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Injuries to Scottish farmers while tagging and clipping cattle: a cross-sectional survey

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Background	Anecdotal reports suggested that farmers were sustaining significant injuries while ear tagging newborn calves or clipping cattle prior to slaughter.
Aims	This national survey was designed for determining the incidence and nature of self-reported injuries to farmers that were sustained while tagging calves and clipping cattle.
Methods	A cross-sectional, anonymous, postal questionnaire survey was sent to all members of the National Farmers Union of Scotland with beef or dairy cattle (n = 4495).
Results	In total, 2439 (54%) usable questionnaires were received and 1341 injuries were reported by 591 (24%) respondents. Tagging-related injuries were reported by 297 (12%) respondents. The most commonly described injury was bruising, but lacerations (3%) and fractures (3%) also occurred. Fifty-eight (20%) individuals lost time from work, with a median of 3 days [interquartile range (IQR) = 2–7 days]. Four hundred and eighteen (17%) respondents reported clipping-related injuries. The most common injury was bruising, but lacerations (6%) and fractures (7%) also occurred. Ninety-five (23%) individuals lost time from work, with a median of 4 days (IQR = 2–14 days). Tagging injuries more commonly affected lower limbs and the trunk, while clipping injuries affected the upper limbs. Tagging injuries were associated with working alone, in an open field and with a vehicle nearby, while clipping injuries were associated with working alone, with beef cattle and with younger age. Both types of injury were associated with injuries from livestock in other circumstances.
Conclusions	Tagging calves and clipping cattle prior to slaughter are associated with a significant risk of injury, which may be severe, necessitating treatment and time lost from work. Policy makers, safety advisers and the farming community should reconsider whether these procedures are necessary and whether current guidelines should be modified in order to improve safety.

Key words	Agricultural injuries; farm safety; farmers; injury risk.
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Introduction

There is little published information about agricultural injuries in the UK, although there is literature from the USA and Canada [1–4]. Official figures reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations system provide information on fatal accidents. However, it is recognized that many non-fatal injuries go unreported [5,6]. This study addresses injuries sustained in relation to two specific working practices: the tagging and clipping of cattle.

Ear tagging of newborn calves was introduced in the early 1980s as a method of tracing animals in order to allow monitoring of diseases, notably tuberculosis. The

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law then changed as a result of European Union (EU) concerns over bovine spongiform encephalopathy. Since 1997, plastic or metal tags have had to be inserted into both ears of calves within 20 days of birth [7]. The birth registration and passport scheme associated with ear tagging was one measure for overcoming the EU export ban on British beef.

The policy of clean livestock introduced in 1997 arose from concerns over infections such as *Escherichia coli* 0157 and required that cattle presented at abattoirs for slaughter were 'clean', i.e. that their hides were free from visible contamination with dirt or faeces [8]. Cattle rejected as not sufficiently clean are returned to farmers who bear the resulting costs of transport. This economic penalty has led many farmers to clip the belly, legs and flanks of their cattle prior to slaughter. This is generally carried out using hand-held clippers for trimming the lower belly and legs of the animal while it is restrained in a cage (see Figures 1 and 2).

The objective of this study was to obtain data on injuries sustained by farmers involved in these practices. We surveyed all beef and dairy stock farmers who were members of the National Farmers Union of Scotland (NFUS) using an anonymous postal questionnaire for collecting information on self-reported injury during the previous 12 months and on routine working practices.

Methods

A postal questionnaire was devised in collaboration with the NFUS Meat and Livestock Committee. Questionnaires were distributed to all beef and dairy farmers identified from the NFUS membership database (n = 4495) in May 2002. A reminder was sent 4 weeks later.

The questionnaire asked about the number of injuries received in the previous 12 months while carrying out tagging and clipping activities. Details of the nature of the injury were entered in a free text box. Specific questions were asked about the circumstances of the injury and working practices at the time of the injury. Those reporting more than one injury were asked to detail the nature and circumstances of the most severe injury sustained, whether medical attention was required and the number of days lost from work.

All farmers were asked to provide general information about their age, number of years in farming, number of regular workers on the farm, employment status (full time/part time and employer/employee), type of farm, number of animals tagged or clipped, working practices in relation to tagging and clipping, and whether they had sustained other cattle-related injuries.

The questionnaires were returned in a freepost envelope. These were input and analysed using SPSS for Windows® (11.0) and Stata (7.0)®. Associations between potential risk factors and injury were tested using χ^2-tests and multiple logistic regression analysis.

Ethical approval for the study was obtained from the Highland Health Board Research Ethics Committee.

Results

Study sample

In total 2622 (58%) questionnaires were returned. After removing respondents who were retired or no longer kept cattle, 2439 (54%) responses were eligible for analysis. Of the respondents, 2235 (94%) were self-employed, while the remainder were employees. There were 2095 (87%) full-time farmers, with 2029 (84%) having beef cattle only, 296 (12%) having both beef and dairy cattle and 98 (4%) having dairy cattle only. The age of the respondents ranged from 19 to 87 years (mean 50.5 years).

Figure 1. Belly clipping an animal in a cattle crush.

Figure 2. Leg clipping an animal in a cattle crush. The operator is at risk of injury from the animal and from the clippers.

Injuries

A total of 1341 tagging- and clipping-related injuries in the previous 12 months were reported by 591 respondents (24%). Tagging-related injuries were reported by 297 (12%) respondents and clipping-related injuries by 418 (17%). The maximum number of injuries recorded by an individual was 24 for tagging and 12 for clipping.

In addition, 568 respondents (23%) reported sustaining other cattle-handling injuries that were unrelated to tagging or clipping activities in the previous 12 months.

Details of the most severe tagging injury reported by each respondent are shown in Table 1. The most common injury was bruising, ranging in severity from minor bruising to serious internal bruising. The lower limbs and trunk were the most common sites affected. A number of those injured required medical attention from a general practitioner (GP) or casualty department or other hospital treatment. One-fifth required time off work as a result of their injury. The median time lost from work was 3.0 days [interquartile range (IQR) = 2–7 days]. Ten per cent of those injured were off work for >3 weeks.

In univariate analysis, the following factors were associated with tagging-related injury: having a handling facility ($P = 0.019$), tagging in an open field ($P = 0.001$), working alone ($P = 0.001$), having a vehicle close by ($P = 0.001$), having other cattle-related injuries in the previous 12 months ($P = 0.001$) and having beef cattle ($P = 0.001$). Employment status (self-employed versus employee) and having regular workers were not associated with tagging injuries. There was a small increase in the risk of injury related to the number of calves tagged [odds ratio (OR) = 1.0025 and 95% confidence interval (CI) = 1.0009–1.0040].

Different procedures are required in the clipping of cattle and a different pattern of injury was seen (Table 2). Just over three-quarters of reported injuries were bruising. Injuries were most common to the upper limbs. A higher proportion of those injured while clipping required medical attention from a GP or casualty department or other hospital treatment compared with those injured while tagging. Almost one-quarter of those injured lost time from work. The median number of days lost was 4 days (IQR = 2–14 days) and 15% of those injured were off for more than 3 weeks.

In univariate analysis, the following factors were associated with having sustained a clipping-related injury: having a handling facility ($P = 0.001$), working alone ($P = 0.001$), having experienced other cattle-related injuries in the previous 12 months ($P = 0.001$), being involved in farming on a full-time basis ($P = 0.003$) and having both beef and dairy cattle ($P = 0.001$). There was no significant relationship between the likelihood of injury and employment status (self-employed/employee) and having regular workers on the farm. There was a small increase in the risk of injury related to the number of cattle clipped (OR = 1.006 and 95% CI = 1.005–1.007).

All potential risk factors found to be significant in the univariate analysis at the level of $P < 0.2$ were entered into a multivariate model. The associations for tagging and clipping between injury and potential risk factors derived from the model are shown in Tables 3 and 4, respectively.

There were significant independent associations for tagging between injury and having a handling facility, tagging in an open field, tagging alone, having a vehicle nearby and having sustained other injuries from cattle that were unrelated to tagging or clipping. The numbers

Table 1. Injuries sustained while tagging calves

Injury	*n*	%[a]
Type of injury		
Bruising	218	82.0
Laceration	7	2.6
Fracture	8	3.0
Other	33	12.4
Site of injury		
Upper limbs	31	14.2
Lower limbs	68	31.2
Trunk	51	23.4
Head	18	8.3
Multiple sites	50	16.8
Injury severity		
Medical attention (GP or casualty)	27	9.2
Other hospital treatment	7	2.4
Lost time from work	58	20.0
Median (IQR) days off work	3.0 (2–7)	–

[a]The sum of the percentages is not necessarily 100, as each respondent may report more than one category or may not have responded to that question.

Table 2. Injuries sustained while clipping cattle

Injury	*n*	%[a]
Type of injury		
Bruising	293	78.3
Laceration	21	5.6
Fracture	27	7.2
Other	33	8.8
Site of injury		
Upper limbs	215	58.4
Lower limbs	60	16.3
Trunk	21	5.7
Head	34	9.2
Multiple sites	38	10.3
Injury severity		
Medical attention (GP or casualty)	73	17.7
Other hospital treatment	32	7.8
Lost time from work	95	23.3
Median (IQR) days off work	4.0 (2–14)	–

[a]The sum of the percentages is not necessarily 100, as each respondent may report more than one category or may not have responded to that question.

Table 3. Association of tagging-related injury with potential risk factors

	Total number of respondents (n = 2439)[a]	Those with more than one injury (n = 297)		Adjusted OR	
		n	%	OR	95% CI
Having handling facility					
Yes	1128	159	14.1	1.49	1.11–1.98
No	1075	116	10.8	1.0	–
Tagging in open field					
Yes	1375	242	17.6	2.09	1.42–3.08
No	910	47	5.2	1.0	–
Tagging alone					
Yes	1651	255	15.4	2.02	1.36–2.98
No	663	40	6.0	1.0	–
Having vehicle nearby while tagging					
Yes	1569	252	16.1	2.08	1.39–3.11
No	665	42	6.3	1.0	–
Type of cattle in farm					
Beef	2029	272	13.4	3.45	0.81–14.76
Dairy	98	2	2.0	1.0	–
Both	296	19	6.4	2.03	0.44–9.20
Had other injuries					
Yes	568	135	23.8	3.25	2.44–4.31
No	1775	144	8.1	1.0	–

The ORs and 95% CIs were derived from multiple logistic regression analysis.

[a]The total sample numbers differ because of missing data.

Table 4. Association of clipping-related injury with potential risk factors

	Total number of respondents (n = 2439)[a]	Those with more than one injury (n = 297)		Adjusted OR	
		n	%	OR	95% CI
Having handling facility					
Yes	1988	398	20.0	5.02	2.68–9.39
No	351	117	3.4	1.0	–
Clipping alone					
Yes	1300	296	22.8	1.70	1.32–2.19
No	953	110	11.5	1.0	–
Type of cattle in farm					
Beef	2029	345	17.0	6.18	2.23–17.14
Dairy	98	4	4.1	1.0	–
Both	296	66	22.3	7.56	2.64–21.69
Age group (years)					
<35	203	45	22.2	3.03	1.57–5.87
35–44	551	117	21.2	3.22	1.78–5.83
45–54	739	143	19.3	3.02	1.69–5.44
55–64	652	93	14.3	2.27	1.25–4.13
65+	271	16	5.9	1.0	–
Had other injuries					
Yes	568	161	28.3	2.35	1.85–3.00
No	1775	240	13.5	1.0	–

The ORs and 95% CIs were derived from multiple logistic regression analysis.

[a]The total sample numbers differ because of missing data.

of calves clipped and age of the respondent were not significantly associated with the risk of injury after adjusting for these other factors.

There were significant independent associations for clipping between injury and having a handling facility, clipping alone and having sustained other injuries from cattle that were unrelated to tagging or clipping. Having beef cattle or dairy and beef cattle was associated with a greater risk than dairy cattle alone. There was also a significant association with age, younger respondents

being more likely to report injury than those aged over 65 years. The number of cattle clipped, expressed as quantiles, was not significantly associated with the risk of injury after adjusting for these other factors.

Discussion

The self-reported injuries while tagging calves or clipping cattle for slaughter in this study were frequent, affecting one-quarter of all respondents and potentially serious.

Could response bias have affected our findings? The response rate of 54% compares favourably with other studies of farmers [9,10]. The proportion of farmers reporting an injury in the first mailing was 26% and in the reminder 19%. However, even in the unlikely event that all non-responders had suffered no injuries, there would still be a substantial burden of morbidity. It is estimated that approximately 70% of all full-time farmers in Scotland are NFUS members and that approximately 80% are beef farmers (R. Henton, NFUS, personal communication).

Population-based studies of agricultural injuries are relatively rare [11,12]. When all causes of injury are examined, machinery and transportation injuries are most common, although animal handling has been recognized as a high-risk activity [3,11,13]. Much research relies on data gathered from hospital admissions, out-patient departments and official reporting mechanisms [1,5,6, 14,15]. However, official reporting may reflect less than 5% of injuries among the self-employed [3].

The patterns of injury reported during tagging and clipping in this study were different. Bruising was the most commonly reported injury for both activities. However, during tagging the lower limbs and trunk were the most frequent sites of injury, generally the result of attacks from distressed cows protecting their calves. For clipping, the upper limbs were most affected and lacerations and fractures were more common. These injuries were often a result of an arm being crushed between the animal and the restraint in which it is held or direct injury from the clippers. Interestingly, 43% of the farmers injured considered the animal that injured them to have been clean prior to clipping, thereby raising the question of whether clipping was necessary in these cases. The rationale for clipping animals is to reduce microbial contamination of meat, since food-borne pathogens are carried on cattle hides [16] and it is assumed that dirty animals will carry a greater risk of carcass contamination. However, the evidence supporting this assumption is inconsistent and some studies have shown no association between the prevalence of organisms on the hide and carcass contamination [17]. Furthermore, clipping is only one of a number of factors that contribute to the cleanliness of animals [18] and recent advice from the Food Standards Agency suggests that clipping should be a 'last resort' for removing visible dirt [19].

The consequences of injury were important. Approximately one-fifth of those injured while tagging required time off work, while almost one-fifth of those injured while clipping required medical attention and one-quarter required time off work. Other farmers added written comments on the questionnaire indicating that they did not regard time off work as an option due to pressure of work. Reluctance to seek medical attention has been previously associated with the pressure of work and distance to travel in rural areas [2].

The risk of clipping-related injury was greater in younger farmers. Age has been previously associated with the risk of agricultural injury. Farmers aged 50 years and under had double the incidence of injuries compared to those over 50 years [13]. In a study of 600 dairy farm workers, injuries were greatest among the 31–40 years age group [12]. However, older farmers may be at greater risk of transportation injuries and significantly more likely to die or be hospitalized as a result of their injuries [1,11]. It is possible that greater experience reduces the overall risk of injury, although familiarity may also lead to the development of risk-taking behaviour [1].

In this study, beef farmers were at greater risk of injury than dairy farmers. Farm type has been associated with the risk of agricultural injury. Reilling's [11] study of Norwegian farmers found that injuries were more frequent on livestock farms than on arable farms. Swine farming has been associated with higher injury rates than beef, dairy, crop and mixed production farming [13]. Another study, in Canada, found that living on a beef farm was significantly associated with all injury occurrences, although there were no difference between farm types and the frequency of animal-related injuries [3].

Full-time farmers were more likely to have received a clipping injury than part-timers. In other studies, owner/operators rather than employees were at greater risk of injury [12,20]. The factors accounting for this may include greater personal investment, longer working hours and fewer employed farm workers. However, it has also been reported that part-time farmers are at greater risk of injury, possibly as a result of combining a full-time off-farm job with farming [13].

Almost one-fifth of the respondents in this study had experienced cattle handling injuries that were unrelated to tagging and clipping activities and they were at significantly greater risk of tagging- or clipping-associated injury. This could reflect a tendency towards risk-taking behaviour, inadequate procedures, the use of unsuitable equipment or inherently more aggressive animals in some farms. In this study we asked farmers to report which breed of cattle caused each injury. However, a very wide range of breeds and cross-breeds were reported and no clear pattern emerged and, in the absence of data on the total numbers of each breed dealt with, we could not

meaningfully analyse this further. The question of possible high-risk situations merits further investigation.

The Health & Safety Executive has issued recommendations and guidelines for handling cattle [21]. These include carrying out these tasks with help from others and having a vehicle close by while handling animals, particularly in open sites. In our study, working alone was associated with increased injury risk, supporting the first recommendation. However, having a vehicle nearby while tagging was associated with increased injury risk. Anecdotally, farmers suggest that a vehicle attracts other animals to the area where tagging is taking place, perhaps increasing the risk of injury. Many farms are now run on a single owner/operator basis. Farming tasks must therefore be carried out single-handedly and other measures may be needed in order to reduce risk in these circumstances.

An unexplained feature of our results is the association between having a handling facility for animals and the risk of injury. We did not ask the subjects to specify whether that facility was being used at the time of injury, nor to describe the facility and we cannot therefore comment further on this finding. Clearly for the clipping of animals some form of cage or handling facility is essential.

Conclusion

In this study we have identified a high prevalence of self-reported injuries in farmers undertaking the tagging and clipping of cattle. These injuries may be severe and result in considerable time lost from work, with the resultant cost to the individual and health care providers. Currently recommended safety practices are in some cases associated with an increased risk of injury. Policy makers, safety advisers and the farming community should carefully consider whether tagging and clipping, as currently recommended, are necessary and whether the guidelines should be modified in order to improve safety.

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