

Bibliometrics Analysis of Research Publications Related to *Sus scrofa domesticus*

Analisa Bibliometrik daripada Penerbitan Kajian Berkaitan Sus scrofa domesticus

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Article progress

Accepted: 3 March 2020

Reviewed: 5 Oktober 2020

Published: 30 November 2020

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Abstrak: Halal and toyyib are popular terms used among Muslims around the world. Food is one of the topics that have always been discussed among scholars referred to as halal and toyyib. For Muslim, *Sus scrofa domesticus* or pig is known as one of the animals which are haram in Islam. The objectives of this study are to analyze trends related to *Sus scrofa domesticus* in existing research publications and to show the most suitable scope of research for future research purposes. This study uses bibliometric analysis to examine the results of past publications on *Sus scrofa domesticus* related research. Researchers found that the majority of the previous research on *Sus scrofa domesticus* articles dominated journals by 97%. Most of the topics studied in the research related to *Sus scrofa domesticus* revolves around Islamic studies while research on the method of analysis conducted in the previous studies found that most studies on *Sus scrofa domesticus* are on scientific analysis. The studies are divided into 10 areas in sciences including biotechnology, biomedical, biochemistry, microbiology, system biology, agriculture, food science, nanotechnology, pharmacology, and food engineering. In Islamic areas, the field of study that focuses on the analysis of the Islamic perspective is Islamic studies. It is found that research publications in *Sus scrofa domesticus* are more active in scientific analysis, compared to Islamic analysis. Therefore, the efforts of researchers in both scientific and Islamic analysis need to be balanced. Analysis of pigs in the Islamic perspective needs to be more productive to the development of Islamic studies. An advanced new study of *Sus scrofa domesticus* is expected to produce benefits to Muslims and society as a whole.

Keyword: *Sus scrofa domesticus*, Bibliometrics, Islamic views, Research trend

Abstrak: Halal dan toyyib adalah istilah popular yang digunakan di kalangan umat Islam di seluruh dunia. Makanan adalah salah satu topik yang selalu dibincangkan dalam kalangan sarjana dalam konteks halal dan toyyib. Bagi orang Islam, *Sus scrofa domesticus* atau babi merupakan salah satu haiwan yang haram dalam Islam. Objektif kajian ini adalah untuk menganalisis trend yang berkaitan dengan *Sus scrofa domesticus* dalam penerbitan penyelidikan dan menunjukkan skop penyelidikan yang paling sesuai untuk tujuan penyelidikan di masa hadapan. Kajian ini menggunakan analisis bibliometrik dengan meneliti hasil penerbitan masa lalu. Penyelidik mendapati bahawa sebahagian besar penyelidikan menguasai jurnal sebanyak 97%. Sebilangan besar topik yang dikaji dalam penyelidikan yang berkaitan dengan *Sus scrofa domesticus* berkisar pada kajian Islam sementara kebanyakan kajian mengenai *Sus scrofa domesticus* adalah analisis saintifik. Kajian ini dibahagikan kepada 10 bidang dalam sains termasuk bioteknologi, bioperubatan, biokimia, mikrobiologi, biologi sistem, pertanian, sains makanan, nanoteknologi, farmakologi, dan kejuruteraan makanan. Didapati penerbitan penyelidikan lebih aktif dalam analisis saintifik, berbanding dengan analisis Islam. Oleh itu, usaha penyelidikan dalam analisis saintifik dan Islam perlu seimbang.

Keywords: intepretation, modern, klasik, interpretation stream

Introduction

Bibliometrics research is defined as the statistical analysis of books, articles, or other publications. This research also measures the output of field of study in research material related to *Sus scrofa domesticus*. This type of research can be used quantitatively and qualitatively to approach variety of questions in humanities and sciences. For example, bibliometric can be used for literature study for its content. These publications give benefit to society in accessing knowledge on *Sus scrofa domesticus*.

Wild boars were named *Sus scrofa* by Linnaeus in 1758, while domestic pigs were initially placed in a different species, *Sus domesticus*, by Erxleben in 1777 (Gentry et al. 2004). The practice of placing them in a single species, however, soon became common. For example, the Swedish zoologist Nilsson referred to wild boar as *Sus scrofa ferus* and domestic pig as *Sus scrofa domesticus*. *Sus scrofa domesticus* belongs to Suidae family along with cattle, sheep, goats, camels, deer and hippopotamuses (Graves et al. 1984). It is part of the order Artiodactyla. Domesticated pigs are descendants of the wild boar which originally ranged through North Africa, Asia and Europe. Pigs were first domesticated approximately 9,000 years ago. At first, the wild boar became extinct in Britain at the 17th century as a result of overhunting and habitat destruction, but population has since rebounded. Now, *Sus scrofa domesticus* can be found easily worldwide like in temperate and tropical regions such as Australia, New Zealand, Indonesia and island nations (Nogueira et al. 2007).

This species lives in a wide range of habitats including forests, marsh land, scrub brush around watering holes, swamp, and grassland, especially in or near dense cover (Graves et al. 1984). They alternate between wooded and open ground, and mostly inhabit areas where the limited ground frost abets their diet of roots and tubers (Boitani et al. 1994). Heavy snowfalls and freezing temperatures limit the range area of wild boars, but they are otherwise able to adapt to a variety of habitats. The interbreeding with Eurasian wild boars, which are more rugged and more cold hardy than the domestic pig, may have helped wild pigs move into northern areas rather than less temperate regions (Waithman et al. 1999).

Sus scrofa domesticus are omnivores. Although they subsist primarily on plant matter, they also supplement their diets with occasional small vertebrate and invertebrate animals, such as earthworms, insects, amphibians, reptiles, and rodents. They may also consume carrion when they find it (Yalden et al. 2001). Food choices depend on the seasonal availability of edible plant foods in their home ranges, and often include berries, roots, tubers, grass, seeds, mushrooms, herbs, and foliage.

Acorns may also be an important part of the pig's diet (Roark et al. 1980). In fact, in medieval Britain, domestic pigs were allowed to forage in the forests for acorns, beach mast, and apples every September, a practice known as Pannage. Although it is no longer common, a few farmers in the New Forest of England keep up this traditional land management technique, clearing the ground of acorns, which are poisonous to the resident ponies and cattle.

Previous Findings

Although selective breeding by the pig industry has altered the appearance and physiology of domestic pigs, comparative studies show that their behavioral characteristics are fundamentally the same as those of the wild boar. For example, the maternal behavior of domestic sows, such as nest building, is seemingly innate and has not changed much despite domestication and artificial selection, for such production-related traits are important to the pig industry as efficient feed conversion or greater litter size. David Wood-Gush and Alex Stolba, scientists at the University of Edinburgh in Scotland, observed domestic pigs in a semi-natural enclosure over several years and concluded that the social behaviour of the domestic pig still closely resembles that of the European wild boar, *Sus scrofa*.

Sus scrofa domesticus is one of the animals that is prohibited in Islam. This is clearly mentioned in the Quran, Sunnah and the consensus of the Muslim jurist (Ijma'). The prohibition of this animal is based on several aspects of harm from either chemical, microbial or psychology (Hawwa et al. 1994). Among the verses in the Quran that emphasizes prohibition of pigs can be found in surah al-Baqarah where Allah said:

"He hath only forbidden you dead meat and blood, and the flesh of swine, and that on which any other name hath been invoked besides that of Allah (s.w.t.) but if one is forced by necessity, without willful disobedience, nor transgressing due limits, -then is He guiltless. For Allah is Oft-forgiving Most Merciful." (Al-Baqarah, 2 : 173)

In commenting on the verse of the word "flesh of swine" or pork meat states in interpretation that, it also includes lard (al-Zamakhsyari, 1998). Even though the Quran mentions only the flesh but the whole pig derivatives and by-products are also prohibited as well. This statement is supported by al-Qurtubi in al-Jami' li Ahkam al-Qur'an which includes lard as a part of the meat (Qurtubi, 2006). Furs and bones which are derived from pig are also haram to be consumed. However, the skins derived from pigs are permitted when they are tanned. Ibn Hayyan and Dawood however suggest that the prohibition was only meant for the meat and not the lard and its derivatives (al-Andalusi, n.d.).

Salmonella typhimurium (*S. Typhimurium*) is a common zoonotic pathogen in *Sus scrofa domesticus* and the pork industry is considered to be an important food vehicle in its transmission to humans. Once contamination of *S. typhimurium* takes place there is every possibility of contamination through the food chain to contaminate pork and pork products (Prendergast et al. 2009). The importance of fat intake in the human diet has been emphasized by many researchers. The composition of pork has higher levels of essential and non-essential fatty acids, polyunsaturated fatty acids and mono-unsaturated fatty acids. When humans ingest undercooked contaminated pork meat, the adult worm develops in the small intestine. After two months of asymptomatic infection, this tapeworm starts producing thousands of eggs that, once released with the stools, can contaminate the environment, infecting pigs (rapidly differentiating into cysticerci mainly in the muscle) and humans (where most severe symptoms are observed due to the presence of cysticerci in the brain) (Nanji et al. 1985).

Methodology

This research uses bibliometrics analysis to examine the results of past research publications. Bibliometrics is the use of statistical methods to analyse books, articles, and other publications. This study can be used in various fields of study such as library science, information science, citation analysis and content analysis (Hertzal, 2003). Bibliometrics can be used for books, websites, policy statements, conference proceedings, monographs and patents. It estimates the influence or impact for a selected research on another future research (Cooper, 2015). The purpose of bibliometrics analysis is to trace the development or impact of research and to compare, communicate and quantify the importance of a scientific work (Basuki, 2002). The main subject of a bibliometrics analysis is past research publications including journals, books, magazine and others, whether in print and electronic media. These past research publications help society to get trusted resources of knowledge. Therefore, bibliometrics analysis show the development of the format of past research publications for books and other media of communication, not applied to books and scientific journals only (Ahmad et al. 2016).

Search or finding method is important to ensure that every research data can be found effectively. 66 publications are analysed in this study to obtain the results. Most of the researchers will be using keywords in order to get the information. Those keywords are:

Keywords

- 1) **Pig + PDF**
- 2) **Halal and Haram + PDF**
- 3) ***Sus scrofa domesticus* + PDF**
- 4) **Porcine DNA + PDF**

The data (research publications) are then grouped according to their format and field of study manually.

Results and Findings Analysis

In this bibliometrics study, authors focus on *Sus scrofa domesticus* in which this production data is the main reference data for past *Sus scrofa domesticus* research related publications. The results focus on two analysis from the data, which are:

1. The format of past *Sus scrofa domesticus* research related publications.
2. The field of study of past *Sus scrofa domesticus* research related publications.

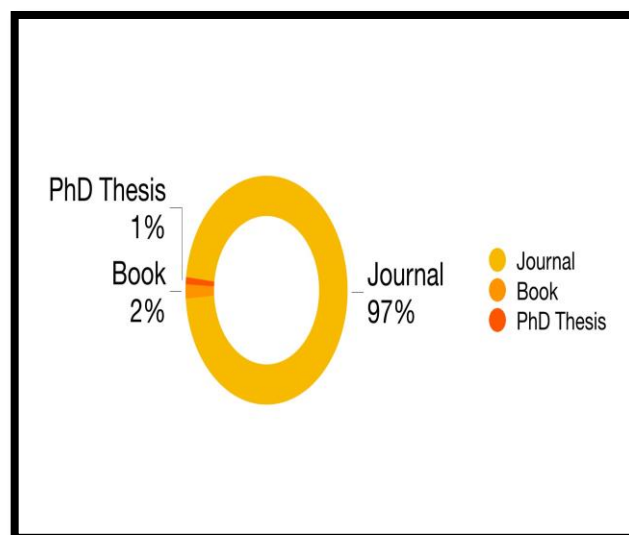


Figure 1. Percentage of the Type of Format of Past Goat's Milk Related Research Publications

According to the figure above, researchers found that majority of the format dominated journals by 97%. The second highest percentage is books by 2%, followed by Ph.D thesis by 1%.

The list of *Sus scrofa domesticus* related research publications based on the type of format (to avoid too much repeated content, researcher only put out a few publications from each type of format. The full publications are shown on the field of study of past *Sus scrofa domesticus* research related publications).

JOURNAL
1. Mohamad, M. A., & Mohamad, M. T. (2017). The Use of Khinzir Terms in Hadith Perspective: Conceptual Analysis in al-Kutub al-Sittah (Penggunaan Istilah Khinzir Dalam Perspektif Hadith: Analisis Konseptual Dalam al-Kutub al-Sittah). <i>Al-Bayan: Journal of Qur'an and Hadith Studies</i> , 15(1), 73-89.
2. Salleh, M. M. M., Deuraseh, N., Subri, I. M., Rahman, S. A., Mustafa, S., Jamaludin, M. A., & Safian, Y. H. M. (2017). The Use of Ceramic Product Derived from Non-Halal Animal Bone: Is it Permissible from the Perspective of Islamic Law?. <i>International Journal of Asian Social Science</i> , 7(3), 192-198.
3. Muflih, B. K., Ahmad, N. S., Jamaludin, M. A., & Nordin, N. F. H. (2017). The concept and component of contaminated animals (Al-Jallalah Animals). <i>International Food Research Journal</i> , 24(Suppl.).
PhD THESIS
1. Tamlikha, T. (2017). Keharaman Babi dalam Al-Quran: Telaah Penafsiran Ayat-ayat Keharaman Babi dengan Pendekatan Sains (Doctoral dissertation, UIN Sunan Ampel Surabaya).
BOOK
1. Al-Qaradhawi, Y., & bin Daud, M. H. (2016). Halal dan haram dalam Islam. PTS Publishing House Sdn. Bhd..

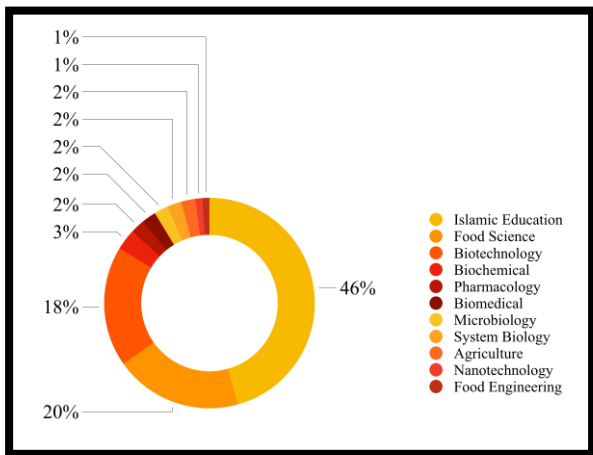


Figure 2. Percentage of the Field of Study Of Past Goat's Milk Related Publications

Based on the figure above, most of the topics studied in the research related to goat's milk basically revolves around the biotechnology field. Research on the method of analysis conducted in the previous studies found that most studies on *Sus scrofa domestica* is scientific analysis. Through comparative evaluation of research, it is found that a total of 54 researches involve the scientific area of study compared to only 8 researches involved in Islamic studies. In the science area, the studies are divided into seven areas. The areas are biotechnology, agriculture, nutrition, biochemistry, systems biology, microbiology and biomedical. In Islamic areas, the field of study that focuses on the analysis of Islamic view. It is found that research publications in *Sus scrofa domestica*

is more active in scientific analysis compared to Islamic analysis.

The list of past *Sus scrofa domestica* research related publications based on field of study are as the following:

ISLAMIC STUDIES

- Rosele, M. I., Ariffin, M. F. M., Ramli, M. A., & Isamai, M. Z. (2016). Pendekatan Ijtihad Kontemporer Dalam Isu Semasa di Malaysia. *Jurnal Islam dan Masyarakat Kontemporari*, 13(2), 53-66.
- Rusdi, M., & Omar, M. A. (2019). Contribution of Animals and Plants in Prospering Lives According to Al-Quran. *Journal of Techno Social*, 11(1).
- Rusdi, M., & Omar M. A. H. (2018). Contribution of Animal and Plants to The Human Sustainability in The Light Of Al Quran As Thematical Approach. *Human Sustainability Procedia*.
- Mohamad, M. A., & Mohamad, M. T. (2017). The Use of Khinzir Terms in Hadith Perspective: Conceptual Analysis in al-Kutub al-Sittah (Penggunaan Istilah Khinzir Dalam Perspektif Hadith: Analisis Konseptual Dalam al-Kutub al-Sittah). *Al-Bayan: Journal of Qur'an and Hadith Studies*, 15(1), 73-89.

5. Salleh, M. M. M., & Subri, I. M. (2018). Analisis Fatwa Mengenai Produk Bone China Dan Solusi Halal.
6. Akar, C., & Abidin, M. S. A. Z. (2019). Gaya Hidup Nabawi: Prinsip-Prinsip Nabawi Yang Diamalkan Imam Said Nursi Dalam Pemakanan. *Al-'Abqari: Journal of Islamic Social Sciences and Humanities*, 17, 57-64.
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8. Ripin, M. N., Haron, Z., Hehsan, A., Hassan, A. M., Muhamad, N. H. N., Jamil, N. H., & Hashim, N. M. (2017). Halal Goods as A Da'wah Medium and Its Challenges. *Al-Qanatir: International Journal of Islamic Studies*, 8(5), 13-25.
9. Awang, A., Ismail, C. Z., & Mahmud, W. (2017). Isu-Isu Pemakanan Halal: Kajian Kes Dalam Hubungan Komuniti Saudara Baru Dan Bukan Muslim Di Negeri Terengganu. *AL-'ABQARI: Journal of Islamic Social Sciences and Humanities*, 11, 139-153.
10. Sukardi, D. (2016). Perlindungan Konsumen terhadap Penggunaan Bahan Kimia Berbahaya pada Makanan dalam Perspektif Hukum Islam. *Al-Mustashfa: Jurnal Penelitian Hukum Ekonomi Syariah*, 3(1).
11. Ali, M. (2016). Konsep Makanan Halal Dalam Tinjauan Syariah Dan Tanggung Jawab Produk Atas Produsen Industri Halal. *AHKAM: Jurnal Ilmu Syariah*, 16(2), 291-306.
12. Ramli, M. A., Zulkepli, M. I. S., Hamdan, M. N., & Jaafar, S. M. J. S. (2018). Aplikasi al-tabayyun dalam menangani penularan maklumat palsu berkaitan produk halal. *Albasirah Journal*, 8(1), 23-36.
13. Tamlikha, T. (2017). Keharaman Babi dalam Al-Quran: Telaah Penafsiran Ayat-ayat Keharaman Babi dengan Pendekatan Sains (Doctoral dissertation, UIN Sunan Ampel Surabaya).
14. Ab Rahman, Z. M. (2019). Pemakaian Kaedah Istihlak dan Istihalah dalam Penentuan Produk Halal di Malaysia Berdasarkan Bidangkuasa Perundangan dan Keputusan Hukum Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal Ehwal Ugama Islam Malaysia.
15. Salleh, M. M. M., Deuraseh, N., Subri, I. M., Rahman, S. A., Mustafa, S., Jamaludin, M. A., & Safian, Y. H. M. (2017). The Use of Ceramic Product Derived from Non-Halal Animal Bone: Is it Permissible from the Perspective of Islamic Law?. *International Journal of Asian Social Science*, 7(3), 192-198.
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17. Sheikhi, M. A., & Firoozabadi, M. D. (2015). Pork Meat from The Viewpoints of Quran and Medical Research. *World Journal of Pharmaceutical Research*, 4(8).
18. Rahim, F. H. A., Muhammad, N. A. B., & Hassan, F. H. (2017). Halal and kosher marketing Strategie. *Journal of Islamic Management Studies*, 1(1), 104-116.
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23. Hamdan, M. N., Post, M. J., Ramli, M. A., & Mustafa, A. R. (2018). Cultured Meat in Islamic Perspective. *Journal of religion and health*, 57(6), 2193-2206.
24. Nor, M. R. M., Latif, K., Ismail, M. N., & Nor, M. N. M. (2016). Predominant Factors of Malaysia-Middle East Religious and Cultural Relations from the Perspective of Halal Food Supply Chain. *Oman Chapter of Arabian Journal of Business and Management Review*, 34(3958), 1-17.
25. Ali, M. (2016). Konsep Makanan Halal Dalam Tinjauan Syariah Dan Tanggung Jawab Produk Atas Produsen Industri Halal. *AHKAM: Jurnal Ilmu Syariah*, 16(2), 291-306.
26. Supaino, E., & Roestamy, M. (2017). Legal Regulation About the Use of Halal Label To Provide Muslim Consumers Protection. *Jurnal Ilmiah Living Law*, 9(1).”
27. Hossain, M. S. (2019). Consumption of Stem Cell Meat: An Islamic Perspective. *IIUM Law Journal*, 27(1), 233-257.
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Riaz, M. N., & Chaudry, M. M. (2018). 20 Biotechnology and GMO Ingredients in Halal Foods. *Handbook of Halal Food Production*, 20.

BIOCHEMICAL

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3. Montero, E., Olguín, E. J., De Philippis, R., & Reverchon, F. (2018). Mixotrophic cultivation of *Chlorococcum* sp. under non-controlled conditions using a digestate from pig manure within a biorefinery. *Journal of applied phycology*, 30(5), 2847-2857.

PHARMACOLOGY

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2. Ab Halim, M. A. B., Kashim, M. I. A. M., Salleh, M. M. M., Nordin, N. B., & Husni, A. M. (2015). *Halal pharmaceuticals*. *Social Sciences (Pakistan)*, 10(4), 490-498.

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Based on the data, researchers can conclude the data in the following table:

No.	Field of study	Frequency	Percentage %
1	Islamic Studies	28	42
2	Food Science	12	18
3	Biotechnology	11	17
4	Biochemical	3	5
5	Pharmacology	2	3
5	Biomedical	2	3
5	Microbiology	2	3
5	System Biology	2	3
5	Agriculture	2	3
10	Nanotechnology	1	1.5
11	Food Engineering	1	1.5
Total:		66	100%

Based on the results above, it is proven that *Sus scrofa domestica* revolves around a wide aspect of study. There are aspects that needed to be studied more actively in both scientific analysis and Islamic analysis. Here are some suggestions from the aspects mentioned:

- i. Islamic analysis research is small compared to scientific analysis in *Sus scrofa domestica* related research publications. Because of that, there should be more researches based on the Quran, hadith and tafsir to be more active. The interpretation of Naqli and Aqli knowledge are also significant to ensure the development of Islamic knowledge and also to widen the area of knowledge for Muslims around the globe.
- ii. Future researches need to be more focused on analysing the food nowadays as the food may contain porcine DNA or anything related to it.
- iii. The breeds of pigs are different for each region. Research activity involving this area of study seems less active in Malaysia than the others. Therefore, *Sus scrofa domestica* research and halal and non-halal animal fat gelatin by using and intensified. Researchers have to cooperate to study the scientific and Islamic analysis of *Sus scrofa domestica* from every sources, so that haram food like *Sus scrofa domestica* could be avoided.

Conclusion

Analysis of *Sus scrofa domestica* within the Islamic perspective needs to be more productive to the

development of Islamic studies. Advanced new studies of *Sus scrofa domesticus* is expected to produce benefits to Muslims and society as a whole.

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