Abstract

BACKGROUND The prevalence of diseases of foodborne and zoonotic origin in Arabic-speaking countries highlights the importance of collaboration between human and animal health professionals. However, accessibility of research and evidence-based practices in these countries is not well characterized. This brief report determines the availability of professional veterinary journals within the Arabic-speaking region.

METHODS An electronic search using 6 databases assessed for publication period, activity status, and available languages incorporated all aspects of veterinary medicine and specialties.

RESULTS Among 29 veterinary journals identified, the oldest current publication originated 63 years ago, with 10 journals currently interrupted or ceased. All 19 currently active journals are available electronically as open access, with 8 also offered in paper format. Veterinary journals published within Arabic-speaking countries are predominantly produced in Egypt, Iraq, and Sudan.

CONCLUSION Electronic access is lacking compared with English-speaking countries, and there is a lack of journals with an Arabic-language option. The reasons associated with language options in veterinary publications are not immediately apparent, yet may highlight differences among public health, health education, and zoonotic professionals and the populations they serve. Veterinary journals in Arabic-speaking countries do not adequately represent the overall region and are limited in access. Further evaluation of regional culture and publisher preferences is indicated to identify new collaboration opportunities among health professionals and local stakeholders.

KEY WORDS Arabic, Middle East, North Africa, research, veterinary medicine.

INTRODUCTION

Arabic-speaking countries currently face various public health challenges regarding zoonotic and foodborne diseases, with globalization of disease transmission of high interest at the international level. The key to effectively addressing these challenges lies in collaboration among public health agencies, as well as physicians and animal health professionals. With continued urbanization, environmental depletion, and social and economic struggles, veterinary medicine is at the forefront in ensuring livestock sustainment, food safety and security, and response to global health crises.

The veterinary profession is a critical link between the health of humans and animals, public policy, and their interaction with the environment. The relationship among these 3 entities is the overall aim of the One Health concept. Six of every 10 infectious diseases in humans include an animal vector, and investigatory processes of these diseases span human, veterinary, and zoonotic agencies. Interprofessional collaboration among veterinary institutions, policymakers, physicians, and animal health...
practitioners broadens existing knowledge and strengthens international partnerships aimed at advancing global health.\textsuperscript{5,7}

Veterinary medical education within Arabic-speaking countries is heavily focused on livestock species,\textsuperscript{8} with veterinarians being critical in promoting animal health, decreasing production loss, and protecting the human population from both zoonotic and foodborne diseases. Because of the significant risk of zoonotic disease transmission within the Middle East and spread outside its borders, the Food and Agricultural Organization of the United Nations is focused on livestock health and disease control within Arabic-speaking countries such as Egypt, Iraq, Oman, Tunisia, and Yemen.\textsuperscript{9,12} Opportunities exist to improve and promote hands-on educational experiences of Arabic-speaking veterinarians and interactions with professionals of Arabic-speaking countries regarding food security and public health and to foster growth in current scientific journals and collaborative efforts in the Arabic-speaking region.\textsuperscript{8,9,12,16-18}

Instrumental to collaboration among veterinary professionals within the Arabic-speaking countries are the sharing and promotion of research and evidence-based practices, particularly through peer-reviewed scientific journals. However, despite a historical scientific heritage, Arabic-speaking countries account for less than 1% of research citations worldwide and devote significantly less resources to research production and dissemination compared with China and Europe.\textsuperscript{19} Currently, availability of veterinary journals, research development, and publication output suggest that the importance of veterinary medicine as a significant component of human health is lacking. The purpose of this brief report is to evaluate the presence and accessibility of peer-reviewed veterinary journals within the Arabic-speaking region and determine potential opportunities for further development of veterinary-directed scientific collaboration in this area.

\textbf{Methods}

An electronic search was conducted using (1) PubMed NLM (National Library of Medicine) Catalog of journals referenced in the NCBI (National Center for Biotechnology Information) database records,\textsuperscript{20} (2) Scopus, (3) Google Scholar, (4) Science Direct, (5) Index Medicus for the Eastern Mediterranean Regional Office Database Journals Directory,\textsuperscript{21} and (6) Iraqi Academic Scientific Journals database\textsuperscript{22} to identify veterinary journals published in Arabic-speaking countries. An integrative search was carried out using a combination of search terms “veterinary; animal; medicine; science; studies; journal AND Algeria; Bahrain; Comoros; Djibouti; Egypt; Iraq; Jordan; Kuwait; Lebanon; Libya; Mauritania; Morocco; Oman; Qatar; Saudi Arabia; Somalia; Sudan; Syria; Tunisia; United Arab Emirates; Yemen; Palestinian Territories” to identify each respective journal listed. An electronic appraisal of the search results identified the corresponding journal’s website. Each respective journal website was reviewed to identify its publication period and other journal-related information such as activity status and languages available. Results of the electronic search were compiled and tabulated (Table 1). For the purpose of this search, veterinary journals were defined as a peer-reviewed journal encompassing any or all disciplines of veterinary medicine, sciences, and specialties. Given the nature of this review, ethical approval and clearance was not necessary and therefore not obtained.

\textbf{Inclusion and Exclusion Criteria.} Given the wide spectrum of the veterinary profession, veterinary journals that explicitly stated veterinary medicine or veterinary-related disciplines within the journal’s respective aim and scope were included in this search. Also, only peer-reviewed journals were included in this search. Both active and interrupted or ceased journals were included in the search results to provide a comprehensive snapshot for discussion purposes. Given the predominant languages used in this region, Arabic, English, and French search terms were used, respectively, in this search. Journals with a clearly stated primary aim and scope focusing only on human medicine, zoology, human public health, nursing, and other discipline-specific health professions were excluded. The authors acknowledge that valuable and applicable data may have been excluded as a result of this delimitation.

\textbf{Results}

The database search returned 29 journals that fit within our inclusion and exclusion criteria and published in Arabic-speaking countries: 13 are from Egypt, 7 from Iraq, 4 from the Sudan, and 1 each originating in Algeria, Libya, Morocco, Saudi Arabia, and Yemen (see Table 1). The oldest journal in our sample was published from 1940-2015 (\textit{Journal of the Egyptian Veterinary Medical Association}); the oldest journal still in publication began in 1954 (\textit{Veterinary Medical Journal Giza}). Among the full sample, 10 journals are currently interrupted or ceased; 3 of these journals had publications periods of approximately 50 years or longer, 1 journal actively published for 18 years, and 5 had periods less than 10 years. Fourteen journals in our sample are or were offered
| Journal Name                                      | Publication Period* | Activity Status       | Country Origin | Language | Print Format† | Open Access | IF‡         |
|--------------------------------------------------|---------------------|-----------------------|----------------|----------|---------------|-------------|-------------|
| Alexandria Journal of Veterinary Science         | 1983-present        | Current               | Egypt          | Eng      | Both          | Yes         | 0.786       |
| Assiut Veterinary Medical Journal                | 1974-present        | Current               | Egypt          | Eng; Ara | Both          | Yes         | N/A         |
| Benha Veterinary Medical Journal                 | 2011-present        | Current               | Egypt          | Eng      | Both          | Yes         | N/A         |
| Egyptian Journal of Sheep and Goat Sciences      | 2006-2015           | Interrupted/ceased   | Egypt          | Eng; Ara | Both          | N/A         | N/A         |
| Egyptian Journal of Veterinary Science           | 1964-2012           | Interrupted/ceased   | Egypt          | Eng; Ara | Paper        | N/A         | N/A         |
| Egyptian Veterinary Medical Society of Parasitology Journal | 2003-2015           | Interrupted/ceased   | Egypt          | Eng; Ara | Paper        | N/A         | N/A         |
| International Journal of Veterinary Sciences and Medicine | 2013-present       | Current               | Egypt          | Eng      | Electronic    | Yes         | N/A         |
| Journal of Advanced Veterinary Research          | 2011-present        | Current               | Egypt          | Eng      | Electronic    | Yes         | 0.47        |
| Journal of the Egyptian Veterinary Medical Association | 1940-2015           | Interrupted/ceased   | Egypt          | Eng; Ara | Paper        | N/A         | N/A         |
| Kaf El-Sheikh Veterinary Medical Journal         | 2003-present        | Current               | Egypt          | Eng      | Both          | Yes         | N/A         |
| Suez Canal Veterinary Medical Journal            | 1998-2015           | Interrupted/ceased   | Egypt          | Eng; Ara | Both          | Yes         | N/A         |
| Veterinary Medical Journal Giza                  | 1954-present        | Current               | Egypt          | Eng      | Both          | Yes         | N/A         |
| Zagazig Veterinary Journal                       | 1972-present        | Current               | Egypt          | Eng      | Both          | Yes         | N/A         |
| Al-Anbar Journal of Veterinary Sciences          | 2008-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | N/A         |
| Al-Qadisiya Journal of Veterinary Medicine Science | 2002-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | N/A         |
| Basrah Journal of Veterinary Research            | 2004-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | 3.259       |
| Iraqi Journal of Veterinary Sciences             | 2008-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | N/A         |
| Iraqi Poultry Sciences Journal                   | 2006-2015           | Interrupted/ceased   | Iraq           | Eng; Ara | Electronic    | Yes         | N/A         |
| Kufa Journal for Veterinary Medical Sciences     | 2010-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | N/A         |
| The Iraqi Journal of Veterinary Medicine         | 2005-present        | Current               | Iraq           | Eng; Ara | Electronic    | Yes         | 0.898       |
| SUST Journal of Agricultural and Veterinary Sciences | 2012-present        | Current               | Sudan          | Eng      | Electronic    | Yes         | N/A         |
| The Sudan Journal of Veterinary Research         | 1979-present        | Current               | Sudan          | Eng; Ara | Paper        | N/A         | N/A         |
| The Sudan Journal of Veterinary Science and Animal Husbandry | 1960-2011           | Interrupted/ceased   | Sudan          | Eng      | Paper        | N/A         | N/A         |
| University of Khartoum Journal of Veterinary Medicine and Animal Production | 2010-2015           | Interrupted/ceased   | Sudan          | Eng; Ara | Electronic    | Yes         | N/A         |
| Maghreb Vétérinaire                             | 1983-1993           | Interrupted/ceased   | Algeria        | Fre; Ara | Paper        | N/A         | N/A         |
| Open Veterinary Journal                         | 2011-present        | Current               | Libya          | Eng      | Electronic    | Yes         | N/A         |
| Revue Marocaine des Sciences Agronomiques et Vétérinaires | 1980-present      | Current               | Morocco        | Fre; Eng | Both          | Yes         | N/A         |
| Journal of Agricultural and Veterinary Sciences  | 2008-present        | Current               | Saudi Arabia   | Eng; Ara | Electronic    | Yes         | N/A         |
| The Yemeni Journal of Agriculture & Veterinary Sciences | 2013-2014           | Interrupted/ceased   | Yemen          | Eng      | Electronic    | Yes         | N/A         |

Ara, Arabic; Eng, English; Fre, French; N/A, information not available.
* Information obtained from electronic database records.
† Paper; electronic; both.
‡ Impact factor (2015-2017) as listed on journal website.
without a printed paper option; 12 are currently open access and exclusively online, and 3 (Iraqi Poultry Sciences Journal, University of Khartoum Journal of Veterinary Medicine & Animal Production, and Yemeni Journal of Agriculture & Veterinary Sciences) were entirely online before they ceased publication. All 19 currently active journals offer an electronic, open-access option; 8 also offer a paper-printed option. Of the 5 journals that offered a paper-only publication option, all are interrupted or ceased. Thirteen Arabic-speaking countries (Bahrain, Comoros, Djibouti, Jordan, Kuwait, Lebanon, Mauritania, Oman, Qatar, Somalia, Syria, Tunisia, United Arab Emirates) and the Palestinian territories do not currently offer an active peer-reviewed veterinary journal.

Language configurations for the entire sample (currently available and interrupted/ceased) were tallied. All 29 journals are or were published in English; 16 in Arabic and English languages; 1 in Arabic, French, and English; and 1 in French and English. Among currently active journals, 9 are published in English only, 9 in Arabic and English, and 1 in French and English. Seven of the 8 journals currently published in Egypt are available in English, with only 1 journal published in both English and Arabic. All 6 current Iraqi journals are published in English and Arabic, and of the 2 current Sudanese journals, 1 is available in English and Arabic and 1 in English only. Three countries offer a single current publication to the research sample: Libya (English only), Morocco (English and French), and Saudi Arabia (English and Arabic).

**DISCUSSION**

Nearly half of the sample consists of veterinary journals from Egypt, and 82.7% of all journals in the sample are produced in Egypt, Iraq, and the Sudan. What is uncertain in our review is whether there is more need for veterinary literature in these 3 countries versus the entire Arabic-speaking region. Also noteworthy, 6 of the 10 journals with interrupted or ceased publication status are from Egypt (5), the Sudan (2), and Iraq (1). Given the stability evidenced in our sample, including publications periods longer than 60 years, it is unclear why some veterinary publications interrupt or cease after less than 10 years. There may be industry-specific and regionally appropriate publication models predictive of long-term viability that are not readily present within this review. A comparative-processes evaluation within the Arabic-speaking region could be useful and necessary.

Since the mid-1990s, the Internet has had a significant impact on world culture and information exchange. The percentage of global 2-way commerce conducted online has increased from less than 1% in 1993 to approximately 97% in 2007. Expansion of Internet penetration in Arabic-speaking countries has lagged behind the United States and Europe, with a current average of 46.8% for the region and significant country-specific variability ranging from 94.1% in Qatar to 5.8% in Somalia. Interestingly, all currently active veterinary journals in this sample are offered in open-access electronic format, and 11 of 19 (57.9%) are exclusively in this format. All 5 print-only journals in this selection are presently ceased (3 Egyptian, 1 Sudanese, 1 Algerian); 4 terminated before the advent of the 1996 USAID (US Agency for International Development)–funded Leland Initiative to bring full public Internet connectivity to the entire Africa continent. It is unknown why print-only journals failed to make a conversion to print and electronic or electronic-only formats.

Compared with English-speaking countries, Arabic-speaking regions rank significantly lower in access to electronic resources and electronic literacy (52.2% vs 87.9%). Increasing online access to existing veterinary publications could present as a short-term solution to the lack of available resources. Current veterinary journals and new startup publications may view open access as a priority format in addition to print and language considerations. Electronic literacy should also be considered with a focus on target audiences such as veterinary or public health professionals versus a broader lay population.

A lack of available peer-reviewed veterinary journals could limit the ability of regionally specific and population-level public health, health education, and zoonotic professionals to deliver information and services to priority populations. Given that a significant number of cultural groups in need within the Arabic-speaking region prefer to receive health information in their native tongue, the high percentage of veterinary journals available without an Arabic-language option (41%) is not fully understood. We are not prepared to suggest this incongruity exists because of industry-accepted standards, individual publisher preference, or established needs within the target populations. Additionally, the preferred language between Arabic-speaking cultural groups and the public health, health education, and zoonotic professionals that represent and serve them could be substantially different. Additional evaluation of how publishers categorize and view their target populations could shed light on the high number of English-only veterinary journals.

Species-specific focus of veterinary research throughout the world reflects the direction of veterinary education.
and practice within respective countries. For example, within the United States, 74.5% of veterinarians work in companion animal practice,\(^28\) with many educational and research programs being similarly directed in these areas.\(^29\) Data regarding to what extent these types of trends occur in other areas of the world are limited. Analysis has indicated, however, that of the articles produced in species-specific veterinary journals in the Middle East from 1996-2010, 13% focused on food animals.\(^30\) This was much in line with North America, Western Europe, and the Pacific region food animal article percentages during the same period.\(^30\) Comparatively, journal articles within the Middle East that discussed small-animal topics accounted for less than 5% within that time frame.\(^30\) This supports to some degree the strong focus on livestock health that is found within this region.\(^8\)

An electronic search by Aboul-Enein et al\(^19\) investigating peer-reviewed public health journals within the Arabic-speaking region revealed 25 journals from 11 countries, with Saudi Arabia, Egypt, and Sudan being most heavily represented. A similar study by Aboul-Enein et al\(^31\) focusing on nutrition journals produced within this region returned 12 journals from 7 different countries, with Egypt again producing a majority of the publications. Further investigation is indicated to identify commonalities among countries most commonly involved in research in each of these disciplines, particularly at the interagency level.

**CONCLUSIONS**

Although there may not be a recognized shortage in current and active veterinary journals in the Arabic-speaking region, there is an unequal distribution among those countries and the Palestinian territories. More than half of the available publications originate in 3 countries, with a significant majority producing 1 journal or none. Evidence suggests that regions with higher gross domestic product have a higher level of international and cross-cultural collaboration.\(^30\) Other publication models within and outside the region should be explored for potential explanation of unequal distribution within the Arabic region.

Availability and access to the Internet cannot be discounted when describing the lack of veterinary publications in some Arabic-speaking regions. Where Internet access among specific target populations and the general public is lacking, veterinary journal publishers may have responded to a perceived lack of market demand. Although an inverse relationship could also be examined and accepted, it would be unlikely that a lack of professional journals affects Internet demand. Although this study did not look specifically at Internet access across individual Arabic-speaking countries, the larger cohort of countries with one or no veterinary publication could examine alternative means of contributing to the greater body of knowledge and subsidize the overall body of veterinary science knowledge.

The present review suggests that English is a dominant language within the veterinary science field in the Arabic-speaking region. Given that the majority of professional and lay populations in the region prefer their native dialects, the effect language has on local research efforts in academic, clinical, and community settings is unclear. Languages and access points offered by professional journals appear to be globalizing, and English is the overwhelming preference in academic publications.\(^32\) However, to describe regionally specific and culturally relevant veterinary systems, the Arabic-speaking region should consider preferences unique to their target populations.

**LIMITATIONS**

Although the authors searched several electronic databases, indices, and available resources using several key search terms and phrases, some journals may have been missed in the search. Additionally, journals that may not be indexed in electronic databases may have been missed in the search. It is important to note that this review was primarily intended to present an overview of veterinary-affiliated journals within the Arabic-speaking region.

**REFERENCES**

1. Seimenis A. Capacity building for zoonotic and foodborne diseases in the Mediterranean and Middle East regions (an intersectoral WHO/MZCP proposed strategy). Int J Antimicrob Agents 2010;36 Suppl 1:S75–9.
2. Summerlee AJ. Gazing into the crystal ball: where should the veterinary profession go next? J Vet Med Educ 2010;37:328–33.
3. Kelly A, Osburn B, Salman M. Veterinary medicine’s increasing role in global health. Lancet Glob Health 2014;2:e379–80.
4. Kelly A, Marshak R, Galligan D, Ferguson J. Public policies, one health, and veterinary medicine. J Am Vet Med Assoc 2015;247:140.
5. Kinnison T, Guile D, May SA. The case of veterinary interprofessional practice: from one health to a world of its own. J Interprof Educ Pract 2016;4:51–7.

6. King LJ, Anderson LR, Blackmon CC, et al. Executive summary of the AVMA One Health Initiative Task Force report. J Am Vet Med Assoc 2008;233:259–61.

7. Kochevar DT. Fifty years of evolving partnerships in veterinary medical education. J Vet Med Educ 2015;42:403–13.

8. Hailat N. Present status and vision for veterinary higher education in the Arab world. J Vet Med Educ 2005;32:151–5.

9. Khamas WA, Nour A. Veterinary medical education in Iraq. J Vet Med Educ 2004;31:301–9.

10. Al-Salihi KA. An insight into veterinary education in Iraq. Vet Rec 2012;171:316–7.

11. Williams CS. Animal health care in Egypt. J Am Vet Med Assoc 1995;206:425–6.

12. Talaat AM. Animal health care in Egypt. J Am Vet Med Educ 1995;206:424–5, author reply 426.

13. Wilson RT. Biodiversity of domestic livestock in the Republic of Yemen. Trop Anim Health Prod 2003;35:27–46.

14. Al Harthi LS, Robinson MD, Mahgoub O. Diets and resource sharing among livestock on the Saiq Plateau, Jebel Akhdar Mountains, Oman. Int J Ecol Environ Sci 2008;34:113–20.

15. Darghouth MA. Piroplasmids of livestock in Tunisia. Arch Inst Pasteur Tunis 2004;81:21–5.

16. Memon MA, Hamieh T, Ghaouch N. A new beginning for veterinary education and the veterinary profession in Lebanon. World J Agric Sci 2012;8:481–4.

17. Maziak W. Boosting biomedical research in the Arab world. Avicenna J Med 2011;1:2–3.

18. El-Azami-El-Idrissi M, Lakhdar-Idrissi M, Ouldilm K, et al. Improving medical research in the Arab world. Lancet 2013;382:2066–7.

19. Aboul-Enein BH, Bernstein J, Bowser JE. Peer-reviewed public health journals from Arabic-speaking countries: an updated snapshot. J Public Health Policy 2017;38:146–57.

20. Rockville, MD: U.S. National Library of Medicine. NLM Catalog: Journals Referenced in the NCBI Databases; 2017. Available at: http://www.ncbi.nlm.nih.gov/nlmcatalog/journals. Accessed March 13, 2017.

21. World Health Organization Eastern Mediterranean Regional Office. Index Medicus for the Eastern Mediterranean Region Journals Directory. Geneva, Switzerland: World Health Organization; 2017 Available at: http://applications.emro.who.int/library/imjournals/. Accessed January 10, 2017.

22. Ministry of Higher Education & Scientific Research of Iraq. Iraqi Academic Scientific Journals Database. Baghdad, Iraq: Ministry of Higher Education; 2017 Available at: http://iajs.net/iaj. Accessed February 2, 2017.

23. Hilbert M, López P. The world’s technological capacity to store, communicate, and compute information. Science 2011;332:60.

24. Internet World Stats. Usage and population statistics. 2016. Available at: http://www.internetworldstats.com/stats.htm. Accessed April 8, 2017.

25. Bland J, Breslar Z, Esselman J, Ireland D. Leland Initiative: Africa Global Information Infrastructure Gateway Project (Project No. 698-0565)—Best Practices for Policy Accommodation, Technology Transfer, and End-User Applications of the Internet in the Developing World. Washington, DC: United States Agency for International Development Africa Bureau, Office of Sustainable Development; 1996.

26. Raynor EM. Factors affecting care in non-English-speaking patients and families. Clin Pediatr (Philadelphia) 2016;55:145–9.

27. Sara K. Role of WHO Arabic Programme in scaling up the Arabic language. East Mediterr Health J 2009;15:665–82.

28. American Veterinary Medical Association. Market Research Statistics: U.S. Veterinarians 2016. Schaumburg, IL: American Veterinary Medical Association; 2017 Available at: https://www.avma.org/KB/Resources/Statistics/Pages/Market-research-statistics-US-veterinarians.aspx. Accessed July 22, 2017.

29. Narver HL. Demographics, moral orientation, and veterinary shortages in food animal and laboratory animal medicine. J Am Vet Med Assoc 2007;230:1798–804.

30. Christopher MM, Marusic A. Geographic trends in research output and citations in veterinary medicine: insight into global research capacity, species specialization, and interdisciplinary relationships. BMC Vet Res 2013;9:115.

31. Aboul-Enein BH, Bernstein J, Kruk J. Professional nutrition journals from Arabic-speaking countries: a regional status. Nutr Bull 2017;42:166–71.

32. Genc B, Bada E. English as a world language in academic writing. Reading Matrix 2010;10:142–51.