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**ALTERNATIVE
DEER FENCES
IN
CORE CAPERCAILLIE and BLACK GROUSE HABITATS
AN INTERIM BEST GUIDANCE NOTE**



This Guidance Note has been jointly produced by The Forestry Commission Forest Research and The Royal Society for the Protection of Birds.

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Purpose

This advice note provides interim guidance on deer fencing in order to reduce mortality to capercaillie and black grouse in the short term, whilst research seeks alternative solutions.

Summary

Research has highlighted fence collisions as a major source of mortality to black grouse and capercaillie but particularly for the rarer capercaillie. Land managers are being urged to minimise as far as practicable the use of fencing in core woodland grouse habitats.

As an alternative strategy, various materials have been fixed onto deer fences to make them more visible to the birds. The use of orange barrier netting was examined by the Game Conservancy Trust, and other more durable forms of marking by RSPB. This note summarises the findings to date, and provides interim recommendations, with notes on construction, attachment and indicative costs.

Where deer fences have to be used, this Note recommends chestnut paling or wooden droppers as effective and more durable forms of fence marking than the original orange plastic barrier netting (though more durable forms are now becoming available). Fences marked with chestnut paling have been shown to reduce collisions almost completely over a two-year period.

This Note also recommends the incorporation of chestnut paling as an alternative design for the top section of new deer fences in important woodland grouse habitats, e.g. woodland with blaeberry, and close to lek sites.

NB. This advice note provides current recommendations based on a limited number of trials and costings by local fence contractors. RSPB and Forest Research are continuing to develop and refine further practical fence designs and costs.

Background

Capercaillie and black grouse are among the fastest declining birds in the UK with recent surveys now estimating the capercaillie population at less than 1000 birds (Wilkinson et. al. in press) and declining at 13% per annum. The decline of black grouse is also acute at 12% per annum with a national population estimated at 6510 lekking males in 1996 (Handcock et. al. 1997). While by no means the single cause of the capercaillie decline, deer fencing is significant, and in many instances, an avoidable cause of mortality.

Research undertaken by the Centre for Ecology and Hydrology, Game Conservancy Trust, RSPB, Scottish Natural Heritage and the Forestry Commission over several years at a number of sites (Catt et. al. 1994, Baines and Summers 1997, Andrew and Baines 1998) have shown conclusively that forest deer fences (particularly internal ones) can be a major source of mortality for woodland grouse, and account for approximately one third of the capercaillie mortality rate.

The current plight of capercaillie and black grouse has brought conservationists, foresters, researchers and land managers together to seek alternatives both to the existing wire deer fences and to new deer fencing used to protect young woodland from high deer populations. This initiative is part of a suite of broader actions identified by Petty (2000) to halt the decline of capercaillie.

Reducing Mortality at Fences

Strategies

The obvious solution to the problem of woodland grouse colliding with deer fences is to remove fences altogether or to make them more visible by marking. The choice may be dependent upon integration with a local deer management strategy. The Forestry Commission is seeking to actively encourage fence removal where it is no longer required and to reduce the construction of new deer fences in core capercaillie areas, where this is practical because of low deer densities, whilst also developing more capercaillie friendly fences for use where deer populations remain a threat to woodland development. The Capercaillie officer, in conjunction with the RSPB, provides advice on the siting of fences to reduce potential problems. The most critical areas are those with 1km of lek sites, fences within woodlands and areas with blaeberry.

Initial trials

The material initially selected for earlier trials to make fences more visible was orange barrier netting, which was commercially available, relatively cheap and lightweight. The results of trials by the Game Conservancy Trust using narrow bands of this netting showed that collisions were reduced by 64% for capercaillie and 91% for black grouse. Marking with this material thus reduced but did not eliminate fence collisions (Andrew and Baines 1997).

While the orange barrier netting was effective in reducing collisions, it often tore from its fixings, required regular re-attachment and soon disintegrated because it was not UV stabilised. An additional problem of attaching plastic barrier netting to exposed fences was that the additional surface area created significant wind resistance causing some fences to blow down. The short life of this material, its visual impact on the landscape and the potential litter problem as it disintegrated, led the RSPB to seek a longer-term solution. A more robust material was sought which was at least as visible as orange barrier netting, was effective and avoided some of the disadvantages.

An Assessment of Alternative Fence Markings

As potential alternatives to orange barrier netting, an assessment was made by RSPB of the visibility of ten different types of fence markings. The list included: heather bundles, ABS TABS (black or white anti bird strike tabs), blue rope woven diagonally on the upper part of the fence, black netlon (Shelter Shading which is similar to but more robust than the orange barrier netting), horizontal wooden rails, vertical and diagonal wooden droppers, and 0.9 m or 1.8m chestnut paling (Summers & Dugan 2001).

While the assessments were mainly based on visibility, the important additional features of cost, weight, speed of attachment and durability were also measured. The results showed the most visible markers to be full-length chestnut paling, wooden droppers and half-length chestnut paling. All were apparently more visible than orange barrier netting so might be more effective in reducing collisions.

Interim Advice for Marking Existing Deer Fences

1 Chestnut paling

Chestnut paling is currently considered to be the most reliable form of fence marking tested. Field trials have confirmed its effectiveness. Prior to marking, three caper and three black grouse collisions were recorded on 800 m of fence at Abernethy Forest Reserve over a 32-month period. No bird collisions were recorded over a 24-month period after attachment of 0.9m paling to the top half of the fence.

Since field observations suggest that most bird strikes occur on the top half of deer fences (Summers & Dugan 2001), it is felt that the extra cost, transport logistics and increased wind resistance rarely warrants the provision of full-length chestnut paling. Half-length (900mm or 1m long) is therefore the preferred option for fence marking in capercaillie and black grouse areas. Construction the full deer fence height with chestnut paling remains an option in particular high risk circumstances. It is recommended that 15cm spacing of pales are used close to lek sites and 30cm spacing elsewhere, especially in exposed locations.

Chestnut paling has a number of advantages/disadvantages when compared to the original orange barrier netting. The use of paling is recommended for fences at sheltered or moderately exposed sites. It should not be used at open hill or exposed locations unless adequately strengthened by additional stakes and stays.

Advantages	Disadvantages
Very visible, but especially when viewed at an angle. Appropriate gaps between pales can be specified for effectiveness against roe or red deer.	Untested for long term effectiveness against deer. Use of thinner timber not conforming to BS1722 is lighter but may be too weak for new fences.
Has a life of 10+ years (some paling fences in the uplands remain serviceable after 20 years)	Expensive.
It is very visible yet does not intrude into the landscape as much as orange plastic netting	Slightly more difficult to attach. Difficult to climb and may need regular crossing points.
May be used to mark existing fences or as a new fence	Bulky and heavier, fence will require strengthening
Wood component is bio-degradable and does not present a future litter problem	
Future potential for locally grown timber to promote a sustainable rural woodland industry	Chestnut not grown locally. Current manufacturers remote i.e. Sussex

Chestnut paling – fence specifications and estimated costs

NB. An additional on-site cost will be incurred because the volume of chestnut paling bundles is much greater than standard wire netting. In all fencing work these are highly variable and are not included in the estimates below.

Material specification:	Chestnut paling 900 mm X 9 m rolls. 2 spun line wires with 15cm or 30cm pale spacing – stapled £16.95 per 9m roll, for BS1722 grade material. Lighter specification pales slightly cheaper. haulage from S. England c. 25p/m
	Additional stakes @ 2.40 each, 12 m spacing
	Thrust posts and stays, 12 m spacing
	New line wire HT 2.5 or 2.65
Labour estimate (Construction only)	150 m/ man day
Total material and labour estimate	
	£2.50 - £3.00/m

Suppliers of wide spaced chestnut paling to BS1722

McArthur Group Ltd
Evanton
Ross-shire
IV16 9XJ
Tel 01349 830878

J F Homewood & Sons
20 Weyhill
Haslemere
Surrey
GU27 1BX
Tel 01428 643819

Fairseat Fencing
Crabtree Close
Gravesend Road
Fairseat, Nr Sevenoaks,
Kent, TN15 7JL
Tel 01732 822731

Suppliers of individual chestnut pales
Eamon Wall & Co
15 West Burnside
Dollar
FK14 7DP
Tel 01259 743212

Other suppliers, e.g. those in the Buyers Guide section of Fencing News may provide a similar specification

Recommendations for attachment:

The following guidance should be followed when attaching paling to existing fences.

1. Ensure that the main line-wire on the existing fence is in adequate condition to support the weight of the paling. It may have to be replaced by a new one (spring steel) at the correct height.
2. Check strainer posts are solid and strengthen or replace if necessary.
3. Existing fences will require additional posts and stakes, and stays at exposed locations. Stake spacing will depend on each site. Spacing of not more than 6 m is currently recommended.
4. Ensure that the top of the paling reaches to the top of the existing fence. No line wires should remain above the paling.
5. To prevent palings dropping out as material dries/weathers, ensure that palings have been stapled to twisted line wires during manufacture. These staples should be galvanised.
6. If paling wires are strained during attachment (by simply using a bar between a post and the pale) then this helps to crimp the palings and prevents them dropping out.
7. Pre-position 4" nails on posts/stakes at the correct height ready to hang paling.
8. Join no more than 4-5 rolls before 'hanging' on fence.
9. Strain short sections and staple to posts.
10. Attach paling wires to top and bottom line wires alternately every metre with stainless steel sack ties, hog rings, or line ties (the normal C rings are too thin and are not recommended). Trials to find the best long term method of attachment are underway.

Additional Notes

- Marking with paling is recommended for fences at sheltered sites or moderately exposed sties. It is not recommended for use on the open hill or exposed locations.
- We have no data to show differential effectiveness but fences close to lek sites should have 15 cm (6") paling centres whilst the 30cm (12") centre material can be used elsewhere.
- When fences run through steep sided hollows, or perhaps over knolls with a high risk of collision, full length 1.8 m paling (or 2x900mm long sections) may be used to reduce the 'gap' below the fence and the possibility of birds attempting to fly below.
- Chestnut paling is difficult to climb. Regular crossing places may have to be incorporated as appropriate.

2 Wooden Droppers to mark existing fences

Wooden droppers also scored highly in the visibility trial. The high visibility and effectiveness against bird strikes of the wooden droppers was confirmed in the field test at Abernethy Forest where 1.2 km of deer fence running through a key black grouse and capercaillie area was 'marked' with vertical droppers. Over a two and a half-year period since the attachment of the droppers, not a single bird strike was recorded. Prior to marking, nineteen black grouse and three capercaillie collisions were recorded over a thirty-two-month period.

Wooden Droppers –fence specifications and estimated costs.

Materials:	droppers 1000 x 50 x 15 mm [perhaps diagonally sawn from 50x50mm] *untreated soft wood @25p each, 20cm spacing (6 per m)
	additional stakes @ 12 m spacing
	thrust posts and stays @ 12 m spacing
	Additional top line wire 2.65 mm spring steel
Labour costs:	estimate of 100 m/man day
	Total material and labour estimate £2.50 - £3.00/m

*Consideration of different timbers may affect price and durability

Recommendations for attachment

1. Ensure that two existing line wires are present and in good condition to staple onto and to take the weight of the droppers. One or two spring steel wires may need to be added.
2. Additional stakes should be added (e.g. alternating with existing) but original post spacing may dictate the spacing of new posts. In most situations a stake every 6m (new and old) will suffice.
3. Stakes and stays must be added before dropper attachment, to counter the additional weight and wind drag on the fence. Every post may have to be stayed at exposed sites.
4. Six droppers per metre are advised for sheltered woodland situations but 4 in more open exposed locations. (It is strongly advised that not less than 4/m are attached).
5. Droppers should be positioned on the upwind side if the fence although the previous construction of the fence may dictate this. Ideally, fencers should work in pairs to ensure that droppers are stapled firmly.
6. Staples should be a few millimetres longer than the width of the dropper (and line wire) so as the ends can be bent backwards to create a firm and lasting grip on the line wires. Barbed staples are an alternative. Failure to fix properly will result in droppers coming loose and moving along the line wires or falling off as the wood weathers and dries. Care should be taken to ensure effective attachment without damaging the galvanising.
7. Once droppers are attached the deer fence may be difficult to climb. Regular crossing places may have to be constructed.

Notes:

- The present glut of small round wood presents a ready source of material for droppers, the production of which will also help sustain local enterprise.
- Larch or red cedar is recommended but the life of lighter softwoods may be extended by pressure treatment although this will add to cost.
- Triangular section droppers may act like chestnut paling in that they will increase the visibility of the fence when viewed at an angle and their wind resistance may be less than rectangular droppers.

3 UV stabilised plastic mesh to mark existing fences.

Consultations with a plastics company have revealed that a modified form of netting can be manufactured with sufficient UV stabilisation for 7 to 10 years. This has a greater wind resistance than the previous thin orange netting manufactured as roadside netting and has thicker strands and joints. Attachment should be by plastic ties (also fully UV stabilised) diagonally across the joints of the net, not on the horizontals. Options may include top fixing only but the longevity of top fixing only has not been evaluated. The roll size is 1.2 x 50m. The original method was to use two 30cm widths of the net. Experience suggests that 600mm widths would be more visible.

New deer fences with Chestnut paling

This Guidance Note recommends the use of Chestnut paling as part of the specification for new deer fence's in capercaillie areas, particularly if fences are required to protect new native woodlands or developing habitat likely to be colonised by woodland grouse. (Picozzi, 1986)

- **Half-length Chestnut should be used on the top section of new deer fences on more open habitats. Where rabbits and hares are not a problem, rylock or line wires may be used on the lower half.**
- **In areas where lagomorphs present an additional problem, rabbit netting with half-length chestnut paling on the upper half is recommended.**
- **Full height (1.8 m or 2 of 0.9m) chestnut paling with 15cm pale spacing is strongly recommended if a new deer fence is essential within 1 km of established capercaillie lek areas**

The cost of a new fence incorporating paling appears to be in the same price range as single 1.8 m high tensile (or two 0.9 m width) deer fence. The specification and estimates for a new deer fence incorporating chestnut paling or deer mesh are given as a guide. Construction trials have been undertaken during spring 2001 and results are awaited.

New deer fence with top half Chestnut paling with Rylock below

Material specification	Chestnut paling to BS 1722 NB 3 twisted line wires 900 mm with 15cm or 30cm centres. 2.6 m deer posts (treated round). 6 m spacing
	5'6" posts (treated round). 6 m spacing
	Stake & thrust plate. 12 m spacing
	Strainer post & stays. 100 m spacing
	C Grade rylock or similar 900 mm
	4 spring steel line wires 2.65 mm
	Staples & line ties
Labour estimate	75 m per man/day
Total estimate of new fence	Materials and construction only £5.50 - £6.50

Costs for Modifying Existing and for New Fences

Approximate Comparative Costs (materials and labour only, no on-site costs are included)

Fence Type	Target Species	Marking	New fence	Life	£/M
Half length Chestnut paling	red/roe	Y		10+	2.50-3.00
Wooden Droppers	red/roe	Y		10+	2.50-3.00
Full height 1.8 m Chestnut paling	red/roe		Y	10+	6.00-7.00
Half length Chestnut paling with Rylock	red/roe		Y	10+	5.50-6.50
Half Length Chestnut with rabbit net below	rabbits hares, deer		Y	10+	5.00-6.50
Standard High Tensile 2m high Cyclone Forest Deer Fence	all deer sp.		Y	15+	6.50-7.50
Two sections of Rylock	All deer sp.		Y	15+	5.00-6.50

NB. These approximate construction costs are from local fencers in Speyside. Material Suppliers, ground conditions and cartage will affect the costs. Changes in detailed specification, materials and costs may occur as further research trials proceed.

Contacts for further information and advice on woodland grouse conservation and grant availability.

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