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Successful management of acetamiprid poisoning in a pregnant cow

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Abstract
Acetamiprid is a novel neonicotinoid insecticide. It is fatally toxic to insects by acting on nicotinic acetylcholine receptors. The toxicity is low in non-target organisms however; severe poisoning has been reported when consumed in large amounts. A case of accidental ingestion of acetamiprid in a pregnant cow was presented with severe gastrointestinal signs. The case was successfully managed with symptomatic and supportive therapy to correct lactic acidosis and gastrointestinal atony. This is a first case report on successful management of accidental Acetamiprid poisoning in pregnant cattle.

Keywords: Acetamiprid, cattle, lactic acidosis, neonicotinoid

1. Introduction
Acetamiprid is a novel insecticide belonging to Neonicotinoid class that acts by exerting neurotoxic effects via irreversible binding to insect nicotinic acetylcholine receptors (nAChRs) and induces neuromuscular paralysis and death [1, 2]. Neonicotinoids do not have a high affinity for mammalian and other non-insect nAChRs, they are thought to have limited toxicity in non-target organisms [3, 4, 5]. However, dose-dependent toxicity can occur through inhalation, ingestion or dermal contact. The neonicotinoids like acetamiprid, and imidacloprid are identified as, a potential neurodevelopmental toxins [6].
Imidacloprid and acetamiprid occupy 25% of global insecticide market [7]. However, only few cases of poisoning with acetamiprid have been reported in humans [8, 9, 10]. To our knowledge, only one case of Acetamiprid poisoning in a buffalo has been reported till date [11]. Here, we describe successful management of a case of Acetamiprid poisoning in a pregnant cow following accidental ingestion.

2. Clinical Presentation
A Crossbred Jersey heifer aged 2 years, weighing around 200kg was presented to the referral clinic of State Animal Husbandry Training Centre (SAHTC), Mandapeta, Andhra Pradesh after accidental ingestion of 20% Acetamiprid (Sharp®). The rectal temperature was 102.6°F, heart rate was 112 bpm, and respiratory rate was 19 per minute. The animal was anorectic, ataxic and lethargic. The animal was dehydrated, had a dry muzzle, stranguria, congested conjunctival mucous membrane, ruminal atony, tympany with a bilaterally distended abdomen. Per rectal examination revealed dark metallic green coloured dung of watery to semi-solid consistency (Fig. 1), distended intestinal loops could be palpated. Transrectal ultrasonogram showed the presence of a live foetus with gestational age of 48±5 days (Fig. 2). Succussion and simultaneous auscultation of the left flank revealed fluid splashing sounds. The ruminal contents were acidic and microscopic examination of rumen liquor revealed absence of motile large and medium protozoa. The symptomatic treatment was initiated with an aim to correct the lactic acidosis using Inj. Sodium Bicarbonate 150 ml, Ringers Lactate 4L, Normal Saline 2L, B-complex and amino acid Injection (Rumeric®) 10 ml were given by intravenous route, Inj. Benzathine Penicillin 20,000 U/Kg, Inj. Chlorpheniramine maleate (Anistamine®) 10 ml were given intramuscular, Probiotics with Rumen Buffer (Bufzone®) 50g was given per os. On the next day, tympany subsided but the animal continued to be anorectic. The consistency of the dung improved by the 3rd day and the animal started passing urine normally (Fig. 3). The treatment except sodium bicarbonate injection and benzathine penicillin was continued for 5 days. The animal started grazing on the 4th day with improvement in all the vital parameters. By the 5th day, the animal was completely normal (Fig. 4), the colour and consistency of dung returned to normal, hydration and rumen motility

were restored. The case follow-up was continued and to the date of submission of this report, there was no loss of pregnancy.

Fig 1: Animal passing metallic green coloured faeces on the day of presentation

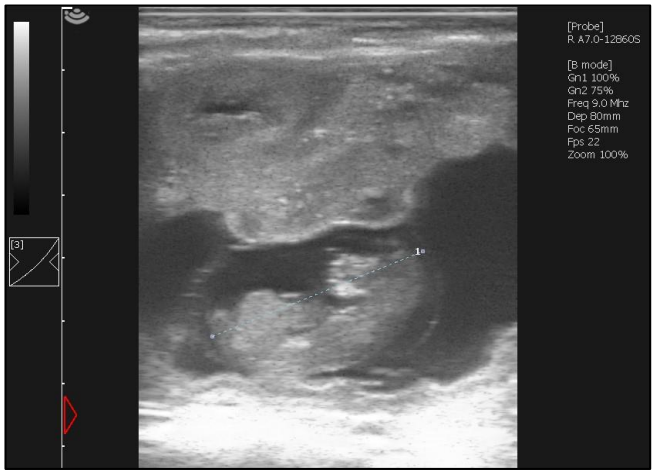

Fig 2: Transrectal ultrasonogram revealing foetus (gestational age 48±5 days)

Fig 3: Animal urinating and passing faeces normally on the 3rd day of treatment

Fig 4: Animal exhibiting normal grazing behaviour on 5th day of treatment

3. Discussion and Conclusion

Acetamiprid is a novel neonicotinoid insecticide similar to imidacloprid and thiacloprid [12]. It is structurally similar to nicotine [13]. Neonicotinoids are nicotinic acetylcholine receptor agonists [14]. The receptors are primarily expressed in the central nervous system of insects. The affinity of neonicotinoids to nicotinic acetylcholine receptors of insects is higher than those of mammals, which results in paralysis and death of insects [14]. Hence neonicotinoids are thought to have limited toxicity in mammals [3]. However, imidacloprid and acetamiprid were identified as potential neurodevelopmental toxins [6].

Acetamiprid poisoning in humans has signs similar to acute organophosphate intoxication with the predominance of nicotinic signs [8]. In the present case, the clinical signs noticed were severe dehydration, dyspnoea, stranguria and tachycardia which are in congruence with the reports of (Imamura *et al.*, 2010 and Kushwaha *et al.*, 2018) [9, 11].

Low pH of the ruminal contents, fluid splashing sounds in the left paralumbar fossa, severe diarrhoea, ataxia and lethargy observed in the p resent case indicate lactic acidosis which is consistent with the findings of (Pravinson *et al.*, 2021 and Pirasath *et al.*, 2021) [8,10] who reported that, the most serious complication of acetamiprid poisoning was development of lactic acidosis. Remarkable recovery noticed in the present case on intravenous administration of sodium bicarbonate and other supportive therapy to correct lactic acidosis further reinforces the role of lactic acidosis in the toxicopathology acetamiprid poisoning in animals.

The affected cow is pregnant carrying a foetus with gestational age of two months. As acetamiprid was identified as potential neurodevelopmental toxin [6], the calf after birth could be examined for possible neurodevelopmental defects.

Although, Acetamiprid is less toxic to mammals, all precautions must be taken while handling the insecticide. As it may cause acute toxicity with respiratory failure [1].Care should be exercised while differentiating a case of acetamiprid intoxication from that of organophosphate as most of the symptoms are similar except for bradycardia, mucous super secretion, miosis, epiphora which are observed in the latter [8].

As there is a lack of standard therapeutic regimen and specific antidote, the clinical signs should be carefully monitored and aggressive supportive therapy should be instituted for a favourable outcome. There are few reports on acetamiprid intoxications in humans reported globally and there was only one case report of Acetamiprid poisoning in Buffalo from India. This report acts as a clinical guide in conservative management of Acetamiprid poisoning in animals.

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