Poisoning by Cashew Apple (Anacardium occidentale L.) in Cattle

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ABSTRACT

Background: The cashew tree (Anacardium occidentale L.) is a plant grown in tropical regions of the world for production of cashew nuts, one of the most traded on the international market for edible nuts. The cashew apple is used for the production of various foods such as juices and sweets, but it can also be used in animal feed in the regions cashew is planted. The cashew apple can be used directly as feed, but usually it is dried for later use. However, many farmers reported the occurrence of poisoning in cattle promoted by the cashew apples, but this poisoning has not yet described. Thus, this study aimed to describe the poisoning by Anacardium occidentale in cattle.

Materials, Methods & Results: It was visited eight farms that often had cases of poisoning by cashew at Rio Grande do Norte state, Brazil, six at the municipality of Mossoró and two at the municipality of Serra do Mel. The farmers were asked whether the animals were fed with cashew apples and the amount supplied to animal, the occurrence of cases of poisoning, species affected, clinical manifestations (clinical signs, severity, and duration of signs), variation in age of affected animals and instituting any treatment. Furthermore, in one of the farms in the city of Mossoró, there were two cattle naturally poisoned by cashew apples given as food. It was recorded the epidemiological survey and clinical evaluation of affected animals. For experimental administration, it were collected cashew apples fallen on the ground on a farm. They were stored at room temperature for 48 h. Before administration, the cashew nuts were separated from the cashew apples. It was used two Holstein male calves, aging one year-old, that had never previously been fed with cashew apples. After fasting overnight, it was offered 30 kg of cashew apple in the trough to the calves. The animals were monitored for 24 h and recorded the volume of cashew apples consumed by each animal and the occurrence of any clinical sign. The interviews revealed that, the cashew apple is widely used for animal feeding at the season of nut production, because of its very low cost. Animals fed the cashew apples are mostly cattle and, less frequently, sheep and goats. Not all animals fed with cashew apples presents poisoning. Adult animals were reported by farmers as the most affected. The toxicosis is considered quite evident, as attendants unanimous in comparison with the appearance of alcoholic intoxication. It was verified that cashew may promote poisoning in cattle, and the main clinical signs are lethargy, staggering gait and, prostration.

Discussion: The cashew apple can promote poisoning in cattle. Poisoning by cashew presented here is similar to poisoning by the marula fruit (Sclerocarya birrea), a plant from Anacardiaceae family, the same family as the cashew tree. The marula poisoning is attributed to the alcohol formed by the fermentation of carbohydrates in the fruits, thus the cashew apple poisoning is probably due to ethanol production in the rumen by fermentation of cashew carbohydrates, resulting in alcoholic intoxication. The poisoning by Anacardium occidentale is reversible, and it seems to be non-lethal.

Keywords: poisonous plants, Anacardium occidentale, Anacardiaceae, cashew, cattle.
INTRODUCTION

Poisonous plants are those species that promote natural cases of poisoning. These plants have significant negative impact on livestock production, especially in tropical countries, because they affect animals by promotion of toxic effects including deaths, reduced food conversion, impaired growth, and abortions [3,20]. In Brazil, 113 plant species were known as promoting poisoning livestock in 2007 [20], but this number have been increased because new species of toxic species have been described [10,13,14], and other had his importance re-evaluated [5,23]. The knowledge of the plant species that are toxic to livestock is very important to establish strategies for prevention of the losses caused by these plants [3,4,19].

The cashew tree (Anacardium occidentale L.) is a plant grown in tropical regions of the world for production of cashew nuts, one of the most traded on the international market for edible nuts. The cashew apple is used for the production of various foods such as juices and sweets, but it can also be used in animal feed in the regions cashew is planted. The cashew apple can be used directly as feed, but usually it is dried for later use [6]. Despite its potential benefits for animal feed, many farmers have reported the occurrence of poisoning in cattle promoted by cashew apple. However, this poisoning has not been yet described. This study aimed to describe the cashew apple poisoning in cattle.

MATERIALS AND METHODS

It was visited eight farms that often had cases of poisoning by cashew at the Northwest region of Rio Grande do Norte state, Brazil, six at the municipality of Mossoró and two at the municipality of Serra do Mel. The farmers were asked whether the animals were fed with cashew apples and the amount supplied to animal, the occurrence of cases of poisoning, species affected, clinical manifestations (clinical signs, severity, and duration of signs), variation in age of affected animals and instituting any treatment. Furthermore, in one of the farms in the city of Mossoró, there were two cattle naturally poisoned by cashew apples given as food. It was recorded the epidemiological survey and clinical evaluation of affected animals.

For experimental administration, it were collected cashew apples fallen on the ground on a farm. They were stored at room temperature for 48 h. Before administration, the cashew nuts were separated from the cashew apples. It was used two Holstein male calves, aging one year-old, that had never previously been fed with cashew apples. After fasting overnight, it was offered 30 kg of cashew apple in the trough to the calves. The animals were monitored for 24 h and recorded the volume of cashew apples consumed by each animal and the occurrence of any clinical sign.

RESULTS

The interviews revealed that, the cashew apple is widely used for animal feeding at the season of nut production, because of its very low cost. Animals fed the cashew apples are mostly cattle and, less frequently, sheep and goats. Regarding the form of administration, the animals are usually released between cashew trees and remained there until nightfall; the animals feed the cashew apples fallen on the ground. Another form of administration is the provision ad libitum of collected cashew apples without nuts in the trough. The cashew apples are administered in dried (whole fruit or meal) or fresh forms. However, most outbreaks of poisoning have been reported in the fresh form in all ranchs, but one outbreak of was caused by the administration of partially dried fruit previously left submerged in water (Figure 1).
Not all animals fed with cashew apples present poisoning. Adult animals were reported by farmers as the most affected. The toxicosis is considered quite evident, as attendants unanimous in comparison with the appearance of alcoholic intoxication. It was reported that initially the animals become lethargic, presenting staggering gait and downcast. With progression, the animals showed depletion in the prone position, remaining this way for hours. Only one animal, according to a report of an owner of Mossoró, RN, presented exciting, characterized by compulsively running away to another paddock, with sudden stops. Animals are not treated, because the picture is reported to be reversible. The duration of toxicosis has been reported ranging from two to four hours.

In the farm that had two cases of poisoned animals at the time of the visit, the flock consisted of eleven crossbred Holstein cattle and about 50 crossbred sheep. Cashew apple was administered partly dry, but had been previously placed in drums with water to remove excess of land attached to apples. Cashew was administered ad libitum in the trough to all the cattle and sheep. Only two cattle showed the poisoning. The clinical manifestations observed in the two animals were lethargy, head tilting, dysmetria, broad base of members and gait, and stumble when they were encouraged to move. Hyperpnea and mild tachycardia were verified (Figure 2).

Regarding the experimental administration of cashew apples, there was great variation between the two cattle in the intake of fruit. Initially, the two animals were reluctant to eat. Within minutes, one of the cattle began to eat avid, while other went to eat cashew apple about 40 min later. The cashew apples were consumed over six h, and the animal that first started the intake consumed three quarters of the total offered. Only this animal showed lethargy, which lasted about two hours, while the other animal began to run from one side to another paddock for 20 min. No other abnormality was detected, even when stimulated animals.

**DISCUSSION**

In the Northwest region of Rio Grande do Norte state, Brazil, the cashew apple is an important food for animals, because its production is much larger than demand, with production focused on obtaining the cashew nuts. In fact, the cashew apple is often used for animal feeding in nuts-producing regions [6]. However, it was found that the poisoning is fairly common, but it has not worried the owners, because the cases that have occurred have been mild and not lethal, not financially compensating the substitution of food.

The main clinical manifestations of poisoning reported by farmers were lethargy, staggering gait and prostration, and eventually excitation. The changes reported in natural cases of poisoning were similar to observed at experimental administration, which confirms the ingestion of cashew apples as the responsible for the poisoning. Adults were considered by farmers the most affected. This fact could be attributed to the acquired habit in experienced animals consuming cashew apples, ingesting them in large quantities. The absence of cases of poisoning in sheep and goats in the reports of farmers suggests that small ruminants are much more resistant to poisoning than cattle. It is well established the species is an important factor for variation in sensitivity to poisoning by toxic plants [3,11,12,28], as well as other toxic agents. This variation in susceptibility between different species can be attributed to differences in absorption, biotransformation and elimination [11,12,17].

Poisoning by cashew presented here is similar to poisoning by the marula fruit (*Sclerocarya birrea*), a plant from Anacardiaceae family, the same family as the cashew tree. The marula poisoning is attributed to the alcohol formed by the fermenta-
tion of carbohydrates in the fruits [9,22]. It occurs because of alcohol yeasts, including Saccharomyces, are found in many fruits [27] and can perform fermentation of carbohydrates and formation of ethanol in the absence of oxygen. Despite the alcoholic intoxication of elephants by the marula was questioned [16], it is quite likely that the poisoning of cattle by cashew apple is promoted by alcohol made by fermenting the fruit. In fact, the cashew apple is used for the production of alcoholic beverages, and fermentation of the fruit results in the production of ethanol and other alcohols such as isoamyl alcohol, isobutanol, propanolol, methanol and N-butanol [29]. Thus, it is possible to prevent the poisoning through change in the forms of collection and storage of cashew apple.

In six of the eight farms visited, the animals had access to sites containing the poisonous plant Ipomoea asarifolia, a very common plant in the evaluated region. However, the poisoning produced by I. asarifolia is a tremorgenic syndrome, whose symptoms include head shaking, muscle tremors, imbalance hindlimb of the animal and fall to the ground, and these symptoms remain for a few days after the end of plant ingestion [15,30]. Thus, the clinical signs produced by I. asarifolia are different from that promoted by cashew apple.

Other plants from the Rio Grande do Norte state that promotes neurological signs that could resemble cashew apple poisoning are Ipomoea carnea [2,8,21], Mascagnia rigida [4,18,19] and cyanogenic plants [24-26]. Ipomoea carnea-affected animals present nystagmus, head tremor, muscle tremors, weakness of the hind limbs and ataxia, and just goats have been poisoned [2,8,21]. The poisoning by cyanogenic plants is caused by cyanide release, and it is generally fatal [24-26]. Clinical manifestations produced by Mascagnia rigida consisted of apathy, muscle trembling, tachycardia, difficulty in standing up, dyspnea, convulsions, and death [4,18,19].

**CONCLUSION**

The cashew apple (Anacardium occidentale) can promote poisoning in cattle, and the main clinical manifestations are lethargy, staggering gait, and prostration. The poisoning is probably due to ethanol production in the rumen by fermentation of cashew carbohydrates, resulting in alcoholic intoxication. The poisoning by cashew is reversible, and it seems to be non-lethal.

**Declaration of interest.** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

**REFERENCES**


