

A Preliminary Estimate of the Cost of Damage Caused by Deer to Agriculture in England

The possible financial impact of deer damage to the eight main Agricultural Census farm types was estimated for each Government Office Region using data from a sample survey of deer damage conducted under a MAFF contract in the mid-1990s, Agricultural Census data on the numbers of each farm type in each region, and recent records of deer distributions.

This suggested that the likely annual cost of deer damage to agriculture may be around £4.3 million, or within the range £1.1 to £5.6 million. The Government Office regions where the greatest level of damage was estimated were Eastern and South West, each at just under £1 million, or within the range £0.25 to £1.25 million. The farm type in which most damage was estimated was Cereals, with an annual cost of damage of about £2.4 million, or within the range £0.6 to £3.1 million.

The few data available from detailed assessments of deer damage suggest that the figures used to calculate these totals are of the right order, indicating that the totals given are reasonable “ball park” figures. These compare with estimates of damage caused to agriculture each year by rabbits, in Britain as a whole, of “tens of millions of pounds annually”, and by badgers, in England and Wales, of £21.5 to £41.5 million.

1 Introduction

- 1.1 Under a Ministry of Agriculture, Fisheries and Food (MAFF) contract (VC0315) Doney & Packer (1998) surveyed damage caused by deer to agriculture and other land uses in four areas of lowland England using a questionnaire and subsequent ground truthing surveys. The areas targeted in their survey were Gloucester/Somerset, Essex/Suffolk, lowland Yorkshire and Northamptonshire. As part of the questionnaire completed in this survey respondents were asked to estimate the cost of damage caused by deer on their farm each year. Although these were subjective estimates by those completing the survey questionnaire, ground truthing of damage to winter wheat in Essex/Suffolk and Gloucester/Somerset subsequently showed that respondents correctly identified deer damage and were as likely to underestimate damage (53%) as they were to overestimate it (40%) (Doney, 1998).
- 1.2 The results obtained by Doney & Packer (1998) and Doney (1998) are used here, together with data from the June Agricultural Census (2002) and the most recently available deer distribution maps (Ward, 2003), to estimate the number of holdings in each rural county in England likely to have deer, the number of those likely to suffer economic damage, and the regional and national costs of that damage for each main farm type.

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2 Methods

- 2.1 The four areas used in the 1998 survey are well populated by deer with three or four species present and at least one species widespread in each survey area (Ward, 2003). Doney & Packer (1998) found that 69% of holdings in these areas reported having deer. As there remain some parts of the country which are not as heavily populated by deer, the number of holdings in each Government Office Region with deer was calculated by estimating the number of 10km squares in the region where deer were not recorded in the recent British Deer Society survey maps (Ward, 2003), and multiplying the percentage of the region with deer recorded by 0.7 (i.e. rounding Doney & Packer's figure to 70%) (Table 1). As access to the original deer distribution data was not available estimates of 10km squares had to be made from published maps and are therefore approximate.
- 2.2 The number of holdings in each rural county and Government Office Region of each of the eight main farming types was obtained from the June 2002 Agricultural Census. Unfortunately these are not the same categories as reported in Doney & Packer (1998). To obtain an estimate of the likely number of each farm type to suffer deer damage the types of damage reported by Doney & Packer (1998) were related to the proportion of each of the eight Agricultural Census farm types in their survey areas judged to be *vulnerable* to each type of damage (Table 2). Thus 76.5% of holdings in the survey area were judged potentially vulnerable to cereal damage, 55.1% to grassland damage and 25.2% to damage to roots, fruit, vegetables and oilseed rape. Since Doney & Packer (1998) found that 43.9% of those with deer reported cereal damage, 6.1% reported grassland damage, and 2.6% to 3.4% damage to roots etc. (rounded to 3%) it is estimated that 57%, 11% and 12%, respectively, of those potentially vulnerable to each type of damage reported such damage.
- 2.3 Doney & Packer (1998) only gave costs of damage reported for respondents claiming cereal damage. These were reported in ranges as follows: No cost (17%); <£100 (33%); £100-£500 (35%); £500-£1000 (10%); £1000-£5000 (5%); >£5000 (1%) (figures rounded up add up to 101%).

Table 1

Estimate of proportion of 10km squares in each Government Office (GO) Region where deer have been recorded and the percent occurrence of deer on holdings, assuming this to be 70% in each 10km square where they are present.

GO Region	Estimated 10km squares with deer (%)	Estimated holdings with deer (%)
North East	100	70
North West	83	58
Yorks & The Humber	100	70
East Midlands	75	53
West Midlands	39	27
Eastern	88	62
South East	75	53
South West	87	61

Table 2

Main Agricultural Census farm types, their occurrence in Doney & Packer's (1998) survey areas (approximated from Agricultural Census counties as Gloucester and N Somerset, Somerset, Essex, Suffolk, Yorkshire & The Humber and Northamptonshire), and the types of damage to which they are judged to be potentially vulnerable.

Farm Type	Number in 1998 survey area (%)	Types of damage to which vulnerable		
		Cereals	Grass	Roots, Fruit, Veg. Etc.
Pigs & Poultry	2026 (6.7)	N	N	N
Mixed	3082 (10.1)	Y	Y	Y
Cattle & Sheep (lowland)	7847 (25.8)	Y	Y	N
Cattle & Sheep (LFA)	2842 (9.4)	N	Y	N
Dairy	2979 (9.8)	Y	Y	N
General Cropping	2379 (7.8)	Y	N	Y
Cereals	7001 (23.0)	Y	N	N
Horticulture	2227 (7.3)	N	N	Y

2.4 In the absence of any other estimates of financial losses these have been used as representative costs of all types of damage. Assuming mean costs of damage correspond to the median within each range, or £5000 for the highest category, these indicate a likely overall mean cost of deer damage for holdings suffering damage of £393 per annum. This figure has been used to estimate the total cost of damage for the proportion of holdings considered likely to suffer damage, assuming this to be the same as in Doney & Packer's study (see 2.2), in each Government Office region, and nationally (Table 3), and to estimate the total damage costs for each main farming type (Table 4). The modal range (£100-£500) has also been used to provide an estimate of the possible range of regional and national damage costs.

Table 3

Estimate of likely annual cost of deer damage to agriculture in each Government Office (GO) Region based on the mean cost of damage per holding and the modal range of damage costs reported by Doney & Packer (1998).

GO Region	Estimated Mean Cost of Damage (£000s)	Estimated Range of Damage Costs (£000s)
North East	191.1	48.6 – 243.1
North West	317.1	80.6 – 403.4
Yorks & The Humber	571.9	145.5 – 727.6
East Midlands	552.4	140.6 – 702.8
West Midlands	250.5	63.7 – 318.7
Eastern	951.9	242.2 – 1,211.1
South East	552.9	140.7 – 703.4
South West	986.4	251.0 – 1,255.0
Total*	4,374.2	1,113.0 – 5,565.1

Table 4

Estimate of likely total annual cost of deer damage to each main Agricultural Census farm type based on the mean cost of damage per holding or the modal range of damage costs reported by Doney & Packer (1998).

Farm Type	Estimated Mean Cost of Damage (£000s)	Estimated Range of Damage Costs (£000s)
Pigs & Poultry	0	0
Mixed	220.8	56.2 – 280.9
Cattle & Sheep (lowland)	725.8	184.7 – 923.4
Cattle & Sheep (LFA)	240.7	61.2 – 306.2
Dairy	305.3	77.7 – 388.4
General Cropping	207.1	52.7 – 263.5
Cereals	2,450.8	623.6 – 3,118.0
Horticulture	223.7	56.9 – 284.7
Total*	4,374.2	1,113.0 – 5,565.1

*Totals may not add up as these have been calculated from raw data and all figures shown have been rounded to nearest £100.

3 Conclusions

- 3.1 There are few objective assessments of deer damage to agriculture which can be used to compare with the figures reported in Doney & Packer's (1998) survey. However two estimates of damage exist for farms in high deer density areas in South West England.
- 3.2 In the early 1990s then MAFF/ADAS Wildlife Advisers estimated losses on a farm where a night shooting notice had been applied for to prevent damage caused by fallow deer (Wilson, 1990 & 1995). Based on sample measurements of loss of 'early bite' grazing, silage grass and cereals, an estimate for losses was made for the whole farm. These were equivalent to 2.4ha grazing land, about 20 tonnes (fresh weight, i.e. approximately 5 tonnes DM) of silage, and 0.9 tonnes feed wheat. Using figures from Nix (2001) the cost of this damage would have been equivalent to around £1028 + £345 + £62 = £1435.
- 3.3 Langbein (2003) estimated a maximum yield loss for red deer damaged feed wheat of £60/ha in the most severely affected field in a study in the Exmoor area. He also recorded high levels of utilization of agricultural pastures but did not quantify yield losses here. Most deer damage was centred on a small proportion of fields, often close to woodland, and cereal losses for their study farms as a whole were thought unlikely to exceed 5%.
- 3.4 As both these studies took place in areas where deer density and damage was considered high the figures used in the estimates presented here (i.e. £393 or £100 - £500 per damaged holding) appear to be of the right order, suggesting that the overall estimated damage costs give a reasonable "ball park" figure. However, in a recent study in the East of England alone the total cost of agricultural damage was estimated at between £1.92 and £4.57 million per annum (White *et al.*, undated). This is higher than might have been expected from the present estimate, but these authors used threshold densities of deer likely to cause damage as low as 0.219 fallow/km² and 0.486 roe/km². This suggests that their estimate may have been towards the high end of the range.

- 3.5 The overall estimate of the annual cost of deer damage to agriculture in England given here, of between £1.1 and £5.6 million, compares with damage caused by rabbits to agriculture, in Britain as a whole, of “tens of millions of pounds annually” (Rees et al., 1985, cited in McKillop et al., 1998) and badgers, in England and Wales, of £21.5 to £41.5 million (Moore et al., 1999).

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