Editorial

Research in the Fat and Oil Industry

AT THE beginning of a New Year it is always desirable to look back and review what has been done in order to learn as much as possible from the mistakes, or successes, as a guide in plans for the future. Especially is this true as regards research programs. 1933 was a great experience for many, but hard times or pressure of circumstances, always stimulates research and development work, and 1933 is outstanding in this respect.

A retrospect of the research work of 1933 on fats and oils shows a new development along certain definite lines. The outstanding developments have been in the study of anti-oxidants and methods of making fats and oils more stable, and in studying the role that fats and oils play in the diet. Anti-oxidants have been the subject of study by a large number of research organizations, the effort being directed towards obtaining a suitable anti-oxidant for food purposes, and this work is one of the very greatest importance to the fat and oil industry as the most important problems that faced the industry, is the prevention of rancidity. A little consideration of this problem of rancidity will show that it is the great outstanding problem in all food products carrying fats and oils and also in manufactured oils and fat products.

Anti-oxidants however are not the only method of solution of this problem and a great deal of progress has been made during the past year in the studying of methods of handling refining and manufacturing fats along proper lines, to increase their natural stability. This has brought out the fact that many natural oils and oil bearing seeds contain substances acting as stabilizers, and one new development has been the utilization of these natural substances to bring about a greater stability in some of the commercial fats.

As one looks ahead for the future, it would seem to be that this line of investigation is probably the most important, and undoubtedly we will see in the next year a great many important facts developed.

The manufacturers of food products using shortenings are plainly aware of the necessity of these improvements and are cooperating in making progress along these lines. This study of rancidity and oxidation of fats and oils, is exceedingly timely because of the work that has been done on the subject of the effect of rancidity or oxidation on the food value of the fats and oils themselves. A number of papers and reports have been made on the effect of oxidized fats and oils on the diet, particularly in animal feeding experiments, which only go to emphasize the importance of this type of work. Dr. D. V. Whipple of the School of Medicine, of the University of Pennsylvania, showed in some recent work, that oxidized fats have a very definite and objectionable effect when fed to animals. Her results show that even slightly oxidized fats do not have the same nutritional value as a neutral sweet fat. This study of the effect of oxidized fats on the diet, should be given a great deal more research and requires much further study to determine just how important this question of oxidation is and what can be done to overcome its effects. A number of other papers have indicated that the presence of peroxides in fats caused by oxidation, seriously affect the value of fats in the diet. It would appear to me that the most important work to be carried on is the continuation of these studies of rancidity, its effects and its prevention, and the development of a satisfactory anti-oxidant would be a very outstanding discovery.

Another interesting development during the past year, has been the continuation of the work done by Dr. Burr, on the role of different fatty acids in nutrition, and his report showing the absolute necessity of fat in the diet. Dr. Burr reports in one paper a new deficiency disease produced by the rigid exclusion of fat from the diet, indicating that fats and oils are a much more important factor in nutrition than has been considered in the past. The possibilities of research along the lines of the various types of oils and fats as to their nutritive value, is exceedingly promising, and has beeen greatly neglected.

This consideration of the role of oils containing varying amounts of different types of fatty acids in nutrition, should be of great importance and brings to mind the work done many years ago on Cod Liver Oil and other fish liver oils, which show that these oils contain a series of fatty acids entirely different from any of the known animal or vegetable oils and which act entirely differently under oxidation, and it is hard to conceive that such a great difference in composition of fatty acids as occurs in Cod Liver Oil, should not have a very definite effect on its nutritive value and it would not be far fetched to believe that some of the valuable properties of Cod Liver Oil have connected with the fatty acid composition of the oil rather than being entirely tied up with the vitamin content.

Another factor which it seems to me has not been given proper consideration is the place of fat in animal feeding. Animal feeds, especially cracklings, cottonseed meal and linseed meal, contain considerable quantities of fat and little or no consideration has ever been given to the question of the value of these fats in studies on animal feeding, and it is certainly indicated at the present time that studies of this kind are important and should be made.

From the review of facts that have been developed during the past year, there seems to be no doubt that in the feeding of chickens particularly, fat plays an important role. On the industrial side of fats and oils, comparatively little work has been done on improving the methods of refining and manufacturing, although apparently during this year there has been an important development of a continuous process of oil refining which may fundamentally change the whole picture, but to anyone who has been familiar with the oil and fat refining there seems to be a vast field of work still to be done.

Solvent extraction of fats and oils has made comparatively little progress in this country, whereas abroad it has been a very definite factor in the production of fats and oils, particularly in the matter of Soya Bean Oil, where enormous quantities of oil has been produced from this product by means of extraction methods, and as the Soya Bean Industry is developing in this country to such an extent, it would certainly seem that further developments of solvent extraction are indicated as a method of producing a very high quality of oil and a better quality of meal.

Possibly the reason that solvent extraction of oils has not made more progress in this country is due to the fact that Cottonseed which is the biggest source of oil does not lend itself particularly to solvent extraction, but with the production of other types of oils it would seem that the development of extraction methods should be given some consideration.

Looking back over the general situation it would seem that 1933 had shown some very marked developments in fat and oil research, especially from the standpoint of improvements in qualities of oils, and particularly towards the improvement of their stability, and the hope that 1934 will see much further developments along these lines.

Some Results That Have Been Obtained by Supplementing the Dietary With Cod Liver Oil

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ACCORDING to Guy[10], liver oils have been used in medicine for something over 1,800 years. Until very recently the information concerning the efficacy of liver oils for treating various human diseases, such as chronic rheumatism, scrofula, and rickets, was based largely on empirical observations. Since the discovery of vitamins it has been very definitely shown that cod liver oil is an exceedingly rich source of Vitamin A and Vitamin D. In other words cod liver oil has an energy value equal to that of the common edible fats and oils and in addition has a vitamin content not possessed by the generally used edible fats and oils. As a consequence of this observation numerous investigations have been conducted to obtain data concerning the source of the vitamins contained in cod liver oil and the influence of various manufacturing procedures, storage conditions, etc., on their permanency in cod liver oil. Obviously a question soon arose as to the practical results which could be expected from the administration of vitamin rich cod liver oil as a supplement to diets which were more or less inadequate with respect to the fat-soluble vitamins present in cod liver oil. The investigations which will be discussed below were undertaken to collect data concerning the influence of cod liver oil on reproduction, concerning its value as a dietary supplement for underpar children of school age and concerning its value for reducing certain types of absenteeism amongst industrial employes.

The study[11] of the possible influence of cod liver oil on reproduction was conducted with young mature Rhode Island Red pullets. Five pens of seventy-five eight-months-old birds were housed and fed under comparable conditions for a period of eight months. The birds of Pen 1 received no cod liver oil and thus served as controls. The birds of Pens 2, 3, 4 and 5, received, daily, ¼ cc, ½cc, 1 cc and 2 cc respectively, of vitamin rich cod liver oil. During the experimental period data was collected concerning the mortality and the body weight of the experimental birds, the egg production, the number of eggs containing blood spots, the weight of eggs, the fertility and hatchability of the eggs, and the vitability of chicks obtained from the eggs. A summary of the results obtained is presented in Table 1.

On referring to Table 1 it will be noted that the mortality of the experimental birds varied considerably with the different pens. The maximum mortality, twelve birds, was for Pen 2. Excepting Pen 2 the mortality of nine for the controls exceeded that of any of the pens which were fed cod liver oil. The body weight per bird at the end of the eight months test is of interest. Ordinarily birds producing a large number of eggs for a long period of time show a greater loss of body weight than similar birds with a low egg production. In this instance however the body weight of the birds which produced the most eggs, i. e., those which received cod liver oil, was essentially the same as that of the control birds. In fact the birds that received cod liver oil were very slightly heavier than the controls at the end of the experimental period. No significant conclusions can be drawn from the data obtained relative to the number of birds which were broody during the experimental period.

The egg production was least, 38.3%, for the controls and highest, 56.6%, for the birds receiving the most oil. It perhaps may be noted here that the returns for eggs produced by Pen 5 was $125.00 greater than for the eggs produced by Pen 1. The number of eggs containing blood spots (probably resulting from hemorrhages in the reproductive organs) was greatest, 4.4%, for the controls and least, 2.0%, for the Pens 4 and 5. Since eggs containing blood spots are not salable the loss on account of blood spots was more than twice as large for the controls as for the birds receiving the larger amounts of cod liver oil. It is not felt that the weight

TABLE 1
Results of Feeding Cod Liver Oil to Laying Pullets

	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5
Pullet Record:					
Mortality	9	12	5	3	2
Body weight at end of experiment, lbs.	6.2	6.3	6.2	6.4	6.5
Number of broody birds	105	84	77	105	78
Egg Record:					
Production, per cent	38.3	47.0	51.2	49.2	56.6
Blood spots, per cent	4.4	3.2	2.6	2.0	2.0
Weight of eggs, gms	57.1	58.6	57.9	58.8	58.0
Fertility, per cent	94.6	94.1	95.1	95.3	96.2
Hatchability, per cent	53.9	63.6	63.3	68.8	72.1
Chick Record:					
Viability of chicks, per cent	42.0	77.0	92.0	85.0	91.0