The Application of Modern Analytical Methods to Transactions in Cottonseed Products

By DAVID WESSON

CONSTANTLY improving analytical methods have done much to remove trading transactions in Cottonseed Products from the realms of rule of thumb, to the basis of more or less scientific accuracy.

The transactions of the American Oil Chemists Society and the work of the Smalley Foundation bear testimony to the constant striving for improvement, which has been going on for many years.

The work of the Smalley Foundation in improving the methods for the analysis of meal, and especially in the determinations of oil and ammonia, have placed transactions, based on this analysis, on a very secure foundation, where the only reasonable chance for error is that of sampling.

The time seems now ripe for a great reform in the commercial practice of selling cottonseed cake and meal.

Other things being equal, the value of these products depends almost entirely on the amount of ammonia or protein present. No producer of metal-containing ores would think of selling the same on any other basis than on the value of the metal contained. Yet thousands of transactions occur where cottonseed meal, often several times as valuable as ores, is simply sold under designations, such as Prime, Choice or Off, without taking into full consideration the true intrinsic values. It would be far better, both for buyer and seller if rules were established whereby cottonseed meal, which is the most highly concentrated protein-bearing cattle food on the market, should be dealt in only on a protein basis, and paid for in accordance with the amount of protein content.

David Wesson

Crude Oil

For years Crude Oil has been handled under trading rules, recognizing the quality of the refined oil produced from it. Its value also depends on the amount of refined oil which the crude oil contains. Our present trading methods depend on an empirical laboratory test which does not tell the actual amount of refined oil con-

tained, but only the amount which a chemist is able to get from a given sample of crude under specific laboratory conditions.

In most highly developed industries dealing with developed materials, it has been customary for many years to value the materials dealt in by the amount of the valuable constituents contained as in the case of metalliferous ores referred to above. In the case of Crude Cottonseed Oil, its value depends on the amount of refined oil which it contains. Our present refining test does not show this. We have available, however, a method which will give within a tenth of a per cent the exact amount of refined oil present in any given sample of crude. By using such a method, discrepancies between different laboratories would disappear, assuming analyses were made by properly skilled chemists. The amount of refined oil from a given sample would depend on the skill employed by the refiner. This of course should not enter into the question of crude oil valuation, except the refiner would naturally know what product he might expect from a given crude.

Color of Oils

This is a matter which has excited a great deal of attention and research during the last thirty years, and the end is somewhere off yet. A method which gave good, workable results nearly thirty years ago, consisted in comparing a column of oil with varying lengths of column of a solution of standard bichromate of potassium. This method, while a little rough, was eminently practical and served for the control of a number of refineries. We next started in using Lovibond glasses, which have become as sacred with many people as the laws of the Medes and Persians. As Dr. Priest has recently shown, the Lovibond glasses vary greatly among themselves. It is possible, however, to obtain a few standard glasses of which the error can be determined. By use of a suitable instrument, such as a Dubosq Colorimeter, it is believed that all practical ends would be served by finding out what depth of a given oil would match a standard glass, and reporting the color accordingly. For instance: if we considered 35 Yellow—7.5 Red, Prime Oil in a 5 inch column, and the sample in question in a depth of 4 inches, matched the standard glass we would have an excess of 20 per cent color over Prime. If a 2½ inch column matched the standard glass, we would have twice as much color in the sample as in Prime Oil. We strongly believe that a system of this kind can be worked out which will do away with a great deal of difficulty which we have in obtaining standard glasses and in making measurements which have no real manufacturing importance and are only useful for hair-splitting distinctions in accepting or rejecting oils for trading purposes.

Flavor

In the good old days when we knew nothing about refining oil, except that caustic soda would remove the free acids and the coloring matter from crude oil, and if the crude oil happened to be made from seed that was more or less damaged, the resultant refined oil would taste bad, flavor was a matter of prime importance. In present day conditions, where all oil has to be deodorized in order to use it for edible purposes, the flavor disappears, and all oils are brought to practically the same level. It

would seem, therefore, that the importance and fine distinctions which are attached to flavor are largely obsolete, and should be given consideration only in deciding whether an oil is prime or off when taken into consideration with analytical factors.

It is the experience of most refiners that a strictly Prime crude oil made from sound seed will not show an acidity of more than 2.5 per cent free fatty acid as oleic acid. An occasional sample of crude will be found where some badly damaged seed has been mixed with sound seed, and if the damage to the seed has been caused by heating, the flavor will be so rank and the difficulty of obtaining good colors with caustic soda and bleaching will become so difficult that such an oil is easily graded as off. Such oils, however, are the exception and met with very seldom.

In conclusion, I wish to say that the time seems ripe for us to leave some of the beaten paths, some of which I helped blaze myself, and strike out into the new and better ways which are clearly indicated by scientific investigation and the progress of the industry.

Editor, Oil & Fat Industries:

One wonders why no more definite attitude, in the form of expression of opinion in this journal, has been taken by cottonseed oil chemists towards the proposal published several months ago by Dr. Wesson to substitute a chemical method for the semi-kitchen one now used in analyzing cottonseed oil.

Considering the effort spent in convincing the industry of the value of chemical service in the rational management and handling of cottonseed products, it is so much more regrettable that the present laboratory method of crude oil analysis lends itself to be used as a tool to undermine the position gained by the chemist.

To illustrate: during a conversation with the manager of the refinery department of a well known company, he referred to "buyers' referee" and "sellers' referee," in the sense that results reported by certain referee laboratories may be expected to be favorable to buyer or seller, as the case may be.

Of the eighty-odd analysts reporting on the check meal sample of the Smalley Foundation, it is unusual to meet with any significant discrepancy in the ammonia percentages. The fairly uniform chemical method of the determination accounts for the uniformity of results.

The laboratory refining test is of course based on the principle of small scale approximation of the large scale process. No need to emphasize that in such cases the large scale process usually has the advantage. But we must admit that there is not necessarily always an invariable relation between the processes of the two different scales. Once a uniform chemical basis method is introduced, the relationship between it and refinery practice will be definitely established, and seller, buyer and chemist will be spared the irritation which is a frequent by-product of the use of the present method.

According to Mr. C. E. McLean, with whom I had occasion to discuss the matter lately, a color reading system of oil could be worked out in connection with the proposed chemical method. S. LOMANITZ.