

The role of National journals on the rise in Brazilian Agricultural Science Publications in Web of Science

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ABSTRACT

Essential to economic growth in Brazil, agricultural research is one of the most productive areas of national science. In recent years, an increase in publications from the field on international databases has helped raise the country's ranking in terms of global scientific output. This is attributable to factors such as the expansion of graduate programs, increased investment in research and the larger collection of Brazilian scientific journals in Web of Science (WoS) and Scopus. The present study analyzes the influence of national journals on the performance of Brazilian output in Agricultural Science represented in WoS from 2002 to 2011, and raises new questions in the debate over the growth of Brazilian scientific output in the last decade. Based on an analysis of 42,106 articles with at least one Brazilian author, papers were mapped in order to identify and characterize the journals used for publication. Results show that the number of articles in the field increased 301.52% during the period studied, due to the expansion of Brazilian journals in WoS and an increase in the number of issues published by these journals. Following inclusion on the database, several journals increased their periodicity. Half of the output assessed was published in national journals, many of which have only recently been included in WoS, are edited in Portuguese and exhibit a low impact factor. The inclusion of new Brazilian titles on the database and changes to the periodicity of journals can be interpreted as signs of improvement in Brazilian agricultural science journals.

Keywords: Agricultural science, Brazilian science, Brazilian scientific journals, scientometrics

INTRODUCTION

In the last decades, Agricultural research has gained ground as one of the most productive fields of Brazilian science in terms of the number of indexed publications on international databases. This performance is closely related to greater public investment in research and development (R and D) and the expansion of graduate programs in the various areas of Agricultural Science.^[1-3] More recently, the increasing number of Brazilian journals in multidisciplinary databases, such as Web of Science (WoS) and Scopus,

gave new impetus to the growth of scientific national output in Agricultural Science and also in other areas of knowledge.^[4-7]

In the case of WoS, the collection of merely 17 indexed Brazilian journals in 2000^[8] grew to 132 in 2010.^[9] In the category of Agriculture, Biology and Environmental Sciences (ABES), the number of indexed journals grew from 8 to 45 in the same period. Brazil was the Latin American country most benefited by the strategy of regional content expansion in WoS from 2005.^[10] With specific regard to the set of indexed journals of WoS in the areas of ABES, there was an increase of 400 new journals between 2007 and 2009. In the period, Brazil ranked first among the ten countries with the largest increase in representation, with 34 journals indexed, followed by India, with 21 journals, Poland, with 15 journals, and Japan, with 14 journals.^[9]

The insertion of new journals contributed to Brazil's climb from 17th to 13th on the Thomson Reuters-ISI global

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scientific output ranking in 2008, measured by the number of indexed papers.^[4] Articles of researchers in Agricultural Sciences and related areas strongly influenced this result.^[4,11]

Nevertheless, considering the last decade, what were the reflexes of the larger collection of Brazilian journals indexed in WoS on national output in Agricultural Science? In addition to the incorporation of new national journals, were there other changes related to the system of scientific communication in the country, especially to the journals, which have affected the productivity in the field? What were these changes?

This study aimed to analyze the influence of national journals on the performance of Brazilian scientific output in Agricultural Science represented in WoS between 2002 and 2011. Papers were mapped based on an assessment of the year of publication, language and title, as well as the periodicity and impact factor of the journals used by Brazilian authors for publication. The goal is to raise new questions in the debate on the causes and effects of the growth in national scientific production during the period studied.

METHODOLOGY

The sources used for this study were the WoS science citation index expanded (SCI-expanded) and Journal Citation Reports (JCRs). The first stage consisted of an advanced search on SCI-expanded for agricultural science papers with at least one author affiliated to Brazilian organizations. To that end, the Brazilian classification of Agricultural Science had to be adapted to the WoS list of category terms in the WC field (WoS Category).

According to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes), institution linked to the Brazilian Ministry of Education that operates in the consolidation and expansion of postgraduate education in the country, Agricultural Sciences are divided into four areas, which are: Food Science, Agricultural Science I (which includes Agronomy, Soil Science, Microbiology and Soil Chemistry, Floriculture, Parks and Gardens, Agrometeorology, among other fields); Veterinary Medicine; Animal Husbandry and Fishery. Based on the adaptation of the Capes table the list of categories of terms of WoS was built the following search expression:

CU = (Brazil OR Brasil) AND WC= (Agricultural Economics and Policy OR Agricultural Engineering OR Agriculture, Dairy and Animal Science OR Agriculture,

Multidisciplinary OR Agronomy OR Fisheries OR Food Science and Technology OR Forestry OR Horticulture OR Plant Sciences OR Soil Science OR Veterinary Sciences OR Zoology).

To adjust the search to research determinations, the option all languages were selected for the field dedicated to language to enable the recovery of records in journals indexed in 45 languages. In the field pertaining to the type of document, we chose the options Article, selecting 2002–2011 for the timespan and SCIE in the field reserved for citation indexes. The search was conducted in January 2013 and recovered 42,106 papers. Bibexcel, a bibliometric toolbox developed by Olle Persson (Umeå Univ, Umeå, Sweden), free-ware for academic non-profit use, and Microsoft Office Excel 2007 for Windows software (Microsoft, Redmond, EUA).

In the second phase of the study, tables were created depicting the annual number of issues and articles published by the 50 journals most used by Brazilian authors, based on the identification of publication sources. JCR was used as a source to establish the profile of the journals (IF, Rank in Category, Quartile in Category). Complementary data on changes to periodicity were collected on the journal websites.

RESULTS AND DISCUSSION

From 2002 to 2011, a total of 42,106 Agricultural Science papers that contained at least one author with affiliations in Brazil were indexed on SCI-expanded. The number of papers has increased 301.52% during the period. In 2000, a total of 1,710 Brazilian publications were recorded, while in 2011, this number was 6,866 [Table 1]. The annual output average was 4,211 articles; however, the median is 3,760, indicating a significant change in the output profile for the area in Brazil over recent years. The largest growth rates were recorded in 2013 (19.24%), 2007 (52.38%) and 2008 (32.61%).

In 2003, the *Revista Brasileira de Ciência do Solo*, published by the Sociedade Brasileira de Ciência do Solo, and *Ciência e Agrotecnologia* issued by the Universidade Federal de Lavras (UFLA) were included in WoS. The two journals published a combined total of 326 articles by Brazilian authors. This appears to have been the primary factor in the increase in scientific output for the area that year. Between 2006 and 2008, another 24 national Agricultural Science journals - many published by universities, mostly containing articles from Brazilian researchers and written in Portuguese - were incorporated into WoS.

The solid inclusion of Brazilian journals in WoS explains the high growth rate in the number of articles from 2006 on. The impact of this inclusion was even more significant because of two other factors that contributed strongly to the growth of scientific production: The frequency and density of the journals included in the database. Starting in 2006, there was an increase in the number of issues published annually by Brazilian journals of Agricultural Sciences and related fields indexed in WoS. Among these journals, 11 shortened the periods between issues or started publishing special issues. The journals included are of large packing density, according to Basu's concept.^[12] On average, the volumes of national journals in the field indexed in WoS assemble about 115 articles. The average number of articles contained in journals from other Latin American countries is of 33 per issue.^[10]

Thus, although the 42,106 articles in Agricultural Sciences of authors with Brazilian affiliation have been published in 771 journals from 43 countries, Brazilian journals are responsible for publishing 22,911 articles, 54,41% of the total production. The result follows the trend observed in previous studies. Traditionally, researchers of Agricultural Sciences in the country, usually, disclose the results of their investigations in national magazines.^[13,14]

When national journals are in indexes such as WoS, there are more possibilities of the scientific community obtaining greater visibility, citations and better evaluation in national development agencies. Capes, for instance, maintains a system of evaluation of graduate programs and of professors based on quantitative criteria of production, such as the number of papers published by researchers in journals indexed in international databases.^[15]

Combined, these factors contributed to focus the scientific production in the area in Brazilian journals. From 2006 on, there was a sharp reversal in the profile of scientific output in the area in what regards the means of publication [Figure 1]. Between 2002 and 2011, the number of articles published in Brazilian journals rose by 564.46% against 162.64% for those published in foreign journals.

Among the foreign journals mostly used by researchers are those edited in the United States, England and the Netherlands [Table 2]. Journals from these three countries published 14,117 articles by Brazilian scientists in the field of agriculture, corresponding to 33.53% of total national output for the period.

The analysis of the data also reveals changes in the languages of publication. The percentage of articles in English fell by 9% between 2002 and 2011. By contrast, the number of articles published in Portuguese rose by approximately 9% for the same period owing to the profile of national agricultural journals included in WoS in recent years. In the light of the national and multidisciplinary nature of research agendas, agricultural investigators from emerging countries prefer to publish in their own language in regional journals.^[13,14,16]

A study of Brazilian scientific output indexed in WoS and Scopus^[5] has found that between 2000 and 2010, a significant percentage of articles were published in national journals that had recently been included on the databases. "As such, both WoS and Scopus registered an increase not only in articles by researchers from the country, but in terms of Brazil's participation." The proportion of articles written in Portuguese on both databases rose significantly.

Table 1: Brazilian agricultural science papers indexed in WoS, 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Number of papers	1710	2039	2276	2607	2980	4541	6022	6481	6584	6866	42,106
Growth %	-	19.24	11.62	14.54	14.31	52.38	32.61	7.62	1.59	4.28	301.52

Source: WoS. Research data. WoS=Web of science

Table 2: Number of Brazilian agricultural science papers indexed in WoS according to the country of origin of the publisher, 2002-2011

Journal country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total articles	Percentage
Brazil	591	879	925	1121	1321	2496	3795	3990	3866	3927	22,911	54.41
United States	431	444	480	488	484	604	815	1024	1046	1088	6904	16.40
England	233	263	251	322	444	552	470	392	458	459	3844	9.13
Netherlands	220	199	273	285	303	356	316	426	459	532	3369	8.00
Other countries	235	254	347	391	428	533	626	649	755	860	5078	12.06
Total articles	1710	2039	2276	2607	2980	4541	6022	6481	6584	6866	42,106	100.00

Source: WoS. Research data. WoS=Web of science

In the specific case of Brazilian scientific production in agricultural science in 2008 and 2009, the percentage of articles in Portuguese overcame the one of articles in English [Table 3]. This was due to the expansion of the number of Brazilian journals in the database. In the following years, English became again the most widely used language for publication. The reversal, it seems, is due to the improvement of the national journals indexed in WoS.

An analysis of language focused exclusively on national journals reveals a growth in the number of articles in English between 2002 and 2011 [Figure 2]. The results confirm the trend indicated in previous studies of the progressive increase of publications in English in Brazilian journals on Agricultural and Health Sciences.^[4,17]

Of the 50 journals with the highest number of articles, 33 are edited in Brazil, 5 in the United States, 5 in the Netherlands, 5 in England, 1 in New Zealand and 1 in Ireland [Table 4]. Among these, five national publications accounted for 23.93% of total national output in

Agricultural Science indexed in WoS over the decade studied. The *Revista Brasileira de Zootecnia*, published by the Sociedade Brasileira de Zootecnia, created in 1973 and indexed in WoS since the 1990s, occupies first place on the list with 2,724 articles. In second position, with 2,061 articles, is *Pesquisa Agropecuária Brasileira*, created by the Ministry of Agriculture and edited since 1976 by Embrapa, a corporation linked to the Ministry which coordinates the Sistema Nacional de Pesquisa Agropecuária and has units in virtually all states in Brazil. The *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, created in 1943 by the Veterinary School of the Universidade Federal de Minas Gerais, a state in southeastern Brazil, is third with 1,848 articles. Both journals have been indexed by the WoS since the 1980s. *Ciência e Agroecologia*, created in 1996 by the UFLA, also in the state of Minas Gerais, and *Ciência Rural*, created in 1971 by the Universidade Federal de Santa Maria, in the south of the country, are fourth and fifth on the list and were indexed in WoS in 2003 and 2007, respectively.

Table 4 presents a list of the 50 journals that account for 65% of Brazilian output for the field between 2002 and

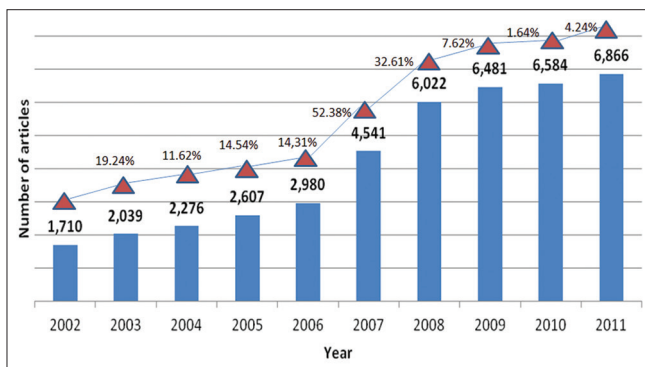


Figure 1: Brazilian Agricultural Science articles in Web of Science (WoS), 2002–2011. Source: WoS. Research data

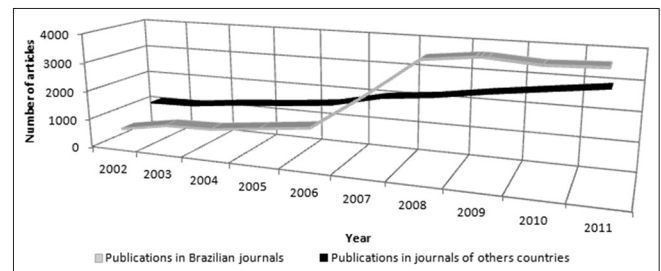


Figure 2: Production evolution according to the country of origin of the journals in which Brazilian Agricultural Science papers were published in Web of Science (WoS), 2002–2011. Source: WoS. Research data

Table 3: Total number of Brazilian papers and the share of publications written in English and Portuguese indexed in WoS, 2002-2011

Year	English	Percentage	Portuguese	Percentage	Other languages	Percentage
2002	1163	68.01	523	30.58	24	1.40
2003	1229	60.27	777	38.11	33	1.62
2004	1501	65.95	768	33.74	7	0.31
2005	1701	65.25	886	33.99	20	0.77
2006	1960	65.77	1014	34.03	6	0.20
2007	2503	55.12	1929	42.48	109	2.40
2008	2841	47.18	3106	51.58	75	1.25
2009	3226	49.78	3232	49.87	23	0.35
2010	3628	55.10	2901	44.06	55	0.84
2011	4103	59.76	2692	39.21	71	1.03
Total	23,855	56.65	17,828	42.34	423	1.00

Source: WoS. Research data. WoS=Web of Science

Table 4: Top 50 journals containing agricultural science papers by Brazilian researchers, 2002-2011

Journal	Total articles	Percentage	Journal country	Journal language	Impact factor	Quartile in category	Category
R. Bras. Zootec.	2724	6.46	Brazil	Mult.	-	-	Veterinary sciences
Pesqui. Agropecu. Bras.	2061	4.88	Brazil	Port.	0.661	Q2	Agriculture, multidisciplinary
Arq. Bras. Med. Vet. Zootec.	1848	4.38	Brazil	Port.	0.269	Q4	Veterinary sciences
Cienc. Agrotec.	1843	4.37	Brazil	Port.	0.395	Q3	Agriculture, multidisciplinary
Cienc. Rural	1601	3.79	Brazil	Port.	0.383	Q4	Agronomy
Rev. Bras. Cienc. Solo	1415	3.35	Brazil	Eng.	0.733	Q4	Soil science
Zootaxa	1205	2.85	New Zealand	Eng.	0.974	Q3	Zoology
Rev. Bras. Frutic.	874	2.07	Brazil	Port.	0.296	Q4	Horticulture
Rev. Bras. Zool./Zoologia (1)	858	2.03	Brazil	Eng.	0.658	Q4	Zoology
Pesqui. Vet. Bras.	842	1.99	Brazil	Mult.	0.538	Q3	Veterinary sciences
Ciencia Tecnol. Aliment.	788	1.86	Brazil	Port.	0.326	Q4	Food science and technology
Sci. Agric.	673	1.59	Brazil	Eng.	0.796	Q2	Agriculture, multidisciplinary
Semin.-Cienc. Agrar.	575	1.36	Brazil	Port.	0.301	Q4	Agriculture, multidisciplinary
Planta Daninha	548	1.29	Brazil	Mult.	-	-	Plant sciences
Vet. Parasitol.	508	1.20	Netherlands	Eng.	2381	Q1	Veterinary sciences
Hortic. Bras.	489	1.15	Brazil	Port.	0.513	Q3	Horticulture
Rev. Arv.	467	1.10	Brazil	Port.	0.327	Q4	Forestry
Rev. Cienc. Agron.	458	1.08	Brazil	Port.	0.713	Q2	Agriculture, multidisciplinary
Acta Bot. Bras.	440	1.04	Brazil	Port.	0.374	Q4	Plant sciences
Biosci. J.	401	0.95	Brazil	Eng.	0.275	Q4	Agronomy
Acta Sci.-Agron.	397	0.94	Brazil	Mult.	0.365	Q4	Agronomy
Neotrop. Ichthyol.	368	0.87	Brazil	Eng.	1048	Q3	Zoology
J. Ethnopharmacol.	357	0.84	Ireland	Eng.	2755	Q1	Plant sciences
Rev. Caatinga	343	0.81	Brazil	Port.	0.321	Q4	Agronomy
Eng. Agric.	335	0.79	Brazil	Port.	0.673	Q4	Agricultural engineering
J. Agric. Food Chem.	327	0.77	United States	Eng.	2906	Q1	Food science and technology
Food Chem.	312	0.74	England	Eng.	3334	Q1	Food science and technology
Acta Sci. Vet.	303	0.71	Brazil	Eng.	0.273	Q4	Veterinary sciences
Iheringia Ser. Zool.	290	0.68	Brazil	Port.	0.423	Q4	Zoology
Rev. Bras. Parasitol. Vet.	289	0.68	Brazil	Mult.	0.722	Q3	Veterinary sciences
Cerne	282	0.66	Brazil	Port.	0.215	Q4	Forestry
Cienc. Florest.	271	0.64	Brazil	Port.	0.286	Q4	Forestry
Crop. Breed. Appl. Biotechnol.	268	0.63	Brazil	Eng.	0.524	Q3	Agronomy
Bioresour. Technol.	238	0.56	Netherlands	Eng.	4750	Q1	Agricultural engineering
Theriogenology	219	0.51	United States	Eng.	2082	Q1	Veterinary sciences
Rev. Bras. Med. Vet.	208	0.49	Brazil	Port.	0.031	Q4	Veterinary sciences
J. Food Eng.	200	0.47	England	Eng.	2276	Q1	Food science and technology
Trop. Plant Pathol.	201	0.47	Brazil	Eng.	0.513	Q4	Plant sciences
Bol. Inst. Pesca	192	0.45	Brazil	Port.	0.164	Q4	Fisheries
J. Venom. Anim. Toxins Trop. Dis.	191	0.45	Brazil	Eng.	0.545	Q4	Toxicology
J. Essent. Oil Res.	190	0.45	United States	Eng.	0.553	Q3	Food science and technology
For. Ecol. Manage.	173	0.41	Netherlands	Eng.	2766	Q1	Forestry
Braz. J. Poult. Sci.	163	0.38	Brazil	Eng.	0.337	Q4	
Anim. Reprod. Sci.	160	0.37	Netherlands	Eng.	1897	Q1	
Commun. Soil Sci. Plant Anal.	157	0.37	United States	Eng.	0.420	Q3	Agronomy
Aquaculture	148	0.35	Netherlands	Mult.	2009	Q1	Fisheries

contd...

Table4: contd...

Journal	Total articles	Percentage	Journal country	Journal language	Impact factor	Quartile in category	Category
J. Fish Biol.	139	0.32	England	Eng.	1834	Q2	Fisheries
Med. Mycol.	138	0.32	England	Eng.	1979	Q1	Veterinary sciences
Phytochemistry	136	0.32	England	Mult.	3050	Q1	Plant sciences
Novon	135	0.32	United States	Eng.	0.295	Q4	Plant sciences
Total articles in top 50 journals	27,748	65.00					

Sources: WoS and JCR. WoS=Web of Science, JCR=Journal citation reports

2011, including basic information on the language of the publication, country of origin and degree of visibility according to the impact factor. Data pertaining to the impact factor are from the 2012 edition of JCRs. The impact factor is used as an indicator to calculate the average number of citations received by a scientific journal, obtained based on the relationship between the number of times the journal was cited and the number of articles it published over a certain period.^[18]

Among the journals listed, two do not feature in JCR Science Edition 2012, that is, their impact factor was not disclosed in 2012. *Revista Brasileira de Zootecnia*, published by the Sociedade Brasileira de Zootecnia, and *Planta Daninha* published by the Sociedade Brasileira da Ciência das Plantas Daninhas, were removed from JCR “for exhibiting anomalous citation standards that were distorting their impact factors”.^[18]

The journals listed encompass 13 distinct categories in WoS - Agriculture, Dairy and Animal Science; Multidisciplinary Agriculture; Agronomy; Soil Science; Plant Sciences; Forestry Science; Veterinary Science; Agricultural Engineering; Horticulture; Fisheries; Food Technology; Toxicology; Zoology. Since some are classified in more than one category, the impact factor listed on the table indicates the area in which the journal received its best classification.

To avoid comparisons between journals from different fields, we analyzed the impact factor of each one based on the quartile it occupies in its area. The quartile indicates the position of the indexed journals on the database within a certain category, according to its impact factor. In JCR, journals are classified into four quartiles (Q1, Q2, Q3 and Q4) and ranked from the highest to the lowest impact factor, depending on the visibility of the publication.

Twelve of the journals on the list of those most used by Brazilian scientists are in the first quartile and all of these are foreign. Of these, particularly noteworthy are Bioresource Technology, with the largest impact factor

among the twelve Agricultural Engineering publications, Forest Ecology and Management, which has the fourth highest impact factor among the 60 Forestry Science journals, and Veterinary Parasitology, with the seventh largest impact factor among the 142 periodicals dealing with Veterinary Science. Four journals fall within the second quartile: One from England, the Journal of Fish Biology in the Fisheries category, and three from Brazil, all in the area of Multidisciplinary Agriculture: *Pesquisa Agropecuária Brasileira*, published by Embrapa, *Revista Ciência Agronômica* by the Universidade Federal do Ceará, and *Scientia Agricola*, of the Universidade de São Paulo. With an impact factor of 0.796, *Scientia Agricola* is 22nd among the 57 Multidisciplinary Agriculture publications featuring in JCR. *Ciência Agronômica* and *Pesquisa Agropecuária Brasileira* are ranked 25th and 27th, respectively.

Nine journals are rated in the third quartile - six from Brazil, two from the United States and one from New Zealand. *Ciência e Agrotecnologia*, published by UFLA, is ranked 38th out of 50 Multidisciplinary Agriculture journals, whilst *Horticultura Brasileira* is placed 30th among the 32 Horticulture publications. The 23 journals with low impact factors that occupy the fourth quartile in several categories include 22 Brazilian journals and one from the United States. In the case of the national publications, most are published in Portuguese or are multilingual and were included in WoS between 2005 and 2009.

***Revista Brasileira de Zoologia* Changed its Name to Zoology in 2009**

A specific analysis of 33 national journals with the highest number of articles revealed that eight changed their periodicity after their inclusion in WoS. *Pesquisa Veterinária Brasileira*, edited by the Colégio Brasileiro de Patologia Animal, which maintained bimonthly circulation since its creation in 1981, began receiving support from the Colégio Brasileiro de Anatomia and adopted monthly periodicity in 2007. The previously

bimonthly *Revista Brasileira de Zootecnia* and *Ciência Rural* also adopted monthly issues in 2008 and 2010, respectively. The *Revista Brasileira de Zoologia*, edited on a quarterly basis by the Sociedade Brasileira de Zoologia, changed its name to *Zoologia* in 2009 and became a bimonthly publication. The same is true for the Bioscience Journal, a periodical issued by the Universidade Federal de Uberlândia, and *Engenharia Agrícola* of the Associação Brasileira de Engenharia Agrícola. Furthermore in 2009, *Revista Brasileira de Fruticultura* issued by the Sociedade Brasileira de Fruticultura and *Acta Scientiae Veterinariae* published by UFRGS adopted quarterly and three monthly periodicity, respectively. Other journals, such as *Revista Brasileira de Zootecnia* and *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, published a large number of special supplements during the period.

Table 5 shows the period in which the national journals most used by Brazilian authors to publish their work were included on the database and the changes that were made to their periodicity in some cases.

Although the precise reason for these changes is not known, it is presumed that the status achieved by the journals in being indexed in WoS enabled them to attract more articles, requiring them to increase their periodicity in order to satisfy demand.

CONCLUSIONS

Measured in number of articles in the WoS, the Brazilian scientific production in Agricultural Sciences grew by over 300% between 2002 and 2011. However, the percentage of articles published in journals with significant international visibility is still small. As demonstrated, journals in the first quartile of JCR published 7% of the total amount of Brazilian articles indexed in WoS for the period analyzed. Those with a lower impact factor - less international visibility according to Thomson Reuters criteria - concentrated more than 80% of Brazilian output in Agricultural Science.

The production was mainly driven by the expansion of the collection of scientific journals of the country in the database and by editorial changes promoted in many national journals. The 42,106 articles registered for this study were published in 771 different journals from 43 countries. However, a significant portion of these were published in Brazilian journals, which accounted

Table 5: Year the Brazilian journals were indexed in WoS, number of issues and papers published per year, 2002-2011

Journal	2002		2003		2004		2005		2006		2007		2008		2009		2010		2011	
	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed
R. Bras. Zootec.	6	227	6	221	6	221	6	253	6	291	6	233	12	267	12	345	12	335	12	331
Pesqui. Agropecu. Bras.	12	230	12	185	12	179	12	167	12	243	12	234	12	236	12	205	12	188	12	194
Arq. Bras. Med. Vet. Zootec.	6	109	6	122	6	123	6	144	6	194	6	253	6	233	6	227	6	209	6	234
Pesqui. Vet. Bras.	4	25	4	25	4	39	4	36	4	40	12	83	12	102	12	152	12	169	12	171
Cienc. Agrotec.			6	207	6	177	6	159	6	166	6	257	6	276	6	277	6	205	6	119
Rev. Bras. Cienc. Solo			6	119	6	106	6	106	6	105	6	158	6	280	6	181	6	192	6	168
Sci. Agric. Zoologia					6	80	6	90	6	71	6	78	6	99	6	97	6	88	6	70
J. Venom. Anim. Trop. Dis.					4	166	4	166	4	147	4	147	4	95	4	98	4	107	4	98
					4	19	4	19	4	19	4	31	4	31	4	44	4	31	4	35

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Table 5: contd...

Journal	2002		2003		2004		2005		2006		2007		2008		2009		2010		2011	
	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed	Issues indexed	Articles indexed
Neotrop. Ichthyol.									4	45	4	55	4	63	4	69	4	63	4	73
Braz. J. Poult. Sci.						4	39	4	37	4	39	4	37	4	35	4	30	4	22	
Rev. Bras. Frutic.					4	127	4	182	4	160	4	157	4	169	4	160	4	154	4	251
Ciencia Technol. Aliment.					4	157	4	169	4	136	4	157	4	169	4	136	4	189	4	137
Semin.-Cienc. Agrar.					4	72	4	90	4	88	4	72	4	90	4	88	4	132	4	193
Planta Daninha					4	98	4	96	4	120	4	98	4	96	4	120	4	121	4	113
Hortic. Bras.					4	108	4	100	4	96	4	108	4	100	4	96	4	82	4	103
Rev. Arv.					6	20	6	112	6	115	6	20	6	112	6	115	6	109	6	111
Rev. Cienc. Agron.					4	69	4	83	4	83	4	69	4	83	4	83	4	95	4	128
Iheringia Ser. Zool.					4	66	4	67	4	62	4	66	4	67	4	62	4	56	4	39
Rev. Bras. Parasitol. Vet.					4	50	4	51	4	70	4	50	4	51	4	70	4	56	4	62
Cerne					4	48	4	46	4	54	4	48	4	46	4	54	4	65	4	69
Cienc. Florest.					4	42	4	49	4	43	4	42	4	49	4	43	4	59	4	78
Rev. Bras. Med. Vet.					4	28	4	40	4	45	4	28	4	40	4	45	4	51	4	44
Acta Bot. Bras.					4		4	103	4	119	4		4	103	4	119	4	121	4	97
Acta Sci.-Agron.					4		4	100	4	100	4		4	100	4	100	4	99	4	98
Acta Sci. Vet.					3		3	103	3	77	4		3	103	4	77	4	65	4	58
Biosci. J.					4		4	60	4	121	6		4	60	6	121	6	120	6	100
Bol. Inst. Pesca					4		4	65	4	54	4		4	65	4	54	4	34	4	39
Cienc. Rural					9		9	431	9	437	9		9	431	9	437	12	405	12	328
Eng. Agric.					4		4	74	4	67	6		4	74	4	67	6	96	6	98
Trop. Plant Pathol.					6		6	67	6	59	6		6	67	6	59	6	48	6	27
Rev. Caatinga					4		4	151	4	83	4		4	151	4	83	4	83	4	109

WoS = Web of Science

for 54.41% of output (22,911 articles). Between 2002 and 2011, the number of articles published in Brazilian journals rose by 564.46% against 162.64% for those published in foreign journals. When analyzing language, a corresponding result is observed: Only 56.65% of articles are published in English and 42.34% in Brazil's official language, Portuguese.

The greater number of Brazilian journals on agricultural areas as well as on other fields of knowledge in the international bibliographic index occurred in a context marked by the expansion of graduate programs in Brazil. There was also the expansion of the Programa de Apoio à Editoração e Publicação de Periódicos Científicos, developed by Capes and by the Conselho Nacional de Pesquisa, which aims to encourage the editing and publication of journals in the country.

From 2006 on, as noted, several national journals adopted shorter periods between issues and started publishing a greater number of issues per year. By the end of the decade, seeking greater international visibility, journals started to publish more articles in English. This has driven the output in the area and can be interpreted as signs of improvement in national Agricultural Science journals. In the coming years, the challenge of Brazilian Agricultural Science journals indexed in WoS is to gain more visibility and impact.

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