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# An evaluation of cattle farmers' knowledge of bovine brucellosis in northeast Portugal

J. García Díez<sup>a,\*</sup>, A.C. Coelho<sup>b</sup>

<sup>a</sup> *Cooperativa Agrícola de Chaves, ADS Vila Pouca de Aguiar, Bairro da Brangada, 5450-005 Vila Pouca de Aguiar, Portugal*

<sup>b</sup> *Departamento das Ciências Veterinárias, CECAV, Universidade de Trás-os-Montes e Alto Douro, Apartado 1013, 5001-911 Vila Real, Portugal*

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## KEYWORDS

Brucellosis;  
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**Summary** Little information is available regarding the connection between the risk of brucellosis infection in cattle and the lack of training and education of cattle producers. A total of 154 cattle farmers from the Vila Real (northern Portugal) municipality were interviewed in person to evaluate their knowledge of bovine brucellosis.

Basic knowledge of the zoonotic characteristics and clinical signs of brucellosis infection and cattle management was obtained from 78.6%, 68.8% and 79.9% of the respondents, respectively. The respondents with infected animals in their herds (odds ratio (OR) 5.5; 95% confidence interval 1.6, 19.5) were more likely to have greater knowledge about bovine brucellosis. The study also revealed a relationship ( $p < 0.01$ ) between the use of breeding males and farms that were already infected with brucellosis. Moreover, the knowledge that brucellosis is a zoonotic disease was also influenced by the number of farms already infected with brucellosis ( $p < 0.01$ ).

Conversely, the number of respondents who were unaware that bovine brucellosis is a zoonotic disease (25.3%) and a foodborne pathogen (21.4%), and the fact that over half (54.5%) of the respondents believed that bovine brucellosis was a treatable infectious disease was associated with the absence of veterinary assistance on the farm (60.4%).

Because the eradication of bovine brucellosis has multiple factors, the success of the national eradication program cannot be based only on the sanitary management of infected herds. Successful eradication will only occur with adequate training programs for farmers, including farm biosecurity, legal fulfillment and veterinary public health programs (in which the role of the veterinarian is fundamental).

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\* Corresponding author. Tel.: +351 259417782; fax: +351 259417376.  
E-mail address: [juangarciadiez@gmail.com](mailto:juangarciadiez@gmail.com) (J.G. Díez).

## Introduction

*Brucella* spp. are facultative intracellular Gram-negative coccobacilli. These non-spore-forming and non-capsulated bacteria cause a serious contagious disease that results in reproductive failure and that has profound public health significance because of its zoonotic characteristics [1,2]. In cattle, *Brucella abortus* is the usual cause of brucellosis, but other *Brucella* spp., such as *Brucella melitensis* and *Brucella suis*, can (in rare cases) infect cattle [3]. The eradication of brucellosis in animals is a necessary step in controlling the disease in humans [4]. In cattle, during animal production, the infection causes heavy economic losses resulting from clinical disease, abortion, neonatal losses, increased calving intervals, reduced fertility, decreased milk production, increased culling rates because of metritis and the emergency slaughtering of infected animals [5,6]. In addition, the disease is an impediment to free animal movement and trade [7]. In Portugal, brucellosis control is mandatory [8]. All cattle older than 12 months are subjected to annual serological testing. Positive animals are culled when both the Rose Bengal and complement fixation tests are positive. Then, samples from several organs are taken at the slaughterhouse for bacteriological isolation. In infected flocks, special measures are performed at the farm, such as an epidemiological survey, cattle movement restriction and (at minimum) four serological tests within a 240-day period [9]. As an additional measure, serological testing (a pre-movement test) is compulsory for all bovine older than 12 months; before they leave the farm [10], calves younger than 12 months are slaughtered if they are the descendants of those cattle previously found to be positive. The potential risk factors for bovine brucellosis seroprevalence have been determined by epidemiological studies [11–13]. Several factors, such as gender, breed, age, herd size and management, ecological conditions and socio-economic factors play an important but poorly defined role [14]. In Portugal, the risk factors of bovine brucellosis have not been previously investigated. Husbandry, grazing, hygiene, milking procedures, veterinary management and/or biosecurity measures are strongly associated with the training and education of farmers. Brucellosis control cannot rely only on test-and-slaughter programs, cattle producers should also be involved; therefore, as an important part of bovine brucellosis control, the aim of this study was to evaluate the farmers' knowledge of bovine brucellosis.

## Materials and methods

### Survey design

A cross-sectional study of bovine brucellosis knowledge was conducted from April to July 2012. A voluntary survey (comprised of personal interviews) was administered to 154 cattle farmers of the Vila Real municipality, in northeast Portugal. The questionnaire was based on a literature review, and the questions were designed to obtain information about bovine brucellosis. Several questions were related to the respondents' demographic characteristics (gender, age and education level) and information about their farms. The participants' overall knowledge of bovine brucellosis was assessed using 18 closed questions. The responses to these questions were combined to generate a knowledge score ranging from zero to 18. After assessing the normality of the scores using a histogram, the composite score was dichotomized using the mean as a cut-off value; therefore, a value coded > one showed higher overall knowledge. A score of one was given to correct responses, and zero was used for incorrect and "I do not know" responses. Based on the mean score of the composite variable (mean = 9.85), the responses were categorized as high (a score above the mean value) and low (a score below the mean value).

To reduce the possibility of farmers answering correctly by chance, all questions included the item "I do not know". During the interview, any herd could have been declared brucellosis positive by veterinary officials.

### Pilot study

A pilot study was conducted to assess the clarity of the questionnaire instructions, layout and time requirement. The pilot questionnaire was administered to 25 bovine farmers from the Sabrosa and Alijó municipalities in northeast Portugal. The results of this work are not included in this study.

### Data analysis

All questionnaire data were entered into an SPSS 19.0 database (SPSS, IBM, New York, USA) and carefully checked; the errors were corrected, and the data were immediately available as an SPSS dataset. All recorded information from each herd was carefully compared with the paper questionnaire and checked; typing errors were detected and corrected.

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