

## TWO UNUSUAL CASES OF PLANT INTOXICATION IN SMALL RUMINANTS

*Twee ongewone gevallen van intoxicatie door planten bij kleine herkauwers*

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### ABSTRACT

An intoxication by *Euonymus japonicus* or Japanese spindle ('Japanse kardinaalsmuts') in sheep and an intoxication by *Pieris japonica* or Japanese Pieris ('Japanse Pieris') in goats is described. Eight sheep were found dyspneic and salivating; five of them died. Three goats showed signs of vomiting, were grinding their teeth and were staggering along. All three goats died. Diagnosis was made based on case history, clinical signs and necropsy findings (presence of plant material in the rumenal content). The literature on *Euonymus* and *Pieris* plant intoxications in sheep and goats is reviewed. Finally, general remarks and guidelines concerning plant intoxications in small ruminants are given.

### SAMENVATTING

In dit artikel worden een vergiftiging door *Euonymus japonicus* ('Japanse kardinaalsmuts') bij schapen en een vergiftiging door *Pieris japonica* ('Japanse Pieris') bij geiten beschreven. Acht schapen werden kortademig aangehouden en speekselden, vijf daarvan stierven. Drie geiten vertoonden braakneigingen, knarsten met de tanden en wankelden rond. De drie geiten stierven. De diagnose was gebaseerd op de anamnese, de symptomen en de pathologische bevindingen (de aanwezigheid van plantenresten in de pens). Een overzicht wordt gegeven van de beschikbare literatuur over *Euonymus*- en *Pieris* intoxicaties bij schapen en geiten. Finaal worden richtlijnen en algemene opmerkingen gegeven over intoxicaties door planten bij kleine herkauwers.

### INTRODUCTION

Livestock, including sheep and goats, can be poisoned by many different plant species. Most of these plants are generally ignored by the animals when there is plenty of grazing or other fodder available (Angus and Sharman, 1991; Plumlee, 1992; Frone and Pfänder, 1983). However, small ruminants and especially goats are of an inquisitive nature and browsing habit. They commonly consume small quantities of poisonous plants without showing adverse effects, particularly when the rumen is full of other feed stuffs (Popay and Field, 1996; Matthews, 1999). In special circumstances, these animals can also ingest a toxic amount

of plant material. Toxicosis can occur when plant trimmings are offered as a feed source or when animals escape from their normal habitat (Plumlee, 1992). In this article, two cases of intoxication of small ruminants with toxic garden plants are described.

### CASE HISTORY

#### Case 1

In November, a flock of eight regularly dewormed sheep that were fed on hay and grass pasture suddenly showed salivation and mortality. In a nearby garden a gardener had been trimming garden plants. Some of



**Figure 1.** *Euonymus japonica* leaves and *Pieris japonica* flowers that were recovered from the rumenal contents of an affected sheep (left). A close-up of the *Euonymus japonica* leaves (right).



**Figure 2.** *Pieris japonica* leaves (1) that were recovered from the rumenal contents of an affected goat (left). A close-up of the *Pieris* flowers (right).

the ornamental plant trimmings were available to the sheep. Five of the eight sheep died. Postmortem examination revealed numerous leaves of *Euonymus japonicus* Thunb. in the rumenal contents. A few flowers of *Pieris japonica* D. Don ex G. Don were also present (Fig. 1). Other signs at autopsy were edematous lungs, hemorrhagic fluid in the trachea and hemorrhagic fluid in the pleural and peritoneal cavities. Histology of the lung and brain showed congestion of capillaries and edema. The most probable diagnosis was made based on case history, clinical signs, necropsy findings and the presence of large numbers of *Euonymus japonicus* leaves in the rumen.

## Case 2

In March, three Toggenburger goats (4-5 years) managed to escape from a small pasture and ate some garden plants, such as *Pieris japonica*, primroses (*Pri-*

*mulacea*), and the bark of spruces (*Picea*). The goats were soon confined again and given considerable amounts of hay, which they ate. Later in the same day, one goat was gnashing and bleating. A few hours later the goat died and the other two goats had also begun gnashing, and were staggering and vomiting. Temperature, pulse and breathing frequency were within normal limits. One goat died that night and the remaining goat was treated with Vetalgin® (Intervet, contains metamizole, an analgetic and spasmolytic drug). The following day, after a brief improvement, the symptoms progressed and it was decided to carry out euthanasia on the goat. Postmortem examination of goats 2 and 3 revealed several leaves of *Pieris japonica* in the rumenal contents (Fig. 2). Other lesions at necropsy included the presence of large amounts of frothy fluid in the tracheal lumen and a segmental congestion of the jejunal mucosa. In the small bowel lumen, a slightly hemorrhagic watery content was

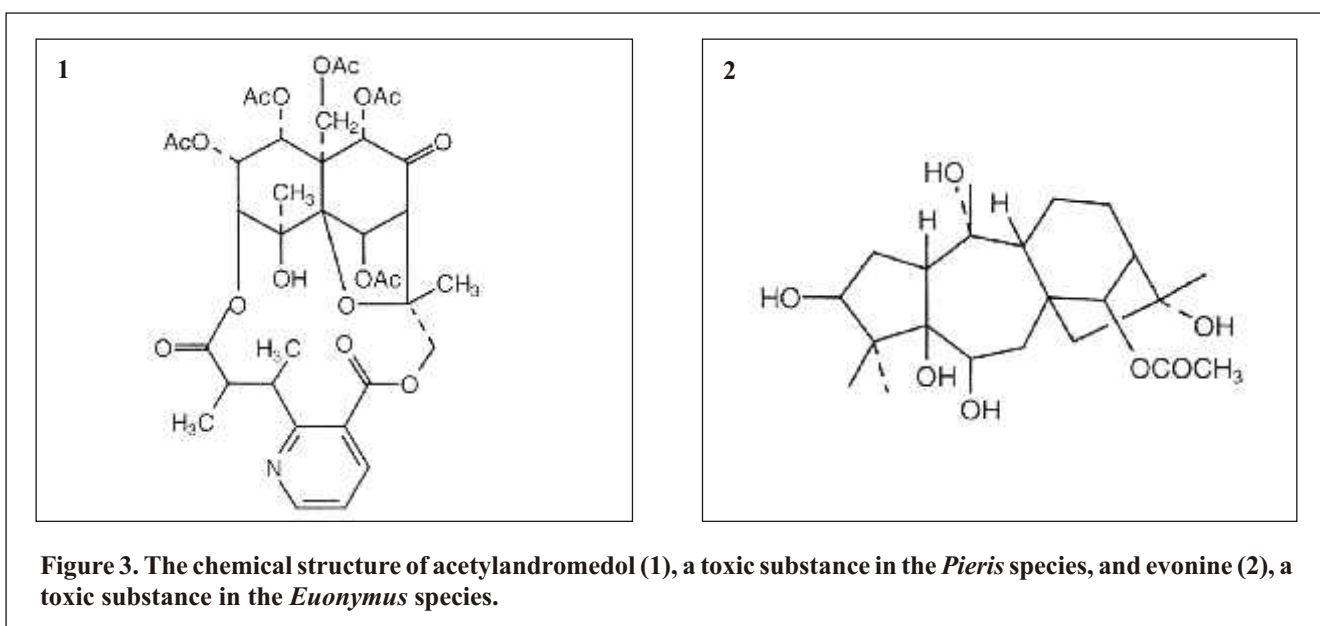
found. Histologic examination of different organs in the two goats revealed extensive pulmonary congestion and edema. In goat 3, a mild bronchopneumonia was present. This could be due to a recent aspiration of food particles. No other microscopic lesions could be observed. The most probable diagnosis was made based on case history, clinical signs, necropsy findings and the presence of *Pieris japonica* in the rumen.

## DISCUSSION

*Euonymus japonicus* or Japanese spindle ('Japanse kardinaalsmuts') belongs to the family of the *Celastraceae* and is regularly grown in gardens. A native member of this family is the *Euonymus europaeus* or Spindle-tree ('Wilde kardinaalsmuts'). The name is derived from the typical shape and color of the berries. The four brightly colored lobes are reminiscent of the red hats of the Roman Catholic cardinals. The seeds (inside the berries), the leaves and the bark are poisonous. Birds can eat the berries without intoxication, because the seeds are not digested by the birds. The poisonous substances are alkaloids (evonin, Figure 3) and to a lesser extent cardiac glycosides or cardenolides (evonoside, evonomoside and evobioside) (Frohne and Pfänder, 1983; Van Genderen *et al.*, 1996a). It is not known which toxic substances are responsible for the symptoms (De Cleene, 2000). The symptoms occur 8-15 hours after intake and include vomiting, abdominal pain, inflammation of the intestines, severe, slimy, watery or bloody diarrhea, disturbances of circulation, collapse and coma. If the animal survives, liver and kidney degeneration occurs

(Clarke *et al.*, 1981; Frohne and Pfänder, 1983; Van Genderen *et al.*, 1996a; De Cleene, 2000). Few reports can be found in the literature about animal toxicity. One book mentions goats and sheep that ingested the young sprigs of the spindle tree and either died (Van Genderen *et al.*, 1996a) or showed diarrhea (Anonymous, 2004). The final diagnosis of intoxication by *Euonymus japonica* was based on the abundant presence of *Euonymus* leaves in the rumen, but in many of such cases several confounding factors exist. Here, a possible dual diagnosis (*Euonymus* – *Pieris* poisoning) could be made, since, to a lesser extent, *Pieris* flowers were also present in the rumen.

*Pieris japonica* or Japanese Pieris ('Japanse Pieris') belongs to the family of the *Ericaceae*. Many ornamental plants are members of this family but belong to another subfamily such as azalea and rhododendron (*Rhododendron* spp.), and mountain laurel (*Kalmia* spp.) (Frohne and Pfänder, 1983). *Pieris* and *Kalmia* are not native species but are commonly found in gardens. The toxic substances are grayanotoxins. They consist of diterpenes with a unique tetracyclic skeleton called andromedane. The most abundant and best known grayanotoxin is acetylandromedol (grayanotoxin I, Figure 3). Others are andromedol, andromedenol and acetylandromedenol. They exert their effect by binding to sodium channels in excitable cell membranes of nerve, heart and skeletal muscle. Grayanotoxins are found in nectar, flowers, stems and especially the leaves. The clinical symptoms are similar after *Ericaceae* poisoning, whatever the species responsible for the intoxication (Visser *et al.*, 1988). After exposure, a rapid onset (within 6 hours) of clinical signs is seen and the





duration of clinical signs is usually about 1-2 days. Initially, depression develops with severe salivation and abdominal pain, vomiting or regurgitation. Rarely, diarrhea occurs. Later on the animals may become recumbent and develop seizures, tachycardia, tachypnea and pyrexia. In severe poisonings, opisthotonus, ataxia and convulsions may occur. The poisoning is usually not fatal but recovery can take several days. Postmortem lesions are generally nonspecific. Mild hemorrhagic enteritis, renal tubular damage and aspiration pneumonia may be present. Fragments of leaves of ericaceous plants may be found in the gastro-intestinal tract. Recently a thin layer chromatography method for detection of grayanotoxins in plant material and stomach contents was described, as well as a liquid chromatography method with mass spectrometry for the analysis of urine and serum (Holstege *et al.*, 2000). Grayanotoxins can be detected in the urine of exposed animals up to 3 to 5 days after exposure (Holstege *et al.*, 2001; Puschner, 2003). No specific antidote is available for grayanotoxin poisoning (Plumlee *et al.*, 1992; Puschner, 2003). There are reports of lethal *Pieris* intoxication in goats (Smith, 1978; Visser *et al.*, 1988; Plumlee *et al.*, 1992) and sheep (Power *et al.*, 1991). Fresh foliage equaling approximately 0.1% of a goat's body weight can be toxic (Smith, 1978). Fetal mummification in a pregnant goat was also diagnosed as being the result of a Japanese *Pieris* poisoning (Smith, 1979). Other evidence of teratogenic effects after *Pieris* intoxication is not available (Plumlee *et al.*, 1992).

In the present case the temperature of the goats was not elevated and only minor lung pathology was observed. Other intoxication cases of *Pieris* in goats also showed no increase of body temperature, but distinct lung pathology was observed (Visser *et al.*, 1988; Plumlee *et al.*, 1992). Vomiting in goats is almost always due to plant poisoning (Matthews, 1999).

For both cases described here, no antidotes are available. The general principle of plant intoxication treatment is to separate the animal from the plant. Sometimes it is possible to remove some plant material from the mouth of the animal. First aid should be continued together with symptomatic treatment such as oral activated charcoal (75 g/animal), spasmolytics, intravenous fluids, oral laxatives, B vitamins and antibiotics (if there is a danger of inhaling vomit). Etamiphylline camsylate (Millophylline V<sup>®</sup>, Arnold Veterinary Products) can be used as a cardiac and respiratory stimulant at a dose of 20 mg/kg. Rumenotomy can be considered if this can be done before clinical signs of

poisoning have developed (Visser *et al.*, 1988; Plumlee *et al.*, 1992; Matthews, 1999).

Prevention is primarily based on education of veterinarians and animal owners regarding the toxicity of these plants, since most cases of poisoning are caused by garden shrubs (Matthews, 1999). The best prevention is to keep animals away from the plants, to minimize the possibility of escape, not to offer plant trimmings and to ensure that other feed is available (Plumlee *et al.*, 1992; Puschner, 2003).

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### KOEIENMEESTERS EN PAARDENMEESTERS IN DE JAREN 1600 (III)

De zeventiende-eeuwse koeien- en paardenmeesters (zie pag 116 en 139) stonden er niet alleen voor. Ze konden 'natuurlijke' ziektegevallen behandelen, maar er waren zoveel 'bovennatuurlijke' aandoeningen veroorzaakt door hekserij of door kwade geesten of duivels.

Op de heksenprocessen verklaarden de meesters dat ze niet konden uitmaken of een dier natuurlijk ziek dan wel betoverd was. Maar wanneer hun middeltjes niet hielpen, durfden ze wel eens suggereren dat er misschien wel toverij in het spel kon zijn. Meester Guillaume van de Velde, *marichiael* (hoefsmid) te Gent, wist echter dat alleen geestelijken het onderscheid goed konden maken. Er was volgens hem een vermoeden van hekserij als paarden groot *ramoer ende tempeest* maakten, wanneer een geestelijke tijdens een beleving (poging tot genezing via gebed) zijn stoel (stola, onderdeel van priesterkledij gedragen bij geestelijke handelingen) op hun kop of rug legde.

Voor dergelijke belevingen deed men beroep op de plaatselijke pastoors of op paters uit naburige steden.

Zo belas de pastoor van Olsene de woning, de stal en het drinkwater op een boerderijtje. Hij stopte allerlei gewijde zaken in de koeienstal en liet wijwater gieten op het brooddeeg en de melk. De pastoor van Dentergem mengde in 1661 wierook en lijnzaadolie, wijdde het mengsel en liet het innemen door de kreupele koe van Joos Vliegers. Hij maakte vervolgens meerdere kruistekens over de koe en belas haar zo lang dat hem het zweet over de wangen liep. Daarna plaatste hij zijn voet over het liggende dier en zei: *staet op in Gods naeme*. De koe kwam meteen recht en bleek korte tijd nadien volledig genezen.

Het waren lang niet altijd geestelijken die men daarvoor aansprak. In sommige gevallen riep men oude vrouwen of mannen te hulp die magische spreuken kenden of magische handelingen verrichtten.

Bron: Monballyu J., 2003 (zie pag 116)