

Effects of acute lupine toxicosis on fetal activity at 60 and 70 days of pregnancy

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Lupine toxicosis (crooked calf disorder) is severe problem in many areas in the Pacific Northwest. This disorder is characterized by the presence of arthrogryposis of the forelimbs, involving the elbow and the carpal joints, and by the variable presence of hind limb contractures, torticollis, scoliosis, kyphosis and cleft palate. We hypothesized that that this syndrome may in part be due to reduced fetal activity during the period of exposure. The objective of this experiment was designed to determine the effect of lupine on fetal activity at 60 and 70 days of pregnancy.

Fetal activity was determined by transrectal ultrasonography before and after lupine challenge in 7 cows at 60 days and 70 days of pregnancy. Each cow was gavaged with dried lupine at 2g/kg body weight. Ultrasound examinations were performed for a period of 20 minutes at 10 hours and 4 hours before lupine challenge and again at 4, 12, 24, 36 and 48 hours after challenge. All examinations were videotaped and viewed at later date by a treatment-blinded person. Fetal activity was determined by counting the number of 2 types of activity (slow limb vs. whole body movement) for each examination period. Repeated measures analysis of variance was performed on number of fetal movements (slow, whole body and total) in a model which included cow, time, day of pregnancy and cow x days of pregnancy interaction as factors. All factors had a significant effect on fetal response to the challenge. A significant ($P < 0.05$) decrease in fetal activity was observed in all cows 4 hours and 12 hours after challenge both at 60 days and 70 days of pregnancy. Cow and cow x days of pregnancy was also highly significant showing that the response to the challenge may be different amongst cows and may depend on the stage of pregnancy.

In conclusion, this preliminary data suggests that lupine toxicosis may have a profound effect on fetal activity. This effect is seen within the period corresponding to maximum plasma concentration for 3 main alkaloids (Anagyrine, 5,6 dehydrolupanine, lupanine) found in lupine (Gay et al 2004). The significant cow and cow x day of pregnancy effect may explain why not all cows in a herd are affected by this syndrome. We have proposed further experiments to determine if there is a difference in concentration of alkaloids in the amniotic fluids and uterine tissue of cows challenged at specific stages of pregnancy.

Keywords: lupine, arthrogryposis, fetal activity, cattle, pregnancy