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Research Output of Veterinary and Animal Sciences as Seen from the Indian Veterinary Journal

***Dr. Dilip Choudhary, **Dr. V.P. Vadlamudi and ***Dr. U.N. Singh [#]**

***** Assistant Librarian, College of Veterinary Science & AH, Chhattisgarh Kamdhenu University, Anjora, Durg (C.G.) India; Email: drgmanoj.ann@gmail.com, dilipchoudhary05@yahoo.com

****** Professor & Head (Retired), Dept. of Pharmacology & Toxicology, College of Veterinary Science & AH, Anjora, Durg (C.G.) India

****** University Librarian, Guru Ghasidas University, Bilaspur (C.G.) India; Email:uns_ggu@yahoo.in

Corresponding author.

Abstract

A sample study was undertaken to assess the research output of Indian veterinary and animal sciences institutes through the publications appeared in the Indian Veterinary Journal (IVJ) during the year 2006 (Volume 83). Out of the 476 articles in the 12 issues of the volume 50, 13 and 38 percent were of main articles, clinical articles and short communications respectively, where in all 84 per cent were of animal health discipline and the rest 16 per cent of animal production discipline. The contributions of Indian and foreign institutes were 72 and 28 per cent respectively. Most of the articles (93%) were contributed by the academic institutes (Universities/Colleges and Research organizations). The institutes located in the southern India ranked first in contributing articles to the journal as compared to other three regions. The Madras Veterinary College, Chennai was identified as the most prolific institute in publishing articles to the journal.

Keywords: Veterinary Science Research, Animal Sciences, Research Productivity, IVJ.

1. Introduction

India's economy revolves around agricultural production system, where livestock is an integral part. About 70 per cent of Indian population depends on agriculture and animal husbandry for livelihood. The national economy as well as the socio-economic growth of the Indian rural sector is backed by sustainable livestock production. The rapid strides in progress in livestock production has been possible through sustained thriving for sound principles of veterinary and animal husbandry education, research and extension programs in the country, ever since the independence. At present there are 40 Veterinary Colleges and around 50 central and state government institutions catering to the needs of education and research in veterinary and animal sciences. It is therefore of interest to see how Indian veterinary science works get reflected in IVJ, the most popular and widely circulated journal.

2. Objective of the Study

The present study was envisaged with the objective of determining the research publication pattern of Indian researchers in veterinary and animal sciences through a sample study of the Indian Veterinary Journal during the year 2006.

3. Methodology

The Indian Veterinary Journal is the most popular widely circulated core journal of the veterinary and animal sciences, a monthly periodical published by the Indian Veterinary Association (a Private Registered Society), with the editorial head quarters at Chennai (www.connectjournals.com/ivj). The articles in the 12 issues of the Volume 83 of journal published in the year 2006 were compiled manually and tabulated through Microsoft Excel Worksheets and subjected to detailed bibliometric analysis as explained below. However, data from SCOPUS was also collected to know the global position of Veterinary science to see where India stands.

- Category of Articles
- Discipline and subject of articles
- Particulars of institutions contributed the articles
- Subject-wise article productivity of the institutions
- Article productivity by different categories of the institutions
- Article productivity based on geographical distribution of the institutions
- Article productivity by prolific institutions

4. Data Analysis

The collected data were analyzed to know about the Indian veterinary sciences and also to see where we stand globally. The top five countries contributing in veterinary sciences along with PR China (13) and Bangladesh (57) were prepared by using SCOPUS Data Base (1996-2015) and given in Table 1. Like other fields, here also USA is undisputed leader followed by UK, Brazil, India and Germany, whereas PR China ranks 13 and Bangladesh 57. In citation also on an average papers published from USA and UK get cited 12.93 and 12.94 times whereas Brazil, Germany, PR China and Bangladesh were 5.31, 7.84, 6.45 and 6.81 times respectively. Here again though India rank is 4th in publication but her citation record even poorer than Bangladesh, say 2.54 times only. Similarly H Index of India is less than the top five countries but better than Bangladesh.

Table 1: Country Rank in Veterinary Sciences as seen from Scopus Data Base (1996-2015)

Rank of the country	Country	No. of Documents	No. of Citable Documents	No. of Citations	No. of Self Citations	No. of Citation per Document	H Index
01	USA	71423	67173	923660	446241	12.93	165
02	UK	27280	27730	353122	94412	12.94	138
03	Brazil	21079	20735	111851	61600	5.31	80
04	India	20444	20203	51866	25748	2.54	50
05	Germany	19670	19302	154252	41926	7.84	98
13	PR China	8776	8650	56563	25457	6.45	61
57	Bangladesh	449	437	3058	516	6.81	25

The journal IVJ includes three categories of articles viz. Main Articles; Clinical Articles and Short Communications. The main articles include Introduction (with no subtitle), Materials and Methods, Results and Discussion, Summary, Acknowledgement (optional) and References with total pages not to exceed four printed pages. The clinical articles comprise Introduction (with no subtitle), Case History and Observations, Treatment and Discussion, Summary, Acknowledgement (optional) and References with pages not to exceed three. Whereas, the short communications have the similar format as a full article, but with pages

not exceeding two. The page limits for the three categories of articles are inclusive of figures, photographs and tables (www.connectjournals.com/ivj).The distribution of different categories of articles is given in Table 2. Out of the total 476 articles covered in the 12 issues of IVJ, nearly 50 per cent were of main articles (237), followed by 37.61 per cent of short communications (179) and 12.6 per cent of clinical articles (60).

Table 2: Different categories of articles published in Indian Veterinary Journal, V. 83 (2006)

Sr. No.	Category of Articles	Number	Percentage	Cumulative Percentage	Cumulative Total
1	Main Articles	337	49.79	49.79	237
2	Clinical Articles	60	12.6	62.39	297
3	Short Communications	179	37.61	100	476

The main articles and short communications comprise of the subjects of animal production as well as animal health disciplines; whereas the clinical articles were of veterinary clinical cases comprising of only the clinical subjects (VM, VOG and VSR) of animal health discipline. Table 3 shows the distribution of the articles as per the discipline. The major component of articles is of animal health (399, 83.82%) whereas animal production discipline share only of 16.18 per cent (77).

Table 3: Different disciplines of articles published in Indian Veterinary Journal, V. 83 (2006)

Sr. No.	Discipline of Articles	Number	Percentage	Cumulative Percentage	Cumulative Total
1	Animal Health	399	83.82	83.82	399
2	Animal	77	16.18	100	476

The IVJ included articles by the authors from Indian and non-Indian institutions. Table 4 as given below shows the number of articles contributed by different categories of institutions.

Table 4: Productivity of Articles by the Broad Category of Institutions in IVJ, V. 83 (2006)

Category of Institutions		Number of Articles			
		Main Articles	Clinical Articles	Short Communications	Total
Indian	Veterinary & Animal Sciences Institutes	142	36	140	318 (92.98)
	Field Veterinary Institutes	2	5	8	15 (4.39)
	Other Institutes	6	1	2	9 (2.63)
	Total	150 (43.86)	42 (12.28)	150 ((43.86)	342 (100)
Non Indian Institutes (Foreign)		87 (64.93)	18 (13.43)	29 (21.64)	134 (100)
Grand Total		237	60	179	476

It is clear from table 4 that Out of the total 476 articles 342 were by Indian institutes (71.85%) and 134 were from the foreign institutes (28.15%). The Indian institutions were broadly grouped under three categories (based on specialization) viz. Veterinary and Animal Sciences Institutes, Field Veterinary Clinics of the Department of Animal Husbandry of different states and other institutes (excluding the above two categories). Among the different categories of Indian institutions most of the articles (93%) were contributed by the Veterinary and Animal Sciences institutes comprising of colleges and research institutes or laboratories in different states as against the meager number of articles together from Veterinary Clinics or institutes other than the veterinary and animal sciences (7%). The contributions of the Indian institutions as main articles and short communications were similar (each 43.86%). The contribution of main articles by the foreign institutions was also higher (64.93% as compared to short communications (21.64%) or clinical articles (13.43%).

Table 5: Subject-wise articles published by different Indian institutes in the IVJ during the year 2006 (Volume 83)

Category of Institutions		Indian Veterinary and Animal Sciences	Field Veterinary Clinics, A.H. Dept. in States	Total	Percentage of Total	Other than Veterinary and Animal Sciences	Grand Total (%)
Animal Production	AGB	22	02	24	28.57	01	25
	AN	12		12	14.29	01	13
	LPM	38		38	45.24	01	39
	LPT	10		10	11.90		10
	Total	82	02	84	100.0	03	87 (25.44)
Animal Health	AHE	10		10	4.02		10
	VAN	09		09	3.61		09
	VM	59	04	63	25.31		63
	VMC	29		29	11.65		29
	VOG	25	02	29	10.84		27
	VPA	15		15	6.02		15
	VPH	02		02	0.80	01	03
	VPP	35	02	37	14.86	01	38
	VPT	16	01	17	6.83		17
	VPB	13		13	5.22	01	14
	VSR	23	04	27	10.84	03	30
	Total	236	13	249	100	06	255 (74.56)
Grand Total		**318**	**15**	**333**	**97.37**	**09**	**2.63**

Table 5 shows the subject-wise articles published by the Indian Veterinary institutes. Out of the total 342 articles almost all were from the veterinary and animal sciences institutes (97.37%) and the contribution from other institutions was negligible (2.63%) of the 333 articles from the veterinary and animal sciences institutes, the articles of animal production subjects (AGB, AN, LPM and LPT) were 84 (25.23%) and the animal health subjects (AHE, VAN, VM, VMC, VOG, VPA, VPH, VPP, VPT, VBP and VSR) articles were 249 (74.77%). Among the animal production discipline, the proportion of LPM was highest (45.24%), followed by AGB (28.57%), AN (14.29%) and lowest of LPT (11.90%). Among the animal health discipline articles, the combined proportion of clinical subjects (VM, VOG and VSR) was near about 48 per cent (119 articles) as against the total 52 per cent of all the other eight subjects together (130 articles).

The distribution of articles as per broad categories of the institutions, based on administrative or organizational setup in the country is summarized in Table 6. The various institutions were categorized under four units viz. Agricultural University, Veterinary University, Central Government Institutions and others. The articles contributed by the institutions under Agricultural University, Central Government Institutions, institutions under Veterinary University and other categories were of 28.65, 12.87, 50.88 and 7.60 per cent respectively, out of the total articles of 342. Accordingly, the Veterinary University ranked 1st, next followed by Agricultural University (2nd), Central Government Institute (3rd) and last other institutions (4th).

There are no reports on research paper output from Veterinary and Animal Sciences researchers from different institutions and organizations in India. However, Garg and Dutt (1992) noted that the major share of Indian agricultural research output (including animal sciences disciplines) came from Agricultural Universities. Ezhil Rani (1998) reported that about 53 and 47 percent of research papers published in the Indian Journal of Fisheries were from Universities/Colleges and Research Stations, respectively Garg *et al*. (2006) also opined that academic institutions were the major contributors of scientific publications output in India.

Table 6: Institute-wise distribution of Indian authors of publications in IVJ, V. 83 (2006)

Category of the Institution	Rank	No. of Research Papers				Percentage of Total	Cumulative Total	Cumulative Percentage
		MA	CA	SC	Total			
Agricultural University	II	43	15	40	98	28.65	98	28.65
Central Govt. Institute	III	22	3	19	44	12.87	142	41.52
Veterinary University	I	74	18	82	174	50.88	316	92.4
Other	IV	11	6	9	26	7.6	342	100

The distribution of authors of articles in the IVJ (2006) as per the four geographical regions of the country viz. the eastern, northern, southern and western region is presented in Table 7. Out of the total 342 articles by the Indian authors, the maximum numbers of articles (160, 46.79%) were contributed from the institutions of southern India, followed by northern India (93, 27.19%), eastern India (64, 18.71%) and lowest from the western India (25, 7.31%). Accordingly they may be ranked also. Perhaps, this might be the first study to analyze the articles published in a major veterinary and animal sciences journal of Indian origin based on geographical distribution of the contributors (authors) in the country. Variations in geographical preferences of authors/institutions with regard to contribution of articles to science journals were also recorded in several other scientific fields in India (Kamal Lochan Jena, 2006; Keshava and Kontikal; 2007; MallinathKumbar and Girish Kumar, 2011).

Table 7: Geographical distribution of Indian authors of articles in IVJ, V. 83 (2006)

Region of the Institutions	Rank	No. of Articles				Percentage of Total	Cumulative Total	Cumulative Percentage
		MA	CA	SC	Total			
Eastern India	III	26	5	33	64	18.71	64	18.71
Northern India	II	49	12	32	93	27.19	157	45.90
Southern India	I	62	20	78	160	46.79	317	92.69
Western India	IV	13	5	7	25	7.31	342	100

MA: Main Articles CA: Clinical Articles SC: Short Communications

Table 8 reveals the other country contributors of the articles in the IVJ during the year 2006. The total number of articles from authors of non-Indian institutions in the Volume 83 was 134. Maximum number (105) was from Turkey (78.35%), followed by 15 from Iran (11.19%) and the rest (14) were collectively from the eight countries such as Malaysia (4), Poland (3), Korea (2) and one article each from Nepal, Bulgaria, Mexico, Spain and Slovak Republic (collectively 10.46%).

Table 8: Productivity of non-Indian authors in publishing articles in IVJ, V. 83 (2006)

Sr. No	Name of the Country	Category of Article				Percentage
		Main Articles	Clinical Articles	Short Communications	Total	
1	Turkey	68	12	25	105	78.35
2	Iran	11	2	2	15	11.19
3	Malaysia	0	3	1	4	2.98
4	Poland	2	1	0	3	2.24
5	Korea	2	0	0	2	1.49
6	Nepal	1	0	0	1	0.75
7	Bulgaria	0	0	1	1	0.75
8	Mexico	1	0	0	1	0.75
9	Spain	1	0	0	1	0.75
10	Slovak Republic	1	0	0	1	0.75
Total		87	18	29	134	100

Bibliometrics, in real sense of its utility, serves the function of 'academic audit' of the institutions of education and research. Inferences of such studies may be very useful in decision making in research administration and planning in different organizations and funding agencies to evaluate their decisions (Pouris, 1989). Bibliometrics is now used in quantitative research exercises of academic output (Henderson *et al*., 2009). The Government of the United Kingdom is using bibliometrics as a tool in its Research Excellence Framework (REF, 2014). Therefore, in view of the importance of scientific publication output it was considered worthwhile to assess the research paper output of the institutions of veterinary and animal sciences. The productivity of prolific veterinary and animal sciences institutes of the country is shown in Table 9. In all 55 individual institutions and Veterinary Clinics from different states contributed to the total 333 articles in the 12 issues of the Volume 83.

Table 9: Productivity of prolific institutes in the Indian Veterinary Journal, V. 83 (2006)

Name of the Institutes	No. of Articles	Rank
Madras Veterinary College, Chennai (Tamil Nadu)	52	I
College of Veterinary Science, Guwahati (Assam)	30	II
Veterinary College and Research Institute, Namakkal (Tamil Nadu)	17	III
College of Veterinary Science, Ludhiana (Punjab)	15	IV
College of Veterinary Science, Tirupati (AP)	14	V
Indian Veterinary Research Institute, Izatnagar (UP)	13	VI
College of Veterinary Science, Bengaluru (Karnataka)	12	VII
College of Veterinary and Animal Sciences, Pantnagar (Uttaranchal)	11	VIII

Among the institutes the Madras Veterinary College (MVC), Chennai ranked first, which contributed 52 articles (15.62%), followed by 30 articles from the College of Veterinary

Science (CVSc), Guwahati (9.01%) and 17 articles by the Veterinary College and Research Institute (VC & RI), Namakkal (5.11%). The rest of the articles (234) were contributed by the other 51 institutions. It is of interest to note that only one article was contributed in the IVJ by as many as 17 institutions in the premier core journal of veterinary and animal sciences journal in the country. The collective contribution from the Field Veterinary Clinics was 15 articles (4.50%).

5. Major Findings of the study

- The Indian Veterinary Journal covers the articles concerning all the subject specializations of veterinary and animal sciences, and includes articles from India as well as abroad.
- The researchers give equal priority in publishing their research findings in the form of main articles and short communications and to a small extent as exclusive clinical articles.
- The scientific output of Indian researchers in the animal health subjects was about three-fold higher than that in animal production subjects.
- LPM and Clinical subjects (VM, VOG and VSR) are the major areas of research output among animal production and animal health disciplines, respectively.
- Researchers from Indian Veterinary Universities ranked first, followed by Agricultural Universities, Central Govt. Institutes and other institutes in contributing the papers.
- Researchers from southern India ranked first, followed next in order by northern, eastern and western regions in the country in contributing the papers.
- The Madras Veterinary College, Chennai was the most prolific institution in contributing articles to the journal during the year 2006.
- USA is the undisputed leader in veterinary sciences followed by UK, Brazil, India and Germany.

6. Conclusion

The major proportion of research output of scientists in the Indian institutes of animal and veterinary sciences was related to animal health discipline rather than that of animal production.

More number of scientists located in Veterinary Universities and those in southern India preferred in contributing articles to the IVJ as compared to the scientists in other institutes regions. The IVJ, being a core journal of the profession, covers all the subjects of veterinary and animal sciences.

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