Living with parasites: tolerance to nematodes in sheep

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Productivity loss cause by gastrointestinal nematode (GIN) infection is a major problem in the livestock industry. Management of these infections has relied on the application of anthelmintic drugs, but the evolution of anthelmintic resistance means this is unsustainable and alternative means of controlling GIN, including through genetic selection are needed.

Broadly, there are two ways individuals cope with infections: resistance and tolerance. Resistance reduces parasite burden through an immune response directly targeting the parasite, while tolerance is the maintenance of productivity despite increasing parasite burden. Breeding for resistance to GIN, by selecting animals with low faecal egg count (FEC) is common, but selection for tolerance has not been widely implemented. A potential drawback of selecting for resistance is a trade-off with productivity, but such concerns do not apply to tolerance. Breeding for tolerance could therefore be a useful tool in mitigating the impact of GIN, but we need to first establish that variation in tolerance exists.

We monitored 200 Romney ram lambs from 16 different sires, some from lines bred for resilience to GIN and others from unselected lines. Following weaning, FEC and body weight were measured fortnightly for 4 months. Using random regression models, we estimated tolerance as the slope of weight on FEC and quantified between-individual and between-sire variation. The overall relationship between weight and FEC was negative, but the slope of this relationship varied by individual and sire. Our models suggested that the least tolerant individual experienced a check in their growth 10 times greater than that of the most tolerance. Further, individuals bred for resilient lines were treated less often, required treatments later in the season and were heavier than those from unselected lines. These differences indicate the potential for selective breeding for tolerance to nematodes in sheep, limiting anthelmintic use.