Problems Encountered in Sampling of Cottonseed and Cottonseed Products[1]

MANY OF THE PROBLEMS encountered in the sampling of cottonseed are also found in the sampling of the various cottonseed products manufactured as well as in the sampling of other commodities. Proper sampling of raw materials and of manufactured products as well as the proper handling of samples so drawn is of vital importance in the present-day operations of mills. Without such procedures it is unreasonable to expect a chemist to produce representative analytical results on the composition of raw commodities or their manufactured products. The analysis cannot be any more meaningful than the representativeness of the sample. Superintendents are utterly defenseless against criticism from management and others unless they have the actual facts developed from proper programs of sampling and analysis. To be able to predict ultimate yields with any degree of accuracy it is essential to know the quality and the composition of cottonseed as received as well as of those seed going into the mill for crushing, also the quality and composition of the various products manufactured. They are primarily interested in producing the greatest amount of each product possible with the highest possible quality. This knowledge is possible only by a careful and systematic program of sampling and analysis.

A number of years ago the United States Department of Agriculture undertook a program of supervising sampling and preparing official samples of cottonseed and the grinding of such official samples by chemical analysis under the provisions of the standards promulgated by the Department. This cooperative program was brought about as a result of requests made by the cottonseed-crushing industry. Through cooperation with the industry and several technical societies, various sampling procedures were carefully studied and approved methods for drawing and preparing official samples of cottonseed were issued and distributed to licensed samplers and mill managements. These methods specified certain sampling tools for drawing samples, large containers for holding bulk samples, method and equipment for reducing bulk samples to proper size for sending to chemists, foreign matter determinations, tonnages to be represented by an official sample, and the approximate amount of cottonseed to be drawn per ton delivered as well as the number of places individual shipments should be sampled. All licensed samplers were bonded to the Department and were subject to periodic and unannounced inspections by the Department's field representatives. In a like manner, various methods of chemical analysis for determining the quality of cottonseed and the quantity of products the mill could expect to produce from given lots of cottonseed were carefully studied, and officially approved methods of analysis were issued. Only independent commercial chemists were eligible for license. All chemists desiring license for official work were required to undergo examinations, written and practical, and to meet strict requirements in order to receive a license. In addition, all equipment used by the chemist was required to pass rigid inspection, and no license was issued until all of the approved equipment was on hand and in use. The licensed chemists are also subject to periodic and unannounced inspections by the chemist in charge of the program.

THE OFFICIAL GRADES for cottonseed, sold or offered for sale for crushing purposes, are covered by the United States Standards for Cottonseed. These standards are designed so that the buyer of the cottonseed pays for what he gets and does not pay for what he does not get. Basis Grade is 100.0; cottonseed grading higher than basis receives a premium while those grading lower than basis take a discount in price.

Official sampling procedures must be carefully followed to obtain representative samples of cottonseed delivered to the mill. All samplers should be impressed with the importance of their job and enlightened regarding how accurate sampling of the raw commodity can affect the ultimate operation of the mill. Car-lot quantities of cottonseed delivered by rail are difficult to sample, particularly since the railroads require cars to be loaded to full visible capacity. As a result the most satisfactory sample can only be taken during the unloading of the cars. However, during recent years, rail shipments of cottonseed to mills in the United States are relatively rare since large motor trucks, many hauling between 15 to 20 tons, have taken over most of the volume. The officially approved methods for sampling truck shipments allow samples to be taken either before or during unloading.

Either official method is fully satisfactory if it is carefully followed through by the sampler. Most mills prefer to have samples drawn by use of the approved trier since it is thought that better and more accurate samples are drawn and there is less chance for the sampler to get an improper cross-section of the loads of seed. We would recommend a minimum of three probes at different locations in each truck load, one of which should reach completely through the load. Approximately 2 lbs. of seed should be drawn per ton of cottonseed delivered, and each sample should represent an approximate car-lot quantity not to exceed 35 to 40 tons. Samples representing tonnages of larger quantities are rarely representative and should be avoided if representative analytical results are to be expected. All bulk samples are carefully weighed, cleaned of foreign matter, and reduced to proper size by the sampler, using an approved shaker-cleaner. Foreign matter removed from the bulk sample is collected and weighed, and the weight is reported on the sampler's certificate along with the gross weight of the original sample. The prepared and reduced sample sent to the chemist for analysis should weigh approximately 2 lbs. and should be packaged in a suitable, air-tight container.

LAST FALL I had occasion to visit a number of mills which had reported being unable to obtain the yields of oil indicated by the chemist's analyses on official samples of cottonseed submitted by them. Frankly I was amazed at the carelessness of the sampling at some of the mills visited and felt reasonably sure that a large portion of their reported losses was caused by poor and careless sampling and the preparation of the gross samples which were drawn. It is human nature to try to find "short-cuts" to make the job at hand easier. However it is doubtful that a conscientious sampler who has been properly instructed in, and impressed with, the importance of proper sampling would intentionally try to fool himself and his superiors by taking "short-cuts" and thus get samples which were not representative. I have observed many examples of such "short-cut" or "easy-way" sampling. While many variations of this sort could be listed, I shall give only some of the most prevalent: taking samples entirely from one point in a load; sampling only the upper 15 to 18 in. of a load of cottonseed averaging about 5 to 6 ft. in depth; leaving drawn samples exposed to air or heat; drawing insufficient portions of seed accurately to represent the shipment; cutting the weights of gross samples to even weights by scooping off part of the upper portion of composited samples; "forgetting" to sample some loads received; estimating weight of foreign matter removed by vision and not by actual weighing; not obtaining full cross-section of the loads, thereby missing the lower layers of seed and foreign matter completely; preparing samples to represent more tons of seed than specified in the official sampling procedures; packaging of the reduced samples improperly for sending to chemists; etc. A carelessly drawn and prepared sample of cottonseed, or of any commodity for that matter, is worthless. Actually it is worse than worthless since it is completely misleading. No chemist can be expected to report analytical results that are true and representative of any shipment unless the sample itself is representative of the whole lot it is intended to represent.

Many of the same problems arise in sampling for mill control. Proper correlation of analytical data covering

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