‘Red rooted’! A case of amaranthus toxicity in lambs on a Hawkes Bay hill farm

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History

Farmer owns two blocks separated by a couple of kilometres, one of which is hard hill country right up against the boundary of the Ruahine Forest Park and the other, a less rugged block, offers easier hills and terrace flats overlooking the Tuki Tuki River.

October born lambs from the harder hill country are weaned and brought down to the river terraces in January where they are run as mobs of 800 to be fattened on a crop of pasja.

Within 48 hours farmer found ‘one or two’ dead lambs in one particular paddock and after ‘a few more’ deaths decided to bring in a couple of carcasses and a sick animal for post mortem at the clinic. A sample of crop was also brought in for nitrate testing. Lambs in all other paddocks were reportedly fine.

Clinical/post mortem findings

The single live lamb was recumbent and had a temperature of 39.8 degrees centigrade. Nothing remarkable was observed but the lamb seemed ‘a little pot bellied’.

On post mortem the abdomen was found to be full of a clear, non-smelling fluid with large clear gelatinous clots throughout. Kidneys were grossly enlarged and pale and surrounded by a thick matrix of a clear, gelatinous exudate. A large haemorrhage was apparent in the capsule of one kidney. The renal cortex in particular was swollen and pale when sectioned.

Similar findings were noted in the two other dead lambs and a sample of kidney was sent away for histopathology.

The pasja sample was contaminated by at least 50% of a weed that the farmer believed was ‘just a bit of fat hen’.

Weed identification

The weed was approximately 50cm long and had distinct green bushy tips and a tapering red root. It was confirmed as Amaranthus spp. aka ‘red root’ (or ‘pig weed’) and a diagnosis of red root poisoning was assumed. A trip out to the offending paddock later that day confirmed an abundance of the plant; up to 40% of the crop was infested by the weed.
Histopathology

There was marked degeneration of tubular epithelium in the renal cortex with many tubules being lined by attenuated epithelium and dilated by eosinophilic hyaline cellular debris. There were also multifocal infiltrates of lymphocytes aggregated throughout the cortex. No oxalate crystals were seen under polarised light. The renal capsule was expanded by oedema.

The morphological diagnosis of severe, diffuse, necrotising nephrosis was made with mild lymphocytic nephritis, consistent with a toxic insult most likely to have been attributable to Amaranthus spp.

Outcome

Despite the farmer having immediately removed all 800 lambs from the offending paddock and putting them onto grass, lambs continued to die over the ensuing 21 days. A total of 156 lambs died over this three week period, the worst day, Day 5, being a total of 27. Most of the dead lambs were found by the water troughs prompting the farmer to joke that ’at least they’re handy to pick up’!

The losses didn’t stop the farmer enquiring about putting a mob of cattle onto the paddock but the crop was subsequently sprayed out without further grazing!

Discussion

Amaranthus spp. is believed to contain an as yet unidentified nephrotoxin that exerts its effects on the proximal renal tubules. No calcium oxalate crystals were seen on histopathology, ruling out oxalic acid as the toxin.

In 21 years as a veterinarian I have never seen such spectacular pathology! The scale of the deaths and the protracted nature of the deaths was staggering and I had no idea what to advise the farmer to expect but considered ‘a few more deaths over the coming days’ a reasonable suggestion. Losses accounted for 19% of the 800 lambs in the mob and a search of the literature brings up very little other than an outbreak in Taumarunui in 2001 in which 400 out of 3000 lambs died (13%) and in Australia a group of 28 lambs from a mob of 194 died due to Amaranthus toxicity (14.4%).

Several notable questions arise.

1. Why do we not see more deaths attributable to Amaranthus spp. given that it is so widespread and the pathology unmistakable?
2. Why did the weed only take root in one paddock? The other paddocks of pasja were only 100m further down the shingle track. It begs the question whether or not this paddock missed being sprayed!
3. Which parts of the plant are toxic and is there a particular phase of growth that the toxin is at its highest levels?
4. Do specific growth conditions influence the level of toxin production?
5. Is there any effect on subsequent growth rates?
References


Oertly D, Black A. Amaranthus toxicity in lambs. *Vetscript* XIV, 10–11, 2001