potential uses, processing and distribution costs and competitive materials.

From this brief presentation, I hope you have obtained some idea of what we plan to do in the new laboratory. It is our hope that active work will be under way by fall. We wish to cooperate fully with all laboratories and organizations interested in the industrial utilization of the soybean and soybean products and will welcome any constructive suggestions as to how we may best accomplish our objectives. In the name of the laboratory I wish to extend a cordial invitation to each of you to pay us a visit any time you may happen to find yourself in the vicinity of Urbana.

The Destruction of Vitamin A By Rancid Cod Liver Oil*

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A RECENT survey[1] of the chemical condition of cod liver oil being dispensed in the city of Philadelphia revealed the fact that a large number of institutions were dispensing an oil that was decidedly rancid. The development of rancidity in these oils was almost wholly due to ignorance of its perishability on the part of those in charge of handling it. In most institutions no precautions against deterioration were taken and it was the usual thing to find the open container of cod liver oil on a shelf in the drug room, exposed to light and air and the fluctuation of room temperature. In one institution a spigot at the bottom of the 10 gallon bottle necessitated the bubbling of air through the entire supply whenever a sample was withdrawn. It is not surprising, therefore, that many samples of oil collected from these institutions showed high peroxide values.

A similar survey[1] of the chemical condition of cod liver oil in the homes of families using it, disclosed the fact that by the time the "last dose in the bottle" was reached many families had a very rancid oil.

When it was found that many institutions were dispensing rancid cod liver oil, and that many families were permitting their supply to deteriorate, a parallel investigation was undertaken to determine in the laboratory the keeping qualities of several samples of cod liver oil, under conditions designed to simulate various home conditions. It was found that a good grade of cod liver oil, kept in the icebox, would have a low peroxide value at the end of six weeks, but that the same oil, kept on the open shelf in the laboratory, exposed to ordinary daylight and the average fluctuations of room temperature, showed detectable rancidity in a week, and marked rancidity in two weeks, and in addition, oil kept in an incubator, under conditions simulating a warm kitchen or bathroom shelf, became markedly rancid in three or four days.

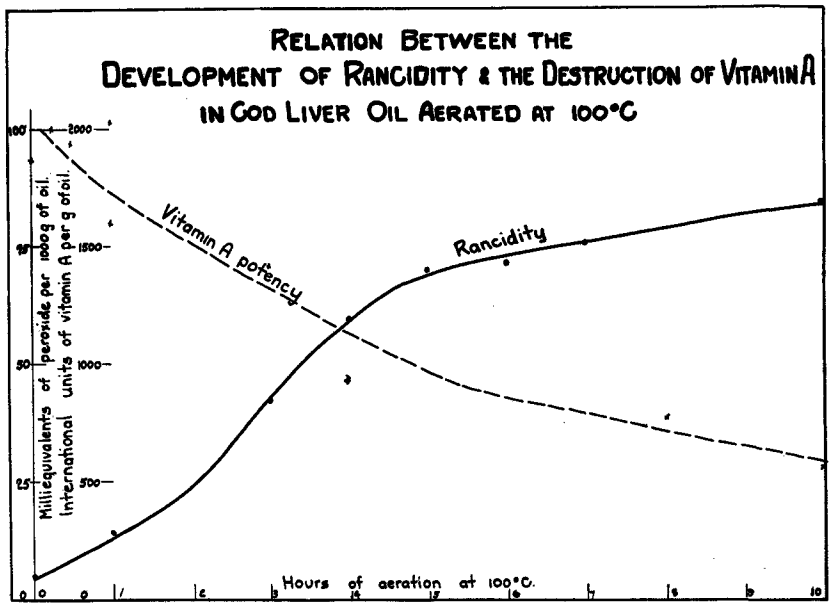

CHART I.

Friderica[2] in 1925 found that rancid oils destroyed their own vitamin A and suggested that it was the presence of the peroxides which inactivated the vitamin. Powick[3] confirmed Friderica's findings and stated further that rancid fat destroyed vitamin A in other dietary ingredients when the fat was mixed with the ration.

Dr. Charles E. Bills determined by the Vitameter the vitamin A content of several series of our cod liver oils. A characteristic curve was obtained, which showed a gradual drop in vitamin A potency as the peroxide value increased when the oil was aerated at 100°C. in the Swift stability test apparatus (Chart 1). In those oils in which rancidity was allowed to develop naturally by exposure to light and air at ordinary temperatures, there was a drop in vitamin A potency as

*A paper presented at the CINCINNATI MEETING of the American Oil Chemists Society.

the oils became rancid, but the shape of the curve was different from that in which the rancidity was accelerated by aeration at 100° C. Time was apparently a factor in the destruction of vitamin A, since the vitamin was destroyed at lower peroxide values when rancidity developed slowly than when the development of rancidity was accelerated (Chart 2).

cod liver oils collected in the surveys showed great variability. It was not possible to correlate vitamin A potency with peroxide value. This was probably due to the fact that rancidity was not uniformly produced in all samples, and in addition, the original vitamin A values of this heterogeneous collection varied widely.

The fact that in the laboratory it

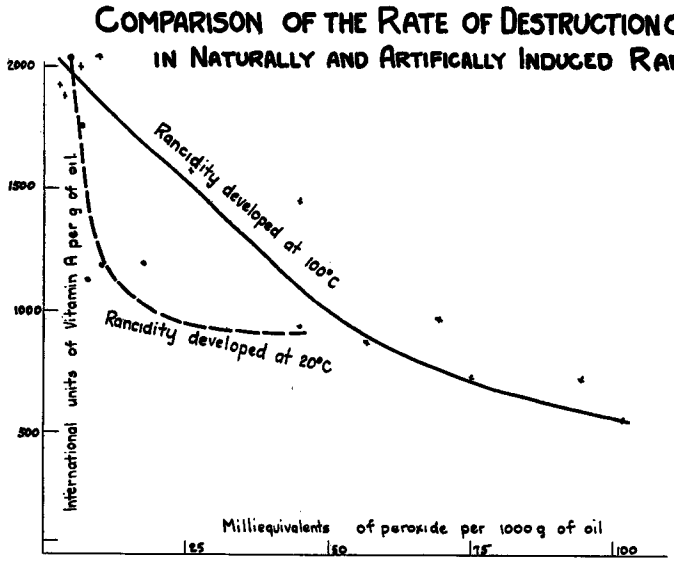

CHART II.

This fact indicated that rancidity produced artificially was not the same as that produced under natural conditions. It may also be noted that so-called "natural conditions" vary widely, and that the rate of destruction of vitamin A may be found to vary with other conditions. It is possible that not only vitamin A but other biological properties of oils are not equally affected by rancidity produced in different ways. The curve of peroxide value may not necessarily be parallel to that of other changes which take place during the development of rancidity.

The vitamin A potencies of the

was possible to keep cod liver oil in good condition, and the further fact that in the survey of homes a number of samples of cod liver oil representing the "last dose in the bottle" were found in as good condition as when the original bottle was opened, was convincing proof that the observance of a few simple precautions could entirely eliminate the difficulty of feeding infants and children a rancid cod liver oil.

Rancid oil is an undesirable food for infants and children for several reasons other than its low vitamin A potency. It has been previously demonstrated in this laboratory (4) (5) that rancid fat caused a serious and fatal disease in dogs when it constituted the sole dietary fat given the animal. The etiology of this "oxidized fat syndrome" has been attributed in part, if not in whole to the destruction of the linoleic and linolenic acids by the oxidative process of rancidity.

In addition to the fact that rancid fats and oils are poor sources of the nutritionally essential fatty acids it is generally believed that rancid fats are gastric irritants. The ingestion of even slightly rancid cod liver oil may well be the cause of the frequent digestive disturbances so often attributed by mothers to cod liver oil. Rancid cod liver oil has a disagreeable taste and odor. At times a child's dislike of this food may be due to the fact that he has been offered a rancid oil.

SUMMARY

1. Vitamin A was destroyed in cod liver oil as rancidity developed.

2. Vitamin A was destroyed at lower peroxide values when rancidity developed at room temperature than when it was accelerated by aeration at 100°C.

3. It is suggested that not only vitamin A, but other biological properties of oils are not equally affected by rancidity produced in different ways and at different rates, and that peroxide value may not necessarily be parallel to that of other changes which take place in an oil as rancidity develops.

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RICE OIL

By H. P. TREVITHICK and R. R. LEWIS
New York Produce Exchange, New York, N. Y.

RICE OIL is an oil obtained from rice meal by expression or extraction. Rangoon rice contains about 15% of oil but other varieties show about 8-9%.

Oil from fresh rice bran is practically neutral, but on standing, the free fatty acid content increases very rapidly, owing to the action of an enzyme, as shown by Browne (J. Soc. Chem. Ind., 1903, 1137). The action of this lapse can be arrested by heating to 100° C. Due to its high acidity, the oil can only be used for soap.

Attempts were made in Louisiana to produce the oil but, probably due to the low prices of all fats, the project disappeared. Recently, however, the industry has been revived abroad and commercial quantities are now available.

The oil has a rather pale greenish yellow color, and upon analysis