

powder, albuminized as it comes on the market, is directly compared with a non-egg powder as manufactured. This is really unfair, as the two powders used may differ in their effects, aside from the egg albumin in one of them. The most striking failure of egg albumin to improve a given powder is shown

TABLE IV—AVERAGE SPECIFIC VOLUME OF BISCUITS—SERIES III

Baking No.	No. averaged	Time baked Min.	Temp. baking ° F.	Av. sp. vol.	Kind of bk. pdr.	Per cent egg alb.
1 A.....	31	10	495	2.79	C.	0.17
B.....	28	10	495	2.54	K. C.	0.0
2 A.....	28	10	470-1	2.60	K. C.	0.0
B.....	28	11	471-4	2.75	C.	0.17
3 A.....	28	10	465	2.71	A.	0.0
B.....	32	10	465	2.63	C.	0.17
C.....	32	10	465	2.53	G.	0.0
4 C 1st half.....	18	10	450-5	2.66	G.	0.0
B 1st half.....	18	10	455-60	2.63	C.	0.17
A 1st half.....	17	10	460	2.70	A.	0.0
4 C 2nd half.....	14	10	458-60	2.20	Lost	0.0
B 2nd half.....	14	10	458-60	2.20	C.	0.17
A 2nd half.....	13	10	458-60	2.15	A.	0.0
5 A 1st half.....	20	12	430-5	2.96	I.	0.0
B 1st half.....	20	12	430-5	2.96	I.	0.2
C 1st half.....	20	12	430-5	2.90	I.	0.5
5 A 2nd half.....	18	12	443-5	2.56	I.	0.0
B 2nd half.....	18	12	443-5	2.54	I.	0.2
C 2nd half.....	18	12	443-5	2.57	I.	0.5
6 A 1st half.....	20	10	455	2.65	G.	0.0
B 1st half.....	20	10	455	2.65	G.	0.2
C 1st half.....	20	10	455	2.59	G.	1.0
6 A 2nd half.....	16	10	460	2.27	G.	0.0
B 2nd half.....	16	10	460	2.25	G.	0.2
C 2nd half.....	16	10	460	2.26	G.	1.0

Average (weighted mean) of 271 biscuits with egg..... 2.627 2.63
 Average (weighted mean) of 238 biscuits without egg... 2.593 2.59

Difference..... 0.034

in Bakings 5 and 6, where the same powder was used first without egg, second with 0.2 per cent added egg, and third 0.5 per cent added egg in Baking 5. In the first half, which was baked at once, the sp. vol. fell from 2.96 with no egg and with 0.2 per cent egg, to 2.90 with 0.5 per cent egg. In Baking 6, 0.0 per cent, 0.2 per cent, and 1.0 per cent egg were present in a second can of Giant powder. The sp. vol. fell from 2.65 with no egg, and 0.2 per cent to 2.59 with 1.0 per cent egg, and in both Bakings 5 and 6, these figures are the averages of 20 biscuits.

SUMMARY OF RESULTS OF BAKING TESTS ON BISCUITS—SERIES III

Baking No.	Temp. baking	Batch	Bk. pdr.	% alb.	REMARKS
(1).....	495	B	K. C.	0.0	Better in looks, taste, odor (judgment of four persons)
(2).....	470-74	B	C.	0.17	Looks better than A. (K. C. 0.00%) no difference in smell or taste
(3).....	465	C	G.	0.0	Best
		B	C.	0.17	2nd
		A	A.	0.0	Poorest
(4) 1st half...	450-60	C	G.	0.0	Best
		B	C.	0.17	2nd
		A	A.	0.0	Poorest
(4) 2nd half..	458-60	B	C.	0.17	Best
		C	G.	0.0	2nd
		A	A.	0.0	Very poor
(5) 1st half...	430-35	C	I.	0.5	Quite good
		B	I.	0.2	2nd
		A	I.	0.0	Very poor
(5) 2nd half..	443-45	C	I.	0.5	Best
		B	I.	0.2	Poorest
		A	I.	0.0	2nd
(6) 1st half...	455	C	G.	1.0	Best
		B	G.	0.2	2nd
		A	G.	0.0	Not bad
(6) 2nd half..	460	C	G.	1.0	Best
		B	G.	0.2	2nd
		A	G.	0.0	Poorest

JUDGMENT

When biscuits are judged by looks much greater differences are noted than by measurement. It appears that a fine looking, large biscuit may have no greater sp. vol. than a smaller and poorer looking biscuit. This is due to the fact that the larger biscuit is heavier, and the sp. vol. works out about the

same as for smaller biscuits. Just why this is so has not been determined.

This difference in judging by looks and measurement is strikingly shown in Baking 1, when batch B (0.0 per cent) was given the preference in looks, taste and odor, by four bakers, separately, although A (C. 0.17 per cent) proved to be larger in sp. vol. by 0.25 in 2.79.

In Bakings 4, 5 and 6 the bakers awarded the honors very uniformly to the biscuits baked with albuminized powder. The differences were so marked that anyone could not fail to see them, yet, these differences do not show in the sp. vol. These were all baked at too low a temperature, and the 2nd half of a bake was always carried out after the dough had stood about five hours.

CONCLUSION

It is the opinion of the writer that when bakings are carried out under normal conditions his work has not demonstrated the usefulness of egg albumin in baking powder, and especially in the very small quantity usually present, *i. e.*, from 0.1 to 0.2 of one per cent.

When the temperature of the oven is too low for baking biscuits properly, egg albumin seems to aid in producing a better biscuit.

When the dough is allowed to stand several hours before baking, a much better biscuit is produced by the powder to which egg albumin has been added.

OFFICE OF THE STATE CHEMIST
BOISE, IDAHO

IRON IN TOMATOES

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Tomatoes have become of much importance as a garden vegetable during the last decade and present evidence indicates that they will become of greater importance. From the view-point of the food, physiological and agricultural chemist more knowledge of their chemical composition is therefore desirable.

Tomatoes are used as a food in many ways. While fresh, they are eaten raw or cooked; tremendous quantities are canned; they form the basis of many soups; large quantities of tomatoes, or their products, are used as sauces for meat or fish foods; in desert regions, or where good drinking water is scarce, canned tomatoes are used largely because of the water and vegetable acid they contain.

Considering the exchange in soil elements, there seems to be a general agreement that the tomato plant uses relatively little phosphoric acid, but more potash and nitrogen. Much of the potash remains in the vines and roots. In comparison with the amount of crop produced, the tomato does not remove much plant food from the soil.

The acidity of the tomato is supposed to be due to citric acid. A small amount of an alkaloid is also supposed to be present in the juice and this decreases as the fruit ripens. During ripening there is a progressive increase in the organic acids, sugars, starch and non-

protein nitrogen and a decrease in protein nitrogen and cellulose. The proportion of other constituents remains practically unchanged. The amount of sucrose in fresh and dehydrated tomatoes differs, due probably, to inversion resulting from ferments and organic acids. About 0.5 per cent of ether extract is obtainable from the dry matter of the tomato, this amount being reduced, however, by previous alcohol extraction.

Passerini¹ states that the pulp of the tomato contains two coloring matters, a yellow amorphous and a red crystalline substance. These are insoluble in water, soluble in amyl alcohol and very soluble in ether. Both are decolorized by chlorine and bromine water, while hydrochloric acid has no action on them. The yellow substance is much more soluble in alcohol than the red. R. Willstätter and H. H. Echer² state that lycopin, the coloring matter of the tomato, differs in several respects from carotin.

E. H. Jenkins and W. E. Britton³ reporting results on two varieties of tomatoes found no difference between them in water and potash content, percentage limits for water and potash on eight samples being respectively 93.41 to 94.81 and 0.287 to 0.356. H. Snyder⁴ found no chemical difference between three varieties. He reports analytical results on three samples: Water, 93.6 to 93.9; protein, 0.80 to 0.86; carbohydrates, 3.79 to 3.85; and ash, 0.54 to 0.69 per cent. W. B. Alwood and W. Bowman⁵ found in four samples of one variety: Water, 91.2 to 94.0 per cent; protein, 0.78 to 1.25; carbohydrates, 3.60 to 4.07; fat, 0.33 to 0.47; and ash, 0.34 to 0.73 per cent. W. O. Atwater and A. P. Bryant⁶ report on analysis of two samples of canned tomatoes: Water, 94.0 and 94.3 per cent; protein, 0.9 and 1.2; carbohydrates, 3.9 and 4.0; fat, 0.2 and 0.4; and ash, 0.5 and 0.6 per cent. One sample of ash contained 5.8 per cent lime, 8.7 per cent phosphoric pentoxide, 68.1 per cent potash and 3.7 per cent magnesium oxide. A number of other investigators—Ricciardelli, A. F. Bacon and P. B. Dunbar, and Albanarg—report similar results of a few analyses of tomatoes.

It is our intention to report the quantity of water, ash and iron in eleven samples of Florida canned tomatoes from different parts of the state. In the literature available we have found no figures showing the amount of iron in tomatoes.

The tomatoes were cut up and canned without appreciable loss of pulp or juice. When received at the laboratory they were cut up in a meat chopper without loss of juice and the water was determined by loss on evaporation of 150 g. samples at 110° to constant weight. The residue or total solids was ashed in thick porcelain dishes in a muffle furnace, at the lowest possible temperature, yielding a fine gray, white or buff colored ash. This was weighed, pulverized and iron determined in duplicate samples of about 0.2 g. The ash was then digested in hydrochloric acid and

again in sulfuric acid. The solution, free from hydrochloric acid, was reduced with hydrogen sulfide, the excess of hydrogen sulfide removed, the solution cooled and the iron titrated with standard potassium permanganate solution.

PERCENTAGE OF WATER, ASH AND IRON IN FLORIDA TOMATOES

Sample No.	Location		Iron as Fe ₂ O ₃ (a)				
			Water	Ash	ash	whole tomatoes	soil
1	Lake City,	Columbia	94.0	0.39	11.53	0.046	3.03
2	Ponce de Leon,	Holmes	93.0	0.58	4.38	0.026	3.29
3	Live Oak,	Suwanee	91.3	0.58	8.09	0.046	3.83
4	Dover,	Hillsboro	92.6	0.53	20.68	0.106	..
5	Greensboro,	Gadsden	94.6	0.53	18.62	0.100	..
6	Pensacola,	Escambia	94.6	0.55	22.25	0.123	..
7	Paxton,	Walton	92.6	0.56	6.09	0.034	..
8	Tallahassee,	Leon	95.0	0.49	7.75	0.037	..
9	Summerfield,	Marion	95.3	0.38	21.45	0.083	..
10	Green Cove Springs,	Clay	95.3	0.63	12.21	0.077	3.12
11	Tallahassee,	Leon	89.3	0.64	8.47	0.054	..
Average.....			93.4	0.53	12.87	0.066	3.32

(a) Average of closely agreeing duplicates.

SUMMARY OF RESULTS

I—The tomatoes from ten counties in Florida contained from 89.3 to 95.3 per cent of water. Geographical location of plot on which the tomatoes were grown did not affect the water content. The average amount of water was 93.4 per cent.

II—The ash varied from 0.38 to 0.64 per cent, averaging 0.53 per cent. There was no fixed ratio between the water and ash or iron and ash.

III—The iron in the ash varied greatly from 1.53 to 7.78, average 4.50 per cent. Calculated to ferric oxide this would represent 4.38, 22.25 and 12.87 per cent, respectively. Iron was present in about the same amount in widely separated counties.

IV—Iron in tomatoes, calculated from the iron in the ash, ranged from 0.012 to 0.037 per cent, averaging 0.023 per cent. Calculated to ferric oxide, this would represent 0.034, 0.123 and 0.066 per cent, respectively.

V—In soil on which these tomatoes were grown (four samples), there was from 1.06 to 1.3 per cent iron, equivalent to 3.03 and 3.72, or an average of 3.32 per cent ferric oxide.

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BLOOD-CHARCOAL AS A PURIFYING AGENT FOR
ARSENIC SOLUTIONS PREVIOUS TO
TITRATION¹

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Whenever possible, arsenic is estimated by the highly accurate and convenient method of titration with iodine. As necessary conditions, the solution must be free from other substances capable of absorbing iodine during the titration and from coloring matter to obscure the end points.

This laboratory has been required to examine very many samples of the arsenical dipping baths² now so largely used for ridding cattle of Texas-fever ticks. The important insecticidal ingredient of these baths is an alkaline arsenite, and it is in this form that the arsenic is introduced when the baths are prepared.

¹ Published by permission of the Secretary of Agriculture.

² Compare *Farmers' Bulletin* 603, U. S. Dept. of Agric.

¹ *Stag. Sper. Agrar.*, 18, 545.

² *Ztschr. physiol. Chem.*, 64, 47.

³ *Conn. Agr. Expt. Sta., Ann. Rpt.*, 1895.

⁴ *Minn. State Bull.*, 63.

⁵ *Va. State Expt. Sta., Bull.* 4.

⁶ *U. S. Dept. Agr., Bull.* 28.