

loss from parasitic worms—it is surprising to find how many of the age-old procedures of penning sheep, feeding them, and moving them have their origin in the control of parasitic worms. This reason is, of course, generally unknown to the farmer, who has developed the methods through a long and costly period of trial and error.

The oft-repeated adage that "sheep should never hear the church bells ring twice in the same field" doubtless refers to the period of six or seven days required for the development of the infective larvae on the grass. The closed system of folding sheep over arable land with the movement of the pens every three days, and the farmers' belief that sheep which are being folded should never be allowed to "run back" on to land grazed some days previously, refer to the same factor. The removal of young sheep from rich, crowded pasture on to clean land at the end of the summer refers to the accumulation of worm-infection on those pastures, as also does the restriction of the number of sheep to the acre, which is so forward a question in every farmer's mind, and sets a very definite limit to the profit that can be made out of an acre of sheep land.

Number of Sheep Carried

It is no exaggeration to say that every good farmer knows almost to a sheep how many his land will carry, and that if he exceeds that number in a normal year they will cease to thrive and may even become diseased and die. It seems quite clear that the evil effects of overstocking and the parasitic disease that is brought on through keeping too many sheep is representative of some flaw in the adjustment of the parasites to the grazing animals, which may be described in popular terms as an upset of the "balance of Nature."

Fortunately for the farmer, the powerful resistance to the development of parasites which the grazing animals ultimately acquire (provided that they do not die in the process) gives this balance a considerable amount of elasticity, without which it would be impossible to crowd sheep together, even with the limited success we now attain. The farmer, however, stretches the elasticity of this ecological (health limit) balance to the very limit in order to make a profit out of his land, and trouble frequently results.

Lowering of Resistance

The number of sheep per acre is only one of the variable factors in the

its nutritive qualities that often occur towards the end of the summer. What may justly be regarded as reasonable stocking during an ordinary year may constitute overcrowding during a drought. Indeed, the variable factors are very numerous, and there are many small alterations, unknown to the farmer's rule of thumb, which favour an increase of the parasites beyond the broad limits of the natural balance, and disease results.

Loss from Parasites

The loss to the country from these parasites is very great indeed, both from outbreaks of obvious disease and

from bad thriving. Figures are difficult to obtain, but I am aware of one farmer who lost between £4000 and £5000 as a result of parasitic gastritis during the course of five years' arable sheep farming, and of 43 sheep farmers in Kent who, on inquiry, were clearly shown to have lost more than £10,000 between them during an epidemic of the disease in the drought of 1933-34.

So long as the farmer stocks his land to the

maximum and remains ignorant of the factors which influence the increase of parasitic worms, these losses will continue. Eradication of the parasites is quite out of the question at the present time, so that we must do what we can to control their increase.

Recent observations on the factors which lead to this end are distinctly helpful, but the struggle to keep the numbers of parasites down is likely to be a long one, and the danger of worm disease will dog the progress of greater stock production through grassland improvement until practical methods of eradicating the parasites have ultimately been found.

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ecological unit of parasite, pasture, and grazing animal. With one or two rare exceptions, a variation in the virulence of the parasitic worms (apart from differences which are peculiar to the various species) is not known to occur, but a lowering of the resistance of the grazing animal as may be brought about through deficient food, or resulting from the increased susceptibility of a group of animals containing too many immature individuals, are common causes of increased worm-burden.

This same result can just as easily be brought about by the derangement of a wise rotation of grazing, or the shortage of pasture and the poverty of