Refining Losses on Edible Vegetable Oils

By Alan Porter Lee

On March 31, 1933, the Bureau of the Census, Department of Commerce, issued a statement showing factory consumption of animal and vegetable fats and oils in the calendar year 1932. In examining the statistics issued by the Bureau of the Census, in which figures are given for losses including "Foots," it is apparent that, unless the statistics are somewhat confused, the factory practice losses in refining on most of our edible oils are considerably higher over all factories than would be justified by proper chemical control. It is assumed that the reason for these high losses is to be found in the operations of those refineries where careful chemical control of the processes is not practiced, as the results obtained by adherence to the methods of the American Oil Chemists' Society are certainly far superior to those indicated by the public statistics.

In arriving at total consumption of each edible vegetable oil, the Bureau of the Census states that a net consumption is calculated by deducting from the total of both crude and refined consumed, the quantity of refined oil produced. Then, under separate headings, the consumption in edible uses is given, the headings being: (1) Compound and Vegetable Shortenings; (2) Oleomargarine; (3) Other Edible Products—which latter class presumably embraces mayonnaise, salad oil and miscellaneous edible products.

In calculating overall percentages of losses, the total of each variety of oil consumed for all edible purposes was added to the amount of loss reported in the statement and this total taken as 100 per cent of the crude raw material. What percentage of this total the loss equalled was then determined and this figure may be considered a fair estimate of the overall loss on that variety of oil as refined for edible purposes during the calendar year 1932. This method of calculating percentage of losses was adopted to avoid inaccuracies due to possible variations in amount of carryover of refined oils at the beginning and the end of the year. The figure adopted for crude consumed, being in each case the sum of the refined oil consumed for edible purposes and the losses incurred on the oil during the year, is not affected by initial or final carryover stocks of either crude or refined oil. No figure for average free fatty acid content on each oil is available but these can be readily estimated by anyone familiar with the various types of edible oils.

The first oil considered is cottonseed oil. According to the figures of the Bureau of the Census, the factory consumption of this oil for edible purposes in the calendar year 1932 was 949,592,000 lbs. The losses on cottonseed oil, including "Foots," are stated at 128,953,000 lbs. The sum of these two figures is 1,078,545,000 lbs., of which amount 128,953,000 (the loss) is equivalent to 11.97 per cent. A figure of practically 12 per cent for losses in refining cottonseed oil for edible purposes seems quite high to anyone familiar with carefully controlled methods of neutralizing, washing, drying, bleaching and filtration.

The figures given by the Bureau of the Census for peanut oil indicate similar results in the handling of this oil in our refineries. The total consumption for edible purposes reported for this oil during 1932 is 7,194,000 lbs. and the reported loss is 1,081,000 lbs. These figures total 8,275,000 lbs., of which the loss of 1,081,000 is equivalent to 13.06 per cent. A loss of 13 per cent on peanut oil may be considered relatively better than a loss of 12 per cent on cottonseed oil but is still quite excessive when considered in the light of carefully controlled operation.

In considering coconut oil, we find that 172,404,000 lbs. of this oil were consumed for all edible purposes and that the losses reported were 22,529,000 lbs., making a total of 194,933,000 lbs. crude basis. Of this figure the reported loss of 22,529,000 lbs. equals 11.56 per cent. On average Manila coconut oil of four to five per cent free fatty acid, such a loss is quite high.

The figures reported on corn oil are so startling as to be almost incredible. Of this oil a total of 30,451,000 lbs. was consumed for all edible purposes and the loss reported was 7,122,000 lbs. This loss represents 18.95 per cent of the sum of refined oil consumed plus loss. Inspection of the amount of corn oil utilized for other purposes than edible, reveals that a total of 4,841,000 lbs. was used for all industrial purposes. It is, therefore, impossible to find an explanation of the high loss figure in the possibility of exceptional losses in processing this oil for industrial uses.

The figure of percentage loss of soybean oil closely approximates that on corn oil. During the year there were 5,072,000 lbs. of soybean oil consumed in edible products, with a reported loss of 1,158,000 lbs. This loss represents 18.58 per cent of the total edible consumption plus loss. The refining of corn oil and soybean oil in this country can hardly be considered a profitable operation, if such losses as these are unavoidable in factory practice.

Palm oil for edible use seems to be the worst offender of all. With, during 1932, a total consumption for edible purposes of 22,803,000 lbs. there was reported by the Bureau of the Census a loss of 8,410,000 lbs. in processing this oil. This loss represents 26.94 per cent of the sum of edible consumption plus loss.

The single oil which appears to have a satisfactory record for the year 1932 in the matter of refining losses is sesame oil. The total consumption of this oil for edible purposes during 1932 was 9,800,000 lbs. and the loss reported by the Bureau of the Census was 689,000 lbs. or 7.99 per cent of the total. There were only 25,000 lbs. of this oil used for any purpose other than edible, so the application of the loss reported as a percentage of the edible consumption may be considered quite accurate.

Losses reported on lard, edible animal stearin and edible tallow were all less than one per cent, as is to be expected, since these oils are refined for edible purposes without the application of a neutralizing process.

It is interesting to note in passing that the loss reported on marine animal oils used for edible purposes is only 2.18 per cent, and that reported on fish oils is 5.99 per cent. This is due undoubtedly to the fact that these oils are processed only by leading manufacturers who utilize competent chemical control in their factory operations.

It appears that the figures quoted herein constitute a challenge to American oil refineries and to their chemists. There is no doubt that the bulk of the oil refined is handled by the methods promulgated by the American Oil Chemists' Society and the factory results are far superior to the averages apparent from these figures. It is to be assumed then that a number of the smaller manufacturers are processing oils with results decidedly worse than those herein indicated, and it is these poor

dietary of certain types of persons is of definite value in improving their physical well-being and efficiency. However, caution must be observed in applying these results to the general public. It should be remembered that cod liver oil is not a panacea, it will not prevent all colds, nor should it be considered as a sure cure for colds and various other troubles. Nevertheless the investigations which have been discussed when coupled with those conducted by numerous other investigators[1-8, 5-9, 15-16, 19-23, 25-27], supply a large volume of data indicating that cod liver oil is of value for reducing the prevalence of colds and similar infections and for improving the physical well-being of certain types of subnormal persons.

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Concerning Packaging Laundry Soap

Editor, Oil and Soap:

Dear Sir:

The article appearing in your November issue entitled "Packaging Laundry Soap" by F. E. Joyce, Omaha, Nebraska, has come to our attention.

Although we do not doubt Mr. Joyce's sincerity, we are at a loss to reconcile his conclusion in connection with liner boards for solid fibre boxes with accepted technical knowledge of the materials concerned. For example, all papers or boards are similarly affected by moisture when manufactured from any of the conventional cellulose products in commercial use today. This embraces kraft as well as jute boards. As a matter of fact, kraft board has a tendency to pick up slightly more moisture than jute boards under conditions of high humidity. As authority for these statements we refer to the U. S. Forest Products Laboratory at Madison, Wisconsin, and enclose a copy of a recent graph prepared at Madison indicating the average changes encountered by all papers with moisture changes, and also a copy of their Project L-128-3 published August 25, 1933, which deals specifically with jute and kraft liner board.

The speed by which papers are affected by changes in humidity depends upon the relative porosity of the sheet and its sizing, although both of these qualities have a relatively small effect in retarding moisture changes.

The statements concerning porosity in the article are, we feel, misleading. So-called "kraft" liners with a thickness of .016 of an inch are generally manufactured with a variation in weight all the way from 42 to 60 pounds per thousand square feet. The heavier sheets are, naturally, more closely formed and are, therefore, less porous than the lighter sheets. As a rule, no commercial jute board is manufactured with a weight less than 60 pounds per thousand square feet, and is therefore all closely formed. The great majority of kraft liners sold are in the lighter weight divisions, and are usually 25 times more porous than commercial jute liner boards when compared upon the Gurley densometer. It is possible that Mr. Joyce's experience may have been confined to high quality closely formed kraft liner boards of substantial weight, in which case the densometer result would be less disadvantageous when compared to a good commercial jute liner, although we do not believe that any kraft boards ordinarily encountered will compare favorably with good commercial jute liner in porosity test.

If Mr. Joyce can arrange to obtain samples of the liner boards involved, we would suggest that they be forwarded to some capable paper testing laboratory for comparison, or to the Forest Products Laboratory at Madison for analysis. We should be glad to cooperate in any way with respect to such tests.

The box consuming industries have been very much confused in recent years due to the wide differences in quality between kraft liners of light or heavy weight. An analysis of comparable values should always be accompanied by a definition of the weight or density of the materials under consideration. In this connection we are attaching a reprint of an article which recently appeared in *Shears Magazine* and which may serve to throw some additional light on the subject.

We should be indebted to you if you would convey this information to Mr. Joyce, and also if you can suggest some suitable means by which an unintentionally misleading impression may be corrected with your readers.

Very truly yours,

CONTAINER CORP. OF AMERICA

E. A. Throckmorton,

Sales Promotion Manager.