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PINE NEEDLE INDUCED ABORTION IN *BOS INDICUS* COWS

T.A. Thrift, A. Bernal, D.A. Neuendorff, C.C. Willard, R.E. Short and R.D. Randel

Background. Needles from Ponderosa pine trees (*Pinus ponderosa*) induce abortion when consumed during late gestation. Incidence of abortion is highly variable depending on stage of gestation and level of consumption. Pine needle induced abortion is more correctly characterized as premature parturition in which the calf is born alive but survival rates are low in range situations. The causative component of pine needle induced abortion remains unknown but it has been demonstrated that dry, green, weathered, or aged needles, in addition to bark and branch tips all induce abortion in cattle. The Ponderosa pine is principally found in the western United States and is the only known *Pinus* species in North America that induces an abortion response. The Loblolly pine (*Pinus taeda*) exists throughout the southeastern United States in areas commonly grazed by cattle. It is not known if needles from the Loblolly pine induce abortion.

Cattle (*Bos taurus*) and Bison have been shown to abort when consumption of ponderosa pine needles is sufficient. Sheep and goats display some resistance and elk appear to be totally resistant to the effects of Ponderosa pine needles. Although the causative agent remains unknown, the mechanism of action involves constriction of uterine blood vessels and subsequent depression in uterine blood flow which results in stress to the fetus and induction of parturition. It has been demonstrated that Brahman cattle have a lower uterine blood flow than *Bos taurus* cattle. Brahman cattle may be less susceptible to the toxic effects of Ponderosa pine needle induced abortion due to the lower level of uterine blood flow.

The objective of this experiment was to determine if Brahman cows are resistant to the toxic effects caused by consumption of Ponderosa pine needles. Additionally, Loblolly pine needles were evaluated to determine if this *Pinus* species might also induce pine needle abortion.

Research Findings. Twenty four mature pregnant Brahman cows were assigned to one of three treatments based on stage of gestation and calf sire. Eight cows served as controls and received only the basal diet of ground bermudagrass hay (10 lbs) and 5 lbs of a 6:1 corn soybean meal mix. Eight cows were assigned to the Ponderosa pine group and were fed 5 lbs of Ponderosa pine needles in addition to the basal diet. The final eight cows were assigned to the Loblolly pine group and received 5 lbs of Loblolly pine needles in addition to the basal diet. Cows started on trial at 265 ± 1 days of gestation and remained on the experimental diets for a period of 10 days or until premature parturition occurred.

Results of this experiment are summarized in Table 1. Brahman cows consuming Ponderosa

pine needles aborted (50%) with greater frequency ($P<0.01$). The fact that four Brahman cows did not abort is not an indication that some Brahman cows are resistant. It has been reported that not all cows that graze in areas of Ponderosa pine abort. The variability in abortion response is most likely due to consumption differences between animals. Cows consuming control and Loblolly pine needle diets did not abort during the 10 day experimental period. The interval to parturition was reduced ($P<0.05$) only in the Ponderosa pine fed group. Birth weight was also reduced in the four premature Ponderosa calves (63 lbs). All premature calves were born alive, but only one out of the four premature calves survived.

The results of this study suggest that Loblolly pine needles do not induce abortion in Brahman cows. The current data suggest that Ponderosa pine is the only known *Pinus* species in North America to induce abortion in cattle.

Application. Pine needle induced abortion appears to result only from the consumption of the *Pinus ponderosa* species. Producers in the southern United States can maintain cattle in areas of high Loblolly pine concentration without concern for abortion, even in times of feed shortages when cattle may be more likely to consume pine needles. Brahman cattle do not appear to be resistant to the effects of Ponderosa pine needle abortion.

Table 1. Effect of feeding Ponderosa and Loblolly pine needles to pregnant Brahman cows.

Treatment	No. of Cows	No. Aborted ^a	Interval to Calving ^b	Calf BW, lb	Calf Survival ^c
Control	8	0	26.8 ^d	73.6 ^{d,e}	100.0
Loblolly	8	0	25.9 ^d	84.2 ^d	87.5
Ponderosa	8	4	16.8 ^e	68.1 ^e	62.5

^aNumber of cows aborting during the 10 day experimental period. Chi-Sq.=9.6, df=2, $P<0.01$.

^baverage interval from start of trial until parturition occurred.

^cCalf survival at 5 days after parturition Chi-Sq.=4.2, df=2, $P=0.12$.

^{d,e}Means with different superscripts in these columns differ, $P<0.05$.