Submission to the Department of Agriculture from the Irish Working Terrier Federation in relation to the "Study into tail injuries amongst working dogs" conducted by Glasgow University Veterinary School

This submission to be read in conjuction with

Survey of tail injuries sustained by working gundogs and terriers in Scotland
(Draft copy)

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1) INTRODUCTION

This submission was prompted by reports that information was being collected for a review by the Scottish Government with the title;

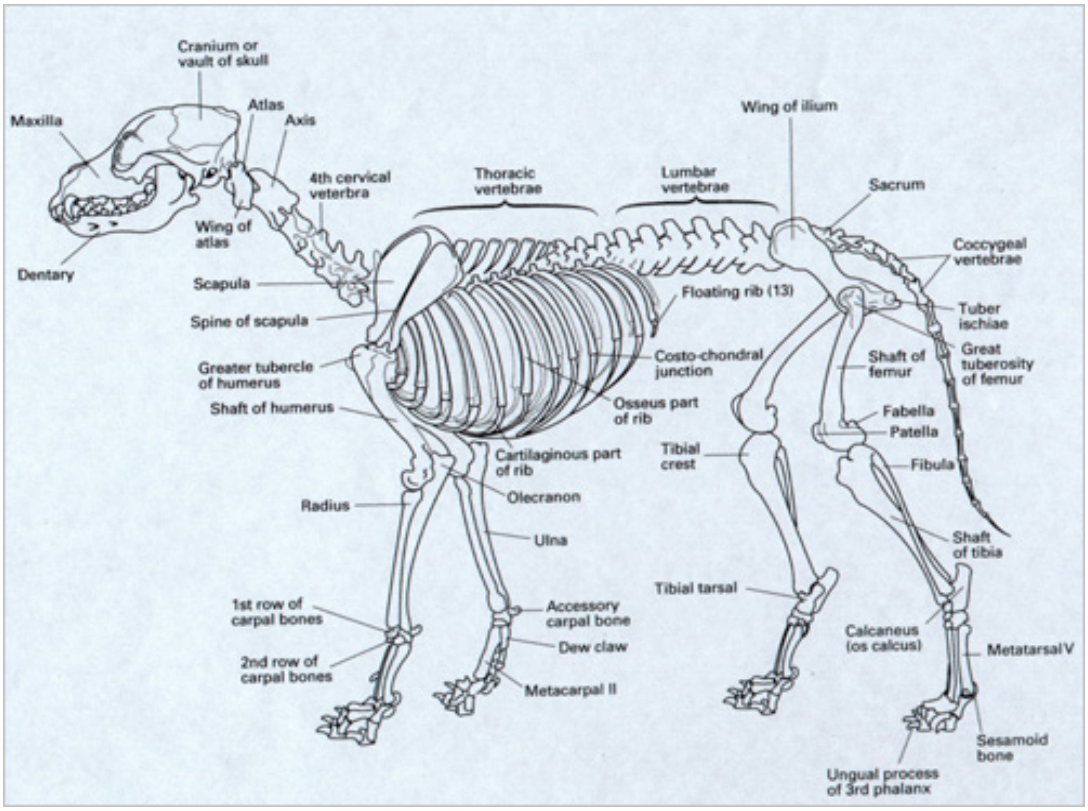
“Survey of tail injuries sustained by working gundogs and terriers in Scotland”.

Originating from the University of Glasgow it involved an internet survey designed using “Survey Monkey” and advertised through three major country sports organisations: the Scottish branch of the British Association for Shooting and Conservation (BASC, Scotland), the Scottish Countryside Alliance (SCA) and the Scottish Gamekeepers Association (SGA). All are members of shooting and gamekeeper’s organisations in Scotland.

Having obtained a draft copy (Appendix 1) and studying the document, the I.W.T.F. believed it was in the best interests of our members and the welfare of working terriers to write a response.

The I.W.T.F. felt the need to clarify our position and the difficulties we have with the data collected, specifically regarding working terriers.

It should be noted that the I.W.T.F. does not agree with the docking of dog’s tails for cosmetic reasons, but considers the prophylactic docking of working dogs tails a practical necessity and serious welfare benefit for our working dogs.



2) EXECUTIVE SUMMARY

The welfare of our working dogs is a primary concern for members of the I.W.T.F. In this regard the I.W.T.F Executive Committee have grave concerns with certain aspects of the Scottish report in relation to the data acquisition, adequate experience of subject matter together with quantitative and qualitative representativeness in relation to working terriers. Below are five major points of conflict we have with regards to the statistical inference towards working terriers.

1) Because of the canvassing route taken the report represents working dogs used in connection with shooting and not pest control with working terriers.

2) The small number of working terriers involved (less than 1.5% of the total) and focuses on incorrect breeds, could not provide enough data to form any scientific conclusion for working terriers.

3) The results fail to reflect any anatomical knowledge of tail sets or types and subsequent consequences in the field.
It does not convey any practical solution to the welfare needs of working terriers with tails carried over their back.

4) The survey provides data on numbers needed to treat. The calculated need to treat may not necessarily require veterinary attention at £50/visit in many cases. But more likely treatment by the owner with pre-prescribed veterinary products. A period of required rest and adequate healing time necessary for a working dog. This layoff period inhibits the owner from utilising his working dog possibly for long periods. Working dogs are bred to and for work. Practical prophylactic control measures such as docking gained from decades of experience by working dog owners has maintained the welfare of their workers at the top of the owners agenda. A constantly injured working dog is at odds with the animals' welfare and is not any use to its owner to perform its duties.

5) The Scottish survey states that Spaniels are at greatest risk of tail injury and 22 times more likely to sustain tail injuries during work. The survey authors believe that this work provides the best available evidence on which to base a consultation for changes to the legislation on tail docking in working dogs in Scotland to allow Tail Docking for certain breeds.

   If anything logical could be drawn from the data in the Scottish survey, it would be that knowing the similarities of size, the vigorous working style and similarity of working environments of working terriers and spaniels, but with the "additional" consideration required for working terriers of which sub-terrain work which was not considered. One could clearly conclude that whatever the report states for Spaniels must also be applied to Working Terriers.

3) SURVEY METHODOLOGY

In our opinion in the field of applied statistics, **survey methodology** studies the sampling of individual units from a population and the associated survey data collection techniques, such as questionnaire construction and methods for improving the number and accuracy of responses to surveys.

Statistical surveys are undertaken with a view towards making statistical inferences about the population being studied, and this depends strongly on the survey questions used and the sample population.

"If you do not ask the right questions, you do not get the right answers."
– Edward Hodnett, 20th century poet and writer

A single survey is made of at least a sample (or full population in the case of a census), a method of data collection (e.g., a questionnaire/internet survey) and individual questions or items that become data that can be analysed statistically. A single survey may focus on different types of topics such as preferences, opinions, behaviour, or factual information, depending on its purpose.

Since survey research is almost always based on a sample of the population, the success of the research is dependent on the representativeness of the sample with respect to a target population of interest to the researcher. In the case of this Scottish report we feel target population range was not adequately inclusive of one of the two main types of currently docked working dogs – working terriers.

The most important methodological challenges of a survey methodologist include making decisions on how to:

- Identify and select potential sample members.
- Contact sampled individuals and collect data from those who are hard to reach (or reluctant to respond).
- Evaluate and test questions.
- Select the mode for posing questions and collecting responses.
- Train and supervise interviewers (knowledge of subject matter).
- Check data files for accuracy and internal consistency.
- Adjust survey estimates to correct for identified errors.

Numbers are power. Apparently freed of all the ambiguity of words, numbers and statistics are powerful pieces of evidence that can effectively strengthen any argument. But statistics are not a panacea, particularly when *statistical **p*** is small and off target population. As simple and straightforward as these little numbers promise to be, statistics, if not used carefully, we believe they can create more problems than they solve.

In no way should this submission be seen as critical of the professional nature in which the survey was produced in relation to Gundog statistical inference.
For Gundogs the study proved successful both quantitatively and qualitatively by reaching its target audience.

For 'working terriers" the study proved less satisfactory both from a quantitative and qualitative prospective, by the inability to reach the target population of working terrier owners and the inclusion of Kennel club breeds that are simply not working dogs.

It needs to be clearly stated that all the working breeds identified in the I.W.T.F. progress report on tail docking specifically notes that working breeds are not eligible for Kennel Club registration.

Hence the statistical variance between terriers and spaniels, dogs of similar size, working style and both of whom work in similar environments, but with the "additional" consideration required for working terriers of which sub-terrain work was not considered.

For anyone used to working dogs in the field this would clearly put "true" working terriers in the same statistical margins as working spaniels.

BASC
The British Association for Shooting & Conservation

SCOTTISH COUNTRYSIDE ALLIANCE
The voice of the countryside

THE SCOTTISH GAMEKEEPERS ASSOCIATION
...managing Scotland's wild places

"All of the above Organisations contacted for the Scottish survey are preliminary involved with the promotion of **Shooting** and Conservation".

4) FOCUS ON SURVEY FINDINGS.

In our preliminary study of the draft Scottish survey we have extracted critical sections of the survey for further scrutiny in which clearly show a deficit with the survey methodology statistical inference, lack of field experience of survey personnel and poor knowledge of strains of working terriers.

4a) Identify and select potential sample members.

Survey extract:

Working dog owners were invited to take part in an internet survey regarding the 2010/2011 shooting season.....

Survey extract:

Materials and Methods

An internet survey was designed using "Survey Monkey" and advertised through three major country sports organisations: the Scottish branch of the British Association for Shooting and Conservation (BASC, Scotland), the Scottish Countryside Alliance (SCA) and the Scottish Gamekeepers Association (SGA)…….

I.W.T.F. Response:

All of the above excellent organisations are preliminary involved with the promotion of shooting and conservation. Their members would concentrate on dogs involved directly with shooting and wildfowl management, i.e. Spaniels, Pointers / Setters and Retrievers.

It is clear from the responses that these gundog breeds were addressed in a comprehensive way reflecting the working kennels involved. Gamekeepers and the shooting field would not normally deal with pest control directly in their daily activities.

In Scotland, pests are controlled by terriermen in the same way as terriermen manage pests all over the British Isles, Europe and Scandinavia.

None of the working terrier organisations were contacted to contribute to the study which is reflected in the poor response in working terrier numbers. It should be noted that a shooting man that also owns a terrier does not specifically mean the he is working the terrier or that it is a working strain not associated with kennel club breeds.

Organisations like the Scottish Working Terrier Association, National Working Terrier Federation, Fell & Moorland Working Terrier Association did not participate and its members make up a vast amount (majority) of working terrier owners.

4b) Contact sampled individuals and collect data from those who are hard to reach (or reluctant to respond).

Survey extract:
To examine the potential for non-responder bias the survey was subsequently administered to a set of gamekeepers and BASC members who did not respond to the original online survey.

Survey extract:
Participants were commonly members of a number of the organisations used to publicise the survey and most (62%; 632/1015) described their primary activity relating to working dogs as being a "recreational shooter".

Survey extract:
This paper describes the first study of a Scottish Government commissioned project aimed at providing evidence for that review and comprised an internet survey of owners of working dogs and of terriers used in pest control in Scotland. The survey was designed to estimate the prevalence of tail injuries in these working dogs; assess the risk of tail injuries in undocked working dogs; and identify risk factors for tail injuries.

I.W.T.F. Response:
In general only gundog owners responded or participated due to shooting organisations being solely canvassed. Yet again to examine the "potential" for non responders shooting organisations were solely contacted. This has the result of creating a biased base in the target sample population.

Below are some basic figures extrapolated from the survey.

200 Terriers only made up only 7% of the total survey.
30% of dogs bred outside of Scotland meaning that all active working terrier breeds in England, Wales, Northern Ireland and the Republic of Ireland, are currently legally docked leaving the potential that these dogs if workers were already docked reducing the risk of injury to close to zero for this set of dogs. This would remove **60 dogs** from the survey leaving just 140 remaining.

The total of **11 terrier breeds mentioned in table 1** of the survey data one breed type was repeated twice reducing the actual number of terrier breeds surveyed to 10. Of these 10 terrier breeds **70% are not considered "active" working terrier breeds** and 40% have undocked tails.

This has the potential of removing a further 98 dogs from 140 remaining leaving just 42 active working terriers some of which may have had docked tails.

This small number of working terriers (less than 1.5% of the total) involved could not provide enough data to form any solid conclusion for "working" terriers.

4c) Evaluate and test questions.

Survey extract:
The breed groups (see table 1 supplementary information) were defined according to The UK Kennel Club (http://www.the-kennel-club.org.uk) and contain breed crosses within each group.

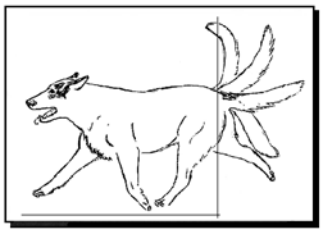
Survey extract:
Participants were commonly members of a number of the organisations used to publicise the survey and most (62%; 632/1015) described their primary activity relating to working dogs as being a "recreational shooter".

I.W.T.F. Response:
Working terriers are not eligible for Kennel Club (K.C.) registration nor would working terrier owners consider pure breed show stock as workers.

None of the working terrier strains are defined by Kennel Club Standards. Indeed working terrier owners wish to steer clear of such artificial K.C. standards for working dogs and avoid the infusion of K.C. show bloodstock to working terrier strains which can drastically reduce working ability and increase genetic faults infused with many show terrier breeds.

The survey has not identified further risk factors for "sub-terrain" working activities over and above working in "thick cover" which is a specific requirement of pest control with terriers. Sub-terrain environments include natural rock and soil earths, manmade drains, hay-bails, rubbish-tips, under civil structures (Barns, Sheds, Factories, Houses), inside tree trunks, etc. All these environments are where working terriers squeeze into areas the size of their shoulder/chest circumference to reach their quarry, whilst flicking their tails vigorously against adjacent surfaces. If tails are not kept docked they most definitely will get damaged during work.

The results fail to reflect any anatomical knowledge of tail sets or types. It does not convey any practical solution to the welfare needs of working terriers with tails carried over the back.



Tail position while working.

4d) Train and supervise interviewers (knowledge of subject matter).

Without being too critical we believe the quality of the results are based on the accuracy of the data supplied, representativeness of the target sample population and knowledge of survey analysts' on the subject matter to enable appropriate evaluation of survey results.

The inclusion of kennel club breeds and lack of engagement with working terrier organisations is reflected in the survey results (Reference Appendix 2. For a letter from the National Working terrier federation in the UK Simple common sense would allude to the fact that a similar size canine (working terrier & spaniel) which work in the same environment (thick cover) with similar vigorous working styles would encounter similar environmental risks and indeed injury. If one adds the fact that working terriers work in the sub-terrain during pest control activities then this would add a further enhanced risk to working terriers over and above that of working spaniel breeds.

There is also significant difference between a shooting man also owning a terrier and a terrierman owning and working his working terrier!!

4e) Adjust survey estimates to correct for identified errors.

The I.W.T.F. feels that this survey needs to be adjusted for clear identifiable errors in relation to the significance of the role of working terrier in pest control activities and the errors in breed (strain) types and lack of quantitative and qualitative statistical inference for working terriers.

5) SIGNIFICANT FACTORS REGARDING WORKING TERRIERS.

Without being too critical we believe the findings in the survey are based on the quantitative and qualitative statistical value of the data supplied.

5a) Focus of the report in relative terms to working terriers.

Regarding the inclusion of the Black Russian terrier.

According to the FCI standard (International show standard) the male stands 72 to 76 cm and not more than 78 cm at the withers compared to the female's 68–72 cm and not more than 74 cm.
The male weighs between 50 and 60 kg (110-132 lbs), and the females weigh between 45 and 50 kg (99-110 lbs). Nowadays, even larger, individuals are tolerated if the dog is well proportioned and retains correct movements.

This dog is not a working terrier.

5b) Numbers of terriers participating in the survey (Quantity & Quality).

Reference Appendix 1; Main Report

Table 1. Characteristics of working dogs included in the survey.

Breed group	Spaniel	1330 (51.8%)
	Retriever	727 (28.3%)
	Hunt Point Retriever	207 (8.1%)
	Terrier	200 (7.8%)
	Pointer/Setters	43 (1.7%)
	Other	59 (2.3%)
	Total	**2566**

Reference Appendix 1; Supplementary information

Table 2. Number of respondents to the survey within each response category for selected variables.

Primary activity relating to working dogs	Recreational Shooter	632 (62.3% of 1015 participants)
	Gamekeeper	79 (7.8%)
	Pest Controller	56 (5.5%)
	Deer Stalker	42 (4.1%)
	Other	206 (20.3%)
	Total	**1015**

Reference Appendix 1; Supplementary information

Table 3. A comparison of data from the original online survey

Dog acquired from Scotland Yes No	163 (78.0%) 46 (22.0%)	1659 (70.1%) 709 (29.9%)	0.02

200 terriers in the study,….7.8% of the total.
42 responders were pest controllers…….5.5% of the total
Acquired outside Scotland from a jurisdiction which allows docking.20% - 30%
Known working strains / breeds….. (See item 3, point C) below…..30%-40%.

These working terrier figures when accumulated together would represent Less than 1.5% of dogs in the survey.

Scientifically or statistically it would be hard to come to any serious conclusions regarding working terriers with this data.

5c) Types of terriers participating in the survey.

Reference Appendix 1; Supplementary information

Table 1: A list of dog breeds and breed groups in the survey

Terrier	11	Bedlington Terrier, Border Terrier, Lakeland Terrier, Cairn Terrier, Fell Terrier, Jack Russell Terrier, Lucas Terrier, Fell Terrier, Patterdale Terrier, Russian Black Terrier, Scottish Terrier

The top three terrier strains shown on the left are the working types commonly used in the field today. (The Lucas terrier is not a worker but is similar in build to a Sealyham crossbred type used in Ireland) The Border Terrier is used in very small numbers.
The five pedigree breeds shown on the right have not been used by terriermen in the field for over 100 years. They are show dogs.

Patterdale Terrier
Tail Type 2
Docked

Fell Terrier
Tail Type 2
Docked

Jack Russell Terrier
Tail Type 1
Docked

Lucas Terrier
Tail Type 2
Docked

Border Terrier
Tail Type 3
Undocked

Lakeland Terrier
Tail Type 2
Docked

Bedlington Terrier
Tail Type 6
Undocked

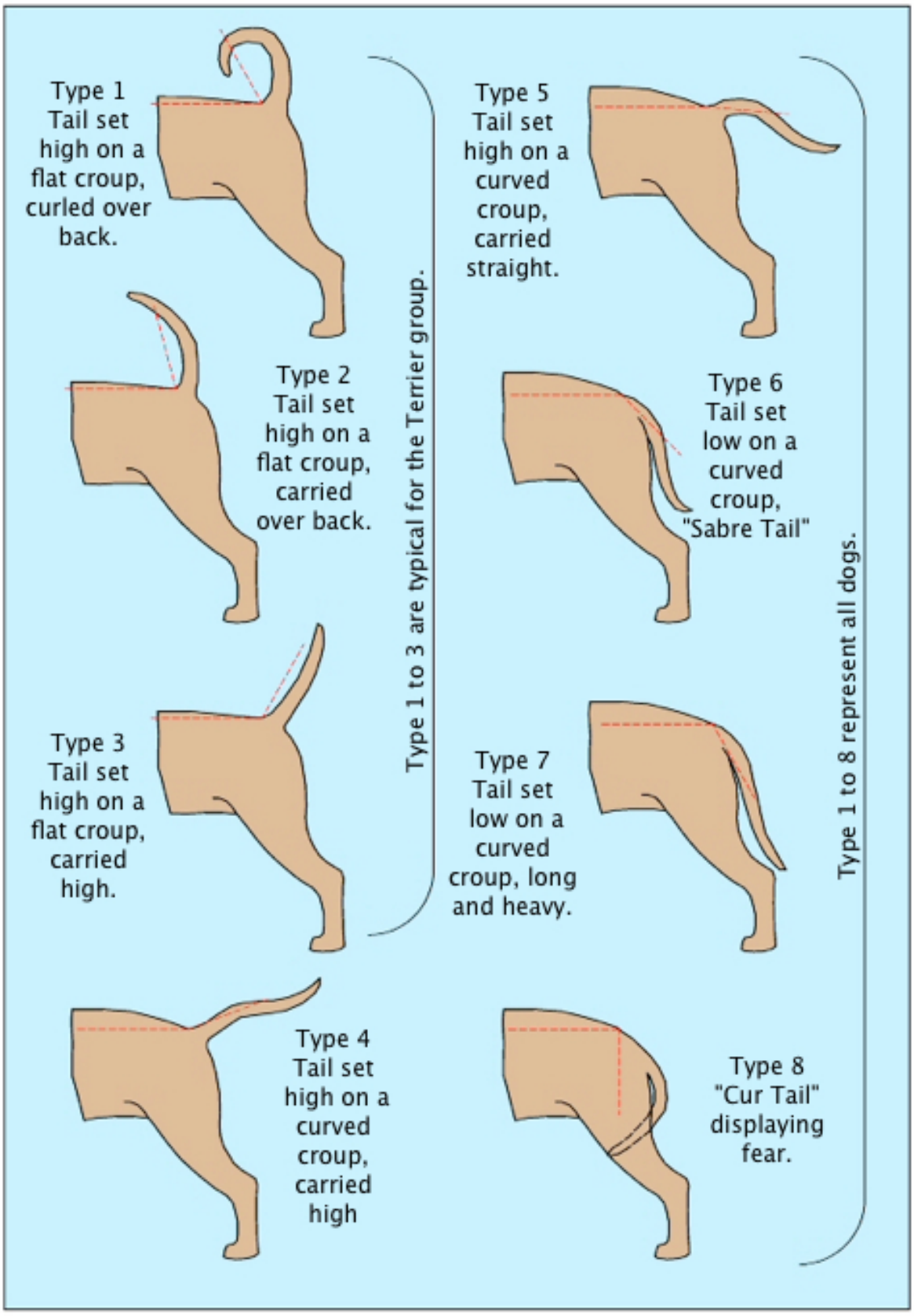
Cairn Terrier
Tail Type 3
Undocked

Scottish Terrier
Tail Type 3
Undocked

Black Russian Terrier
Tail Type 2
Docked

5d) Knowledge of tail types and consequences

d1) Tail set differences



d2) Tail position while at rest.


Border Terrier
Tail Type 3


Jack Russell Terrier
Tail Type 1


Patterdale Terrier
Tail Type 2

From the photographs above three different tail sets can be viewed while the dog is at rest. Note the Type 3 tail angles backwards from the dog's body, it has a tendency to drop easily. Type 3 is not docked as it poses no welfare danger to the terrier.
Type 1 and 2 are carried over the back of the dog. There is no tendency for this type of tail to drop below the level of the back at any time.
It is necessary for these tails to be shortened to prevent injury during pest control activities.

d3) Tail position while running through cover.


Border Terrier
Tail Type 3


Jack Russell Terrier
Tail Type 1


Patterdale Terrier
Tail Type 2

Photographs of these tail types confirms that tails carried over the back of the dog would sustain injury when working in dense cover (thorns and briars).
A common argument used by the anti docking proponents put forward is that the Foxhound and Fox have long tails. But a look at Foxhound and Red Fox tail types while active show that they pose no risk to the animal.


Foxhound
Tail Type 6/7


Red Fox
Tail Type 5

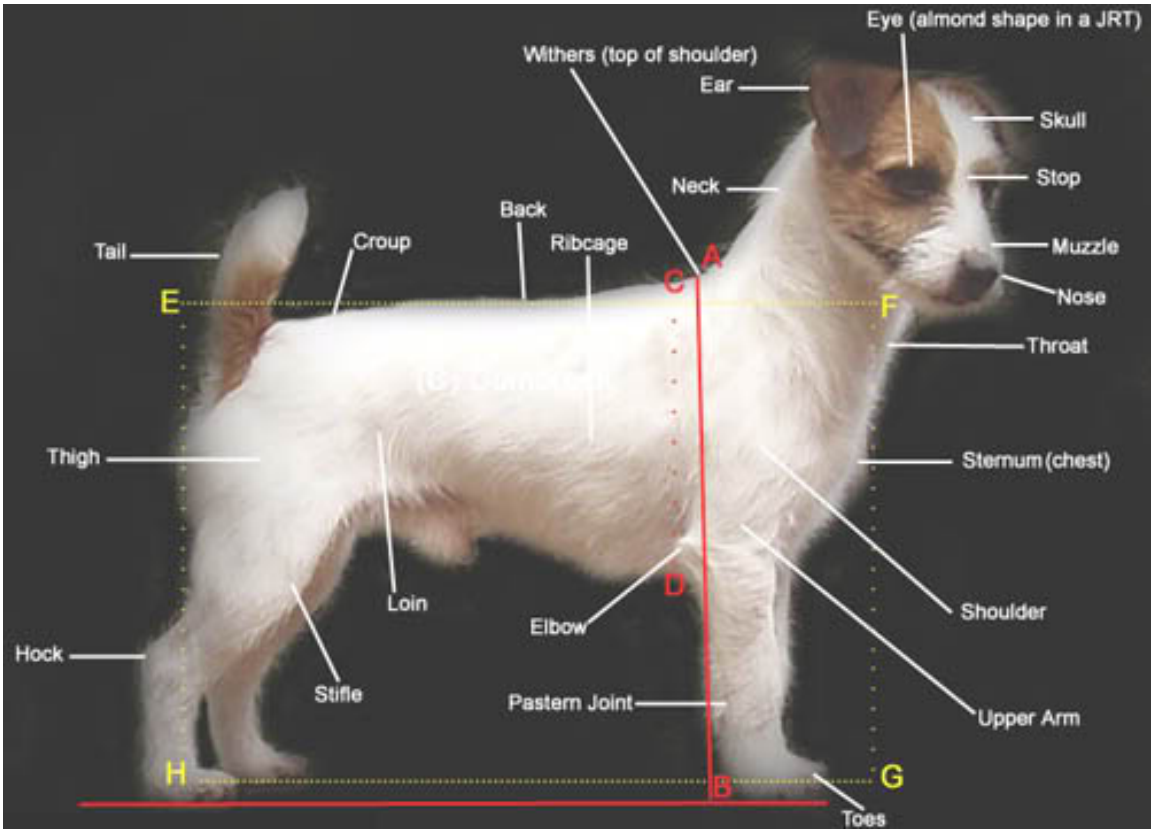
d4) Tail position while underground.

Border Terrier
Tail Type 3

Jack Russell Terrier
Tail Type 1

Patterdale Terrier
Tail Type 2

When working underground, the terrier with Tail type 3 is seen wagging at low level in the tube (Tunnel). This poses no impediment to the dogs work. In contrast Type 1 and 2 are carried high touching the ceiling of the tube. If undocked the tail at high level would hinder the dog's progress and cause it to have restricted movement.



6. CONCLUSION.

While acknowledging the professionalism of the attached survey, the Irish Working Terrier Federation would like to make a submission to the Department of Agriculture that this survey has little to offer regarding working terriers.

This survey was produced without approaching the working terrier organisations in Scotland for their input, or obtaining sufficient numbers of respondents to make an informed statistical inference and included the incorrect type of terriers which would not be fully reflective of the hunting field today.

If anything logical could be drawn from the data in the Scottish survey, it would be that knowing the similarities of size, the vigorous working style and similarity of working environments of working terriers and spaniels, but with the “additional” consideration required for working terriers of which sub-terrain work which was not considered.

One could clearly conclude that whatever the Survey states for Spaniels must also be applied to Working Terriers.

7. APPENDIX 1 (SCOTTISH SURVEY - NOTE: THIS IS A DRAFT COPY)

Please Note: This is a Draft Copy

Survey of tail injuries sustained by working gundogs And terriers in Scotland

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4000 words excluding abstract, tables, legends ack and refs PLUS 1 page summary if accepted. Supp material allowed.

Abstract (200 words/13 lines)
Working dog owners were invited to take part in an internet survey regarding the 2010/2011 shooting season, which was designed to estimate the prevalence of tail injuries; assess the risk of tail injuries in undocked working dogs; and identify risk factors for tail injuries. Of 2860 working dogs, 13.5% sustained at least one tail injury during the 2010/2011 shooting season. Undocked spaniels and Hunt Point Retrievers (HPR) were at greatest risk of tail injury with 56.6% of undocked spaniels and 38.5% of undocked HPR sustaining at least one tail injury during the season. There was no statistically significant difference in the risk of tail injury in dogs docked by one third, half or shorter. In order to prevent one tail injury, sustained while working between five and 15 spaniel or HPR would need to be docked as puppies.

We believe that this work provides the best available evidence on which to base a consultation for changes to the legislation on tail docking in working dogs in Scotland. Docking HPR and spaniels by one third would significantly decrease the risk of tail injury sustained while working in these breeds.

Key words: Working dogs, welfare, tail docking, tail injury

Introduction

The dog was the first species to be domesticated (Mills 2010) and exists today as more than 400 breeds worldwide (Fogle 2000). The selection by humans for diverse functions led to the existence of specific breeds of dogs, which were further defined by Kennel Clubs' breed standards, increasingly based on a dog's physical appearance (Mills 2010). Historically, tail docking was performed in many breeds for a variety of reasons (Morton and others 1992). Until recently 61 (29%) of the 210 breeds currently eligible for registration in the UK were either sometimes docked or "routinely docked" (The Kennel Club 2012; Bennett and Perini 2003).

Tail docking of dogs for non-therapeutic (that is prophylactic or cosmetic) reasons has been banned in the United Kingdom since 2007 when the Animal Welfare Act 2006 (ANON 2006) came into force. However, amendments made to the Act (The Docking of Working Dogs' Tails (England) Regulations 2007; The Docking of Working Dogs' Tails (Wales) Regulations 2007) allow the docking of certain working dogs or working dog breeds. Only recently the Welfare of Animals Act (Northern Ireland) 2011 came into force with similar exemptions (The Welfare of Animals (Docking of Working Dogs' Tails and Miscellaneous Amendments) Regulations (Northern Ireland) 2012). The Animal Health and Welfare (Scotland) Act 2006 includes however a total ban on non-therapeutic docking of dogs, with no exemptions.

Mutilation in any species poses an ethical dilemma, considering the pain at removal as well as the animal's long-term welfare, and seems justifiable only if it protects the animal from greater suffering if not performed (Morton 1992; Bennett and Perini 2003). The ethical problems and health issues involved with tail docking have been described in depth elsewhere (Morton 1992; Holt and Thrusfield 1993; Wansborough 1996; Bennett and Perini 2003). Earlier studies by Darke and others (1985) and Diesel and others (2010) found a relatively low incidence of canine tail injuries in veterinary practice data. However, a high incidence of tail injury and a protective effect of preventative tail docking in working dogs have been claimed by country sports organisations who would welcome amendments to the legislation bringing Scotland into line with the legislation in England, Wales and Northern Ireland. When introducing the ban in Scotland the Scottish Government agreed to review the legislation after five years and assess the impact of the ban on, for example, the risk for tail injury in undocked working gundogs and terriers, especially spaniels and Hunt Point Retrievers (HPR).

This paper describes the first study of a Scottish Government commissioned project aimed at providing evidence for that review and comprised an internet survey of owners of working dogs and of terriers used in pest control in Scotland. The survey was designed to estimate the prevalence of tail injuries in these working dogs; assess the risk of tail injuries in undocked working dogs; and identify risk factors for tail injuries. The second study (accompanying paper) used veterinary practice records to describe the prevalence of more severe tail injuries in working and non-working dogs that were deemed by owners to require veterinary treatment.

Materials and Methods

An internet survey was designed using “Survey Monkey” and advertised through three major country sports organisations: the Scottish branch of the British Association for Shooting and Conservation (BASC, Scotland), the Scottish Countryside Alliance (SCA) and the Scottish Gamekeepers Association (SGA). The survey was activated to receive responses between 8/08/2011 and 3/10/2011 and included mainly retrospective questions about any injuries which dogs sustained during the one year survey period between 01/08/2010 and 31/07/2011. Participants were required to have their permanent residence in Scotland and to own a working gundog or a terrier in pest control. It was emphasised that owners should take part in the survey regardless of whether or not their dogs had sustained injuries during the time in question. Completion of the questionnaire was only allowed once per internet protocol (IP) address but participants were able to exit and resume the survey at a later time. If requested, participants (n=39) were sent a paper version of the questionnaire. The survey consisted of 20 questions and responses were stored automatically as participants progressed through the survey. Participants were not able to return to previously answered questions. Some questions were answerable as free text; others were presented as multiple choice questions or as drop-down menus. To examine the potential for non-responder bias the survey was subsequently administered to a set of gamekeepers and BASC members who did not respond to the original online survey. The breed groups (see table 1 supplementary information) were defined according to The UK Kennel Club (http://www.the-kennel-club.org.uk) and contain breed crosses within each group.

Statistical analysis

Data were automatically downloaded from “Survey Monkey” into an Excel spreadsheet. All statistical analyses were performed using Stata 11 (S.E.) statistical software. Epi-Info 6 was used to calculate statistical power.

A sample size calculation was conducted, which indicated that a total of 100 cases of tail injury, with many more responses relating to dogs without tail injury, would yield more than 80% statistical power to identify odds ratios of at least 2 (or 0.5), with 95% confidence, given exposure prevalences in the uninjured population of between 14% and 64%. Given a conservative prevalence estimate of tail injury of 5% the original aim was therefore to gather responses relating to 2000 dogs, of which at least 100 would have sustained a tail injury in the last year.

Dogs (n=16) that were reported by owners to have natural bob-tails were removed from the dataset before analysis. Univariable, multivariable and mixed-effects logistic regression models were produced for three outcomes. A forward selection procedure was used during all model building. Variables with P-values < 0.2 were considered for inclusion in the multivariable model. Variables were retained in a multivariable model if likelihood ratio test P values were <0.05. The Wald test P value was used for categorical variables. Potential confounders were evaluated by resubmitting all of the variables from the univariable analyses that were not included in the final models, one at a time. The hierarchical nature of the data set, with dogs clustered within respondent, was accounted for by inclusion of respondent

as a random effect in all final multivariable models. Models adjusted for this potential clustering are reported.

Results

Characteristics of the survey participants are listed in table 2 (supplementary information). A total of 1035 respondents participated in the survey, of whom 848 (81.9%) completed the whole questionnaire. Participants were commonly members of a number of the organisations used to publicise the survey and most (62%; 632/1015) described their primary activity relating to working dogs as being a “recreational shooter”. A total of 2860 dogs were owned by 1005 respondents who owned at least one dog.

Characteristics of the dogs included in the survey are listed in table 1. The majority (70.0%) of all dogs, included in the survey, originated from Scotland. The majority of working dogs in the survey were either spaniels (52%) or retrievers (28%). Most (1254; 52.9%) dogs had their tails docked to some extent (20.4% docked by a third; 16.6% docked by half; 12.1% docked short and 3.8% with a tail tip dock only). Among the spaniels 79.9% (991) had a docked tail (35.2% docked by a third; 25.7% docked by half; 12.9% docked short and 6.1% with a tail tip dock only).

When comparing spaniels of different ages, born before or after the introduction of the tail docking ban, the percentage of spaniels originating from outside Scotland has more than doubled from 20.5% to 48.5% and the percentage of undocked working spaniels has increased from 8.4% to 31.7%, since the introduction of the ban.

When asked whether their dog(s) had any tail injuries during the survey period 29.3% (260) stated that one or more of their dogs had sustained a tail injury. Of 2356 dogs, whose owners completed this part of the questionnaire, 317 (13.5%) had sustained at least one tail injury during the previous shooting season. Of dogs that sustained at least one tail injury, the number of tail injuries per dog is shown in figure 1. Almost 42% (132/317) of these dogs sustained two or more tail injuries and 13.2% (42/317) sustained four or more tail injuries, during the previous shooting season.

Compared to pointer/setters, retrievers or terriers (7.0%; 61/876), spaniels (17.8% (221/1238); p-value < 0.001) and HPR (15.6% (30/192) p-value <0.001) were significantly more likely to have sustained at least one tail injury (figure 2).

Dogs with undocked tails (20.3% (221/1091); p-value <0.001) or with a tail tip dock (19.5% (17/87); p-value <0.001) were significantly more likely to have sustained at least one tail injury than dogs docked by one third, half or short, combined (6.6%; 75/1142) (figure 3).

Among spaniels 55.6% (135/243) of undocked dogs and 21.6% (16/74) of dogs with a tail tip dock had experienced at least one tail injury during the survey period (figure 4). Both undocked spaniels (p-value <0.001) and those with a tail tip dock (p-value <0.001) were significantly more likely to have sustained at least one tail injury than spaniels docked by one third, half or

short, combined (7.5%; 66/880). Undocked spaniels were also more likely to have sustained at least one tail injury than spaniels with a tail tip dock (p-value <0.001).

Only four HPR were reported to have a tail tip dock making comparison with this group difficult (figure 5). However, undocked HPR (38.5% (25/65); p-value < 0.001) were significantly more likely to have sustained at least one tail injury than HPR docked by one third, half or short, combined (3.4%; 4/118).

Owners of 299 dogs with a tail injury gave a detailed description of their dogs' "worst tail injury" sustained during the survey period. A total of 103 of 2356 (4.5%) dogs were reported as requiring veterinary treatment for this tail injury. Sixteen of 192 HPR, (8.3%) and 68 of 1238 spaniels, (5.6%) received veterinary treatment for their worst tail injury.

Mixed effects multivariable models were built using tail injury as the outcome variable for all dogs; spaniels only; and HPR only. The final mixed effects multivariable logistic regression models for each of these outcomes are shown in table 2.

Tail length was statistically significant in all models, with undocked tails being consistently more likely to be injured than tails that had been docked.

However, the form of this variable that produced the best fitting model varied between models. When modelling any tail injury as the outcome in either all dogs or just spaniels a tail-tip dock was associated with a five to six fold reduction in the likelihood of tail injury (odds ratios = 0.18 and 0.14), compared to undocked dogs. Docking by one third, half or short were all associated with an approximately 20 to 25-fold reduction in the likelihood of tail injury (odds ratios between 0.03 and 0.05), compared to undocked dogs. There was no statistically significant difference in the likelihood of tail injury between dogs docked by one third, half or short in any of the final models. In HPR there was no statistically significant difference in the likelihood of tail injury in dogs with undocked tails and those with a tail-tip dock. However, docking by one third, half or short were all associated with an approximately 15 to 25-fold reduction in the likelihood of tail injury (odds ratios between 0.04 and 0.07), compared to undocked dogs or dogs with a tail tip dock.

In the model including all dogs, breed was also significantly associated with the likelihood of tail injury, with HPR and spaniels being 11 and 22 times more likely to have been reported to have sustained a tail injury, respectively compared to retrievers, pointer/setters, terriers or other breeds, combined. No other variables were retained in the models for individual breed types.
In all three models there was a statistically significant degree of clustering at the level of the respondent. In addition, inclusion of respondent as a random effect had a significant impact on the magnitude of some of the odds ratios included in final multivariable models. For example in the single level, multivariable model of tail injuries in all dogs the odds ratio associated with spaniels was 11.8, but when accounting for clustering within respondent this odds ratio almost doubled to 22.1 (table 2.). The inclusion of respondent as a

random effect had no influence on the variables actually included within any of the models.
Given the lack of evidence suggesting any reduction in the likelihood of tail injury in dogs docked by half or shorter compared to dogs docked by one third, the number of dogs that would need to be docked by one third to avoid one tail injury was used to calculate the number needed to treat (NNT). The

NNT was calculated from prevalence estimates and odds ratios (where available) and varied depending on the proportion of the litter assumed to become working dogs. Using a typical litter size of five puppies the NNT was calculated assuming that one, three or all five of the puppies became working dogs. To prevent one tail injury in all working breeds the NNT would be between 5 and 45 and to prevent one tail injury in spaniels or HPR the NNT would be between 5 and 15 (table 3). To prevent one tail injury that required veterinary treatment in all working breeds one would need to dock by one third between 20 and 90 puppies, and to prevent one tail injury that required veterinary treatment in spaniels, between 10 and 30 puppies would need to be docked by one third.

A comparison of initial responders and non-responders is provided in table 3 supplementary information. The prevalence of tail injury in docked or undocked dogs of different breeds was not statistically significantly different between initial responders and non-responders (all p-values > 0.2). However, non-responders owned fewer spaniels but more terriers and pointer/setters and their dogs were more often housed outside. More owners in the non-responder group reported that the ban changed their use of dogs and this group were also more likely to own a dog that was bred in Scotland.

Discussion

Tail injuries in working dogs occurred frequently with 29% of working dog owners responding to the survey reporting a tail injury in one or more of their dogs and 13.5% of all dogs in the survey sustaining at least one tail injury during the shooting season covered by the survey. Prevalence estimates indicated that spaniels and HPR were significantly more likely to have sustained a tail injury than other working breed groups such as retrievers, terriers and pointer/setters. Undocked spaniels and HPR were reported to have been at greatest risk of tail injury with 56.6% of all undocked spaniels and 38.5% of all undocked HPR sustaining at least one tail injury during the 2010/2011 shooting season. These findings concur with the results of earlier studies which indicated that undocked working spaniels were at high risk (Houlton 2008; Diesel and others 2010) and docked pet dogs at significantly lower risk of sustaining a tail injury (Diesel and others 2010).

Multivariable logistic regression models indicated that both breed and tail length were significantly associated with the likelihood of tail injury with spaniels being 22 times and HPR 11 times more likely to have sustained a tail injury compared to the others breeds. Other working breed groups that were included in significant numbers in the survey (terriers, retrievers and pointer/setters) were at significantly lower risk of tail injury. Changes to the legislation on tail docking may therefore be most appropriately considered for individual breed groups rather than all working dogs.

Compared to possessing an undocked tail, a tail tip dock was associated with an approximately five-fold reduction in likelihood of tail injury and a dock of one third or shorter was associated with an approximately 20-fold reduction in the likelihood of tail injury. There was no statistically significant difference in the likelihood of tail injury in dogs docked by one third, half or short, indicating no apparent added benefit in terms of protection from tail injury when docking shorter than by one third.

A similar result was observed when modelling the likelihood of tail injury in working spaniels alone. Again there was no apparent benefit to docking shorter than by one third. In HPR dogs there was no significant difference in the likelihood of tail injury in undocked and tail tip docked dogs. However, it is important to note that there were only four HPR with a tail tip dock included in the survey so the statistical power to identify a difference in risk would have been limited. When comparing dogs docked by one third or more with undocked dogs or dogs with a tail tip dock, there was a similar 15-25-fold reduction in the likelihood of tail injury to that seen in the two previous models.

These results would suggest a clear potential benefit to be gained from docking (at least by one third) in spaniels and HPR. The same cannot be said for other working breeds but this may in part be due to the fact that

some of the other working breeds were much less likely to be docked at all, therefore making statistical comparisons of the likelihood of tail injury within these breeds, given different tail lengths, difficult from this survey. For example, only 15 of 623 retrievers were docked at all. An important aspect of this work is to remember that the intervention (docking) must be done very soon after birth several months before the dog is at risk of sustaining a tail injury during work. There is therefore a need to account for the likelihood that not all of a typical litter of working dog puppies will go onto to work and be at risk of tail injury while working. Hence the widely varying estimates of NNT when only one or all five of a litter go onto work. It would be useful to gather data from breeders on the exact number of a litter that do enter work in order to reduce the uncertainty around these estimates. Given that there was no apparent extra benefit of docking shorter than by one third our calculations were based on tails docked by one third, compared to undocked dogs. The number of spaniels or HPR that would need to be docked by one third to avoid one tail injury over one shooting season would be between 5 and 15, depending on how many of a litter would become working dogs. The NNT to avoid one tail injury that required veterinary treatment in a shooting season was between 10 and 30 for spaniels or between 20 and 90 for all working dogs. These NNT estimates are substantially lower than the approximately 500 described by Diesel and others (2010), which included far fewer working dogs and many more pet dogs. Given the fact that the current paper was specifically focussed on working dogs, the dogs most at risk of tail injury and most affected by the ban on tail docking, we suggest that the figures calculated as part of this study are much more likely to represent the likely impact should legislation be altered to allow docking in spaniels and HPR or indeed all working dogs.

If amendments were made to allow for docking in spaniels and HPR, best practice clinical procedures (e.g. as described by Schoen and Sweet 2009) should be followed to ensure that tail docking of puppies was as humane and safe as possible. Useful to mention the details of puppy docking eg age, technique. There is limited scientific data regarding pain perception of pups at docking. However, Noonan and others (1996) did indicate stress and pain responses during and after tail docking in dogs and the assumption that performing procedures at younger ages results in less pain has been challenged (Taylor and others 2001). Additionally, very little is known about the effects of tail amputation when performed later on in life. However, permanent neuroma formation has been described in six dogs (mainly Cocker Spaniels) after tail amputation at one to four years old (Gross and Carr 1990). Intuitively one would hypothesise that repeated tail tip injuries, followed by an amputation as an adult, would be more painful than the one off pain of being docked as a puppy. However, it is important to remember that docking as a puppy does not entirely remove the risk of subsequent tail injury and gun dog owners should also be encouraged to reduce the risk of tail injury by for example: Ensuring dogs are housed in suitable kennels and where feasible selecting less hazardous areas for a shoot or field trial.
A further impact of the complete ban on tail docking in Scotland has been the apparent substantial decrease in the proportion of working dogs having been bred in Scotland since the ban. Although data are not available this is likely to have resulted in both a decline in financial gain and in the number of

Scottish breeders of working dogs, in particular of Spaniels. The sourcing of more dogs from outside Scotland may itself pose welfare concerns caused by unnecessarily long transport times. In addition, anecdotal reports of Scottish breeders sending bitches to relatives or friends outside Scotland for whelping, so that the puppies could be legally docked, are not uncommon.

An important limitation of this study was the fact that the survey was publicised through country sports associations which were clearly critical of the complete tail docking ban in the past and proactive in their attempts to allow preventative tail docking in working gundogs and terriers (Petition PE1230 to the Scottish parliament). A bias toward survey participants opposed to the tail docking ban for working gundogs is therefore possible, which may have increased the prevalence of tail injuries reported in this survey. However, country sports organisations are the only representation for owners of working gundogs and terriers and the target population of working gundog owners could not have been reached by any other means.

Participation in the survey was also surprisingly low given that the tail docking legislation has been hotly debated. The survey was advertised directly to approximately 10,000 members of the Scottish arm of BASC (including approximately 4500 working dog owners), 8,000 SCA and 5000 SGA members, the latter including 1200 gamekeepers nearly all of whom were dog owners. Yet, only 1005 owners of working gundogs and terriers participated in the survey and it is impossible to know whether dog owners did not take part because they were unaware of the survey; did not have the motivation to participate due to lack of time, internet access or a lack of tail related problems. Nevertheless, it was encouraging to see that estimates of the prevalence of tail injury were not significantly different between initial responders and non-responders.

The comparison with “non-responders” did show bias towards spaniels and HPR, potentially because some owners believed that the survey was only for these particular breeds. This may have increased the overall prevalence of tail injuries in all working dogs as spaniels and HPR were the breed groups most likely to sustain tail injuries. However, within breed group prevalence estimates would remain unaffected by over representations of certain breeds amongst the initial respondents and as such we believe that the within breed prevalence estimates are more useful than broad estimates for all working dogs.

We contend that this work provides the best available evidence on which to base a consultation for changes to the legislation on tail docking in working dogs in Scotland. The work clearly indicated that working spaniels and HPR (but not terriers or pointer/setters) were at increased risk of sustaining tail injuries, especially if undocked. In addition, the work shows that docking HPR and spaniels by one third (but not shorter) would significantly decrease the risk of tail injury sustained while working in these breeds.

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References:

ANON (1992) BSAVA questionnaire on docking. *Journal of Small Animal Practice* **33**, 247

ANON (2006) Animal Welfare Act 2006. More detail

BENNETT, P.C. & PERINI, E. (2003) Tail docking in dogs: a review of the issues. *Australian Veterinary Journal* **81**, 208-218

BOWER, J.M. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **158**, 139

CLARKE, R. (2001) response letter to "A breeder defends docking dogs' tails". *Australian Veterinary Journal* **79**, 95

DARKE, P.G.THRUSFIELD, M.V. & AITKEN, C.G. (1985) Association between tail injuries and docking in dogs. *Veterinary Record* **116**, 409

DE BLESER, B. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **volume**? (Feb 4) 175

DEE, L.G. (2009) Arguments for continuation of ear cropping and tail docking. *Journal of the American Veterinary Medical Association* 234(5), 598-599

DIESEL, G. , PFEIFFER, D., CRISPIN, S. & BRODBELT, D. (2010) Risk factors for tail injuries in dogs in Great Britain. *Veterinary Record* **166**, 812-817

EDWARDS, A.M. (1984) Mutilations. *Veterinary Record* **volume**? (May 26) 528

FARDELL, M.D. (1984) Tail docking. *Veterinary Record* **volume**? (August 4) 111-112

FOGLE, B. (2000) In The New Encyclopedia of the Dog, 2nd edn., editors needed? Dorling Kindersley Ltd. London, p 7

GROSS, T.L. & CARR, S.H. (1990) Amputation neuroma of docked tails in dogs. *Veterinary Pathology Online* **27**, 61-62

GUSSETT, R. (2009) Arguments for continuation of ear cropping and tail docking. *Journal of the American Veterinary Medical Association* 234(5), 598

HOLT, P.E. & THRUSFIELD, M.V. (1993) Association in bitches between breed, size, neutering and docking, and acquired urinary incontinence due to incompetence of the urethral sphincter mechanism. *Veterinary Record* **133**, 177-180

HOLT, P.E. & THRUSFIELD, M.V. (1997) Tail docking in dogs. *Australian Veterinary Journal* **6**, 449

HOLT, P.E. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **158**, 139

HOULTON, J.E. (2008) A survey of gundog lameness and injuries in Greta Britain in the shooting seasons 2005/2006 and 2006/2007. *Veterinary and Comparative Orthopaedics and Traumatology* **21**, 231-237

MILLS, D.S. (Ed.) (2010), In The Encyclopaedia of applied Animal Behaviour and Welfare, …publisher, edition, pp 181 - 184

MORTON, D. (1992) Docking of dogs: practical and ethical aspects. *Veterinary Record* **131**, 301-306

NUTTALL, K. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **158,** 211

PEARCE, J. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **157,** 175-176

PRESCOTT-PRIME, K. (2001) A breeder defends docking dogs' tails. *Australian Veterinary Journal* **79**,94-95

REYNOLDS, J.P. (2009) Arguments for continuation of ear cropping and tail docking. *Journal of the American Veterinary Medical Association* 234(5), 599

SCHOEN K. & SWEET D.C. (2009) Canine and feline tail amputation. *Lab animal Europe* **9(8)**, 17-18

SEAVERS, A. (2000) Docking dispute. *Australian Veterinary Journal* **78**,599

SMITH, W.J. (1984) Mutilations. *Veterinary Record* volume? (August 11) 135

SQUIRES, P. (2010) Tail injuries in dogs in Great Britain. *Veterinary Record* **volume?** (August 7) 225

The Kennel Club (2012) Pedigree dog breeds, www.thekennelclub.org.uk/item2102; accessed 08/12/2012

WANSBOROUGH, R.K. (1996) Cosmetic tail docking of dogs. *Australian Veterinary Journal* **74**, 59-63

WRAY, J.G. (2006) Non-therapeutic docking of dogs' tails. *Veterinary Record* **158,** 211

Table 1. Characteristics of working dogs included in the survey.

Variable	Catergory	N (% of total for each question)	
Country in which bred	England	578 (24.4)	
	Scotland	1657 (70.0)	
	Ireland + Northern Ireland	49 (2.1)	
	Wales	48 (2.0)	
	Other	36 (1.5)	
	Total	**2368**	
Breed group	Spaniel	1330 (51.8)	
	Retriever	727 (28.3)	
	Hunt Point Retriever	207 (8.1)	
	Terrier	200 (7.8)	
	Pointer/Setters	43 (1.7)	
	Other	59 (2.3)	
	Total	**2566**	
Gender	Female entire	1087 (45.9)	
	Female neutered	308 (13.0)	
	Male entire	837 (35.3)	
	Male neutered	137 (5.8)	
	Total	**2369**	
Housed	Both inside and outside	497 (21.0)	
	Indoors	751 (31.7)	
	Outdoors	1123 (47.4)	
	Total	**2371**	
Tail length	Docked short	287 (12.1)	
	Docked by half	394 (16.6)	
	Docked by one third	484 (20.4)	
	Docked tail tip only	89 (3.8)	
	Natural bobtail	16 (0.7)	
	Undocked	1101 (46.4)	
	Total	**2371**	
Number (%) bred in Scotland		Age at time of survey (years)	
		≤4	**≥5**
	Spaniels	265 (51.5)	495 (79.5)
	HPR	52 (48.6)	42 (52.9)
	Retrievers	273 (88.3)	306 (85.7)
Number (%) of spaniels of each tail length		Age at time of survey (years)	
		≤4	**≥5**
	Docked short	47 (7.7)	107 (17.6)
	Docked by half	115 (18.8)	197 (32.4)
	Docked by one third	207 (33.8)	225 (37.0)
	Docked tail tip only	48 (7.8)	27 (4.4)
	Natural bobtail	1 (0.2)	1 (0.2)
	Undocked	194 (31.7)	51 (8.4)
	Total	**612**	**608**

Table 2. Mixed effects multivariable logistic regression models describing the association between a. tail length and breed and the likelihood of tail injury; b. tail length and the likelihood of tail injury in Spaniels; and c tail length and the likelihood of tail injury in HPR.

Outcome variable	Explanatory variable	Odds ratio	P-value	95% Confidence Interval
Tail injury in all working dogs	Tail length			
	Undocked (Reference)	1		
	Tail tip dock	0.18	<0.001	0.08 – 0.4
	Docked to 2/3rds	0.05	<0.001	0.03 – 0.09
	Docked to half length	0.04	<0.001	0.02 – 0.07
	Docked short	0.05	<0.001	0.03 – 0.1
	Breed			
	Retriever, Pointer/Setters, Terrier or Other (Reference)	1		
	Hunt Point Retrievers	10.9	<0.001	5.3 – 22.3
	Spaniel	22.1	<0.001	13.1 – 37.2
	Degree of clustering within respondent (*Rho) = 0.36*		<0.001	
Tail injury in Spaniels	Tail length			
	Undocked (Reference)	1		
	Tail tip dock	0.14	<0.001	0.06 – 0.3
	Docked to 2/3rds	0.04	<0.001	0.02 – 0.08
	Docked to half length	0.03	<0.001	0.01 – 0.06
	Docked short	0.04	<0.001	0.02 – 0.1
	Degree of clustering within respondent (*Rho) = 0.37*		<0.001	
Tail injury in HPR	Tail length			
	Undocked or tail tip dock (Reference)	1		
	Docked to 2/3rds	0.04	0.014	0.003 – 0.5
	Docked to half length	0.07	0.008	0.01 – 0.5
	Docked short	0.04	0.001	0.006 – 0.26
	Degree of clustering within respondent (*Rho) = 0.39*		0.03	

Table 3. The number of dogs needed to be docked by one third length (Number Needed to Treat (NNT)) to avoid one tail injury in a working dog and the actual number of puppies and litters (assuming an average of five puppies per litter) that would need to be docked to ensure this number of docked dogs went into work. For example, one would need to dock six spaniels to prevent one injury requiring veterinary treatment. If on average only one dog (from a typical litter of five puppies) goes on to work and be at risk of tail injury while working, one would need to dock six litters or 30 puppies to ensure a total of six docked dogs went into work. If one could guarantee all five puppies went on to work from all litters one would need to dock 2 litters or 10 puppies to ensure a total of six docked dogs went into work.

Prevention of	NNT (*calculated from prevalence estimate; #calculated from odds ratio)	Actual number of puppies & (five puppy litters) to dock to prevent one tail injury in a working dog, given: *Number of litter that become working dogs*		
		1	*3*	*5*
Any tail injury in all working breeds	9*	45 (9)	15 (3)	10 (2)
	5#	25 (5)	10 (2)	5 (1)
Any tail injury in Spaniels (or HPR)	3* (3)*	15 (3)	5 (1)	5 (1)
	2# (3)#	10 (2)	5 (1)	5 (1)
A tail injury requiring veterinary treatment in all working breeds	18*	90 (18)	30 (6)	20 (4)
A tail injury requiring veterinary treatment in Spaniels	6*	30 (6)	10 (2)	10 (2)

Figures

Figure 1. Histogram of number of tail injuries per dog, in those dogs, that sustained at least one tail injury between 1/8/2010 and 31/7/2011.

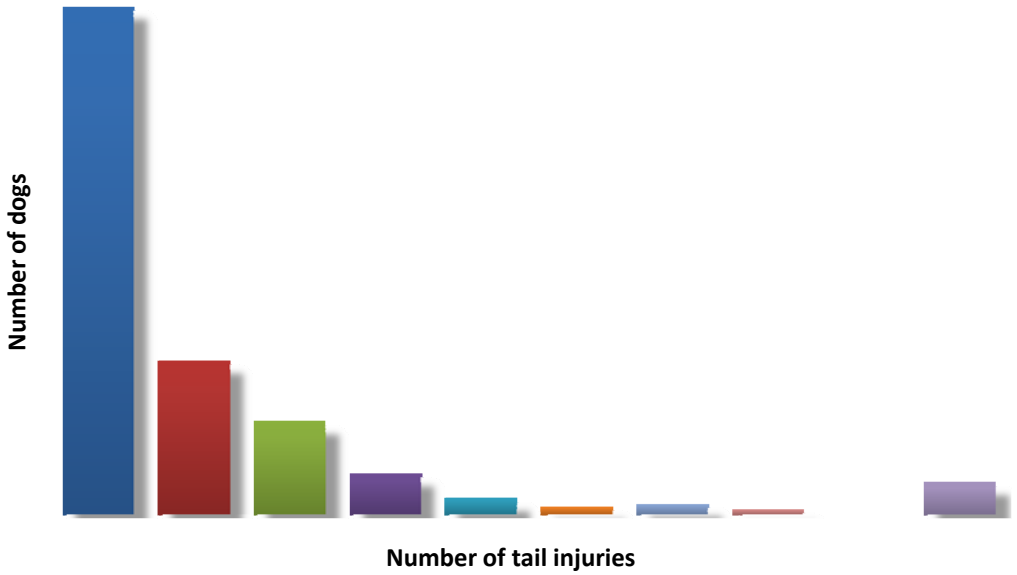


Figure 2. Prevalence of tail injury in each breed group between 1/8/2010 and 31/7/2011 (showing 95% confidence intervals). A & B indicate breed groups for which the prevalence estimates are statistically significantly different (A – p-value <0.001; B – p-value <0.001).

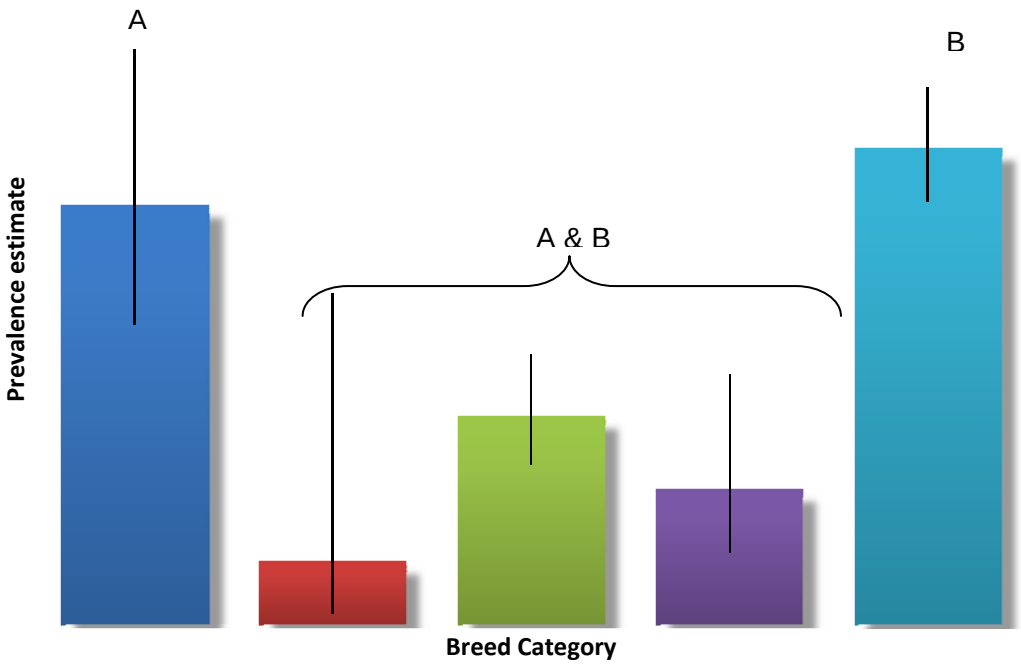


Figure 3. Prevalence of tail injury in all dogs by tail length between 1/8/2010 and 31/7/2011 (showing 95% confidence intervals). A & B indicate breed groups for which the prevalence estimates are statistically significantly different (A – p-value <0.001; B – p-value <0.001).

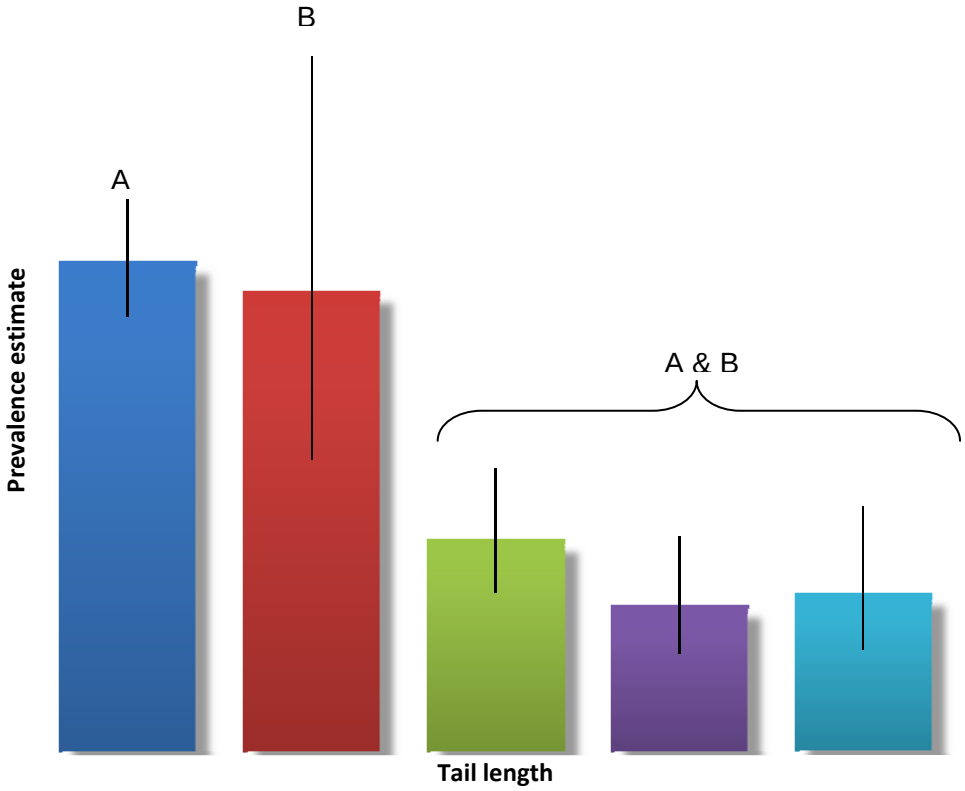


Figure 4. Prevalence of tail injury in spaniels by tail length between 1/8/2010 and 31/7/2011 (showing 95% confidence intervals). A, B & C indicate breed groups for which the prevalence estimates are statistically significantly different (A – p-value <0.001; B – p-value <0.001; C – p-value <0.001).

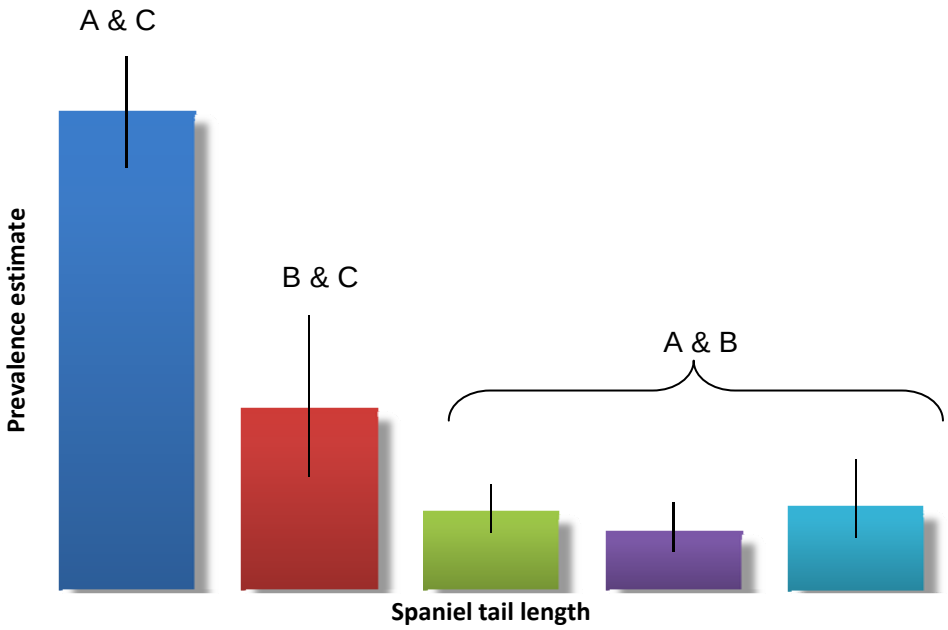
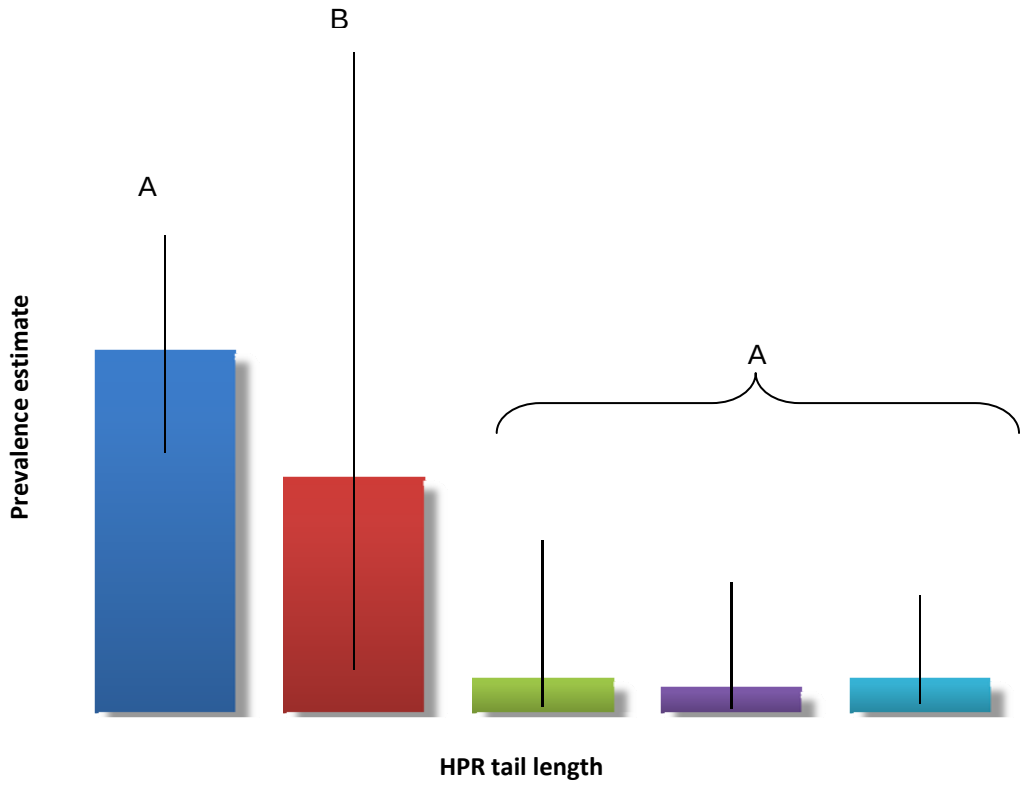


Figure 5. Prevalence of tail injury in HPR by tail length between 1/8/2010 and 31/7/2011 (showing 95% confidence intervals). A indicates breed groups for which the prevalence estimates are statistically significantly different (p-value <0.001).



Supplementary information

Table 1: A list of dog breeds and breed groups in the survey

Breed category	Number of breeds	Breeds represented in the survey
HPR	9	Brittany, German Shorthaired Pointer, German Wirehaired Pointer, Hungarian Vizsla/Hungarian Wirehaired Vizsla, Italian Spinone, Korthall Griffon, Munsterlander, Slovakian Rough Haired Pointer, Weimaraner
Pointer/Setters	4	English Pointer, English Setter, Gordon Setter, Irish Setter
Retriever	4	Labrador Retriever, Golden Retriever, Flat Coated Retriever, Chesapeake Bay Retriever
Terrier	11	Bedlington Terrier, Border Terrier, Lakeland Terrier, Cairn Terrier, Fell Terrier, Jack Russell Terrier, Lucas Terrier, Fell Terrier, Patterdale Terrier, Russian Black Terrier, Scottish Terrier
Spaniel	5	Clumber S., Cocker S./Field Cocker S., English Springer Spaniel, Field S., Welsh Springer Spaniel
Other	15	Border Collie, Beagle, Belgian Shepherd, Boxer, Poodle, Doberman, French Mastiff, German Shepherd, Greyhound, Hannovarian Schweisshund, Lurcher, New Zealand Huntaway, Rottweiler, Dachshund/Teckel, Whippet. (This group also contained crosses between different breed categories)

Table 2. Number of respondents to the survey within each response category for selected variables. (BASC = British Association for Shooting and Conservation; SCA = Scottish Countryside Alliance; SGA = Scottish Gamekeepers Association).

		N participants (%)
Membership	BASC	712 (68.8% of 1035 participants)
	SCA	110 (10.6%)
	SGA	226 (21.8%)
	Other	160 (15.5%)
	None	136 (13.1%)
	Total	**1344***
Primary activity relating to working dogs	Recreational Shooter	632 (62.3% of 1015 participants)
	Gamekeeper	79 (7.8%)
	Pest Controller	56 (5.5%)
	Deer Stalker	42 (4.1%)
	Other	206 (20.3%)
	Total	**1015**

Active working dogs owned	Dog owners	1005
	Active working dogs owned	2860
	Mean dogs per owner (median)	2.85 (2)
Did the docking ban change use of dogs?	Yes	181 (21.5%)
	No	659 (78.5%)
	Total	**840**
Did the docking ban change the selection of breed or location?	Yes	457 (54.3%)
	No	385 (45.7%)
	Total	**842**

*Question for which several answers per participant were allowed.

Table 3. A comparison of data from the original online survey (responders) with data from a group of British Association for Shooting and Conservation (BASC) and Scottish Gamekeepers Association (SGA) members (non-responders) who had not responded to the original survey. (Showing Chi-squared p-value unless specified otherwise)

Category	**Non-responders** (n=77 owning 222 dogs)	**Responders** (n=1005 owning 2860 dogs)	**P-value**
Median dogs per owner (mean; range)	2 (2.87; 1-9)	2 (2.8; 1-21)	0.20¥
Median dogs age (mean; range)	5 years (6; 0.5-14)	5 years (6; 0.5-15)	0.97¥
Dogs housed Inside (%) Outside (%)	 41 (21.6) 149 (78.4)	 751 (40.1) 1123 (59.9)	 <0.001
Did the ban on tail docking change your use of dogs? Yes (%) No (%)	 25 (33.3) 50 (66.7)	 181 (21.5) 659 (78.5)	 0.01
Did the ban change your selection of breed or source of new dog? Yes (%) No (%)	 40 (53.3) 35 (46.7)	 457 (54.2) 386 (45.8)	 0.88
Number of different breed groups owned: Spaniels (%) HPR (%) Retrievers (%) Terriers (%) Pointer/Setters (%)	 90 (40.5) 13 (5.9) 74 (33.3) 27 (12.2) 10 (4.5)	 1330 (51.8) 207 (8.1) 727 (28.3) 200 (7.8) 43 (1.7)	(Each breed group compared to all others) 0.001 0.24 0.11 0.02 0.008*
Gender of dogs Male Female	 103 (46.7) 118 (53.3)	 974 (41.1) 1395 (58.9)	 0.11
Dog acquired from Scotland Yes No	 163 (78.0) 46 (22.0)	 1659 (70.1) 709 (29.9)	 0.02
Owner reporting at least one tail injury Yes No	 22 (30.0) 53 (70.0)	 260 (29.3) 628 (71.7)	 0.99
Number of dogs with at least one tail injury	25 of 220 (11.4)	317 of 2356 (13.5%)	0.38

¥Mann-Whitney test; *Fisher exact test

8. APPENDIX 2 (CORRESPONDENCE FROM THE N.W.T.F. – UK.)

NATIONAL WORKING TERRIER FEDERATION

(A Member of the Council of Hunting Associations.)

1A Bridgnorth Road, Trescott, Wolverhampton. WV6 7EU
Tel: 0776 7777 835 Email: WdBrr@aol.com

Irish Working Terrier Federation
F.A.O. Mr G. O'Donoghue.
24th October 2013

The University of Glasgow's Study Into Tail Injuries In Working Dogs.

Dear Mr O'Donoghue

Further to our telephone conversation regarding the above.

I can confirm that the National Working Terrier Federation, which is the lead organisation representing working terriers in the U.K. (including Scotland), was not consulted on, nor requested to participate in the above study.

Yours sincerely

B. W. Wade

Barrie W. Wade C.I.T.P. M.B.C.S. (Chairman)