Future land evaluation for farm system design

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Land evaluation has a long history of describing and quantifying the productive capacity of land, but there is a global recognition of the need for this discipline to evolve and recognise other services provided by landscapes, beyond food production, as well impacts on receiving environments.
Here a natural capital and ecosystem services framework, developed to capture the capability of landscapes for a range of services, was paired with new generation farm system analytical capability. This new farm system model INFORM (Integrated Farm Optimisation and Resource Allocation Model) has the ability to optimise the use of the farm natural resources and infrastructure by maximising profit within ecological boundaries. The user can explore the implications of considering a range of services and operational boundaries on farm system design and performance for multiple outcomes.
Farms are an assemblage of multiple landscapes including a mix of topographies and soil types that respond differently to inputs and management practices. The framework of INFORM makes it possible to take into account the variability in the contribution of each management units to the business before optimising the use of pastures and livestock for maximising profit.
Using a hill country sheep and beef farm, we explored the impacts on the farm system, profit per hectare and environmental footprints, of land use change (retirement, soil conservation) and limits on N loading. This approach represents a step change over current approaches which first explore economic outcome and then mitigates for specific emissions. It was successful in delivering multiple benefits from increased profit/ha to decreased environmental footprints by optimising the use of variable soils and landscapes. Analytical farm system frameworks will require such capability into the future. The approach also creates the capacity to assess if the farm system is sustaining natural capital stocks on which future business opportunities are based.