TABLE II

Flavor Tests of Simulated Soybean, Soybean, and Cottonseed Oils

Oil	Light Exposure		Heat Treatment
	0.5 hr.	1 hr.	1hr.
Simulated Soybean	8.5	5.4	7.0
Soybean	5.3	3.6	3.8
Cottonseed	8.2	7.8	7.7
Soybean	5.4	4.6	4.5
Cottonseed	8.2	8.2	7.5
Simulated Soybean	4.8	5.0	4.0

between the flavor stabilities [3] of cottonseed oil and soybean oil. Actually, as shown in Table II, there is a marked difference. Possibly this apparent discrepancy is due to the fact that there is no standard basis of comparison between the various pairs examined, i.e., the second sample of any given pair is judged solely on the basis of the value assigned to the first. To obviate this lack of a standard of reference all possible pairs of the three oils had to be tested. From the information in Table II the oils may be arranged in the following order of decreasing flavor stability: cottonseed>simulated soybean>soybean.

The flavor panel unanimously agreed that the flavors produced by heat and light treatment of the simulated oil were distinctly different from those appearing in soybean oil under the same conditions. The flavors were difficult to describe, but grassy, haylike, and other flavors typical of reverted soybean oil were absent. Drying and persistent aftertastes evident in the soybean oil were sometimes encountered in the simulated oil.

The effect of tocopherol on the flavor quality and stability of the simulated soybean oil was next investigated. Refined soybean oil is reported (17) to contain 0.02% of α-tocopherol and 0.10% of γ-tocopherol. A sample of the simulated oil containing these concentrations of added α- and γ-tocopherol was exposed to the G-E lamp for one hour and compared to a similar sample of the simulated oil containing no added antioxidant. The flavor scores were 7.5 for the former sample and 5.5 for the latter. Despite this improvement in flavor stability, the tocopherol did not appear to change the quality of the flavor and no reversion effects were apparent. This was also found to be the case when a sample of the simulated oil containing 0.10% of α-tocopherol was shelf-stored in light at room temperature for nine days.

Conclusions from organoleptic observations have to be drawn with considerable caution. They are no more reliable, in the ultimate sense, than are the organs of taste and smell of the individual members of the flavor panel. Thus far the results would tend to indicate that the ordinary fatty acid constituents of soybean oil are not entirely responsible for the flavor characteristics of reverted soybean oil. Likewise, the hypothesis that linolenic acid is the sole causative agent does not appear likely although it is possible that this acid contributes to the flavor instability of soybean oil, particularly to the persistency and drying effects of the reverted oil.

[3] A distinction is made in this paper between the terms flavor stability and flavor reversion. The latter is applied only to the characteristic taste and flavor of light and heat-treated soybean oil. The former is used in a broader sense to designate the relative flavor qualities among the several oils examined.

Summary

A simulated soybean oil has been synthesized from purified fatty acids. The flavor characteristics of the oil after heat and light treatment are described and compared to those of soybean and cottonseed oils.

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Report of Seed and Meal Analysis Committee
May, 1946

THE Seed and Meal Analysis Committee has under study the methods of analysis of cottonseed, peanuts, tung fruit and their meals, and of soyflour. The Subcommittee for Cottonseed and Cottonseed Meal reports as follows:

In considering the problem of reexamining the methods of the A.O.C.S. for moisture in cottonseed and cottonseed products it was felt that fundamental data on weight losses under varying conditions of type of oven, temperature, time, and sample preparation should be obtained. Through the generous cooperation of the Southern Regional Research Laboratory a thorough program of investigation was undertaken, following the pattern used in "Determination of Moisture in Peanut Kernels," Hoffpauir, Oil & Soap, November, 1945. The materials used were whole and crimped cottonseed, fumed ground cottonseed, whole and ground cottonseed meats, and cottonseed meal. As this work by Hoffpauir and Petty has been published in Oil & Soap, November, 1946, the results will not be fully reviewed here. It is a valuable addition to the literature on this subject.

The weight loss curves indicated that (1) the drying of whole seed 12-16 hours (overnight) is most reliable and that (2) drying crimped seed 5 hours at 101°C. gave results several tenths per cent lower. (3) Whole seed dried 2½ hours at 130°C. gave results in close agreement with overnight at 101°C. (4) Fumed ground seed showed a small continued weight loss beyond the official drying period of 2 hours at 101°C. (5) Cottonseed meal showed a very small weight loss between two and three hours' drying at 101°C.

The committee undertook collaborative work, under routine conditions, on the above materials at, and with some modifications of, the drying periods named. Within the limits chosen, the variations were in general agreement with the weight loss curves of Hoffpauir and Petty. See Table I.

On the basis of these data the majority of the committee agree that:

1. Drying whole cottonseed 12-16 hours (overnight) at 101°C. is justified as the official method for moisture.
2. The procedure of drying crimped seed 5 hours at 101°C. should be removed from official methods as low results

TABLE I.

Moisture in Cottonseed and Products Under Variations of Drying Time and Temperature

	Whole Seed				Crimped Seed			Cottonseed Meal	
	16 hr. 101°C.	1 hr. 130°C.	2 hr. 130°C.	3 hr. 130°C.	1 hr. 130°C.	5 hr. 101°C.	8 hr. 101°C.	2 hr. 101°C.	3 hr. 101°C.
Hoffpauir (From Curves)	8.2	7.5	8.1	8.3	8.1	7.7	7.9	5.75	5.8
Cox	12.13		11.62	12.20	11.52	11.68	11.84	8.12	8.17
Haire	13.57G		13.30		13.17	13.03	13.25	7.15	7.03G
McIsaac	11.67		11.42	11.80	11.40	11.36	11.64	7.34	7.39
Pope	(9.40)	(8.43)	(8.65)	(8.95)	(9.53)	(9.47)	(9.49)	8.25	8.36
Rettger	11.70	10.76	11.62	11.82	11.88	11.36	11.62	7.64	7.66
Wilkins	12.98		12.70	13.06	12.70	12.56	12.98	5.97	5.98
Avg. of 5	11.35		11.09	11.44	11.12	10.93	11.20		
Avg. of 6	11.72		11.46		11.46	11.28	11.54		
Avg. of 7	11.39				11.19	11.02	11.25	7.17	7.20

Note: Each result above except those from weight loss curves is the average of 3 to 5 determinations. Each collaborator furnished his own samples. Ovens used were forced draft, Freas, Despatch, or DeKhotinsky except two results by glycerine jacketed oven indicated by "G". Results in parentheses indicate determinations reported in this line were on two different lots of seed.

were obtained even when the drying period was extended to 8 hours.

3. There is need for a quicker method than (1) above for emergencies. Drying whole seed 2½ hours at 130°C. appears to give results in close agreement with (1). Further work should be done toward justifying this procedure as an optional official method for moisture in cottonseed.
4. No change in the 2-hour drying period for fumed ground cottonseed is indicated.
5. There appears to be no substantial reason for the present difference in drying periods of 2 hours for fumed ground seed and 3 hours for cottonseed meal. The weight loss curves and the collaborative work showed a negligible increase in loss during the third hour of drying. It is recommended that the drying periods be made uniform for the two materials, viz., 2 hours at 101°C.

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The report and recommendations of the Subcommittee have been unanimously approved by the Seed and Meal Analysis Committee, with the exception that one member is of the opinion that further work should be done on the determination of moisture in cottonseed meal. Hence, it is recommended that (1) the method for determining moisture in whole cottonseed specifying crimping and drying for 5 hours at 101°C. be removed from the official methods and (2) the drying period at 101°C. for the determination of moisture in cottonseed meal be reduced from 3 to 2 hours.

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The Role of Various Substances in Stabilizing Animal Tissues*

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TWO factors known to affect the stability of fats are (a) their fatty acid composition and (b) the presence of antioxidants or pro-oxidants.

Lea (1,2) has shown that the inclusion of cod-liver oil in the food of hogs results in an increased susceptibility of the body fats to oxidation (**Figure 1**). To explain this he assumed that the very highly unsaturated fatty acids, normally present in traces in pig fat, were increased in amount when the fish oil was fed. The effects were so striking that he suggested that it would be highly desirable to feed A and D concentrates and avoid the introduction of the unsaturated fish oil acids into the body fat.

He also suggested that in addition to changing the fatty acid composition of the body fat the diet might also affect its antioxidant content. In 1942 Overman (3) attempted to change the keeping time of the body fat of rats by feeding ascorbic acid and hydroquinone but found no definite improvement in stability.

In the laboratory at the University of Minnesota (4, 5, 6) several groups of young albino rats were put on different diets and kept for 30 to 150 days, killed, and the rendered abdominal fat tested for stability by measuring the increase in peroxide value at 63° C. or the oxygen absorption in Warburg flasks at 100° C. The results, some of which are shown in Figures 2-7, give clear evidence of the following effects on the keeping quality of body fats of rats:

1. Common mixed diets differ greatly in this regard.
2. The Minnesota stock diet was not improved by addition of food said to be rich in antioxidants.
3. Protein level was not important.
4. The type of fat in a purified diet is very important, butterfat being much more effective than lard. Fresh lard is much better than rancid lard but rancid lard does not introduce pro-oxidants or greatly reduce the antioxidants in a period of four weeks.
5. The feeding of tocopherols to vitamin E-free rats greatly improves the stability of the body fat whereas hydroquinone and wheat germ oil actually have deleterious effects.
6. The effect of tocopherol is so uniform that the length of induction period may be used as a method of estimation of the amount of tocopherol in the body fat.

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