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SHORT COMMUNICATION

NATURAL RESISTANCE OF BOVINE ANIMALS TO *MICRURUS NIGROCINCTUS* VENOM

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WE REPORT in this paper on the *in vivo* resistance of bovine animals to the venom of the elapid *Micrurus nigrocinctus*, the most prevalent coral snake in Costa Rica (TAYLOR *et al.*, 1974). A preliminary report has been published elsewhere (BOLAÑOS *et al.*, 1973).

The following six types of experiments were performed: (1) four Red Polled X Brahman cows (350–380 kg) were each bitten once by different specimens of *M. nigrocinctus*, measuring 0·80–1·0 m in length. The bites were, respectively, on the ventral surface of the tongue, dorsal surface of the tongue, nostrils and one teat. In each case we saw the fang marks and the contraction of the snakes venom glands. The fact that the snakes had not been milked and that they held on during the bite for a considerable length of time assured us that venoms had been injected. (2) Solutions of dried venom from the Instituto Clodomiro Picado, having a mouse LD_{50} of 0·39 mg per kg body weight (BOLAÑOS, 1972) were injected into the same cows 6 days after the previous experiment. Three of the animals were given 5, 10 and 20 mg of venom intravenously, and the fourth was given 5 mg subcutaneously into the ventral portion of the tongue. (3) Ten mg of the venom was injected into two Holstein calves (40 kg each). One cow received the venom intravenously and the other subcutaneously, in the ventral surface of the tongue. (4) Fifteen mg of the venom were injected intramuscularly in the neck of four Angus X Jersey cows, average weight 235 kg. (5) One horse weighing 250 kg was injected intramuscularly with 20 mg of the venom and served as a control. (6) Neutralization tests were performed on serum samples from the cows, obtained prior to each venom injection or bite (BOLAÑOS *et al.*, 1974).

The intravenously and intramuscularly inoculated animals, as well as those injected subcutaneously in the nostrils, teats or dorsal surface of the tongue, and those bitten spontaneously in the same anatomical areas, failed to show any local or general signs of poisoning. Only the animals injected or bitten on the ventral surface of the tongue showed localized edema and intense salivation (Fig. 1). In two cases, the edema involved the interjawbone space. One of these animals showed signs we thought could be of neurological origin, such as relaxation of the neck muscles, light palpebral ptosis and drowsiness; nevertheless, all signs disappeared. They were not seen in the other animals.

Two control animals, one adult cow and a calf, were injected subcutaneously with 2·0 ml of sterile saline solution into the ventral surface of the tongue and did not show any local

or general signs. The horse, used as a control, showed paralysis of the hind legs 8 hr after the inoculation, total paralysis within 30 hr with dyspnea and prostration, and death at 67 hr. Previously, in an immunization procedure for the production of antivenin, another horse died with similar signs after a subcutaneous dose of 15 mg of *M. nigrocinctus* venom. Our laboratory tests on the blood sera of the animals failed to show neutralizing activity.

This report shows that cattle are more resistant to the neurotoxic activity of *M. nigrocinctus* venom than horses, and that this resistance is greater than 0·25 mg per kg. On the other hand, BELLUOMINI, (1972 Doctoral Thesis, University of Sao Paulo, Brazil) found that 0·05 mg per kg of *Crotalus durissus terrificus* venom is sufficient to kill an adult cow. We also found that bites by *M. nigrocinctus* in cattle are not of immediate economic or veterinary importance. *M. nigrocinctus* venom has a component that causes edema which is only evident in certain anatomical parts of cattle, as on the ventral surface of the tongue.

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Note added in proof

Twin calves each received one mouse LD_{50} (0·39 mg per kg) and a third calf received two mouse LD_{50} doses of coral snake venom. One of the twins and the third calf died while all had paralysis. The resistance of cattle to coral snake venom appears similar to that of mice.

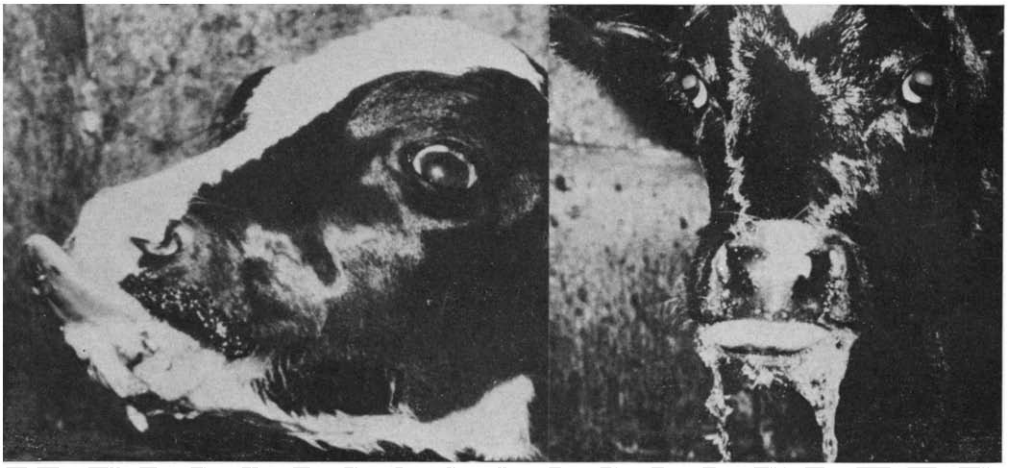

FIG. 1. EDEMA OF THE TONGUE AND SALIVATION IN HOLSTEIN CALVES, 4 hr AFTER THE SUBCUTANEOUS INOCULATION OF 10 mg OF *M. nigrocinctus* VENOM IN THE VENTRAL SURFACE OF THE TONGUE.