Poisoning Associated with Ingestion of Redroot Pigweed (*Amaranthus retroflexus*) in Cattle – Case Report

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Abstract: On a farm in Slovenia two cows died overnight without any previous signs of disease. The cows were fed green forage, containing a big portion of redroot pigweed (*Amaranthus retroflexus*) at least for four consecutive days. Poisoning with this plant was suspected. Pathomorphological changes established by the necropsy of both cows confirmed the suspicion of poisoning.

Keywords: Cows, *Amaranthus retroflexus*, redroot pigweed, poisoning, sudden death.

INTRODUCTION

Redroot pigweed (*Amaranthus retroflexus*) is a one – year plant, which grows 30 – 130 cm in height. The plant is a common weed often found on the fields, it prefers dry soil [1]. Redroot pigweed is a common plant worldwide including Slovenia. Poisoning of cattle with this plant was reported already in 1963 [2], since then only a few reports have been published on this topic [3-7]. Poisoning of cattle in Slovenia has not been reported yet [8]. Usually the poisoning takes place on the pasture mostly during the times of drought when appropriate forage is unavailable and cattle may ingest toxic amounts of redroot pigweed. Poisoning with redroot pigweed has been reported including in pigs. Apparently, pigs like to eat this plant [9, 10]. Poisoning with redroot pigweed causes injury of kidney and perirenal oedema in cattle and pigs [3, 5, 10, 11] but not in rabbits [12]. The plant is toxic because of the ability to accumulate high amounts of nitrates in the stems, especially if it is growing on the soil rich with nitrogen. The leaves contain an incomplete defined toxin which causes nephrotoxicosis. The plant also contains soluble oxalate [5, 10, 13, 14] (Fig. **1**).

CASE REPORT

The first week in July 2007 a local veterinarian who is working in the south east region of Slovenia came to the Clinic for Ruminants. He reported that the only two cows on the farm suddenly died during the night. The cows were of Simmental breed, 4 and 10 years old, approximately 500 kg of body weight. The owner did not notice any previous signs of disease. On the floor around the dead cows no signs of restlessness were found, bedding was not scattered, indicating that the animals died without agony or excitations. The cows were fed twice a day with green forage from the field where clover was sown. The veterinarian did not find clover in the crib, but only some unknown green plant, was also found when he checked the forage stored in front of the cowshed. The owner told him the cows were eating this forage for at least four days. On the base of anamneses and his own findings the veterinarian suspected the poisoning and he sent both cows to post mortem examination. The suspicious plant was brought to the Clinic for Ruminants, where we established that the plant is a redroot pigweed (*Amaranthus retroflexus*); our establishment was confirmed by the expert in the botanical garden Jože Bavcon, PhD (personal communication).

Fig. (1). Redroot pigweed (*Amaranthus retroflexus*) (Foto: M. Klinkon).

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Pathomorphological examination in both cows established hemorrhagic subcutaneous oedema on the abdomen and moderate rumen tympany. In fore stomachs green fibrous contents were found and in one of the cows ruminitis and obstipation of omasum were ascertained. The intestine of both cows was filled with gas. In both cows hyperaemia and oedema of lungs as dilatation of heart were established. In pericardium 2 – 3 dl of clear yellowish red fluid was found. The kidneys were swollen with perirenal oedema. Histopathology of kidney was not performed. The results of post mortem examination confirmed the suspicion of poisoning. The veterinarians from the Clinic for Ruminants visited the farm after this incident and took the precise anamnesis again. We established that the forage which was provided to the cows contained at least 80% of redroot pigweed. The cows were getting smaller amounts (approximately 10 kg per meal) of this forage but when the owner saw they liked to eat it she gave them more, and at least 20 kg were fed in the evening, prior to death the next morning.

DISCUSSION

Before sudden death the cows in this case were fed with green forage which contained a big portion of redroot pigweed for at least four days. In that period there was enough moisture so the plants were growing fast and the redroot pigweed overgrew the field sown with clover. It is known that redroot pigweed is a strong competitor and can supplant other plants [1]. The time from exposure to the poisoning of cows was similar to the other reports [3, 5]. The cows in this case died suddenly without any clinical signs of disease. The Spearman [4] also reported that the cattle were found dead on the pasture. Other authors reported about clinical signs like posterior incoordination, weakness, trembling of the muscles of the hind limbs, depression, diarrhoea and extensive ventral subcutaneous oedema. The death followed in 1 – 14 days after onset of clinical signs. In the blood samples of affected animals increased concentrations of urea, creatinine and activity of CPK (creatine phosphokinase) were established [3, 5-7]. Similar clinical signs were reported in poisoned pigs [9] and in poisoned cattle with *Amaranthus hybridus* in South Africa [15]. The redroot pigweed is able to accumulate a high level of nitrate and can be toxic to the kidneys especially when grazed fresh on the field [16]. Clinical signs described in nitrate poisoning are different from the signs established by redroot pigweed poisoning. In nitrate poisoning the nitrate is reduced to nitrite in the rumen. Nitrite converts haemoglobin to methaemoglobin, causing the brown discoloration of mucus membranes and blood. In acute cases clinical signs appear 2 – 6 hours after intake of food containing high level of nitrate. Signs include polypnoea, dyspnoea, tachycardia, abdominal pain, tympany, diarrhoea and frequent urinating. Muscle tremor, weakness, intolerance to exercise, convulsions, and death is possible in just few hours [17, 18]. The cows in our case died without convulsions, what was established also in the report by Sperman (1989) [4]; this is not typical for poisoning with nitrate.

Gross pathomorphological examination of both cows established haemorrhagic subcutaneous oedema in abdominal region, perirenal oedema and fluid in pericardium in our case. The established pathomorphological changes agree with findings of other authors. In cows that died due to redroot pigweed poisoning they found increased quantity of fluid in body cavities, subcutaneous oedemas and petechial haemorrhages on serous surfaces. Perirenal oedema, swollen kidneys with petechial haemorrhages were also established, histopathological necrosis of tubules was ascertained [3, 5-7, 11], and similar changes were established also in pigs [9]. Pathomorphological changes in poisoning with redroot pigweed are different from changes appearing in poisoning with nitrate. Changes in nitrate poisoning include brown coloured blood and tissues, cardiac haemorrhage, poor clotting of blood and pulmonary congestion. Frequently, overload of forestomachs, hyperaemia of mucosal membranes of alimentary tract, hyperaemia of lungs sometimes with interstitial emphysema, and fluid in pericardium are found [16-18].

On the basis of case history; the cows were fed by forage containing a lot of redroot pigweed for at least 4 days, the evening prior to death they got a bigger quantity (at least 20 kg) of this forage. Due to the results of postmortem examination which agreed with findings of other authors we are of the opinion that the cows died because of poisoning with redroot pigweed.

CONCLUSIONS

This is the first case of poisoning of cattle with *Amaranthus retroflexus* reported in Slovenia. Poisoning with this plant is probably caused by the combination of unknown nephrotoxic agent, nitrate and oxalate. Different species of *Amaranthus* are used as ornamental or forage plants but *Amaranthus retroflexus* is a common weed also in Slovenia, and due to lack of knowledge in people it is possible that more cases of poisoning of cattle will occur in the future.

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