mestic oil, the mixture seemed to refine about the same as a straight domestic oil of a similar grade. The last shipment however, gave us hopes that we will be able to handle this oil straight in the future.

Monday, May 25, 1936, we received a sample of Crude Chinese Oil, which was of a much better quality than any we had received in shipments. We ran laboratory refinings which shows it almost the same quality as our domestic oil of the same fatty acid.

Below are the results:
F. F. A., 4.1%.
Lye used, 12% 16 dg.
Refining loss, 17.4.
Color, 35—12.3.
Standard bleach, 35—5.5.
Bleach 3% Activated earth, 0.5%.
Activated Carbon, 35—4.3.

We do not know the history of this oil, but it shows evidence that the Chinese are beginning to strive for quality, and will soon be able to give us an oil equal to our own.

SOY BEAN ANALYSIS*

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THE question of a method for the analysis of soy beans for oil mill purposes is one that this year has been of considerable importance to both the mill chemist and the commercial chemist.

To the cottonseed analyst the most natural approach is to follow the general procedure for cottonseed and I imagine most of us started, at least, along that line. However, the fact that the oil is considerably more of a drying oil than cottonseed oil and the fact that heating increases the tendency of an oil to oxidize, made some of us question whether or not we were safe in preheating the beans before preparing them for anlysis. This was the starting point for our experiments, which proved, we believe that the procedure for cottonseed must be considerably changed for the analysis of soy beans.

The moisture determination is usually made by the government licensed graders of soy beans by the use of a Brown-Duval Moisture Tester. This agrees very well with figures obtained by the use of a Bidwell-Sterling apparatus using Toluol. As neither of these methods lend themselves well to quantity work we tried drying overnight at 101° as we do cottonseed. The results we got averaged about five-tenths per cent lower than the figures obtained by the Toluol distillation. After considerable work we found that three hours at 130° C. in a Freas Forced Draft Oven will produce results agreeing exactly with the Toluol method. However, a longer period at this temperature darkens the beans and gives results that are too high. This tendency to hold moisture extends to the partially dried ground beans, for samples dried overnight at 101° C. do not show the maximum results which are obtained in two hours at 130° C. Three hours does not materially affect this determination.

The oil contained in the beans must be pretty well protected from oxidation, for we find no difference in the amount of oil extracted when the beans are airdried, dried one hour at 130° C. or two hours at 130° C. If airdrying (overnight on top of the Freas Oven) is used, grinding in the Bauer Mill is possible, but a very fine powder cannot be produced. After two hours at 130° C. the beans can be ground to flour by using the new 3,600 r.p.m. Bauer Brothers' Mill or by grinding twice through the regular seed mill. If airdrying and coarse grinding be used, regrinding of the partially extracted beans is essential. If very finely powdered meal is used and two gram portions are weighed out a continuous eight-hour extraction will give practically maximum results. Similar amounts will be shown by extracting two hours, regrinding in a mortar and re-extracting for three hours' additional. This regrinding should not be done before the beans have had two hours' extraction, for if reground sooner a loss of meal while regrinding would cause low results.

Five gram portions, either with or without regrinding, do not give maximum results. This is probably due to the difficulty of regrinding the larger quantity sufficiently fine in the mortar. Regrinding with sand in the mortar adds to the difficulty and to the time necessary to regrind, but does not seem to give higher extractions.

The ammonia determination does not offer any trouble, the ground beans being so uniform that closely agreeing results are easy to obtain.

The work that has led to these facts and figures was done in our laboratory and that of a mill interested in crushing soy beans. It was done largely for our own information, however, as there is no committee of the Society on the analysis of soy beans and as there has been quite a demand for this work during the past year, which will probably increase in the future, I thought possibly the Society would like to adopt as a temporary or tentative method the procedure I am going to suggest as a means of obtaining more concordant results between different laboratories. This method, of course, to be succeeded by an official method when such is submitted to and approved by the uniform methods committee.

The procedure is probably not perfect, but it seems to me that its use would at least tend toward better results than those being obtained at present where every one is using his own plan.

The question of foreign matter in the beans is slightly different from foreign matter in cottonseed. As long as government graders are doing the grading of the beans, the foreign matter contained as determined by them affects the grade of the beans and in that manner the price. Furthermore, the question of whether split beans and shell particles should be classed as Dirt and Trash is a rather difficult one and as most of the mills at least are running the beans without further cleaning I do not believe the question of foreign matter should enter into the laboratory analysis.

*A paper presented at the Spring Meeting, A. O. C. S., New Orleans, May 28 and 29, 1936.

My suggestions for the procedure for the other determinations follow:

Moisture:

Weigh eight to ten grams of the whole beans and dry three hours at 130° C. in a Freas Forced Draft Oven.

Pre-Drying:

Dry 60 grams for two hours in a Freas Forced Draft Oven at 130° C.

Grinding:

Grind the 60 grams of partially dried beans as fine as possible, putting through the Bauer Brothers' Mill a second time unless the new 3,600 r.p.m. mill is used.

Second Moisture:

Five grams are heated two hours in Freas Oven at 130° C.

Oil:

Extract two gram portions wrapped in filter paper as a seed for two hours, regrind in a mortar and re-extract three hours' additional.

Ammonia:

Use 1.4 or 1.7 grams and follow the method for cottonseed meal.

Free Fatty Acid:

If this determination is desired it can be made by following the procedure for cottonseed by partially drying and grinding through the official food chopper. It may be necessary, however, to run the beans two or three times through the food chopper to get them fine enough so that the official 7.05 grams of oil will be obtained.

Calculation of Results:

Recalculate oil and ammonia to the original moisture basis. Report moisture and oil to the first decimal, ammonia to the second decimal.

Calculation of Yields:

For uniformity I suggest the use of definite fixed moisture and oil percentages left in the cake. The average is probably about 7.5 per cent moisture and 5.0 per cent oil. The yield of cake and available oil from the beans can then be calculated from the analysis as follows:

Add together the pounds of moisture and the pounds of oil in a ton of beans. Subtract this figure from 2,000 lbs. The result is pounds of dry, oil-free cake. Assuming the above moisture and oil percentages will be left in the cake this dry, oil-free cake is 87.5 per cent of the total cake.

The oil left in the cake is 5.0 per cent of this total cake and the oil yield the difference between the pounds of total oil and the oil in the cake. The ammonia in the cake is calculated by dividing the pounds of total ammonia by the weight of cake and multiplying by 100. The moisture and manufacturing loss of the beans is the difference between the sum of the cake and available oil and 2,000 lbs.

Example of Calculation of the Yields:

Assuming beans analyze—
Moisture — 12.5
Oil — 17.3
Ammonia — 7.20
250 lbs. Moisture
346 lbs. Oil

2,000—596 = 1404 lbs. dry, oil-free cake = 87.5% of total cake.
1404 ÷ 87.5 % × 100 = 1604 lbs. total cake.
1604 × 5.0% = 80 lbs. oil in cake.
346 total oil — 80 = 266 lbs. of Available Oil. 144 lbs. ammonia ÷ 1604 × 100 = 8.97% ammonia in cake. 2000 lbs.—(cake 1604 plus oil 266) = 130 lbs. manufacturing loss.

Report of Color Glass Development Committee

BRIEFLY reviewing the past work of this committee it will be recalled that its efforts were directed toward sounding out the possibilities of readjusting the glasses as at present furnished by the Lovibond establishment to conform more closely to the N″ scale developed by the Bureau of Standards and accepted by the Society as standard.

During the early part of last year this problem was brought to the attention of the Electrical Testing Laboratories of New York City by the committee. They were immediately interested and after a preliminary investigation by their Dr. Roger S. Estey, agreed to undertake the work.

The necessary equipment was purchased and installed. This was described in a lantern slide lecture given by Dr. Estey before the members of the Society in attendance at the Memphis meeting last year.

The method of readjusting the glasses depends upon reduction of their thickness by polishing with cloth and rouge. The amount of polishing required for any given glass is estimated from a preliminary calibration. The glass is then polished for a given time at a given pressure and recalibrated. In order to arrive at an accurate N″ value, the glass must be repolished and rechecked several times.

Since it is of necessity a "cut and try" process it is obviously time-consuming and requires a high degree of technical skill. The actual change in thickness of the glass is of the order of magnitude of a few thousandths of a millimeter.

To date the Electrical Testing Laboratories have received and readjusted

From Referee Laboratories, 43 glasses

From Refineries, 68 glasses
or a total of 111 glasses.

When this committee was first organized it was thought it might be possible to interest one of the manufacturers of colored or optical glass in producing Lovibond slides conforming to the N″ scale without readjustment. All possible sources have been investigated without success. The various glass companies declined to attempt their manufacture on the ground that it would be economically unsound. The cost of the development and research involved would far overshadow the maximum returns that could be expected.

The present solution of the problem, while it may not be ideal, is at least practical and a great improvement over what existed before. It is now possible for both referee and refinery chemist to work with glasses having no practically significant difference in N″ value.

Respectfully submitted,
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Dr. Roger S. Estey,
Dr. T. G. Richert,
Mr. Arthur Schroder,
Mr. P. E. Ronzone,
Mr. W. A. Welch.
L. M. Gill, Chairman.