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Report of the Smalley Committee, 1960-61

SEVEN SUBCOMMITTEES distributed nine different series of samples this season. Table I lists the types of samples and the distribution of participation by 514 collaborators on the analysis of 4,541 samples. In addition, a number of samples were distributed free of charge to inquiring laboratories to encourage future participation by new collaborators. Subscription to the program this year showed an increase of about 1.5% over last season.

TABLE I

Type of sample	Number of collaborators	Number of samples	Determinations per sample
Cottonseed	48	10	6
Soybean	37	10	2
Peanut	10	7	5
Meal	142	15	3–4
Vegetable oil	81	6	3
Tallow and grease	91	5	7
Glycerine	26	5	3–5
Drying oil	16	6	5
Edible fat	63	5	14

Each subcommittee has furnished its collaborators with a final report, summarizing the work and listing relative standings.

As of April 10 the Smalley account showed the following: receipts, $7,570.47; expenses, $6,675.49; and net $894.98. The balance may be decreased by as much as $100 by a few outstanding expenses. However it may be conservatively estimated that our total expenses will be about $200 less than last year while our total receipts increased by $321.47. Unless postal rates are increased considerably we should not have to increase our prices. A detailed account has been given to the Governing Board.

The subcommittee chairmen have expressed their thanks to all of those to whom we are indebted for making the Smalley program a success this year. To acknowledge them individually would be impractical in this report, but we are nonetheless appreciative of their contributions.

The previously-established grading systems were used again this year. Although they are reasonably sound, we hope to improve some weak spots and, in some cases, to tighten tolerances in line with the increased excellence of analytical work.

A new award will be presented this year in the form of a trophy given by the personnel of the Barrow-Agee Laboratories to honor the memory of E.R. Barrow and G.W. Agee. This award will be given each year to the collaborator attaining the highest grade in the cottonseed series. The Barrow-Agee Cottonseed Trophy will be permanently retired by a collaborator who wins it three times. The first leg on this trophy has been won by Paul D. Cretien of the Texas Testing Laboratories, Dallas, with a grade of 99.70%.

Other Smalley certificates of proficiency to be presented this year are as follows.

Cottonseed. With 48 chemists participating, second place was attained by J.R. Mays Jr., Barrow-Agee Laboratories, Memphis, Tenn., with a grade of 98.80.

Soybean. Of the 37 chemists participating, five of them tied for first place with perfect scores. Certificates will be given to D.A. Bradham Jr., Barrow-Agee Laboratories, Greenville, Miss.; W.N. Kesler, Woodson-Tenent Laboratories, Little Rock, Ark.; J.G. Bowling, Woodson-Tenent Laboratories, Des Moines, Ia.; W.G. Wadlington, Woodson-Tenent Laboratories, Chicago, Ill.; and Nick Brokamp, Archer-Daniels-Midland Company, Cincinnati, O.

Peanut. First place among 10 chemists was won by T.C. Law, Law and Company, Atlanta, Ga., with a grade of 98.80. Second went to Philip C. Whittier, Law and Company, Montgomery, Ala., with 98.64.

Tallow and Grease. Participating chemists numbered 91. First place was given to A. Dennis Caeton, Los Angeles Soap Company, with a grade of 100; second was given to F.A. Adams, Procter and Gamble Company, Long Beach, Calif., with 99.36.

Edible Fat. With 63 chemists participating, two tied for first place with grades of 99.44: M.W. Felker, Anderson, Clayton and Company, Sherman, Tex.; and William Stewart, Swift and Company, Atlanta, Ga.

Drying Oils. Sixteen chemists participated; first place was won by O.W. Johanson, Archer-Daniels-Midland Company, Minneapolis, Minn., with 94.50; and second, by V.F. Bloomquist, Minnesota Linseed Oil Company, Minneapolis, with 94.25.

Glycerine. Of the 26 chemists who participated, four tied for first place with perfect scores: T.S. McDonald, Procter and Gamble Company, Dallas, Tex.; A.H. York, Procter and Gamble Company, Cincinnati, O.; J.H. Dietz, Harshaw Chemical Company, Gloucester City, N.J.; and F.D. Newcomb, Lever Brothers Company, Los Angeles, Calif.

Vegetable Oils. First place among 81 chemists was won by W.J. Howard, HumKo Company, Champaign, Ill., with a perfect score. Ben C. White, Barrow-Agee Laboratories, Shreveport, La., and F.M. Tindall, HumKo Company, Memphis, Tenn, were tied for second place with grades of 99.4. After a recalculating of the results, with no tolerances allowed, the ties remained unchanged. Both were given certificates.

Meal. This is the original Smalley series and continues to have the largest participation. There were 142 chemists this year. Samples were sent to Canada, Mexico, and South America.

First place for moisture went to Biffle Owen, Plant-

ers Manufacturing Company, Clarksdale, Miss., with 100. Tied for second place with grades of 99.8 were H.L. Hutton, Woodson-Tenent Laboratories, Clarksdale, Miss.; J.K. Sikes, Plains Cooperative Oil Mill, Lubbock, Tex.; J. M. Ridlehuber, Western Cottonoil Company, Abilene, Tex. Recalculation, with no tolerance, gave second place to Mr. Hutton.

The determination of oil resulted in a three-way tie for first place. With grades of 99.8 certificates were given to E.R. Hahn, Hahn Laboratories, Columbia, S.C.; Mr. Law; and M.P. Etheredge, Mississippi State University, State College.

The determination of nitrogen also resulted in a tie for first place, with perfect scores, to Mr. Hahn and Mr. Owen.

Tied for first place on the determination of crude fiber, with grades of 99.4, were Mr. Kesler and W.D. Simpson, Woodson-Tenent Laboratories, Wilson, Ark.

The Smalley Cup, given each year for combined proficiency on the determination of moisture, oil, and nitrogen, was won by Mr. Owen with a grade of 99.84. Mr. Hahn was second with 99.80.

IN VIEW of the exceptionally high quality of analytical work done in the Smalley program the committee believes that recognition should be given to those chemists who did not win certificates but still did outstanding work:

Meal

Combined moisture, oil, and nitrogen: Messrs. Hutton, Simpson, D.B. McIsaac, Mays, M.A. Clark, Bradham, and White

Moisture: B.D. Brock, Duane Tilson, E.C. Flack, and Robert Hein

Oil: Messrs. Simpson, Bradham, White, Clark, and Owen

Nitrogen: Messrs. Hutton, P. McG. Shuey, Mays, McIsaac, and Clark

Crude Fiber: W.J. Johnson

Vegetable Oil

Messrs. Mays, P.L. Philips, R.C. Pope, A.H. Preston, L.I. Clack, L.F. Diebel, and Stewart

Drying Oils

G.C. Reid and E.J. Jacobson

Edible Fat

Messrs. J.L. Hale, R.A. Marmor, N.J. Simon, R.M. Uschan, L.D. Belcher, Newcomb, T.C. Bond, J.J. Ganucheau, Adams, P.J. Maurer, A.H. Steffen, and J.G. Laird

Tallow and Grease

Messrs. J.R. Fortin, J.S. Boulden, J.E. Maroney, J.S. Cooley, and Preston

Other classifications are Mr. Pope, peanut; Mr. Owen, soybean; and G.G. Dickinson, cottonseed.

L.V. ANDERSON, T.J. BALDWIN, R. T. DOUGHTIE JR., K.H. FINK, J.R. HARRISON, J.P. HEWLETT, W.J. MILLER, chairman

Fluid Shortening Medium

ALAN S. GEISLER, Atlas Powder Company, Wilmington, Delaware

Because of an apparent interest in a liquid shortening with good baking properties, a program for the development of such a product was instituted. Past efforts to accomplish this by dissolving or suspending emulsifiers in vegetable oils had not had notable success. In this instance it was decided to use a different approach, that of making an emulsion in water, in trying to impart desirable baking properties to vegetable oils. It was also desired that a fluid product be produced from animal or hydrogenated vegetable fats, using the same approach.

Shortening emulsions were prepared by using sorbitan monostearate, polyoxyethylene-20-sorbitan monostearate, and mono- and diglycerides as dual-purpose emulsifiers to provide a stable emulsion and impart good baking properties. Emulsions were prepared and tested and found capable of utilizing all common shortening base-stocks in baking. In most cases also excellent results in cream icings were obtained.

The most serious problem which occurred was the tendency of emulsions made with animal fats to become plastic. A study of the causative factors was made, and the conclusion was reached that a stable fluid product could be obtained through careful selection of ingredients. Important factors which affected emulsion viscosity were monoglyceride level and hardness; the ratio of sorbitan monostearate to polyoxyethylene sorbitan monostearate, and their level; and the shortening base-stock used.

The stability of the emulsions was studied and the conclusions were reached that aging did not affect baking quality significantly although optimum effectiveness was reached apparently several days after preparation; the emulsions were not particularly subject to oxidative rancidity; bacteria and mold counts increased only slightly during storage periods as long as two months at room temperature.

An unexpected result was the markedly-improved performance when the shortening was pre-emulsified as shown by the baking data and icing quality factors which were reported.

CONSIDERABLE effort has been expended in studying the function of fats in baking and in improving shortenings through compounding and processing developments. The importance of plasticity and the value of emulsifiers have been demonstrated fairly conclusively, particularly by Carlin (1), and well summarized by Bailey (2). They have also shown that the finer the dispersion of the fat in the aqueous phase that can be obtained, up to a point, the greater the volume and the better the texture of the cake. It has also been demonstrated that the ability to trap air in the creaming of a batter is essential to the production of a cake with good volume. Plastic short-

White Layer Cake

	Plastic shortening	Emulsion
Mix 2 min., Speed No. 1	*g.*	*g.*
Cake flour	181.6	181.6
Sugar	236.1	236.1
Nonfat dry milk solids	18.2	18.2
Salt	4.5	4.5
Baking powder (double acting)	9.9	9.9
Cream of tartar	2.5	2.5
Plastic shortening	85.0	.....
Emulsion	.....	178.0
Water	106.0	13.0
Add slowly, mix 3 min., Speed No. 1		
Water	27.0	27.0
Add slowly, mix 2 min., Speed No. 1		
Whole eggs	13.6	13.6
Egg whites	122.5	122.5

Scale—350 g. of batter into two 8-in. pans.
Bake at 350°F. for 27 min.