

**Bibliometrica analysis about Pyometra in dogs**  
**Análisis Bibliometrica sobre piometra en perros**  
**Análise bibliométrica sobre Pyometra em cães**

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## **Abstract**

The pyometra is a common illness in dogs, with high morbidity and mortality. Therefore this study aimed to present a Bibliometric analysis of scientific publications about Pyometra in dogs, themed indexed in the database Scopus, in the period from 2000 to 2015. For collection was used to Bibliometrics as a recognized measurement technique of production and dissemination of scientific knowledge. The results were obtained through a quantitative and detailed search of 248 publications indexed in Scopus, in the

period from 2000 to 2015, after refinement were analyzed 230 publications. There is a remarkable interest in the subject that is of great importance in academia and science on the topic thus contributing to the dissemination and awareness of the severity of the condition.

**Keywords:** piometra; bibliometría; Scopus; perro; bibliometric analysis; scientific publicaciones.

## Resumen

La piometra es una enfermedad común en perros, con alta morbilidad y mortalidad. Por lo tanto, este estudio pretende presentar un análisis bibliométrico de las publicaciones científicas sobre la piometra en perros, temática indexado en la base de datos Scopus, en el período comprendido entre 2000 y 2015. Para la colección se utilizó para la bibliometría como una técnica de medición reconocido de producción y difusión del conocimiento científico. Los resultados fueron obtenidos a través de una búsqueda detallada y cuantitativa de 248 publicaciones indexadas en Scopus, en el período 2000-2015, después de refinamiento fueron analizados 230 publicaciones. Hay un notable interés en el tema que es de gran importancia en la academia y ciencia sobre el tema, contribuyendo a la difusión y la concienciación de la gravedad de la afección.

**Palabras clave:** piometra; bibliometría; Scopus; perro; análisis bibliométrico; publicaciones científicas.

## Resumo

A piometra é uma doença comum em cães, com alta morbidade e mortalidade. Portanto, este estudo teve como objetivo apresentar uma análise bibliométrica de publicações científicas sobre a Pyometra em cães, com o tema indexado na base de dados Scopus, no período de 2000 a 2015. Para coleta foi utilizada a Bibliometrics como técnica reconhecida de medição de produção e disseminação de conhecimentos científicos. Os resultados foram obtidos através de uma pesquisa quantitativa e detalhada de 248 publicações indexadas em Scopus, no período de 2000 a 2015, após refinamento foram analisadas 230 publicações. Há um interesse notável no assunto que é de grande importância na academia e ciência sobre o tema, contribuindo assim para a disseminação e consciência da gravidade da condição.

**Palavras - chave:** piometra, bibliometría; Scopus; cão; análise bibliométrico; publicações científicas.

## Introduction

In the last decade, the goal of the study of canine reproduction has been to organize the pieces of the puzzle that involves the reproductive mechanisms of the species. Understanding the endocrine pattern and its interrelations, and how the reproductive function is influenced by the individual hormonal environment, plays a critical role in the performance of the animal, since they have peculiarities that are not observed in other domestic species.

In the modern world, with the increasing expansion of urban centers and consequent increase in the canine population, there is now, as far as public health is concerned, as for animal protectors, a search for efficient forms of population control to rationalize the problem and containment of zoonoses, such a piometra, aiming at the end a perfect integration between animals and human beings, not forgetting the animal well-being.

The present article aims to present the results obtained from a study about the published works on the subject - pyometra in dogs - that aims to present a bibliometric analysis of the scientific publications that concentrate on a qualitative evaluation, through the measurement of the production and dissemination of scientific knowledge.

## Theoretical Review

The pyometra is a common disease that compromises the reproductive system, causing in a systemic inflammatory process, which is characterized by the accumulation of purulent exudate in the uterine lumen due to Cystic endometrial hyperplasia (HEC) associated with a bacterial infection. Therefore, inexorably, is one of the most important diseases in animals, causing high mortality rate (Fransson, Lagerstedt, Bergstrom *et al.*, 2007). The your establishment is a result of hormonal influence the virulence of bacterial infections and the individual capacity of the dog to fight these infections, usually affecting dogs with reproductive age, old and/or nulliparous (Johnson, 2006, Garcia Filho, Martins, Machado & Machado 2012).

The etiology of this disease is very complex and can be linked to the evolution of a HEC, the administration of progestins long-term compounds for preventing estrus, estrogen Administration to the dogs inevitably mated and pós-inseminação or pós-cópula infections (Aiello & Mays, 2001, Muller, Teixeira, Almeida, Conceição & Silva 2013). The manifestation of pathology is entered with the age of the animal, amount of heat cycles and ovarian changes present. After the suspected episode of pyometra in dogs not be castrated, and that have a history of use of contraception to prevent pregnant. Clinical signs observed and compatible with pyometra occurs more routinely in the estrous cycle

of female dog diestro, presenting itself in two ways: with vulvar secretion and cervix open or without vulvar and secretion with closed cervix (Fransson, 2003, Whitney & Gobello, 2006, Garcia, Nogueira & Pinheiro Júnior, 2009).

The open pyometra is characterized by relaxed cervix, considered less serious than closed due to the free flow of vaginal discharge of bloody or mucopurulent type, easy identification by the owner. However, it is observed that the closed pyometra is the most severe form, resulting in bloating and abdominal soreness that belatedly diagnosed, causes systemic signs from septicemia and toxemia which can progress to shock, coma, and eventually death (Muller *et al.*, 2013).

The normal bacterial flora of the vaginal tract may be the main sources of contamination to the uterus when there is the relaxation of the cervix during the stage of proestrus (Johnston, 2001). Commonly, the presence of more than 70% of the opportunistic bacteria *Escherichia coli* in cases of pyometra, due to the high affinity for endometrium and myometrium, although this not part of the normal colony of bacteria in the vaginal canal. There is also the presence of the bacteria *Staphylococcus SP.*, *Streptococcus SP.*, *Klebsiella SP.*, *Pasteurella SP.*, *Pseudomonas SP.*, and *Proteus SP.* (Chan, Yu, Lok, & Hui, 2000, Egenvall, Bonnett, Olson & Hedhammar, 2000, Weiss, Calomeno, Sousa *et al.*, 2004, Hagman, Kindahl & Lagerstedt, 2006).

The clinical signs that can be found in affected females, depending on the severity of the infection, are: apathy, anorexia, lethargy, vomiting, depression, polyuria, polydipsia, vomiting, diarrhea, fever, leukocytosis, hypotension, weight loss, presence of vulvar discharge and dehydration (Troxel, Cornetta, Pastor, Hartzband & Besancon, 2002, Hagman *et al.*, 2006, Garcia Filho *et al.*, 2012, Silveira, Machado, Silva *et al.*, 2013). Thus, a thorough history, associated with a thorough clinical examination and the findings of the complementary examinations ultrasound, x-ray and vaginal cytology, in addition to the early diagnosis of the disease tied to the determination of metabolic deviations can contribute significantly to improve the prognosis of operated animals and decrease the mortality of females affected (Chu, Lee, Moore & Wright, 2001, Iwase, Shimizu, Koike, Yasutomi, 2001, Feldman & Nelson, 2003, Whitney & Gobello, 2006).

The treatment can be therapeutic or surgical depending on the severity of the condition, however, generally, the choice of ovariosalpingohysterectomy (OSH), resulting in rapid recovery of the animal (Johnson, Delavari, Kuskowski & Gaastra 2001, Fransson & Rangle, 2003).

## Methodology

The methodology used was the Bibliometric analysis of the articles published, in order to maximize the coverage in step, we use the indexed database of scientific publications in the database Scopus.

The Scopus is the largest interdisciplinary database, produced by the Publisher Elsevier since 2004, with coverage since 1960, which contains abstracts and citations of over 27 million of articles, books, conference proceedings and scientific, technical and medical journals (Elsevier, 2004).

At the base of Scopus the keyword used was pyometra in dogs (pyometra in dogs), a total of 248 documents, in order to maximalizar the existing documents on the subject of Pyometra in dogs through the articles published and indexed in the period from 2000 to 2015, whereas only documents were selected health science (Health Sciences) and the veterinary area.

To refine your search in the field of veterinary medicine, was found a total of 230 papers in Scopus base with all the documents published and indexed in the period from 2000 to 2015. The data obtained from the survey, a spreadsheet has been developed using the Microsoft Excel software architected with the following fields: year, periodical which publish more, country, institution, authors who publish more keyword frequency, the ten most cited articles.

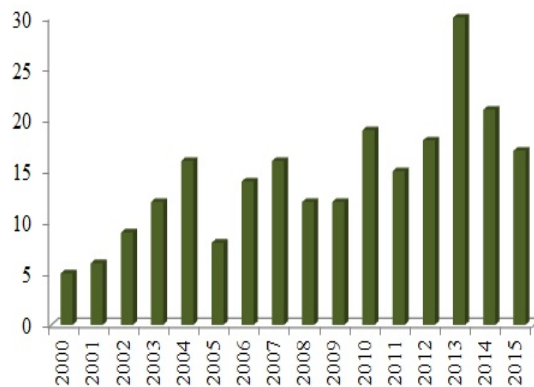
Soon, the study presented here covers the existing documents about Pyometra in dogs in the period from 2000 to 2015. It is known that the Bibliometrics, as the study of information science, has a relevant role in the analysis of the scientific production of a country, once your indicators depict the degree of development of an area of knowledge to a scientific field or to know.

Another factor that justifies the use of a Bibliometric analysis to enable and assist the synthesis and analysis of existing knowledge in the scientific literature on a specific topic. Another relevant point about the Bibliometric analysis is to allow readers the ability to assess the appropriateness of the procedures employed in the preparation of the review, by obtaining information (Teza, Míguez, Fernandes, Dandolini, & De Souza, 2015).

## **Results and Discussion**

The analysis begins by the number of scientific articles published from 2000 to 2015. We can observe a resignation in the following years 2000 (five), 2001 (six), 2002 (nine), 2003 (twelve), 2004 (eight), 2005 (15), but you can see a resumption of interest of researchers on the subject over the last six years, i.e. from 2010 until 2015, with notoriety for the year 2013 (30), with a jump in productivity, in that the number of publications is double the previous years In addition to being the greatest of all recorded periods, as illustrated in Figure 1.

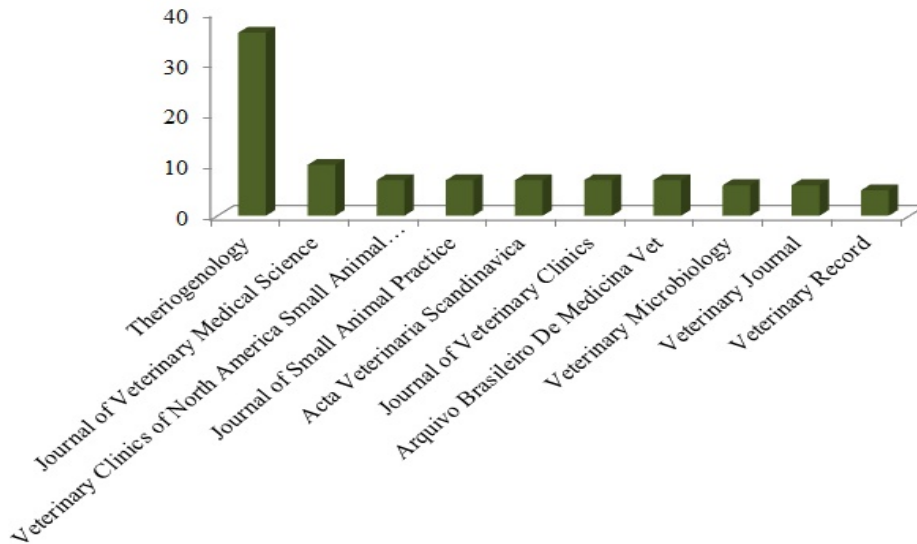
**Figure 1: Total number of articles published from 2000 to 2015.**



**Source: prepared from the Scopus database (2016).**

As a result, periodicals were analyzed that presented themselves with greater frequency in articles published about this theme. Figure 2 presents the ten journals with the greatest amount of publications. Stand out among the journal *Theriogenology* with 36 published documents, thus it was verified the Qualis magazine in *sucupira* platform, being referenced with the Qualis A2. The *Theriogenology* enables an international forum for researchers, physicians and industry professionals in animal reproductive biology. This acclaimed journal publishes articles on a wide range of topics in reproductive and developmental biology, domesticated mammalian, avian and aquatic species, as well as of wild species that are subject to veterinary care in research or conservation programs. The *Journal of Veterinary Medical Science* presented the ten documents published with the Qualis B2. The *Journal of Veterinary Medical Science (JVMS)* is a newspaper that carries out a *pré-revisão* of articles, as well as publish a variety of articles on veterinary science basic research to applied science and clinical research. The *JVMS* is published monthly, consisting of twelve copies per year, in the areas of Anatomy, Physiology, pharmacology, toxicology, pathology, immunology, microbiology, virology, parasitology, internal medicine, surgery, clinical pathology, avian disease, public health, ethology and animal laboratory science. Although the *JVMS* have played a role in the publication of scientific achievements of researchers and doctors Japanese for many years, now are also accepted entries submitted from all over the world.

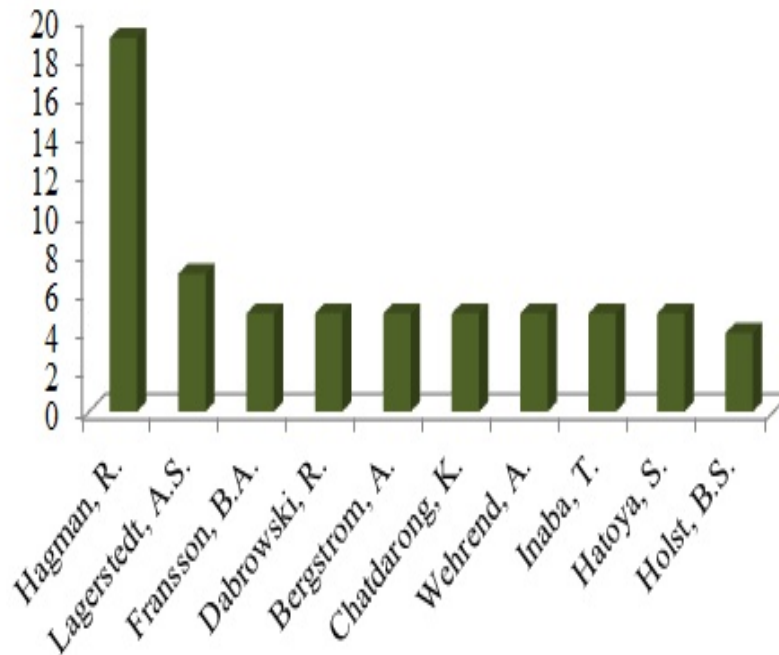
**Figure 2: The 10 most frequently for Periodicals publications.**



**Source: prepared from the Scopus database (2016).**

Countries of origin of the publications, the United States leads the list with a frequency of 36 published articles, representing 20% of the total amount, followed by Sweden with 27 items, 15% of the total amount. The Brazil leaves no wish unfulfilled and stands in third place 22 articles published, totaling a percentage of 12%. A merger between the two countries, since they are responsible for 35% of publications on the topic while 65% are distributed among 8 countries. Figure 3 presents the ten countries with largest amount of publications.

**Figure 3: Countries with highest number of publications.**



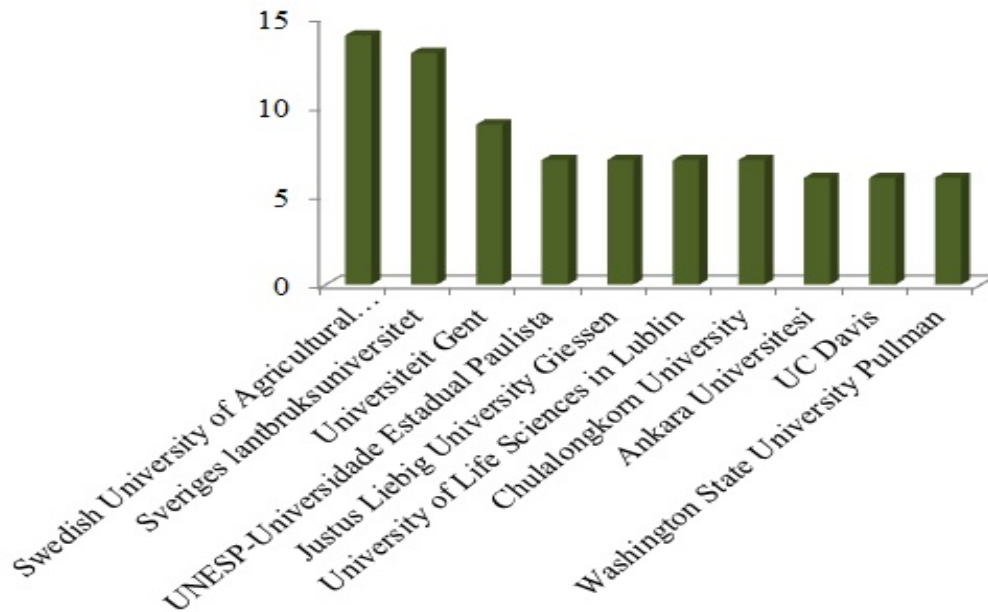
**Source: Elaboration, from the Scopus database (2016).**

Among the 160 institutions that examine the respect of pyometra in dogs-themed, ten were selected that has the largest number of publications, as shown in Figure 4. Although the United States other than the country that publishes on the subject, according to figure 3, the list of institutions is led by the Swedish University of Agricultural Sciences Faculty of Veterinary and Sveriges lantbruksuniversitet, located in Sweden.

We can still observe the Universidade Estadual Paulista-UNESP, lies between the fourth I more publishes articles about pyometra in dogs, with a total of seven publications.



**Figure 4: The 10 Institutions with the largest number of publications.**



Source: Source: prepared from the Scopus database (2016).

Then, we selected the ten most authors published works about Pyometra in dogs, along with your institutional link (affiliate) and country, are presented in table 1. The lead author is Hagman, r. with 19 publications, followed by Lagerstedt, A.S. with seven works. This table confirms the data presented in Figure 4, in addition to demonstrate that most publications is authors linked to institutions located in Sweden.

**Table 1- Authors with the highest number of publications and your affiliation.**

Author	NP*	Affiliation	Countries
Hagman, R.	19	University of Agricultural Sciences	Sweden
Lagerstedt, A.S.	7	Sveriges lantbruksuniversitet	Sweden
Fransson, B.A.	5	Washington State University Pullman	United States
Dabrowski, R.	5	Wojskowa Akademia Techniczna	Poland
Bergstrom, A.	5	University Animal Hospital	Sweden
Chatdarong, K.	5	Chulalongkorn University	Thailand
Wehrend, A.	5	Justus Liebig University Giessen	Germany
Inaba, T.	5	Osaka Prefecture University	Japan



**Table 2 - Most cited articles on the topic of Pyometra in dogs.**

Author	Title	Year	TC*
<b>Mastrocinque, Fantoni, D.T.</b>	S.; “A comparison of preoperative tramadol and morphine for the control of early postoperative pain in canine ovariohysterectomy”	2003	106
<b>Van Goethem, Schaeffers-Okkens, Kirpensteijn, J.</b>	B.; A.; “Making a rational choice between ovariectomy and ovariohysterectomy in the dog: A discussion of the benefits of either technique”	2006	86
<b>Smith, F.O</b>	“Canine pyometra”	2006	66
<b>Egenvall, A.; Hagman, R.; Bonnet, B. N., Hedhammar, A., Olson, P., Lagerstedt, A.-S.</b>	“Breed risk of pyometra in insured dogs in Sweden”	2001	66
<b>Nakamura, Takahashi, M.; Ohno, K.; Koshino, A.; Kakashima, K.; Setoguchi, A.; Fujino, Y.; Tsujimoto, H.</b>	M.; “C-reactive protein concentration in dogs with various diseases”	2008	65
<b>De Bosschere, Ducatelle, Vermeirsch, H.; Van Den Broeck, W.; Coryn, M.</b>	H.; R.; “Cystic endometrial hyperplasia-pyometra complex in the bitch: Should the two entities be disconnected?”	2001	55
<b>Dabrowski, R.; Wawron, W.; Kostro, K.</b>	“Changes in CRP, SAA and haptoglobin produced in response to ovariohysterectomy in healthy bitches and those with pyometra”	2007	48
<b>Chen, Y. M. M.; Wright, P. J.; Lee, C. – S.; Browning, G. F.</b>	“Uropathogenic virulence factors in isolates of Escherichia coli from clinical cases of canine pyometra and feces of healthy bitches”	2003	48
<b>Verstegen, J.; Dhaliwal, G.; Verstegen-Onclin, K.</b>	“Mucometra, cystic endometrial hyperplasia, and piometra in the bitch: Advances in treatment and assessment of future reproductive success”	2008	46
<b>Pretzer, S.D.</b>	Clinical presentation of canine pyometra and mucometra: A review	2008	44

TC \*-Total quotes.

Source: prepared from the Scopus database (2016).

## Final Considerations

Generally speaking, Pyometra in dogs is a disease with high mortality. It is of the utmost importance that there should be an excellent knowledge about the pathophysiology, predisposing factors, the laboratory changes, forms of diagnosis and therapeutic measures. Thus, this article is proposed to carry out a Bibliometric analysis of scientific publications on the subject of Pyometra in dogs.

With the results obtained in Bibliometric analysis, a total of 248 articles and documents indexed in Scopus base with all documents (All) in the period from 2000 to 2015. The data collected were discussed and analyzed in advance using the Microsoft Excel program.

There is a significant increase of published articles from 2010 with 19 publications, with a jump to the year 2013, contributing 30 publications. In addition to about 160 institutions studying the topic Pyometra in dogs, that is, it is notable that the subject is of great importance in the academic and scientific.

When it comes to pathology to be commonplace in clinics of small animals, commonly seen in canine breed, it is concluded that there are a number of little expressive of scientific publications on the subject. In fact one should invest more on new research and publications in the veterinary area. It is expected that the results exposed in this article contribute to the dissemination and awareness of gravity that the pathology Pyometra in dogs for owners of these animals, in addition to contributing to the growth of research on the topic.

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