THE HISTORY OF ERGOT ALKALOIDS

Ergot or ergot fungi refers to a group of fungi of the genus Claviceps (Schardl et al., 2006). The most common fungus of this group is *Claviceps purpurea (C. purpurea)*.

This fungus grows on rye and related plants, and produces alkaloids that can cause ergotism in humans and other mammals after consuming grains contaminated with its fruiting structure (ergot sclerotium). Claviceps includes about 50 known species, mostly found in the tropical regions. Economically significant species include *C. purpurea* (parasitic on grasses and cereals), *C. fusiformis* (on pearl millet, buffel grass), *C. paspali* (on dallis grass), *C. africana* (on sorghum), and *C. lutea* (on paspalum). *C. purpurea* most commonly affects outcrossing species such as rye (its most common host), as well as triticale, wheat and barley. It rarely affects oats.

Epidemics of ergotism occurred frequently in the Middle Ages. These were characterized by gangrene, neurological diseases and death. Ergotism is caused by eating rye bread contaminated with the fungus *C. purpurea*. In 1582, it was described that giving birth could be hastened by administering a few spurs of the homeopathic remedy secale cornutum. However, the dosage was very inaccurate resulting in frequent uterine ruptures. Therefore, after 1828, the ergot alkaloids were no longer used during giving birth but only as a measure to prevent postpartum haemorrhage. From 1875 onwards many derivatives of ergot alkaloids were found. Dudley and Moir isolated ergometrine in 1932. It proved to have a very specific uterotonic action. However, because of severe and unpredictable

side effects and the instability of the drug, ergometrine is not the drug of choice for either the prevention or the treatment of postpartum haemorrhage (Van Dongen and De Groot, 1995).

IN VITRO ADSORPTION TESTS FOR ERGOT ALKALOIDS (ECCA LABORATORY)

Despite the known ergot alkaloid toxicity, there is a lack of legislation in the EU regarding its presence in the food and feed chain. Maximum residue levels are expected soon as the European Food Safety Authority (EFSA) is currently compiling data on the occurrence of ergot alkaloid levels in cereal and cereal products (EFSA, 2012). EFSA recommends monitoring the following 6 major ergot alkaloids (*-ines*) along with their corresponding epimers (*-inines*):

- Ergometrine
- Ergotamine
- Ergosine
- Ergocristine
- Ergocryptine
- Ergocornine

ECCA is an independent laboratory accredited by BELAC (Belgian Accreditation Organization) according ISO 17020 n° 051-INSP and ISO 17025 n° 051-TEST which has been approved by the Belgian Federal Agency for the Safety of the Food Chain (FASFC). Based on an extensive literature study, ECCA developed the separation and detection of the individual ergot alkaloids on LC-MS/MS, the equipment of choice for this quantitative analysis.

ERGOT ALKALOIDS IN HUMAN MEDICINE

Remember:

- Dihydroergotamine and ergotamine belong to the group of medicines known as ergot alkaloids. They are used to treat severe, throbbing headaches, such as migraine and cluster headaches. Dihydroergotamine and ergotamine are not ordinary pain relievers as they will not relieve any kind of pain other than throbbing headaches. Because these medicines can cause serious side effects, they are usually used for patients whose headaches are not relieved by acetaminophen, aspirin, or other pain relievers.

- Dihydroergotamine and ergotamine may cause narrowing of the blood vessels in the body. This can lead to serious side effects that are caused by a decrease in the flow of blood circulation to many parts of the body.

Good to know:

Ergovaline is considered to be the primary agent of fescue toxicosis of *Neotyphodium coenophialum* - infected tall fescue in the USA (Yates et al. 1985). It also appears to be a significant factor in the occurrence of heat stress in stock grazing perennial ryegrass infected with the endophyte *Neotyphodium lolii* (Easton et al. 1996).

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