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The role of *Brucella* infection in abortions among traditional cattle reared in proximity to wildlife on the Kafue flats of Zambia

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Summary
The role of *Brucella* infections in cattle abortions was investigated in 914 females from 124 herds. Animals were tested for exposure to *Brucella* species and history of abortion over the past three years. Sera were tested using the Rose Bengal test (RBT) and competitive enzyme-linked immunosorbent assay (c-ELISA).

Of 886 females tested, 189 were positive on RBT, and 154 (81.5%) were confirmed by c-ELISA. At the individual animal level, 16.2% (95% confidence interval [CI]: 12.6% to 19.8%) of the cows had aborted their foetuses in the last three years, while *Brucella* seroprevalence was estimated at 23.9% (95% CI: 19.8% to 28.0%), after adjusting for area clustering and weighting according to sampling fraction.

At the herd level, abortions were recorded in 50% of the herds (95% CI: 41.2% to 58.8%) and the seroprevalence was 58.1% (95% CI: 49.5% to 66.6%). A multiple logistic regression model identified the presence of anti-*Brucella* antibodies (odds ratio = 3.4; 95% CI: 1.6 to 7.4) and age as having significant effects on the risk of cattle abortion but no distinct factors could be identified at herd level. These results establish that *Brucella* infections contribute significantly to cattle abortions in the traditional livestock sector of Zambia.

Keywords
Abortion – Brucella – Brucellosis – Cattle – Kafue flats – Livestock-wildlife interface – Traditional livestock – Zambia.

Introduction

Cattle abortion (expulsion of the foetus between 41 and 260 days) is a common cause of reduced livestock productivity among traditional cattle in Zambia (19, 24). While poor management and a range of physiological conditions, such as nutritional disorders, may lead to abortion (23), it is also a common sign of several infectious diseases. Infectious agents that cause abortions include:

– bacteria
– protozoa
– viruses
– mycoplasmas.

Zambia has an estimated total livestock population of 2,900,000 cattle, 82,000 sheep and 954,000 goats (24). Most Zambian rural human populations depend on livestock for their livelihood, and approximately 84%, 96% and 64% of the national cattle, goat and sheep herds, respectively, are found in the traditional livestock sector, which is dominated by subsistence farmers, most of whom are indigenous people who raise cattle on communal land (24). In the commercial sector, in addition to cattle, farmers mainly rear sheep, whereas some traditional farmers rear goats, especially those farmers with low incomes, because goats are cheaper to buy and more tolerant of adverse conditions. It has been observed that the traditional livestock sector is characterised by high morbidity and mortality rates. This is coupled with low reproductive efficiency, demonstrated by:

– low conception rates
– low parturition rates
– long calving intervals
– abortions (24).

Annual calving rates are estimated to average from 40% to 55% in the traditional sector, compared with 55% to 75% in the commercial sector. Most traditional cattle in Zambia are reared in proximity to wildlife (in livestock–wildlife interface areas), where there is plenty of communal grazing land and freedom from tsetse flies. However, in many of these production areas, animal diseases have been singled out as the most important factor limiting livestock productivity in traditional cattle. The spread and maintenance of these diseases are related to several epidemiological determinants, such as:

– virulence and transmissibility (1) of the causative organism
– climatic and environmental factors
– the presence or absence of reservoir or maintenance hosts
– the presence or seasonal abundance of vectors
– strain adaptability
– the presence of susceptible populations (3).

Brucellosis is one of the infectious diseases that causes widespread economic losses, due to abortion, stillbirths, the birth of weak calves and extended calving intervals (23). Cattle abortions due to *Brucella* usually take place at between six and eight months of gestation (7, 23). Past studies in Zambia have also diagnosed other infectious diseases likely to cause abortion, such as:

– Rift Valley fever
– infectious bovine rhinotracheitis
– bovine viral diarrhoea (8, 10, 21).

Moorthy (13) conducted a survey on the aetiology of genital infections and abortions in Zambian traditional cattle and isolated *Campylobacter fetus* subsp. *venerealis*, among other pathogens, although no *Brucella* species was isolated.

Thus, specific causal factors of abortion in cattle have not been fully described, although *Brucella* and other infections are suspected (21, 24). Cattle brucellosis, especially that caused by *B. abortus*, tends to have similar manifestations to those seen in the reproductive performance record of Zambian traditional cattle (4, 7), and *Brucella* has been assumed to be a main causative agent of abortion in Zambian traditional cattle, despite the lack of direct evidence. A recent study found a high level of antibodies against *Brucella* spp. in a livestock–wildlife interface area of Zambia (15), where individual and herd seroprevalence in cattle ranged from 14.1% to 28.1% and 46.2% to 74.0%, respectively. Three types of cattle-grazing strategies were encountered in the study area:

– local grazing
– transhumant grazing
– flood-plain grazing.

Seroprevalences were seen to vary according to the area and grazing strategy, that is, the highest seroprevalence figures were found in the Lochinvar region and in areas of transhumant grazing (15).

This study aims to determine the possible role of *Brucella* spp. infection in abortions among traditionally managed cattle in the livestock–wildlife interface areas of the Kafue flats of Zambia. By doing so, the authors hope to investigate possible interventions to improve cattle fertility in these areas.

Materials and methods

Study area and design

A cross-sectional study was conducted in Zambia between February 2003 and August 2004. Two livestock–wildlife interface areas were included in the study, around Blue Lagoon and Lochinvar National Parks, while Kazungula – which is not an interface area – was included for comparative purposes. The study areas were selected for their concentrations of livestock and wildlife and the presence of common grazing areas, in line with the objectives of the study. Most of the cattle in these areas are the traditional zebu and sanga breeds, with a small number of mixed-breed animals. Three types of cattle-grazing strategies are used in the study areas: local grazing, transhumant grazing and flood-plain grazing.

Cattle reared in the livestock–wildlife interface region share grazing land with wild ruminants, including:

– Kafue lechwe *(Kobus leche kafuensis)*
– Cape buffalo *(Syncerus caffer)*

– wildebeest *(Connochaetes taurinus)*
– hippopotamus *(Hippopotamus amphibius)*
– impala *(Aepyceros melampus)*.

The Kafue lechwe is of particular interest because it has a large population, close contact with cattle on the flood plains and a history of brucellosis (8, 20, 22). Kafue lechwe are gregarious animals and tend to move in large herds, ranging from hundreds to thousands of animals. They live as semi-aquatic grazers along the flood-lines of the Kafue River plains. The animals spend much of their time in water up to 50 cm deep and are rarely seen far from the edge of the water (20). The present population of lechwe on the Kafue flats is estimated to range between 40,000 and 45,000 (11).

During the dry season, when there is limited pasture and water in the highlands (April to November), cattle are moved to the plains (transhumant herds). Some of the larger herds, which cannot find sufficient grazing land around the village, are kept permanently on the plains (flood-plain grazing) and compete for grazing and water with the wildlife.

The design and sampling strategies of the original study, on which this study is based, are described in a previous paper (15). A total of 1,245 cattle from 124 herds, aged two years or more, with no history of vaccination against *Brucella* spp., were tested for the presence of antibodies against *Brucella* (32 other samples were spoiled). Cattle were tested in Blue Lagoon National Park (n = 564, from 52 herds); Lochinvar National Park (n = 515, from 50 herds) and Kazungula (n = 166, from 22 herds). The present study took a subset of data (n = 886) from this original study, in which only adult cows from Blue Lagoon (n = 377), Lochinvar (n = 373) and Kazungula (n = 136) represent all 124 herds.

Epidemiological data and abortion history

Basic data on age, parity and history of abortion were collected for each animal. In addition, information was gathered on:

– herd factors (e.g. type of management and grazing pattern) and area level factors (e.g. climate conditions and wildlife in the area)

– husbandry practices

– grazing and watering patterns

– herd structure

– animals introduced into the area and those sold or slaughtered ('offtakes').

These epidemiological data were collected by an interviewer who administered a pre-tested questionnaire. Detailed information was gathered on the history of abortion in the herd over the last three years. The cattle owner was asked about:

– the number of abortions for each cow
– the period when each abortion occurred
– the approximate size of the calf when aborted.

A cow that delivered an almost fully formed dead calf in the third trimester or a dead or weak calf (as described by the farmer) was considered to have aborted. A herd was classified as abortive if at least one animal had experienced an abortion in the previous three years.

Brucellosis serology

The Rose Bengal test (RBT) was conducted as described earlier (2). *Brucella abortus* antigen from a reference source from the World Organisation for Animal Health (OIE) (Veterinary Laboratories Agency, United Kingdom) was used to screen sera for the presence of antibodies against *Brucella* spp. The degree of agglutination was graded on an ordinal scale from 0 (no agglutination) to 3 (coarse clumping), with corresponding (RBT) positive scores of 1, 2 and 3. All doubtful readings after repeated testing were recorded as negative readings.

Svanovir™ Brucella-Ab competitive ELISA (c-ELISA) kits (Svanova Biotech AB, Uppsala, Sweden) were also used to determine anti-*Brucella* spp. antibody titres. The analyses were conducted according to the instructions of the manufacturer, with antibody titres recorded as a percentage of inhibition (PI). Again, the threshold for determining seropositivity was set according to the recommendations of the manufacturer (PI ≥ 30%).

An animal was considered to be seropositive if it returned positive results using either the RBT or c-ELISA. A herd was classified as brucellosis-seropositive if at least one animal tested positive on either test (RBT or c-ELISA).

Data analysis

The database establishment and necessary manipulation were performed in Excel®, before transferring the database to Stata SE 9 for Windows (Stata Corp., College Station, Texas). The database included bio-data about each animal, as well as herd-level specific information, ecological data and management system factors. Individual- and herd-level brucellosis seroprevalence and abortion proportions over the past three years were computed using the survey command estimates in Stata, with adjustments for strata (study area) and weighting according to the sampling fraction in each primary sampling, as described by Dohoo *et al*. (6). The proportion of abortive cattle and herds and the distribution of anti-*Brucella* spp. antibodies (a proxy for exposure to *Brucella* spp. field strains) were determined.

At the individual animal level, the effects of age, parity, *Brucella* seropositivity and other factors which have a possible causal relationship with abortion were investigated in a logistic model, using the survey logistic procedure in Stata, with settings as above. The model was manually constructed, according to the details of logistic model building described by Dohoo *et al*. (6).

An attempt was made to model herd-level data using the xtlogit procedure, with 'herd abortion status' as the outcome and 'area' as a random effect. The herd *Brucella* status was entered into the model, and herd-level predictors were tested in a forward selection procedure.

Results

Descriptive statistics

From the total of 1,277 animals sampled during the initial survey (914 females and 363 males), only 1,245 sera (886 females and 359 males) were tested. The remainder (n = 32) were either haemolysed, mislabelled or broken. Over all, 17.2% (214/1,245) sera were classified as positive by RBT, of which 87.9% (a raw estimate) (188/214) were subsequently confirmed as positive by c-ELISA. Among the females tested (n = 886), 189 tested positive by RBT and 154 (81.5%) were further confirmed by c-ELISA. Almost all the sera that had a positive RBT score of 3 also tested positive by c-ELISA. However, some randomly selected negative RBT animals showed positive results by c-ELISA only (results not included).

From a total of 886 female cattle in the study, 118 (13.3%) had experienced at least one abortion within the last three years. Adjusting for clustering by areas, the proportion of the population which had experienced an abortion was estimated at 16.2% (confidence interval [CI] 95%: 12.6% to 19.8%). Results differed between areas, as shown in Table I. The proportion of herds with a history of abortion in the last three years was 50% (95% CI: 41.2% to 58.8%), with regional results shown in Table I. Some area variation was found at the individual animal level, but not at the herd level. Figure 1 shows the seasonal variations, with peaks in October (just before the rains) and June (two months after the rains), corresponding to the main calving seasons in traditional cattle in Zambia.

At the individual animal level, the prevalence of antibodies against *Brucella* spp. was estimated to be 23.9% (95% CI: 19.0% to 28.0%), while the herd level prevalence was found to be 58.1% (95% CI: 49.5% to 66.6%). Details on the area prevalence are shown in Table I. Since the study was conducted on animals with no history of vaccination against *Brucella*, all *Brucella*-seropositive animals were considered to have been exposed to *Brucella* spp. wild-type strains. Among the 705 cows that did not have anti-*Brucella* spp. antibodies, only 60 (8.51%) had a history of abortion whereas, among the 189 that did have antibodies against *Brucella* spp., 59 (31.2%) had a history of abortion, indicating some association between a history of abortion and the presence of antibodies against *Brucella* spp.

Figure 2 shows the relationship between the probability of an abortion and age. The authors note that a decreasing

Table I

Prevalence of antibodies to *Brucella* species and abortions in Zambian traditional cows, by study area, between 2001 and 2003

All estimates are adjusted for clustering by area and, in addition, animal-level estimates are weighted by sample fraction

Study area	At animal level: 886 animals studied		At herd level: 124 herds studied	
	Seroprevalence [(a)] (95% CI)	Abortion prevalence (95% CI)	Seroprevalence [(b)] (95% CI)	Abortion prevalence [(c)] (95% CI)
Blue Lagoon	P = 68/337 21.84% (15.28-28.41)	P = 61/377 18.07% (12.09-24.04)	P = 23/52 44.2% (30.5-58.0)	P = 32/52 61.5% (48.1-75.0)
Lochinvar	P = 91/373 28.29% (21.78-34.80)	P = 39/373 13.29% (8.29-18.29)	P = 37/50 74.0% (61.6-86.4)	P = 23/50 46.0% (31.9-60.1)
Kazungula	P = 30/136 22.18% (14.62-29.74)	P = 18/136 16.12% (9.17-23.07)	P = 12/22 54.5% (33.0-76.1)	P = 7/22 31.8% (11.7-51.9)
All areas	P = 189/886 23.92% (19.80-28.04)	P = 118/886 16.22% (12.59-19.84)	P = 72/124 58.1% (49.5-66.6)	P = 62/124 50.0% (41.2-58.8)

a) Individual seroprevalence based on the Rose Bengal test (RBT)
b) Herds with ≥ 1 animal testing positive by both RBT and enzyme-linked immunosorbent assay
c) Herds with ≥ 1 abortive animal fraction in each primary sampling
P : proportion; actual number of animals returning positive results by RBT out of total number of female animals tested (raw data)
CI: confidence interval

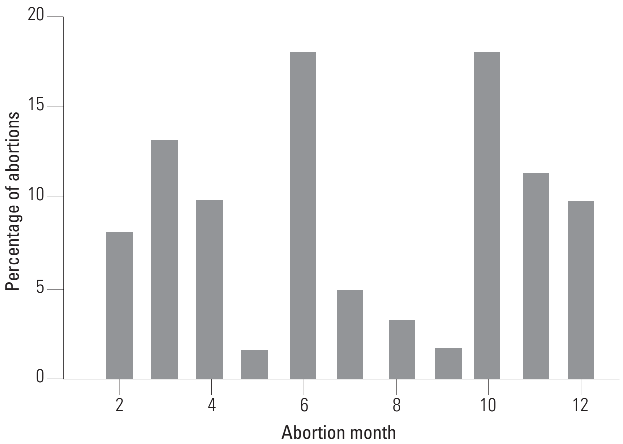

Fig. 1
Seasonal distribution (January to December) of abortions in Zambian traditional cows, recorded between February 2003 and August 2004

trend over age was found in Blue Lagoon and Lochinvar National Parks, while an increasing trend was found in Kazungula.

Logistic regression analyses

After controlling for the influence of 'area', the survey logistic regression model identified the presence of anti-*Brucella* antibodies as the main explanatory variable on the risk of cattle abortion at the individual animal level, with the variable influence of age. Parity was highly correlated with age and the authors preferred to keep age in the model (Table II). Owing to a limited explanatory value of the overall model, the separate logistic regressions were run for each area and a marked difference was found between the regions (Table II). More important, the separate models revealed a certain effect of age not found in the overall model.

Modelling the abortion status of the herd did not give a reliable model and no strong association between abortions and the *Brucella* status of the herd was discovered (results not shown).

Discussion

The study revealed a substantial problem with abortions in traditional cattle in the study area, and showed that exposure to *Brucella* spp. plays a significant role in abortions among cattle reared in the traditional sector. Most abortions were recorded between October and June. This period is reported to be the calving season for Zambian traditional cattle (19). Since *Brucella* causes abortion mainly in the third trimester (4), this peak

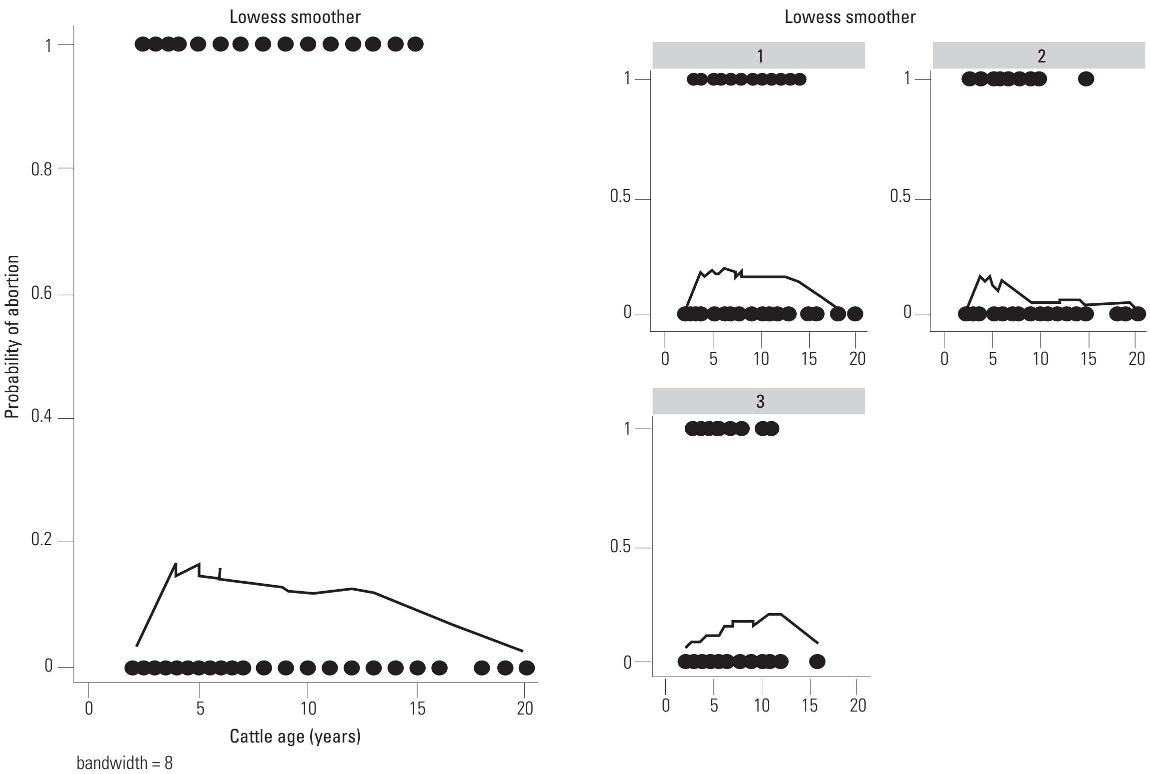

Fig. 2
Smoother scatter plot of abortions in relation to cattle age, for the whole study and broken down into the areas of Blue Lagoon (1), Lochinvar (2) and Kazungula (3)

Table II

Survey logistic regression analysis of the risk of abortions in traditional cattle living in livestock–wildlife interface areas

Overall estimates are adjusted for clustering by area and weighting by sample fraction. This model is based on seropositivity by the Rose Bengal test

Predictor variable	Odds ratio	95% confidence interval	*p*-value
	Over all areas (n = 886)		
Seropositive for *Brucella*	3.43	1.60-7.36	0.00
3.5-5 years vs 2-3 years	0.55	0.34-0.89	0.02
5.5-7 years vs 2-3 years	2.16	0.94-4.96	0.07
> 7 years vs 2-3 years	1.58	1.36-1.82	0.00
	Blue Lagoon (n = 377)		
Seropositive for *Brucella*	2.98	1.29-6.92	0.01
3.5-5 years vs 2-3 years	0.60	0.07-5.30	0.65
5.5-7 years vs 2-3 years	2.02	0.51-7.97	0.32
> 7 years vs 2-3 years	1.79	0.41-7.73	0.44
	Lochinvar (n = 373)		
Seropositive for *Brucella*	2.23	0.88-5.64	0.09
3.5-5 years vs 2-3 years	4.14	0.21-80.61	0.35
5.5-7 years vs 2-3 years	23.51	2.69-205.66	0.00
> 7 years vs 2-3 years	4.93	0.43-56.86	0.20
	Kazungula (n = 136)		
Seropositive for *Brucella*	22.32	6.13-81.26	0.00
3.5-5 years vs 2-3 years	0.11	0.01-0.83	0.03
5.5-7 years vs 2-3 years	0.19	0.02-1.48	0.11
>7 years vs 2-3 years	Not estimated	Not estimated	Not estimated

abortion period coinciding with the calving season fits the biology of *Brucella* as the causative agent. However, it is not easy to give a definite interpretation of this pattern.

Although Lochinvar had both the highest individual *Brucella* seroprevalence and the highest seroprevalence at herd level, this region had the lowest number of abortions attributed to brucellosis. The high seroprevalence value and low levels of anti-*Brucella* antibodies in seropositive animals (results not shown) may suggest that *Brucella* is endemic in Lochinvar, leading to a low number of abortions. On the other hand, high levels of anti-*Brucella* antibodies in Kazungula cattle, coupled with a high number of *Brucella*-associated abortions, may suggest recent infection. In Kazungula, most abortions were reported to have occurred between April and September 2003 and the animals were sampled in November of the same year.

The difference between the two areas may be that cattle in Lochinvar are likely to be chronically exposed to *Brucella* infectious agents. Human communities in Lochinvar are situated just along the boundary of the Lochinvar National Park and are closer to the plains than Blue Lagoon and Kazungula. This means that Lochinvar cattle, which are also predominantly reared using flood-plain and transhumant grazing systems, are far more likely to interact more often on the plains and have regular contact with wildlife.

In two separate studies by Rottcher (20) and Pandey *et al*. (18), brucellosis was reported among Kafue lechwe and other wildlife species. Rottcher (20) examined a total of 439 sera from 37 species and recorded brucellosis reactors among the following:

– Kafue lechwe
– puku
– wildebeest
– buffalo
– bushbuck
– zebra
– impala
– eland.

Rottcher suggested that brucellosis was more likely to be a problem in gregarious wildlife species, such as those listed above (with the exception of bushbuck). More recently, Pandey *et al*. (18) examined sera from 150 Kafue lechwe in the same study area, between 1991 and 1997, and observed an estimated seroprevalence of 22%. Other reports of brucellosis in lechwe include observations by Suzuki *et al*. (22).

Animals grazing in livestock–wildlife interface areas also tend to graze communally with other cattle from other areas. Communal grazing is a known risk factor of *Brucella* spp. infections (5, 12). However, the observed difference in numbers of abortions between cattle grazing in the interface area and those that did not could not be solely attributed to communal grazing. This is because even animals that did not graze in the interface area grazed communally within the village surroundings and yet had low numbers of abortions.

Since brucellosis is estimated to exist at a seroprevalence level of about 22% in lechwe (18), it is also possible that sharing water holes and grazing land between cattle and wildlife may lead to bi-directional transmission of brucellosis and other infectious diseases, through aerosols and contamination of water and pasture. However, no definite conclusion can be drawn, since it is not certain whether *Brucella* spp. do cause abortions in local wildlife species, thus contaminating the environment.

The situation in the Blue Lagoon National Park may suggest an intermediate state between recent infections and chronic infections. Towards the end of 2002 and beginning of 2003, 'abortion storms' were recorded in the Blue Lagoon area. For instance, farmers with 51, 200, 263 and 750 animals recorded 9, 20, 51 and > 100 abortions, respectively. Most animals in Blue Lagoon were tested from August 2003.

At the individual animal level, multiple logistic regressions revealed that the presence of high levels of anti-*Brucella* antibodies and the age of the animal had a significant effect on cattle abortions (Table II). The presence of high levels of anti-*Brucella* antibodies is an indication of recent *Brucella* infection, a known cause of abortion (9). Since age distributions differed between areas, it was important to keep age in the logistic models. As seen in Table II, however, the effects of age varied, demonstrating a minor statistical difference. The difference in the influence of the age factor on abortions across the study could be attributed to variations in the stages of the disease process among the three study areas. An epidemic situation was suspected in Kazungula, which might make all age groups susceptible to abortion. On the other hand, in (suspected) endemic areas, such as Lochinvar, only young and unexposed cattle are likely to abort. Age is a known risk factor for *Brucella*-related abortions. Following *Brucella* infection, most cattle tend to abort in the first pregnancy, whereas they are less likely to abort during their subsequent pregnancies. Thus, heifers are generally more susceptible to *Brucella*-related abortions than older cows.

No relationship between abortions and anti-*Brucella* antibodies was found at the herd level, but the herd size was noted to be associated with the abortion status of the herd. This is, of course, to be expected, even when abortions occur at random. The association of abortions with herd size is in agreement with the theory of an infectious agent being the cause of the observed abortions – in this case, *Brucella*, which is known to be a problem in large herds (5, 9, 17).

It must be pointed out that other infections, such as Rift Valley fever, campylobacteriosis, infectious bovine rhinotracheitis and bovine viral diarrhoea, are also likely to account for some abortion cases. In addition, non-infectious causes, such as stress, were observed in female draught animals and were likely to have contributed to abortions. However, *Brucella* infections seem to be a significant contributor to cattle abortions in this study.

The results of the RBT and c-ELISA were interpreted in parallel to improve sensitivity. When a serial interpretation was attempted, the individual seroprevalence in females (154/886) was estimated at 18.7% (95% CI: 15.0% to 22.3%), which is not significantly different from the 23.4% (95% CI: 19.8% to 28.0%) obtained when the RBT was used alone. Since brucellosis is endemic in Zambia, and most herds tested experienced reproductive problems consistent with brucellosis, a parallel interpretation can be justified, as the RBT is a more sensitive test than the c-ELISA (16). Furthermore, serological tests have been observed to lack specificity in brucellosis-endemic areas (14), a situation which may apply to Zambia.

This study has demonstrated that *Brucella* infection plays a major role in abortions in the cattle populations under examination. Since *Brucella* abortions can be effectively controlled using vaccination, it may be useful to recommend vaccinating cattle in these areas, to reduce economic losses for farmers as well as the health risk for humans dealing with such abortions.

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Rôle de l'infection à *Brucella* dans les avortements survenus dans des troupeaux de bovins de race traditionnelle élevés à proximité d'animaux sauvages dans les plaines de Kafue, en Zambie

J.B. Muma, J. Godfroid, K.L. Samui & E. Skjerve

Résumé

L'importance des infections à *Brucella* dans les avortements survenant dans le bétail a été étudiée chez 914 vaches provenant de 124 troupeaux. Les vaches ont fait l'objet d'une recherche d'anticorps dirigés contre *Brucella* spp. ; en outre, l'historique des avortements survenus chez ces animaux dans les trois années écoulées a été établi. Les épreuves sérologiques utilisées étaient l'épreuve à l'antigène tamponné (EAT) ou rose Bengale et l'épreuve immuno-enzymatique (ELISA) de compétition.

L'EAT a révélé la présence d'anticorps vis-à-vis de *Brucella* chez 189 vaches sur les 886 testées, présence confirmée par dosage ELISA de compétition chez 154 d'entre elles (soit 81,5 %). À l'échelle individuelle, 16,2 % des vaches (IC 95 % : 12,6 %-19,8 %) avaient avorté dans les trois années écoulées, tandis que la prévalence de vaches possédant des anticorps dirigés contre *Brucella* était estimée à 23,9 % (IC 95 % : 19,8 %-28,0 %), après ajustement lié aux classifications par zones et pondération par fraction d'échantillonnage.

À l'échelle des troupeaux, des avortements ont été enregistrés dans 50 % des troupeaux (IC 95 % : 41,2 %-58,8 %) tandis que la prévalence d'anticorps dirigés contre *Brucella* était de 58,1 % (IC 95 % : 49,5 %-66,6 %). Un modèle de régression logistique multiple a permis de déterminer que la présence d'anticorps dirigés contre *Brucella* (rapport de cotes [*odds ratio*] = 3,4 ; IC 95 % : 1,6-7,4) et l'âge des vaches sont deux facteurs ayant un effet significatif sur le risque d'avortement ; aucun autre facteur n'a pu être identifié à l'échelle du troupeau. Ces résultats ont permis d'établir que les infections à *Brucella* sont un facteur significatif d'avortement chez les bovins de race traditionnelle en Zambie.

Mots-clés

Avortement – Bétail traditionnel – Bovins – Brucella – Brucellose – Interface animaux d'élevage-faune sauvage – Plaines de Kafue – Zambie.

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Influencia de la infección por *Brucella* en los abortos registrados en rebaños de ganado vacuno de razas tradicionales a proximidad de animales salvajes en la llanura del Kafue, Zambia

J.B. Muma, J. Godfroid, K.L. Samui & E. Skjerve

Resumen

Se investigó la influencia de las infecciones por *Brucella* en los abortos de 914 vacas pertenecientes a 124 rebaños. Se hicieron pruebas para detectar la exposición a la especie *Brucella* y se estudiaron los antecedentes de abortos registrados durante los tres años anteriores. Las muestras de suero se analizaron con la prueba de rosa de Bengala (RBT) y la prueba de inmunoabsorción enzimática (ELISA) competitiva.

De las 886 vacas estudiadas, 189 dieron resultados positivos con la RBT y 154 (81,5%) se confirmaron con la prueba ELISA competitiva. A escala de los animales, el 16,2% (IC al 95%: 12,6%-19,8%) de las vacas tenía un antecedente de aborto en los tres años anteriores y, tras el ajuste en función de la concentración de los animales y la ponderación en función de la fracción de la muestra, se estimó la seroprevalencia de *Brucella* en un 23,9% (IC al 95%: 19,8%-28,0%).

A escala de los rebaños, en el 50% se habían registrado abortos (IC al 95%: 41,2%-58,8%) y la seroprevalencia alcanzó el 58,1% (IC al 95%: 49,5%-66,6%). Se determinó que la presencia de anticuerpos anti-*Brucella* (razón de probabilidades = 3,4; IC al 95%: 1,6-7,4) y la edad tenían una importante influencia en el riesgo de aborto de los animales con un modelo de regresión logística múltiple, pero no se pudieron identificar otros factores. Estos resultados demuestran que las infecciones por *Brucella* aumentan significativamente el número de abortos registrados en los rebaños de ganado vacuno de raza tradicional de Zambia.

Palabras clave

Aborto – Bovino – Brucella – Brucelosis – Ganado vacuno de raza tradicional – Llanura del Kafue – Zambia – Zona de contacto entre animales domésticos y fauna salvaje.

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