Perceptions of Johne's disease and a summary of deer farm characteristics in 2014

Results from a JML phone survey of 151 deer farmers

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Contents

Table of figures

Introduction

The purpose of the JML survey within the JDRC intervention study was to obtain a measure of the economic impact Johne's disease (JD) has on deer farmers and relate it to the JD-suspect lesion rate for their deer. This was a key recommendation made in the strategic review of JML. A better understanding of the link between on-farm impact of disease and JD-suspect lesion rate will help to better manage and control this serious animal health issue.

The following report summarises the demographic portion of this phone survey which has information describing deer farms, deer farmers, and their perception of JD.

Further analysis of this data including multivariate comparisons will be made by AbacusBio Ltd. AbacusBio were contracted to collaborate in developing the survey and to conduct the data analysis to provide impartial and independent results. The following report has been prepared by JML to summarise relevant information without extending into the more in-depth analysis from AbacusBio Ltd.

Materials and methods

Between December 2013 and January 2014, deer farmers were interviewed by phone to obtain their perceptions of how JD impacts their farming operation. The phone interview took approximately 15-20 minutes for most participants. Interviews were conducted from the JML office by two assistants (including the author) and the Project Manager. A total of 231 farmers were identified as candidates by AbacusBio Ltd and a letter was mailed to them by JML in November 2013 seeking their participation. The goal was to survey 150 of these 231 farmers.

Survey questions were developed in conjunction with AbacusBio Ltd.

The interviewer entered the participant's answers into a website designed by Abacusbio Ltd for the collection of data. The questions in the survey detailed demographic information, the number and type of deer farmed as well as other stock classes, and the impact of JD on the farm. The second portion of the survey collected data for analysis by AbacusBio Ltd using *1000Minds* software to determine how farmers prioritise JD relative to monetary gains and weaning rate. Data were analysed using SPSS software.

Information on deer numbers and the number of deaths in the previous season that farmers thought were due to JD was combined with processor information on the tally of deer for that farm, their average carcase weight, JD-suspect lesion rate, and weight difference associated with JD-suspect lesions. An estimate of the economic impact for each farm in the 2012/13 season assuming the replacement value of a deer was $400 and the value of a kilogram of carcase was $8.00.

Results

We surveyed 151 farmers, farming 254118 deer representing 28% of the national kill in the 2012/13 season. Lesion rate data for the 2012/13 season is summarised in *Figure 1*. JD-suspect lesion rate ranged from 0 to 7.94% with an average of 1.18% and standard deviation of 1.22%. The JD-suspect lesion rate for surveyed farms was significantly higher than the average lesion rate of 0.63% for all deer processed in 2012/13 ($p < .01$).

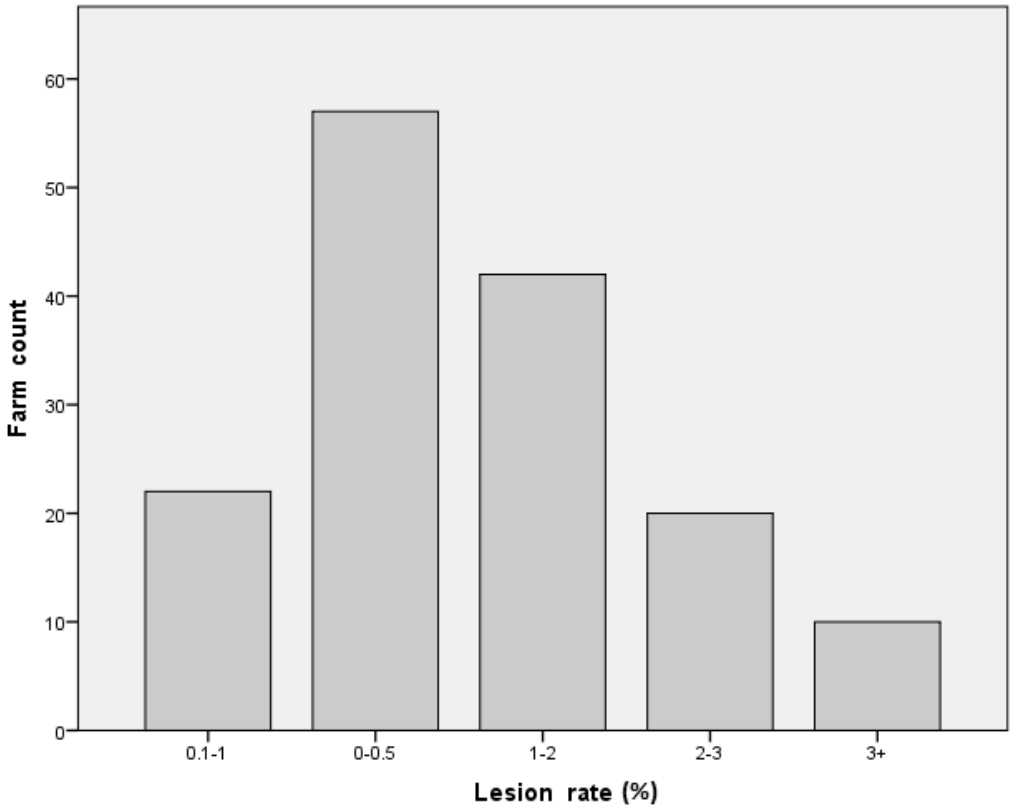

Figure 1. Lesion rate data for the 2012-2013 season on surveyed farms.

The size of the deer unit of each farm ranged from 30ha to 4580ha, with an average of 560ha and standard deviation of 832.2ha. The frequency distribution of farm size is represented in Figure 2. The distribution is not normally distributed, with most farms under 1000ha and only a few larger than that.

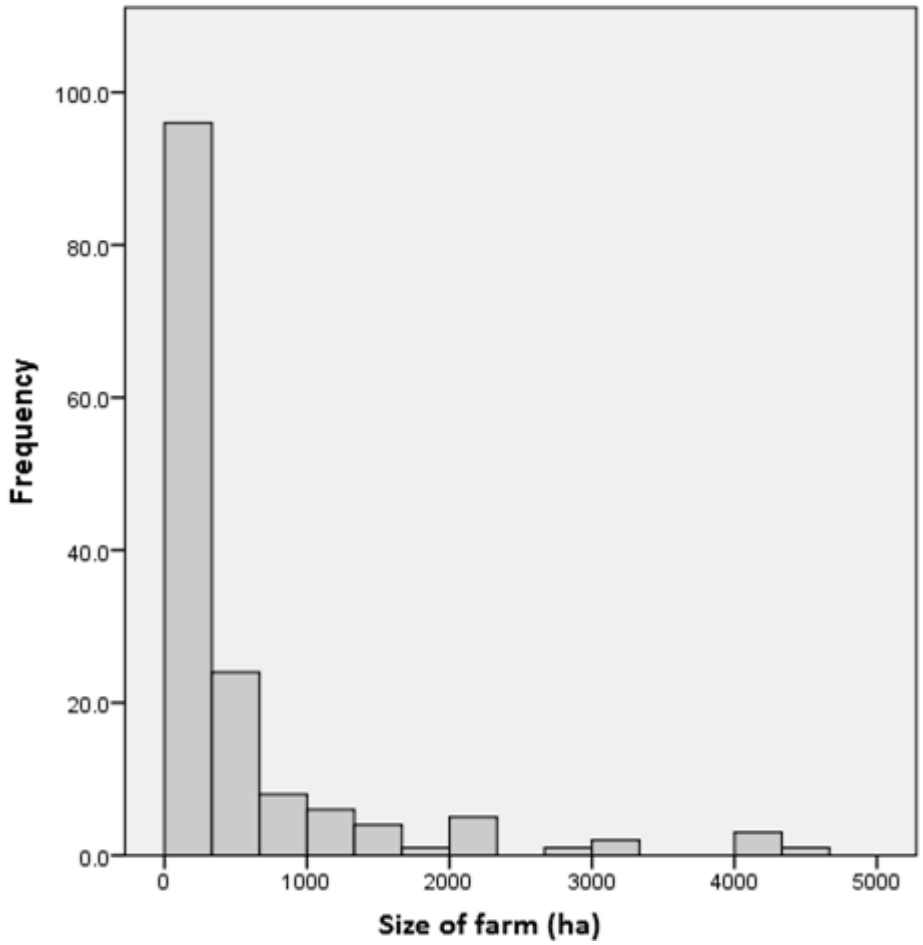

Figure 2. Frequency distribution of size of farms in hectares (ha).

The number of years each farmer had spent farming deer is shown in Figure 3. The experience of the surveyed farmers was spread widely across the different timeframes, but the most farmers (n = 49, 32.5%) identified as having greater than 30 years deer farming experience. In contrast, a small number of farmers (n = 10, 6.6%) claimed to have farmed deer for 26-30 years.

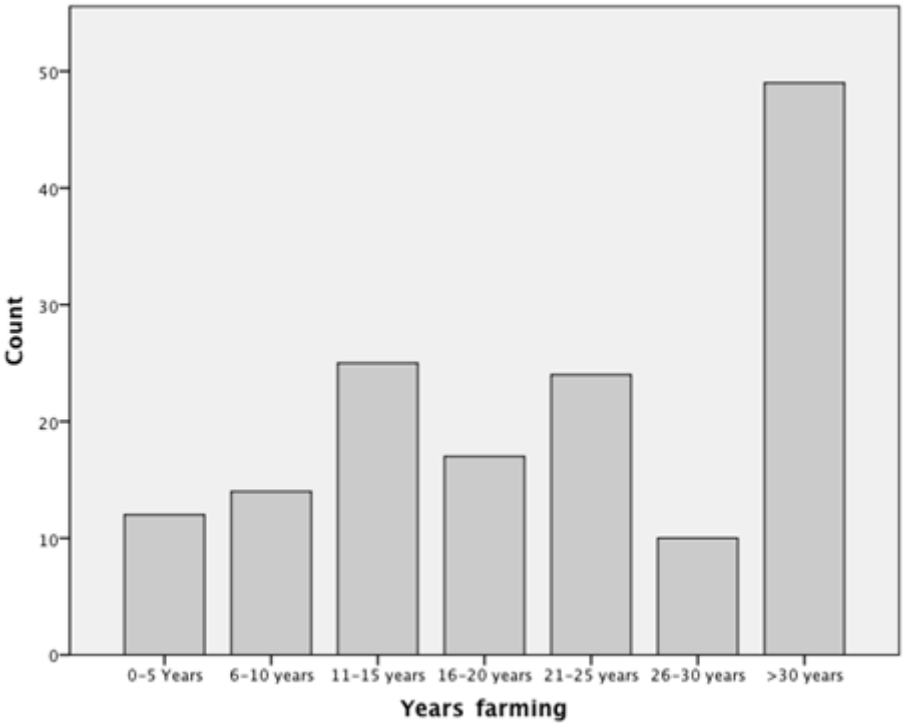

Figure 3. Frequency distribution of number of years spent deer farming.

Figure 4 shows the distribution of the proportion of income deer farming contributed to each farmer's total farming income. Most farms were predominantly deer farming or predominantly other animals. Few (n = 18, 11.9%) had equal investment in both deer and other animals. The greatest number of farms (n = 40, 26.5%) fell into the 21-40% income bracket from deer farming, followed closely by the 81-100% bracket (n = 36, 23.8%). The 0-20% and 61-80% bracket were roughly equal (n = 28, 18.5% and n = 27, 17.9%, respectively).

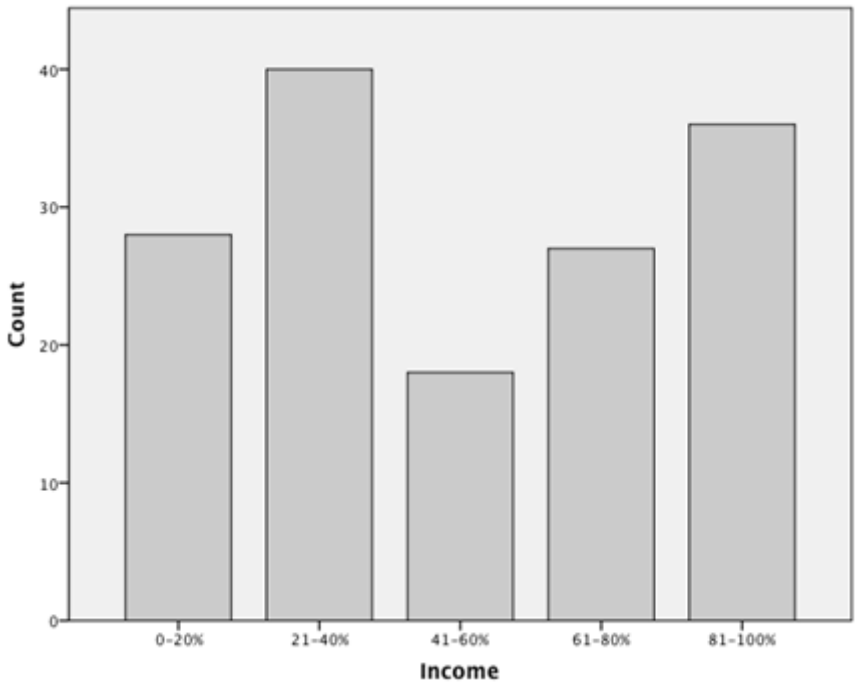

Figure 4. Frequency distribution of percentage of income coming from deer farming.

Nearly half of the surveyed farmers (n = 72, 47.7%) believed that JD is a lesser issue than internal parasites. In contrast, 36.4% (n = 55) believed that JD was a greater issue than internal parasites, and 15.9% (n = 24) believed they were equally large issues.

Figure 5 shows the level of concern each farmer identified with in regards to JD on their farm. A score of ‘0’ indicates no concern and a score of ‘5’ indicates critical concern. Most farmers felt a moderate level of concern with few identifying with the extremes of the scale.

Out of 151 surveyed farmers, only 8.6% (n=13) claimed no concern whatsoever about JD on their farm. The incidence of JD-suspect lesions on their farms (average of 0.085%) was about ten-fold lower than for all other farmers (average of 0.95%) who indicated some level of concern average (p = .027).

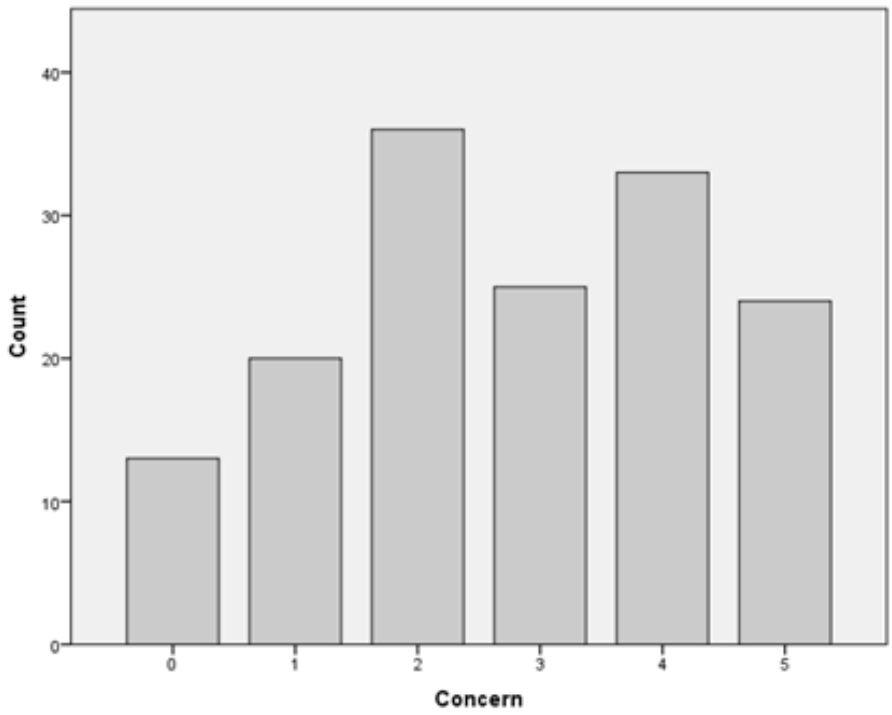

Figure 5. Frequency distribution of level of concern among farmers about Johne's disease on their farm. 0 indicates no concern, 5 indicates critical concern.

Most farmers believed the impact of JD on their farm was either declining or already low. These findings are presented in Figure 6. Twenty six farmers were excluded from this analysis due to claiming to have never detected the disease on their farm. When the 'desirable' trends in impact are added together (steep decline, gradual decline, constant low prevalence and inverted U-shape), all of which result in either a declining or low prevalence, 76.8% (n=96) of farmers fell into these categories. The most common trend was gradual decline. In contrast, 23.2% (n=29) of farms fell into the 'undesirable' trend categories (steep incline, gradual incline, constant high prevalence, U-shape).

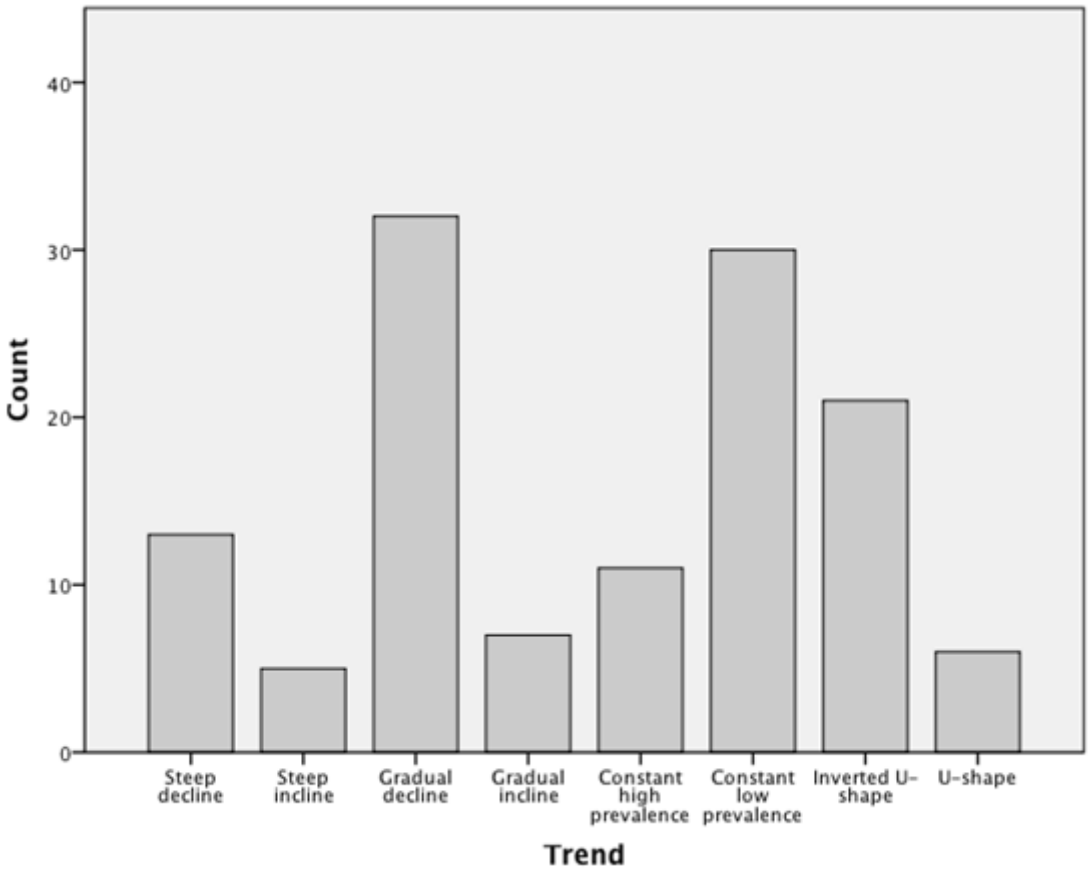

Figure 6. Frequency distribution of trend of Johne's disease on each farm.

The total number of deer per farm ranged from 25 to 9030 with an average of 1809.33 and standard deviation of 1876.34. The number of deer per hectare (not deer stock units) ranged from 0.36 to 14.41, with an average of 4.86 and standard deviation of 2.67.

Figure 7 shows the frequency distribution of primary (A) and secondary (B) deer types. None of the surveyed farmers kept Wapiti/Elk deer as their primary breed. Only 1 farm (0.7%) claimed to have Fallow deer. Most farms (78.7%, n = 118) did not have a secondary deer breed, but of those that did (21.3%, n = 32), most were Wapiti/Elk (14%, n = 21), followed by Hybrid (5.3%, n = 8) and a small number (2%, n =3) had red deer as the secondary breed.

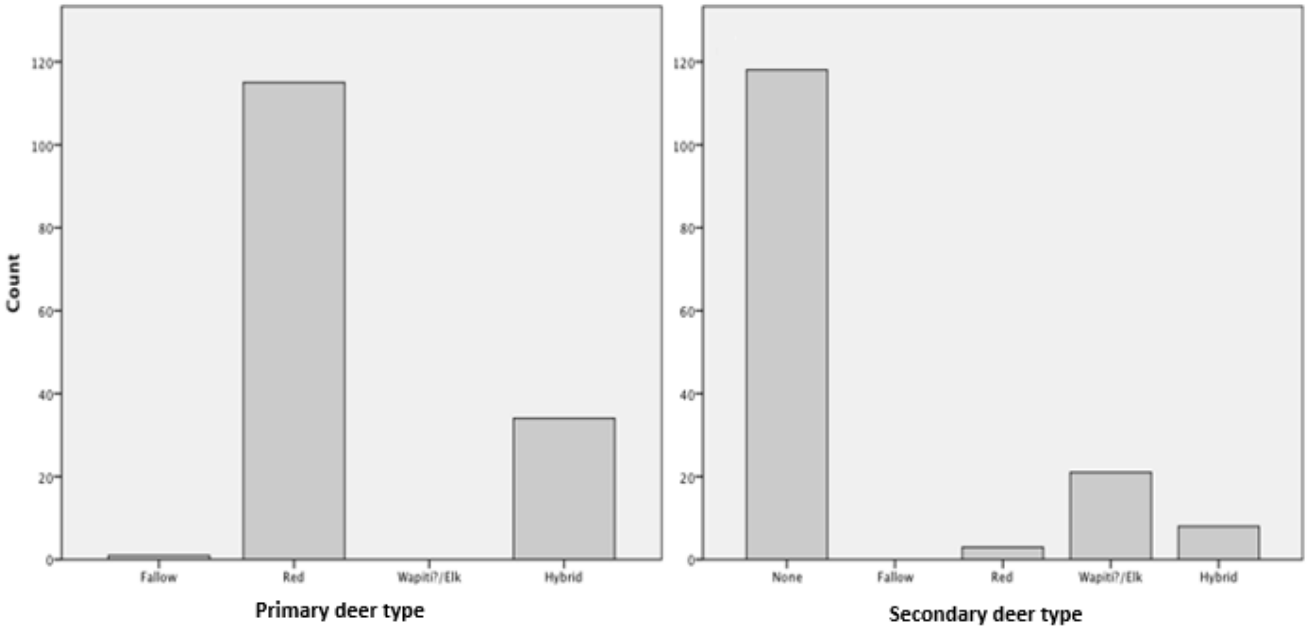

Figure 7. Frequency distribution of primary and secondary deer type on each farm.

Of the farmers surveyed, 15.9% (n = 24) claimed to never purchase stags, 47.7% (n = 72) never purchased hinds, and 58.9% (n = 89) never purchased weaners. These respondents were excluded from the following summary of deer trading.

The number of weaners purchased during the 2012/13 season ranged from 0 to 6000, with an average of 587.26 and standard deviation of 1107.47. The number of hinds purchased in the 2012/13 season ranged from 0 to 1700 with an average of 91.87 and standard deviation of 211.68. The number of stags purchased in the 2012/13 season ranged from 0 to 1500 with an average of 23.81 and standard deviation of 146.64.

Stock unit per hectare ranged from .69 to 25.94 with an average of 9.95 and standard deviation of 5.30. There was no correlation between stock unit per hectare and lesion rate in 2012 (Figure 8).

The economic loss per deer stock unit ranged from $0 to $18, with an average of $1.33 and standard deviation of $2.75.

Total economic loss ranged from $0 to $53015 with an average of $3215 and a standard deviation of $7245. The loss per stock unit ranged from $-0.56 to $18 and was positively but not significantly correlated with lesion rate (Figure 9) (p = 0.4). The negative economic losses can be explained by four farms on which the deer identified with lesions were heavier than those without lesions. For example they may have processed several heavy deer (mature stags) which had lesions, while the lighter hinds did not have lesions. This would cause the presence of lesions to be associated with heavier carcass weights.

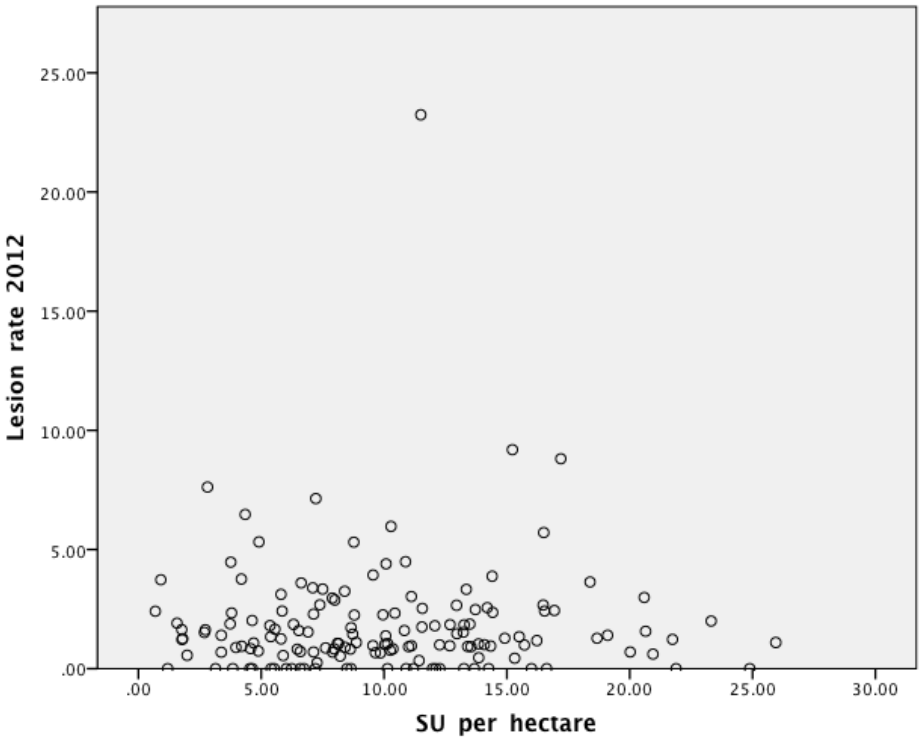

Figure 8. Correlation between stock unit per hectare and lesion rate for 2012.

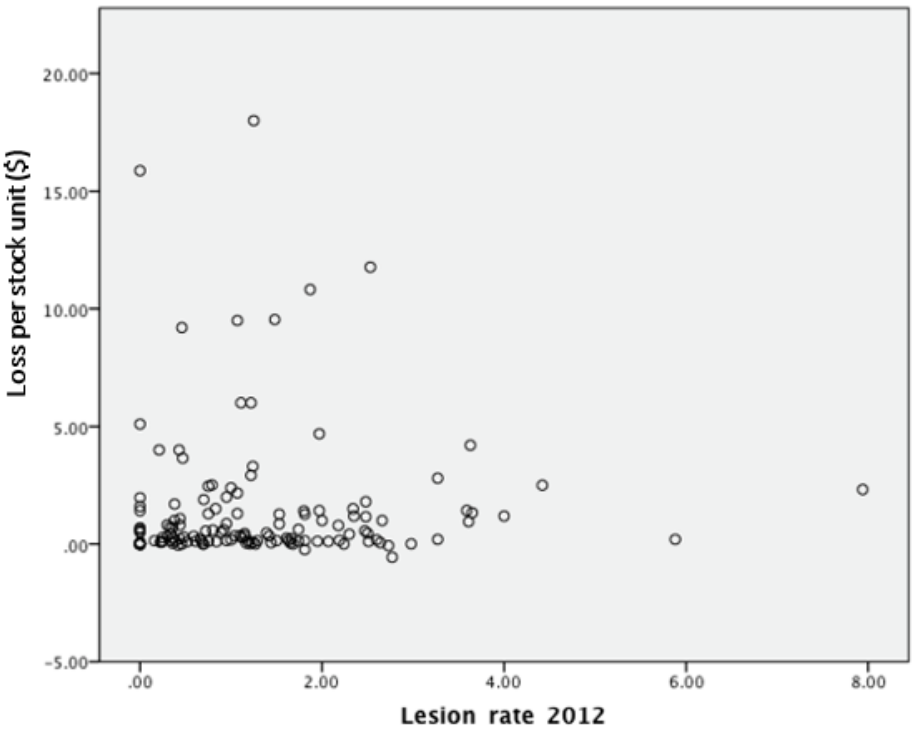

Figure 9. Correlation between loss per year per stock unit in dollars and lesion rate for 2012.

Discussion

The average JD-suspect lesion rate in deer from the surveyed farms was significantly higher than the national average. We intentionally selected farms with a high prevalence of lesions for inclusion in the study which introduced this bias. Our reasoning was to include farms where JD was most likely to be a big problem, but we also surveyed farms with no history of JD-suspect lesions for balance. There may also have also been a small amount of selection bias on the farmer's part, i.e. farmers who had a bigger problem with the disease may have been more motivated to complete the survey, thereby being more likely to agree to take part. In contrast, farmers who did not have a large incidence of JD on their farm may have been less likely to agree to take part given that management of the disease was not at the forefront of their priorities.

Most farmers felt that the impact of JD on their farm was either declining or already low, despite the average lesion rate for surveyed farms being higher than the national average. This suggests the impact of the disease is unlikely to increase substantially at the industry level over the next few years, provided farm management remains largely unchanged. Even so, there remains a small proportion of farms on which JD is a serious and growing issue.

In the years following the discovery of JD in the Deer Industry it came to dominate animal health meetings such as Cervetec and was seen as a critical risk. In contrast, the present study found that almost half of respondents (48%) felt that internal parasites were a more serious issue than JD, while 36% felt JD was more important. This shows an important shift in perception from JD being by far the greatest threat to deer farming to 'just another' important animal health issue.

Almost one third of the farmers surveyed had been working with deer for over thirty years. This bias in age structure towards people late in their career indicates that new deer farmers should be attracted into the industry to maintain a balanced age structure in the coming years.

The estimated average annual economic loss due to JD of $1.33 per deer stock unit is consistent with other data collected by JML during JD consultations. While a tail of farms have substantially higher losses than this, most are in the region of $0-$2.00. To put this in an on-farm perspective, a loss of $1.33/deer SU for a typical 500 hind breeding and finishing herd would be approximately $3,100 annually.

The most common category for number of years spent farming dear was the "greater than 30 years" category, and the least common was the "26-30 years" category. It was expected that there would be a linear progression through the categories, thus expecting that the 26-30 years category would be the second most common. This discrepancy may be due to unreliability of the farmers to accurately recall how long they had been farming deer, so the "greater than 30 years" option could have been selected as an easier option than trying to determine which of the two highest categories they fall into.

This study provides some useful data on the trading practices of deer farmers. Almost half (48%) never purchase hinds and over half (59%) never purchase weaners while almost all purchase stags. It would be interesting to compare these figures with those collected in other studies, or examine the relationship between impact of JD and trading practices.

Conclusion

Information from 151 deer farmers representing 28% of the 2012/13 season's kill shows that the impact of JD in most cases is either declining or already at low levels, but serious issues exist in a small number of herds. The disease is now considered of similar importance to intestinal parasites, rather than an issue placing the entire deer industry in peril. It remains a drain on productivity, with an average loss of $1.33 per deer stock unit per year, or approximately $3,100/yr for a typical 500 hind breeding/finishing unit. In this survey we revealed that the majority of farmers have been in the business for at least 30 years and that most of them buy stags but trading of other stock classes is less common. More multivariate analysis of this data will follow from AbacusBio Ltd.

Acknowledgements

JML would like to acknowledge the assistance of the Johne's Disease Research Consortium and AbacusBio Limited in conducting this work.

JML would also like to thank the deer farmers for their time and efforts in completing the survey, it is much appreciated.