

to the opening of the slaughtering season, and conducted a series of surveys of the conditions prevailing in the meat-freezing works and during transport to the ship. Selected lines of sheep and lambs of known pedigree, history, and in some cases fed on a known diet, were slaughtered and rolled closely in regard to temperature, weight-changes, moisture-losses, &c., from the works onwards. Consignments of these selected sheep were maintained under continuous observation on the voyage to Great Britain, where the scientific examinations will be again resumed, and a report will be issued outlining the results and such amendments as may be suggested for the elimination of defects such as loss of bloom and weight, which are reported to occur in shipments of our mutton and lamb.

#### PORK AND BACON INVESTIGATIONS.

During the year a number of investigations on the effect of fluctuation in temperatures upon the keeping-quality of pork, and its subsequent influence upon bacon produced in this country, were conducted at a cool store in Wellington. The general result of these investigations indicate that fluctuations in temperature caused marked deterioration in the quality of the bacon produced, and where the variations have been extreme it was found impossible to make bacon from the pork which had deteriorated to such an extent in cool storage.

#### CHEESE.

During the year investigations were inaugurated into the behaviour of cheese from the factory stage until its arrival on the London market. The Dairy Research Institute and the New Zealand Dairy-produce Board have co-operated in the provision of cheeses made under normal factory practice and under specified conditions. These cheeses have been maintained under known and measured conditions of temperature during storage and transport, and on arrival in London were again examined by the British Dairy Research Institute at Reading and by the Cambridge Low-temperature Research Station.

#### FRUIT.

A series of experiments dealing with the behaviour of fruit in the holds of vessels while being transported overseas was completed in the previous season, and no further experimental consignments were despatched during this season. The complete report of the experiments is now being prepared, and will be shortly issued in London. Meantime the land store work of the Cawthron Institute has been continued, investigations dealing with the influence of soil, climate, storage, &c., on the six main export varieties being detailed below:—

The special feature of the year's work has been the study of maturity at picking-time and the temperature of storage in relation to the carriage of export fruit from New Zealand to England. The experiments have been designed to indicate the ideal treatment required by the more important varieties so as to ensure satisfactory condition on and after arrival of the fruit on the Home market. Conditions ruling in ordinary commercial practice have been simulated as far as possible in the experiments, so that the results of the work may have direct practical application. The varieties dealt with are Cox's Orange, Dunn's Favourite, Jonathan, Delicious, Statesman, and Sturmer, the principal varieties exported from New Zealand. Fruit was taken at two stages of maturity and stored at each of three temperatures 32° F., 35° F., and 38° F. After two month's storage, part of the fruit was examined immediately, and part was left at ordinary temperatures and examined at the end of three weeks. Records were kept of the incidence of physiological and fungal diseases, and notes were made on the general appearance and quality of the fruit.

The association of internal breakdown with low temperature has been found to hold good for all varieties, but marked differences in resistance to the disease are shown by the individual varieties. Cox's Orange has been shown to be a particularly sensitive variety, Jonathan is fairly susceptible, Sturmer and Dunn's Favourite show a moderate degree of resistance, Statesman is still less markedly affected, while Delicious is practically unaffected by the disease. Storage temperatures have been suggested which will reduce the possibility of internal breakdown development to a minimum, having regard to the other factors which influence the condition of the fruit, and where a variety is tolerant of a range of temperature this has been indicated.

Cox's Orange is the only one of the six varieties that has shown any extensive development of bitter-pit. This disease is confined almost entirely to fruit of the early picking, and has been found more prevalent at high storage temperature. Low temperatures in store arrest the progress of the disease, but do not prevent its subsequent development when the fruit is taken out of store and kept at normal temperatures. In consideration of the risk of internal breakdown, low storage temperature is not recommended as a means of control of bitter-pit; avoidance of early picking is suggested as the best method at present available.

Deep scald, a disease occurring chiefly in the Jonathan, has been shown to be associated with excessively low storage temperature. A temperature of 35° F. appears to be the lower limit beyond which a more or less extensive occurrence of scald may be expected. At 38° F., complete control of the disease was secured. Early-picked fruit is more susceptible than late-picked, and following a two-months' storage-period there is found a marked advance in the progress of the disease on removal of the fruit to outside temperatures.

Jonathan-spot is shown to occur only in late-picked fruit, and its development is favoured by storage at high temperature.

Where orchard operations have been carefully carried out, very little fungal trouble should be experienced in the overseas transport of any of the varieties under experiment. Practically the only serious losses due to rots occurred where the fruit was already damaged in some way or other by unsuitable storage conditions. Apples showing breakdown or deep-scald were found to be particularly