the first appearances were some 2 weeks or more earlier, and because the country was much drier than in 1956, the typical browning of green herbage was not nearly so noticeable. The uneaten herbage did change colour, however, and the damage to plants was much more severe, a big proportion being killed.

Nature of the Damage

The autumn and early winter of 1956 were very favourable to pasture growth, and though the caterpillars cleaned up a considerable amount of cattle feed, they also cleaned out and opened up big areas of accumulated roughage on many of the unimproved hills. In some districts, notably Wairoa, the loss of cattle feed called for an adjustment of winter stocking, but generally pastures recovered well and no great harm was done.

The position was very different, however, after the much more extensive infestations in such districts as Hawke's Bay and the Wairarapa in the autumn of 1957. The caterpillars then became active after a prolonged dry spell which had already badly dried the pastures. Their activities, though starting earlier, persisted well into June, by which time the debilitated sward was unable to recover because of cold, wet conditions. Then in late spring, when such areas normally make good growth, drying winds took their toll, and the summer and autumn of 1957-58 were the driest in these coastal areas for many years. The effect of the drought on the feed position in the autumn and winter of 1958 on east coast hill country was bad enough, but on the big areas already depleted by the ravages of the caterpillar the result was really serious.

On the majority of hill country farms from the Wairarapa to Poverty Bay reductions in livestock carried were necessary, particularly of cattle, because of the exceptionally low rainfall and prolonged droughty conditions, but where the caterpillar had also affected pastures the reductions had to be much heavier than would have been necessary otherwise.

In many areas a further problem arose in that the opening up of the sward resulted in heavy infestation of large blocks of hill country by thistles of various sorts, flat weeds, and other weeds.

Remedies

There are at least two remedial measures to combat the caterpillars when pastures are attacked. They can be stopped in their tracks as it were by spraying with several of the new insecticides including DDT and dieldrin and either killed off completely or prevented from moving on to fresh areas. On areas fed over by the caterpillars the sward is opened up with much bare soil and these conditions are very suitable for successful oversowing, especially with clovers.

Several important features of the two large-scale outbreaks on east coast hill country either prevented successful use of either of these remedies or where they were used made the results generally uneconomic. In the 1956 outbreaks most of the damage had been done before farmers realised what had happened. However, quite a number were successful in stopping further movement on to fresh areas by aerial spraying round the perimeter of the advancing caterpillars. A band of some 50 to 60 ft. was sprayed with one pass of the aeroplane or helicopter. About half the band was applied on the advancing caterpillars and the rest to the pasture ahead. One of the main considerations in such cases was the fear that the caterpillars would move on to and clean out improved pastures in the valleys and lowlands adjoining the hills. As already stated, they did not do so even where no spraying was done.

Oversowing of Affected Areas

Only a few farmers took advantage of the conditions left by the caterpillars by oversowing with clovers and topdressing affected areas. Most hill country men considered it too late to oversow because it was well into June before the caterpillars stopped feeding. However, because of the favourable winter and spring those who did oversow were generally successful in getting a strike and satisfactory establishment.

The 1957 outbreaks were generally a little earlier and much more spraying was done, but here again by the time it was decided to act the caterpillars had already advanced over big areas of country and the cost of spraying was very high relative to results in saving feed.

Some quite successful oversowing was also done in some districts, but the extremely adverse conditions of the following spring, summer, and autumn killed off most of the young clover plants.

The fact that most of the country affected had never been topdressed before made the establishment of oversown clovers still more difficult so late in the season. The successful establishment of oversown clovers by one or two farmers who risked oversowing and topdressing infested areas in mid April when the caterpillars started to show up, and some 6 to 7 weeks or more before their active feeding stopped, indicated that this could be done safely, and so give the clovers much better conditions for establishment. The difficulty, of course, was in deciding what area to oversow, since no one knew just how far the caterpillars would go unless they were stopped by spraying with insecticide.

Effectiveness of Spraying

Though the spraying was effective, it was difficult to decide on the value of tackling such widespread and massive invasions of pastures. There is no doubt that the sprays used and the method of application were effective in stopping the further spread of the caterpillars, but the spraying was far too late, and the cost, relative to the type of feed saved on unimproved hill country, unduly high. But here again it was not known that the caterpillars would not move on to and clean up more valuable pastures adjoining the hills.

Effective sprays applied by helicopter or aeroplane per acre were: 1½ pints of 15 per cent dieldrin in 5 to 10 gallons of water, more water being used according to the rankness of growth; 2 pints of 20 per cent DDT in similar quantities of water.

The dieldrin was much quicker in action than the DDT, but the latter was quite effective. When the caterpillars were inactive for some days the insecticides took longer to act.

Possibilities of Early Spraying

The fact that the main hatchings of eggs, which gave rise to the immense populations of voracious caterpillars on the move in search of fresh feed, took place in relatively small patches of over-rank grass high in the hills some 2 or 3 weeks before the movement began suggests that had any of these infestations been noted and the danger appreciated at this early stage spraying of such areas would have been much less costly and far more effective in preventing damage. It would have been possible, also, had the early incidence of abnormal numbers of the small caterpillar been reported, to have given farmers in districts with similar climatic and farming conditions a warning to investigate the hills on their properties.

This should certainly be the procedure when infestations start in valuable crops such as barley, wheat, oats, and maize, where early action by spraying can save thousands of pounds.

It is quite possible, however, that by the time another visitation of the type and magnitude of those of 1956 and 1957 occurs again on the hill country of the east coast the lessons learnt on how best to combat this pest and remedy its damage will have been forgotten.