samples were assayed for radioactivity on a standardized DuBridge electrometer and compared with aliquots of the dose of radio-strontium administered.

CHART I.

	Period after i.v. administration, hr	No. ccs of milk secreted	% of dose of $^{88}\text{Sr}^{89}$ present in milk
Cow 227	0-6	2329	3.9
	6-30	8700	4.9
	30-54	8000	1.24
	54-78	7600	.54
	78-102	7700	.42
	Total	34355	11.00
Cow 269	0-6	1435	2.3
	6-30	6800	3.85
	30-54	7400	1.11
	54-78	6100	.43
	78-102	5400	.19
	Total	27135	7.88

² Pecher, Chas., PROC. SOC. EXP. BIOL. AND MED., to be published.



Results. The accompanying graph and chart reveal that 11% of the dose of radio-strontium administered to the first cow was found in the 34,355 cc of milk secreted during the first 4¼ days, and 7.88% in the 27,135 cc of milk secreted by the second cow during the same period. The percentages of the dose found per 100 cc of milk from the two cows were almost identical (graph). The greatest amounts of radio-strontium were found in the milk during the first few hours following administration. This suggests that much of the calcium found in milk may be derived from that present in the diet, and Pecher has shown, in mice, that some is derived from that most recently deposited in the trabecular portion of bones. 97-99% of ^{89}Sr in all the samples studied was present in the precipitate of the alcohol-milk mixture and only 16% passed through the collodion bag as an ultra-filtrate. It is impossible to separate the calcium phosphate-calcium caseinate complex of milk and from the above findings it is clear that it is essentially impossible to separate the strontium complex also.

Summary. 7.88% and 11% of a dose of radio-strontium were secreted in the milk of two Holstein cows during 4¼ days following its intravenous administration.