PEPSIN—A RESUME OF TESTS

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In a previous article¹ entitled "Some Observations upon the Assay of Digestive Ferments," I called attention to the great variation in the apparent strength of a sample of pepsin due to the age of the egg used in the test, and showed that eggs between the ages of 5 to 7 days leave the least residue when used in testing the strength of the pepsin. I therefore recommended, for uniformity in results, that chemists adopt age limits for their eggs when testing pepsin, and it is interesting to note that the Revision Committee of the Pharmacopoeia, having confirmed these findings, have adopted this egg limit in their revised test for pepsin. The revised wording, which I have every reason to believe will appear in the U. S. P. IX test for pepsin, will state: "Immerse a hen's egg, which should not be less than 5 nor more than 12 days old."

After having determined the large factor which the age of the egg bears in the assay of pepsin, it was of interest to me to know how my results would vary when choosing my eggs as to age and when going into the open market and buying "strictly fresh eggs" from a reliable dealer.

I have compiled the results from a series of many tests. Part of these tests were made with eggs of known age (5 to 12 days), and the balance with so-called "strictly fresh eggs." The pepsin used in all these tests was a sample found to leave a residue of about 1 cc. under ideal conditions and was chosen because of the fact that it is easier to note slight differences in strength with a residue of 1 cc. than with a smaller residue.

Assay Date 1915	Age of Eggs Days	Residue Cc.	Assay Date 1915	Age of Eggs Days	Residue Cc.	Assay Date 1915	Age of Eggs Days	Residue Cc.	Assay Date 1915	Age of Eggs Days	Residue Cc.
2/13	7	1.25	4/3	3	0.75	6/2	10	0.6	7/2	10	0.4
15	7	0.6	8	9	0.75	7/2	10	0.4	24	12	0.4
19	7	0.9	9	10	0.45	8/2	10	1.0	4	10	0.95
20	7	1.25	10	8	1.5	6	10	1.0	10	7	0.8
22	7	1.25	12	8	1.0	4	10	0.95	7	7	0.75
25	10	1.0	13	9	0.6	9/3	7	0.75	6	7	0.8
26	5	1.0	14	8	0.5	10	8	1.0	9	7	1.0
4	10	1.25	15	9	1.5	14	9	0.8	16	8	0.8
5	9	1.0	26	7	0.3	17	7	0.9	18	7	1.0
8	7	0.5	27	8	0.25	20	8	0.65			
			29	9	0.4						
10	9	1.0	5	9	0.35						
12	6	1.0	7	10	0.5						
17	9	1.0	8	8	1.25						
20	8	1.0	14	11	1.25						
26	6	1.5	21	11	0.65						
31	7	0.55	22	7	0.55						
			26	10	0.25						

Table I includes a series of 50 assays from eggs of known age, and of this series we find:

28 assays (56 per cent) below 1 cc.

40 assays (80 per cent) not more than 1 cc.

10 assays (20 per cent) above 1 cc. Of the latter 10, just 2 are 1½ cc.

¹ THIS JOURNAL, 3 (1911), 919.

TABLE II—PEPSIN TESTS ON EGGS OF UNKNOWN AGE BUT GUARANTEED "STRICTLY FRESH"

Assay Date 1915	Residue Cc.	Assay Date 1915	Residue Cc.	Assay Date 1915	Residue Cc.	Assay Date 1916	Residue Cc.	Assay Date 1916	Residue Cc.
9/23	1.0	10/25	0.7	12/2	0.85	1/10	1.0	2/10	1.0
28	1.0	29	0.6	3	0.4	13	0.6	11	1.0
10/4	0.9	11/15	0.5	8	0.4	14	0.9	14	1.75
5	2.25	9	0.5	9	0.9	17	1.25	15	2
7	2.25	11	0.5	10	0.3	19	0.3	18	1
8	2.5	16	0.7	17	0.5	28	0.65	21	1.75
13	2.25	17	2.0	20	0.7	2/5	2.5	23	1
14	1.25	22	0.45	23	0.8	7	3	25	2.25
17	1.75	26	0.3	28	2.0	4	2	28	0.9
20(a)	0.75	29	0.2	29	1.25	6	1.0		
				31	0.3				

(a) Source of supply changed.

Table II includes a second series of 50 assays from eggs supposedly fresh, but of unknown age. Here we find:

25 assays (50 per cent) below 1 cc.

32 assays (64 per cent) not more than 1 cc.

18 assays (36 per cent) above 1 cc.

Of these last 18 assays with a residue more than 1 cc., the largest residue recorded was 3 cc. Whether the eggs used in this test were too fresh, or, on the other hand, older than the age limit previously described, I did not determine.

The two tables show well the advantage accruing in choosing eggs of known age, and in the testing of pepsin as well as with rennin, I repeat my caution—"Know your standard." Always use a standard pepsin as control, whose strength you have tested under different conditions as to age of eggs, etc., and draw your conclusions as to the strength of the unknown samples from the deportment of said control.

In concluding, I wish to state that in the above assays the conditions such as temperature, agitation, reaction, etc., were under absolute control, and the error due to the personal equation has been eliminated as far as possible.

Another fact brought out in this connection which I have not heard discussed is this: If we can determine the strength of pepsin by the age of the egg, the contrary is also true. We can approximately determine the age of a number of eggs by testing against a pepsin of known strength. If the residue is much more than experience has shown the control to run with eggs 5 to 12 days old, it is natural to assume that it is due to one of two causes: Either the eggs are absolutely fresh, or they are more than 12 days old. If they are too fresh and one has supply enough, they can be kept for 5 or 6 days and another assay made. If with this second assay a marked decrease in the amount of residue is shown, the eggs can be considered as strictly fresh. If the residue continues to increase, they were more than the age limit to start with and hence not strictly fresh.

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ARTIFICIAL GAS-FIRED FURNACE INSTALLATION

By CHARLES E. RICHARDSON

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One of the largest, if not the largest artificial gas-fired furnace installation in this country has been made in the plant of the Eddystone Ammunition Corporation, Eddystone, Pa., for the purpose of hard-

ening and tempering (or drawing) 3-in. shells. The installation consists of three hardening furnaces and three tempering furnaces. One hardening and one tempering furnace are at present under construction and two each at present in operation. The furnaces are arranged in units—one hardening and one tem-