

## Vaccination of cattle against neosporosis in consecutive pregnancies

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Neosporosis, is a significant cause of abortions in cattle worldwide, with considerable economic consequences for both the beef and dairy cattle industries. Israel is endemic to neosporosis, with considerable prevalence and clinical implication in many farms. Vertical transmission of infection from dams to fetuses during pregnancy is the main route of transmission in cattle. Infection of the fetus during pregnancy may lead to abortion or to the birth of an apparently healthy, yet congenitally infected calf. Currently, no effective treatment or preventive measures are available for neosporosis to reduce its health and economic impact. Preliminary studies in Israel demonstrated that vaccination with live or frozen parasites during pregnancy may reduce the risk of abortion in seropositive cows by 55%. The aim of the current study was to evaluate the efficacy of vaccination during pregnancy in reducing abortions, and to evaluate the effect of vaccination on future pregnancies, in order to design appropriate vaccination regime.

Serum samples were collected from 1059 heifers in five dairy farms during their first pregnancy, and the serological prevalence and antibody titers were evaluated by IFAT. The total seroprevalence of neosporosis in all farms (at a titer of 1:200 or higher) was 61%, and 33% had a titer of 1:800 or higher (which was previously found to be linked with a higher risk of abortion). Of these 1059 cows, 260 were sampled at least twice and 21 were sampled during three pregnancies. Most cows maintained their serological status (positive/negative) throughout the study, however, fluctuations in antibody titers were noted.

In addition to IFAT, 288 of the samples have been tested using the ImmunoComb commercial serological kit which can be performed in the field, in order to evaluate its effectiveness as an alternative for farm owners and attending veterinarians to use in-house. The correlation between the results of both assays was high and significant ( $p=0.727$ ,  $P>0.001$ ), and the kit appear to be suitable for the detection of cows with high antibody titers of 1:800 or higher.

Serum samples were also collected from 132 of the calves born to cows which were included in this study, prior to the ingestion of colostrum, in order to evaluate the rate of vertical transmission. There was a correlation between the dams antibody titer and the risk of vertical transmission, and the rate of vertical transmission from dams with antibody titers of 1:800 or higher was 90%.

Data regarding the outcome of pregnancy (normal calving or abortion) was available for 1476 of the pregnancies. In total, 88% of the pregnancies resulted in normal calving and 12% resulted in abortion. The rate of abortions increased in consecutive pregnancies, and a significant positive correlation between the number of pregnancy and the risk of abortion was observed ( $p=0.171$ ,  $P<0.001$ ). The rate of abortions also correlated with the antibody titer ( $p=0.213$ ,  $P<0.001$ ).

Of the 351 heifers with antibody titers of 1:800 or higher 173 were vaccinated with a dose of  $10^8$  frozen parasites on days 120-140 of their first pregnancy and 24 were re-vaccinated during their second pregnancy. The rate of abortion did not differ significantly between vaccinated (16.5%)

and unvaccinated (18.5%) cows ( $P=0.590$ ). In addition, neither single nor repeated vaccination did not seem to affect the risk for multiple inseminations ( $P=0.618$ ), the rate of vertical transmission ( $P=0.414$ ) or removal from the herd ( $P=0.399$ ). The effect of vaccination varied between farms, and the rate of abortions was lower in vaccinated cows in two of the five farms, but this reduced rate was not statistically significant.

The results of this study support the hypothesis that neosporosis is a multifactorial disease, and that the environment, management, husbandry and other health conditions may have critical influence on the efficacy of vaccination in preventing abortions. In addition, since the effect of vaccination was not significant in either pregnancy, the effect of re-vaccination could not have been evaluated.