THE USE OF ENZYME INDUCERS IN PREVENTING SIGNAL GRASS *(BRACHIARIA DECUMBENS)* TOXICITY IN SHEEP

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Keywords: *Brachiaria decumbens*, toxicity, sheep, enzyme, induction.

Introduction

Signal grass *(B. decumbens)* causes severe hepatic damage in sheep. The affected sheep normally died after several weeks of continuous grazing on this grass. Initial studies showed that *B. decumbens* toxicity in sheep may be partially prevented by adding 1 gm/liter of zinc sulphate in their drinking water (Salam Abdullah et al. 1994). The mechanism of protection by zinc from the toxic effect of *B. decumbens* may be due to the binding of the toxic compounds from *B. decumbens* with zinc in the rumen of sheep. In view of its partial protection, the study using zinc sulphate to prevent this toxicity was discontinued and zinc sulphate was replaced with enzyme inducers such as phenobarbitone, prochloraz and griseofulvin. The purpose of this study is to increase the enzyme activities in sheep and subsequently increase the detoxification of the toxic substance. The study on the chemoprotective role of phenobarbitone in *B. decumbens* toxicity in sheep has been completed.

Materials and Methods

Twenty six healthy young adult Wiltshire and Indigenous Malaysian crossbred rams (14-16 months of age) were used in this study. They were divided in 4 groups i,e Group A (control); Group B (Phenobarbitone only) Group C (Phenobarbitone and *B. decumbens*) and Group D (*B. decumbens* only). All animals in Group B and C were given phenobarbitone orally at the dose rate of 30mg/kg body weight for five consecutive days one week before allowing than them to graze on *B. decumbens*. The administration of phenobarbitone was continued for three consecutive days every two weeks till until the end of the study. The animals in Group A and B were fed cut grass such as Mardi Digit *(Digitaria Setivalva)* and Guinea grass *(Panicum maximum)*. All animals were provided with feed concentrate daily, mineralized salt licks and water *ad libitum* till the end of ten weeks experimental period. All animals with severe signs of *B. decumbens* toxicity were sacrificed immediately while those which did not show any toxic signs and the control group were sacrificed at the end of ten weeks. Liver and kidney samples were collected and kept frozen in liquid nitrogen until enzyme assay were performed. The activities of aminopyrine-N-demethylase and aniline-4-hydroxylase and cytochrome P-450 were determined according to the methods described by Mazel (1971). The enzymatic activities of UPP glucuronyltransferase and was determined according to the method of Dutton and Storey (1962).

Results and Discussion

Two animals in group C and seven animals in group D developed signs of *B. decumbens* poisoning 6-7 weeks and 4-8 weeks respectively after continuous grazing on *B. decumbens* pasture. The signs observed were similar to the signs reported earlier by Salam Abdullah et al. (1989, 1990). One animal in Group D did not develop any toxic signs until the end of the experiment. None of the animals in Group A and B developed any signs of toxicity. The enzyme activity in the liver and kidney of all the animals are shown in Table 1. The activity of Cytochrome P-450 and Aniline-4-hydroxylase in the liver of *B. decumbens* treated sheep decreased significantly ($p<0.001$) compared to the control group. Meanwhile the activity of Aminopyrine-N-demethylase and UDP glucuronyltranferase also decreased significantly ($p<0.05$). However, there were no significant difference ($p>0.05$) in the activity of all enzymes occurred except Aminopyrine-N-demethylase which decreased significantly ($p<0.001$) compared to the control group. The decreased activity of the four enzymes in liver and one enzyme in the kidney of sheep affected by *B. decumbens* was due to severe hepatic and kidney damage. Phenobarbitone treatment has increased significantly the activity of hepatic enzymes Cytochrome P-450, UDP glucuronyltransferase ($p<0.001$); Aminopyrine-N-demethylase, Aniline-4-hydroxylase ($p<0.01$) and Glutathione-s-transferase ($p<0.05$) compared to with the control group. Except for Cytochrome P-450, phenobarbitone has also increased the activity of the above enzymes in the kidney. Meanwhile, the activity of the above enzymes in the liver and kidney of sheep treated with phenobarbitone (Group C) was lower compared to Group B. Nevertheless, the activity of hepatic enzymes was still significantly higher ($p<0.001$) compared to with Group D animals. Our data (Group B and Group C) clearly show that phenobarbitone is a good inducer of Cytochrome P-450, Aminopyrine-N-demethylase, Aniline-4-hydrozylase, UDP glucuronyltranferase and Glutathione-s-transferase. Induction of these enzymes demonstrated the ability of phenobarbitone to prevent *B. decumbens* toxicity in sheep.

Conclusions

Phenobarbitone treatment has significantly increased the enzyme activities in the liver and kidney of sheep in both the groups. However, the induction of enzyme activities by phenobarbitone in group C was slightly lower than in Group B. The increased in enzyme activities especially in the liver provided some protection to sheep from the toxic effect of *B. decumbens* in phenobarbitone. Treated sheep than those not given as reflected by two out of six rams in Group C developed the toxic signs much later and milder compared to the intoxicated sheep in Group D which were not given phenobarbitone. The present results suggest that phenobarbitone may be useful in preventing Signal grass (*B. decumbens*) toxicity in sheep.

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Supported by IRPA Grant 01-02-04-0088