

Occurrence of Dogs and Cats Diseases Records in the Veterinary Clinics Routine in South Brazil and Its Relationship to Mycotoxins

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Abstract

An evaluation of diseases affecting dogs and cats and their relationship to pet food mycotoxin contamination was reported in South Brazil. Veterinary Clinics registries were surveyed for diseases, type of feeding, breeding environment, among other adverse conditions that the animals were exposed. Also the ingredients reported on the labels of pet food packages mycotoxin related were surveyed. From the diseases and clinical signs recorded and related to possible mycotoxicosis, the major casuistic were hepatic portal system (32.0 %) followed by the renal (30.0 %) and nervous systems (27.0 %) of cases. About ingredients of pet food, the main vegetable ingredients related were rice and maize with 57.0 and 55.0 %, that were susceptible to aflatoxin, ochratoxin A, citrinin, deoxinivalenol, among others mycotoxins. The data obtained in this study can help the clinics to consider the frames of mycotoxicosis as a final diagnosis in veterinary clinical routine.

Key words: dog, cat, pet food, disease, mycotoxins.

1. Introduction

Several diseases have been reported in veterinary clinics, as well as an increased observation and diagnosis of cancer in pets. Many factors may be responsible for the onset of these diseases, such as genetic predisposition (different races), pathogens (bacteria, fungi, viruses), biological (bioactive amines, bacterial and fungal toxins), physical (pieces of metal, glass, rubber), chemical (antibiotics, heavy metals, pesticides) and environmental contamination (breeding forms, stress, pollution) (Zicker, 2008; de Souza Koerich *et al.*, 2010). Many diseases can be linked directly or indirectly to the diet of these animals since many owners are opting to offer processed foods to their pets (Simao and Scussel, 2008). Industrialization is not to always synonymous of food security, as the diverse composition may enable a variety of contaminants to be present (Boermans and Leung, 2007). Besides, being a food supplied daily, it means to expose the animals to continuous and uninterrupted contact with possible contaminants of different nature.

The main composition of foods for dogs and cats is based on ingredients from *plant* (maize, wheat, soy, rice) and *animal* (meat, bone, fat) (Zicker, 2008; Brito *et al.*, 2010). Regarding the contaminants that can reach these raw materials, mycotoxins can play an important role, especially if the raw materials for commercial pet foods contain grains or their derivatives of low quality (Richard, 2007; Brito *et al.*, 2010). Mycotoxin contamination can get into processed pet food either during (a) by using bad or lack of raw materials selection at factory reception, (b) during food processing, (c) packaging and especially at the (d) storage of the final products which can compromise the animal health. Depending on the toxins that can contaminate pet food, different target organs and organic systems can be affected, with acute or chronic clinical signs, such as *liver* (aflatoxins -AFLs - primary target organ; ochratoxin A - OTA and citrinin - CTR - secondary target organ), *reproductive* (zearalenone - ZON), *nervous* (fumonisin - FBs) *kidney* (OTA, CTR), *vascular* (trichothecenes - DON and T2 toxin) and the development of *cancer* (chronic toxicosis) (Puschner, 2002; Richard, 2007).

In fact, several mycotoxicosis have been reported in dogs and cats caused by AFLs, OTA, ZON, CTR, DON, roquefortine and penitren A, found contaminating processed foods (Puscher, 2002; Boermans and Leung, 2007).

Considering that there are (a) only a few data on pet food contamination and diseases mycotoxins related, (b) the increase of pet foods production and (c) pets constant exposure to daily food intake, the objective of this study was to evaluate the occurrence of dogs and cats diseases and clinical signs that are related to possible mycotoxicosis (affected hepatic portal, renal, reproductive, nervous organic systems and neoplasias) in the veterinary clinics and parallel, an evaluation of ingredients reported on the labels of commercial pet food packages and the possibility of raw material to vehicular toxigenic fungi and mycotoxins, exposing the animals to the frameworks of mycotoxicosis.

2. Material and methods

2.1 Dogs and cats diseases and clinical signs

Between June 2010 and December 2010, a study was to evaluate the occurrence of dogs and cats diseases and clinical signs that are related to possible mycotoxicosis (affect hepatic portal, renal, reproductive, nervous organic systems and neoplasias) in the veterinary clinics. A total of 86 veterinary clinical records of dogs and cats, with confirmed by clinical and laboratory diagnostic regarding the diseases mentioned above, were collected in the veterinary clinics located in the region of Great Florianopolis, Santa Catarina State in Southern Brazil. A form was designed to collect data such as the date of sampling, animal data (age, sex, breed), type of feeding, breeding environment, among other adverse conditions that the animals were exposed and that may promote the occurrence of diseases (stress etc).

2.2 Evaluation of ingredients reported in pet food

An evaluation of ingredients reported on the labels of commercial pet food packages was made to verify the possibility of raw material to vehicular toxigenic fungi and mycotoxins and exposed the animal to the mycotoxicosis. Forty-six packages of dogs (23) and cats foods (23) available commercially were evaluated regarding the ingredients of plant origin (grains and cereals) described on the label, in the list of composition.

After obtaining all the information mentioned above, correlation was recorded between the disease and mycotoxins, as well as the basic composition used for commercial food production. A correlation was made with these ingredients mentioned possible transmission of mycotoxins and appearance of disease and clinical signs in animals.

3. Results and discussion

The most common diseases and clinical signs related to mycotoxicosis affecting dogs and cats recorded in the veterinary clinics during the period of six months were those of the following organic systems: hepatic, renal, nervous and reproductive, including also neoplasias (Figure 1).

Details on data obtained in the present study regarding the animals' characteristics, diseases and breeding conditions are described in Table 1.

3.1 Dogs and cats diseases and clinical signs

Among the conditions evaluated and correlated with mycotoxicosis, the highest occurrence was those involving the *hepatic system* with a total of 33.0 %, in which 71.0 % of cases were diagnosed as liver failure and 29.0 % of hepatitis, followed by kidney with 30.0 % diagnosed as chronic renal disease. The *nervous system* had a total of 27.0 % cases registered with 39.0 % of seizures, 30.5 % of tremogonia (muscle tremors and incoordination) and loss of proprioception and 30.5% of epilepsy. In the *reproductive system* there were reported only 6.0 % of cases, witch 40.0 % from pyometra (uterine infection) and 60.0 % of fetal mortality. Neoplasias accounted for 5.0 % of diseases, each case in a different target organ: liver, kidney, spleen and adrenal gland. Animals diagnosed with signs of malignancy were all dogs, three females and one male aged between 8 and 10 years, poodle (2), daschund and german shepherd, one each. All diets were based on processed foods and raised *in* (2) and *outside* (2) apartment/house. Important to emphasize that 18 (21.0 %) having veterinary records were found simultaneous description of conditions, usually involving two or more *systems* (kidney / liver, tumor / liver, liver / renal / among others).

3.2 Characteristics of the animal breeding and eating habits

Observing the way of raising the animals of the present study with respect to (3.2.1) *eating habits*, 90.0 % of the animals were fed with industrialized and 10.0 % of the animals with mix feeding food industrialized and homemade food, a habit commonly observed in diets of cats. Regarding (3.2.2) *environment*: 76.0 %, more than a half of the animals, were created inside the home owners, and only 24.0 % were created in areas outside of houses, with food exposure to moisture and environmental conditions that favor fungal growth and mycotoxin production, and (3.2.3) *stress conditions*: more than 50.0 % of the animals took weekly baths in petshops, increasing signs of disease. The absence of the owners is also considered a cause of stress in animals.

3.3 Ingredients used in commercial dog and cat foods

With respect to the study of the ingredients (raw material) used to produce food for dogs and cats and listed in 46 packages of complete dry foods, as expected, maize (whole and ground) and rice (grits, whole or broken) were present in the composition of 96.0 and 94.0 % of the products. Wheat was present in half (52.0 %) of the products, followed by soybean meal, barley, oats and sorghum accounting for 44.0, 37.0, 13.0 and 6.5 % respectively. Figures 2 show the percentages obtained in this study regarding ingredients of plant origin in food for dogs and cats, respectively. A major concern with the addition of grains, seeds and subproducts in animal feed is their susceptibility to toxigenic fungi and mycotoxin production. Ingredients such as maize, rice, wheat, oats, barley, peas, groundnuts, sunflower, among others are good substrates for fungi growth, including toxigenic strains (Scussel, 2002; Bullerman and Bianchini, 2007). The main mycotoxins that are found in most cereal grains are AFLs, FBs, OTA, DON and ZON (Lazzari, 1997; Scussel, 2002, Simao and Scussel, 2008). The ingredients reported in the evaluation of pet food labeling and the correlation with most commonly mycotoxins vehiculated by them are presented in Table 2.

3.4 Diseases and clinical signs versus mycotoxins

In animals, mycotoxins have no characteristic clinical signs of chronic intoxication, thus allowing the misdiagnosis of the disease. For example, refusal of food can have many causes, but when the diet is based on food containing maize or other cereal grains, they may be indicative of *Fusarium* and / or *Aspergillus* toxins. Tremogenic toxins cause tremors and convulsion, and may be confused with other causes such as epilepsy and seizures. Some mycotoxins, including trichothecenes, ZON and FBs can bring reduction of productivity and growth. Low resistance to infection/reduced immunity can result from ingestion of mycotoxins (Boermans; Leung, 2007). Table 2 describes the main mycotoxins found in the raw material used to produce feed and possible harmful effects and target organs. Important to emphasize that the extrusion process (temperature 100-200 ° C and 34-37 atm pressure) can reduce the mycotoxins concentrations in feed, but not sufficient to eliminated them. However, they are stable in most food processing systems, tolerating temperatures above 260°C (Scussel, 1998, 2002). In such cases, these toxins can become residues in food animals, such as the hepatotoxic AFLs and hepato and nephrotoxic OTA (Bullerman and Bianchini, 2007). Looking at the data on types of diseases diagnosed during the study period, we observed that animals with a diet based on processed foods (90.0 %) had a higher occurrence of diseases of different organs, as well as neoplasias. These data can be related to diet and the quality of the supplied products. Monitoring the quality of pet foods should be performed frequently to ensure product safety and, consequently, the health of animals. In this study, should clarified that pet foods of sick animals weren't analyze because the study was based on veterinary clinical records, besides the mycotoxicosis show clinical signs in long term (chronic diseases). Owners of pets should be counseled about storage of food before and after being opened, to avoid possible contamination at the household level. "No treatment is effective if the cause of the disease is still present" (de Souza Koerich, 2010).

4. Conclusion

The mycotoxicosis are still little discussed and considered among veterinary practitioners. Although the pathogens are known, yet there is little data reported in the literature on the occurrence of mycotoxin poisoning in pet animals. The clinical signs of mycotoxicosis are nonspecific and can confuse the veterinarian's final diagnosis. The data obtained in this study can be a tool to clarify the relationship between the conditions seen in pets in Southern Brazil and possible mycotoxicosis frames, which are generally not considered as a final diagnosis. Education on the choice of food and proper storage, ensuring the quality of feed provided the owners is important to guarantee health animals.

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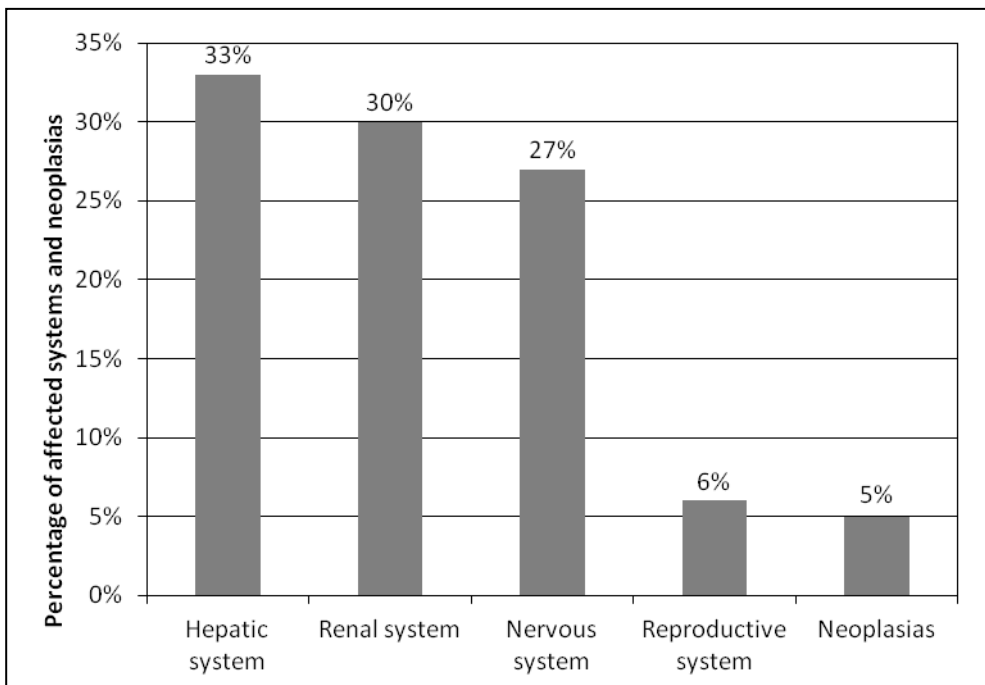


Figure 1 – Percentage of affected systems and neoplasias diagnosed in dogs and cats in the Great Florianopolis Region, Southern Brazil.

Table 1 – Characteristics and food habits of dogs and cats obtained from veterinary clinics in Great Florianopolis Region.

Effected systems, clinic signs and diseases	Animal		Gender		Age ¹			Industrial	Food		Environment	
	Dog	Cat	Female	Male	Puppy	Adult	Senior		Mixed ²	Inside	Outside	
Hepatic												
Failure	14	1	11	9	2	7	10	17	1	17	3	
Hepatitis	6	2	4	4	1	3	3	8	NR	7	1	
Renal												
Chronic disease	18	9	13	13	2	4	14	21	5	19	7	
Nervous												
Convulsion	9	NR	4	5	2	5	2	9	NR	8	1	
Epilepsy	7	NR	4	3	NR	3	3	7	NR	5	2	
Tremogonia / incoordination	7	NR	4	3	2	2	2	7	NR	5	2	
Reproductive												
Piometra	2	NR	2	NR	NR	2	NR	2	NR	2	NR	
Fetal death	2	1	3	NR	NR	3	NR	3	NR	1	2	
Neoplasia												
Neoplasia ³	4	NR	3	1	NR	1	4	4	NR	2	2	

¹ Puppy: up to 1 year; adult: 1-7 years; senior: over 7 years of age

² Mixed: industrial and homemade food

³ Neoplasia in liver, kidney, spleen and adrenal gland

NR: not registered

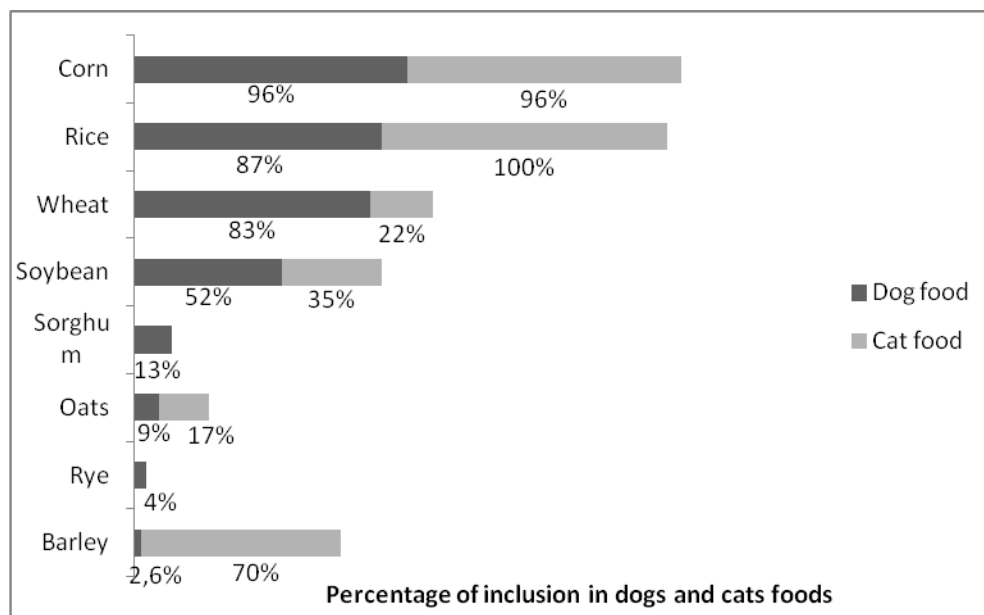


Figure 2 – Percentage of grain-based ingredients (cereals and pulses) described in labels to dog and cat dry food commercialized in Brazil.

Table 2 - The main pet food vegetable ingredients, their susceptibility to mycotoxin production and toxic effects in animals.

Ingredients of pet food	Mycotoxins	Toxic effects in animals
Maize, rice, oats, wheat, soybean, sorghum, rye and barley	Aflatoxins	Hepatotoxic, carcinogenic, reduced growth rate, hemorrhagic enteritis, lowered immunity and productivity
Maize, rice, oats, wheat, soybean, sorghum, rye and barley	Fumonisin	Leukoencephalomalacia in horses
Maize, oats, wheat and rye	Ochratoxin A	Hepatotoxic, nephrotoxic, abortion, poor feed conversion, reduced growth rate and reduced immunity to infection
Maize, rice, wheat and oats	Citrinin	Toxemia and cancer (carcinogenic)
Cereals, soybean	Tremogenic toxins	Tremors and convulsions
Cereals	Patulin	Bleeding in the lung and brain edema and toxic to kidneys
Maize, wheat and soybean	Zearalenone	Hyperestrogenism, infertility, death
Maize, wheat, oats and soybean	Deoxinivalenol	Refusal of food for pigs, dogs and cats, reduced weight gain
Maize and winter cereals	Trichothecenes	Severe inflammation of the gastrointestinal tract hemorrhage, edema, vomiting and diarrhea, infertility, degeneration of the bone marrow, slow growth and sterility
Rye	Ergot toxins	Vasoconstriction and loss of extremities

Adapted of Boermans and Leung (2007)