and obsolescence—of a distillation and cracking plant, taking into account the saleability of the by-products in the latter case, and the associated chemical industries using hydrogen (*e.g.*, ammonia, as fertilizer) and carbon dioxide in the former.

Such a plant would have political advantages, and also might be adapted to the oils from low-temperature carbonization plants, should a number of such be successfully developed.

Comment on production of oil from coal by low-temperature carbonization will be included in a general report on the technical aspects of fuel utilization in New Zealand, which at present is in course of preparation by a competent local committee and will be published shortly.

WHEAT RESEARCH INSTITUTE.

The Wheat Research Institute's year was one of steady progress in the breeding and selection, milling, baking, chemical, and economic investigations upon which its staff is engaged. One cross-bred variety of wheat, the progeny of Tuscan, New Zealand's best-yielding crop, and White Fife, one of the highest-quality Canadian varieties, gives promise of being able to surpass in climatic adaptation, yield, milling extraction, and baking-quality the best varieties now grown in the Dominion. Based upon the breeding and selection work is a thorough system of seed-certification, which has gone far towards assisting the production of better yields, and done much to simplify the problems of the miller and the baker. Each year an increasing area is being sown in certified seed of known variety, free from fungous pests and weeds, and is exerting a profound influence on the whole industry.

Very large numbers of milling tests were completed during the year, and, from these, millers were advised of the best procedure to adopt to provide flour of as even and high a grade as possible. Baking and chemical tests of all samples milled were also conducted, so that a great deal of valuable information has been secured regarding the effects of soil, climatic, harvesting, and storage factors on wheat-quality; and this, being made available to growers, millers, and bakers, has enabled measures to be taken by each with some degree of certainty as to the results to be expected, as against the random trials which previously were necessary.

Many problems of special interest to bakers have been investigated, particularly satisfactory results being secured relative to the use of milk in bread-manufacture. The work carried out has indicated that small alterations in the manufacture of dried milk have yielded a product of much greater use for improving the nutritive value of the loaf. As a result of investigations by the chemist, it has become possible to provide a wholemeal bread free from the drawbacks which previously were associated with this class of loaf, and in consequence its use has greatly extended.

In order that the savings in cost arising from the adoption of the header harvester might not be nullified through loss in quality, the Institute has provided an advisory service at harvest-time so that the grain dealt with by these machines was treated and seasoned in a manner best suited to maintain the highest quality, and in consequence it has been noted that harvesting wheat by this method has not resulted in any sacrifice in regard to quality.

It is worthy of attention that the scientific guidance which the Wheat Research Institute is rendering to these important industries is gradually producing results which are inspiring confidence in all three, and leading them each to secure their own future welfare by the adoption of improved methods established on a scientific basis.

PROBLEMS OF MEAT FREEZING, STORAGE, AND TRANSPORT.

During the year the extended survey of meat freezing, transport, and storage, carried out in conjunction with the Department of Scientific and Industrial Research in Great Britain and the New Zealand Meat-producers Board, was completed, and the results circulated to all concerned. An account of the work is in process of publication, and reveals avenues along which savings can be effected and by which an improved product can be placed in Smithfield. A quickened realization that improvements can be made is desirable; also application of the results obtained. In my opinion, freezing-works would do well to encourage their engineers to take an active part in this work and to display initiative, and give responsibility to progressive engineers and managers. The technical care taken in treatment of carcasses on the cooling-floor, and during freezing, storage, and transport, in certain foreign meat-works, is in marked contrast to practices in some works in New Zealand.

Mr. C. R. Barnicoat, who took part in the observations of the shipments of lamb in connection with the main survey, was retained at the Low Temperature Research Station to work for a year on the changes that take place in the fat of pork, mutton, &c., due to storage. An article has been prepared by him on "The Influence of Atmospheric Oxidation on the Palatability of Fats." In the case of mutton, the exposure of carcasses to ordinary temperatures for short periods during storage (*i.e.*, sweating) has a deleterious effect on the fat. In the case of pork, particularly for ultimate use as bacon, the effects are much more serious. It is realized that if we are to increase our exports of pig-products an increasing proportion ultimately will need to be used as bacon. Two possible methods of accomplishing this have been suggested. First, the frozen carcasses can be transported to Great Britain and made into bacon in factories there. Laboratory experiments have shown that very good bacon can be made from suitable frozen carcasses, and that inferiority usually can be traced to the frozen pork having been stored under bad conditions or for too long a time. Bacon equal in quality to Danish, or even better, can be made in Great Britain from frozen carcasses exported from New Zealand. Carcasses, of course, must be of the right conformation and properly finished, and the fat must be hard: soft, oily fats tend to become rancid during storage. It is far more important that the fat should be hard if the carcasses have to be frozen and used for the subsequent manufacture of bacon, than if they are to be consumed at once as pork or made into bacon for local consumption. Unless the fat is hard, rancidity tends to develop during storage and transport of the frozen carcass, although it may not