

of the disease. It was suggested that the provisions of mature feed for grazing during the early weeks of the autumn flush could be ensured by shutting up paddocks during December. This advice has been followed by very few farmers, allegedly because it is not possible to carry out this practice in the type of dry season which appears to predispose to an outbreak of facial eczema. The practicability of the scheme, however, has been demonstrated at both Ruakura and the out-station at Karamu, at both of which stations it has been found possible to provide mature pasture for autumn feeding by shutting up in December. At Karamu a quarter of an area carrying more than six ewes to the acre was closed and the sheep were carried on the remaining three-quarters without suffering any harm. The effectiveness of this scheme in preventing facial eczema has yet to be demonstrated, but if this can be done it is considered that the proposals will prove both economic and practical.

"The field survey has been continued by one veterinarian and one agricultural instructor.

"(3) Meteorological stations have been instituted at the Karamu out-station and at twelve other farms which were badly affected during the last outbreak, and the station at Ruakura has been supplemented. Records are now being kept at one or other of these stations for rainfall, shade temperature, grass-minimum temperature, soil temperature, humidity, wind, and sunshine. These estimations are being supervised and recorded by Mr. Walker, who has been seconded to Ruakura by the Department of Scientific and Industrial Research.

"(4) Forty affected ewes were selected at Ruakura, and monthly examinations have been made of these for weight, hæmoglobin, bilirubin, and these are being continued with a view to discovering the after effects of the disease.

"(5) A comprehensive series of experiments have been set up at Ruakura and the Karamu out-station, designed:—

"(a) To produce the disease so as to lengthen the period during which the investigation can be conducted; and

"(b) To study means of preventing the disease.

"The methods used have included pasture control by varying intensity of stocking, rotational grazing, spelling, and irrigation; the effect of pasture species, forage crops, and supplementary feeding. All experimental ewes were brought from non-facial-eczema districts. They and their lambs have been weighed and the ewes tested for hæmoglobin and blood bilirubin at monthly intervals which are now being shortened to weekly intervals.

"(6) An extensive chemical investigation by the staff of the Chief Agricultural Chemist and the chemists of the Department of Scientific and Industrial Research based largely on the above experiments has been initiated in which variation in the following is checked at regular intervals: Soil moisture and nitrogen, pasture protein and non-protein nitrogen, sugars, cellulose, lignin, chlorophyll, carotene, and minerals. Concurrently, an estimation of pasture species has been made by agrostologists of the Department of Scientific and Industrial Research.

"(7) A small series of experiments was initiated at Massey Agricultural College when it seemed likely that conditions there would be more favourable than those in the Waikato. These duplicated some of the more important experiments conducted at Ruakura.

"(8) The possibility of using a glasshouse for simulating the conditions present during a facial eczema outbreak is being investigated by the Plant Research Bureau of the Department of Scientific and Industrial Research.

"(9) A series of small outbreaks at Gisborne during April of this year have been investigated.

"(10) Material from affected animals has been examined histologically and chemically at Wallaceville.

"(11) Livers collected at various abattoirs have been examined histologically at Wallaceville with a view to determining whether the liver-changes precede the outward manifestation.

"(12) Extracts of pasture collected from paddocks in which the disease has occurred and extracts of ingesta from affected animals are being prepared for feeding to sheep and laboratory animals at Wallaceville.

"(13) Injections into laboratory animals are being made with blood from affected animals to test for photosensitizing substances.

"(14) A series of experiments have been commenced at Wallaceville with laboratory animals and with sheep to study the phenomena of photosensitization and its connection with liver-function."

Advantage has been taken of small outbreaks of the disease in March, 1939, in the Gisborne and Wairoa districts to carry out further experimental work and to obtain pasture from known infective paddocks. Much material has also been taken from affected animals.

Shortly after rain in February livers showing an increase in bile-capillary tissues were observed in Kaiti Meat Works from many farms in the Gisborne District. Photosensitivity—i.e., skin-lesions—were not at that time connected with the liver-lesions. There is now strong evidence to favour the supposition that there are two toxic principles bringing about the composite condition known as facial eczema, the one an icterogenic, liver-damaging factor, and the other a photosensitive agent which may or may not require prior liver damage.