Journal of Animal and Veterinary Advances 11 (23): 4389-4393, 2012
ISSN: 1680-5593
© Medwell Journals, 2012

A Bibliometric Analysis of Peste Des Petits Ruminants

[1]Lei Chen, [1]Yongxi Dou and [2]Xuepeng Cai
[1]State Key Laboratory of Veterinary Etiological Biology,
Key Laboratory of Epizootic Diseases of Grazing Animals,
Chinese Academy of Agricultural Sciences, Ministry of Agriculture,
Lanzhou Veterinary Research Institute, 730046 Gansu, China
[2]China Animal Disease Control Center, Ministry of Agriculture, 100125 Beijing, China

Abstract: Bibliometric methods were used to analyze publications from the Web of Science on Peste des Petits Ruminants (PPR) in the past 18 years. Results showed that although PPR is now a widespread and serious disease in many developing countries, the total number of articles on PPR is only 342. The research indicates that more basic studies should be done on the PPR and differentiating infected from vaccinated animals vaccines which would be important to prevent the disease. Moreover, collaborations among authors, institutions and countries as well as good financial support are the keys to control or even eradicate PPR.

Key words: PPR, bibliometrics, publications, financial support, China

INTRODUCTION

Peste des Petits Ruminants (PPR) is an acute and highly contagious disease that affects mainly sheep and goats and occasionally small ruminants living in the wild (OIE, 2008). Because of similar clinical symptoms, PPR has for a long time been confused with rinderpest and mistaken for that disease in small ruminants. The first recorded PPR outbreak was in the Ivory Coast in 1942 (Gargadennec and Lalanne, 1942) but until 1979, its causative pathogen, the PPR Virus (PPRV) was classified as the fourth member of the genus *Morbillivirus* in the Paramyxoviridae family (Banyard *et al*., 2010). PPR used to be endemic in Western Africa but now has widely spread to span West and Central Africa, Arabia, the Middle East and Southern Asia-areas encompassing much of the developing world where small ruminants provide a good source of supplemental food and goods for trade. This geographical distribution underscores the huge burden PPR puts on agriculture which in turn increases the poverty of these regions (Gibbs *et al*., 1979). Moreover, PPR has occurred in the European Union and has now broadened it host species to include several wild animals, causing high mortality. Experts from the Food and Agriculture Organization (FAO) and the World Organisation for Animal Health (OIE) have appealed that PPR be the next disease of eradication after rinderpest (Baron *et al*., 2011).

China has the most sheep and goats in the world as of 2011 according to the ministry of agriculture of the PRC, these numbered at about 26 million sheep and 29.2 million goats (cvonet.com). Since, the outbreaks of PPR in Tibet in 2007, the Chinese government has paid much attention to PPR. From 2010, PPR was listed as one of the diseases requiring compulsory vaccination. In summary, PPR is a widespread and potent disease whose effects cause much economic loss.

To assist efforts seeking the prevention of PPR it is necessary to have a better understanding of the current state of research on PPR. Bibliometrics is a systematic method that utilizes quantitative analysis and statistics to describe patterns of publication, evaluate research output and analyze research trends. Currently it is widely used as a powerful tool by both scientists and managers when initiating a project. Web of Science is thought to be one of the most authoritative scientific and technical literature indexing tools that serves the most important areas of science and technology research (Boyack *et al*., 2005). Its multidisciplinary content covers >12,000 of the highest impact journals worldwide including Open Access journals and >150,000 conference proceedings. Here researchers present an analysis of research on PPR using bibliometrics with the Web of Science database.

MATERIALS AND METHODS

Data source and bibliometric methods: Data were retrieved on March 21, 2012 from Web of Science with the topic search term peste des petits ruminants and a time span of all years which retrieved records from 1995 to

Corresponding Author: Xuepeng Cai, China Animal Disease Control Center, No. 20 Maizidian Street, Chaoyang District, 100125 Beijing, China

now. We examined the publications by closely looking at the years of publication, subject areas, institutions, authors, countries, funding agencies and the publications citations.

RESULTS AND DISCUSSION

A total of only 342 SCI publications were output, far fewer than we expected given the wealth of publications that exist on other important diseases of livestock. However, this paucity of publications allowed us to achieve a better understanding of PPR research by being able to look carefully through each publication and its topic. To more easily analyze the results, we used figures and tables to describe the output and future trends of PPR research.

Publication years: As Fig. 1 shows, in the past decades the annual number of SCI publications on PPR research has generally been growing indicating that research has aroused increasing attention. Researchers focused on the years having the top 10 number of publications and with 1995 having 18 publications, placing it in the top 8, researchers selected all the papers published in 1995 and found that this was a productive year. Many methods developed that year are still in commercial use including for example the competitive ELISA kit (Libeau *et al*., 1995). After researchers sorted the publication data by date, researchers found that the once exotic disease for most countries is now a cause for serious concern and serum surveillance by many countries.

Subject areas: According to the classification of subject areas by Web of Science, the 342 Science Citation Index (SCI) articles were distributed in 20 subject categories (Fig. 2). Among the most productive subjects, veterinary sciences had 179 articles which is 52.339% of all papers and agriculture had 12.865% of all output. Basic studies on the PPRV itself were relatively few despite the fact that research on the biology of pathogens helps to better understand the diseases they cause which in turn leads to better control and prevention. Therefore, more studies on the immunology, cell biology and virology of the PPRV should be made in the future.

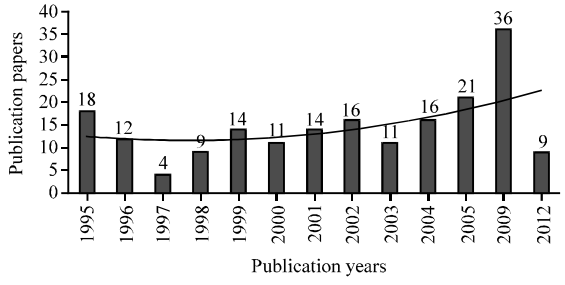

Fig. 1: Number of publications on PPR by year

Countries/territories: About thirty seven countries contributed PPR publications to SCI with the most productive being India, holding more than 1/3 of all papers. Looking at the top 12 countries (Fig. 3) shows that most publications came from developing countries where PPR outbreaks often occur. However, most of these countries do not have research capabilities as advanced as those in developed countries. Luckily also placing among the top 12 were several developed countries England, France, Austria and the United States. Because England and France once had colonies in the countries where many of the PPR outbreaks have occurred, it is conceivable collaboration between these countries might be easier compared with countries not having such ties. Nevertheless, more connections should be made between developing and developed countries regardless of their historical connections. This is because PPR is spreading so quickly that it has the potential to cause great economic damage in sheep and goats anywhere in the developing world which may pose a threat to the world as a whole. As for China, drastic action seems to be in order. China has already been threatened by PPR and has large markets in sheep and goat products. Although, they are now developing vaccines and diagnostics, broader collaboration with other countries will ensure mutual access to multiple virus strains and surveillance of mutations of the PPRV, allowing quick action to be taken according to the surveillance results.

Funding agencies: Of all the publications, only 6 funding agencies were found. These were the European Union, FAO, ICAR, Indian Council of Agricultural Research Government of India New Delhi India, Indian Council of Agricultural Research New Delhi India and the Ministry of Agriculture of China with the numbers of publications being supported by these agencies being 4, 4, 2, 2, 2 and 2, respectively. Of note is the fact that 294 (85.965%) records did not contain data on funding despite what surely must have been a source (s) of funding. Moreover, PPR now is recognized by the FAO and OIE as the fastest growing and potentially the most economically important disease of sheep and goats anywhere in the developing world. Therefore, such large-scale funding agencies like the Bill and Melinda Gates Foundation which aim at enhancing healthcare and reducing extreme poverty globally, especially for poor countries should be invited to be a great supporter in the future.

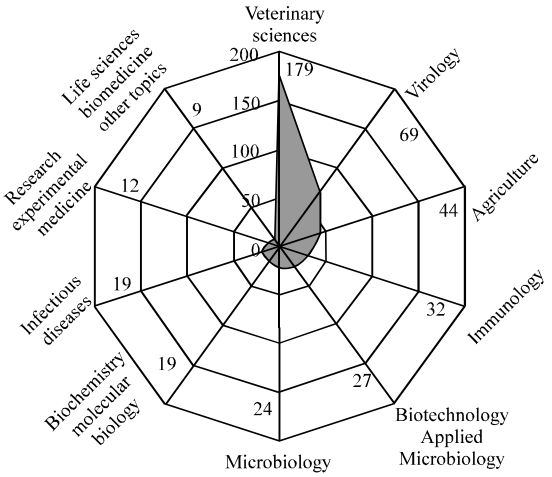

Fig. 2: Main areas of research on PPR

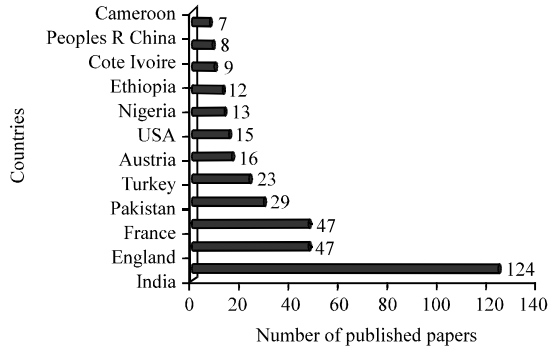

Fig. 3: Top 12 most productive countries for papers on PPR

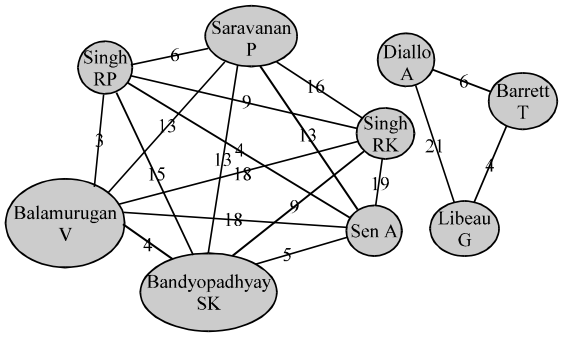

Fig. 4: Collaborations among the top 10 authors

Institutions and authors: Researchers manually reorganized the output of all the publications as classified by institutions and authors. About 268 authors and 90 institutions contributed to PPR articles, although most of the research on PPR, about 140 publications (40.94%) was done by the top 10 authors (Table 1). Moreover, among these top authors, collaborative work with authors, in different institutes in the same countries frequently co-occurred as it did with researchers, from different countries (Fig. 4). Through their publications we can see that the collaboration between scientists and their institutes is the trend in modern research activity.

Table 1: Top 10 most productive authors and their institutes

Authors	Institute/Rank in terms of publications	Country	No. of publication	%
Libeau G	CIRAD/No. 3	France	38	11.11
Barrett T	Inst Anim Hlth/No. 2	England	33	9.65
Diallo A	IAEA/No. 10	Austria	30	8.77
Singh RK	Indian Vet Res Inst/No. 1	India	25	7.31
Singh RP	Indian Vet Res Inst/No. 1	India	24	7.02
Shaila MS	Indian Inst Sci/No. 4	India	23	6.73
Sen A	Indian Vet Res Inst/No. 1	India	22	6.43
Balamurugan V	Indian Vet Res Inst/No. 1	India	20	5.85
Bandyopadhyay SK	Anim Husb Commissioner	India	20	5.85
Saravanan P	Indian Vet Res Inst/No. 1	India	16	4.68

Citation reports: The top ten publications by citation are shown in Table 2. These publications represent the most important information about PPR and are useful for having a quick understanding of the disease and its distribution, epidemiology, pathology, vaccinology and diagnosis.

Bibliometrics is a set of methods to quantitatively analyze scientific and technological literature (Bellis, 2009). Although, bibliometrics belongs to the field of library and information science, it has wide applications in other areas. Many research fields use bibliometrics to explore the impact of their field and the impact of researchers or a particular publication but in fact bibliometrics is also a powerful tool that allows researchers and facilities to have a fuller understanding of a field before they conduct research. This can save a lot of time in research activities such as generating hypotheses and finding collaborators.

Researchers present here the first systematic description of the published output of PPR research. The results show that though PPR is one of the most important viral diseases in livestock, only 342 SCI publications exist. Most of these articles come from developing countries where PPR outbreaks occur with high-standard articles from developed countries being few. There is much unknown about the PPRV itself which merits research to provide the theoretical support for vaccines and diagnostics to prevent and control or even eradicate PPR. To achieve this, a Differentiating Infected from Vaccinated Animals (DIVA) vaccine is important and we are happy to see that there are many researchers trying various kinds of DIVA vaccines. Some publications reported the expansion of the host species of PPRV from

Table 2: Top 10 most cited papers

Time cited	Correspondence	Title	Institutes	Country	Years
99	VanOirschot, JT	Sequence and structure alignment of paramyxoviridae attachment proteins and discovery of enzymatic activity for a morbillivirus hemagglutinin	Inst Anim Sci and hlth ID Dlo, Dept Mammal Virol	Netherlands	1997
91	Forsyth, MA	Evaluation of polymerase chain reaction for the detection and characterisation of rinderpest and peste des petits ruminants viruses for epidemiological studies	Inst Anim Hlth	England	1995
88	Barrett, T	Geographic distribution and epidemiology of peste despetits ruminants viruses	Inst Anim Hlth and Cirad	England and France	1996
74	Barrett, T	Recent epidemiology of Peste des Petits Ruminants Virus (PPRV)	Inst Anim Hlth and Indian Vet Res Inst	England and India	2002
72	Libeau, G	Development of a competitive ELISA for detecting antibodies to the peste des petits ruminants virus using a recombinant nucleoprotein	NERC, Serv Epidemiol, Ctr Antl Elevage and Rech Vet	England, Chad and Mauritania	1995
56	Barrett, T	Morbillivirus infections with special emphasis on morbilliviruses of carnivores	Inst Anim Hlth	England	1999
55	Taylor, WP	The isolation of peste des petits ruminants virus from Northern India	Dept Anim Husb and Dairying, Inst Anim Hlth, CTR Cooperat Int Rech Agron Dev	India, France and England	1996
48	Bandyopadhyay, SK	Development of a monoclonal antibody based competitive-ELISA for detection and titration of antibodies to Peste des Petits Ruminants (PPR) virus	Indian Vet Res Inst	India	2004
45	Ozkul, A	Prevalence, distribution and host range of peste des petits ruminants virus, Turkey	Ankara Univ and Inst Anim Hlth	Turkey and England	2002
40	Duignan PJ	Morbillivirus infection in cetaceans of the Western Atlantic	Natl Vet Serv Labs, Queens Univ Belfast, Sea World Florida, New England Aquarium, Okeanos Ocean Res Fdn, Univ Guelph, Mote Marine Lab, Myst Marinelife Aquarium	USA, North Ireland and Canada	1995

initially sheep and goats to camels (Khalafalla *et al*., 2010) and gazelles (Elzein *et al*., 2004). This indicates the importance of studies on the mechanisms of reaction between the PPRV and its receptors as well as surveillance of the virus mutation.

CONCLUSION

Collaboration between scholars and their institutions is important in modern research, particular for PPR research which now mainly occurs in developing countries. Sharing resources, exchanging ideas and securing good financial support from countries and foundations are the keys to successfully fighting PPR.

ACKNOWLEDGEMENTS

Many thanks to Professor Lu Wenru for his dedicated research of teaching the informatics course. This research was supported by the Special Fund for Agro-scientific Research in the Public Interest (No. 201103008) and the earmarked fund for China Agriculture Research System (No. CARS-40-10).

REFERENCES

Banyard, A.C., S. Parida, C. Batten, C. Oura, O. Kwiaktek and G. Libeau, 2010. Global distribution of peste des petits ruminants virus and prospects for improved diagnosis and control. J. Gen. Virol., 91: 2885-2897.

Baron, M.D., S. Parida and C.A. Oura, 2011. Peste des petits ruminants: A suitable candidate for eradication? Vet. Rec., 169: 16-21.

Bellis, D.N., 2009. Bibliometrics and Citation Analysis: From the Science Citation Index to Cybermetrics. Scarecrow Press, Lanham, MD., USA., ISBN: 0810867133, Pages: 417.

Boyack, K.W., R. Klavans and K. Borner, 2005. Mapping the backbone of science. Scientometrics, 64: 351-374.

Elzein, E.M., F.M. Housawi, Y. Bashareek, A.A. Gameel, A.I. Al-Afaleq and E. Anderson, 2004. Severe PPR infection in gazelles kept under semi-free range conditions. J. Vet. Med. B Infect. Dis. Vet. Public Health, 51: 68-71.

Gargadennec, L. and A. Lalanne, 1942. La peste des petits ruminants. Bulletin du Service Zootechnique Epizootique du Afrique Occidentale Francaise, 5: 16-21.

Gibbs, E.P., W.P. Taylor, M.J. Lawman and J. Bryant, 1979. Classification of peste des petits ruminants virus as the fourth member of the genus Morbillivirus. Intervirology, 11: 268-274.

Khalafalla, A.I., I.K. Saeed, Y.H. Ali, M.B. Abdurrahman and O. Kwiatek *et al*., 2010. An outbreak of peste des petits ruminants (PPR) in camels in the Sudan. Acta Trop., 116: 161-165.

Libeau, G., C. Prehaud, R. Lancelot, F. Colas, L. Guerre, D.H.L. Bishop and A. Diallo, 1995. Development of a competitive ELISA for detecting antibodies of the *Peste des petits ruminants* virus using a recombinant nucleoprotein. Res. Vet. Sci., 58: 50-55.

OIE, 2008. Manual of diagnostic tests and vaccine for terrestrial animals 2009. Chapter 2.7.11. Peste des Petits Ruminants. http://web.oie.int/eng/normes/MMANUAL/2008/pdf/2.07.11_PPR.pdf.