



Farmer reported prevalence and factors associated with contagious ovine digital dermatitis in Wales: A questionnaire of 511 sheep farmers

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ARTICLE INFO

Article history:

Received 7 May 2013
Received in revised form
18 September 2013
Accepted 21 September 2013

Keywords:

Contagious ovine digital dermatitis
Lameness
Infectious foot disease
Sheep
Epidemiology
Welfare

ABSTRACT

In 2012, 2000 questionnaires were sent to a random sample of Welsh sheep farmers. The questionnaire investigated farmers' knowledge and views on contagious ovine digital dermatitis (CODD) – an emerging disease of sheep responsible for causing severe lameness, welfare and production problems. The overall response rate was 28.3% with a usable response rate of 25.6%. The between farm prevalence of CODD was 35.0% and the median farmer estimated prevalence of CODD was 2.0%. The disease now appears endemic and widespread in Wales. Furthermore, there has been a rapid increase in reports of CODD arriving on farms since the year 2000. Risk factors for CODD identified in this study include the presence of bovine digital dermatitis (BDD) in cattle on the farm and larger flocks. Farmers also consider concurrent footrot/interdigital dermatitis, buying in sheep, adult sheep, time of year and housing to be associated with CODD. Further experimental research is necessary to establish whether these observations are true associations.

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1. Introduction

Lameness is one of the most significant causes of poor welfare in sheep (Goddard et al., 2006; Fitzpatrick et al., 2006; Winter, 2008). According to a recent sheep welfare expert panel, lameness was the only indicator that was consistently identified as an on farm welfare issue for all four of the production stages of sheep – young lambs, growing lambs, ewes and rams (Phythian et al., 2011). A recent Farm Animal Welfare Council (FAWC) report (FAWC, 2011) estimated that at least three million sheep are lame in the UK at any one time and that six to nine million sheep become lame in the UK over the course of a year.

In the majority of cases, lameness in sheep is caused by infectious agents and there are three main expressions

of disease. Footrot and interdigital dermatitis (ID) cause over 90% of lameness in sheep in the United Kingdom (Kaler and Green, 2008). They have been extensively researched in the UK, Australia and New Zealand (and to a lesser extent elsewhere) and effective control strategies have been established (Kaler and Green, 2008; Bennett and Hickford, 2011; Raadsma and Egerton, 2013).

In 2005, Nieuwhof and Bishop estimated the cost of footrot (FR) in the UK to be £24 million annually, including costs associated with labour, medicines, structures and lost production (Nieuwhof and Bishop, 2005). A similar estimate for New Zealand put the annual cost of treatment for FR together with associated production losses for the Merino sheep industry at NZ\$ 11 million (Hickford et al., 2005).

Contagious ovine digital dermatitis (CODD) is an emerging disease and currently is less well understood. It was first reported in sheep in the UK in 1997 (Harwood et al., 1997) and is reported to occur across the UK and Ireland

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(Kaler and Green, 2008; Scott, 2010). The FAWC lameness report (2011) highlighted the as yet scant evidence into the prevalence, incidence and aetiology of CODD although it notes that CODD causes severe lameness and consequently is a significant welfare concern (FAWC, 2011). The most recent surveys indicate a farm level prevalence of between 13% and 53% (Wassink et al., 2003a; Kaler and Green, 2008). Recent work has suggested a role for treponemes in the aetiology of CODD similar to bovine digital dermatitis (BDD) (Dhawi et al., 2005; Sayers et al., 2009). However, there is some question over the possible interaction of other organisms such as *Dichelobacter nodosus* and *Fusobacterium necrophorum* (Moore et al., 2005).

Several authors have described the clinical features of CODD, and currently they are still the mainstay of disease diagnosis (Winter, 2008). Common themes include those features which seem pertinent in distinguishing it clinically from FR, namely that lesions tend to commence at the coronary band (compared to the interdigital space) and then quickly under run the hoof horn capsule abaxially. In severe cases the whole horn may be shed leaving the sensitive lamellae exposed (Harwood et al., 1997; Naylor et al., 1998; Wassink et al., 2003b; Winter, 2008). Sheep tend to be extremely lame with severe consequences such as loss of body condition and increased recumbency (Harwood et al., 1997; Winter, 2008; Duncan et al., 2012). With little recent epidemiological data available, it is not easy to determine the true spread of CODD since its first report, or current prevalence in the UK.

Postal questionnaires have previously been used to assess farmer's views on lameness in sheep in the UK (Grogono-Thomas and Johnston, 1997; Kaler and Green, 2008; Wassink et al., 2010). These have described the prevalence and risk factors for FR, and the between and within farm prevalence of CODD. Other epidemiological aspects of CODD such as factors associated with disease have not yet been examined.

The aim of this study was to determine the farmer reported prevalence and factors associated with CODD using a postal questionnaire.

2. Materials and methods

2.1. Study population

Welsh sheep farms were chosen as the study population as CODD in this population has not previously been studied in detail, Wales has a substantial sheep population and the industry forms a significant part of the Welsh economy – in June 2011 there were 14,184 registered agricultural holdings with sheep (Welsh Assembly Government, 2012), although many farmers may have more than one holding. Simple randomisation, using random numbers, was used to select 2000 farmers registered with the Farm Assured Welsh Livestock (FAWL) database. The FAWL farm assurance scheme is a voluntary scheme although due to the financial benefits of belonging, the vast majority of sheep farmers are members and currently FAWL reports it has over 7200 members (FAWL, 2013).

2.2. Sample size calculation

Given the response rates of previous published lameness surveys, together with the response rates from other farm questionnaires by The University of Liverpool, a response rate of approximately 50% was predicted. Sample size calculations were performed using Stata IC 12 (Statacorp, TX). To detect a 10% difference in prevalence with 90% power and alpha at 5%, a sample size of 1076 would be required. The questionnaire was sent by post to the 2000 selected farmers in spring 2012. This equates to approximately 27% of the sampling frame.

2.3. Description of the questionnaire

A pilot questionnaire was tested on a sample of 20 farmers. Adjustments to the questionnaire were made on the feedback responses to the pilot questionnaire.

The final 15 page questionnaire written in English, together with a cover letter written in English and in Welsh stressing the anonymity and confidentiality of the data and a reply paid envelope, was sent to the selected farms. Using a mixture of open and closed question techniques, general and detailed questions were asked with regards to infectious foot conditions, farm and management factors, together with questions looking at the views and opinions of farmers on sheep lameness issues. Questions included factual based responses e.g. 'Do you lamb your sheep inside?' and opinion based responses e.g. 'Do you think CODD on your farm is worst when sheep are housed?'. When considering their opinion, farmers were asked to consider when most problems occurred, or when CODD was at its worst.

Farmers were asked to base their classification of foot diseases on a pictorial guide (see supplementary materials) which demonstrated the key diagnostic features of CODD, FR and ID. The pictorial guide was developed in the pilot study by sheep veterinarians and sheep farmers in order to ensure valid diagnosis. The farmers had the option to request all the documents, in particular the questionnaire in Welsh. All returned questionnaires were entered into a cash prize draw.

One month after the initial survey a second set of documents was sent out to all non-responding farmers with an adjusted covering letter encouraging farmers to respond. Again farmers had the option to request the questionnaire in Welsh. Due to financial constraints only one reminder could be sent.

2.4. Data analysis

The questionnaires were returned to The University of Liverpool and checked manually for inconsistencies. The data were then entered into a Microsoft Access Database (Microsoft, USA) followed by further range and consistency checks.

All analyses were conducted using Stata IC 12 (Statacorp, TX). Descriptive statistics were estimated, together with regression analyses where appropriate. Probability values of <0.05 were taken as significant.

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