268 (2500)

Factors influencing the determination of gluten in wheat flours.

By D. B. DILL.*

[*From the Food Research Institute and Department of Chemistry, Stanford University, Calif.*]

The washing of gluten from wheat flour has a two-fold purpose. An approximate idea of protein content is obtained from the weight of dry gluten. The per cent of water imbibed by the gluten together with its coherence and other physical properties furnish the analyst with a rough index to flour strength.

Tap water is usually employed for gluten washing, but this has obvious disadvantages on account of its variation in concentration, composition, hydrogen ion concentration, and buffer action. When it is lacking in buffer action, the results of gluten washing are no doubt greatly influenced by variation in hydrogen ion concentration and buffer action of the flour itself.

The effects on gluten washing of solutions of various concentrations, of different composition and of various pH values have been investigated. Wet and dry gluten and total nitrogen in the dried gluten were determined.

It was found that there was practically no loss in protein when a washed gluten was kneaded under a stream of tap water (containing about 0.025 per cent total solids) for 45 minutes, while with freshly boiled and cooled distilled water there was a loss of over 25 per cent of the protein in that time. A modicum of electrolytes in the wash water is therefore essential in preventing dispersion of gluten proteins during washing.

Sodium phosphate buffer solutions of pH = 7.6 and of concentrations ranging from 0.01 to 1.25 per cent were next compared with tap water and boiled distilled water. A family patent flour was used. There was minimum protein dispersion with buffer solutions of 0.10 and 0.01 per cent concentration and with tap water. The dispersion was somewhat increased with buffer solutions of concentrations of 0.25 per cent and above. It is perhaps significant that buffer solutions ranging from 0.01 per cent to 0.50 per cent gave approximately equal imbibition values. Imbibition was considerably less with the 1.25 per cent buffer solution.

---

* Introduced by Carl L. Alsberg.

Finally a series of flours was employed. Some of these were soft wheat flours from which the gluten could be washed only with difficulty. Buffer solutions of pH values 4.4, 5.4, 5.8, 6.8 and 7.6, all of 0.1 per cent concentration were compared with tap water, 0.1 per cent NaCl and 0.1 per cent $CaCl_2$.

With three of the six flours which have been investigated the least protein dispersion occurred with the buffer solution of pH = 6.8. In the other three flours there was approximately the same dispersion by buffer solutions of pH = 5.8, 6.8 and 7.6 and by tap water. In those flours which were particularly difficult to wash, the least difficulty was experienced with the phosphate buffer solution of pH = 6.8.

With each of the six flours, imbibition by the gluten washed out with this buffer solution checked closely with imbibition by the tap water gluten. Imbibition by sodium chloride solution glutens was variable. Imbibition by calcium chloride solution glutens was invariably highest. These calcium chloride glutens were also characteristically incoherent and sticky. This is important in indicating a specific effect of calcium ions on gluten quality. The failure of tap water to produce a similar effect on gluten quality may be due to its lower concentration, to the antagonistic effect of some of its anions, or to its buffer action.

The results suggest that uniform results in gluten washing may be obtained by the use of a sodium phosphate buffer solution which is approximately neutral in reaction and which has a concentration of 0.1 per cent.

269 (2501)

Effects of dehepatization on the reactions of the urinary bladder in canine anaphylactic and histamine shock.

By W. H. MANWARING, V. M. HOSEPIAN, J. R. ENRIGHT and DOROTHY F. PORTER.

[*From the Laboratory of Bacteriology and Experimental Pathology, Stanford University, Calif.*]

In a previous paper[1] it was shown that the urinary bladder is thrown into sharp contraction during the first two minutes of

[1] Manwaring, W. H., Hosepian, V. M., Enright, J. R., and Porter, Dorothy F., PROC. SOC. EXP. BIOL. AND MED., 1924, xxi, 284.