This might be true with the person who is skilled in determining bread flavor; however, with the average person the difference is not great enough to make it detectable.

You know, flavor is a very elusive factor. Hand a person a slice of bread and say, "My, doesn't that have a nice butter flavor?" Chances are that he will agree with you. If you had simply asked, "What is the flavor in this bread?" no telling what the answer might have been; probably anything but a butter flavor.

We have been studying bread flavor for some time, and we find that differences must be large before definite preferences with judges can be established. Thus, differences must be very great before the public will detect them; and, remember, the public buys the products.

Nevertheless, of all shortenings, butter and lard are preferred by a few bakers because of flavor, while the vegetable shortenings are usually considered to have an absence of flavor. When high percentages of shortening are used in bread (a few bakers are using high percentages) and in other products where high percentages are used, the factor of flavor becomes of major importance. Thus, in sweet yeast raised products, much butter is used.

Shortening in Relation to the Rate of Staling of Bread:

That shortening prolonged the life of bread was mentioned before. From observations of the baker and the consumer, shortening not only produces a more silky texture and a "shorter," softer crumb, but its presence maintains the texture and crumb in this condition for a longer time; thus, delaying crumbliness. This is all simply due to its lubricating action and to a delay in the loss of moisture by its coating around the individual particles.

However, according to the chemist, this softness and loss in moisture has nothing to do with staleness. Then what is chemical staling? Simply expressed, it is the change in the form of the starch. According to recent x-ray studies, as bread or other yeast raised products leave the oven, the starch has both a crystalline and amorphous component. As the product ages, the amorphous component disappears and finally all of the starch exists in the crystalline form. This change takes place in approximately 24 hours.

So far researches have failed to show that shortening delays the aforementioned aging of the starch granules of the crumb. Yet it cannot be doubted that it has the above mentioned advantages. The consumers can see these advantages and it is the consumers' opinions that count.

The Characteristics of a Preferred Shortening:

The preferred shortening should have the following characteristics:

1. Long plastic range which will insure proper distribution even at lower temperatures. A review of the literature shows that lard has the longest plastic range of any shortening mentioned and may be used even at icebox temperatures. On the other hand, lard becomes rather soft at high temperatures, and for this reason may prove less desirable if the baker stores the product at temperatures of 90° to 120°F. Compound type shortenings seem to stand up better at the higher temperatures because they have a firmer body.

Hydrogenated shortenings become very hard and brittle at temperatures near freezing, although they are quite plastic at 70° to 90° F. Manufacturers of hydrogenated shortening very often vary the plasticity of the shortening according to season in order that it may be neither too soft nor too hard. Butter has a good plastic range. Cocoanut oil margarines have a rather small plastic range, but the new domestic margarines (most of them made from cottonseed oil) have about the same range of plasticity as butter itself.

2. Pleasing flavor. The above discussion of flavor will suffice here.

3. High shortening power which will give maximum tenderness per pound of fat used. Shortometer tests show that lard has greater shortening power than other fats. An approximate listing of fats and oils according to their shortening power is as follows:

Lards
Hydrogenated shortenings
Compound shortenings
Cottonseed oil
Butter
Cocoanut oil
Edible Mineral Oil

It is realized that this listing may vary slightly depending on the shortening in question. It must be pointed out that these results on shortening power have not been obtained from bread or other yeast raised products. They have been obtained by means of a shortometer on crackers, cookies, and pie dough. In the case of bread it is almost impossible to determine small differences in the shortening power of the shortening used.

4. Good keeping quality at room temperature. The baker should be able to store the shortening for a reasonable length of time without it "oiling out" or becoming rancid.

5. Free from foreign odors.

6. Color must be such that it does not detract from the color of the baked product.

7. Perform well throughout the baking procedure, and make a pleasing product for the consumer, which, after all, is the final test.

Throughout this paper it has been attempted to put the facts in a brief and concise form and it is hoped that they may prove of some value.

LIST OF A. O. C. S. REFEREE CHEMISTS FOR 1938-39

The following have certificates reading on all cottonseed products and similar materials covered by the official methods of the A. O. C. S.:

D. C. Picard, The Picard Laboratories, Birmingham, Ala.

G. K. Witmer, The Battle Laboratories, Inc., Montgomery, Ala.

L. B. Forbes, L. B. Forbes Laboratories, Little Rock, Ark.

Thos. C. Law and J. D. Evans, Law & Company, Inc., Atlanta, Ga.

P. McG. Shuey, Shuey & Company, Savannah, Ga.

G. H. Kyser, Barrow-Agee Laboratories, Shreveport, Louisiana.

T. G. Weiss, Barrow-Agee Laboratories, Inc., Leland, Miss.

R. M. Simpson, Chas. W. Rice & Company, Columbia, S. C.

G. W. Agee, E. R. Barrow and J. R. Mays, Jr., Barrow-Agee Laboratories, Inc., Memphis, Tennessee.

G. M. Partee, Jr., Memphis, Tennessee.

E. H. Tenent, Woodson-Tenent Laboratories, Memphis, Tenn.

N. C. Hamner, Southwestern Laboratories, Dallas, Texas.

P. D. Cretien, Texas Testing Laboratories, Dallas, Texas.

R. H. Fash and F. B. Porter, The Fort Worth Laboratories, Fort Worth, Texas.

F. R. Robertson, Houston Laboratories, Houston, Texas.

V. S. Skinner, Shilstone Testing Laboratory, Houston, Texas.

The following have certificates reading on cottonseed, cottonseed meal and cottonseed cakes and similar materials covered by the official methods of the A. O. C. S.

G. C. Henry, Law & Company, Macon, Georgia.

John T. Boyd, Jr., Barrow-Agee Laboratories, Inc., Cairo, Ill.

B. L. Caldwell, Barrow-Agee Laboratories, Inc., Jackson, Miss.

Thos. B. Caldwell, Law & Company, Inc., Wilmington, N. C.

The following have certificates reading on all fatty oils and soap stock covered by the official methods of the A. O. C. S.:

John C. P. Helm, New Orleans, Louisiana.

S. Lomanitz, Oklahoma City, Oklahoma.

The following have certificates reading on all fatty oils, soap stock, oil cake and meal covered by the official methods of the A. O. C. S.:

W. F. Beedle, G. W. Gooch Laboratories, Ltd., Los Angeles, Cal.

P. W. Tompkins, Curtis & Tompkins, Ltd., San Francisco, Cal.

H. M. Shilstone, Shilstone Testing Laboratories, New Orleans, La.

Edw. G. Williams, New Orleans, La.

H. P. Trevithick, Bureau of Chemistry of the New York Produce Exchange, New York, N. Y.

H. M. Bulbrook, Industrial Laboratories, Fort Worth, Texas.

Robert H. Acock, The Oil Mill Laboratory, Austin, Texas.

ABSTRACTS

Oils and Fats

Edited by
M. M. PISKUR and RUTH LINDAHL

The value of the refractometric methods for determining the oil contents of seeds, oil cake, and extraction residue. F. Wittka. *Seifensieder-Ztg.* **65**, 742-3, 762 (1938). The Leithe method for refractometric oil analysis is an aid in process control. The method is unsuitable for seed analysis.

Comparative tests on butter pastry. W. Stodt. *Z. Untersuch. Lebensm.* **76**, 228-32 (1938). All the fat of bakery products is not extd. by the usual drying followed by Soxhlet extn. An average of 2.53% more fat is obtained if the sample is first boiled with dilute HCl, filtered and the residue and filter paper dried and extd. The butyric acid, sapon., and residue values of both extns. were compared. It was concluded that the per cent butter fat can be calcd. by the usual formulas.

History and the preparation and processing of oils and fats in Gross-Hamburg. A. Meyer and H. Schmalfuss. *Fette u. Seifen* **45**, 445-50 (1938). This is a historical sketch, statistics and a list of fat and oil industries in the Hamburg district.

Shark fishing and processing with special consideration to the liver oils. W. Schnakenbeck. *Fette u. Seifen* **45**, 450-6 (1938). A monograph. Included in the publication are charts giving the yield of oil from various sharks and the characteristics of the oils.

The measurement of herring oil in bulk. Neal M. Carter. Fisheries Research Board Can., Progress Repts. Pacific Stas. No. **36**, 16-19 (1938). The coeff. of cubic expansion or contraction per degree F., commercially accepted as 0.000404, for the conversion of a vol. of oil measured at its temp., to its vol. at 60° F., is not correct for all temps., because of the sepn. of stearins. Neither is the wt. of 1 gal. of oil at 60° F. a const. factor. The av. coeff. of expansion for oils between 60° and 120° F. was 0.000416. Stearin started to sep. at 77° F. and below, but, by carefully cooling to obtain a supersatd. soln. at these lower temps., it was possible to study the effect of the pptn. of stearin upon the coeff. of expansion. For the samples examd., the av. coeff. of expansion between 32° and 75° F. was found to be 0.00060 to -61. The wts. of a U. S. gal. at 60° of 1 sample were: 7.701 lbs., when liquid; 7.732 after stearin had sepd., on cooling and standing 24 hrs. at that temp.; and 7.751 after holding at 32° for 24 hrs. and then warming to 60°. (*Chem. Abs.*)

Oil bleached with combination absorbents. M. Singer. *Seifensieder-Ztg.* **65**, 701-2, 722-3 (1938). Bleaching agents prepd. from a combination of active carbon and earth were efficient and economical. The economies are realized from decrease in cost of bleaching agent, decrease in oil loss, saving in filtering cloths and improvement in bleaching effect. Cost data for bleaching in Germany are given.

Saturated acids of completely hydrogenated oils by fractional distillation. V. Hardened olive- and hardened rape seed oil. Seiichi Ueno and Masayoshi Iwai. *J. Soc. Chem. Ind. Japan* **41**, 256-7 (1938). An olive oil of I no. 80.7 and sapon. no. 191.8 had I no. 0.3, sapon. no. 187 and m.p. 67.1-70.7° after hardening. This was sapond.; the unsapond. was removed and the mixed fatty acids recovered. These were transformed to their Me esters and fractionally distd. The results indicated: C_{16} acids 7-10, C_{18} acids 90-93%, and C_{20} and C_{14} acids trace. This figure for C_{16} acids is higher than given in literature. A hardened rape seed oil (I no. 0.6, sapon. no. 170, m.p. 59.4-61.4) obtained from a typical rape seed oil (I no. 100.4), sapon. no. 174.5, n_D^{20} 1.4732) was investigated in the same manner as was the olive oil. The compn. of the mixed fatty acid of the hydrogenated oil was: stearic (palmitic, probably involved) acid 44, behenic acid 55 and lignoceric acid 1%.

Chemistry of fat spoilage. III. Influence of attended matter. F. Kiermeier and K. Taufel. *Fette u. Seifen* **45**, 487-91 (1938). The authors review the literature on the effect of natural impurities of oils from the standpoint as to whether they accelerate, reduce or have no effect on the spoilage rate.

Protection by guaiac against destruction of vitamin E by rancidity of fats of the diet. K. Johnson, A. J. Carlson and P. Bergstrom. Arch. Path. **26**, 144-6 (1938). The expts. support the contention that rancidity in fats destroys vitamin E. By retarding the development of rancidity in lard, guaiac prevents the destruction of vitamin E artificially added to the lard of the diet and increases reproduction in rats. (*Chem. Abs.*)