BIBLIOMETRIC ANALYSIS OF WORLD'S AND BRAZILIAN'S PUBLICATIONS IN SCOPUS DATABASE: FISH NUTRITION

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RESUMO

Percebendo a necessidade de mais esclarecimentos sobre o estado da investigação sobre nutrição de peixes, este trabalho teve como objetivo fazer um estudo bibliométrico, utilizando o banco de dados *Scopus*, usando com chave de busca o termo Nutrição de peixes, tanto no Brasil como no mundo inteiro. Os resultados foram apresentados estratificados, mostrando as tendências de publicação na área de conhecimento específico. A pesquisa na base de dados Scopus foi realizada em 2012, tendo em conta a série histórica de 1999 a 2010. Os dados obtidos a partir da pesquisa foram: número de publicações por ano ou série histórica, publicação por autor, por área, por jornal, por instituição, por país da publicação. A análise da concentração foi realizada pela comparação do número de publicação dos 10 principais contribuintes (países, área de conhecimento, autores, instituições e jornal) em relação ao total de publicações da base. Para a análise temporal, foram usadas equações de regressão exponencial do número de publicações relativas ao ano. Os valores de cada variável foram linearizados pela aplicação do logaritmo, onde o coeficiente angular da equação indica a taxa de crescimento durante um período específico. A pesquisa mostrou que as publicações em "Nutrição de Peixe" tiveram um crescimento significativo na última década, uma vez que a taxa de crescimento em publicações em todo o mundo e no Brasil foram 204,4 493,2 em "Nutrição de Peixes", respectivamente.A análise desses dados sugere um interesse contínuo em todas as regiões pesquisadas, com grande potencial para o desenvolvimento desse tipo de pesquisa, especialmente no Brasil.

Palavraschave: digestão, enzimasdigestivas, fisiologia de peixes, metodosestatisticos

ABSTRACT

Realizing the need for more clarification on the status of research on Fish Nutrition, this work aimed to do a bibliometric study, using the *Scopus* database, using the entries Fish Nutrition and Enzyme Activity, both in Brazil and worldwide. The results were presented stratified, showing the tendencies of publication in the specific knowledge area. The research in the *Scopus* database was performed on January 2012, taking into account the historical series from 1999 to 2010. The data obtained from the research were: number of publications per year or historic series, publication by author, by area, by journal, by institution, by country and the language of the publication. The analysis of the concentration was performed by the comparison of the number of publication of the 10 main contributors (countries, knowledge area, authors, institutions and journal) in relation to the total of publications from *Scopus* database. For a temporal analysis, were used exponential regression equations of the number of publications in relation to the year. The values of each variable were linearized by the application of the logarithm, by means that the equation's angular coefficient indicates the rank of growth in a specific period. The research

showed that publications in "Fish Nutrition" and "Enzyme activity" had significant growth in the last decade, once the growth rate in publications worldwide and in Brazil were 204.4 and 493.2 in "Fish Nutrition", respectively. Also, the growth rate of publications for "Enzyme activity" showed values of 157.9 and 292 for the world and Brazil. The analysis of these data suggests a continuous interest in the areas surveyed, with great potential for development of this kind of research, especially in Brazil.

Keywords: digestion, digestive enzymes, fish physiology, statistic methods.

1 Introduction

Aquaculture can be defined as the growth of organisms whose life cycle is totally or partially aquatic; among them are fishes, amphibians, mollusks, crustaceans and aquatic plants. Within the aquaculture, fish-farming is a very highlight sector.

The world catch of fish raised its apex at the years 1990, stopping at the baseline of 95 million tons. Aquaculture, by its time, presented growing rates near 10% per year, at the last 15 years. It raised, in 2010, the rank of 55.1 million tons, being one of the most raising activities among the world agribusiness (FAO, 2010).

It is important the knowledge of the eating habits of the fishes, for the adequacy of the given ration. The eating habit gives an idea of the nutritional needs of each species. For example: carnivorous fishes make better use of animal's origin food, needing higher protein content in ration, when bred in captivity. Besides, they normally don't use well the vegetable food; omnivorous and herbivorous fishes are less exigent in relation to protein content and well profit a larger variety of foods. The eating management, therefore, must consider the animal's habits, the breeding system, the natural productivity, the climatic conditions, the food handling, among other aspects (Chong, 2002; Conceição et al., 2009).

Most of food digestion occurs in the fishes' intestines and pyloric caeca, when they exist. The intestinal secretions presents a high number of enzymes, including the three major classes, that are the proteases, lipases and amylases, wich hydrolyses the three major respective classes of nutrients, and that are substratum-dependents (Hidalgo et al., 1999; Conceição et al., 2003; Moro et al., 2010).

Besides, the information about the pancreatic enzyme development pattern, its secretion in the duodenum and activity in the intestinal content are important to implement nutritional and dietary strategies, to improve the use of nutrients by the animals (Halver and Hardy, 2002; Conceição et al., 2003).

Nowadays, one of the sciences that have raised attention is bibliometrics, from which is possible, through application of statistic methods, do observations towards the state of the art or scientific strand (Pritchard, 1969; Monari and Molinari, 2008; Malesios and Abas, 2012).

The information flow, the behavior of the scientific community, the communication channels, mainly journal, all of this is part of the Science and are as important as the researches that constitute new discovers (Fonseca, 1986; Oliveira et al., 1992; Natale et al., 2012).

The question, however, is in what manner is possible to make such diagnostic. One of the possibilities consists in utilization of methods thet allow measuring the productivity of the researchers, groups or research institutions. To do so, it is essential the use of specific techniques of evaluation that may be quantitative or qualitative, or even a combination of both (Alvardo, 1984; Torres-Salinas, 2009; Malesios and Arabatzis, 2012).

Generally, these are some possibilities of application of the bibliometric, scientometric and informetric techniques: identify the tendencies and the growth of the knowledge in a specific area; identify the papers of the core of a discipline; predict the publication tendencies; study the

dispersion and the obsolesce of the scientific literature; measure the degree and the pattern of collaboration among the authors; analyze the process of citation and co-citation; evaluate the circulation and usage of documents in a document center; measure the growth of specific areas and the raising of new themes (Alvardo, 1984; Halver, 2001; Malesios and Abas, 2012).

The aim of the present work is realize a bibliometric study, using the Scopus data base, on the subjects "Fish nutrition" and "Enzyme activity", as in Brazil as in the world, being the results presented stratified, stating the publication tendencies in the scientific area.

2 Materials and Methods

The data were obtained based on the Scopus scientific database (www.scopus.com). The search was performed on January 09, 2012, being the research refine performed as described below and illustrated in Table 1.

Table 1. Search criteria and refine of the researches in Scopus database.

TITLE-ABS-KEY	REFINE		
	SUBJAREA	TITLE-ABS-KEY2	COUNTRY
fishnutrition	norestriction	norestriction	norestriction
fishnutrition	norestriction	norestriction	Brazil
fishnutrition	Agri, Bioc, Vete	norestriction	norestriction
fishnutrition	Agri, Bioc, Vete	norestriction	Brazil
fishnutrition	Agri, Bioc, Vete	Enzymeactivity	norestriction
fishnutrition	Agri, Bioc, Vete	Enzymeactivity	Brazil

The data obtained from the research were: number of publications per year or historic series, publication by author, by area, by journal, by institution, by country and the language of the publication.

The analysis of the concentration was accomplished by the comparison of the number of publication of the 10 most contributors (countries, knowledge area, authors, institutions and journal) in relation to the total of publications.

For the calculation of the concentration, were always used the top 10 of each search mode in the statistic analysis. The rank of growth was calculated in the base of the number of publications between the years 1999 to 2010, once at the time of the research the data of 2011 and 2012 were not totally registered at Scopus database.

For a temporal analysis, were used exponential regression equations (log - log) of the number of publications in relation to the year, according the statistic model: $\log Y = a + b.\log X$, where the angular coefficient "b" represents the growth rate (Gujarati, 2011).

The values of each variable were linearized by the application of the logarithm, by means that the equation's angular coefficient indicates the rank of growth in a specific period. The statistic analyses were performed in the Minitab applicative, 15.1.1.0.2007 version.

3 Results

Table 2 shows the total number of listed articles in Scopus database when are used the terms "Fish nutrition" and "Enzyme activity" without any restriction, being referential the number of publications, and using the restriction tool for country "Brazil".

Table 2. Publications per year and total, at the world and in Brazil, using the searching terms and the research refine tools.

Year	– Fishnutrition		– Fishnutrition – Agriculture		– Fish nutrition – Agriculture – Enzyme activity	
	Total	Brazil	Total	Brazil	Total	Brazil
2010	550	41	238	36	48	5
2009	476	31	182	23	43	6
2008	435	17	247	12	35	2
2007	483	12	293	10	50	1
2006	469	11	323	8	66	1
2005	359	10	211	8	42	1
2004	378	10	252	7	49	2
2003	381	6	253	4	41	1
2002	276	5	156	3	22	0
2001	231	4	151	2	29	0
2000	185	1	118	1	23	0
1999	171	5	112	3	19	1
TOTAL	**6903**	**193**	**3901**	**147**	**589**	**22**

It was performed a research to the database taking as referential the period between 1999 to 2010, being shown the number of published articles per year, by research terms and restricted to the target areas of the research, according to Table 2.

The Figure 1 demonstrates the participation (%) of Brazilian articles in relation to the worldwide, the position of Brazilian publication in relation to other countries and the proportion of Brazilian authors publishing in English.
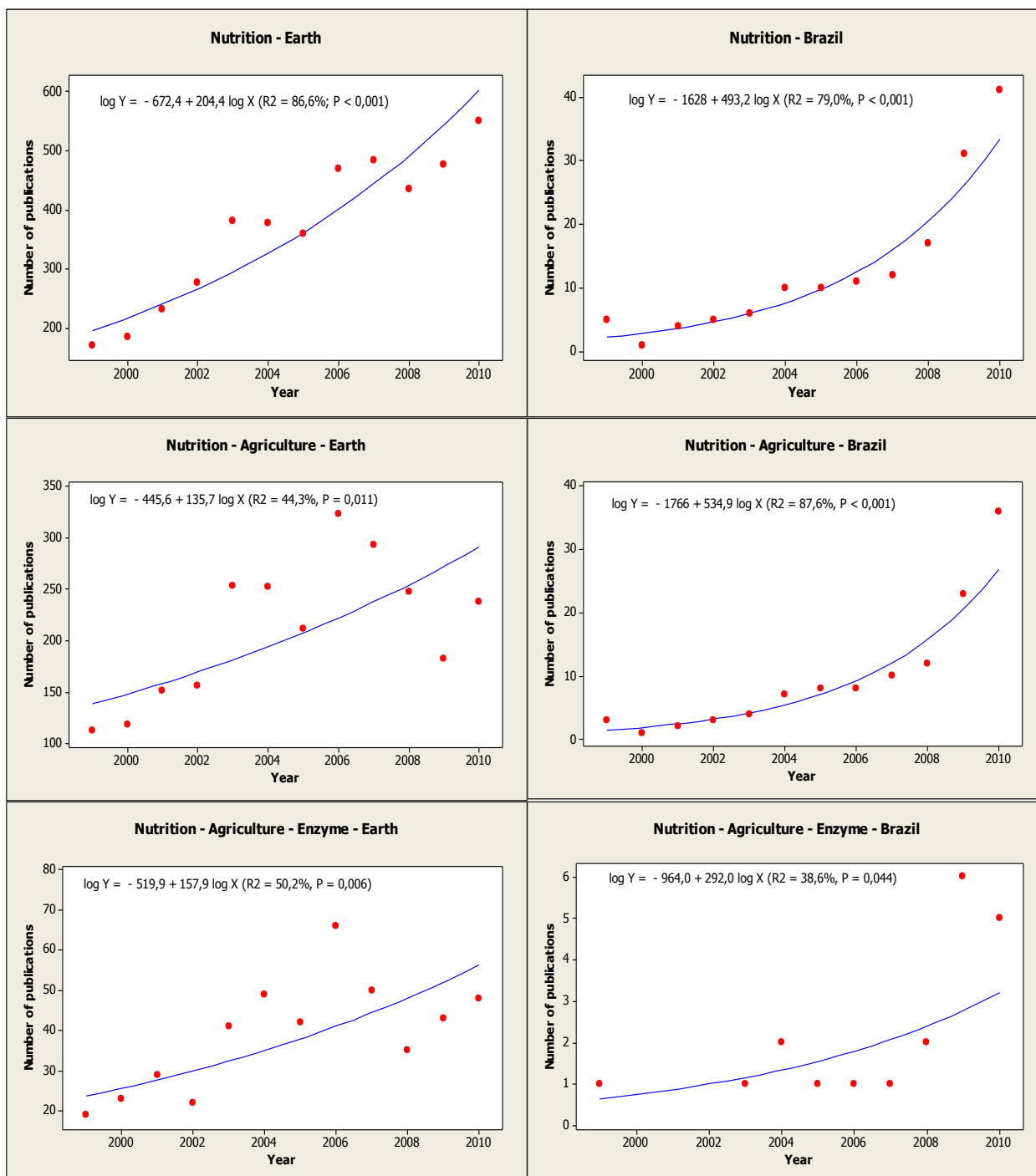
Figure 1. Publication growth rate, worldwide and in Brazil, at the period
from 1999 to 2010, expressed by the linearized angular coefficient.

The Figure 2 shows the linearized regressions for the analyzed data. For these regressions were used all the publications corresponding to the terms and filters of interest, being comprised the period between 1999 and 2010, once the 2011 and 2012 data were not totally indexed to the database at the time of this study.
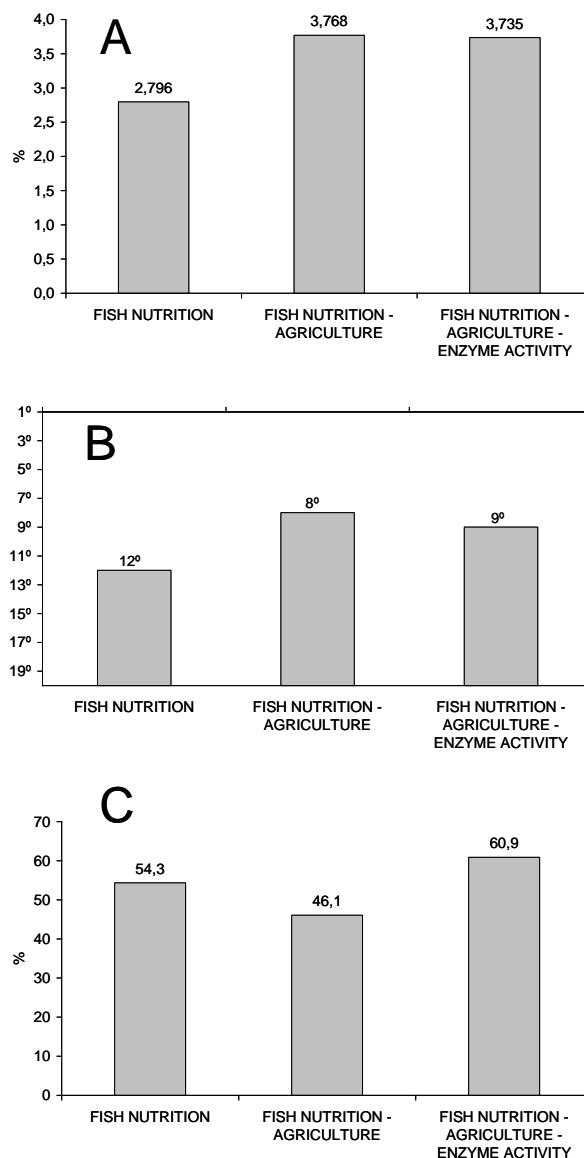
Figure 2. Participation of (%) Brazilian articles in relation to the worldwide (A); Position of the Brazilian publication in relation to other countries (B); Proportion of Brazilian authors publishing in English (C).

Table 3 presents a top 10 ranking of the major authors that published more articles concerning the search methodology and research refine, as worldwide as national sphere.

Table 3. The "top 10" authors by term and search refining.

Fishnutrition				Fishnutrition - agriculture				Fish nutrition - agriculture enzyme activity			
Total		**Brazil**		**Total**		**Brazil**		**Total**		**Brazil**	
Author	n	Author	n	Author	n	Author	n	Author	n	Author	n
Calder, P.C.	33	Pezzato, L.E.	18	Gatlin, D.M.	24	Pezzato, L.E.	18	Panserat, S.	17	Moraes, G.	6
Bistrian, B.R.	28	Barros, M.M.	15	Shiau, S.Y.	22	Barros, M.M.	14	Kaushik, S.	16	Goncalves, G.S.	3
Gatlin, D.M.	27	Boscolo, W.R.	12	Hardy, R.W.	22	Boscolo, W.R.	12	Tocher, D.R.	13	Lundstedt, L.M.	3
Kaushik, S.J.	24	Feiden, A.	10	Kaushik, S.J.	20	Feiden, A.	10	Medale, F.	11	Pezzato, L.E.	2
Shiau, S.Y.	23	Donzele, J.L.	9	Kaushik, S.	20	Donzele, J.L.	9	Conceicao, L.E.C.	10	Almeida, L.C.	2
Hardy, R.W.	22	Waitzberg, D.L.	8	Pezzato, L.E.	19	Signor, A.A.	8	Ronnestad, I.	10	Cyrino, J.E.P.	2
Panserat, S.	22	Signor, A.A.	8	Panserat, S.	19	Guimaraes, I.G.	7	Krogdahl, A..	9	Barros, M.M.	2
Kaushik, S.	21	Guimaraes, I.G.	7	Tocher, D.R.	19	Cyrino, J.E.P.	6	Calder, P.C.	8	Neto, J.R.	2
Michaelsen, K.F.	21	Dorea, J.G.	7	Pezzato, L.E.	18	Moraes, G.	6	Shiau, S.Y.	8	Donzele, J.L.	2
Medale, F.	20	Moraes, G.	6	Calder, P.C.	17	Roubach, R.	6	Kaushik, S.J.	7	Pedron, F.A.	1

Figure 3:A shows the publication growth rate (%), wordwide and in Brazil, when applied the search filter "Fish Nutrition", selected the knowledge area and another fiter "Enzyme activity". Figure 3:B shows the concentration range of publication by the main authors, being applied the same refining terms.
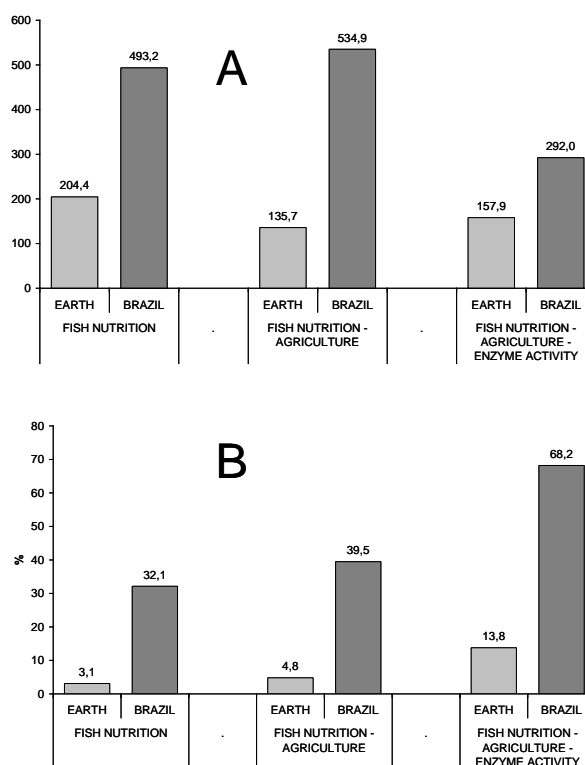
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Figure 3. Publication growth rate (%), worldwide and in Brazil (A);
Concentration range of publication by the main authors (B).

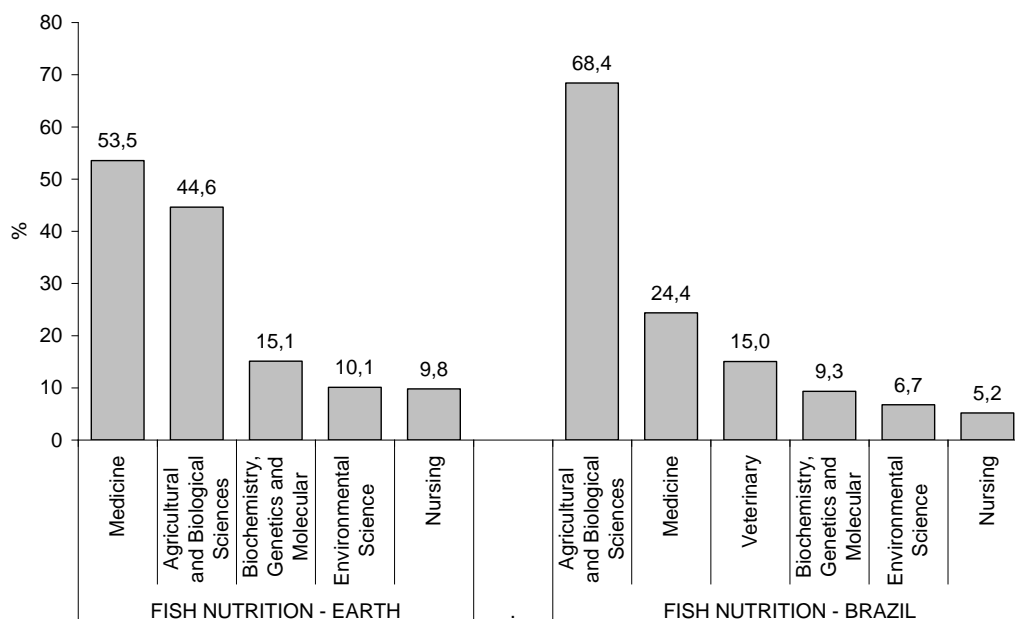Figure 4 shows the concentration rage of publication by knowledge area.

Figure 4. Concentration range of publication by knowledge area.

The Table 4 (APPENDIX A) shows the top 10 media or journal in which are published the paper about "Fish nutrition" and "Enzyme activity". Theseinformation are specially important to take choices about where to submit an article.

Figure 5 demonstrates the concentration range of publication of the "top 10" journals and the concentration range of publication by institution, worldwide and in Brazil.
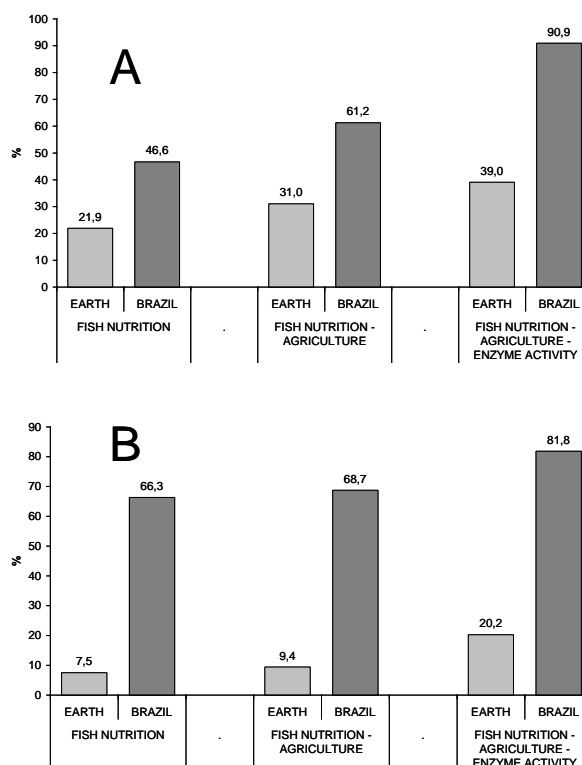

Figure 5. Concentration range of publication of the "top 10" journals (A);
Concentration range of publication by institution, worldwide and in Brazil (B).

The Table 5 (APPENDIX B) shows the total number of publications by institutions in the world and in Brazil, using the proposed methodology. The institutions are ranked by the top 10.

4 Discussion

The percent (%) participation of Brazilian articles in comparison to the total publications, found in the research using as reference the Scopus database, at the period from 1999 to 2010, was analyzed. Were first searched the published articles containing the term "Fish nutrition", without any filter, what showed, after statistical analysis, that Brazilian articles represented 2.796% of the total published articles. It was also performed the analysis for the publications with the term "Fish nutrition", refined/filtered by the knowledge areas that are of interest to the research, "agriculture and biological sciences" or "biochemistry, genetics and molecular biology" or "veterinary", that represents 3.76% of the total publications. When, besides the previous restrictions and search terms, the term "Enzyme activity" was added, the Brazilian participation maintains representation of 3.73%, almost equal to the previous evaluation.

One of the possible evaluation forms is the composition of a publication ranking inside the Scopus database, highlighting the position of Brazilian publications, in relation to other countries. This ranking, whose amplitude ranges from the 1st to the 15th countries, shows Brazil at the 12th position, when the reference search term is "Fish nutrition". When was performed the restriction by knowledge area, the position in the ranking jumps to 8th; and introduced the term "Enzyme activity", the position becomes the 9th, showing the significance of Brazilian publications in relation to the world total in the areas and subjects here focused.

Also was evaluated the proportion of Brazilian authors publishing in English, when apply only the term "Fish nutrition" as reference in the Scopus database. It was observed that 54% of publications were published in English. When the knowledge area filters applied were "agriculture and biological sciences" or "biochemistry, genetics and molecular biology" or "veterinary", this value decreases to 46%. When the term "Enzyme activity" is added, it is observed an increase of the number of publications in English, what may shown a tendency of publication in specialized international journals, and higher classification in Brazilian regulating organs attending this field.

The detailed analisys of the linearized angular coefficient obtained through this study may be understood as a publication growth rate, worldwide and in Brazil, at the period from 1999 to 2010, indexed at Scopus database. It can be seen that when the search reference is "Fish nutrition", the world publications increased at a rate of 204.4 in the decade, while Brazil publications increases at a rate of 493.3 in the same area. When the search in the database is restricted to the knowledge areas "agriculture and biological sciences", or "biochemistry, genetics and molecular biology" or "veterinary", it can be seen that the world improvement is about 135.7, against 534.9 increase in Brazilian publications. When, besides the term "Fish nutrition" and the restriction/refine of the specific knowledge areas, is also included the term "Enzyme activity", the world growth rate in the historic series is about 157.9, while in Brazil is of 292.

These results suggest that the growth rate of publications in the studied period is at minimum two times more elevated, in Brazil, for every used search forms, terms and filters/refines, what shows a tendency in fish nutrition research, above the world media. In Brazil, these researches are mainly focused at the agricultural sciences area. It is also observed a higher growth rate in Brazilian publishing when the search is refined by the term "Enzyme activity", stating the development of a research subarea, linked to animal nutrition.

The author's contribution rate, related to worldwide and Brazilian publications, was also evaluated. It was observed that the rate of concentration of the top 10 authors corresponds to 3.1% of the world publication and the top 10 Brazilian authors correspond to 32.1% of the

national publication, when the search term is "Fish nutrition". It was also observed a significant rising at the concentration range of publications for the main authors when the search in database is restricted to "agriculture and biological sciences" or "biochemistry, genetics and molecular biology" or "veterinary", amounting 4.8% of the world publications and 39.5% of Brazilian publications.

When, besides the previously listed terms and the knowledge area restriction, is added the term "Enzyme activity", the concentration rate jumps to 13.8% in the world and 68.2% in Brazil, showing that the research in these areas are probably concentrated in established and organized institutions and research groups. Another statement was that the concentration range of publications of the top 10 authors becomes even higher as the areas and subareas of knowledge were defined, specifically and correlated to the wide range of the research lines.

The concentration of publications when analyzed the distribution by knowledge area was also evaluated. When our search was performed without restrictions and only by the term "Fish nutrition", there was a great concentration in the Medicine area, corresponding to 53.5% and 24.4%, for total and Brazilian publications, respectively. However, when the number of publications in "agriculture and biological sciences" were analyzed, obtained numbers were 44.6% for total and 68.4% for Brazilian publications. The observed concentration of publications was higher in Medicine area, in total records and may indicate that important research institutions work with fish for other means that not applies to the Animal Sciences. In fact, sebrafish (*Daniorerio*) is a conventional animal model for *"in vivo"* experiments in developmental biology and applied physiology. The observed concentration of Brazilian publications also showed the major relevance of this theme for Agricultural Sciences in Brazil.

It was performed the analysis on the participation of the top 10 journals with higher concentration of articles in the search for "Fish nutrition" and "Enzyme activity". This information is especially important in case of choice of where to submit an article in these fields. As seen, 21.9% of the total publications are restricted to the "top 10" journals, although on research restricted to Brazil this value is of 46.6%. When the search in the Scopus database was performed using two interest terms and restricting the knowledge areas, was observed a significant concentration rates to 39.0% for the world's "top 10" journals, and incredible 90.9% for the Brazilian's top 10 journals. It is important to highlight the Brazilian Journal of Zootechny, the journal with higher number of national publications with the reference term "Fish nutrition". When, the term "Enzyme activity" was added, and restricting to "agriculture", this journal was even competitive at international level appearing in "top ten" journal.

These numbers may lead to an interpretation of a greater specificity of journals for the publications in Animal Nutrition, when the subarea is Enzymology. They also may indicate that in Brazil, the "top 10" journals are practically the better/only reference for researches in knowledge areas of interest of this work.

It was also demonstrated the concentration of publication by institution, worldwide and in Brazil. The concentration rate of the "top 10" more productive institution, when the reference term was "Fish nutrition" showed a percentage of 7.5% in relation to the total data. The Harvard School of Public Health was the 1st score institution, not being observed any Brazilian institution in the list. When the search was restricted to Brazil, the concentration value raises to 66.3%, being UNESP – UniversidadeEstadualPaulista, Universidade de São Paulo and Universidade Federal de Viçosa the three institutions that more published. It indicates that in Brazil, Enzymology research is strongly concentrated to a few universities or research groups.

When, besides the search term, it was used the filter/restriction to the knowledge areas "agriculture or biological sciences" or "biochemistry, genetics and molecular biology" or "veterinary", it were obtained values of 9.4% for the top 10 world institutions, and of 68.7% for Brazil. When the term "Enzyme activity" was included, the values raised to 20.2% and 81.8%, worldwide and Brazil, respectively, suggesting a strong concentration of researches of specific

groups in a few institutions, being the French UnitéMixte INRA-INFREMER-Université Bordeaux the world most productive and Universidade Federal de São Carlos, Universidade de São Paulo e Universidade Federal de Santa Catarina, in Brazil, at the three first positions of the rank.

This research demonstrated that quantity of publications concerning "Fish nutrition" and "Enzyme activity" raised significantly at the last decade, being the improvement of publications worldwide and in Brazil of 204.45 and 493.2, respectively. Also the observed growth rate of publications about "Enzyme activity", were of 157.9 and 292, worldwide and in Brazil respectively, suggesting a crescent interest on the researchers in those areas attending to a great potential of biotechnological development maily in Brazil. This interest can be understood as a higher need to improve the animal nutrition researches, leading scientists and institutions to deepen studies in enzymology applied to animal nutrition.

5 Aknoledgment

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7 APPENDIX A

Table 4. Leading journals by numbers of publications in the total and in Brazil using the search term "Fish nutrition" and refining the research in the area "agriculture".

Fishnutrition				Fishnutrition – agriculture				Fish nutrition - agriculture - enzyme activity			
Total		Brazil		Total		Brazil		Total		Brazil	
Aquaculture	338	Rev. bras. zootec.	28	Aquaculture	338	Rev. bras. zootec.	28	Aquaculture	75	Rev. bras. zootec.	8
Am. j. clin. nutr.	259	Pesqui. agropecu. Bras.	14	Am. j. clin. nutr.	163	Pesqui. agropecu. Bras.	14	AquacultureNutrition	26	Aquaculture	2
J. nutr.	228	Ciencia Rural	10	JournalofNutrition	162	Ciencia Rural	10	Lipids	24	AquacultureNutrition	2
Br. j. nutr.	145	Hydrobiologia	8	AquacultureResearch	88	Hydrobiologia	8	AquacultureResearch	22	AquacultureResearch	2
Eur. j. clin. nutr.	116	Aquaculture	7	Eur. j. clin. nutr.	86	Aquaculture	7	Comp. biochem. physiol	18	Comp. biochem. physiol., Part A Mol. integr. physiol	2
Public Health Nutrition	101	Archivos De Zootecnia	6	Hydrobiologia	83	Archivos De Zootecnia	6	Fishphysiol. biochem.	16	ScientiaAgricola	2
AquacultureResearch	88	AquacultureNutrition	5	Lipids	83	AquacultureNutrition	5	Comp. biochem. physiol, Part A Mol. integr. physiol.	15	Boletim do Instituto de Pesca	1
Hydrobiologia	83	Acta sci., Anim. sci.	4	J. Am. Diet. Assoc.	71	Acta sci., Anim. sci.	4	JournalofNutrition	15	Comp. biochem. physiol., Part B Mol. integr. physiol	1
Lipids	83	JPEN	4	AquacultureNutrition	71	ScientiaAgricola	4	Am. j. clin. nutr.	11	Fishphysiol. biochem.	1
AquacultureNutrition	71	ScientiaAgricola	4	Public Health Nutrition	64	AquacultureResearch	4	Rev. bras. zootec.	8	Grasas Y Aceites	1

8 APPENDIX B

Table 5. Number of publications by institution, in total SCOPE data and from Brazil.

Fishnutrition				Fishnutrition - agriculture				Fish nutrition - agriculture enzyme activity			
Total		**Brazil**		**Total**		**Brazil**		**Total**		**Brazil**	
Harvard School of Public Health	71	UNESP-Universidade Estadual Paulista	39	UniversityofStirling	53	UNESP-Universidade Estadual Paulista	36	UnitémixteINRA - IFREMER-Université Bordeaux	23	Universidade Federal de São Carlos	6
Nasjonaltinstiutt for ernærings-ogsjømatforskning	67	Universidade de São Paulo	30	Nasjonaltinstiutt for ernærings-ogsjømatforskning	51	Universidade de Sao Paulo	14	UniversityofStirling	21	Universidade de São Paulo	3
Universityof Southampton	65	Universidade Federal de Viçosa	14	Texas A and M University	41	Universidade Federal de Viçosa	12	Nasjonaltinstiutt for ernærings-ogsjømatforskning	17	Universidade Federal de Santa Catarina	3
Wageningen University and Research Centre	64	Universidade de Brasília	13	UnitémixteINRA - IFREMER-Université Bordeaux	41	Universidade Estadual do Oeste do Paraná	12	Universitetet i Bergen	15	Universidade Federal de Santa Maria	3
UniversityofStirling	55	Universidade Estadual do Oeste do Paraná	12	UNESP-Universidade Estadual Paulista	39	Instituto Nacional de Pesquisas Da Amazônia	12	Universidade do Algarve	14	Universidade Federal de Viçosa	2
Inserm	49	Instituto Nacional de Pesquisas da Amazônia	12	UC Davis	33	Universidade Estadual de Maringá	11	IFREMER Centre de Brest	14	UNESP-Universidade Estadual Paulista	2
UC Davis	48	Universidade Estadual de Maringá	11	Inserm	31	Instituto de Pesca	8	Norgesveterinærhøgskole	12	Universidade Estadual de Campinas	2
Texas A and M University	47	Universidade Federal do Rio de Janeiro	10	Universitat de Barcelona	31	Universidade Federal de São Carlos	7	National Taiwan OceanUniversity	10	Instituto de Pesca	2
National Institute of Public Health and the Environment	46	Universidade Federal de São Paulo	10	Universityof Southampton	31	Universidade Federal de Santa Catarina	7	Universidade do Porto	9	FMVZ	1
University of Copenhagen, Faculty of Life Sciences	44	Instituto de Pesca	8	Universitetet i Bergen	31	Universidade Federal de Santa Maria	7	Universityof Southampton	9	FEAD	1