Multivariate analysis of risk factors of bovine brucellosis in Northeast Portugal

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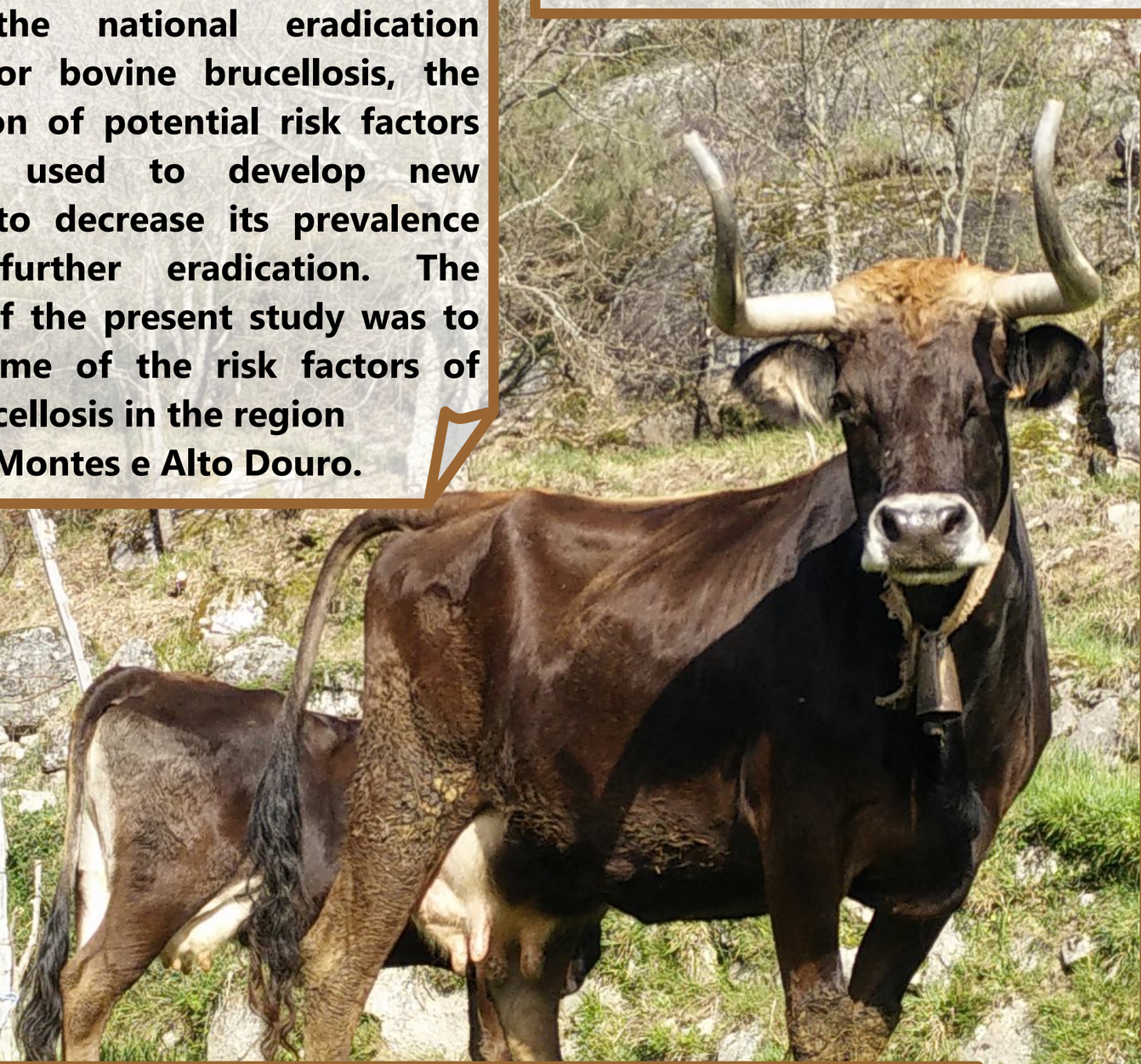
Introduction

Brucellosis is a zoonotic disease with worldwide distribution. It affects a great variety of hosts, including cattle. Its clinical presentation implies gross economic losses due to abortions and decrease of animal productivity. Brucellosis also represents an important public health significance due to its zoonotic character. Thus, to improve the national eradication program for bovine brucellosis, the investigation of potential risk factors could be used to develop new strategies to decrease its prevalence and its further eradication. The objective of the present study was to identify some of the risk factors of bovine brucellosis in the region of Trás-os-Montes e Alto Douro.

Material and methods

Data obtained from the national animal health database (farm identification, main animal production, birth date, sex, existence of small ruminants commingled with cattle in the same farm, number of cattle farms in the same location and number of small ruminant farms in the same area) from 2001 to 2016 of Trás-os-Montes e Alto Douro were studied. Also, geographical characteristic (sea level, mean annual pluviosity and mean annual temperature) were included. For logistic regression, previous variables with $p<0.05$ in the univariable analysis were used to construct a multivariable model.



Discussion

In the study area, cattle production is characterized by small herds of family type management. The risk factors identified are compatible with contact between cattle from different farms and also by contact with small ruminant flocks. Despite the efforts made in the control of bovine brucellosis, results showed that there are other factors that are difficult to control, such as contact with game or the persistence of *B. abortus* in the environment. Although this type of production is essential to local economy and avoids rural desertification, implementation of biosecurity measures adapted to this type of production is necessary.

Results

Multivariable logistic regression analysis showed the five variables associated ($p<0.05$) with the prevalence of antibodies for brucellosis. The β coefficient, standard error, odds ratios and the 95% confidence level for the factors are presented in Table 1. Those factors which remain in the model after adjustment are: "Herd size", "Age", "Existence of commingling small ruminants", "Season" and "Altitude". Small herds displayed higher risk of being seropositive (OR=1.48, 95% CI 1.29 to 1.71). Also, the logistic regression model showed that young animals presented higher odds (OR=1.49, 95% CI 1.24 to 1.69) of being seropositive to brucellosis than older animals. The odds (OR=1.59, 95% CI 1.29 to 2.04) for seropositivity were higher in cattle commingled with small ruminants. The odd ratio for a positive test increased in hot season (OR=1.85, 95% CI 1.59-2.15). Also, high altitude (OR=2.38, 95% CI 2.07 to 2.73) resulted as a risk factor for positive results for bovine brucellosis

Table 1. Assessment of risk factors of bovine brucellosis by logistic regression in Northeast Portugal

Variables	[a]β	MofV	Wald's p	[c]OR	95% [d]CI
Herd Size					
Large	-	-	-	1	-
Small	0.393	0.072	0.000	1.48	1.29-1.71
Age					
Older	-	-	-	1	-
Young	0.370	0.079	0.000	1.45	1.24-1.69
Existence of commingling small ruminants					
No	-	-	-	1	-
Yes	0.463	0.127	0.000	1.59	1.24-2.04
Season					
Cold	-	-	-	1	-
Hot	0.612	0.077	0.000	1.85	1.59-2.15
Altitude					
Low/Medium	-	-	-	1	-
High	0.866	0.071	0.000	2.38	2.07-2.73

MofV: measures of variation; C.I.: confidence interval; OR: odd ratio