THE NON-OXIDIZABILITY OF VITAMIN A IN FOODS

By E. F. KOHMAN

There are in existence statements of rather recent date to the effect that we are in grave danger if we rely for our vitamins on cooked foods. It has been stated that we should eat raw foods at least twice daily because no cooked or canned foods can supply us with sufficient vitamins. Numerous other similar statements could be recalled but for brevities sake they will be omitted.

Vitamin C is regarded as being the vitamin most easily lost but vitamin A shares with it this reputation of delicateness. Although formerly heat was commonly designated the destructive agent, it now seems to be more popular to ascribe it to oxidation, and it is even admitted that in some cases this may be avoided. In a recent editorial the *Journal of the American Medical Association* says: "The reports of the destructive effects of heat have been grossly exaggerated. The liability seems to apply more particularly to vitamins A and C and to depend largely on the conditions of heating employed. When the possibility of oxidation is precluded, as in commercial canning rather than open air heating, the loss of vitamins is greatly reduced if not actually negligible.

The point I wish to make is that the oxidation of vitamin A in foods in general, within the practice of food handling, is not only highly improbable but practically impossible.

Several years ago Drummond and Coward showed that vitamin A in butter fat is susceptible to destruction by oxidation. For example, butter fat in shallow dishes at 95°C lost its vitamin A fairly completely in 3 hours, while when heated under the same conditions with the exclusion of air their was no loss in 15 hours. Admitting this susceptibility to oxidation, where in the food industry do such conditions obtain that permit of oxidation. Drummond and Coward at the same time showed that live steam could be passed through butter fat for 6 hours with no loss of vitamin A, and Hopkins showed that butter fat lost no vitamin A upon autoclaving 4 hours at 120°C. It is possible that had oxygen been passed through at the same time it might have had a destructive effect but such conditions are not met with in the handling of foods.

Platon[3] reports a comparison of the vitamin A content of butter made in the usual way as against its being made in an atmosphere of carbon dioxide. He could detect no difference to denote any destruction of vitamin A in the ordinary process. Vitamin D is even less susceptible to destruction since it is now general practice to rid fats of vitamin A by heating in the presence of oxygen whereby the vitamin D is not seriously diminished, though it too may be destroyed by excessive treatment.

When we consider vitamin A in food products other than fats we find conditions even less likely to permit of oxydation. Steenbock and Boutwell[4] autoclaved yellow maize, chard, carrots, sweet potatoes, squash and alfalfa for 3 hours at 121°C with no evidence that vitamin A was appreciably reduced. This is in line with our own experience. We have doubled the process of canned peas[5] from 25 minutes to 50 minutes at 120°C and after both processes found the canned peas equivalent to raw in vitamin A content. Extending the commercial process of canned spinch[6] from 70 minutes at 110°C to 120 minutes gave us no evidence that vitamin A was dmiinished in either case.

It is evident, therefore, that we may indulge in broiling, stewing, roasting, cooking or baking as it suits our gustatory fancy with no fears of depriving ourselves of this particular vitamin. With the question—what would be the result of bubbling oxygen through a moist food while it is being cooked, we hardly need concern ourselves, since we can content ourselves with the assurance that foods are never subjected to such conditions.

Research Laboratories, National Canners Association, Washington, D. C.

[1] Drummond and Coward—Biochem. Jr. 1920, 14, 734.
[2] Hopkins, Brit. Med. Jr. 1920, 2, 147; Biochem. Jr. 1920, 14, 725.
[3] Platon, Biochem. Ztscher. 1925, 155, 228.
[4] Steenbock and Boutwell, Jr. Biol. Chem. 1920. 41, 163.
[5] Eddy, Kohman and Carlsson, Ind. End. Chem. 1926, 18, 85.
[6] Eddy, Kohman and Carlsson, Ind. End. Chem. 1925, 17, 69.