

Equine leucoencephalomalacia in New Caledonia

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Leucoencephalomalacia of horses is a mycotoxicosis due to the ingestion of seeds contaminated with the fungus *Fusarium moniliforme*, which is distributed widely throughout the world (Biester and Schwarte 1939; Rodriguez 1945; Iwanoff *et al* 1957; Badiali *et al* 1968; Wilson and Maronpot 1971; Kellerman *et al* 1972; Marasas *et al* 1976; Pienaar *et al* 1981; Magnol *et al* 1983; Nelson *et al* 1983; Nyack and Padmore 1983).

The first diagnosed outbreak of the disease in New Caledonia occurred in a Noumea riding club in 1981. The horses were fed on a ration containing a high proportion of locally grown maize and the onset of disease coincided with the feeding of a new batch of this maize. Forty-five horses were affected, showing anorexia, loss of condition, prostration, liver dysfunction and evidence of central nervous disorder, namely alternating periods of excitement and drowsiness, incoordination, aimless circling, muscular tremors, paralysis of the lower lip, standing in a corner of the pen with lowered head and apparent blindness. Five horses died 10 to 28 days after the onset of clinical signs.

A necropsy was performed on one of these horses. The liver was severely congested. A softened, oedematous area approximately 5cm in diameter and surrounded by a haemorrhagic zone was present in the left cerebral hemisphere. On histological examination the lesion appeared as an area of oedema of the white substance, without necrosis of the neuroglial cells. There were numerous perivascular haemorrhages. Foci of hepatocyte necrosis, with moderate inflammatory reactions, were present in the liver. Chemical analyses did not reveal significant quantities of mercury, lead or arsenic.

For the detection of fungi whole seeds of maize were immersed in a 2% aqueous solution of calcium hypochlorite, then crushed and placed in a wet incubating chamber for 48 h at 26°C. Where the maize had been crushed prior to being fed to horses, incubation was done directly, without previous superficial disinfection. Mucorales were recovered from 25% of the samples, *Penicillium* sp from 33% and *Fusarium moniliforme* from all. *Fusarium* spp were classified according to Nelson *et al* (1983).

When feeding of the affected maize was discontinued the clinical signs shown by surviving horses became less severe, but some remained very weak for several weeks.

In 1983 a second episode occurred, affecting a 15-year-old stallion that had been fed for 2 weeks from a fresh, locally produced batch of maize. In this instance the development of the disease was extremely rapid, with death occurring 24 h

after the onset of clinical signs, manifested as unsteadiness and walking in circles, followed by lateral recumbency, with paddling movements of the limbs. The lower lip was paralysed and skin sensitivity was absent in the lower lip, and in the anterior and posterior aspects of the limbs.

The major lesion found at necropsy was a focus of liquefaction of the white matter in the right cerebral hemisphere (Figure 1). Histological examination revealed, under a normal cortex, extensive colliquative necrosis of the white matter, associated with scattered haemorrhagic foci, and generalised oedema. The Virchow-Robin spaces were infiltrated by red cells, lymphocytes and a few polymorphonuclear leucocytes. Congestive and haemorrhagic lesions were also observed in the liver, mesentery and intestine.



Figure 1. Grossly affected brain of horse with leucoencephalomalacia, showing necrotic lesion in right cerebral hemisphere and dilated lateral ventricle.

Fungi isolated from the crushed maize fed to the horse were various Mucorales and *Penicillium* sp (10% of seeds), *Aspergillus flavus* (20%), and *F. moniliforme* (100%). The conidial production of the *Fusarium*, after 36 h incubation at 26°C, was estimated at 3×10^7 conidia/g of maize, which indicated massive infestation of the seed.

Fusarium spp are soil fungi that frequently infect maize in New Caledonia, *F. moniliforme* being very common, while *F. graminearum* occasionally has also been isolated (Nelson *et al* 1983). Maize is generally sown in 2 seasons, from November to March, or from April to October. When sowings in the former season are made late the harvest takes place during the cooler months (June to August) period that is particularly conducive to the development of moulds.

In the episodes described maize had been harvested at the end of June and was heavily infested with *F. moniliforme*. Storage of the crushed seeds in too humid an atmosphere subsequently led to abundant mycelial growth and the production of the toxin responsible for equine leucoencephalomalacia. There are some 10,000 horses in New Caledonia, but until recently relatively few have been fed on maize, hence the prevalence of leucoencephalomalacia has been low. However, the increased keeping of horses for recreational riding and the planned increase in the cultivation of cereals for livestock production may well result in an increase in prevalence. More research is needed on the biology and control of *F. moniliforme* under New Caledonian conditions and on its toxins.

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References

- Badiali, C., Mamdouh, H. A-Y., Radwan, A. I., Hamoy, F. M. and Heldebrandt, P. K. (1968)—*Am. J. vet. Res.* **29**: 20.
- Biester, H. E. and Schwarte, L. H. (1939)—*N. Am. Vet.* **20**: 17.
- Iwanoff, X, Chang-Kuo, Y. and Shin-Chien, F. (1957)—*Arch. exp. Vet. Med.* **11**: 1035.
- Kellerman, T. S., Marasas, W. F. O., Pienaar, J. G. and Naude, T. W. (1972)—*Onderstepoort J. vet. Res.* **39**: 205.
- Magnol, J. P., Le Bars, J. and Quere, J. P. (1983)—*Rev. Med. vet.* **134**: 297.
- Marasas, W. F. O., Kellerman, T. S., Pienaar, J. G. and Naude, T. W. (1976)—*Onderstepoort J. vet. Res.* **43**: 113.
- Nelson, P. E., Toussoun, T. A. and Marasas, W. F. O. (1983)—*Fusarium Species*, Pennsylvania State University Press, University Park, Pennsylvania.
- Nyack, B. and Padmore, C. L. (1983)—*Eq. Practice* **5**: 33.
- Pienaar, J. G., Kellerman, T. S. and Marasas, W. F. O. (1981)—*J. s. afr. vet. med. Ass.* **52**: 21.
- Rodriguez, J. A. (1945)—*An. Soc rur. Argent.* **69**: 305.
- Wilson, B. J. and Maronpot, R. R. (1971)—*Vet. Rec.* **88**: 484.

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