more drops of concentrated HNO_3 and heat until the digestion is complete and white fumes of $HClO_4$ appear. Cool the digest and transfer it to a 25-ml. volumetric flask. Dilute somewhat with water, add 1.0 ml. of the molybdate solution, and mix. Then add, without delay, 2 ml. of elon solution and dilute the mixture to 25 ml.

Prepare the blank by diluting a mixture of 1.0 ml. of perchloric acid, 1.0 ml. of molybdate solution, and 2.0 ml. of elon solution to 25 ml.

Reading:

Set the spectrophotometer at 820 mμ and adjust the instrument to read zero with the blank as a reference. Read the optical density of the sample and compare with a reference curve prepared by use of the standard phosphorus solution. Readings should be taken at the same time interval after addition of the reducing agent.

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[Received August 19, 1953]

Interim Report of the Bleaching Methods Committee. The Proposed Official Bleaching Earth of United States Origin

Historical

THE purpose of this part of the report is to review the background of the circumstances leading to action taken by the Society to abandon the use of the XLOOO brand English natural bleaching earth, employed for a number of years as the A.O.C.S. official natural bleaching earth, for one of domestic origin and more similar to the material now used by the vegetable oil industry.

At the Atlanta meeting of the Society in May 1950 a recommendation was made by the Uniform Methods Committee to the effect that future stocks of official natural bleaching earth should be of United States origin. J. T. R. Andrews, chairman of the U.M.C., in his report (J.A.O.C.S., Vol. 29, p. 47) states in part "the wisdom of this decision is becoming quite apparent since a survey of our supply of official natural bleaching earth, bearing the 5% dosage level, shows some indication of non-uniformity." Further mention of this survey will be made elsewhere in this report.

The Uniform Methods Committee reported in their 1947-48 report to the Society the acceptance of the responsibility from the Chemists' Committee of the N.C.P.A. and the Technical Committee of the N.S.P.A. for the preparation and standardization of official bleaching earth (natural and activated) and filter aid. Elaborating further, the report states that they procured and standardized through the cooperation of The Procter and Gamble Company a new lot of official natural bleaching earth, the first new lot of earth to be prepared in nine years. With increased usage of the natural bleaching earth, especially by the soybean oil industry, this supply was rapidly depleted, consequently it was necessary to procure a new lot of earth, which was certified for use as A.O.C.S. official natural bleaching earth on August 1, 1949. It will be recalled by some, due to the unprecedented quantity of earth required to meet the needs of the industry, that considerable difficulty was experienced in an attempt to match the bleaching potency of the previous lot of natural earth, which had carried a dosage figure of 6%. The undertaking was one of much greater magnitude than heretofore experienced. The problem to find somebody equipped and willing to mix to uniformity, screen, and pack some 12 tons of earth was no simple problem.

It should be pointed out that the above-mentioned earth was divided into two lots. It was found that 5% of the first lot of the new earth was the equivalent of 6% of the old standard in bleaching efficiency. This lot was depleted by July 31, 1951. However, prior to the expiration date (July 31, 1951), there existed indications of a lack of uniformity in bleaching response. The Bleaching Methods Committee, through the cooperation of Swift and Company, sampled all of the existing stock of earth in the Chicago warehouse of the Central Scientific Company, namely, the remainder of lot 1 and all of lot 2. Bleaching tests were conducted on both lots. The first lot received, designated to be used at the 5% level, was found to be non-uniform in bleaching efficiency. The second lot designated as 5.67%, was found to be of satisfactory uniformity in bleaching response, using of course, as a basis for the conclusion, the results obtained on the cans of earth sampled. This earth was subsequently certified by the Chemists' Committee of the N.C.P.A. and the Technical Committee of the N.S.P.A. for the year beginning August 1, 1951 and expiring July 31, 1952.

Expiration dates of July 31, 1953 and July 31, 1954 were subsequently certified. At the present time there is an indication that there is a sufficient supply of natural earth remaining to meet the requirements until current expiration date, namely July 31, 1954. The Society has had a few complaints during the past year concerning non-uniformity of the 5.67% dosage earth. In each case, upon investigation, the earth involved in the complaints has varied in the degree of fineness from relatively coarse to extremely fine. The discrepancies in bleaching potency were attributed to the lack of uniformity in particle size of the material from can to can.

At this point the fact should be mentioned that through the years there has been no single permanent standard to compare each new lot of earth against. It is reasonable to assume therefore that the English earth, at its source, may have changed in its selectivity for removing color pigments without this having been detected under the rather empirical conditions of the bleaching and color tests. The practice has been to determine the bleaching potency in terms of Lovibond red of the new lot of earth against the previous lot of earth.

The difficulty experienced in the preparation of such a large quantity of earth without adequate facilities for mixing and screening resulted in some embarrassment to the Society. This and the fact that a more efficient bleaching earth was highly desirable motivated the recommendation to replace the English natural earth with one of United States origin.

THE responsibility for obtaining future supplies of bleaching and diatomaceous earths, to be distributed by the Society, was delegated to the Bleaching Methods Committee, by action of the Uniform Methods Committee with the approval of the Governing Board, as part of a program outlined in the U.M.C. report for 1949-50 (J.A.O.C.S., Vol. 27, p. 350). At the time it was the consensus that the Bleaching Methods Committee should make a thorough investigation of the problem of locating a reliable source of a bleaching earth, of United States origin, that would serve the industry as a single bleaching standard in place of the natural and activated earths specified in the Official and Tentative Methods of the Society. Some opposition was registered against such a radical deviation from established procedure, *i.e.,* in replacing also the official activated earth with a natural earth. There was extremely strong opinion among some of the members of the trade associations that very careful consideration should be given at this time to any departure from present practices in order to avoid most certain complications arising from necessitated changes in the trading rules.

The Bennett-Clark Company, through George F. Clark Jr., a member of the Bleaching Methods Committee, offered to the Society their facilities and resources for the purpose of selecting a domestic natural bleaching earth to replace the English natural earth standard. L. B. Parsons of Lever Bothers Company offered the services of F. F. Roney of their Research and Development Division to formulate a statistical procedure for sampling a lot of clay which the Bennett-Clark Company agreed to pack and set aside pending disposition.

Mr. Roney prepared a detailed outline of a suggested random sampling and testing procedure to apply in connection with the proposed natural bleaching earth to be prepared by the Bennett-Clark Company. The samples were drawn in accordance with the statistical procedure suggested by Mr. Roney and forwarded to D. L. Henry of Law and Company, Atlanta, Georgia, who had so generously offered to conduct 120 bleach tests on four cottonseed and four normal colored soybean oils furnished through the courtesy of the Procter and Gamble Company. Instructions were to select oils typifying the average (rather than the extreme) range of oils, which were currently being bleached with the official natural bleaching earth.

The bleaching data, consisting of 72 bleaches using the proposed earth and 48 bleaches with the present official earth and color readings by the A.O.C.S. and Wesson Methods, compiled by D. L. Henry, were analyzed by F. F. Roney, using both graphical and statistical procedure. Mr. Roney's recommended conclusion as to the homogeneity of the whole lot of proposed earth was that it approximates the official earth sufficiently to be acceptable on this count. Quoting further from Mr. Roney's report: "An experimental earth concentration of 2.9%, which is the average of all these estimates, would bleach cottonseed oil to a color about 0.5 R. darker than with a 5.67% bleach with the present official earth, while soybean oils at the same experimental earth bleach level would be about 0.5 R. lighter than with the official bleach. It would seem undesirable therefore to have one equivalent concentration for the two types of oil."

The latter statement has been substantiated by the Bleaching Methods Committee, using as a basis the results obtained with the proposed earth on a far larger number of oils from different geographical sources. Consequently the recommendation of the Bleaching Methods Committee was that two earth concentrations be specified, namely, one for cottonseed oil and another for soybean oil. The technical report of the committee follows.

T. C. SMITH, chairman
Joint Bleaching Methods and
Refining Committees

Comparisons of the Bleaching Activities of a Domestic Natural Fullers Earth Proposed for Official Use and the Current Official Natural Earth. Determination of Equivalent Percentages Required to Give the Same Colors on Refined Soybean and Cottonseed Oils

AT the beginning of the 1953 crop season, shortly after the new Bleaching Methods Committee was formed, a multiple program of testing was initiated, which was designed to show the following:

1. The accuracy of interlaboratory checking with the bleach test, using both the current official (English) earth and the proposed domestic official earth—and on soybean oil, the official activated earth.
2. Agreement on color readings.
3. Short-term aging test of bleaching response to these three earths.
4. Percentage of the proposed official natural earth equivalent to 5.67% of the current official earth on both refined soybean oil and on cottonseed oil.

It is the last objective with which we are immediately concerned in view of the necessity to replace present supplies of official earth before August 1, 1954.

Cottonseed Oil

The equivalent percentage was determined in two stages. In the first, represented by the data in Table I, no particular stipulation was made in respect to the kind and origin of the refined oil to be used except that it should be freshly refined, especially in the case of the soybean oil. When the results had been collected and examined, the variations in the equivalent percentage were such as to make it necessary to repeat the work. In this second determination it was emphasized to the collaborators that in order to represent commercial trading practice, only refined oils should be used which represented a quantity of refined cottonseed oil in storage, rather than oil from the cup refinings made on individual tank cars or even on grab samples or daily composite samples from a refinery. It was known that such samples had been used to a large extent in the first stage. The reason for this distinction is that the official bleach test is used in trading only to grade bleachable prime summer yellow oil. Such oil is usually accumulated from current refinings in outside storage tanks holding millions of pounds. Accordingly tank cars or tank wagons loaded from these storage tanks represent a composite of oil from many different crude sources so that differences in the comparative bleaching responses to the two different earths among different crudes tend to be averaged out. In other words, the first stage results reflected variations that would not be encountered in practice.

TABLE I (First Stage)

Percentage of Proposed Official Domestic Earth Equivalent to 5.67% of Current (1952-1953) Official Earth–Cottonseed Oil

Member	Equivalence Proposed to Official, %	Lovibond Colors, Red	
		5.67% English Earth (Official)	3.5% Domestic Earth (Proposed)
A	3.8	2.1	2.2
A	4.4	1.7	2.0
A	3.35	1.7	1.7
A	4.2	5.6	6.0
A	3.4	3.4	3.35
A	5.3	1.25	1.55
A	4.2	1.75	1.94
A	3.0	3.8	3.55
B	4.0	2.8	3.0
C	3.0	2.15	3.03
C	3.0	2.3	....
D	3.3*	3.8	3.7
D	6.2*	2.4	3.05[a]
D	5.2*	2.5	3.0[a]
D	6.1*	2.3	2.95[a]
D	5.7*	2.4	2.9[a]
D	5.1*	4.2	5.0

Average equivalence 4.07%.
2nd average equivalence 3.79 (see note *).
95% confidence limits of average 3.31% to 4.27%.

* These values were omitted from the 2nd average since they represented grab samples from a refinery stream rather than bulk samples.

[a] These oils did not grade the same with 3.5% of the proposed earth as they did with 5.67% of the present official earth. Oils not marked graded the same with both earths at these levels.

Table II shows the results of the second determinations of the equivalent percentage of the proposed clay. The variations are such that the committee considers could normally be expected in comparing two entirely different kinds of earth. Also the committee believes that the degree of variation is sufficiently small to justify approving the proposed stock of clay to replace the current official earth at the scheduled time.

TABLE II (2nd Stage)

Percentage of Proposed Official Domestic Earth Equivalent to 5.67% of Current (1952-1953) Official Earth–Cottonseed Oil

Member	Equivalence Proposed to Official, %	Lovibond Colors, Red	
		5.67% English Earth (Official)	3.5% Domestic Earth (Proposed)
C	5.4	2.05	2.26
D	2.5	2.1	1.75
D	3.0	1.9	1.74
D	3.0	2.13	2.05
E	2.6	1.42	1.29
E	2.7	1.3	1.14
F	3.3	2.13	2.06
F	3.6	2.44	2.45
F	4.2	2.73	2.85
F	3.3	5.13	5.0
G	2.8	2.6	2.4[a]
G	2.8	2.6	2.33[a]
G	3.6	2.4	2.42
G	4.0	2.0	2.13
G	3.6	1.8	1.83
G	3.5	3.0	3.0
H	5.67	1.8	2.44
H	5.67	2.1	2.44
I	3.1[b]	2.3	2.03
I	3.0[b]	4.02	3.77
J	3.8	2.45	2.53

Average equivalence 3.58%.
95% confidence limits of average 3.15% to 4.01%.

[a] These oils did not grade the same with 3.5% of the proposed earth as they did with 5.67% of the present official earth. Oils not marked graded the same with both earths at these levels.

[b] Equivalence determined by A.O.C.S. photometric method as this laboratory was not equipped with Lovibond color glasses. Excluding these values, average equivalence is 3.59%.

Table III shows the results obtained in establishing the equivalent percentage on soybean oil.

For the record, it should be mentioned that a special meeting was held October 1, 1953, at the Procter and Gamble Company, Ivorydale, O. at the request of Dr. Andrews, chairman of the Uniform Methods Committee, to discuss the results obtained up to the present and to plan further moves. Present at this meeting were:

Procter Thomson, president, A.O.C.S.
J. T. R. Andrews, chairman, Uniform Methods Committee

TABLE III

Percentage of Proposed Official Domestic Earth Equivalent to 5.67% of Current Official Earth–Soybean Oil

Member	Equivalence of Proposed to Official %	Lovibond Colors, Red	
		5.67% English Earth (Official)	2.0% Domestic Earth (Proposed)
A	2.6	2.6	3.2
A	2.8	4.5	5.4
A	1.2	3.4	2.4
A	3.6	2.3	2.6
B	1.8	6.1	5.5
B	2.83	4.23	5.0
B	2.1	2.45	2.52
*B	3.2	3.3	4.9
C	1.5	2.38	2.12
C	2.25	2.46	2.65
D	2.2	1.9	2.0
D	1.1	2.1	1.6
D	1.2	2.1	1.5
D	2.0	2.7	2.7
D	1.8	2.5	1.85
D	2.3	2.4	2.5
E	2.3	1.52	1.6
E	2.15	2.15	2.2

Average equivalence 2.16%, 95% confidence limits 1.82% to 2.50%.

*The only oil having r.b. color lower than threshold value 3.5 with 5.67% current official earth, but not with 2.0% of proposed earth.

R. T. Clause, member, Bleaching Methods Committee
T. C. Smith, chairman, Joint Refining and Bleaching Methods Committees
R. C. Stillman, chairman, Color Committee
G. W. Holman, chairman, Refining subcommittee
G. F. Clark Jr., member, Bleaching Methods Committee
C. P. Long, member, Governing Board.
Egbert Freyer, chairman, Bleaching Methods Committee

On November 1, 1943, a meeting of the committee was held in Chicago, at which the results were discussed and the following recommendation for submission to the Uniform Methods Committee adopted:

> The Bleaching Methods Committee, meeting at 3:30 p. m., November 1, at the Sherman hotel, Chicago, recommends to the Uniform Methods Committee that on the basis of the data obtained to date, most of which was on 1952 crop oil, that the standard dosage of proposed clay be set tentatively at 2% for soybean oil and 3½% for cottonseed oil, which percentages were found to be most nearly equivalent to present official earth at 5.67%.
>
> It is the opinion of the Bleaching Methods Committee that final evaluation should be within the province of the N.C.P.A. and N.S.P.A. committees, suggesting to the Uniform Methods Committee that this be the approach to final acceptance, particularly as this will broaden the experience on an additional year's oil production.
>
> The committee's work shows stocks of clay to be uniform in bleaching power, but the dosage equivalent to the present official earth is variable, particularly on cottonseed oil; however the dosages chosen as tentatively standard placed all oils examined in the same grade as the official earth.

This last statement required later modification, to read "placed 85% of the oils comprising the second stage in the same grade (PBSY—or not bleachable) as did the current official earth." Also, whereas the current official earth graded 15 or 71% of the oils in Group II as bleachable, the proposed official earth graded 16 or 76% of them as bleachable. The ones graded not bleachable however were not necessarily the same oils in both cases.

The results of the inter-laboratory checking and color determination are of some interest and significance and were submitted to a rather exhaustive statistical analysis by W. T. Coleman, from which the following conclusions may be quoted:

1. The random error in this test was normal.
2. The random error of the photometric color method was less than the Lovibond method, but the over-all error, indicated by the existence of interactions with a difference-between-laboratory factor, is about the same.

Presentation of this other material will be deferred until the regular annual spring report of the subcommittee when it is hoped that one or two points will have been settled that the committee has not been able to resolve before the deadline set for the present report. This concerns the extent to which the inter-laboratory discrepancies are determined by factors inherent in bleaching technique and the extent to which they may be determined mainly by color reading discrepancies.

P. W. BATEMAN
G. H. BENCK
G. F. CLARK JR.
R. T. CLAUSE
W. T. COLEMAN
D. L. HENRY
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H. E. SEESTROM
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Bleaching Methods Committee
T. C. SMITH, chm.,
Joint Committees

[Received February 3, 1954]

Supplementary Statement by the Bleaching Methods Committee Chairman

GRATEFUL acknowledgment is made for the contributions to the above committee program by J. R. Mays Jr., of the Barrow-Agee Laboratories, chairman of the N.C.P.A. Chemists' Committee, and V. C. Mehlenbacher of Swift and Company, acting for H. S. Mitchell who is a member of the Chemists' Committee and of the N.S.P.A. Technical Committee.

The results from the Swift and Company laboratory were received too late to be fully integrated into the report. The following equivalent percentages were found on six different tank cars of refined cottonseed oil received at Chicago from scattered origins:

2.0, 1.9, 2.4, 3.0, 2.6, 3.0% of the proposed official earth.

The standard bleach test results on these oils were:

3.05, 3.7, 7.6, 3.0, 7.4, 3.1 red.

Note that none of these oils could be classed as Bleachable Prime Summer Yellow Cottonseed Oil, which is the only grade of refined cottonseed oil on which the official earth is used in trading under the N.C.P.A. rules. The oil which bleached to 3.05r by the official method however gave a bleach of 2.1r, using 3.5% of the proposed earth. This represents by long odds the worst discrepancy, percentagewise, in the color readings on this group of six oils and the only one which the proposed earth graded bleachable.

It will be noted that these results extend the lower limit of the range of equivalent dosages from 2.5% shown in Table II of the report, down to 1.9%. The average of the equivalent dosages found is reduced from 3.58 to 3.33 by the inclusion of this group (log-log).

The significance of the relationships shown by the data in the report and just above may be clarified somewhat by the following remarks.

While the range of equivalent percentages is fairly large, nevertheless, with a few exceptions, the differences between the color values obtained, using the two earths at the indicated levels, are not especially large—in fact, in most cases they are of the same order of magnitude as ordinary differences obtained in making color readings in different laboratories. Note, in fact, that the color reading difference in one case, obtained by the laboratory (Member H) which got the highest equivalent dosage, 5.67% of the proposed earth (*vs.* 3.3% average of all), is still relatively small, 2.1 *vs.* 2.44 red, indicating that on this oil the color *vs.* percentage earth graph has a very flat slope.

Note also that the color discrepancies on the first two oils tested by Member G, on which the equivalent dosages were found to be 2.8, are nevertheless no worse than ordinary color reading discrepancies, .2 and .27r. Since the color readings by the two earths however happened to fall on different sides of the threshold color value 2.5, that caused these two to fail to be graded the same by both earths.

Two other examples are shown by the first two data in this table. Member C obtained one of the highest values for the equivalent dosage, 5.4%, yet the color obtained at the 3.5% level was only .21 red higher than obtained by the official earth. At the other extreme, Member D found an equivalent dosage of only 2.5% on its first oil, a whole per cent below the tentative average value, 3.5, selected as probably representing the correct equivalent, and yet the actual color reading obtained at 3.5% level on that oil was only .35 red lower than the color obtained using 5.67% of the official earth.

In judging the appropriateness of adopting the proposed earth, it is not the range of values found for the equivalent dosage that we should study, but rather the magnitude and range of the color reading differences, considering these in relation to normal testing discrepancies, and especially to consider the way the two earths grade the group of oils tested with respect to whether they bleach 2.5 or lower—or fail to do so.

It is to be emphasized that the oils used in this survey cover a considerable variety of geographic origins and cover two crop seasons. If the total number of oils covered, 27, can be considered to constitute a reasonable cross-section or coverage, then it is appropriate to ask whether failure of the two earths to grade oils in the same category (bleachable or not bleachable) to the extent only of about 10% of the oils tested, is a sufficiently serious objection on which to base a criticism of the proposed earth for service as an official bleaching earth—especially when the new earth is far more similar in its selective bleaching action to some commercial earths being used to a large extent in the industry—which circumstance would seem to be a reason to consider that the grade scale corresponding to the use of the proposed earth would classify refined oils more reliably for commercial utilization than does the current official (English) earth.

In considering the variations in the equivalent dosage found on different samples of refined oil, it must be emphasized that different kinds of bleaching earths act differently in bleaching vegetable oils. The pigment systems of the oils are not simple, and experience has shown that fuller's earths remove various pigments selectively to some extent; also the selectivity of one earth may be quite different from that of another earth of a different type. We therefore have to expect some appreciable variation in the percentage of one earth necessary to bleach different oils, even of the same kind, to the same color as another earth of a different type—especially one which is far more active, or far less active. An outstanding piece of evidence of this is the circumstance that a very much smaller equivalent dosage for the proposed earth was found applying to soybean oil than was found for cottonseed oil.

Accordingly, in reaching the decision to change the type of its official bleaching earth from that of English earth having relatively low activity, to a domestic earth comparable in a degree to domestic earths being used in commercial bleaching, it should have been understood that even a fair degree of uniformity of equivalent dosages between the two earths, when compared on different oils, could not necessarily be expected; and had such uniformity been set up as a prerequisite for making the change to a domestic natural earth, we believe that such a requirement should have been sufficient to rule out the change in the first place.

Although somewhat disappointed at first, after studying the matter and taking into consideration the differential selective action, the committee considered that the oil-to-oil uniformity of the proposed earth in relation to the official earth was as good as could be expected when comparing two entirely different types of earth—two which differ in activity as much as do these. Once the change is made, if it is made, there seems adequate reason to believe that the new earth will perform in the desired function as well as the English earth. About the same percentage of the refined cottonseed oil made should still be graded as bleachable as before, although a few oils here and there, a small percentage of the whole, will undoubtedly grade bleachable with the new earth, when it would have failed to do so with the old English earth—and *vice versa.*

In such cases, if one asks which earth gives the "correct" indication, the committee believes that there is just as much reason to favor the indication of the proposed, more active earth than there is to let the indication of the old (English) official earth determine the grade. In fact, since the proposed earth is far more similar to the earths used by many refiners in commercial practice, this should perhaps make it the preferred one in cases of conflicts of grade indication. But it is significant to recall that with only one earth to use, there could be no such thing as conflict between the two.

In this last connection we might also consider that if the industry had been using an official earth similar to the proposed earth during the past 25-odd years and for some reason it were considered desirable or necessary to change over to a "new" official earth similar to the currently-official earth, exactly the same discrepancies would be encountered, and one believes that such objections as might be voiced to making the change would probably be much louder than we are likely to hear in the present instance, if this change is approved—especially as it would represent a considerable departure from commercial practice.

Egbert Freyer.

February 12, 1954

Fatty Acid Contents of Certain Processed Foods[1]

CONSTANCE WILLARD, R. D. ENGLERT, and L. M. RICHARDS, Stanford Research Institute,
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In recent years the role of fat in the diet has been found to be much more significant than was previously realized. In particular, such unsaturated constituents of fat as linoleic and arachidonic acids have been found to be essential to the health of laboratory animals (5, 6, 11). While there is less evidence concerning the role of these fatty acids in human nutrition, a deficiency of these acids in humans may be associated with certain forms of eczema and with other symptoms comparable to the first clinical manifestations of essential fatty acid deficiency in animals (4, 10).

Because these acids are highly unsaturated and therefore subject to possible alteration or destruction by the oxygen of the air, chemicals, or heat, the effects of ordinary processing and cooking of fat-containing foods are of significance in human nutrition. Most fat analyses reported in the literature have been performed on unprocessed, raw samples (12). Recently however studies of the effect of cooking on the essential fatty acids of meats and poultry (8), and of baked and fried foods (7) have been made. In the present work the fatty acid contents of certain foods which had undergone various types of processing are reported. The foods studied include meats cured by several processes, American and Swiss type of process cheeses, and vegetable oils altered by hydrogenation.

Samples

Fresh, representative samples of bacon, ham, luncheon meat, and frankfurters were obtained directly from a processing plant. The luncheon meat and frankfurters contained both pork and beef.

Samples of Swiss- and American-type processed cheese, together with corresponding samples of "cheese raw material," taken just before addition of the emulsifiers to the cheese products, were obtained from a manufacturer.

Oleomargarine was purchased over the counter, and a sample of bakers' shortening was obtained from a distributor.

General Procedure and Results

Two sets of data were obtained for each sample analyzed:

1. A small portion of fat was converted to fatty acids (see following section), and these were analyzed spectrophotometrically for polyunsaturated components.
2. A second portion of fat was converted to methyl esters by methanolysis except in the case of the cheese fats. By use of special techniques the fatty acids of the latter were esterified *in toto* by conventional means without the conventional prior steam distillation of volatile components. In all cases the total methyl esters were fractionated in one distillation without separation of saturated and unsaturated portions.

Individual distillation cuts were combined into fractions representing acids having the same number of carbon atoms or into transition fractions representing acids of two different carbon chain-lengths. Each fraction was then analyzed chemically and spectrophotometrically to determine both saturated

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