

LETTERS TO THE EDITORS

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Ascorbic Acid in Mashed Potatoes

ALTHOUGH it might be expected that the mashing of potatoes, with the intimate distribution of air throughout the heated vegetable which it involves, would cause considerable oxidation of ascorbic acid, little information on the matter seems to be available.

Experiments were therefore carried out: (1) to determine the loss incurred when potatoes were mashed and served immediately after mashing; (2) to compare the rate of destruction of ascorbic acid when mashed and whole potatoes were kept hot; (3) to compare the effect of keeping whole and mashed potatoes hot in bulk and in small helpings.

A thoroughly representative sample of about 900 gm. of medium-sized potatoes, boiled whole, was taken and one half was mashed and immediately sampled. The whole and the mashed potatoes were then weighed and, except for one small helping kept at room temperature, were kept hot in a water-heated double pan for more than two hours, at a temperature of 80-85° C., samples being removed periodically for estimation of ascorbic acid by titration against 2:6 dichlorophenol-indophenol. The remainder were weighed after the last sample had been taken to enable allowances to be made for the loss in weight due to evaporation during heating. This loss was too small to be significant, however.

TABLE 1.

ASCORBIC ACID IN WHOLE AND MASHED POTATOES KEPT HOT.			
Description	Kept hot	Ascorbic acid mgm./100 gm.	
Boiled	0 min.	5.4	
	20 "	4.0	
	60 "	2.5	
Boiled, then mashed	135 "	0.9	
	0 min.	5.0	
	20 "	1.8	
Whole, kept at room temperature	30 "	0.5	
	135 "	0.4	
Whole, kept at room temperature	0 min.	5.4	
	135 "	4.3	

The results of the experiment are shown in Table 1. It is clear that mashing small quantities of potatoes has no immediate effect on their ascorbic acid content, but the rate of loss during subsequent heating is considerably accelerated.

The table also shows that while standing at room temperature cooked whole potatoes lose but a small proportion of their ascorbic acid. This supports the suggestion of Dienst¹ that it is preferable to allow vegetables to cool and to reheat them when necessary rather than to keep them hot. In another experiment, not quoted in the table, it was found that during three hours standing, even at room temperature, mashed potatoes lost more ascorbic acid than did whole potatoes.

TABLE 2.

Description	Ascorbic acid, mgm./100 gm.
Potatoes, whole after cooking	4.7, 4.5 (mean 4.6)
" immediately after mashing	4.0, 4.0 (mean 4.0)

	Kept hot		
	Kept hot	Kept hot in bulk	Kept hot in individual helpings
Potatoes, whole	30 min.	4.9	—
"	60 "	4.1	3.8
" mashed	30 "	2.4	3.0
"	60 "	0.9	1.0
Cabbage	0 min.	12.0	12.0
"	60 "	5.6	4.2

Table 2 shows the effect of a similar experiment carried out with the kind co-operation of Messrs. Barkers, Ltd., under large-scale catering conditions at their canteen at Messrs. Sebro Ltd. The effect of keeping vegetables hot in bulk and in small helpings was studied simultaneously. The result confirmed the conclusions previously reached in the laboratory on the effect of mashing. The difference between vegetables kept hot in small portions and in bulk is variable; mashed potatoes lost more in bulk, while cabbage and whole potatoes incurred greater oxidation in separate helpings in this experiment. Other experiments have given variable results, but the magnitude of the differences has always been small, so that it appears not to matter whether the vegetables are served up or left in bulk during the time they are kept hot. This result agrees with that previously found by Dienst¹.

It was found that if the mashing of the potatoes took more than a short time, a loss might occur during the process. For example, when a large batch was mashed by hand the time occupied was ten minutes, and the ascorbic acid fell from 10.5 mgm. to 6.9 mgm. per 100 gm.

The significance of these results is clear. If potatoes are to be kept hot for some time before serving, as seems inevitable under many conditions of communal feeding, they should not be mashed; nor should they be mashed unless the process can be completed within two or three minutes. There seems to be little difference in ascorbic acid content between vegetables kept hot in bulk and in small helpings.

I wish to express my thanks to Dr. L. J. Harris for helpful advice and hospitality at the Dunn Nutritional Laboratory where this work was carried out.

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¹ Dienst, C., *Deutsch. Med. Wochenschr.* (Cologne), **68**, 400 (1942).

Pure Crystalline Rennin

NORTHROP¹ has shown that crystallization is a useful procedure in the purification of certain enzymes. Crystalline form, however, is not reliable evidence of purity, as pointed out, for example, by Pirie², but may be considered as confirmatory evidence. For these reasons, in a recent attempt in this laboratory to obtain pure rennin, conditions favouring crystallization have been chosen. A preparation consisting largely of flat crystalline plates but containing a small proportion of spheroids has been obtained. From the accompanying photomicrographs it can be seen that although the outline of the plates is irregular, it tends to be triangular or rectangular, that the bounding surfaces are plane, and that the small surfaces forming the 'edges' of the plates are at right angles to the main surfaces. The latter conclusion arises from the rectangular appearance of the plates when seen 'on edge'.

A preliminary experiment has shown that the solubility of this preparation is independent of the amount of solid phase present, whether judged by the activity or by the amount of nitrogen in the solution. Thus it may be assumed, subject to confirmation by more extensive experiments, that no major impurity is present. Northrop¹ found that less than 1 per cent of mucin prevented the crystallization of pepsin, and it seems probable that a similarly small quantity