

Title: COMPULSORY MICROCHIPPING OF DOGS IN ENGLAND IA No: Defra 1372 Lead department or agency: Department for Environment, Food and Rural Affairs Other departments or agencies:	Impact Assessment (IA)		
	Date: 03/03/2014		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Secondary legislation		
Contact for enquiries: Andy Patnelli (0207 238 5899)			
Summary: Intervention and Options			RPC Opinion: GREEN

Cost of Preferred (or more likely) Option			
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, Two-Out? Measure qualifies as
£49.7m	£-4.26	£0.40m	Yes IN

What is the problem under consideration? Why is government intervention necessary?

There is continuing stakeholder and public concern over the impact on society of irresponsible dog owners. Irresponsible ownership creates negative externalities through an increase in the number of lost/abandoned dogs which leads to poor dog welfare and results in an estimated annual cost of £32.8m to local authorities and welfare organisations. There have been significant efforts by charities to increase microchipping take-up (improving traceability and more responsible ownership). However, with the numbers of strays remaining high, these measures have not been wholly effective. Government intervention is now necessary to increase the numbers of microchipped dogs to benefit dog welfare and wider society.

What are the policy objectives and the intended effects?

The policy objective is to improve animal welfare by increasing traceability of dogs through microchipping and to encourage responsible dog ownership. This is an integral part of a wider package referred to in the introduction to the evidence base. More lost dogs will be re-united with their owners more quickly to the benefit of owners and dogs and saving Local Authorities and charities considerable kennelling costs. It will also be easier for those responsible for tackling abuses of dog welfare to bring owners to account and to protect public safety. Traceability back to breeders will in the longer term lead to dog health improvements as poor breeding conditions and practices lead to health problems and generic/congenital problems.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 0 - Do nothing and rely on owners and/or existing campaigns by dog charities and voluntary agreements to encourage more microchipping.

Option 4 - Require all puppies only to be microchipped and registered on a database on transfer of ownership after one year.

Option 5 - Require all dogs to be microchipped from April 2016 onwards.

Option 5 is the preferred option as it which provides maximum benefits and confers clarity on enforcement. This option was approved by Home Affairs Committee following consideration of responses to Consultation in 2012 and was announced as the way forward on 6 February 2013. The selection of options is described at paragraphs 21 and 22 in the main text of this IA.

Will the policy be reviewed? It will/will not be reviewed. If applicable, set review date: 10/2019					
Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	Micro Yes	< 20 Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: 0	Non-traded: 0	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: _____ de Mauley _____ Date: _____ 09/06/2014 _____

Summary: Analysis & Evidence

Policy Option 4

Description: Require all puppies only to be microchipped and registered on a database on transfer of ownership after one year

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 0.9	High: 20.6	Best Estimate: 10.84

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	See annex B	See annex B	See annex B
High	See annex B	See annex B	See annex B
Best Estimate	0.8	1.8	16.2

Description and scale of key monetised costs by 'main affected groups'

Costs of implanting and registering microchip will fall on business, civic society organisations and the public totalling £1.8 million per annum. There will be transition costs of £0.8m to business for microchip scanners and implantation training and to databases and veterinary practice management system providers for adopting standard information capture. Government will incur a minor transition cost of £0.02m in order to issue information to dog owners.

Other key non-monetised costs by 'main affected groups'

The time taken by the public to update their details on databases as required.
The cost for implantation training for other groups than breeders (e.g. dog groomers, etc.)
Any additional costs associated with enforcing the policy which will be incurred by the public sector.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	See annex B	See annex B	See annex B
High	See annex B	See annex B	See annex B
Best Estimate	0	3.4	27.1

Description and scale of key monetised benefits by 'main affected groups'

As dogs die and are replaced by future generations civic society organisations benefit from increasing traceability of dog owners. Over time, this has two effects: the number of stray dogs decreases and more strays can be reunited with their owners. Both effects reduce the total number of days stray dogs spend in kennels of local authorities and welfare re-homing centres and therefore the costs of those bodies. This benefit amounts to £3.4 m per annum on average.

Other key non-monetised benefits by 'main affected groups'

Dogs and owners are re-united more quickly. The public benefits from any associated impacts arising from more responsible dog ownership because of traceability such as reduced incidences of dog attacks and nuisance and reduced incidences of poor animal health caused by unacceptable breeding conditions/practices.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

Given the limited approach to enforcement which will focus on irresponsible owners/breeders that come to enforcers attention for breaches of other regulations there are risks concerning the likely level of compliance with the regulations. Key assumptions and sensitivities relate to: the baseline growth and uptake of microchipping, the cost of microchipping/registration, updating details, and the change in stray dogs resulting from an increase in microchipping. Detailed sensitivity analysis is provided in annex B.

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 0.5	Benefits: 0	Net:- 0.5	Yes	IN

Summary: Analysis & Evidence

Policy Option 5

Description: Require all dogs to be microchipped from April 2016

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 20.3	High: 75.2	Best Estimate: 49.71

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	See annex B	See annex B	See annex B
High	See annex B	See annex B	See annex B
Best Estimate	29.0	1.4	38.8

Description and scale of key monetised costs by 'main affected groups'

Costs of implanting and registering microchips will fall on business, civic society organisations and the public totalling £1.4million per annum. There will be transition costs of £0.8m to businesses for microchip scanners, implantation training and for adopting software. Civil society organisations donate microchips worth £9m (including labour costs). The public incurs a transition cost of £19.1m to microchip adult dogs. Government will incur a minor transition cost of £0.04m for providing information to dog owners.

Other key non-monetised costs by 'main affected groups'

The time taken by the public to update their details on databases as required.
The cost for implantation training for other groups than breeders (e.g. dog groomers, etc.)
Any additional costs associated with enforcing the policy will be incurred by the public sector.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	See annex B	See annex B	See annex B
High	See annex B	See annex B	See annex B
Best Estimate	0	10.8	88.5

Description and scale of key monetised benefits by 'main affected groups'

From the outset, civic society organisations benefit from a greater traceability of dog owners which means more dogs can be reunited with their owners therefore reducing kennelling and care costs for local authorities and welfare re-homing centres. This benefit equals £10.7million per annum which is significantly higher than option 4 which has to wait until the dog population has fully turned over.

Other key non-monetised benefits by 'main affected groups'

Dogs and owners re-united more quickly. The public benefits from any associated impacts arising from more responsible dog ownership because of traceability such as reduced incidences of dog attacks and nuisance and reduced incidences of poor health caused by unacceptable breeding conditions/ practices.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

Given the limited approach to enforcement which will focus on irresponsible owners/breeders that come to enforcers attention for breaches of other Regulations there are risks concerning the likely level of compliance with the regulations. Key assumptions and sensitivities relate to: the baseline growth and uptake of microchipping, the cost of microchipping/registration, updating details, scanner, training and the change in stray dogs resulting from an increase in microchipping. Detailed sensitivity analysis is provided in annex B.

BUSINESS ASSESSMENT (Option 5)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: .4	Benefits: 0	Net: -0.4	Yes	IN

Evidence Base (for summary sheets)

Introduction

1. This proposal is part of a package of measures announced on 6 February 2013 by the Government aimed at promoting more responsible dog ownership, tackling irresponsible owners as well as reducing the cost of enforcing the law on dangerous dogs. Animal welfare matters are devolved and accordingly the requirement to microchip dogs applies to England only. Wales is planning to introduce parallel regulations. The other proposals that will impact on businesses, courts, police and others are: (i) extending the criminal offence of allowing any dog to be dangerously out of control to private property (where the dog has a right to be) – this is currently completing its passage through Parliament as part of the Anti-social Behaviour Crime and Policing Bill and is expected to become law by this Easter and (ii) removing the requirement for the police to hold suspected prohibited type dogs while the case is being dealt with in the courts - secondary legislation to be drafted once the Bill becomes law. The reference numbers of the consultation impact assessments relating to (i) and (ii) above, were DEFRA 1412 and DEFRA 1411 respectively. The final IA for (i) is subsumed by the Home Office led IA accompanying the Anti-social Behaviour Crime and Policing Bill.
2. In addition, the Government made funding available for local community initiatives to foster responsible dog ownership and setting up a network to ensure sharing of best practice between police officers responsible for dangerous dog work. Reports on the projects have been received and are to be evaluated and published when resources permit. We also proposed to increase the fee for placing a prohibited type dog on the Index of Exempted Dogs to reflect the increase in administrative costs, since 1997 when the fee was last increased, from £20+VAT to £77+VAT. This came into effect on 1 July 2013 and will reduce the costs of public money spent on administering the Index. The reference number for the impact assessment for this proposal is DEFRA 1255.
3. Microchipping is a quick and permanent way of identifying a dog, taking no more than a few minutes to implant. A microchip is a passive device unless stimulated by an appropriate scanner which can receive a radio signal from the microchip indicating its 15 digit identification code. This code can then be mapped against the data recorded on the microchip database to identify the owner of the dog and therefore ensures accurate traceability.

Problem under consideration

4. There has been growing concern from the public and major Governmental and non-Governmental stakeholders including local authorities, police, dog charities and the public about the prevalence of irresponsible dog ownership. Irresponsible dog ownership encompasses factors such as: neglecting the welfare of the dog, breeding dogs for appearance and failing to consider the implications for their health and inability to keep dogs under control in public places and allowing dogs to stray and become lost. There is existing legislation which encourages traceability; the Control of Dogs Order 1992 requires any dog on any highway or in a public place to wear a collar with the name and address of the owner on it, or on a plate or badge attached to the collar. However, this policy has proven to have major drawbacks as collars and tags can easily be lost and need replacing or can be deliberately removed. Moreover, collars and tags are not a legal requirement in the home so if a dog escapes it is not traceable if it was not wearing its collar. It is also worth noting that the Dogs Trust Stray Dog Surveys 2011-13 indicate from responses received that only 4-5% of dogs returned to owners were as a result of collars and tags compared with 41% in 1999.

Currently, it is very difficult to trace stray, abandoned or nuisance dogs to their owners, which means that irresponsible dog ownership is very hard to prosecute.

5. There is evidence from abroad which suggests that countries with compulsory/increased microchipping have higher levels of owner identification of strays. In Sweden where microchipping is compulsory, over 90% of stray dogs are reunited with their owners within 24 hours of being collected by the authorities.¹ Furthermore, a US research study by Lord et al (2009) found that dogs with microchips were likely to be relocated with their owners, they concluded that 'the high rate for return of microchipped dogs supported microchipping as a valuable permanent pet identification modality'.²
6. Experiences with compulsory microchipping in England also indicate that microchipping promotes more responsible dog ownership. Wandsworth Borough Council has said "*Our very strongly held view is that compulsory microchipping plays a major role in promoting and encouraging responsible dog ownership. When we introduced this as a tenancy condition for people living on our housing estates, we saw a clear reduction in the number of strays we had to deal with and a big fall in dog-related complaints. The microchip provides a clear link between a dog and its owner and enables the council to take action against those tenants who allow their dog to cause a nuisance.*"³
7. The Dogs Trust Stray Dog surveys indicate that on average there were some 102,000 stray dogs picked up by local authorities in England between 2010/11 and 2012/13. We estimate that local authorities and welfare organisations incur costs of approximately £33m for kennelling, euthanising and microchipping stray dogs in England (see paragraphs 29 and 30).

Rationale for Intervention

8. Irresponsible dog ownership can impose costs on society (negative externalities) through for example dog attacks, poor animal welfare and the cost to society of having to treat and care for abandoned dogs. It is therefore a case of market failure as defined in the Treasury Green Book and this policy is intended to limit its impact. Implanting a microchip in a dog increases the traceability of the dog to its owner therefore making it more likely that irresponsible owners can be found and action taken against them. This helps ensure a greater proportion of irresponsible owners incur costs as a result of their actions, therefore also acting as a deterrent against irresponsible ownership⁴.
9. One of the most prevalent negative externalities to society associated with dog ownership is that arising from the abandonment of dogs. Increasing the traceability of dog owners will reduce the number of dogs which cannot be reunited with their owners therefore reducing the kennelling costs of local authorities and welfare organisations.

Policy objective

10. The policy objective of this, and related measures, is to incentivise responsible dog ownership and improve dog health and welfare. A key component in promoting responsible dog ownership is to achieve better traceability of all dogs and their owners. As pointed out above, tags can be easily lost and removed, whereas a microchip provides a permanent identification and ensures traceability.

¹ Tasker L (2008), Stray Animal Control Practices (Europe), WSPA/RSPCA International

² Lord L K, Ingwersen W, Gray J L, Wintz D J, (2009), Characterization of animals with microchips entering animal shelters, *J Am Vet Med Assoc*, **235**(2):160-167

³ Mark Callis, Dog Control Service Manager, Wandsworth Council

⁴ See e.g. Becker G. (1968) Crime and Punishment: An Economic Approach, *Journal of Political Economy*, **76**:169-217,

11. Traceability allows lost dogs to be quickly re-united with their owners and avoids dogs having to spend unnecessary time in kennels with possible attendant welfare problems or having to be re-homed. It also allows abandoned dogs and nuisance dogs to be traced to their owners who may then be held to account. It may also lead back to irresponsible breeders or identify stolen dogs and help bring those responsible to account. The greater the traceability of dogs to owners, the more accountable owners become for the welfare and behaviour of their dogs. It therefore follows that improving traceability will lead to more responsible dog ownership and help alleviate the concerns of stakeholders and the public.
12. In an independent inquiry into dog breeding⁵, Professor Patrick Bateson (FRS, Emeritus Professor of Ethology at Cambridge University) noted that:

'In many quarters the view is strongly expressed that each dog in the United Kingdom should be microchipped, preferably by the breeder. One argument for doing so is that microchipping would greatly facilitate those whose job it is to control abuses of dog welfare by making it much easier to trace animals back to their owner and breeder. It would enable owners of errant pets to get them back more easily and also make dog owners more responsible. It would be a deterrent against dog theft and possibly lead to savings to Local Authorities by reducing kennelling costs.'
13. Compulsory microchipping is supported by the Police, Veterinarians (Royal College of Veterinary Surgeons and British Veterinary Association) and welfare organisations including the RSPCA, Dogs Trust, the Advisory Council on the Welfare Issues of Dog Breeding, Blue Cross and Battersea Dogs and Cats Home. It is firmly believed this measure will have a positive impact on animal welfare and may assist in the control of dangerous and nuisance dogs. The traceability of all dogs to their owners and ultimately back to the breeders will help to encourage more responsible ownership and breeding as enforcement authorities will find it easier to take remedial action and, where appropriate, prosecutions.

Consultation responses and Stakeholder interaction

14. Defra consulted on dangerous dogs policy both in 2010 and 2012. The earlier consultation did not seek opinion on the method of introducing compulsory microchipping though key stakeholders have been extensively consulted since.
15. The Government carried out a further consultation on measures to promote responsible dog ownership from 23 April to 15 June 2012. The consultation sought views on the way in which compulsory microchipping should be introduced in England and the Government response was published on 6 February 2013.
16. The consultation IA in 2012 set out the following options: Option 0, Do nothing; Option 1, require all dogs to be microchipped on change of ownership; Option 2 Require all dogs to be microchipped on change of ownership for a period of 5 years after which all dogs must be microchipped; Option 3, Require all dogs to be microchipped within a year of legislation coming into force; and option 4, all puppies must be microchipped and registered on a database on transfer of ownership. In going out to consultation the Government stated a preference for Option 4.
17. The public consultation on promoting responsible ownership held in 2012 had nearly 27,000 responses. Of these 96% supported compulsory microchipping (up from 84% of 1875 responses to the 2010 public consultation on the capability of current legislation to protect the public from dangerous dogs and encourage responsible dog ownership conducted in 2010).
18. The 2012 consultation also sought views on whether or not compulsory microchipping would have a positive or negative financial impact. A majority of enforcement agencies, welfare/re-

⁵ Independent Inquiry into Dog Breeding, Patrick Bateson, University of Cambridge, 2010

homing centres, breeders and microchip database companies thought there would be a positive impact. 51% of owners felt there would be a negative impact but many of the responders (some 8,000 out of the nearly 27,000) responses commented that the cost would be negligible. This suggests that the small cost of compliance is not a bar to compliance.

19. The results of the consultation showed just 4% in favour of Option 0 (Do nothing), 2% for Option 1 (require microchipping on change of ownership), 8% for Option 2 (require microchipping on change of ownership for a period of 5 years after which all dogs must be microchipped), 76% for Option 3 (require all dogs to be microchipped and registered within one year of legislation coming into force) and just 10% for the preferred option of microchipping puppies.
20. Most of the stakeholders such as the Police, RSPCA, Blue Cross, Dogs Trust and Kennel Club expressed a wish for compulsory microchipping of all dogs by a set date. The British Veterinary Association and Battersea Dogs and Cats Home also agreed but felt they could accept a fully phased approach if this route was eventually followed. The Advisory Council on Welfare Issues of Dog Breeding support a fully phased approach⁶.
21. In view of the responses to the consultation, Cabinet clearance on the way forward was given for the introduction of microchipping for all dogs from 5 April 2016. This is in effect a variation on Option 3. Although the requirement to microchip all dogs will come into force in April 2016 other parts of the Regulation are planned to come into force in October 2014 (i.e. for implanters to be trained and for certain database and microchip standards to be in place) which means that Option 3 is no longer applicable and a new Option 5 has been created requiring all dogs to be microchipped within 18 months instead of the 12 months under Option 3.
22. In view of the results of the consultation and Cabinet clearance on the way forward, this Final IA therefore refers to Option 0, Option 4 (being the originally preferred option and Option 5 (which has Cabinet clearance)
23. The response from stakeholders to the announcement that we would introduce compulsory microchipping for all dogs from April 2016 has been encouraging and is greatly welcomed. The Dogs Trust, Blue Cross and Battersea Dogs and Cats Home have been offering free microchipping at their respective centres and continue to do so. The Dogs Trust made an offer to meet the cost of all microchips and earmarked £6 million for the provision of free microchips to veterinarians, local authorities and housing associations. They are expected to begin a campaign from April 2014 to encourage owners of unchipped dogs to get their dogs microchipped. Other welfare organisations and local authorities arrange community events for dog owners that offer free microchipping.

Policy Options

24. The policy options outlined in Table 1 include a 'do nothing' baseline (Option 0), a requirement for puppies to be microchipped from April 2015 (Option 4) and a mandatory requirement for all dogs to be microchipped from April 2016 (Option 5). The reason for this choice of options to be analysed in this IA is describe in the preceding section at paragraphs 21 and 22

⁶ Summary of responses to the 2012 consultation dated 6 February 2013

Table 1 Options

Option	Description
Option 0	Do nothing Do nothing and rely solely on owners and/or existing campaigns by dog charities to encourage more microchipping.
Option 4	Require puppies only to be microchipped and registered on a database on transfer of ownership after one year This option would require all puppies to be microchipped (by 8 weeks of age) but not older dogs. Breeders would need to ensure that their puppies are microchipped and registered before they are sold or gifted to a new keeper. Anyone breeding a dog and keeping it for themselves will also need to microchip and register that dog and keep the details current. This option gives the freedom of choice to those keeping their older dogs and to those selling or gifting older dogs as to whether or not the dog should be microchipped
Option 5	Require all dogs to be microchipped from April 2016 This option would require all dogs to be microchipped from April 2016 and would require all existing dogs to be microchipped and registered on a database by this time and thereafter all puppies to be microchipped and registered by 8 weeks of age and all imported dogs of any age to be registered on a database after being in the country for 30 days or on transfer of keepership if sooner. Breeders would need to ensure that their puppies are microchipped and registered before they are sold or gifted to a new keeper. Keepers' details must be kept current. This option gives enforcers and keepers certainty on whether any dog must be compliant and also delivers maximum benefits to civil society and keepers from the outset.

25. Option 5 is the preferred option

26. *Voluntary schemes.* A voluntary agreement with dog breeders which encourages them to microchip all dogs could boost uptake of microchips. Some dogs are bred by registered breeders (commercially for sale) while others are sold by small scale hobbyist breeders. Others are the result of individual keeper's dogs having a litter. Due to the diverse and fragmented nature of the dog breeding industry as well as strong pre-existing arrangements, a voluntary agreement with dog breeders is unlikely to be a solution. It is firmly believed by the voluntary sector and enforcers that the only way to achieve a significant increase in the uptake of microchipping is to make microchipping compulsory.

Background and key data

27. The dog population in the United Kingdom is around 8.5 million, as estimated by the Pet Food Manufacturers Association⁷. Assuming that dog ownership is proportional to UK's population (86% of the UK households are in England⁸) it follows that there are approximately 7.3 million dogs in England. The number of dogs is projected to increase in line with the number of households by 1.4% each year⁸.

28. Anonymised and consolidated data, from the four microchip databases that currently register dogs and their keepers in England, indicate that approximately 4.8m (66% of all dogs) are microchipped and registered. This leaves an estimated 2.5 million dogs (34%) un-microchipped in England. Whilst the numbers of dogs microchipped has risen slowly year on year from twenty years ago when microchipping was introduced, it is likely that this growth rate will decrease over time as a higher proportion of dogs become microchipped; the Dogs Trust have stated that *'there is likely to be a ceiling reached on voluntary dog microchipping well below 100%'*.⁹ We have therefore assumed that the growth rate decreases from 1.4% in 2014 to virtually zero in 2023 as the proportion of chipped dogs in the overall population approaches 80%. These values are chosen to match the proportion of chipped dogs in the baseline of the Consultation IA. Figure 1 shows the number of chipped and unchipped dogs projected over the next 10 years. We developed a spreadsheet model to predict the number of dogs and to assess the costs and benefits of the policy options¹⁰. The methodology leading to this estimate is detailed in annex A.

⁷ Pet Food Manufacturers Association, Annual Report 2013

⁸ DCLG 2013 Live tables on household projections, table 401. Available at: <https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections>

⁹ Report on the Cost Impacts of Compulsory Microchipping of Dogs in England, Dogs Trust, 2011

¹⁰ The model was peer reviewed internally to assure its quality.

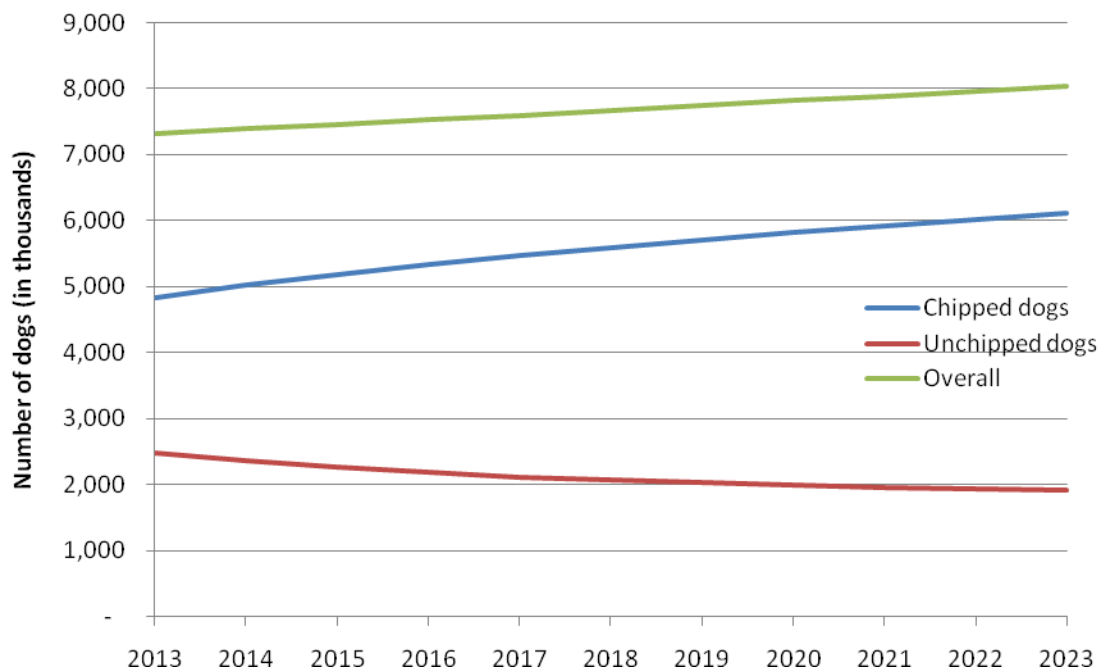


Figure 1 Projected dog population (Defra estimate)

29. Over the last three years an average of 102,000 strays were passed on to English local authorities. Approximately 56,000 were reunited with their owner identified through a collar, owner enquiries and in around 23,000 cases through a microchip. Of the remaining 46,000 dogs, 8,000 were put to sleep, 28,500 stray dogs were passed to welfare organisations for re-homing and 9,000 were re-homed by local authorities.
30. Local authorities house stray dogs for an average of 4 days¹¹ at an average daily cost of £21.50 per day¹². This gives a total of £8.9m in costs to local authorities for housing 102,000 stray dogs. In addition, each of the 8,000 euthanisations costs approximately £105¹³ which gives a cost of approx. £850k. We therefore estimate that stray dogs cause cost local authorities £9.7m.
31. Stray dogs passed on to welfare organisations take an average of 37 days¹⁴ before being re-homed. The welfare organisation incurs kennelling costs of approx. £21.50 per day¹⁴, which means each dogs costs approximately £800. Based on the number of dogs passed on to welfare organisations for re-homing the annual cost is approximately £22.7m. Taking account of costs incurred both by local authorities and welfare organisations means that stray dogs give rise to an annual cost of approximately £32.4m.
32. Data from the Stray Dog survey suggests that unchipped dogs are more likely to go astray than chipped dogs. Assuming that the currently observed rates at which unchipped and chipped dogs respectively go astray, we estimate that increased microchipping will cause a decline in the number of stray dogs over the next ten years to approximately 95,000 stray dogs without any intervention.
33. The Kennel Club together with Dogs Trust and other welfare organisations have provided significant financial support of initiatives aiming to increase the voluntary uptake of microchipping over the years. These initiatives include funding microchipping, regional

¹¹ According to Dog Trust (2013) 23% of stray dogs are microchipped (see Table 16). We assume that all chipped stray dogs are re-united with their owners within one day. Of the remaining stray dogs, 77% do not carry a microchip and may spend the full statutory period of seven days in local authority kennels. Approximately 54% (Dog Trust, 2013) of unchipped stray dogs are re-united or re-homed; assuming that unchipped dogs are picked up steadily up to the seventh day implies that the average housing period for unchipped dogs is 5 days $((100\%+46\%)/2 \cdot 7=5)$. Combining these two estimates gives an average kennelling period of 4 days for all stray dogs $(23\% \cdot 1 + 77\% \cdot 5=4)$.

¹² Assuming the same kennelling costs as for welfare organisations

¹³ Estimates provided by Dogs Trust and Battersea Dogs and Cats Home (including disposal costs), November 2013

¹⁴ Estimates provided by Dogs Trust and Battersea Dogs and Cats Home, November 2013

microchip installation and advertising campaigns. Veterinarians also encourage microchipping.

34. The Dogs Trust, in common with other re-homing/rescue centres microchip every dog without a microchip that arrives at their 17 re-homing centres in the UK. In 2013 this was some 15,000. All their centres, along with those of Battersea Dogs and Cat Home and the Blue Cross have been offering microchipping and registration at no cost to the dog owner¹⁵ for the last year to encourage all owners to microchip their dogs in the run up to 2016.
35. The Dogs Trust teams in their campaign regions (such as North of England, London) hold weekly responsible dog ownership events in key hotspot areas (identified in conjunction with their councils) at which free dog microchipping is offered. In London alone it has carried out over 100 events a year across 16 councils. Free microchipping is offered at each and every event. As well as free microchips, the Dogs Trust has offered all councils and housing associations in the North of England and Greater London free scanners, free microchipping training for all their staff, free microchipping literature to use to promote microchipping in their community, and free support with organising microchipping events in their borough or estates. Finally, the Dogs Trust offer free legal advice through a specialist solicitor to help councils and housing associations consider ways in which their tenancy agreements can be used to promote responsible dog ownership through compulsory microchipping. Free scanners have also been offered to councils, breeders and re-homing centres by the Kennel Club¹⁵. These offers have been in place prior to the announcement of the compulsory microchipping policy and form part of the baseline.

Monetised costs and benefits

36. A key element in the assessment is the number of dogs microchipped each year and the number of strays. To estimate these numbers, particularly relative to the baseline, we developed a model of the dog population (see annex A for more detail). Both Option 4 and 5 aim at increasing the number of dogs with a microchip. In this section we set out the estimation of the cost and benefits of the options relative to the baseline. The policy imposes costs on the public and breeder for chipping and registering dogs, which also is the main cost of the policy.
37. Enquiries of microchip suppliers suggest the cost of the microchips and initially registering the breeder's details is £4-£7.50 per dog depending upon the supplier and size of the order. We use the average price of £5.50 per microchip in the analysis.
38. Veterinarians charge between £10 to £40¹⁶ for implanting a microchip; this includes an element of profit and will also help the surgery to cover their overhead costs (rent, etc.). We expect that members of the public would get their dog microchipped by veterinarians during a routine visit and therefore do not anticipate any changes in the overhead costs. Thus, it is appropriate to use the costs incurred by the veterinarian to estimate the costs of microchipping. According to the British Veterinarian Association, the vet spends approximately 10 min to explain and implant the microchip at an hourly wage rate of £25.70¹⁷. Additionally, some member of the vet's staff requires 5 min for the initial registration at an hourly wage rate of £13.00¹⁸. Taking account of the cost of the microchip and labour time gives a cost of approximately £10.90 per dog chipped by the veterinarian.

¹⁵ Providing microchips and other services at no charge to the public incurs costs to civil society organisations.

¹⁶ See Purina homepage, last retrieved 11 February 2014. Available at: <http://www.purina.co.uk/content/your-dog/your-new-dog/responsible-dog-ownership/microchipping-your-dog>

¹⁷ The Annual Survey of Hours and Earnings, provisional results 2013, SOC 2216 (veterinarians) gives £19.77 per hour. This has been increased by 30% to cover non-wage costs of labour (leave, employer NI contributions, etc.).

¹⁸ The Annual Survey of Hours and Earnings, provisional results 2013, SOC 4 (administrative and secretariat occupations) gives £10.00 per hour. This has been increased by 30% to cover non-wage costs of labour (leave, employer NI contributions, etc.)

39. In the light of the high veterinary charge for implanting microchips, we assume that breeders will implant microchips themselves. We assume that it takes 15 minutes to implant a chip and register the breeder's details at an hourly wage rate of £11¹⁹. Taking account of the cost of the microchip and labour time gives a cost of approximately £8.25 per dog chipped by the breeder. We assume that commercial breeders sell roughly 34% of all puppies²⁰.
40. Once the dog has been chipped, the dog owner is required to maintain an accurate and current record on the database (e.g. when moving to a new address). Changing the database entry is costly and we assume that all dog owners take out a lifetime update service at a charge of £16²¹.
41. Financial constraints are not assumed in themselves to be an impediment for dog owners to microchip. Installation of a microchip is a small expense relative to the lifetime expense of a dog which is estimated by the RSPCA at between £16,000 - £31,000 depending on the breed and size of the dog. Furthermore, as noted above there are welfare organisations providing free microchipping service to all
42. In addition to these recurring costs, breeders and other businesses will have to bear a range of transition costs at the start of the policy:
- a. **Training for microchip implanters:** Microchipping must be done by a competent, trained person to ensure there is no physical distress, discomfort or resultant behavioural problems. Vets and welfare organisations, dog wardens, dog training clubs, rescue centres and grooming businesses have ready trained implanters and a number of voluntary sector organisations offer training on microchipping to local authorities. The training is currently being developed so the eventual cost is not yet known. However, the developer Lantra currently estimates this may cost up to £130. In addition to the cost for the training itself, we include a valuation for the 4 hours spent at the training at £11 per hour¹⁹. As in the consultation IA, we assume that every second registered breeders require training i.e. 2,250 breeders²². This gives a one-off cost of £392,000.
 - b. **Microchip scanners to identify dogs:** Those carrying out microchipping will also need to have scanners to read the microchip details. Suitable scanners cost approximately £80²³ but can cost more for the most advanced models. Based on 2,250 breeders, this give a one-off cost of £180,000.
 - c. **Database updates:** The regulation will specify the information that all databases need to record. Most of the information is already recorded, but some additional details (e.g. name and address of breeder). We assume that each database provider sets aside £50,000 to cover the costs of changing the database²⁴. We estimate accordingly that all four currently existing providers incur a cost of £200,000 in aggregate. Future providers will be able to design their database in compliance with the regulation and will not incur additional costs.
 - d. **Veterinary management practice systems:** These provide a link to the databases and need to amend their system to reflect the newly required information. Information obtained from the industry body VetXML suggests that

¹⁹ The Annual Survey of Hours and Earnings, provisional results 2013, SOC 6131 (animal care and control service) gives £8.45 per hour. This has been increased by 30% to cover non-wage costs of labour (leave, employer NI contributions, etc.).

²⁰ Based on the Pet Food Manufacturers Association (2010) see also Table 18 in Annex A.

²¹ All four databases offer a 'lifetime' service for a fee of £15 -18, with a median of £16. This fee covers the registration of the new keeper and any updates to the registered details (such as change of address) for the lifetime of the dog whilst with the keeper (or up to 8 years in one case).

²² No new information on the number of commercial breeders requiring training. We therefore retain the assumption made in the Consultation IA.

²³ Estimate provided by the Kennel Club, November 2013

²⁴ Aggregate and anonymised information of database providers (commercially sensitive). The Annual Survey of Hours and Earnings, provisional results 2013, SOC 2136 (Programmers and software development professionals) shows a weekly wage of roughly £1000 (including 30% non-wage costs). Hence, a budget of £50,000 is sufficient to hire five programmers for ten weeks which seems a conservative estimate.

these changes will cost £2,250 for each of the 15 suppliers²⁵. This gives a one-off cost of £34,000.

- e. **Information costs:** The change in policy will need to be made known widely to reduce incidences of non-compliance. It will be appropriate for Government to publish articles in appropriate veterinarian, trade and commercial publications, arrange for posters and leaflets to be available in veterinary surgeries, provide information to all licensed breeders and publicise the changes outside of the United Kingdom. A broadly similar information exercise was conducted for the publication in 2010 of the 3 Codes of Practice for the welfare of Dogs/Cats/Horses, Ponies, Donkeys and their Hybrids at a cost of £10,000. As this is a broader policy than the Code of Practice we expect the associated cost to be higher and estimate costs to Government of £20,000 under Option 4. The larger scale of Option 5 requires promoting the new policy wider and we expect higher costs of £40,000 under Option 5.

43. All animals entering the UK must already be microchipped under pet travel requirements. It will be a requirement that any dog brought into the country for more than 30 days must be registered on a database operating here by the keeper, or by the new keeper if the dog is sold or gifted on before then. The Animal Health and Veterinary Laboratories Agency advise that the numbers of recorded commercial imports have risen to around 2000 in the last three years. However as it is the keeper’s responsibility to register the dog there is no cost to business. The cost of keepers registering their dogs is covered in the general modelling.

44. As set out in paragraph 32, microchipping reduces the number of stray dogs and the duration stray dogs spend in Local Authority and rescue centre kennels. Accordingly, the key monetised benefit is avoided costs for kennelling and euthanizing stray dogs.

Option 4

45. Under this policy, breeders would need to ensure that their puppies are microchipped and registered before they are sold or gifted to a new keeper. Keepers have an obligation to keep their details on the database up to date. To allow Defra to inform breeders and members of the public and to allow sufficient lead-in time, the requirement would become effective one year from the regulations coming into force. Under the baseline, we assume that the proportion of microchipped puppies is the same as prevails in the overall population. Once the policy has become effective we assume that 85% of puppies are chipped and hence compliant with the chipping requirement²⁶.

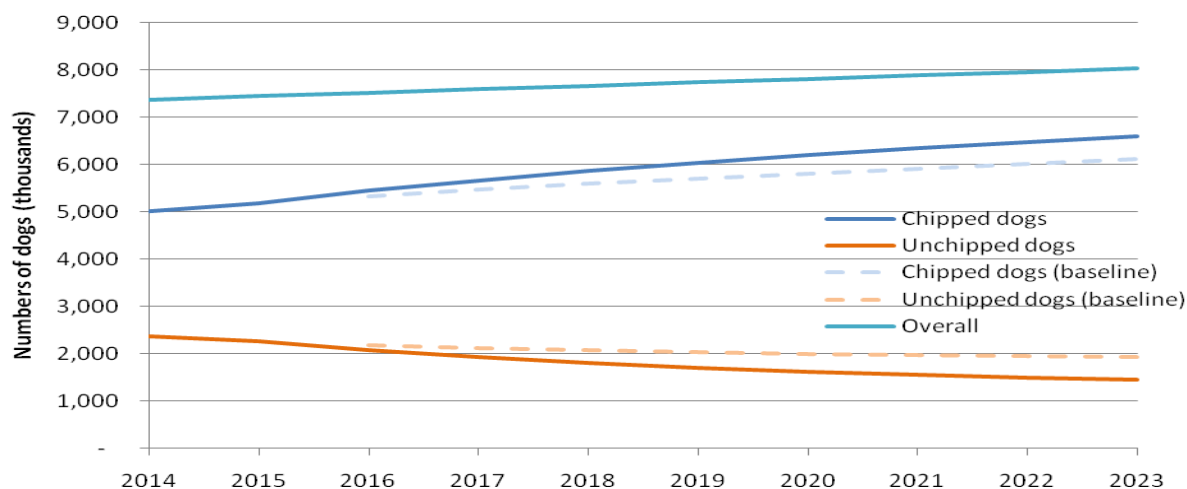


Figure 2 The number of chipped and unchipped dogs under Option 4

²⁵ Most of these are members of the VetXML consortium

²⁶ See paragraph 76. The assumption is based on compliance rates in other countries with compulsory microchipping,

46. Figure 2 shows the number of chipped and unchipped dogs under Option 4 in comparison with the baseline. It shows a gradual increase of chipped dogs above the baseline, which is caused by the higher proportion of chipped puppies. Table 2 shows the number of chipped puppies under the baseline, Option 4 and also the number of chipped puppies above the baseline. The number of unchipped stray dogs reduces under Option 4 compared to the baseline causing a decrease in the number of stray dogs chipped by civil society organisations. See annex A for more detail on the underlying population model.

Table 2 Chipped dogs under Option 4

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	Breeders	158	163	168	172	176	179	183	186	189	192
	Civil Society Organisations	27	26	25	24	24	23	23	23	22	22
	Local Authorities	9	9	8	8	8	8	8	7	7	7
	Public	393	384	378	375	373	374	375	377	380	384
Option 4	Breeders	158	234	236	239	241	243	245	248	250	253
	Civil Society Organisations	27	26	24	22	21	20	19	18	17	17
	Local Authorities	9	9	8	8	7	7	6	6	6	6
	Public	393	419	408	400	394	391	389	389	389	390
Compared to baseline	Breeders	0	71	69	67	65	64	63	62	61	60
	Civil Society Organisations	0	0	-1	-2	-3	-4	-4	-5	-5	-5
	Local Authorities	0	0	0	0	-1	-1	-1	-1	-2	-2
	Public	0	35	30	25	21	17	14	11	9	6

47. Table 3 shows the costs of Option 4. As set out in paragraphs 37 to 40 above, the breeder incurs costs of £8.25 for each chipped puppy and new the dog owner needs to pay £16 for registration and subsequent updates to the database. Puppies not sold by breeders (e.g. being passed on from friends or acquaintances) will need to be chipped by the dog owner. We would expect that these dog owners would not look around for the cheapest microchipping opportunity, but seize the opportunity to get the dog chipped during a visit to their veterinarian. We therefore assume that each puppy microchipped by a member of the public incurs costs of £10.90 for the implantation and further £16 for registration and subsequent updates to the database. The initial costs are described in paragraph 42.

Table 3 Costs of Option 4

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Dog Owners	Microchips	0	2,089	1,869	1,686	1,533	1,402	1,288	1,188	1,099	1,018	13,173
Government	Publicity	0	20	0	0	0	0	0	0	0	0	20
Breeders	Microchips	0	587	567	551	537	527	518	510	504	498	4,799
	Scanners	0	180	0	0	0	0	0	0	0	0	180
	Implantation training	0	392	0	0	0	0	0	0	0	0	392
Other businesses	Veterinary practice mgmt. system update	0	34	0	0	0	0	0	0	0	0	34
	Database update	0	200	0	0	0	0	0	0	0	0	200
	Transitional Costs	0	825	0	0	0	0	0	0	0	0	825
	Recurring costs	0	2,676	2,436	2,237	2,070	1,928	1,806	1,699	1,603	1,517	17,971
	Total Costs	0	3,501	2,436	2,237	2,070	1,928	1,806	1,699	1,603	1,517	18,797
	Discounted Costs	0	3,383	2,274	2,018	1,804	1,624	1,469	1,335	1,217	1,113	16,236

48. As pointed out in paragraph 6, microchipping encourages more responsible dog ownership and we expect the number of stray dogs to decrease (see Annex A for further details). We estimate that the total number of stray dog decreases from 99k in 2014 to 78k in 2023. Local authorities benefit from this development, as they kennel each chipped stray dog for one and each unchipped stray dog for 5 days (see footnote 11) at a daily cost of £21.50.

49. The picture differs slightly for chipped dogs; the increase in the number of dogs (both through the rising dog population and the rising proportion of chipped dogs) causes an increase in the number of chipped stray dogs. However, the owners of such dogs can be

identified and re-united with the dogs. Table 4 shows the projected number of chipped and unchipped stray dogs under Option 4.

Table 4 Number of chipped and unchipped stray dogs under Option 4

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	Chipped	24	25	26	27	27	28	28	29	29	30
	Unchipped	75	72	69	67	66	64	63	62	61	61
Option 4	Chipped	24	25	26	28	28	29	30	31	31	32
	Unchipped	75	72	66	61	57	54	51	49	47	46
Compared to baseline	Chipped	0	0	1	1	1	2	2	2	2	2
	unchipped	0	0	-3	-6	-8	-10	-12	-13	-14	-15
	Overall	0	0	-3	-5	-7	-9	-10	-11	-12	-13

50. Not all unchipped dogs can be re-united with their owner: about 10% are put down whilst in Local Authorities kennels, 36% of unchipped dogs are passed on to civil society organisations for re-homing and 12% are re-homed by the local authorities (see Table 17 in annex A). A reduction in unchipped dogs therefore generates savings for both local authorities and civil society organisations. Table 5 shows the numbers of euthanized dogs and the number of dogs re-homed by civil society organisations and local authorities.

Table 5 Number of dogs euthanized and re-homed by civil society organisations

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Euthanised	10% of unchipped stray dogs	0	0	0	-1	-1	-1	-1	-1	-1	-2
Re-homed by civil society organisations	36% of unchipped stray dogs	0	0	-1	-2	-3	-4	-4	-5	-5	-5
Re-homed by local authorities	12% of unchipped stray dogs	0	0	0	0	-1	-1	-1	-1	-2	-2

51. The reduction of the overall number in stray dogs generates an average annual saving of roughly £4.2m over the period of 2016 – 2023. Each euthanasiation and disposal costs local authorities £105¹³ and the reductions in euthanized dogs generate a saving of £37k in 2016, which rises to £163k. The local authority chips an unchipped stray dog before re-homing and consequently the reduction in number leads to an annual saving of approximately 10k over the period 2016 – 2023 Civil society organisations benefit from the reduction in dogs for re-homing by approximately £3m on average. Table 6 summarises the benefits of Option 4

Table 6 Benefits of Option 4

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Local Authorities	Kennelling	0	0	351	640	878	1,074	1,234	1,365	1,471	1,556	8,569
	Euthanasiation	0	0	37	67	92	113	130	143	154	163	899
	Microchipping	0	0	3	6	8	10	11	13	14	14	79
Civil society organisations	Kennelling	0	0	974	1776	2,437	2,981	3,427	3,791	4,084	4,319	23,789
	Microchipping	0	0	10	18	25	31	36	39	42	45	247
	Total	0	0	1,374	2507	3,441	4,208	4,838	5,351	5,766	6,097	33,583
	Discounted	0	0	1,283	2262	2,999	3,543	3,936	4,206	4,379	4,473	27,080

52. To summarise the costs and the benefits of Option 4, we subtract the sum of discounted costs from with the sum of discounted costs. The resulting figure is called net present value (NPV) and indicates the monetised value of the policy option. Table 7 shows the calculations and a NPV of approximately £10.8m.

Table 7 Summary of costs and benefits of Option 4

in thousand £2012	
PV Benefits	27,080
PV Costs	16,236
Net Present Value	10,844

Option 5 Regulate for compulsory microchipping of all dogs within 18 months of legislation coming into force together with requirements to keep records up to date and sanctions for non-compliance

53. Under this option all dogs need to be microchipped from April 2016. This means that all existing dogs and all puppies are required to be microchipped and registered, as well as all imported dogs of any age to be registered on a database after being in the country for 30 days or on transfer of keepership if sooner. Breeders would need to ensure that their puppies are microchipped and registered before they are sold or gifted to a new keeper. Keepers have an obligation to keep their details on the database up to date.

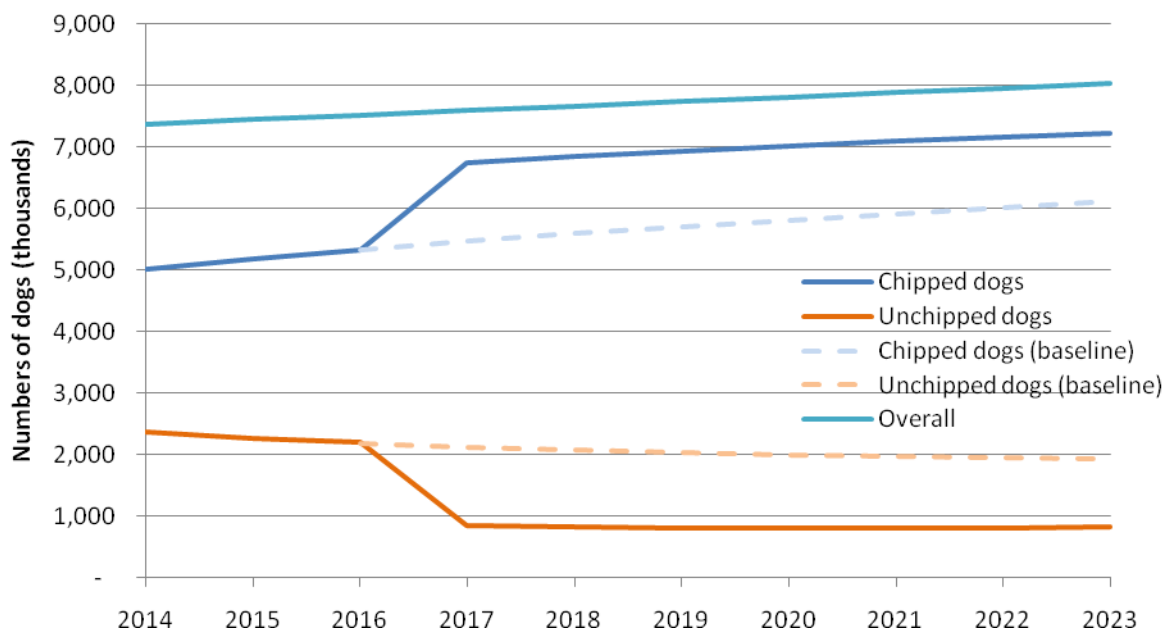


Figure 3 The number of chipped and unchipped dogs under Option 5

54. Figure 3 shows the number of chipped and unchipped dogs under Option 5 in comparison with the baseline. In 2016, it shows a steep increase of chipped dogs above the baseline which is caused by the compulsory microchipping requirement. We assume that only 60% of unchipped adult dogs comply with the regulation and 85% of puppies (as in Option 4). Table 8 shows the number of chipped puppies under the baseline, Option 5 and also the number of chipped puppies above the baseline (see annex A for details on the estimation methodology)

Table 8 Number of chipped dogs under Option 5 and compared to the baseline

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	Breeders	158	163	168	172	176	179	183	186	189	192
	Civil Society Organisations	27	26	25	24	24	23	23	23	22	22
	Local Authorities	9	9	8	8	8	8	8	7	7	7
	Public	393	384	378	375	373	374	375	377	380	384
Option 5	Breeders	158	163	236	239	241	243	245	248	250	253
	Civil Society Organisations	27	26	1,116	10	9	9	9	9	9	9
	Local Authorities	9	8	8	3	3	3	3	3	3	3
	Public	393	384	470	400	394	391	389	389	389	390
Compared to baseline	Breeders	0	0	69	67	65	64	63	62	61	60
	Civil Society Organisations	0	0	1,091	-15	-14	-14	-14	-13	-13	-13
	Local Authorities	0	0	0	-5	-5	-5	-5	-4	-4	-4
	Public	0	0	92	25	21	17	14	11	9	6

55. Table 9 shows the costs of Option 5. The Dogs Trust offers free microchips worth up to £6m to veterinarians, local authorities and housing associations in the lead up to microchips becoming compulsory in England in April 2016. At a price of £5.50, these funds are sufficient to buy approximately 1.1m microchips, which are implanted by volunteers. Assuming the same labour costs as for breeders (£2.25 per microchip) implies that the free microchipping campaign has a total value of up to £9m. In the central scenario, the number of dogs microchipped in 2016 exceeds the 1.1m offered by the Dogs Trust. The remainder needs to be chipped by a veterinarian at the expense of the public at a cost of £10.90 per dog (see paragraph 38). In addition, all dog owners incur a cost of £16 to take out a lifetime update service for their dog (see paragraph 40).

Table 9 Costs of Option 5

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Dog Owners	Microchips	0	0	1,895	1,422	1,292	1,182	1,088	1,005	931	864	9,680
	One off intervention	0	0	19,139	0	0	0	0	0	0	0	19,139
Government	Publicity	0	0	40	0	0	0	0	0	0	0	40
Breeders	Microchips	0	0	567	551	537	527	518	510	504	498	4,212
	Scanners	0	0	180	0	0	0	0	0	0	0	180
	Implantation training	0	0	392	0	0	0	0	0	0	0	392
Other businesses	Veterinary practice mgmt. system update	0	0	34	0	0	0	0	0	0	0	34
	Database update	0	0	200	0	0	0	0	0	0	0	200
Civil society organisations	Free microchip initiative	0	0	9,000	0	0	0	0	0	0	0	9,000
	Transitional costs	0	0	28,984	0	0	0	0	0	0	0	28,984
	Recurring costs	0	0	2,462	1,973	1,830	1,709	1,605	1,515	1,435	1,363	13,892
	Total costs	0	0	31,446	1,973	1,830	1,709	1,605	1,515	1,435	1,363	42,876
	Discounted costs	0	0	29,355	1,780	1,594	1,439	1,306	1,191	1,090	1,000	38,755

56. Under Option 5, we estimate that the total number of stray dog decreases from 99k in 2014 to 61k in 2023. Similar to Option 4, the number of unchipped stray dog decreases, while the increase in the number of dogs (both through the rising dog population and the rising proportion of chipped dogs) causes an increase in the number of chipped stray dogs. However, the owner of such a dog can be identified and re-united. Table 10 shows the projected number of chipped and unchipped stray dogs under Option 5.

Table 10 Number of chipped and unchipped stray dogs under Option 5

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	Chipped	24	25	26	27	27	28	28	29	29	30
	Unchipped	75	72	69	67	66	64	63	62	61	61

Option 5	Chipped	24	25	26	33	33	34	34	34	35	35
	Unchipped	75	72	69	27	26	25	25	25	26	26
Compared to baseline	Chipped	0	0	0	6	6	6	6	6	6	5
	unchipped	0	0	0	-40	-40	-39	-38	-37	-36	-35
	Overall	0	0	0	-34	-34	-33	-32	-31	-30	-30

57. Not all unchipped dogs can be re-united with their owner: about 10% are put down whilst in local authorities' kennels and 32% of unchipped dogs are passed on to civil society organisations for re-homing and 12% are re-homed by local authorities (see

Table 17). A reduction in unchipped dogs therefore generates savings for both local authorities and civil society organisations. Table 11 shows the numbers of euthanized dogs and the number of dogs re-homed by civil society organisations.

Table 11 Number of dogs euthanized and passed on to civil society organisations

in thousand dogs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Euthanised	10% of unchipped stray dogs	0	0	0	-4	-4	-4	-4	-4	-4	-4
Re-homed by civil society organisations	36% of unchipped stray dogs	0	0	0	-15	-14	-14	-14	-13	-13	-13
Re-homed by local authorities	12% of unchipped stray dogs				-5	-5	-5	-4	-4	-4	-4

58. The reduction of the overall number in stray dogs generates an average annual saving of roughly £15.4m over the period of 2017 – 2023. The reductions in euthanized dogs generate a saving of £443k in 2017, which falls slightly to £382k. The local authority chips an unchipped stray dog before re-homing and consequently the reduction in number leads to an annual saving of approximately 36.5k over the period 2017 – 2023. Civil society organisations benefit from the reduction in dogs for re-homing by £11m on average. Table 12 summarises the benefits of Option 5

Table 12 Benefits of Option 5

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Local Authorities	Kennelling	0	0	0	4,216	4,138	4,048	3,951	3,849	3,744	3,640	27,586
	Euthanasiation	0	0	0	443	434	425	415	404	393	382	2,896
	Microchipping	0	0	0	39	38	37	37	36	35	34	255
Civil society organisations	Kennelling	0	0	0	11,706	11,489	11,240	10,968	10,684	10,396	10,105	76,588
	Microchipping	0	0	0	121	119	117	114	111	108	105	794
Total		0	0	0	16,525	16,220	15,867	15,484	15,083	14,675	14,265	108,120
Discounted		0	0	0	14,905	14,135	13,360	12,596	11,855	11,145	10,467	88,462

59. To summarise the costs and the benefits of Option 5, we subtract the sum of discounted costs from with the sum of discounted costs. The resulting figure is called net present value (NPV) and indicates the monetised value of the policy option. Table 13 shows the calculations and a NPV of approximately £49.7m.

Table 13 Summary of costs and benefits of Option 5

	in thousand £2012
PV Benefits	88,462
PV Costs	38,755
Net Present Value	49,708

Non monetised costs and benefits

60. In addition to the monetised costs and benefits in the previous section, microchipping is likely to generate a range of non-monetised costs and benefits.

Benefits

61. The improved traceability of dog owners will also aid in issuing control orders and in prosecutions of cruel and irresponsible owners, which might lead to savings for enforcement authorities. It might also act a deterrent to irresponsible dog ownership (e.g. letting the dog out of the house unsupervised) and against dog theft.

62. A good record of dog owners can also lead to disease control benefits as it could enable veterinarians to contact owners for health schemes and emergency procedures. This is particular relevant in the case of any diseases that can be transferred to humans such as rabies.

63. The wellbeing of dogs provides an intrinsic benefit to those in society who care about dogs. If dog welfare improves then these people will benefit and they would, in principle, be willing

to pay a monetary amount to increase responsible ownership. Therefore, improvements in dog welfare should be considered as a further additional benefit above the monetary benefits resulting from reduced kennelling, microchipping and euthanasia costs. Increasing uptake of microchipping allows owners/breeders to be traced and provides them with an incentive to improve general dog welfare, in particular by:

- a. **Improving the health status of puppies:** It is understood from evidence presented by the Blue Cross that puppies are often passed to owners (either sold or given away) with health concerns including worms, fleas, malnutrition and various serious diseases, dogs may be poorly socialised by breeders or not inoculated. In addition to the health expenses, the illness of puppies negatively affects the dog's welfare. Local authorities enforce the Breeding and Sales of Dogs Act and licence commercial breeders. So where illnesses are tracked back to breeders raising litters in poor environments, then immediate action can be taken
- b. **Limiting improper breeding:** Poor breeding practices may also lead to genetic defects being perpetuated or appearing which may need considerable treatment. Perpetuating or introducing genetic defects into the dog population causes pain and suffering for the affected dogs and therefore reduces the dog's welfare. Additionally, the treatment costs can be very expensive. Again, enabling local authorities to trace and prosecute irresponsible breeders will improve the general welfare status of the dog population over time.
- c. **Reducing Dog attacks:** Attacks on people and other animals may be the result of keepers not training and so not controlling their dogs properly. As microchipping allows the keeper to be identified, the keeper can be held to account for the actions of their dog. Knowledge of that traceability will be an incentive to keepers to train and control their dogs better which in turn would lead to fewer prosecutions, lower veterinary bills in respect of injured animals and reduced costs to the NHS in treating injuries to people. Hospital Episode Statistics show that the number of hospital admissions as a direct result of dog attacks has increased from 2,915 in financial year 1997-98 to 6,334 between June 2012 and May 2013²⁷ and that there are more than 200,000 dog attacks in England every year that require treatment in A&E Departments or Drop-in Centres.

Costs

64. Dog owners will need to maintain accurate data with the database and may need to update their details for example as a result of moving house. The costs assumed for registering the dogs (see footnote 21) already covers any amendments for the lifetime of the dog. However, there will be a small time cost incurred by the dog owner to update the details. There is no evidence on the number of average updates recorded during the lifetime of a dog and we were therefore not able to quantify these costs to the public.
65. Implanters other than breeders or vets (e.g. dog groomers) may or may not already meet the new training standards imposed by the regulation. If they already meet the required standard then no additional training will be required. However, others will have to undergo training to become a qualified implanter or cease to implant microchips. There is no evidence on how many commercial implanters there are in England and we were not able to quantify the expected training costs.
66. New offences will be introduced for not microchipping and not keeping registration details up to date. However, it is recognised that whilst it will be necessary to have sanctions for those failing to microchip puppies and those failing to keep their records up to date, police and local authority resources are stretched. As a result so it is expected that enforcement will be restricted to irresponsible owners whose dogs have been allowed to cause a problem

²⁷ <http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=1131>

such as fouling, causing a nuisance or out of control. It is also likely to be used in cruelty cases or cases of unlicensed breeding. Any enforcement action is likely only to be part of a wider action. Actions on just failing to microchip will be very few. However Option 5 would lead to more legislative certainty since, under this option, dogs found without a microchip or certificate of exemption would be in breach of the law. Option 4 will be harder to enforce as without further investigation it will be unclear whether a dog found without a microchip is legally obliged to have one or otherwise as it is difficult to age a dog past six months of age and so to determine whether it is in scope of the regulations. It has therefore been assumed that there are no quantifiable enforcement costs as enforcement is likely to be limited.

Sensitivity analysis

67. We conduct extensive sensitivity analysis in Annex B.

Business costs and One In, Two Out status

68. For the purpose of One In, Two Out (OITO), we only assess the direct impacts on businesses and civil society organisations²⁸. The compulsory microchipping of puppies imposes costs on breeders to microchip their puppies, seek out training and procure a microchip scanner. We assume that all breeders fully comply with the regulation and chip all their puppies. Furthermore, database and veterinary practice management providers need to update their systems as a direct consequence of the regulation. For the purpose of the OITO assessment, we assume that these costs remain with the businesses. In practice, we would actually expect this cost to be passed on to the dog owners.

69. Costs avoided by civil society are an indirect benefit. Microchipping encourages more responsible dog ownership, which in turn reduces the number of stray dogs and therefore the number of dogs for re-homing. Because of this indirect nature these benefits do not constitute a direct benefit to civil society organisations and need to be disregarded for the calculation of the equivalent annualised net cost to business (EANCB)²⁹. Table : shows the cost to business under Option 4. Table

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Breeders	Microchips	0	587	567	551	537	527	518	510	504	498	4,799
	Scanners	0	180	0	0	0	0	0	0	0	0	180
	Implantation training	0	392	0	0	0	0	0	0	0	0	392
Other businesses	Veterinary practice mgmt. system update	0	34	0	0	0	0	0	0	0	0	34
	Database update	0	200	0	0	0	0	0	0	0	0	200
Total costs		0	1,392	567	551	537	527	518	510	504	498	5,604
Discounted costs		0	1,345	529	497	468	443	421	401	383	366	4,853

70. The chipping of adult dogs (Option 5) is a regulation on individual citizens, not on businesses and is not considered for OITO. Civil society organisations announced to fund £9m worth of microchips and volunteers time under Option 5. This is a purely voluntary measure, rather than a requirement, and as such is not a direct cost imposed by the regulation. Table 14 shows the direct cost to business under Option 5.

Table 14 Direct cost to business under Option 5

in thousand £2012		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum
Breeders	Microchips	0	0	567	551	537	527	518	510	504	498	4,212
	Scanners	0	0	180	0	0	0	0	0	0	0	180

²⁸ see Better Regulation Framework Manual (July 2013), item 1.9.31 – 1.9.33 on p. 45

²⁹ “The EANCB of a regulation is defined as the annualised value of the present value of net costs to business and civil society organisations. This includes both annually recurring net costs and net transitional costs that occur as a result of the regulation being introduced / removed / simplified” (see paragraph 44 in HMG, 2011, One In, One Out Methodology)

	Implantation training	0	0	392	0	0	0	0	0	0	0	392
Other businesses	Veterinary practice mgmt. system update	0	0	34	0	0	0	0	0	0	0	34
	Database update	0	0	200	0	0	0	0	0	0	0	200
	Total costs	0	0	1,372	551	537	527	518	510	504	498	5,017
	Discounted costs	0	0	1,281	497	468	443	421	401	383	366	4,260

71. Based on the discounted cost to business in Table and Table 14 we calculate the EANCB. Both options show a direct net cost to business (see

72. Table 15) and accordingly need to be classified as an IN. Option 4 and 5 have the same recurring costs to business because the number of puppies chipped by breeders is the same under both Options. The transition costs are also unaffected by the additional requirement to chip adult dogs under Option 5. Option 5 shows a lower direct cost to business because it is implemented one year later.

Table 15 Direct impact on business and civil society organisations of Options 4 and 5

In thousand £s		PV £2012, 2014 base year	PV £2009, 2010 base year	Equivalent Annual
Option 4	Direct cost to business	4,853	3,943	458
	Direct benefits to business	0	0	0
	EANCB			458
Option 5	Direct cost to business	4,260	3,461	402
	Direct benefits to business	0	0	0
	EANCB			402

Proportionality of IA

73. The major costs and benefits of this policy, namely the cost of implanting and updating the microchips and the resulting benefits of reducing the kennelling costs of stray dogs have been monetised. This IA additionally includes the cost of upgrading databases to comply with specific standards and to record specified information. As for others benefits, such as those arising from reducing dog attacks and improving breeding standards, the information required for robust quantification is unavailable and would have been prohibitively costly to obtain. We had hoped that the consultation exercise would reveal sufficient evidence to help estimate the likely willingness of the public to pay for these benefits. In the event such information is only indirect. 96 % of respondents supported compulsory microchipping. 51% thought there would be a burden on the public but it was recognised by many that it would be negligible (see paragraph 18). Given the data constraints in this field and the relative magnitude of the various impacts we believe that this represents a proportionate approach to the quantification of the impacts of this policy measure.

Risks and assumptions

74. The enforcement of the policy is limited to owners who allow their dogs to cause problems, including straying, fouling and attacks on people or other animals. There are concerns that the low enforcement efforts may not encourage owners to comply with the legislation. Option 4 could also lead to further under compliance in the short to medium term as it is difficult to age a dog once it is 6 months old or more and thus some keepers could claim their dogs are older than they are (and were born before regulations came into force) to avoid compliance. This specific risk to Option 4 is not a risk under Option 5 as all dogs must be microchipped and there is enforcement certainty.

75. The policy aims to reduce instances of irresponsible ownership; those irresponsible owners are less likely to comply with the microchipping legislation but are likely to come to attention under legislation covering problems of irresponsible ownership such as the Dangerous Dogs Act or Animal Welfare Act, and microchipping may be enforced through that legislation.

There is a risk that the full potential benefits outlined here may not materialise if uptake amongst those targeted by the policy is lower than we assume. But that risk will be offset at least in part by irresponsible owners coming to light through breaching other regulations, such as the Dangerous Dogs Act, breeding regulations etc. for which the requirement to microchip can be imposed as part of the sanctions under those rules.

76. Concerns regarding uptake are partially mitigated by evidence from other countries. Compulsory microchipping schemes have been implemented in many other countries including: France, Denmark, Spain, Sweden, Portugal and Japan. In European countries with compulsory microchipping legislation there are high levels of compliance with 80% to 90% of dogs estimated to be microchipped.³⁰ With the exception of dogs in inner city areas it is therefore expected that compliance with this regulation is likely to be high.
77. There are concerns that databases may encounter problems in registering high volume of dogs. The long lead in time and the planned information campaign should result in a steady effort to microchip dogs, which will enable databases to manage their workload better.
78. In addition, to the assumptions highlighted in the text above used in the analysis are explained in Annex A and Table 21 and Table 22 in Annex B.

Wider impacts

Justice System

79. As explained in paragraph 66, new sanctions are being created to make it unlawful for keepers to fail to have a dog microchipped and registered on a database and to keep those details current, for microchips implanted to meet certain international standards, database operators to record specified information and operate to specified standards and for implanters to be trained and assessed to standard approved by the Secretary of State. It is proposed that breaches will be in the first instance by the serving of a Notice, which can be appealed to First Tier Tribunal. There would only be a prosecution if a Notice is not complied with. Local authorities will be given powers to chip dogs and recover the costs from the keepers.
80. The people most likely to infringe the regulations are the minority of keepers that are irresponsible and allow their dogs to cause a nuisance, foul, be dangerously out of control etc. As such offences of failing to microchip or keep records up to date are likely to be additions to enforcement action taken under other legislation such as the Dangerous Dogs Act or anti-social behaviour legislation rather than stand-alone cases. This will minimise the impact on the Justice system. Discussions are ongoing with Ministry of Justice colleagues regarding sanctions and the use of tribunals.

Health and Wellbeing

81. Microchipping will confer traceability of dogs to their owners and as such confer accountability where a keeper through poor training and control of their dog causes injury or death to another person. As such microchipping is an incentive to keepers to properly train and control their dogs which in turn should lead to fewer attacks causing death injury or distress. This would lead to less human suffering and treatment costs.

Small and Micro Business Assessment

82. Despite a paucity of evidence on the nature of the industry one can safely assume that it is unlikely any commercial breeder or dog trader employs more than 10 full-time employees (FTE). Breeding dogs is not labour intensive work and the market is not concentrated enough for there to be businesses operating with more than 10 FTE's. The direct business costs outlined above of £0.4m for the preferred option are therefore likely to fall entirely on

³⁰ European Pet Network/The Kennel Club estimates

micro-businesses. An exemption of micro businesses would therefore undermine the effectiveness of the policy and cannot be granted. However, the preferred option will only become effective in 2016 and grants micro-businesses a long lead in time to comply with the regulation and businesses can offset the higher costs with higher prices for their puppies.

83. Those dog breeders/traders not already microchipping their dogs may need to be trained to implant microchips and those breeders and pet shops selling puppies will need a scanner to read microchips. Whilst there is an initial outlay, it is relatively small at approximately £220-£300. The microchips will cost dog breeders/traders approximately £8 to install, which is a small amount relative to the retail price of a puppy and the lifetime cost of its care. Taking this into account it is likely that breeders will be able to pass the cost of the microchip onto the customer and this is unlikely to result in lower sales. The costs being passed on to keepers effectively mean that the burden will not be on micro-businesses but on the keepers to whom microchipping is providing the benefit of having their dogs returned if lost.
84. The additional information to be recorded by databases and captured by Veterinary practice management software is vital to re-unite the dogs and therefore avoid negative welfare impacts. An exemption of businesses to record the required information could therefore threaten the attainment of the policy targets.

Competition assessment

85. This policy is not expected to have any substantial impact on competition within the microchipping industry. Provided their products meet specified standards, the policy does not discriminate between microchip providers. The regulation is also subject to consultation under the EU Technical Services Directive, which gives other EU member states the opportunity to voice any concerns about potential adverse impacts on competition.
86. The policy does not discriminate between microchip installers provided they have undertaken the required training and meet the required standards. Dog owners/breeders requiring microchipping can still use existing microchip installers whether they be vets, dog breeders or welfare organisations. Nevertheless, as recognised above, it is possible that there will be the incentive for more people to enter the microchipping market so existing providers may face increased competition. This impact is likely to be matched by increased demand for microchips and microchipping services

Summary (including non-quantified costs and benefits)

87. Option 4 concerns the proposal to introduce compulsory microchipping gradually through microchipping puppies only. This policy would help build the numbers of microchipped dogs in the general population as older dogs die and are replaced without placing a requirement on owners of currently un-microchipped dogs who are free to keep their dogs un-microchipped. It would take the longer to realise full benefits to society. This legislation will create a steady, manageable workload for the microchip database operators and implanters. However it will be difficult to enforce. This policy has the lower net present value of £10.8m
88. Option 5 provides the greater savings. There will be a short term burden on existing dog owners who will have to microchip their dog within a relatively short time. A compulsory scheme provides legislative certainty for owners and enforcers and this option was announced as the way forward, following Cabinet Clearance in February 2013 and has the highest net present value at £49.7m.
89. Both options have non-quantified costs associated with them. Enforcement of failure to microchip could add costs to CPS and Courts but those most likely to default are likely to be made compliant under other legislation (e.g. Dangerous Dogs Act). Responsible owners who are likely to obey any notice served upon them should not add any significant caseloads to the CPS and Courts. There will also be costs to the public associated with the time spent

updating their contact details on the microchip databases but there is no evidence of the number of average updates in a dog's lifetime so this cannot be quantified.

90. Both options have unquantified benefits. These are likely to accrue more quickly with Option 5 over Option 4. There will be a reduced incidence of welfare problems caused by kennelling untraceable dogs and an increase in dog health and savings to owners through a gradual reduction in illnesses and defects caused by poor breeding conditions and practices because problems are more traceable back to breeders who can then be brought to account. Increasing traceability leading to more healthy dogs and a decrease in the pressures on charitable veterinary organisations like the PDSA and the Blue Cross. In addition a reduction in the time that re-homing centres have to look after lost dogs and the need to destroy more difficult to re-home dogs. That traceability will also encourage more responsible ownership that in turn should lead to reduced numbers of dog attacks and savings to the NHS in treating those attacks together with savings from a reduction in lost days of work. There is also likely to be a reduction in dog nuisance to the benefit of society.

Annex A: Estimating numbers of dogs, cost and benefits

91. To assess the impact of compulsory microchipping of dogs, we use a two-step approach. First, we set up a model of England's dog population. Second, we estimate the costs and benefits of the policy based on the changes in the dog population. We consider following scenarios:

- Do nothing (Option 0) to establish a baseline
- All puppies are required to be chipped from 2015 (Option 4)
- All dogs need to be microchipped from 2016 (Option 5)

The following section explains the structure of the population and cost/benefit model.

Population model

92. The population model has the purpose to estimate:

- The number of dogs subject to compulsory microchipping
- The number of chipped and unchipped stray dogs

93. In order to do so, we divide England's dog population into two categories (chipped/unchipped) and model the most important flows over time. These are:

- Births and deaths
- Chipping of adult dogs
- Dogs go astray
- Returned to owner
- Re-homed
- Euthanized

94. Figure 4 gives a schematic overview of the population model. The percentages refer to the population which the arrow originates from with the only exception of births, which refers to the population dogs are born into. The following sections will explain each flow and its quantification.

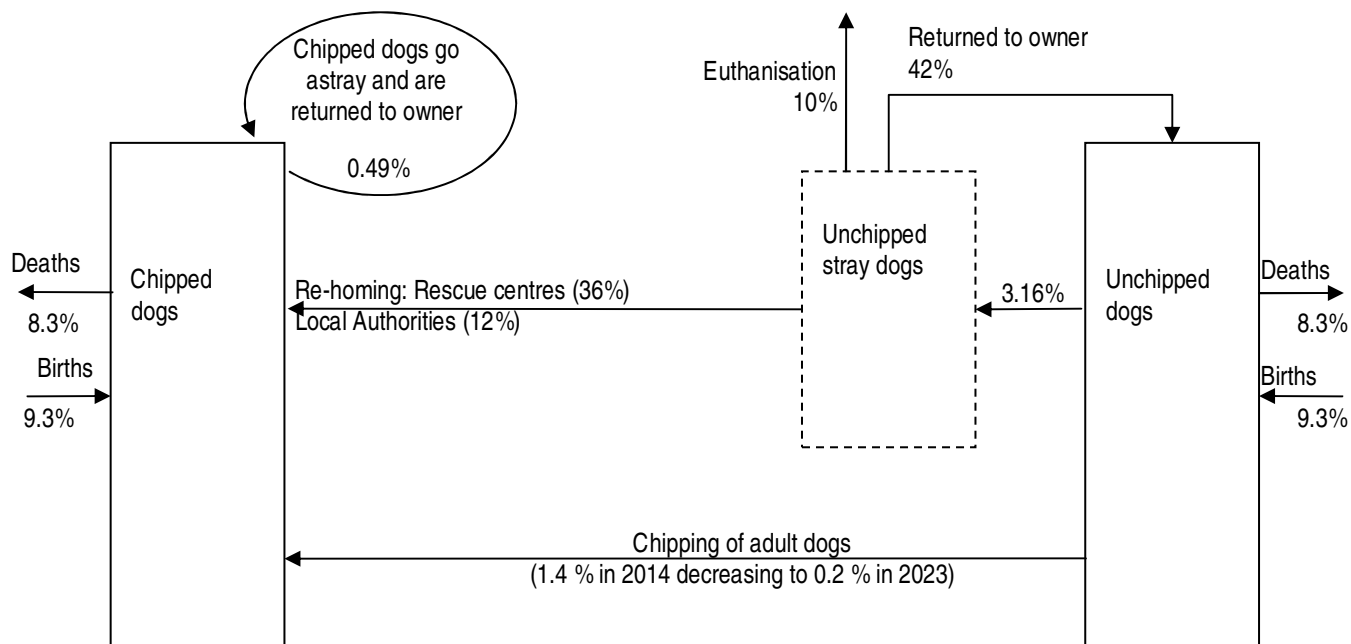


Figure 4 Schematic overview of the baseline population model.

The current chipped and unchipped dog population

95. The Pet Food Manufacturers Association estimates that there are currently 8.5m dogs in the UK. The policy only covers England and we use the number of households to scale down the dog population number. According to DCLG³¹ household data, approx. 86% of all UK households are in England and therefore estimate the English dog population approx. 7.3m dogs. There are currently four active databases with entries on 4.8m microchipped dogs (2/3 of the dog population).

Birth, Deaths and population growth

96. The average lifetime of a dog is assumed to be 12 years, which implies that each year approx. 8.3% of the dog population dies. We also expect that the dog population grows in line with England's household numbers at an annual growth rate of 0.96% per year³¹. To reach an overall growth rate of the population, the birth rate needs to exceed the proportion of dead dogs. Accordingly we chose a birth rate of 9.7%.

Number of stray dogs

97. We estimate that approx. 102,000 stray dogs are picked up by local authorities (LA) each year³². According to the stray dog survey, only 11% of stray dogs had a microchip but this question only has a response rate of about 10%. This could mean that the percentage of stray dogs with a microchip could be much higher. The stray dog survey also asks for the method stray dogs are re-united with their owner: 21% of returned stray dogs were due to the owner contacting the LA, 19% were identified using a microchip, 2% were identified by their ID disk, 2% had both an ID disk and microchip and for the remaining 56% the method is not known.

98. We assume that the records for all microchipped stray dogs are up to date and hence these dogs can be returned to their owner. To derive an upper bound for the proportion of

³¹ See table 401 of DCLG household projections. Available at: <https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections>, last retrieved on 28 January 2014

³² Dogs Trust (2013) Stray Dog Survey, three year average

microchipped dogs, we assume that all dogs for which the method of re-unification is not known are in fact microchipped. This would imply that 75% of dog re-unifications are due to microchips, which suggests that a maximum of 36% of stray dogs carry a microchip.

99. The calculations suggest that 10% to 36% of the stray dog population have a microchip. In the absence of further information, we use the midpoint between those two extremes as our best estimate and assume that 23% of stray dogs are chipped.
100. The simplest approach to compute the propensity to go astray would be to assume that both chipped and unchipped dogs are equally likely to go astray. This would imply that we would observe approx. 2/3 of stray dogs carry a microchip. This seems contrary to the stray dog survey which shows a much smaller proportion of stray dogs with microchip. The much lower proportion of stray dogs with microchip compared to the proportion of chipped dogs in the overall population suggests that unchipped dogs have a higher propensity to go astray. We estimate that each year only 0.49% of chipped dogs go astray compared to 3.16% of unchipped dogs.

What happens to stray dogs

101. Approximately 48% of all stray dogs are returned to their owner, whilst 25% are passed on to civil society organisations for re-homing, 8% are re-homed by the local authority (LA) directly, 7% euthanized by the LAs, and 12% are unaccounted for³³. The modelling requires keeping track of all stray dogs and we assume that the given responses are representative for the whole stray dog population. Consequently, we need to scale up the proportions of dogs being euthanized, re-homed and re-united with their owner:

Table 16 The destiny of stray dogs

Flow	All stray dogs	Scaled up
Re-united with owner	48%	55%
Re-homed by civil society organisation	25%	28%
Re-homed by Local Authorities	8%	9%
Euthanised	7%	8%
Unknown	12%	0%
3 year average, Source: Dogs Trust (2013)		

What happens to unchipped stray dogs

102. Table 16 shows the overall flows of *all* stray dogs. We also need to consider that all chipped stray dogs are returned to their owner, to keep track of what happens to unchipped stray dogs. The 55% figure for re-uniting stray dogs with their owner includes both chipped and unchipped dogs. Because all chipped dogs are re-united with their owners only the remainder is due to unchipped dogs. Furthermore, only unchipped dogs are re-homed or euthanized. Both considerations mean that we need to adjust the percentages in Table 16 to take full account of all unchipped dogs. Table 18 shows what happens to chipped and unchipped stray dogs, based on 23% of stray dogs being chipped:

³³ Based on three year averages

Table 17 What happens to unchipped stray dogs

Flow	(A) All stray dogs [(A)=(B)x(C)+ (D)x(E)]	(B) Proportion of chipped stray dogs	(C) What happens to chipped stray dogs	(D) Proportion of unchipped stray dogs	(E) What happens to unchipped stray dogs
Re-united with owner	55%		100%		42%
Re-homed by Rescue centres	28%	23%	0%	77%	36%
Re-homed by Local Authorities	9%		0%		12%
Euthanised	8%		0%		10%
	100%		100%		100%

Chipping of adult dogs

103. There has been a growth in the number of microchipped dogs over the last few years. It is estimated that this growth would continue without any policy intervention albeit at a slowing pace. The growth rates are chosen to follow the Consultation IA such that the proportion of chipped dogs in the dog population grows from 66% in 2013 to 75% in 2023.

Policy impact of Option 4

104. Option 4 requires the chipping of all puppies born after April 2015. We expect a certain degree of non-compliance and assume that only approximately 85% of puppies are chipped after the policy comes into effect. This changes the modelling in so far that 85% of all puppies born become part of the chipped dog population, whereas the baseline model assumes that puppies are microchipped in the same proportion as prevails in the dog population. Figure 5 shows schematically how the change affects the population model. The modelling of Option 4 differs to the baseline such that births into the chipped and unchipped population are based on the whole population and driven by the compliance to the compulsory microchipping regulation.

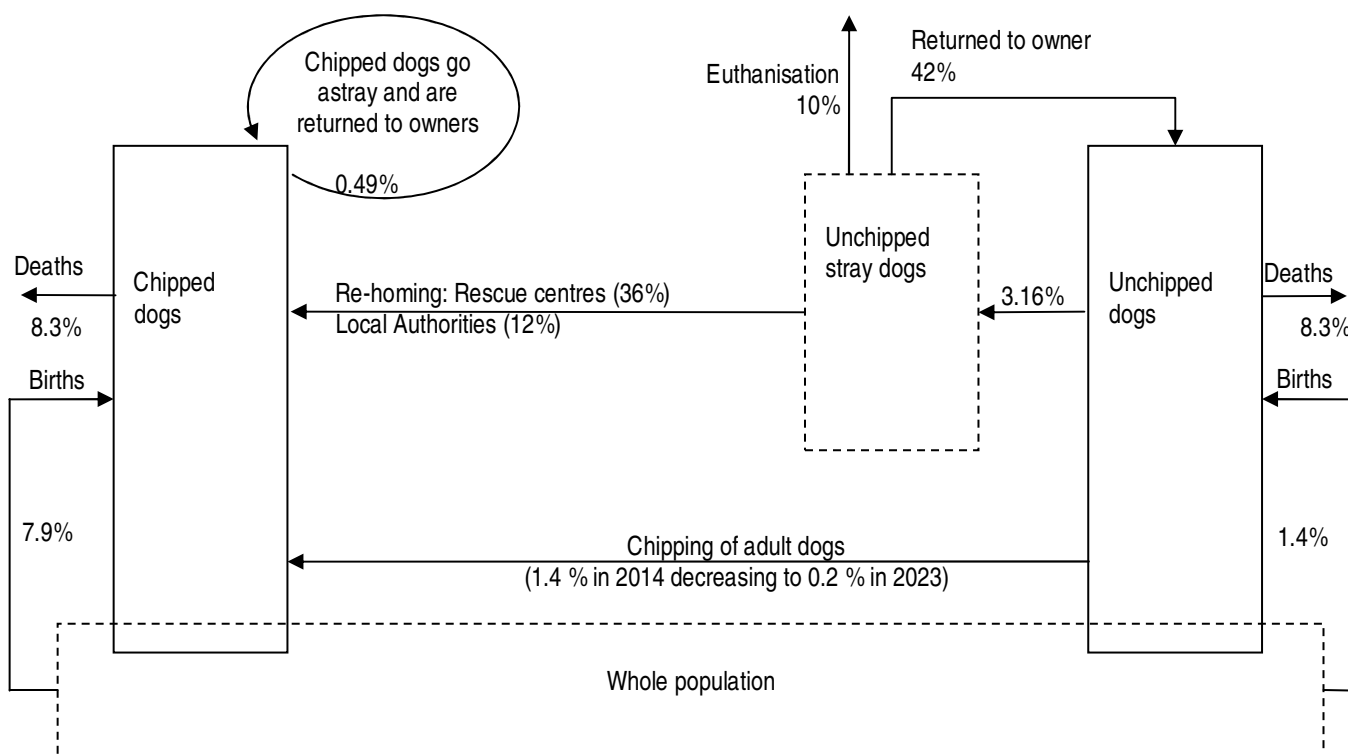


Figure 5 Schematic overview of the population model under Option 4

Policy impact of Option 5

105. Under Option 5, all dog owners are required to microchip their dog from 2016 onwards. This means, that adult dogs need to be microchipped in addition to the requirement under Option 4. This is modelled as a one-off increase in microchipped dogs in 2016 to reflect the policy intervention. We assume that there is some degree non-compliance and only 60% of unchipped dogs are chipped. Furthermore, if an unchipped dog goes astray and the owner can be identified, then the dog becomes part of the chipped dog population. Figure 6 shows schematically how the change affects the population model. There are two distinctions compared to Figure 5: First, unchipped dogs returned to their keeper are required to be microchipped and become part of the chipped dog population. Second, when microchipping of dogs becomes compulsory there is a large one-off flow from the unchipped to the chipped dog population.

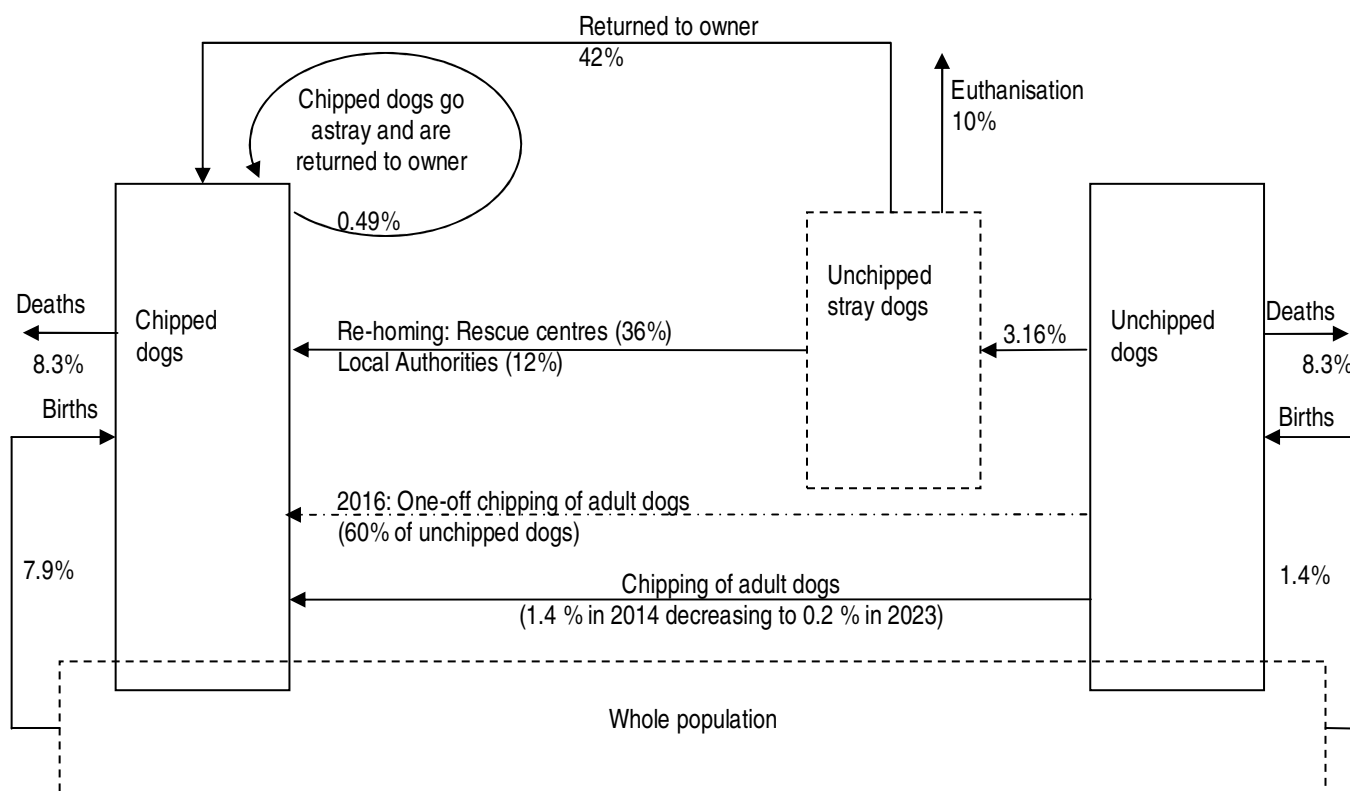


Figure 6 Schematic overview of the population model under Option 5

Estimating costs and benefits

106. As set out in the beginning we use the population model to estimate the costs associated with each policy option (including do nothing). The costs under Option 4 and 5 are then compared to Option 0; cost savings are counted as benefits and increases in costs as the costs of the policy. The costs and benefits are assessed over a period of ten years and discounted at 3.5%³⁴ to compute the net present value of the policy.

107. We are interested in how much cost and benefits are generated each year and therefore base our estimates on the flows³⁵ of the model. In general, costs are incurred for chipping dogs, housing and euthanizing stray dogs and some overhead costs for the policy. The unit

³⁴ Following guidance set out in HMT (2011) Green Book

³⁵ A flow is the annual change of the population, e.g. the number of puppies born into the chipped dog population or the number of unchipped dogs go astray

cost for each item is the same across all scenarios (with exception of the overheads) and differences are mainly driven by changes in the number of chipped dogs. Figure 7 shows a schematic overview and each cost item is explained in more detail below.

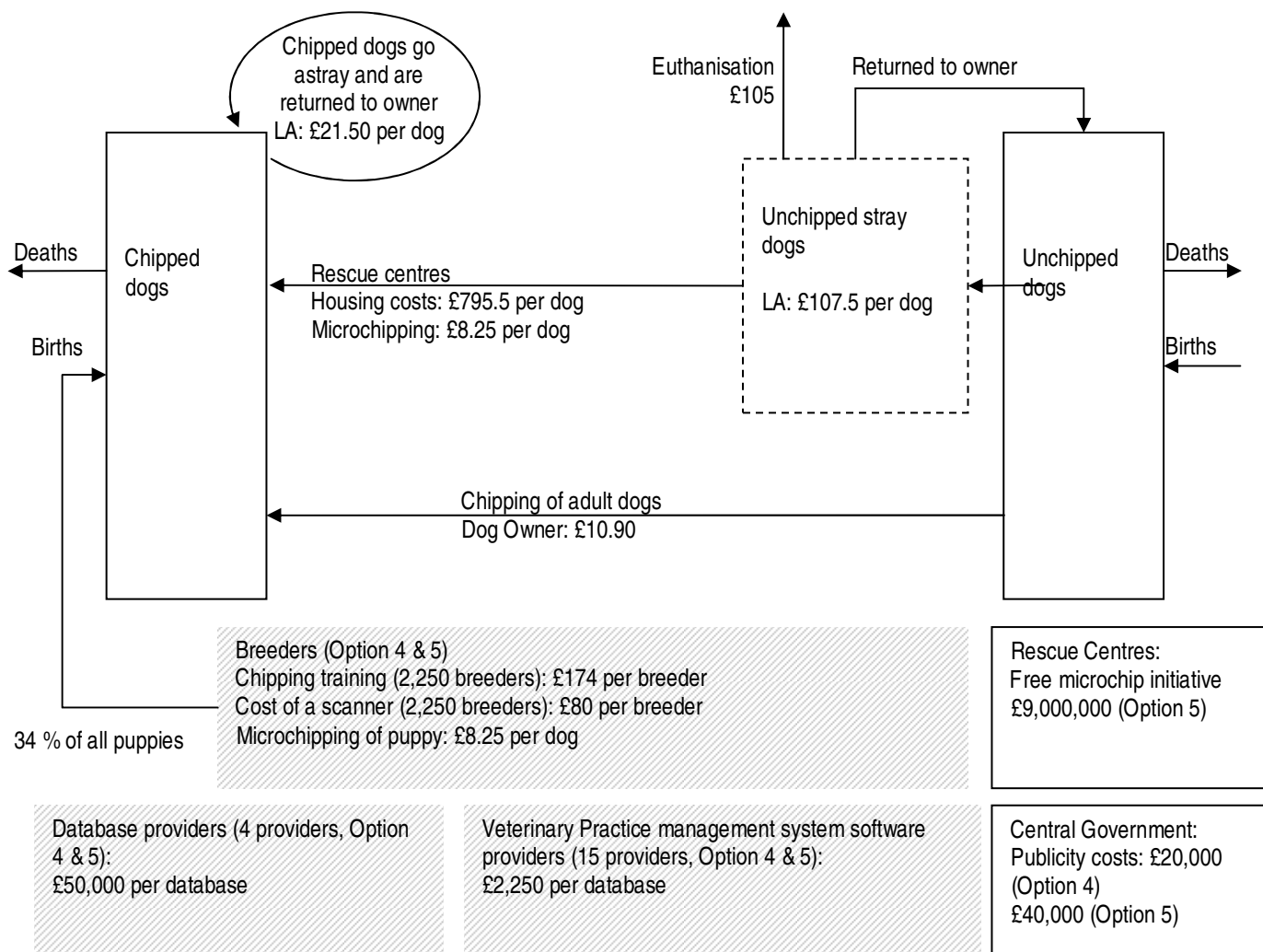


Figure 7 Schematic overview of the cost model (rounded figures), hatched items are relevant for the calculation of the direct impact on business

108. We assume that local authorities house chipped stray dogs for one day and unchipped stray dogs for an average of 5 days (see footnote 11). In 2014, we assume that 23% of stray dogs are and 77% are not microchipped, which gives an overall average of 4 days per stray dog. We assume the daily housing costs are the same as for rescue centres and amount to approx. £21.5¹⁴. This means that each chipped stray imposes costs of £21.50 and each unchipped stray dog imposes costs of £107.50. If the dog cannot be re-united with the owner, the LA either passes the dog on to a welfare organisation or put it asleep at a cost of £105¹³.

109. Rescue centres take on average 37 days until they found a new owner at a cost of approx. £21.50 per day, costing approx. £796 per re-homed dog. In addition, all re-homed dogs are microchipped imposing costs of £5.50 for the microchip plus £2.75 in staff time³⁶.

110. Veterinarians charge between £10 and £40³⁷ for implanting a microchip; this includes an element of profit and will also help the surgery to cover their overhead costs (rent, etc.). We

³⁶ Implanting takes approx. 15 min at an average hourly wage of £11 (Animal Care and Control Service, SOC 613 (ASHE provisional results 2013), inflated by 30% to account for non-wage costs). Also see footnote **Error! Bookmark not defined.**

³⁷ See Purina homepage, last retrieved 11 February 2014. Available at: <http://www.purina.co.uk/content/your-dog/your-new-dog/responsible-dog-ownership/microchipping-your-dog>

expect that members of the public would get their dog microchipped by veterinarians during a routine visit and therefore do not anticipate any changes in the overhead costs. Thus, it is appropriate to use the costs incurred by the veterinarian to estimate the costs of microchipping. According to the British Veterinary Association, the vet spends approximately 10 min to explain and implant the microchip at an hourly wage rate of £25.70³⁸. Additionally, some member of the vet's staff requires 5 min for the initial registration at an hourly wage rate of £13.00³⁹. Taking account of the cost of the microchip and labour time gives a cost of approximately £10.90 per dog chipped by the veterinarian.

Policy impact

111. Under Option 4 and 5, breeders are required to microchip all of their puppies. For the breeders it is cheaper to implant the microchip themselves (£8.25 as for rescue centres) rather than calling a Veterinarian. We estimate that 34% of all puppies are sourced from breeders (see Table 18). We maintain the assumption from the Consultation IA that 50% of the 4,500 breeders require microchipping training (£130 participation fee plus £44 in labour time⁴⁰) and a scanner (£80 each⁴¹).

Table 18 Sources of dogs

	percentages based on all dogs (puppies & adult)	percentages based on puppies only
Rescue centres	32%	0% (adult dogs only)
Private ads, internet	20%	29%
Friends or acquaintances	25%	37%
Recommended breeders, pet shops	23%	34%
Source: Pet Food Manufacturers Association		

112. The regulation will specify the information that all databases need to record. Most of the information is already recorded, but some additional details (e.g. name and address of breeder). We assume that each database provider sets aside £50,000 to cover the costs of changing the database⁴². We estimate accordingly that all four currently existing providers incur a cost of £200,000 in aggregate. Future providers will be able to design their database in compliance with the regulation and will not incur additional costs.

113. Similarly, Option 4 and 5 will require some changes to Veterinary Practice Management Systems. According to VetXML (an industry body), there are currently 15 such providers and each would need to spend £2,250 for the amendments.

114. The promotion of the policy would also incur costs to the central government of approx. £20,000 (Option 4) and £40,000 (Option 5).

115. The Dogs Trust offers free microchips worth up to £6m to veterinarians, local authorities and housing associations in the lead up to microchips becoming compulsory in England in April 2016. At a price of £5.50, these funds are sufficient to buy approximately 1.1m microchips, which are implanted by volunteers. Assuming the same labour costs as for breeders (£2.25 per microchip) implies that the free microchipping campaign has a total value of up to £9m. In the central scenario, the number of dogs microchipped in 2016 exceeds the 1.1m offered by the Dogs Trust. The remainder needs to be chipped by a veterinarian at the expense of the public at a cost of £10.90 per dog (see paragraph 38). In

³⁸ The Annual Survey of Hours and Earnings, provisional results 2013, SOC 2216 (veterinarians) gives £19.77 per hour. This has been increased by 30% to cover non-wage costs of labour (leave, employer NI contributions, etc.).

³⁹ The Annual Survey of Hours and Earnings, provisional results 2013, SOC 4 (administrative and secretariat occupations) gives £10.00 per hour. This has been increased by 30% to cover non-wage costs of labour (leave, employer NI contributions, etc.)

⁴⁰ The training lasts approx.4 hrs at an average hourly wage of £11 (Animal Care and Control Service, SOC 613 (ASHE provisional results 2013), inflated by 30% to account for non-wage costs)

⁴¹ Estimate provided by the Kennel Club, 19 November 2013

⁴² Aggregate and anonymised information of database providers (commercially sensitive). The Annual Survey of Hours and Earnings, provisional results 2013, SOC 2136 (Programmers and software development professionals) shows a weekly wage of roughly £1000 (including 30% non-wage costs). Hence, a budget of £50,000 is sufficient to hire five programmers for ten weeks which seems a conservative estimate.

addition, all dog owners incur a cost of £16 to take out a lifetime update service for their dog (see paragraph 40). It cannot be expected that this commitment would be sustained under Option 0 and 4.

Annex B: Sensitivity analysis

116. There is substantial uncertainty surrounding parameters used in the population and cost model. Sensitivity analysis often assumes that all parameters are at the high or low end of the range at the same time. Hence, this approach bases its estimates on the very extreme situations, which are very unlike in a situation with a multitude of different sources of uncertainty. To address this issue we use a Monte Carlo simulation approach (see Figure 8).

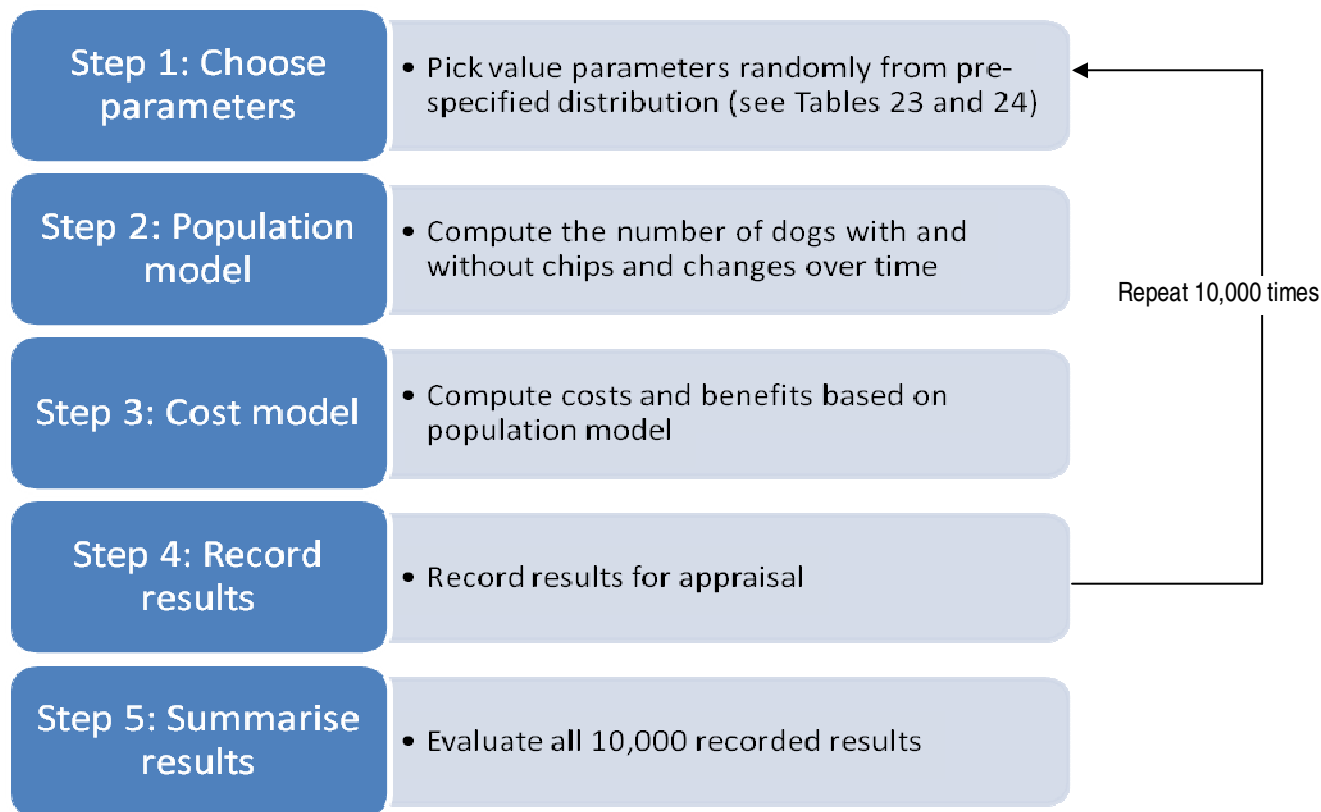


Figure 8 Steps in a Monte Carlo analysis

117. The general approach is to randomly choose a value for each parameter from a certain range and record the results from the population and cost model. This is repeated 10,000 times to generate a distribution of results. We can then calculate the expected value and also compute estimates of the range covering 95% of all values. Hence, the low value represents the value below which 2.5% of the values in the distribution are (the 2.5 percentile) and the high value represents the 97.5 percentile.

118. Table 21 and Table 22 show the low and high values for Option 4 and 5 respectively. Note that the net present value is not equal to the difference between the present value benefits and present value costs.

Table 19 Low and high ranges for Option 4

In thousands £2012	Low	Best estimate	High
PV Benefits	13,665	27,080	46,279
PV Costs	7,208	16,236	30,849
Net Present Value	936	10,844	20,584

Table 20 Low and high ranges for Option 5

In thousands £2012	Low	Best estimate	High
PV Benefits	59,886	88,462	122,851
PV Costs	29,860	39,133	56,549
Net Present Value	20,337	49,330	75,214

119. The net present value is calculated as the present value of benefits minus the present value of costs. The best estimate is the expected value (the average) of benefits, costs and net present values and is equal to the figures in the main body of the IA. A property of expected values is that the expected difference of two random values (in our case the expected net present value) is equal to the difference of the expected values (in our case the difference between the average of benefits and the average of costs). However, when looking at the 2.5 and 97.5 percentile this is not true and therefore the low net present value is not equal to the difference between low PV benefits and low PV costs. Figure 9 shows the distribution of the benefits, costs (both in present value terms) and the net present value and gives a graphical representation of the statistical issue.

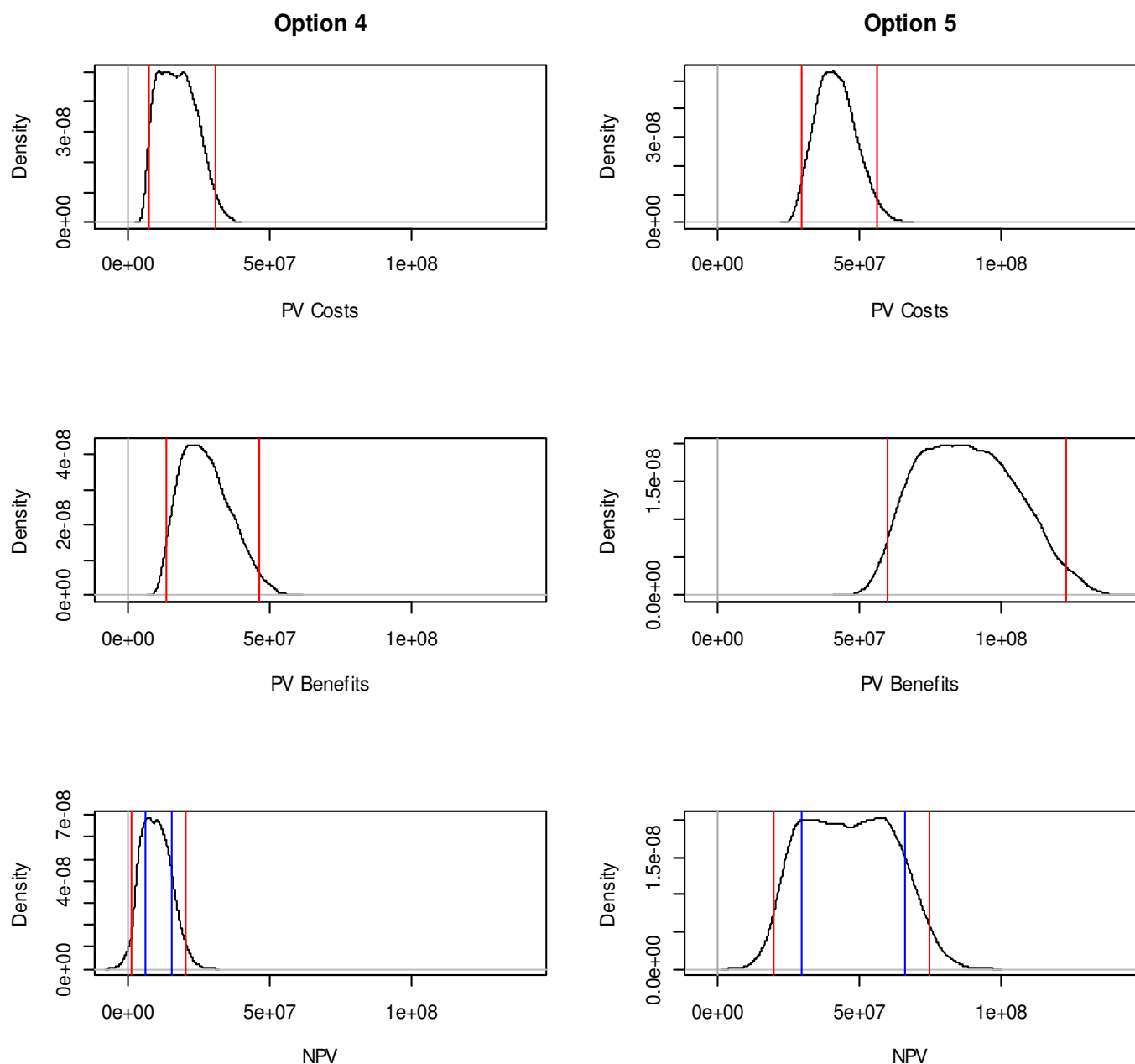


Figure 9 Distribution of costs, benefits and net present value. The grey line indicates zero, red lines the 95% confidence interval, and blue lines show the difference between the respective confidence bounds.

Table 21 Assumptions and uncertainty ranges around population model parameters

	Central	Low	High	Source
English dog population in 2013	7,310,000			Pet Food Manufacturer Association (2013) & DCLG (2013) household data
Proportion of chipped dogs in 2013	66%			Database providers, consolidated data
Proportion of chipped dogs in 2023	76%			Chosen to match consultation IA
Annual growth rate of dog population	0.96%	0.94%	1.02%	DCLG (2013) household data
Death rate of dog population	8.3%	7.1%	10%	Consultation IA
Birth rate of dog population	9.3%	8.1%	11.0%	Calculated as growth rate + death rate to reach overall growth
<i>Stray dogs</i>				
Number of stray dogs in 2013	102,000			Dog Trust (2013) Stray dog survey. 3 year average for England
Proportion of microchipped stray dogs	23%	10%	36%	Based on Dog Trust (2013) Stray Dog survey
Propensity of unchipped dogs to go astray	3.16%	3.69%	2.63%	Calculated to match the assumed proportion of microchipped stray dogs
Propensity of chipped dogs to go astray	0.49%	0.21%	0.76%	
<i>Unchipped stray dogs</i>				
Re-united with owner	42%	50%	30%	Dog Trust (2013) Stray dog survey
Passed to civil society organisations	36%	31%	44%	Dog Trust (2013) Stray dog survey
Re-homed by local authority	12%	10%	14%	Dog Trust (2013) Stray dog survey
Euthanized	10%	9%	13%	Dog Trust (2013) Stray dog survey
<i>Compliance rates</i>				
All new born dogs (Option 4&5)	60%	50%	70%	Assumption
Unchipped adult dogs	85%	80%	90%	Assumption following international examples

Table 22 Assumptions and uncertainty ranges around cost model parameters

	Central	Low	High	Source
<i>Housing of stray dogs</i>				
Daily cost of kennelling [£/day]	£21.50	£18.00	£25.00	Dogs Trust, Battersea Dogs and Cats Home
Cost of euthanisations [£/dog euthanized]	£105.00	£73.00	£137.00	Dogs Trust, Battersea Dogs and Cats Home
<i>Cost of microchipping</i>				
Cost of microchip	£4.00	£5.50	£7.50	Market data
Cost of chipping training	£130.00	£90.00	£170.00	Lantra estimate +/-£40
Breeder: Labour cost of implantation	£1.83	£2.75	£3.66	Time estimates by British Veterinary Association (+/- 33%) and wage estimates (inflated by 30% to reflect overheads) from the Annual Survey of Hours and Earnings (10 min of SOC 6131)
Veterinarian: Labour cost implantation	£10.90	£7.60	£30	Time estimates by British Veterinary Association and wage estimates (inflated by 30% to reflect overheads) from the Annual Survey of Hours and Earnings (10 min of SOC 2216 & 5 min of SOC 4) Low range is 30% less than best estimate. High range uses the charge incurred by the public.
<i>Cost to other businesses</i>				
Cost to update dog databases [£/database]	£50,000	£40,000	£60,000	Estimate by database provider +/-£10k
Cost to veterinary practice management software providers [£/software provider]	£2,250	£1,500	£3,000	Estimate by VetXML member