Parasite management in grazing livestock is on a knife-edge: on the one hand, anthelmintic resistance and fears over environmental residues dictate reduced reliance on chemical control; on the other, production efficiency and good welfare and the economic, environmental and social sustainability they support risk being undermined by inadequate control. Additionally, infection dynamics are changing with the weather, driving unfamiliar epidemiological patterns and opening up new parasitic threats. More precise and evidence-based targeting of parasites offers a way to address many of these problems together and confer much-needed capacity for climate change adaptation in the sector. Increasing availability of tools for diagnostic and performance monitoring could support rapid improvement in evidence-based and sustainable parasite control, but the supply and role of expert advisors to help farmers navigate a more complex future world of parasite management could limit progress. Climate-driven models of parasite transmission potential and infection hazard can help by identifying elevated risk and focusing interventions effectively, to make better strategic and operational decisions.