

Considerable material is in hand for further work, both analytical and pharmacological, and this aspect is reported upon by Dr. I. J. Cunningham as follows:—

“The aspects of facial eczema investigated by the nutrition section are three:—

- “(1) The routine examination of bloods from bilirubin and the performance of liver-function tests to establish differential diagnosis of facial eczema and photosensitization.

“A very large number of samples have been examined at a few outbreaks in the field, at Gisborne, at Ruakura, and at Palmerston North, the last two in connection with attempted experimental production of facial eczema.

- “(2) The examination of blood-samples for the presence of photosensitizing agents. The detection of phylloerythrin in quantities as small as 0.01 mgm. has been satisfactorily carried out. Only five of a total of fifty bloods examined have proved positive for phylloerythrin. Further search is to be made into various tissues of affected animals.

“A scheme of work is being elaborated to cover the investigation of the porphyrin metabolism of the sheep. At the present time the faecal excretion of phylloerythrin is being determined and correlated with the chlorophyll intake.

- “(3) Examination of extracts from pasture on areas on which facial eczema is occurring is being conducted. The extracts are made by the Chemistry Section and tests are conducted at Wallaceville. So far no results are available as material is only now coming in.

“The use of small animals for work on photosensitization, using artificial light sources, is also being examined along with the susceptibility of the same small animals to liver toxins.”

One experiment with icterogenin kindly supplied by Dr. Rimington of the Medical Research Laboratory, London, has shown a liver-damage in a rabbit similar to that seen in sheep with facial eczema.

*Vitamins.*—Vitamin D determinations have been made in a few samples of New Zealand fish-liver oils, and also some samples were examined for Professor Davies, of Melbourne.

Mutton-bird oil shown to be low in vitamin A by Professor Davies has also been shown to be low in vitamin D by Dr. Marion M. Cunningham.

*Cobalt.*—A series of experiments designed to discover the minimum quantity of cobalt top-dressing and the intervals at which this should be applied to protect sheep on bush-sick country were initiated at Mamaku in June, 1938. Top-dressings of from 2½ oz. to 2½ lb. of cobalt sulphate per acre were applied in the autumn; an additional 5 oz. cobalt sulphate was given to one paddock in the spring, another paddock received 5 cwt. lime in the autumn to test the effect of this in depressing cobalt uptake by the pasture. One group of sheep have access to a cobalt lick in a paddock which has received no cobalt top-dressing in order to determine how far this procedure is practicable in districts where top-dressing is not practised. To measure the effects of the various treatments they are being compared with those produced by regular drenching of cobalt and by grazing on a paddock not top-dressed with cobalt in which no cobalt supplement is fed. The pastures in the various paddocks are sampled monthly and analysed for cobalt. To date there has been no evidence of bush sickness in any of the ewes, nor have any of the various treatments produced any noticeable effect on them. A proportion of the lambs in the control paddock are now showing signs of bush sickness.

Experiments are being continued with all of the lambs and some of the ewes during this year. An opportunity will be taken to study the hæmatology and pathology of the disease, as well as to investigate the possibility of using the cobalt content of the liver as a diagnostic measure. Experiments are being initiated to study the fundamental action of cobalt by comparing the therapeutic efficacy of liver from healthy and affected animals.

*Entero-toxaemia.*—Mr. M. Buddle reports that, in conjunction with the routine examination of small intestinal contents from suspected cases of entero-toxaemia in the field, the majority of toxic filtrates of the ileal contents have been typed by serum-neutralization tests to determine whether other strains of *Clostridium welchii*, in addition to type D, are operative in ovine mortalities in New Zealand. The bacterial flora of the ileum has been determined in the greater percentage of laboratory-confirmed cases of entero-toxaemia, and the welch-like organisms have been isolated and typed by serum neutralization tests. The m.l.d. has been determined on the majority of the isolated *C. welchii* type D cultures and those of high toxicity have been retained for use in the preparation of special vaccines (products artificially reinforced by ammonium sulphate and *Potassium alum* precipitations) for immunity trials. In view of the promising results following a vaccination trial with a reinforced vaccine in Tasmania conducted by the Council for Scientific and Industrial Research it is proposed to determine the effective immunity transmitted to the offspring of ewes which have been vaccinated prenatally with a product of this type prepared from local strains.

Work on the typing of strains of *C. welchii* isolated from cases of entero-toxaemia in both the North and South Islands has only incriminated type D as the pathogen, and to date *C. welchii* types B and C have not been recovered from cases of ovine entero-toxaemia in New Zealand.

With the publication of Roberts' work on the mechanism of entero-toxaemia, a deficiency in our knowledge of the behaviour of *C. welchii* in the alimentary tract and the conditions initiating its proliferation has at last been adjusted. Roberts suggests that the mechanism operative in young