Veterinary Microbiology 154 (2011) 1–13

Contents lists available at ScienceDirect

Veterinary Microbiology

journal homepage: www.elsevier.com/locate/vetmic

Review

Ochratoxin A in feed of food-producing animals: An undesirable mycotoxin with health and performance effects

Sofia C. Duarte [a,b,*], Celeste M. Lino [a], Angelina Pena [a]

[a] Group of Health Surveillance, Center of Pharmaceutical Studies, University of Coimbra, Polo III, Azinhaga de Sta Comba, 3000-548 Coimbra, Portugal
[b] Department of Veterinary Medicine, Escola Universitária Vasco da Gama, 3040-714 Coimbra, Portugal

ARTICLE INFO

Article history:
Received 4 March 2011
Received in revised form 30 April 2011
Accepted 4 May 2011

Keywords:
Ochratoxin A
Mycotoxins
Animal
Feed
Exposure
Performance

ABSTRACT

Mycotoxins are secondary fungal metabolites, whose presence in feed- and foodstuffs is unavoidable. Ochratoxin A (OTA) is one of the known mycotoxins with greatest public health and agro-economic significance. Several toxic effects have been ascribed following exposure, namely nephrotoxicity, as well negative impacts in the performance of farm animals, resulting in major economic implications. Of no less importance for the route of human exposure that can also embody the carry-over of OTA from feed into animal-derived products is also a concern.

For all these reasons the present article updates the worldwide occurrence of OTA in different raw ingredients and finished feed destined to food-producing animals. After that a brief characterization of specie susceptibility and the major rationales is made. An historical overview of field outbreaks linked to OTA exposure in farm animals, concerning the implicated feeds, contamination levels and major clinical and productivity effects is presented. Finally a review of the major animal health and performance potential impacts of animals being reared on contaminated feed is made allied to a perspective regarding its co-occurrence with other mycotoxins, and simultaneous parasitic and bacterial infections.

Ultimately, this article aims to be instructive and draw attention to a mycotoxin so often neglected and elapsed from the list of differential diagnosis in farm practice. For the unpredictability and unavoidability of occurrence, OTA will definitely be an enduring problem in animal production.

© 2011 Elsevier B.V. All rights reserved.

Contents

* Corresponding author at: Group of Health Surveillance, Center of Pharmaceutical Studies, University of Coimbra, Health Sciences Campus, 3000-548, Coimbra, Portugal. Tel.: +351 239 488 400; fax: +351 239 827 126.
E-mail address: sofiacanceladuarte@gmail.com (S.C. Duarte).

0378-1135/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.vetmic.2011.05.006

1. Introduction

Mycotoxins (from Greek 'mycos') form a distinct group of secondary metabolites produced by fungi imperfecti (Fink-Gremmels, 2008a). These low molecular weight natural contaminants thus constitute a toxigenically and chemically heterogeneous group, producing a wide variety of injurious effects in animals (Marquardt, 1996), and presenting interspecies and sometimes individual variations in toxic endpoints. Often times most factors contributing to the presence or production of mycotoxins in foods or feeds including storage, environmental, and ecological conditions are beyond human control (Hussein and Brasel, 2001). Mycotoxins should never be underestimated or neglected due to the unpredictability of climatic and environmental conditions and the inability of most agricultural systems to face and manage mycotoxin prevention or contamination (Prandini et al., 2009).

Mycotoxicoses in animals are characterized as feed related, non-contagious, non-transferable, non-infectious, and non-traceable to microorganisms other than fungi. Mycotoxin-induced disease syndromes can be confused with other diseases caused by pathogenic microorganisms thus embodying a diagnostically difficult problem (Hussein and Brasel, 2001; Bokhari, 2010). In fact, in the field, changes in performance or behavior and increased susceptibility to infectious diseases are possible subtle and non-specific signs of exposure, making difficult to establish a cause–effect relationship with (contaminated) feedstuffs, complicating the clinical diagnosis and thus contributing to causality difficulties. Furthermore the presence of multiple contributing factors, such as environmental stress, multiple mycotoxins, nutrient/vitamin deficiencies, multiple fungi, infectious agents, can influence the clinical signs, severity and progression of the disease. In addition, mycotoxins in feeds are not evenly distributed, thus reproducing the disease at the same dosages as seen in feed samples collected from field can be difficult (Morgavi and Riley, 2007).

It is important to highlight that the impact of fungal toxins upon animals extends beyond their clinical features. Despite the ever-increasing understanding of mycotoxins, they still have a continuous and severe economic impact worldwide. This economic impact results from lowered productivity, reduced weight gain, reduced feed efficiency, less meat and egg production, greater disease incidence because of immune system suppression, subtle damage to vital body organs, and interference with reproduction is many times greater than that of immediate morbidity and mortality (Marquardt, 1996; Hussein and Brasel, 2001).

Ochratoxins are a structurally related group of compounds that was characterized after the discovery of aflatoxins (AFs), during the so-called "mycotoxin gold rush" (Bennett and Klich, 2003). Ochratoxins (Fig. 1) are produced primarily during storage by fungus of the genera *Aspergillus*, such as *A. ochraceus*, mainly in tropical and warmer regions and by *Penicillium verrucosum*, in temperate and colder areas (Duarte et al., 2010a). The most commonly occurring and most toxic member is ochratoxin A (OTA) (Peckham et al., 1971; Hagelberg et al., 1989). Its toxicological profile includes nephrotoxicity, hepatotoxicity, teratogenicity and immunotoxicity. In addition, OTA

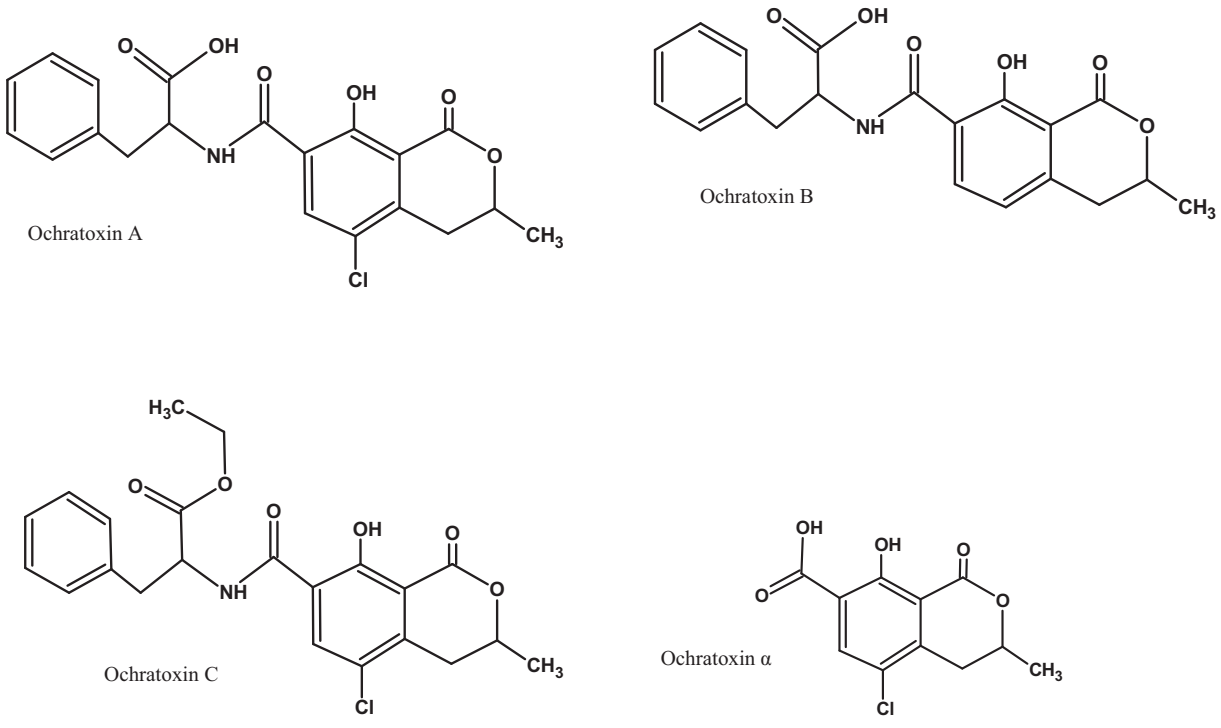

Fig. 1. Basic chemical structure of major ochratoxins.

Download English Version:

https://daneshyari.com/en/article/2467531

Download Persian Version:

https://daneshyari.com/article/2467531

Daneshyari.com