Invisible fencing in wood pasture

A comparison of costs
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Red Poll cattle wearing collars with sensors and GPS units (Epping Forest, UK)

Why invisible fencing?

Invisible fencing is an innovation that allows the control of cattle movement without needing physical barriers. In open areas, cattle can be fitted with a Geographical Positioning System (GPS) which will signal when a cow approaches a boundary.

Under trees in a wood pasture, due to the intermittent GPS signal, an alternative method is to bury an electric cable in the soil surface that emits a shortwave radio signal which is sensed by a transponder on a cattle collar. The transponder emits a noise as a cow approaches the boundary and, if she does not turn back, it provides an electric pulse similar to an electric fence. At Epping Forest, each collar also includes a GPS sensor which helps to locate the cattle.
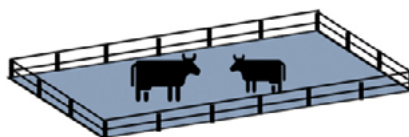

Cow collar with the sensing unit

Background

The Corporation of London at Epping Forest have demonstrated the technical feasibility of virtual fencing to control livestock in areas of high recreational use that require uninterrupted access. Dr Jeremy Dagley at Epping Forest, with colleagues has developed a best practice guide covering the equipment, fitting and training, design, installation, and safety (Dagley and Phillips 2016). The focus of this leaflet is on the costs of invisible fencing. relative to wooden fencing.
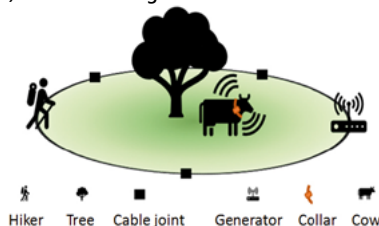
Financial comparison

Using data from Epping Forest, we examined the cost of invisible fencing relative to wooden fencing with two horizontal beams and mesh netting. A spreadsheet model was developed to describe the main costs with key variables including: fence length, the area, the cattle number, and the capital and running costs of the components. Although the model included grant support options, the results presented in this leaflet assume no grant support (Burgess et al. 2017). The costs of each system were calculated over a period of 30 years, to account for the lifetime of the different components e.g. wooden fence and collars (15 years), generator for invisible fencing (10 years), and generator batteries (5 years). Although the model allows the discounting of future costs, this leaflet presents only the undiscounted costs.

a) Wooden fencing

b) Invisible fencing

Hiker   Tree   Cable joint   Generator   Collar   Cow

A study was undertaken to compare the costs of a) wooden fencing and b) invisible fencing where the cattle wear a collar which senses the output from a buried wire

Advantages

Invisible fencing is an option for managing cattle movement in wood pasture of high recreational value. Cattle movement can be constrained without any obtrusive above-ground barriers restricting public access. The inclusion of GPS transponders can also help locate the cattle across large areas. It is possible to use a combination of approaches so that wooden fences are used next to busy roads and invisible fencing is used in open grassland areas.

Open space with invisible fencing

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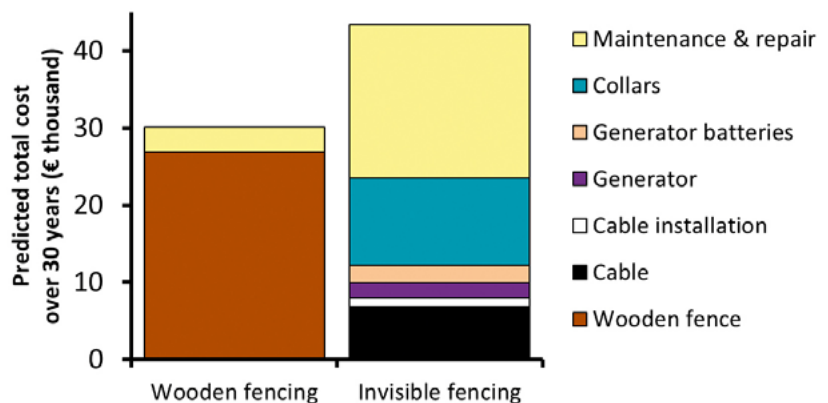*Cranfield University, Bedfordshire, MK43 0AL, UK*
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Comparison of costs with wooden fencing

On the basis of the assumptions described by Burgess et al. (2017), the costs for the wooden and invisible fencing (for an area of 12.5–50.0 ha assuming a density of 0.4 cows/ha) of €74 to €208/cow are very high in the context of commercial suckler-beef production. These high costs are justified at Epping Forest because of the high recreational value of the wood pasture. For a 25 ha system with 10 cows requiring 2000 m of fencing, the annualised cost for the invisible fencing (over 30 years) at €144/cow is 44% greater than €100/cow for a wooden fence. The high cost of invisible fencing is primarily a result of the assumed high maintenance and repair costs, as the capital costs are similar.

Area (ha)	Assumed number of cows	Wooden fence		Invisible fence	
		Assumed length (m)	Annual cost (€/cow)	Assumed length (m)	Annual cost (€/cow)
12.5	5	1414	137	1414	208
25.0	10	2000	100	2000	144
50.0	20	2828	74	5656*	175

*The maximum length of the underground cable transmitting the radio signal is 2000 m. Hence, if the length is greater than 2000 m (as demonstrated above) it is necessary to use "double loops", and this increases the length of cable required and the associated maintenance costs.

Costs over 30 years for 2000 m wooden fencing and invisible fencing for a 25 ha system with 10 cows (Assumption £1: €1.1)

Conclusion

Experience at Epping Forest shows that the invisible fencing is effective in constraining cattle, the use of GPS is helpful for locating cattle, and visitors to the wood pasture have unimpeded access.

For a 25 ha system with 10 cows, invisible fencing was calculated to be 44% more expensive than wooden fencing, primarily because of the assumed high maintenance costs such as checking and changing batteries. These higher costs can be justified at Epping Forest because of the high societal value of providing all members of the general public with unimpeded access to a widely-used recreational area.

Further information

Dagley J, and Phillips J (2016). Invisible fencing for conservation grazing: a user's guide. https://www.youtube.com/watch?v=kxz7nR17WE8

Burgess PJ, Chinery F, Eriksson G, Pershagen E, Pérez-Casenave C, Lopez Bernal A, Upson A, Garcia de Jalon S, Giannitsopoulos M, Graves A (2017). Lessons learnt – Wood pasture and parkland in the UK. AGFORWARD project. 24 pp.