Stillbirths Associated with *Neospora caninum* and BVDV type II in Dairy Heifers

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Introduction

Although stillbirths can contribute significantly to dairy heifer replacement costs, causes of most stillbirths are unknown, partly because of the high diagnostic costs and difficulty interpreting results. Costs can be prohibitive for necropsy and diagnostic work-up of dead calves of sufficient numbers to obtain a confident herd diagnosis, and interpretation of case-control-type of serology data for cows at calving can be confusing. Even though there has been little documentation, agents typically considered when investigating a stillbirth problem include leptospira, Bovine Viral Diarrhea Virus (BVDV), Infectious Bovine Rhinotracheitis Virus (IBRV), and *Neospora caninum*. The objective of the present study was to assess, using a prospective diagnostic approach, the extent to which these agents were associated with a high rate of stillbirths that had appeared among heifers on a large dairy.

Materials and Methods

During a long-term prospective study of BVDV on a 2000-cow dairy, an unusually high rate of stillbirths occurred among calving heifers. While no clinical cases of BVDV were identified in the herd, BVDV persistent infection had been identified. A random sample of study heifers that had been tested serologically at 10-12 months of age for evidence of infection with BVDV, *Leptospira hardjo*, *L pomona*, IBRV, and *N caninum* was followed to assess calving outcome. The heifers had been vaccinated at 13 months of age, using a modified live (MLV) vaccine with BVDV type I, IBRV, and 5 serovars of leptospira, and bred at about 15 months of age. At the time of calving, stillbirth, gender, and calving difficulty were recorded. Data was analyzed by logistic regression and analysis of variance (ANOVA) to assess effects of exposure to these infectious agents, gender, and calving difficulty on presence of a stillborn calf.

Results and Conclusions

Of 105 calvings, 16 (15.2%) were stillborn. The proportion of males stillborn (6/47=0.127) was lower than that for females (10/58=0.172) (P=0.06). Calving difficulty was greater for stillbirths (mean score=2.33) than for calves born alive (mean score=1.81) (P=0.01). The proportion of stillbirths among heifers seropositive to *N caninum* at 10-12 months of age (7/25=0.28) was higher than that for seronegative heifers (9/97=0.09) (adj. risk ratio=5.3; P=0.005). There was a significant interaction between neospora and gender, where a higher proportion of stillbirths occurred among females born to *N caninum* seropositive heifers than among males born to seropositive heifers (P=0.02). Heifers with evidence of BVDV type II exposure by 10-12 months of age were 1.67 times more likely to have a stillborn calf than a heifer with no evidence of the exposure (P=0.03). No association was found between stillbirths and exposure by 10-12 months of age to BVDV type I, IBRV, or the two leptospira serovars. These preliminary results indicate that *N caninum* and BVDV II can contribute substantially and significantly to stillbirths in some herds, and that female calves may be more susceptible to stillbirth due to *N caninum* than male calves. In addition, effects of BVDV type II exposure among heifers may be prolonged, where exposure before 10-12 months of age can affect fetal health more than a year later.