
A SCIENTOMETRIC STUDY ON BUFFALO RESEARCH IN INDIA AND PAKISTAN: A PROFILE BASED ON CAB DIRECT ONLINE

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ABSTRACT

This paper intends to observe and compare the R&D output on 'Buffaloes' by the researchers in India and Pakistan. The chosen study period is 55 years (1955-2009) and CAB Direct Online is the source database for this research. During the period (1955 – 2009) a total of 9,096 and 706 publications were published by the scientists of India and Pakistan respectively on buffalo research and India is the top producing country with 9,096 papers (92.80%) followed by Pakistan with 706 papers (7.20%). The average number of publications published per year by India and Pakistan were 165 and 12 respectively. The spurt in the literature output of India and Pakistan were reported during 2001-2009 and 1991-2000 respectively. The study also reports the most preferred journals and most productive authors in India and Pakistan. This study also provides an inventory and scientometric dimensions of publications on buffalo research by India and Pakistan.

Keywords: *Buffalo, India, Pakistan, Scientometric analysis, CAB Direct*

Introduction

The role of buffalo in the livestock economy of India and Pakistan is vital and they are considered to be the base of these two countries dairy industry. More than 50 per cent of milk production of these countries is produced by buffaloes. The average milk yield of buffaloes of Pakistan is 1,909 Kg followed by India with 1407 kg. The buffalo population of India and Pakistan is furnished in Figure-1.

Since buffaloes play a vital role in the socio-economic development of India and Pakistan, most of the government agencies dealing with animal science research provide importance for research on buffaloes. Therefore, the present study attempts to map research on buffalo by India and Pakistan as seen from CAB Direct Online database.

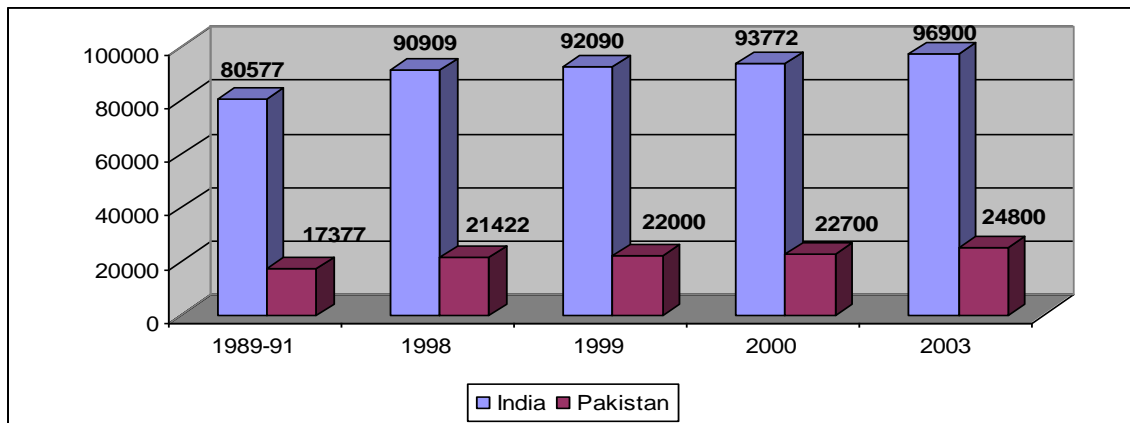
Methodology

All publications on buffalo having an author address in India and Pakistan were downloaded from five major databases of CABI viz., Animal Breeding Abstracts, Animal

1. Deputy Librarian 2. Assistant Librarian

Nutrition Abstracts, Dairy Science Abstracts, Index Veterinarius and Veterinary Bulletin Abstracts through CAB Direct Online. The search was made using the keyword ‘buffalo’ in the Title field and India and Pakistan in the author affiliation field of CAB Direct Online database. The period undertaken for this study is from 1955 to 2009 since the database coverage is from 1955.

Fig.-1: Buffalo population in India and Pakistan*
(Unit: 1000 heads)



**(Source: FAO Production Year Book 2000 Vol.54)*

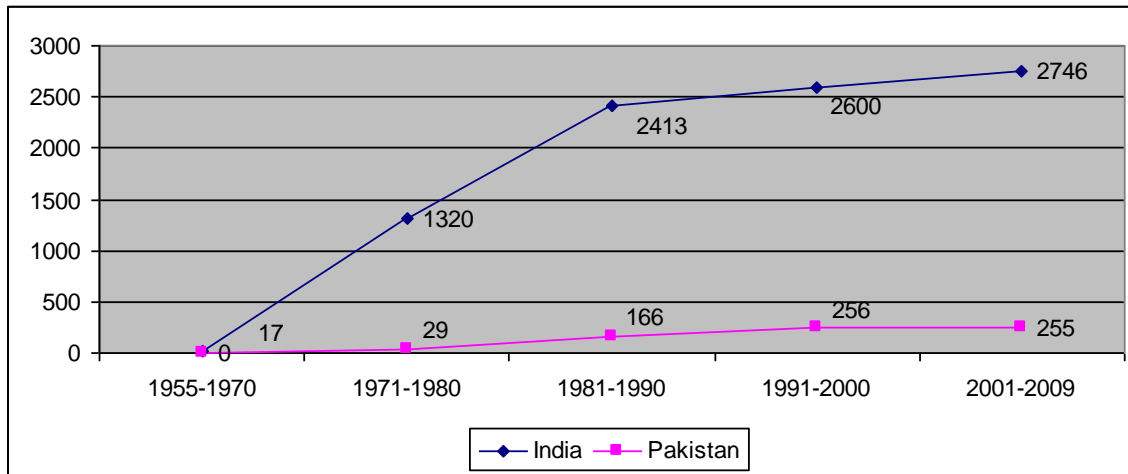
Analysis

Journal articles, seminar and conference publications, books and book chapters published by India and Pakistan since 1955 to 2009 were considered for this study. This study revealed that India is the top producing country with 9,096 papers (92.80%) followed by Pakistan with 706 papers (7.20%).

The number of records pertaining to India and Pakistan obtained from the database for the period 1955-1970, 1971-1980, 1981-1990, 1991-2000 and 2001-2009 are depicted in Figure-2.

It is noticed that there is a steep rise in the number of publications on buffalo between 1955-1970 and 1971-1980 *i.e.* from 17 publications to 1,349 which is about 7735% increase. Again there is a steep rise in number of publications between 1971-1980 and 1981-1990 *i.e.* from 1349 publications to 2579 publications which is about 189% growth. From 1991 onwards, as far as India is concerned, there is a steady growth in the number of publications on buffalo. In case of Pakistan, there is no much difference between 1991-2000 to 2001-2009.

Fig.2 Contribution of India and Pakistan to the literature of buffalo research as seen from CAB Direct Online (1955 – 2009)



Distribution by Journals

This study revealed that most of the Indian and Pakistan scientists prefer their national journal for publication of research work. The most preferred 15 journals by Indian and Pakistan researchers are furnished in Table-1 and Table-2 respective.

Table-1 India: Top 15 Journals

Sl.No.	Journal Title	No. of Papers	Country of Publication
1	Indian Journal of Animal Sciences	1,598	India
2	Indian Veterinary Journal	1,164	India
3	Indian Journal of Dairy Science	743	India
4	Buffalo Journal	394	Thailand
5	Indian Journal of Animal Reproduction	327	India
6	Buffalo Bulletin	249	Thailand
7	Indian Journal of Animal Nutrition	159	India
8	Indian Journal of Animal Production and Management	145	India
9	Intas Polivet	139	India
10	Livestock Adviser	135	India
11	Cheiron	108	India
12	Theriogenology	107	USA
13	Asian-Australasian Journal of Animal Sciences	104	Korea
14	Indian Journal of Veterinary Medicine	103	India
15	Haryana Veterinarian	102	India

Table-2: Pakistan: Top 10 Journals

Sl.No.	Journal Title	No. of Papers	Country of Publication
1	Pakistan Veterinary Journal	236	Pakistan
2	Buffalo Journal	53	Thailand
3	Asian-Australasian Journal of Animal Sciences	34	Korea
4	Buffalo Bulletin	29	Thailand
5	Sarhad Journal of Agriculture	17	Pakistan
6	International Journal of Agriculture and Biology	16	Pakistan
7	Journal of Animal and Plant Sciences (JAPS)	16	Kenya
8	Theriogenology	15	U.S.A.
9	Animal Reproduction Science	14	U.S.A.
10	Pakistan Journal of Agricultural Sciences	13	Pakistan
11	Veterinarski Arhiv	11	
12	Indian Journal of Animal Sciences	9	India
13	Indian Journal of Dairy Science	9	India
14	Pakistan Journal of Agricultural Research	9	Pakistan
15	Buffalo Newsletter	8	Thailand

However, they are also publishing their research papers in foreign journals as well. The foreign journals used often by India and Pakistan researchers to publish their work on buffalo research are listed in Table-3. This study revealed that the top three foreign journals used by the researchers of both the countries are the same *viz.*, Buffalo Journal, Buffalo Bulletin and Theriogenology. Further, out of 15 foreign journals used by the researchers of both the countries, seven foreign journals are the same.

Table-3: Top 15 Foreign Journals used by Indian and Pakistan researchers

S. No.	India	No. of Papers	Pakistan	No. of Papers
1	Buffalo Journal	394	Buffalo Journal	53
2	Buffalo Bulletin	249	Buffalo Bulletin	29
3	Theriogenology	107	Theriogenology	15
4	Asian-Australian Journal of Animal Sciences	104	Animal Reproduction Science	14
5	Animal Reproduction Science	64	Veterinarski Arhiv	11
6	Milchwissenschaft	58	Buffalo Newsletter	8
7	Veterinary Record	52	Turkish Journal of Veterinary & Animal Sciences	7
8	Veterinary Research Communication	42	Revue Scientifique et Technique-OIE	6
9	Bubalus Bubalis	39	Veterinary Record	6

S. No.	India	No. of Papers	Pakistan	No. of Papers
10	Tropical Animal Health and Production	29	Livestock Science	5
11	Zentralblatt fur Veterinarmedizin	27	Tropical Animal Health and Production	5
12	Animal Nutrition and Feed Technology	26	Journal of Dairy Science	4
13	World Review of Animal Production	22	Acta Veterinaria Brno	3
14	Animal Feed Science and Technology	20	Livestock Research for Rural Development	3
15	Journal of Dairy Research	17	Milchwissenschaft	3

Distribution by subject category

The 9,096 and 706 papers published by Indian and Pakistan scientists are classified by CAB Direct Online database under various subject categories (CABICODE). The top 15 subject categories under which the research papers published by the Indian and Pakistan researchers are furnished in Table-4 and Table-5 respectively. This indicates the priority area of research undertaken by the Indian and Pakistan scientists on buffalo research. This study revealed that the top CABI CODE under which the papers published by both the countries are the same and this means the priority areas of research undertaken by both the countries are almost similar.

Table-4 : Buffalo Research in India - Top 15 Subject Categories

CABI CODE	Subject Category	No. of papers
LL210	Animal Reproduction and Development	1,512
LL600	Animal Physiology and Biochemistry	1,450
LL110	Dairy Animals	1,309
LL860	Non-communicable diseases and injuries of animals	1,181
LL250	Animal Reproduction and Embryology	1,147
QQ010	Milk and Dairy Produce	1,038
LL200	Animal Breeding and Genetics	913
LL510	Animal Nutrition	866
QQ500	Food Composition and Quality	799
LL820	Parasites, Vectors, Pathogens and Biogenic Diseases of Animals	765
LL520	Animal Nutrition (Production Responses)	751
LL500	Animal Nutrition (General)	501
LL821	Prion, Viral, Bacterial and Fungal Pathogens of Animals	340
LL900	Animal Toxicology, Poisoning and Pharmacology	320
LL880	Animal Treatment and Diagnosis	303

Table-5 : Buffalo Research in Pakistan - Top 20 Subject Categories

CABI CODE	Subject Category	No. of papers
LL110	Dairy Animals	150
LL210	Animal Reproduction and Development	137
LL250	Animal Reproduction and Embryology	115
LL600	Animal Physiology and Biochemistry	103
LL820	Parasites, Vectors, Pathogens and Biogenic Diseases of Animals	101
LL860	Non-communicable Diseases and Injuries of Animals	77
LL200	Animal Breeding and Genetics	68
QQ010	Milk and Dairy Produce	65
LL520	Animal Nutrition (Production Responses)	61
LL510	Animal Nutrition (Physiology)	59
LL821	Prion, Viral, Bacterial and Fungal Pathogens of Animals	52
LL500	Animal Nutrition (General)	42
QQ500	Food Composition and Quality	42
HH400	Pesticides and Drugs (General)	34
LL822	Protozoan, Helminth, Mollusc & Arthropod Parasites of Animals	29

Top Producing Authors

The top 15 productive authors in India on buffalo literature were: Kumar (S) with 176 papers, followed by Kumar (A) with 173 papers, Singh (S) with 156 papers, Singh (B) with 126 papers, Roy (K.S.) with 117 papers, Madan (M.L.) with 115 papers, Singh (R) with 105 papers, Kumar (R) with 104 papers, Tripathi (V.N.) with 98 papers, Singh (J) with 96 papers, Singh (N) with 96 papers, Ganguli, (N.C.) with 87 papers, Singh (M) with 83 papers, Sharma (A) with 80 papers and Singh (P) with 80 papers.

The top five most productive Indian institutions involved in research on buffaloes are (1) College of Veterinary and Animal Sciences, Pantnagar, Uttarkhand, (2) Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, (3) Indian Grassland and Fodder Research Institute, Jhansi, (4) College of Veterinary Sciences & Animal Husbandry, Faizabad, Uttar Pradesh and (5) Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab.

PAKISTAN

Pakistan is the second largest producer of literature on buffalo research with 706 papers (7.03%). The most preferred journals by Pakistan researchers are furnished in Table-6. It is noticed that about 40% of the papers are published in their national journals and other papers in foreign journals. The foreign journals often used by Pakistan researchers to publish their scientific work on buffalo research are furnished in Table-7.

Table-6: Journals often used by Pakistan researchers to publish work on buffalo research

Sl.No.	Journal Title	No. of Papers	Country of Publication
1	Pakistan Veterinary Journal	236	Pakistan
2	Buffalo Journal	53	Thailand
3	Asian-Australasian Journal of Animal Sciences	34	Korea
4	Buffalo Bulletin	29	Thailand
5	Sarhad Journal of Agriculture	17	Pakistan
6	International Journal of Agriculture and Biology	16	Pakistan
7	Journal of Animal and Plant Sciences (JAPS)	16	Kenya
8	Theriogenology	15	U.S.A.
9	Animal Reproduction Science	14	U.S.A.
10	Pakistan Journal of Agricultural Sciences	13	Pakistan
11	Veterinarski Arhiv	11	
12	Indian Journal of Animal Sciences	9	India
13	Indian Journal of Dairy Science	9	India
14	Pakistan Journal of Agricultural Research	9	Pakistan
15	Buffalo Newsletters	8	
16	Pakistan Journal of Zoology	8	Pakistan
17	Pakistan Journal of Veterinary Research	7	Pakistan
18	Turkish Journal of Veterinary & Animal Sciences	7	Turkey
19	Pakistan Journal of Science	6	Pakistan
20	Revue Scientific et Technique: OIE	6	France

Table- 7: Foreign Journals often used by Pakistan researchers to publish work on buffalo research

Sl.No.	Journal Title	No. of Papers	Country of Publication
1	Buffalo Journal	53	Thailand
2	Asian-Australasian Journal of Animal Sciences	34	Korea
3	Buffalo Bulletin	29	Thailand
4	Theriogenology	15	
5	Animal Reproduction Science	14	
6	Veterinarski Arhiv	11	
7	Indian Journal of Animal Sciences	9	India
8	Indian Journal of Dairy Science	9	India
9	Buffalo Newsletters	8	
10	Turkish Journal of Veterinary & Animal Sciences	6	Turkey
11	Revue Scientific et Technique: OIE	6	France
12	Veterinary Record	6	U.K.
13	Livestock Science	5	Netherland
14	Tropical Animal Health and Production	5	
15	Journal of Dairy Science	4	U.S.A.
16	Acta Veterinaria Brno	3	
17	Indian Journal of Animal Nutrition	3	India
18	Indian Veterinary Journal	3	India
19	Livestock Research for Rural Development	3	
20	Milchwissenschaft	3	

Most Productive Authors

The most productive authors of Pakistan are Ahmad (M) with 43 papers followed by Ahmad (N) with 41 papers, Samad (H.A.) with 40 papers, Sarwar (M) with 37 papers, Khan (M.A.) with 36 papers, Khan (A) with 33 papers, Khan (M.S.) with 31 papers, Muhammad (G) with 31 papers, Chaudhry (R.A.) with 28 papers, Khan (M.Z.) with 26 papers, Ali (C.S.) with 24 papers, Anwar (M) with 23 papers, Usmani (R.H.) with 22 papers, Mahr-un-Nisa with 21 papers, Lodhi (L.A.) with 20 papers, Ullah (N) with 20 papers, Maqbool (A) with 19 papers, Qureshi (Z.I.) with 19 papers, Afzal (M) with 18 papers and Ahmad (K.M.) with 18 papers.

Most Productive Institutions

The most productive Pakistan institutions were: Buffalo Research Institute, Pattoki, followed by University of Agriculture, Faisalabad and Gomal University, Dera Ismail Khan.

High frequency keywords

The high frequency keywords were:

Milk yield (97), estrus (60), sperm (56), lactation (54), disease prevalence (52), semen (51), spermatozoa (51), epidemiology (48), oestrus (47) and bacterial infections.

Conclusion

The role of buffalo in the rural economy of India and Pakistan is vital. Lower producer prices for buffalo meat in countries like India indicate the resilience and the much needed competitive strength in the wake of globalization. In view of the fact that the livelihoods of millions are intertwined with livestock like buffaloes, the same need to be conserved and nurtured in the right path for which continuous research need to be done. It is well understood that the future of Indian agriculture depends on animal husbandry sector and the growth of animal husbandry depends on three factors, *viz.*, research, public policy and the farming community's cooperative action. The greater the synergy among these three factors, the better it would be for India.

In this context, this macroscopic analysis of buffalo research related publications analyses the research output over a 55 year period *i.e.*, from 1955 to 2009, in the form of published literature by Indian and Pakistani scientists, using CAB Direct Online database. This paper has identified the institutions that are active, the most active authors and the journals in which the scientists published their work.

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