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Systematic Review

Disciplinary Categorization of the Cattle Supply Chain—A Review and Bibliometric Analysis

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Abstract: Global warming is a problem that threatens humanity, with livestock being one of the causes. A systematic literature review was carried out by using some appropriate elements of the PRISMA statement to identify disciplines that work to mitigate the effects of the livestock industry by organizing them according to their approach to addressing this problem. The main objective is to find information and classify the disciplines, papers, literature review methodologies, research gaps, authors, and journals developing the management of the cattle supply chain. This paper could analyze and mitigate the adverse effects on society and the environment generated by the industry, organizing them according to their approach. Twenty databases were consulted between March and May 2020, from which 146 review documents were chosen. The papers reviewed were published between 2003 and 2020. The eligibility criteria for selection were open access to the full text, publication in an indexed journal, and a focus on any discipline related to cattle. The unselected papers did not have DOIs or duplicates, and those focused on other types of meat and book chapters. Subsequently, the information in the selected papers was described and consolidated, and these papers had 602 authors and were from 99 journals. Next, a discipline categorization was proposed. The results were organized, showing that among all the analysis criteria, the category of veterinary medicine had the best results in terms of indicators; therefore, additional research is needed on the other disciplines, especially in culture, technology, management, quality control, tanneries, and transportation, as there was less research within these disciplines. It is recommended that research on a mix of the different proposed disciplines be conducted. The proposed categorization's main contribution is to identify and group the cattle supply chain's different disciplines and the definition of research gaps organized under a structure organizational management model. Finally, a multicriteria selection methodology must be used that prioritizes the discipline categories proposed in this review to guide future research.

Keywords: supply chain; cattle; sustainability; categorization

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1. Introduction

Livestock impacts on the environment and its contribution to the increase in the generation of greenhouse gases (GHGs) through its production systems and each echelon of the supply chain are problematic and concerning to academic entities and social, environmental, governmental, and non-governmental organizations that are working to identify alternatives to mitigate the adverse effects of this economic sector worldwide [1–3]. This systematic literature review focuses on identifying the different disciplines relating to the cattle supply chain.

This categorization seeks to understand the important interests of the actors involved in managing livestock, identify in detail new and established areas of knowledge and research, jointly develop synergistic scenarios, and achieve the sustainable development objectives established by the Food and Agriculture Organization (FAO) of the United Nations,

2030 Agenda [4,5]. One objective is conducting water management while recognizing water as a finite vital resource for all ecosystems on Earth and as a right for all living organisms, even if all do not have that right. Approximately 1.5 million children die each year due to a lack of clean water. Water reserves are threatened due to increased demand from industries, agricultural production systems, urban waste, contamination of waterways, and mining; there is no equilibrium in water use, and water supply is less than water consumption; as a result, 47% of the world's population will live with water scarcity by 2030 [6–10].

Similarly, government representatives at the FAO World Food Summit rejected that 800 million people in the world cannot meet their food needs, which implies establishing sustainable action plans defined in conjunction with world leaders focused on identifying these communities and offering food and nutritional security [11–13]. In addition, mitigating climate change is a priority. The conclusions presented by the Intergovernmental Panel on Climate Change suggest that source control in production systems should be conducted, all significant events should be tracked, and critical indicators should be removed. According to the projections for the next five years, the temperature will continue to increase, and it is expected that the goal of maintaining global warming below 2 °C will be achieved [14]. Finally, the population is expected to increase to 9800 million by 2050 and 11,200 million by 2100 [15].

This scenario could increase meat consumption by 73% by 2050 and, consequently, some goals for improving environmental conditions could be affected [16]. The projected world production for the current year of beef cattle is 70,707 kilotons, and consumption is 70,430 kilotons. The production projection for the year 2030 is 74,713 kilotons, and consumption is 74,421. The data indicates that the demand must be fully satisfied [17]. Meat consumption provides nutritional benefits such as proteins, fats, minerals, and vitamins with a high supply of bioavailability and micronutrients for humans [16,18]. The low or non-consumption of beef could affect the health of the human being, especially in the absence of iron content that the body needs. Anemia problems could affect intellectual development, amenorrhea, and fertility impairment [19]. Based on the previously described overview, the objective of this systematic literature review was to identify disciplines related to the livestock industry and categorize them by analyzing and organizing the related information found in each scientific article on technical approaches and then produce an interdisciplinary guide that promotes mixing, experimenting with, and identifying new methodologies to address the problems generated by livestock. As an additional objective, we sought to identify and analyze information from papers, authors, and journals in detail.

Previous research has contributed to the scientific progress related to livestock and has identified cultural diversity for and against the permanence of the sector in the economy from different disciplines. However, no contributions have grouped them and identified the same concerns regarding animal welfare and the environment. This document, unlike previous works, collects all those disciplines around livestock and identifies gaps allowing future researchers to be interested in the same concerns. Likewise, it encourages the industry to find common paths from different positions to focus efforts on maintaining the works and transforming practices that are harmful to the environment and turning them into competitive advantages for the sector, where the opponents are future friends and tend toward common goals.

2. Materials and Methods

2.1. Search Strategy

A systematic literature review was conducted of reviews performed on the cattle supply chain, following the guidelines of the proposal to improve the publication of systematic reviews and meta-analyses guideline report (PRISMA) (Please see Appendix A Section). About 60,000 published papers have used the PRISMA guideline report for systematic review until August 2020, ensuring the reliability and suitability of the findings [20]. These published papers have demonstrated the PRISMA's effectiveness as a methodology for conducting systematic literature reviews. A total of 20 databases were consulted between

March and May 2020, and 10 identical keywords were used for each search, yielding 2060 references (Table 1), with the number of papers per database in Table 2.

The papers reviewed were published between 2003 and 2020. A PRISMA flowchart was made to present all the steps of the literature search and final selection (Figure 1). The inclusion criteria of the papers were as follows: (i) open access to the full text; (ii) publication in indexed journals; and (iii) a focus on any discipline related to cattle. Unselected papers were those without DOIs/duplicates/focus on other livestock/and book chapters.

Of the documents that did not have open access, three were identified that were considered necessary to include; thus, the authors were contacted, and the provision of the complete texts was facilitated through ResearchGate. Finally, the number of papers per database selected for the final review is presented in Table 3.

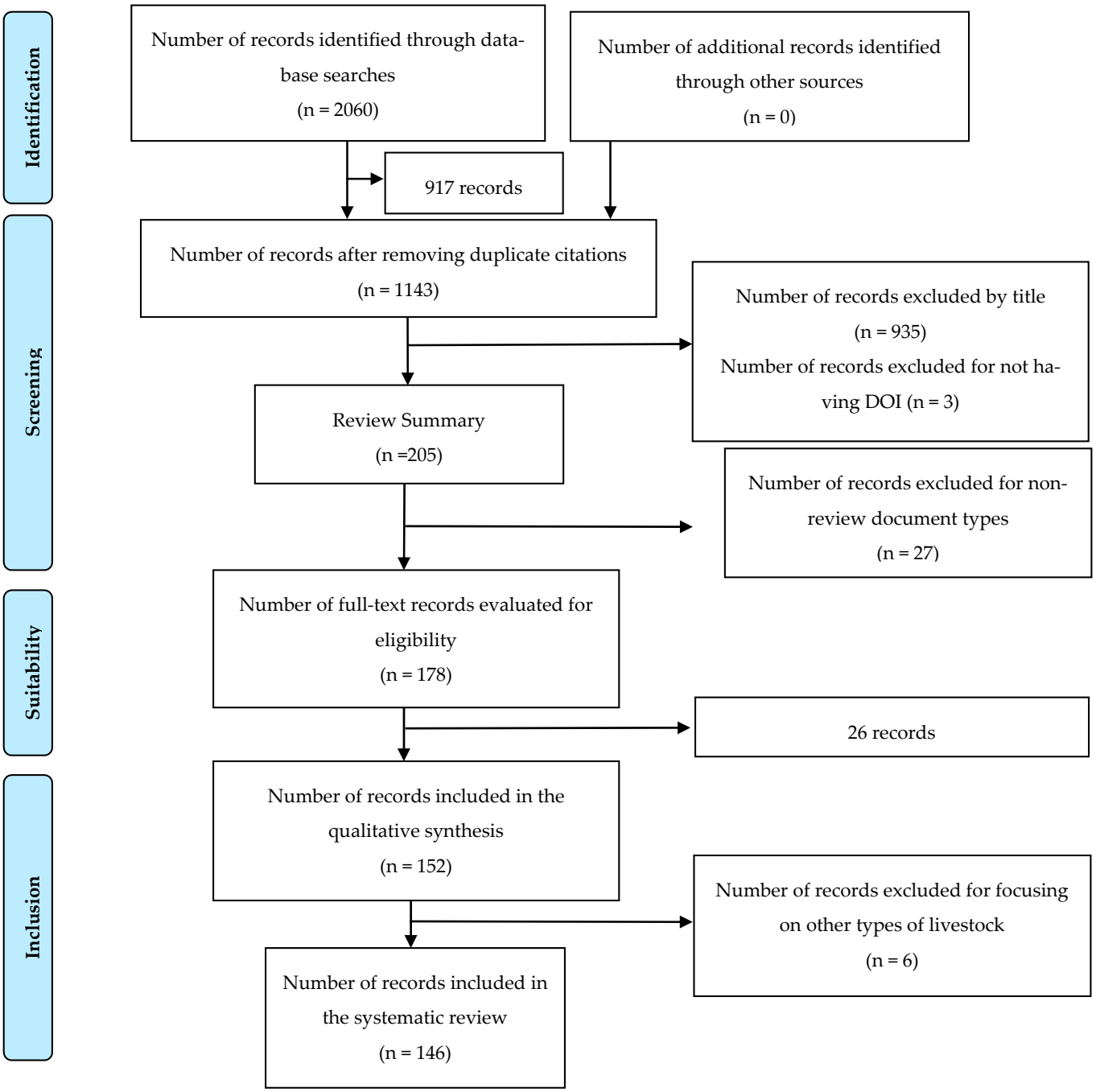

Figure 1. PRISMA flowchart of the bibliographic search and text selection process.

Table 1. Search terms and equations in databases.

ID	Search Terms	Equation
#1	meat supply chain review systematic of literature	TITLE-ABS-KEY (meat AND supply AND chain AND review AND systematic AND of AND literature)
#2	systematic review of literature sustainable development and search within results cattle	(TITLE-ABS-KEY (systematic AND review AND of AND literature AND sustainable AND development) AND (cattle)
#3	review systematic of supply chain meat	TITLE-ABS-KEY (review AND systematic AND of AND supply AND chain AND meat)
#4	review systematic of meat sustainability	TITLE-ABS-KEY (review AND systematic AND of AND meat AND sustainability)
#5	review systematic of meat transport	TITLE-ABS-KEY (review AND systematic AND of AND meat AND transport)
#6	review systematic of meat cattle	TITLE-ABS-KEY (review AND systematic AND of AND meat AND cattle)
#7	review of literature sustainability assessment of beef cattle	TITLE-ABS-KEY (review AND of AND literature AND sustainability AND assessment AND of AND beef AND cattle)
#8	review systematic sustainability beef cattle	TITLE-ABS-KEY (review AND systematic AND sustainability AND beef AND cattle)
#9	review systematic gas emissions greenhouse and cattle	(TITLE-ABS-KEY (review AND systematic AND gas AND emissions AND greenhouse) AND TITLE-ABS-KEY (cattle)
#10	review systematic gas emissions greenhouse and fresh food	(TITLE-ABS-KEY (review AND systematic AND gas AND emissions AND greenhouse) AND TITLE-ABS-KEY (fresh AND food)

Table 2. Number of papers obtained from the databases.

Search Terms ID	Scopus/ Science Direct	Gale Onfile/ Agriculture	Wiley Online Library	Proquest	Agecon Search	Agris	Ambientalex	Usda	Ebscohost	IEEE	Springer	Oxford Univer-sity	Taylor y Francis	WoS, Kjd, Rsci, Scielo	Sage	MDPI
#1	4	2	31	10	1	0	0	0	104	0	280	609	4278	8	18	0
#2	13	24	0	3	0	0	0	0	1	0	144	0	0	1	5	0
#3	11	1	0	9	0	0	0	0	16	0	0	0	1	15	7	0
#4	12	3	0	4	0	1	0	0	31	0	11	0	0	20	8	1
#5	8	6	0	9	0	0	0	0	6	0	15	0	0	18	11	0
#6	52	9	0	8	1	0	0	0	91	0	81	0	12	111	10	0
#7	2	0	0	11	0	0	0	0	3	1	40	0	22	7	2	0
#8	4	0	0	7	1	0	0	0	4	0	20	0	0	6	4	0
#9	6	0	28	5	0	0	0	0	9	0	9	0	0	10	0	0
#10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	113	45	59	66	3	1	0	0	265	1	600	609	35	196	65	1

2.2. Data Analysis

The information obtained from each article was consolidated in a spreadsheet and included a summary, keywords, objectives, results, conclusions, recommendations, research gaps, weighted impacts in the field, number of citations in Scopus, and literature review methodologies. Subsequently, information on each review was collected and consolidated. This information consisted of the following: affiliations, thematic areas, country of origin, number of papers, total citations, and H index, yielding a total of 602 authors based on Scopus. Finally, from 99 journals, the following data were obtained: the Journal Citation Report (JCR), Scimago Journal and Country Rank (SJR), H index, rejection rates, percentile of prominence and CiteScore from Scopus, and publisher, editor(s), original language, frequency, cost of publication, and country, from Scopus and Web of Science.

Table 3. Number of papers selected for absolute review.

Database	Quantity of Items
Ambientalex	0
Ebscohost	35
Gale Onfile/Agriculture	9
IEEE	1
Proquest	27
Agecon search	0
Agris	0
Sage	5
Scopus/Science direct	44
Springer	5
Taylor & Francis	7
USDA	0
Wiley online library	2
WOS, KID, RSCI, Scielo	11
MDPI	0
Total	146

3. Data Analysis

The supply chain integrates functions from suppliers that offer goods and services to customers. The supply function includes the participation of different stakeholders directly or indirectly fulfilling the demand [21]. These activities are repeated several times for the flow supply channel [22]. The beef supply echelons are suppliers, plant production, transportation modes, and final distribution. The main objective of the supply chain is to integrate activities that allow managing the supply chain in real-time to simplify activities [23]. Likewise, supply chains add value to stakeholders and create competitive advantages [24].

Similarly, it is necessary to manage its operations to improve profitability and competitiveness [25]. Subsequently, organizations use concepts of green supply chains and collaborative strategic alliances to turn them into tools and reduce the unfavorable environmental, social, and economic impact of their industrial operations; including awareness of the importance of sustainability [26–31]. Finally, supply chain management plans and controls forward and backward goods, services, and information from origin to destination for the fulfilling needs of all stakeholders [32].

The cattle supply chain begins with the production or raising of the cattle, and its objective is to wean, raise and fatten the cattle. Once the animals meet weight expectations, they are sent through carriers to marketing centers called beaches, fairs, or livestock auctions. The price is negotiated according to the value per kilogram, and the product is sold. Another alternative is when the buyer finds the cattle to negotiate it for a tentative value, evaluating the price probabilistically based on their experience, or buying it by the weight of the carcass placed. Subsequently, the cattle are loaded onto trucks or trailers and sent to processing plants or refrigerators, where the cattle are slaughtered and prepared in quarters

or eighths of the carcass to be sent to refrigeration rooms. Next, they are distributed in equipped vehicles with refrigeration to small meat outlets or industrial companies. Consecutively, companies and small businesses ship fresh or processed products to customers. The customer also could go to buy their products personally. Finally, some companies have integrated the entire supply chain, produce, transport, benefit, and have their industrial plants; sometimes, the same producers take the cattle from their farms to these plants [33].

The results obtained in the review literature and the proposal to categorize the cattle supply chain are presented Figure 2.

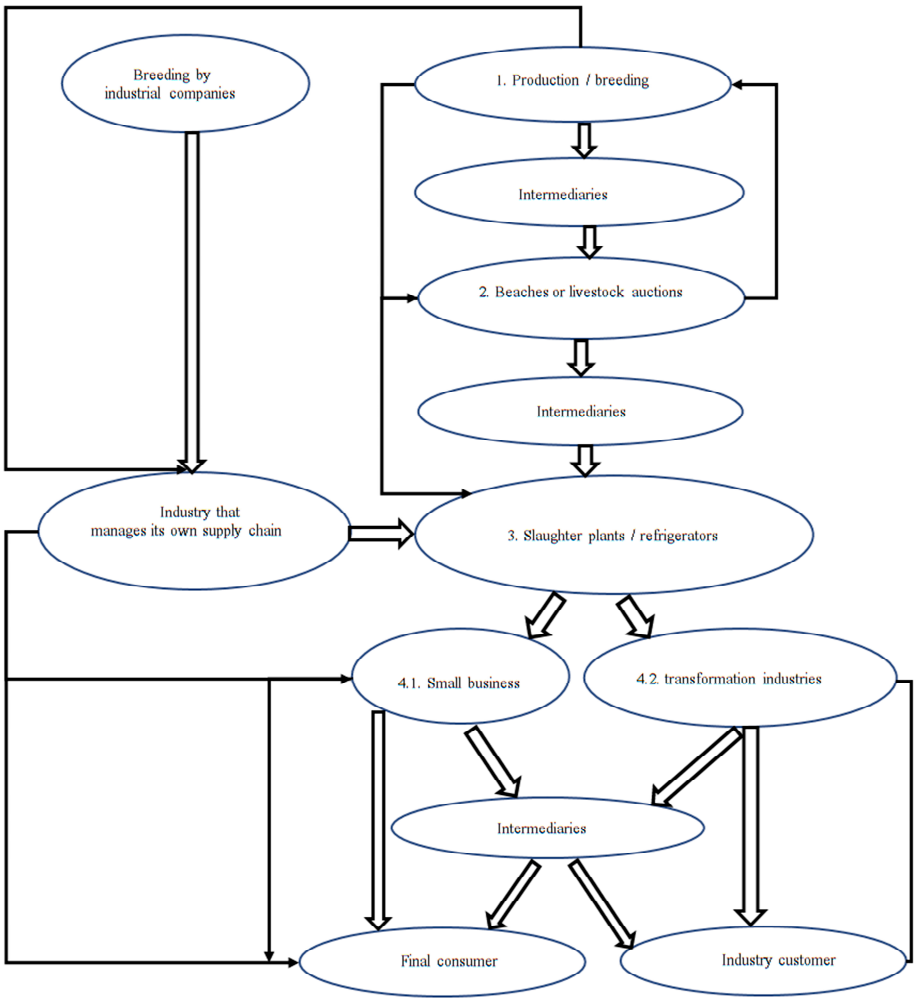

Figure 2. Echelons of livestock supply chain.

3.1. Categorization

Table 4 presents the suggested discipline categories and approaches and the number of publications covering the cattle supply chain. The discipline's organization was performed according to the objectives of each area of interest in scientific papers. Based on the review, researchers are increasing their research in veterinary medicine, and 33% of the total number of papers were on veterinary medicine. Similarly, the category of culture and transport accounted for the lowest percentage of the total number of review papers at 2.96%. This analysis highlighted the need to increase research in this disciplinary area in the scientific community.

Finally, this organization has been performed based on the analysis of the relationship between the objectives of each paper. We have separated each category as appropriate to the echelons of the entire cattle supply chain. Indeed, the proposed structure allows

generating the cross-cutting nature of the disciplines as they interfere and relate to each other in all the echelons of the meat supply network.

Table 4. List of proposed categories and approaches.

Category	Publications	Focus	Publications
Global warming	25	Climate change	1
		Meat consumption	6
		Emissions of greenhouse gases	8
		Nutrition	3
		Industrial processes	1
		Hydric resource	1
		Waste	3
		Soils and plants	2
Culture	4	Spirituality	1
		Origin and evolution	3
Tanneries	3	Conservation	1
		Occupational health	2
General agricultural sector	36	Strategic alliances	1
		Food	15
		Subsistence allowance	6
		Supplies	3
		Greenhouse gas mitigation	2
		Industrial processes	5
		Prospective	2
		Hydric resource	2
Quality management and control	8	Consumer	4
		Safety	3
		Temperature	1
Veterinary medicine	49	Cattle welfare	11
		Illness	17
		Internal Medicine	1
		Nutrition	20
Perspectives	9	Current and future context	7
		Innovation and competitiveness	1
		Developing countries	1
Technology	7	Infrared spectroscopy	1
		Nanotechnology	1
		Emerging and innovative technologies	3
		Artificial vision and UAV	2
Transport	5	Aerial	1
		Maritime	1
		Land	3

3.2. Papers

Figure 3 indicates the increase in researcher interest in the livestock industry from the first publication to efforts to obtain a sample of papers to develop this document. Table 5 shows the different methodologies that the researchers used to carry out their scientific reviews. It is observed that 74% of the authors did not use a formal guide; however, we found that 12.59% used PRISMA reporting guideline as an approach for conducting their systematic literature reviews. In addition, there is interest from other authors in offering guidelines for conducting a literature review. Table 6 lists the publications that used the right parts of the PRISMA reporting guideline. Besides, Table 7 specifies which publications misnamed their work that PRISMA is a method when it is evident that it is a reporting guideline. It identifies the publications attached to the diagram and the PRISMA checklist. Table 8 shows that the impact and number of citations of agricultural sector disciplines related to the cattle supply chain accounted for higher proportions of the review papers at 35.22% and 33.99%, respectively. Similarly, veterinary medicine identified the highest number of research gaps, at 32.68%; these gaps were extracted from those suggested by the authors and not from the documents they reference in their papers.

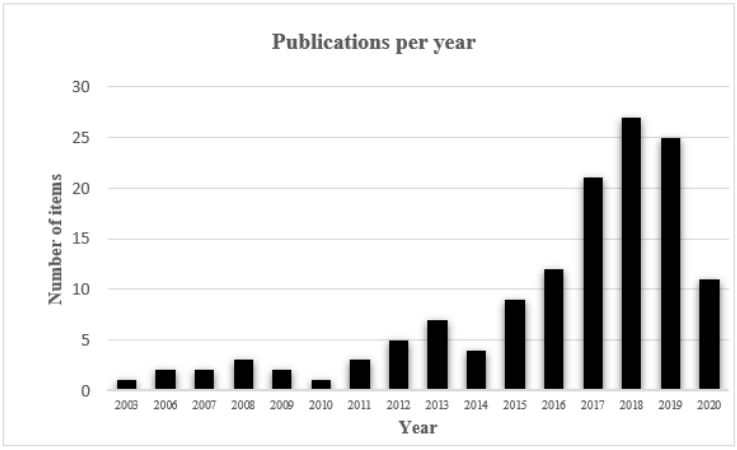

Figure 3. Number of publications per year.

Table 5. Methodologies used by the publications to carry out the reviews.

Methodologies—Report Guidelines	Number of Papers
(Carroll et al., 2011)	1
(Gurwick et al., 2013)	1
(Pullin y Gavin 2006; Lortie 2014)	1
(Webster and Watson, 2002)	1
(Chapman et al., 2017)	1
(Creswell, 1998)	1
(Fahimnia et al., 2015; Wamba and Mishra, 2017)	1
(Mallett et al., 2012)	1
Cochrane	3
(Kitchenham et al., 2004)	1
Joanna Briggs Institute Methodology—Report Guide Cochrane	1
(Llonch et al., 2015)	1
(Khan, Kunz, Kleijnen and Antes, 2003)	2
Without Specific Method	107
Report Guide PRISMA	17
(Conforto, Amaral y Silva, 2011)	1
Report Guide Cochrane-PRISMA	2
(Tranfield et al., 2003)	1
(O'Connor et al., 2014; Sargeant and O'Connor, 2014a)	1
(Mayring, 2003)	1

Table 6. Number of publications, citations, citation impact and gaps using Scopus data.

Publications	Number of Papers
(Escarcha, Lassa and Zander, 2018)	1
(Chai et al., 2019)	1
(Sánchez and Sabaté, 2019)	1
(Lynch, 2019)	1
(York, Heffernan and Rymer, 2018)	1
(Clune, Crossin and Verghese, 2017)	1
(Andreas et al., 2019)	1
(Galán et al., 2018)	1
(Wurtz et al., 2019)	1
(Collins et al., 2018)	1
(Lukasz et al., 2016)	1
(Pérez and Federico, 2019)	1
(Rachael et al., 2019)	1
(Anne and Roess, 2020)	1
(Uffe et al., 2018)	1
(Marques et al., 2020)	1
(Goldansaz et al., 2017)	1
Total	17

Table 7. Publications including PRISMA diagram.

Publications	Number of Papers	Including Prisma Diagram?	Including a Copy of Reporting Guidelines?	Correctly Stated
(Escarcha, Lassa y Zander, 2018)	1	No	No	X
(Chai et al., 2019)	1	Yes	No	X
(Sánchez y Sabaté, 2019)	1	No	No	X
(Lynch, 2019)	1	Yes	No	X
(York, Heffernan y Rymer, 2018)	1	No	No	X
(Clune, Crossin y Verghese, 2017)	1	Yes	No	X
(Andreas et al., 2019)	1	Yes	No	X
(Galán et al., 2018)	1	Yes	Yes	X
(Wurtz et al., 2019)	1	Yes	Yes	X
(Collins et al., 2018)	1	Yes	Yes	X
(Lukasz et al., 2016)	1	Yes	Yes	X
(Pérez y Federico, 2019)	1	Yes	No	X
(Rachael et al., 2019)	1	Yes	No	X
(Anne y Roess, 2020)	1	Yes	No	X
(Uffe et al., 2018)	1	Yes	Yes	X
(Marques et al., 2020)	1	Yes	No	X
(Goldansaz et al., 2017)	1	Yes	No	X
Total	17			

Table 8. Number of publications, citations, citation impact and gaps using Scopus data.

Category	Publications	Citations	Citation Impact	Gaps
Global warming	25	759	52.47	55
Culture	4	32	4.04	5
Tanneries	3	17	0.94	6
General agricultural sector	36	1711	82.34	88
Quality management and control	8	308	4.82	10
Veterinary Medicine	49	1178	68.54	117
perspectives	9	66	11.39	17
Technology	7	244	9.48	43
Transport	5	315	8.17	17
Total	146	4630	242.19	358

3.3. Authors

Table 9 shows that the highest number of researchers, papers, and H-indexes were in the discipline category of veterinary medicine, and the lowest number of researchers, papers, and H-indexes were in the discipline categories of culture tanneries and transport. However, the highest number of citations corresponds to the general agriculture sector at 44.09%.

3.4. Journals

Table 10 indicates that England has the most significant number of cattle production-related journals at 29.54%. Table 11 consolidates the number of publications for each journal, where the journal with the cleanest methods of production had the highest number of publications at 7.4%. Similarly, in comparison to JCR, SJR had 39 more papers in category Q1 based on Table 1. This comparison of a single component showed that each journal's impact factor and scientific relevance were different in the JCRs than in the SCR, although they were the same in some of the components. Tables 12–16 present information on Publisher, ISSN, publication cost, badge, submission to first decision review—acceptance time, post time, acceptance rate, post frequency, and electronic address.

Table 9. Number of Authors, articles, total citations and H index by category.

Category	Publications	Authors	Articles	Total Citations	Index h
Global warming	25	77	765	20,789	67
Culture	4	12	1045	19,166	191
Tanneries	3	15	890	11,872	160
General agricultural sector	36	134	9657	439,022	2213.18
Quality management and control	8	25	514	7401	137
Veterinary Medicine	49	251	25,336	420,481	3580
perspectives	9	33	1684	23,174	350
Technology	7	37	2092	38,898	445
Transport	5	18	994	14,759	257
Total	146	602	42,977	995,562	7400.18

Table 10. Number of journals by country.

Country	Number of Journals
Germany	3
Brazil	2
Canada	1
South Korea	1
United States	16
Egypt	2
Scotland	1
Spain	1
France	1
England	26
Italy	1
Japan	1
New Zealand	1
Netherlands	13
Poland	2
Czech Republic	1
Swiss	10
United Kingdom	9
not indexed	7
Total	99

Table 11. Number of publications, SJR, H-Index, Journal category and CiteScore impact indicator.

Journal	Number of Posts	SJR	H-Index	Q1	Q2	Q3	Q4	No Indexing	CiteScore
Acta Veterinaria Brno	1	0.220	36			1			0.8
Agriculture	2	0.424	8		1				2.04
Agroecology and Sustainable Food Systems	3	0.540	35		3				1.41
Agronomy	1	0.771	14	1					2.59
Agronomy for Sustainable Development	2	1.806	81	2					5.91
Asian-Australasian Journal of Animal Sciences	8	0.638	45	8					1.58
Annals of Animal Science	1	0.510	14	1					S/A
Animal	1	0.791	61	1					2.04
Animals	5	0.669	23	5					2.21
Appetite	1	1.452	120	1					3.97
Advances in Dermatology and Allergology	1	0.445	19			1			1.32
Advances in Nutrition	1	2.678	69	1					6.62
BMC Veterinary Research	1	0.848	46	1					2.06
Food Quality and Preference	1	1.140	100	1					4.57
Global Change Biology	2	4.316	217	2					9.14
Environmental Research Letters	1	2.710	97	1					6.1

Table 11. *Cont.*

Journal	Number of Posts	SJR	H-Index	Q1	Q2	Q3	Q4	No Indexing	CiteScore
Nutrient Cycling in Agroecosystems	1	1.060	87	1					2.98
Meat Science	5	1.397	142	5					3.58
Science of The Total Environment	1	3.072	410	2					5.92
Livestock Science	1	0.666	99	1					1.61
Comunicata Scientiae	1	0.260	8			1			S/A
Climate	1	0.544	13			1			1.95
Veterinary Clinics of North America: Food Animal Practice	1	0.556	60		1				1.34
Foods	1	0.000						1	S/A
Iberian Conference on Information Systems and Technologies (CISTI)	1							1	S/A
Food Control	1	1.450	103	1					4.45
British Food Journal	2	0.485	69	2					2.08
Journal of Animal Science	2	0.871	138	2					1.62
Journal of Cleaner Production	10	1.620	150	10					7.32
Landscape Ecology	1	1.821	115	1					4.41
Plant Ecology	1	0.864	92	1					2.06
Applied Energy	1	3.455	162	1					9.54
Biotechnology & Biotechnological Equipment	1	0.394	24			1			1.58
Applied Spectroscopy	1	0.502	101	1					1.99
Phytochemistry	1	0.926	157	1					3.42
Waste Management & Research	1	0.527	66	1					2.11
Waste Management	1	1.523	127	1					6.15
Ecological Engineering	1	1.104	109	1					3.73
Food Research International	2	1.328	134	2					4.18
Water Environment Research	1	0.286	64	1					0.96
Preventive Veterinary Medicine	1	1.102	84	1					2.55
Environment International	1	2.693	157	1					8.58
Veterinary Microbiology	2	1.166	114	2					2.78
Nutrients	2	1.493	75	2					4.51
Parasitology	1	0.989	102	1					2.23
Parasites & Vectors	2	1.565	64	2					3.22
Pastoralism	1	0.530	16		1				1.32
PeerJ	1	1.037	45					1	2.5
Outlook on Agriculture	1	0.358	26					1	0.98
PLoS ONE	4	1.100	268	4					2.97
Energy Procedia	1	0.468						1	1.3
Food Chemistry	1	1.768						1	5.8
Environmental Impact Assessment Review	1	1.424	80	1					4.32
International Food and Agribusiness Management Review	1	0.397	30		1				1.36
Critical Reviews in Food Science and Nutrition	2	1.709	135	2					6.44
Animal Health Research Reviews	4	0.861	49	4					2.39
Canadian Journal of Animal Science	1	0.461	52		1				0.9
Canadian Journal of Public Health	1	0.580	65	1					S/A
Animal Science Journal	1	0.610	30	1					1.41
Journal of Dairy Science	1	1.340	166	1					3.11
Journal of Data, Information and Management	1	0.000						1	S/A
Journal of Agricultural of Economics	1	1.100	52	1					2.59
Revista Gestão e Projetos	1	0.000						1	1.55
Journal of Agricultural and Environmental Ethics	1	0.451	41	1					S/A
Journal of Industrial Engineering and Management	1	0.351	22		1				1.6
Journal of Environmental and Public Health	1	0.610	27		1				2.07
International Journal of Food Science	1	0.487	12		1				2.11
International Journal of Supply and Operations Management	1	0.000						1	S/A
International Journal of Environmental Research and Public Health	1	0.818	78		1				2.81
International Journal of Production Research	1	1.585	115	1					4.34
International Journal of Tryptophan Research	1	1.546	16	1					4.68
International Journal of Public Health	1	1.024	49					1	2.26
International Journal of Agricultural Sustainability	1	0.928	32	1					2.6

Table 11. *Cont.*

Journal	Number of Posts	SJR	H-Index	Q1	Q2	Q3	Q4	No Indexing	CiteScore
Italian Journal of Animal Science	1	0.470	27		1				S/A
Revista Em Agronegócio e Meio Ambiente-RAMA	1	0.110	5				1		0.1
Australian Veterinary Journal	1	0.423	55	1					2.2
Environmental Health	1	1.433	73	1					4.55
Food Security	1	1.247	34	1					2.91
Agricultural System	1	1.355	95	1					4.33
SpringerPlus	2	0.431	33	2					1.76
Sustainability	2	0.549	53		2				3.01
Clean Technologies and Environmental Policy	4	5.116	206	2	2				7.2
Chemical and Biological Technologies in Agriculture	1	0.628	13		1				2.44
Trends in Food Science & Technology	1	2.558	162	1					8.78
Trauma	1	0.174	14			1			0.36
Vaccine	1	1.759	164	1					3.18
Viruses	1	1.812	59	1					4.03
Zoonoses and Public Health	1	1.010	57	1					2.48
Transboundary and Emerging Diseases	1	0.95	70	1					8.6
Journal of Advances in Management Research	1	0.61	24		1				4.7
Research in Veterinary Science	1	0.58	79	1					3.9
European Journal of Clinical Nutrition	1	1.08	165	1					7.9
Journal of Consumer Affairs	1	0.61	65	1					3
Journal of Agribusiness in Developing and Emerging Economies	1	0.51	18		1				3.4
Journal of Food Protection	1	0.54	144		1				3.8
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	0.3	34		1				2.3
International Journal of Operations and Production Management	1	2.29	146	1					11.1
Australian Journal of Experimental Agriculture	1	0	0					1	0
Veterinary Record	1	0.4	104		1				1.9
Total	146	74.652	5512	105	23	6	1	11	

Table 12. Data from JCR, H-Index and Journal Category.

Journal	Number of Posts	JCR	H-índex	Q1	Q2	Q3	Q4	No Indexing
Acta Veterinaria Brno	1	0.566	35			1		
Agriculture	2	2.259	19	2				
Agroecology and Sustainable Food Systems	3	1.381	21		3			
Agronomy	1	2.259	20	1				
Agronomy for Sustainable Development	2	4.263	84	2				
Asian-Australasian Journal of Animal Sciences	8	1.227	52		8			
Annals of Animal Science	1	1.515	18		1			
Animal	1	2.026	72	1				
Animals	5	1.654	21	5				
Appetite	1	3.501	127	1				
Advances in Dermatology and Allergology	1	1.757	23				1	
Advances in Nutrition	1	7.24	82	1				
BMC Veterinary Research	1	1.792	51	1				
Food Quality and Preference	1	3.684	106	1				
Global Change Biology	2	8.88	216	2				
Environmental Research Letters	1	6.192	109	1				
Ciclos de nutrientes en agroecosistemasNutrient Cycling in Agroecosystems	1	2.848	85		1			
Meat Science	5	3.483	149	5				
Science of The Total Environment	1	5.589	38	1				
Livestock Science	1	1.376	69		1			
Comunicata Scientiae	1	0						1
Climate	1	1.143	17				1	

Table 12. *Cont.*

Journal	Number of Posts	JCR	H-índex	Q1	Q2	Q3	Q4	No Indexing
Veterinary Clinics of North America: Food Animal Practice	1	1.539	61		1			
Foods	1	3.011	25		1			
Iberian Conference on Information Systems and Technologies (CISTI)	1							1
Food Control	1	4.248	114	1				
British Food Journal	2	1.717	53			2		
Journal of Animal Science	2	1.697	48		2			
Journal of Cleaner Production	10	6.395	87	10				
Landscape Ecology	1	4.349	119	1				
Plant Ecology	1	1.789	91		1			
Applied Energy	1	8.426	109	1				
Biotechnology & Biotechnological Equipment	1	1.097	29				1	
Applied Spectroscopy	1	2.064	90		1			
Phytochemistry	1	2.905	162		1			
Waste Management & Research	1	2.015	122			1		
Waste Management	1	5.431	143	1				
Ecological Engineering	1	3.406	122		1			
Food Research International	2	3.579	141	2				
Water Environment Research	1	1.24	60				1	
Preventive Veterinary Medicine	1	2.302	84	1				
Environment International	1	7.943	170	1				
Veterinary Microbiology	2	2.791	123			2		
Nutrients	2	4.171	98	2				
Parasitology	1	2.456	100		1			
Parasites & Vectors	2	3.031	74	2				
Pastoralism	1	0	10					1
PeerJ	1	2.353	58		1			
Outlook on Agriculture	1	1.043	27		1			
PLoS ONE	4	2.776	2		4			
Energy Procedia	1	0						1
Food Chemistry	1							1
Environmental Impact Assessment Review	1	3.749	71	1				
International Food and Agribusiness Management Review	1	0.937	23				1	
Critical Reviews in Food Science and Nutrition	2	13.408	246	2				
Animal Health Research Reviews	4	2.034	17	4				
Canadian Journal of Animal Science	1	0.85	51			1		
Canadian Journal of Public Health	1	1.248	53			1		
Animal Science Journal	1	1.301	29		1			
Journal of Dairy Science	1	3.082	87	1				
Journal of Data, Information and Management	1	0						1
Journal of Agricultural of Economics	1	2.506	39	1				
Revista Gestão e Projetos	1	0	3					1
Journal of Agricultural and Environmental Ethics	1	1.398	32		1			
Journal of Industrial Engineering and Management	1	0	11					1
Journal of Environmental and Public Health	1	0	12					1
International Journal of Food Science	1	0						1
International Journal of Supply and Operations Management	1	0						1
International Journal of Environmental Research and Public Health	1	2.468	14		1			
International Journal of Production Research	1	3.199	106		1			
International Journal of Tryptophan Research	1	0	11					1
International Journal of Public Health	1	2.373	49		1			
International Journal of Agricultural Sustainability	1	2.243	31	1				
Italian Journal of Animal Science	1	1.265	29		1			
Revista Em Agronegócio e Meio Ambiente-RAMA	1	0						1
Australian Veterinary Journal	1	1.145	48		1			
Environmental Health	1	4.43	75	1				
Food Security	1	2.153	43		1			
Agricultural System	1	4.131	95	1				
SpringerPlus	2	0	45		2			
Sustainability	2	5.184	30					2
Clean Technologies and Environmental Policy	4	10.746	198	2		2		

Table 12. *Cont.*

Journal	Number of Posts	JCR	H-índex	Q1	Q2	Q3	Q4	No Indexing
Chemical and Biological Technologies in Agriculture	1	0	14					1
Trends in Food Science & Technology	1	8.519	153	1				
Trauma	1	0	6					1
Vaccine	1	3.269	87		1			
Viruses	1	3.811	73		1			
Zoonoses and Public Health	1	2.164	44			1		
Transboundary and Emerging Diseases	1	4.521	66		1			
Journal of Advances in Management Research	1	0	16			1		
Research in Veterinary Science	1	2.554	74	1				
European Journal of Clinical Nutrition	1	4.884	151		1			
Journal of Consumer Affairs	1	2.603	59		1			
Journal of Agribusiness in Developing and Emerging Economies	1	0	14		1			
Journal of Food Protection	1	2.755	127			1		
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	0	0					1
International Journal of Operations and Production Management	1	9.36	122	1				
Australian Journal of Experimental Agriculture	1	1.621	68	1				
Veterinary Record	1	2.56	0	1				
Total	146	118.471	2522	65	45	13	5	18

Table 13. Data from publisher, ISSN (NP: No publication).

Journal	Number of Posts	Publisher	ISSN
Acta Veterinaria Brno	1	Universidad de Ciencias Veterinarias y Farmacéuticas	1801-7576
Agriculture	2	MPDI	2077-0472
Agroecology and Sustainable Food Systems	3	Taylor y Francis Ltd.	2168-3573
Agronomy	1	MPDI	2073-4395
Agronomy for Sustainable Development	2	Springer	1773-0155
Asian-Australasian Journal of Animal Sciences	8	Asociación Asiática-Australasia de Sociedades de Producción Animal	1011-2367
Annals of Animal Science	1	De Gruyter Poland	1642-3402
Animal	1	Elsevier Ltd.	1751-7311
Animals	5	MPDI	2076-2615
Appetite	1	Elsevier Ltd.	0195-6663
Advances in Dermatology and Allergology	1	Termedia Publishing House Ltd.	1642-395X
Advances in Nutrition	1	American Society for Nutrition	2161-8313
BMC Veterinary Research	1	BioMed Central Ltd.	1746-6148
Food Quality and Preference	1	Elsevier Ltd.	0950-3293
Global Change Biology	2	Wiley-Blackwell Publishing Ltd.	1365-2486
Environmental Research Letters	1	IOP Publishing Ltd.	1748-9326
Ciclos de nutrientes en agroecosistemasNutrient Cycling in Agroecosystems	1	Springer	1385-1314
Meat Science	5	Elsevier Ltd.	0309-1740
Science of The Total Environment	1	Elsevier Ltd.	0048-9697
Livestock Science	1	Elsevier Ltd.	1871-1413
Comunicata Scientiae	1	Federal University of Piaui	2176-9079
Climate	1	MPDI	2225-1154
Veterinary Clinics of North America: Food Animal Practice	1	Elsevier Ltd.	0749-0720
Foods	1	MPDI	2304-8158
Iberian Conference on Information Systems and Technologies (CISTI)	1	NP	2166-0727
Food Control	1	Elsevier Ltd.	0956-7135
British Food Journal	2	Emerald Group Publishing Ltd.	0007-070X
Journal of Animal Science	2	American Society of Animal Science	1525-3163
Journal of Cleaner Production	10	Elsevier Ltd.	0959-6526
Landscape Ecology	1	Springer	1572-9761
Plant Ecology	1	Springer	1573-5052
Applied Energy	1	Elsevier Ltd.	0306-2619

Table 13. *Cont.*

Journal	Number of Posts	Publisher	ISSN
Biotechnology & Biotechnological Equipment	1	Taylor y Francis Ltd.	1314-3530
Applied Spectroscopy	1	SAGE Publications Inc.	1943-3530
Phytochemistry	1	Elsevier Ltd.	0031-9422
Waste Management & Research	1	SAGE Publications Inc.	1096-3669
Waste Management	1	Elsevier Ltd.	0956-053X
Ecological Engineering	1	Elsevier Ltd.	0925-8574
Food Research International	2	Elsevier Ltd.	0963-9969
Water Environment Research	1	Water Environment Federation	1554-7531
Preventive Veterinary Medicine	1	Elsevier Ltd.	0167-5877
Environment International	1	Elsevier Ltd.	0160-4120
Veterinary Microbiology	2	Elsevier Ltd.	0378-1135
Nutrients	2	MPDI	2072-6643
Parasitology	1	Cambridge University Press	1469-8161
Parasites & Vectors	2	Springer	1756-3305
Pastoralism	1	Springer	2041-7136
PeerJ	1	PeerJ Inc.	2167-8359
Outlook on Agriculture	1	SAGE Publicaciones Inc.	0030-7270
PLoS ONE	4	Biblioteca Pública de Ciencias	19326203
Energy Procedia	1	Elsevier Ltd.	1876-6102
Food Chemistry	1	Elsevier Ltd.	0308-8146
Environmental Impact Assessment Review	1	Elsevier Ltd.	0195-9255
International Food and Agribusiness Management Review	1	International Food and Agribusiness Management Association	1559-2448
Critical Reviews in Food Science and Nutrition	2	Taylor y Francis Ltd.	15497852
Animal Health Research Reviews	4	Cambridge University Press	1466-2523
Canadian Journal of Animal Science	1	Instituto Agrícola de Canadá	0008-3984
Canadian Journal of Public Health	1	Springer	1920-7476
Animal Science Journal	1	Wiley-Blackwell Publishing Ltd.	1740-0929
Journal of Dairy Science	1	Elsevier Ltd.	0022-0302
Journal of Data, Information and Management	1	Springer	2524-6364
Journal of Agricultural of Economics	1	Wiley-Blackwell Publishing Ltd.	1477-9552
Revista Gestão e Projetos	1	UNIV NOVE JULHO	2236-0972
Journal of Agricultural and Environmental Ethics	1	Springer	1187-7863
Journal of Industrial Engineering and Management	1	OmniaScience	2013-0953
Journal of Environmental and Public Health	1	Hindawi Limited	1687-9805
International Journal of Food Science	1	Hindawi Limited	2314-5765
International Journal of Supply and Operations Management	1	Kharazmi University	2383-2525
International Journal of Environmental Research and Public Health	1	MPDI	1660-4601
International Journal of Production Research	1	Taylor y Francis Ltd.	1366-588X
International Journal of Tryptophan Research	1	SAGE PUBLICATIONS LTD	1178-6469
International Journal of Public Health	1	Springer	1661-8564
International Journal of Agricultural Sustainability	1	Taylor y Francis Ltd.	1747-762X
Italian Journal of Animal Science	1	Taylor y Francis Ltd.	1594-4077
Revista Em Agronegócio e Meio Ambiente-RAMA	1	University Centre of Maringa-CESUMAR	2176-9168
Australian Veterinary Journal	1	Wiley-Blackwell Publishing Ltd.	1751-0813
Environmental Health	1	BioMed Central Ltd.	1476-069X
Food Security	1	Springer	1876-4525
Agricultural System	1	Elsevier Ltd.	0308-521X
SpringerPlus	2	Springer	2193-1801
Sustainability	2	MPDI	2071-1050
Clean Technologies and Environmental Policy	4	Springer	1618-954X
Chemical and Biological Technologies in Agriculture	1	Springer	2196-5641
Trends in Food Science & Technology	1	Elsevier Ltd.	0924-2244
Trauma	1	SAGE Publications Ltd.	1477-0350
Vaccine	1	Elsevier Ltd.	0264-410X
Viruses	1	MPDI	1999-4915
Zoonoses and Public Health	1	Wiley-Blackwell Publishing Ltd.	1863-2378
Transboundary and Emerging Diseases	1	Wiley-Blackwell Publishing Ltd.	1865-1674
Journal of Advances in Management Research	1	Emerald Group Publishing Ltd.	0972-7981
Research in Veterinary Science	1	Elsevier Ltd.	0034-5288
European Journal of Clinical Nutrition	1	Nature Publishing Group	0954-3007
Journal of Consumer Affairs	1	Wiley-Blackwell Publishing Ltd.	0022-0078

Table 13. *Cont.*

Journal	Number of Posts	Publisher	ISSN
Journal of Agribusiness in Developing and Emerging Economies	1	Emerald Group Publishing Ltd.	2044-0839
Journal of Food Protection	1	International Association for Food Protection	0362-028X
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	CAB International	1749-8848
International Journal of Operations and Production Management	1	Emerald Group Publishing Ltd.	0144-3577
Australian Journal of Experimental Agriculture	1	CSIRO PUBLISHING	0816-1089
Veterinary Record	1	Wiley-Blackwell Publishing Ltd.	0042-4900
Total	**146**		

Source: Owner.

Table 14. Data from publication cost, fee, submission to first decision and review—acceptance time (NP: No publication).

Journal	Number of Posts	Publication Cost	Fee	Submission to First Decision	Time Unit	Review/ Acceptance Time	Time Unit
Acta Veterinaria Brno	1	362.22	USD	0	NP	0	NP
Agriculture	2	1958.08	USD	16.6	Days	3.3	Days
Agroecology and Sustainable Food Systems	3	0	Free	0	Days	175	Days
Agronomy	1	2175.64	USD	17.2	Days	2.9	Days
Agronomy for Sustainable Development	2	2807.24	USD	0	NP	0	NP
Asian-Australasian Journal of Animal Sciences	8	197.5	USD	0	NP	0	NP
Annals of Animal Science	1	0	NP	0	NP	0	NP
Animal	1	1811.12	USD	0	NP	0	NP
Animals	5	1958.08	USD	15.6	Days	3.4	Days
Appetite	1	3380	USD	0	NP	58.8	Days
Advances in Dermatology and Allergology	1	1528.13	USD	0	NP	14	Days
Advances in Nutrition	1	5500	USD	0	NP	0	NP
BMC Veterinary Research	1	2478.97	USD	68	Days	133	Days
Food Quality and Preference	1	4350	USD	19.6	Days	43.4	Days
Global Change Biology	2	0	Free	0	NP	60	Days
Environmental Research Letters	1	2201.64	USD	4	Days	51	Days
Ciclos de nutrientes en agroecosistemasNutrient Cycling in Agroecosystems	1	2931.75	USD	36	Days	0	NP
Meat Science	5	4010	USD	0	NP	56	Days
Science of The Total Environment	1	3400	USD	16,1	Days	28.7	Days
Livestock Science	1	2600	USD	0	NP	55.3	Days
Comunicata Scientiae	1	70.48	USD	0	NP	0	NP
Climate	1	1740.52	USD	11.8	Days	2.9	Days
Veterinary Clinics of North America: Food Animal Practice	1	0	NP	0	NP	0	NP
Foods	1	2393.21	USD	16	Days	3.5	Days
Iberian Conference on Information Systems and Technologies (CISTI)	1	0	NP	0	NP	0	NP
Food Control	1	4300	USD	26.6	Days	33.6	Days
British Food Journal	2	3260.02	USD	60	Days	0	NP
Journal of Animal Science	2	3728	USD	0	NP	0	NP
Journal of Cleaner Production	10	3740	USD	0	NP	60.9	Days
Landscape Ecology	1	3463.77	USD	52	Days	0	NP
Plant Ecology	1	2931.75	USD	42	Days	0	NP
Applied Energy	1	4020	USD	26.6	Days	33.6	Days
Biotechnology & Biotechnological Equipment	1	1545	USD	16	Days	29	Days
Applied Spectroscopy	1	0	Free	0	NP	0	NP
Phytochemistry	1	3910	USD	25.9	Days	44.1	Days
Waste Management & Research	1	3000	USD	0	NP	0	NP
Waste Management	1	3880	USD	0	NP	41.3	Days

Table 14. *Cont.*

Journal	Number of Posts	Publication Cost	Fee	Submission to First Decision	Time Unit	Review/ Acceptance Time	Time Unit
Ecological Engineering	1	3400	USD	0	NP	54.6	Days
Food Research International	2	3800	USD	0	NP	43.4	Days
Water Environment Research	1	0	Free	0	NP	0	NP
Preventive Veterinary Medicine	1	3450	USD	0	NP	59.5	Days
Environment International	1	3500	USD	17.5	Days	30.8	Days
Veterinary Microbiology	2	3220	USD	23.8	Days	34.3	Days
Nutrients	2	2828.34	USD	18.1	Days	2.9	Days
Parasitology	1	2839	USD	0	NP	0	NP
Parasites & Vectors	2	2478.97	USD	48	Days	86	Days
Pastoralism	1	1250.8	USD	81	Days	21	Days
PeerJ	1	1195	USD	35	Days	0	NP
Outlook on Agriculture	1	0	NP	0	NP	0	NP
PLoS ONE	4	1749	USD	48	Days	90	Days
Energy Procedia	1	0	NP	0	NP	0	NP
Food Chemistry	1	3790	USD	0	NP	0	NP
Environmental Impact Assessment Review	1	3300	USD	23.8	Days	45.5	Days
International Food and Agribusiness Management Review	1	1471.54	USD	0	NP	0	NP
Critical Reviews in Food Science and Nutrition	2	0	Free	13	Days	47	Days
Animal Health Research Reviews	4	2839	USD	0	NP	0	NP
Canadian Journal of Animal Science	1	1000	USD	0	NP	0	NP
Canadian Journal of Public Health	1	2478.97	USD	0	NP	0	NP
Animal Science Journal	1	0	NP	0	NP	0	NP
Journal of Dairy Science	1	0	Free	0	NP	0	NP
Journal of Data, Information and Management	1	2478.97	USD	61	Days	0	NP
Journal of Agricultural of Economics	1	0	Free	0	NP	0	NP
Revista Gestão e Projetos	1	0	Free	0	NP	0	NP
Journal of Agricultural and Environmental Ethics	1	2478.97	USD	78	Days	0	NP
Journal of Industrial Engineering and Management	1	560.32	USD	58	Days	0	NP
Journal of Environmental and Public Health	1	1400	USD	0	NP	32	Days
International Journal of Food Science	1	775	USD	0	NP	52	Days
International Journal of Supply and Operations Management	1	0	Free	2	Days	355	Days
International Journal of Environmental Research and Public Health	1	2719.55	USD	17.8	Days	3.6	Days
International Journal of Production Research	1	0	Free	9	Days	64	Days
International Journal of Tryptophan Research	1	750	USD	0	NP	0	NP
International Journal of Public Health	1	3463.77	USD	0	NP	171	Days
International Journal of Agricultural Sustainability	1	0	Free	16	Days	52	Days
Italian Journal of Animal Science	1	1030.07	USD	33	Days	49	Days
Revista Em Agronegócio e Meio Ambiente-RAMA	1	44.05	USD	0	NP	0	NP
Australian Veterinary Journal	1	3150	USD	0	NP	0	NP
Environmental Health	1	2592.17	USD	77	Days	75	Días
Food Security	1	2931.75	USD	62	Days	0	NP
Agricultural System	1	3710	USD	0	NP	44.8	Days
SpringerPlus	2	0	NP	0	NP	0	NP
Sustainability	2	2175.64	USD	15.4	Days	3.9	Days
Clean Technologies and Environmental Policy	4	2931.75	USD	24	Days	0	NP
Chemical and Biological Technologies in Agriculture	1	2139.39	USD	36	Days	58	Days
Trends in Food Science & Technology	1	5410.72	USD	0	NP	65.1	Days
Trauma	1	0	NP	0	NP	0	NP
Vaccine	1	3250	USD	49	Days	79.1	Days
Viruses	1	2610.77	USD	15.5	Days	3.3	Days
Zoonoses and Public Health	1	4300	USD	0	NP	0	NP
Transboundary and Emerging Diseases	1	4900	USD	0	NP	0	NP
Journal of Advances in Management Research	1	3370	USD	60	Days	0	NP
Research in Veterinary Science	1	2830	USD	49	Days	69.3	Days
European Journal of Clinical Nutrition	1	4480	USD	9	Days	0	NP
Journal of Consumer Affairs	1	2950	USD	0	NP	0	NP
Journal of Agribusiness in Developing and Emerging Economies	1	3370	USD	60	Days	0	NP

Table 14. *Cont.*

Journal	Number of Posts	Publication Cost	Fee	Submission to First Decision	Time Unit	Review/ Acceptance Time	Time Unit
Journal of Food Protection	1	3000	USD	0	NP	0	NP
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	0	NP	0	NP	0	NP
International Journal of Operations and Production Management	1	3370	USD	60	Days	0	NP
Australian Journal of Experimental Agriculture	1	2700	USD	0	NP	0	NP
Veterinary Record	1	3500	USD	0	NP	0	NP
Total	146						

Table 15. Data from post time, acceptance rate and post frequency (NP: No publication).

Journal	Number of Posts	Post Time	Time Unit	Acceptance Rate	Post Frequency	Time Unit
Acta Veterinaria Brno	1	0	NP	0%	4	Times a year
Agriculture	2	0	NP	70%	12	Times a year
Agroecology and Sustainable Food Systems	3	14	Days	11%	10	Times a year
Agronomy	1	0	NP	52%	12	Times a year
Agronomy for Sustainable Development	2	0	NP	0%	1	Once a year
Asian-Australasian Journal of Animal Sciences	8	0	NP	0%	12	Times a year
Annals of Animal Science	1	0	NP	0%	2	Times a year
Animal	1	0	NP	0%	12	Times a year
Animals	5	0	NP	49%	12	Times a year
Appetite	1	7.7	Days	19%	12	Times a year
Advances in Dermatology and Allergology	1	14	Days	0%	6	Times a year
Advances in Nutrition	1	30.4167	Days	0%	6	Times a year
BMC Veterinary Research	1	14	Days	0%	1	Once a year
Food Quality and Preference	1	5.6	Days	20%	8	Times a year
Global Change Biology	2	30	Days	0%	12	Times a year
Environmental Research Letters	1	108	Days	47%	12	Times a year
Ciclos de nutrientes en agroecosistemasNutrient Cycling in Agroecosystems	1	0	NP	0%	9	Times a year
Meat Science	5	4.9	Days	0%	12	Times a year
Science of The Total Environment	1	7.7	Days	25%	24	Times a year
Livestock Science	1	6.3	Days	20%	12	Times a year
Comunicata Scientiae	1	0	NP	0%	0	NP
Climate	1	0	NP	62%	12	Times a year
Veterinary Clinics of North America: Food Animal Practice	1	0	NP	0%	3	Times a year
Foods	1	0	NP	59%	12	Times a year
Iberian Conference on Information Systems and Technologies (CISTI)	1	0	NP	0%	0	NP
Food Control	1	5.6	Days	0%	12	Times a year
British Food Journal	2	0	NP	0%	11	Times a year
Journal of Animal Science	2	0	NP	0%	12	Times a year
Journal of Cleaner Production	10	10.5	Days	0%	30	Times a year
Landscape Ecology	1	0	NP	0%	10	Times a year
Plant Ecology	1	0	NP	0%	12	Times a year
Applied Energy	1	0	NP	0%	24	Times a year
Biotechnology & Biotechnological Equipment	1	14	Days	41%	6	Times a year
Applied Spectroscopy	1	0	NP	0%	12	Times a year
Phytochemistry	1	0	NP	22%	18	Times a year
Waste Management & Research	1	0	NP	0%	12	Times a year
Waste Management	1	16.8	Days	0%	12	Times a year
Ecological Engineering	1	0	NP	0%	12	Times a year
Food Research International	2	0.9	NP	0%	12	Times a year
Water Environment Research	1	0	NP	0%	12	Times a year
Preventive Veterinary Medicine	1	7	Days	25%	13	Times a year

Table 15. *Cont.*

Journal	Number of Posts	Post Time	Time Unit	Acceptance Rate	Post Frequency	Time Unit
Environment International	1	0	NP	0%	12	Times a year
Veterinary Microbiology	2	7	Days	21%	12	Times a year
Nutrients	2	0	NP	51%	12	Times a year
Parasitology	1	0	NP	0%	14	Times a year
Parasites & Vectors	2	14	Days	0%	1	Once a year
Pastoralism	1	68	Days	0%	1	Once a year
PeerJ	1	0	NP	0%	0	NP
Outlook on Agriculture	1	0	NP	0%	4	Times a year
PLoS ONE	4	170	Days	22.30%	NP	NP
Energy Procedia	1	0	NP	0%	0	NP
Food Chemistry	1	4.9	Days	0%	24	Times a year
Environmental Impact Assessment Review	1	0	NP	0%	6	Times a year
International Food and Agribusiness Management Review	1	0	NP	0%	4	Times a year
Critical Reviews in Food Science and Nutrition	2	18	Days	27%	12	Times a year
Animal Health Research Reviews	4	0	NP	0%	2	Times a year
Canadian Journal of Animal Science	1	0	NP	0%	4	Times a year
Canadian Journal of Public Health	1	0	NP	0%	6	Times a year
Animal Science Journal	1	0	NP	0%	1	Once a year
Journal of Dairy Science	1	42.7	Days	0%	12	Times a year
Journal of Data, Information and Management	1	0	NP	0%	0	NP
Journal of Agricultural of Economics	1	0	NP	0%	3	Times a year
Revista Gestão e Projetos	1	0	NP	0%	4	Times a year
Journal of Agricultural and Environmental Ethics	1	0	NP	0%	6	Times a year
Journal of Industrial Engineering and Management	1	0	Days	91%	5	Times a year
Journal of Environmental and Public Health	1	73	Days	22%	1	Once a year
International Journal of Food Science	1	0	Days	21%	NP	NP
International Journal of Supply and Operations Management	1	96	Days	0%	4	Times a year
International Journal of Environmental Research and Public Health	1	0	NP	54%	24	Times a year
International Journal of Production Research	1	20	Days	16%	24	Times a year
International Journal of Tryptophan Research	1	30	Days	0%	1	Once a year
International Journal of Public Health	1	21	Days	89%	1	Once a year
International Journal of Agricultural Sustainability	1	19	Days	8%	4	Times a year
Italian Journal of Animal Science	1	20	Days	33%	4	Times a year
Revista Em Agronegócio e Meio Ambiente-RAMA	1	0	NP	0%	0	NP
Australian Veterinary Journal	1	0	NP	0%	12	Times a year
Environmental Health	1	22	Days	0%	1	Once a year
Food Security	1	0	NP	0%	6	Times a year
Agricultural System	1	0	NP	0%	9	Times a year
SpringerPlus	2	0	NP	0%	0	NP
Sustainability	2	0	NP	61%	24	Times a year
Clean Technologies and Environmental Policy	4	0	NP	0%	4	Times a year
Chemical and Biological Technologies in Agriculture	1	123	Days	0%	1	Once a year
Trends in Food Science & Technology	1	9.1	Days	0%	12	Times a year
Trauma	1	0	NP	0%	4	Times a year
Vaccine	1	18.2	Days	43%	52	Times a year
Viruses	1	0	NP	51%	12	Times a year
Zoonoses and Public Health	1	0	NP	0%	8	Times a year
Transboundary and Emerging Diseases	1	0	NP	0%	6	Times a year
Journal of Advances in Management Research	1	0	NP	0%	3	Times a year
Research in Veterinary Science	1	4.2	Days	20%	6	Times a year
European Journal of Clinical Nutrition	1	0	NP	0%	12	Times a year
Journal of Consumer Affairs	1	0	NP	0%	3	Times a year
Journal of Agribusiness in Developing and Emerging Economies	1	0	NP	0%	5	Times a year
Journal of Food Protection	1	0	NP	0%	12	Times a year
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	0	NP	0%	0	NP
International Journal of Operations and Production Management	1	0	NP	0%	12	Times a year
Australian Journal of Experimental Agriculture	1	0	NP	0%	12	Times a year
Veterinary Record	1	0	NP	0%	50	Times a year
Total	146					

Table 16. Data from electronic address.

Journal	Number of Posts	Electronic Address
Acta Veterinaria Brno	1	https://actavet.vfu.cz/ (accessed on 24 January 2021)
Agriculture	2	https://www.mdpi.com/journal/agriculture (accessed on 24 January 2021)
Agroecology and Sustainable Food Systems	3	https://www-tandfonline-com.bd.univalle.edu.co/toc/wjsa21/current (accessed on 24 January 2021)
Agronomy	1	https://www.mdpi.com/journal/agronomy (accessed on 12 March 2021)
Agronomy for Sustainable Development	2	https://www.springer.com/journal/13593 (accessed on 12 March 2021)
Asian-Australasian Journal of Animal Sciences	8	https://www.ajas.info/index.php (accessed on 12 March 2021)
Annals of Animal Science	1	https://search-proquest-com.bd.univalle.edu.co/agriculturejournals/publication/publications_1976406?accountid=174776 (accessed on 12 March 2021)
Animal	1	https://www.journals.elsevier.com/animal (accessed on 12 March 2021)
Animals	5	https://www.mdpi.com/journal/animals (accessed on 20 March 2021)
Appetite	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/appetite (accessed on 20 March 2021)
Advances in Dermatology and Allergology	1	https://www.termedia.pl/Occupational-exposure-as-a-presumable-cause-of-subcutaneous-sarcoidosis-in-a-tannery-worker-case-report-and-review-of-the-literature,7,31645,0,1.html (accessed on 20 March 2021)
Advances in Nutrition	1	https://academic-oup-com.bd.univalle.edu.co/advances/issue/7/6 (accessed on 20 March 2021)
BMC Veterinary Research	1	https://bmcvetres.biomedcentral.com/ (accessed on 20 April 2022)
Food Quality and Preference	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/food-quality-and-preference (accessed on 20 April 2022)
Global Change Biology	2	https://onlinelibrary-wiley-com.bd.univalle.edu.co/journal/13652486 (accessed on 20 April 2022)
Environmental Research Letters	1	https://iopscience.iop.org/journal/1748-9326 (accessed on 20 April 2022)
Ciclos de nutrientes en agroecosistemasNutrient Cycling in Agroecosystems	1	https://www-springer-com.bd.univalle.edu.co/journal/10705 (accessed on 20 April 2022)
Meat Science	5	https://www.sciencedirect.com/journal/meat-science (accessed on 20 April 2022)
Science of The Total Environment	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/science-of-the-total-environment (accessed on 20 April 2022)
Livestock Science	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/livestock-science (accessed on 20 April 2022)
Comunicata Scientiae	1	https://comunicatascientiae.com.br/comunicata (accessed on 20 April 2022)
Climate	1	https://www.mdpi.com/journal/climate (accessed on 20 April 2022)
Veterinary Clinics of North America: Food Animal Practice	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/veterinary-clinics-of-north-america-food-animal-practice (accessed on 20 April 2022)
Foods	1	https://www.mdpi.com/journal/foods (accessed on 20 April 2022)
Iberian Conference on Information Systems and Technologies (CISTI)	1	https://ieeexplore.ieee.org/abstract/document/8760955/authors#authors (accessed on 20 April 2022)
Food Control	1	https://www.sciencedirect.com/journal/food-control (accessed on 20 April 2022)
British Food Journal	2	https://www.emeraldgrouppublishing.com/journal/bfj (accessed on 20 April 2022)
Journal of Animal Science	2	https://academic.oup.com/jas (accessed on 20 April 2022)
Journal of Cleaner Production	10	https://www-sciencedirect-com.bd.univalle.edu.co/journal/journal-of-cleaner-production (accessed on 20 April 2022)
Landscape Ecology	1	https://www-springer-com.bd.univalle.edu.co/journal/10980 (accessed on 13 April 2022)
Plant Ecology	1	https://www-springer-com.bd.univalle.edu.co/journal/11258 (accessed on 13 April 2022)
Applied Energy	1	https://www.sciencedirect.com/journal/applied-energy (accessed on 13 April 2022)
Biotechnology & Biotechnological Equipment	1	https://www-tandfonline-com.bd.univalle.edu.co/toc/tbeq20/current (accessed on 19 April 2022)

Table 16. *Cont.*

Journal	Number of Posts	Electronic Address
Applied Spectroscopy	1	https://journals.sagepub.com/home/asp (accessed on 20 April 2022)
Phytochemistry	1	https://www.sciencedirect.com/journal/phytochemistry (accessed on 20 April 2022)
Waste Management & Research	1	https://journals-sagepub-com.bd.univalle.edu.co/home/wmr (accessed on 20 April 2022)
Waste Management	1	https://www.sciencedirect.com/journal/waste-management (accessed on 13 April 2022)
Ecological Engineering	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/ecological-engineering (accessed on April 2022)
Food Research International	2	https://www-sciencedirect-com.bd.univalle.edu.co/journal/food-research-international (accessed on 20 April 2022)
Water Environment Research	1	https://onlinelibrary.wiley.com/journal/15547531 (accessed on 20 April 2022)
Preventive Veterinary Medicine	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/preventive-veterinary-medicine (accessed on 20 April 2022)
Environment International	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/environment-international (accessed on 19 April 2022)
Veterinary Microbiology	2	https://www-sciencedirect-com.bd.univalle.edu.co/journal/veterinary-microbiology (accessed on 19 April 2022)
Nutrients	2	https://www.mdpi.com/journal/nutrients (accessed on 20 April 2022)
Parasitology	1	https://www.cambridge.org/core/journals/parasitology (accessed on 20 April 2022)
Parasites & Vectors	2	https://parasitesandvectors.biomedcentral.com/ (accessed on 20 April 2022)
Pastoralism	1	https://pastoralismjournal.springeropen.com/ (accessed on 20 April 2022)
PeerJ	1	https://peerj.com/life-environment/ (accessed on 20 April 2022)
Outlook on Agriculture	1	https://journals-sagepub-com.bd.univalle.edu.co/home/oag (accessed on 20 April 2022)
PLoS ONE	4	https://journals.plos.org/plosone/ (accessed on 20 April 2022)
Energy Procedia	1	https://www.sciencedirect.com/journal/energy-procedia (accessed on 20 April 2022)
Food Chemistry	1	https://www.sciencedirect.com/journal/food-chemistry (accessed on 20 April 2022)
Environmental Impact Assessment Review	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/environmental-impact-assessment-review (accessed on 20 April 2022)
International Food and Agribusiness Management Review	1	https://www.wageningenacademic.com/loi/ifamr (accessed on 20 April 2022)
Critical Reviews in Food Science and Nutrition	2	https://www-tandfonline-com.bd.univalle.edu.co/toc/bfsn20/current (accessed on 20 April 2022)
Animal Health Research Reviews	4	https://www.cambridge.org/core/journals/animal-health-research-reviews (accessed on 20 April 2022)
Canadian Journal of Animal Science	1	https://cdnsciencepub.com/journal/cjas (accessed on 20 April 2022)
Canadian Journal of Public Health	1	https://www.springer.com/journal/41997 (accessed on 20 April 2022)
Animal Science Journal	1	https://onlinelibrary-wiley-com.bd.univalle.edu.co/journal/17400929 (accessed on 20 April 2022)
Journal of Dairy Science	1	https://www.journalofdairyscience.org/ (accessed on 20 April 2022)
Journal of Data, Information and Management	1	https://www-springer-com.bd.univalle.edu.co/journal/42488 (accessed on 20 April 2022)
Journal of Agricultural of Economics	1	https://onlinelibrary-wiley-com.bd.univalle.edu.co/journal/14779552 (accessed on 20 April 2022)
Revista Gestão e Projetos	1	https://periodicos.uninove.br/index.php?journal=gep&page=index (accessed on 20 April 2022)
Journal of Agricultural and Environmental Ethics	1	https://www-springer-com.bd.univalle.edu.co/journal/10806 (accessed on 20 April 2022)
Journal of Industrial Engineering and Management	1	http://www.jiem.org/index.php/jiem/index (accessed on 20 April 2022)
Journal of Environmental and Public Health	1	https://www.hindawi.com/journals/jeph/ (accessed on 20 April 2022)
International Journal of Food Science	1	https://www.hindawi.com/journals/ijfs/ (accessed on 20 April 2022)

Table 16. *Cont.*

Journal	Number of Posts	Electronic Address
International Journal of Supply and Operations Management	1	http://www.ijsom.com/ (accessed on 20 April 2022)
International Journal of Environmental Research and Public Health	1	https://www.mdpi.com/journal/ijerph (accessed on 20 April 2022)
International Journal of Production Research	1	https://www-tandfonline-com.bd.univalle.edu.co/toc/tprs20/current (accessed on 20 April 2022)
International Journal of Tryptophan Research	1	https://journals-sagepub-com.bd.univalle.edu.co/home/try (accessed on 20 April 2022)
International Journal of Public Health	1	https://www-springer-com.bd.univalle.edu.co/journal/38 (accessed on 20 April 2022)
International Journal of Agricultural Sustainability	1	https://www-tandfonline-com.bd.univalle.edu.co/toc/tags20/current (accessed on 20 April 2022)
Italian Journal of Animal Science	1	https://www.tandfonline.com/toc/tjas20/current (accessed on 20 March 2021)
Revista Em Agronegócio e Meio Ambiente-RAMA	1	https://periodicos.unicesumar.edu.br/index.php/rama (accessed on 20 March 2021)
Australian Veterinary Journal	1	https://onlinelibrary-wiley-com.bd.univalle.edu.co/journal/17510813 (accessed on 20 March 2021)
Environmental Health	1	https://ehjournal.biomedcentral.com/ (accessed on 20 March 2021)
Food Security	1	https://www-springer-com.bd.univalle.edu.co/journal/12571 (accessed on 20 April 2022)
Agricultural System	1	https://www-sciencedirect-com.bd.univalle.edu.co/journal/agricultural-systems (accessed on 20 April 2022)
SpringerPlus	2	https://springerplus.springeropen.com/ (accessed on 20 April 2022)
Sustainability	2	https://www.mdpi.com/journal/sustainability (accessed on 20 April 2022)
Clean Technologies and Environmental Policy	4	https://www.springer.com/journal/10098/ (accessed on 20 April 2022)
Chemical and Biological Technologies in Agriculture	1	https://chembioagro.springeropen.com/ (accessed on 20 April 2022)
Trends in Food Science & Technology	1	https://www.sciencedirect.com/journal/trends-in-food-science-and-technology (accessed on 20 April 2022)
Trauma	1	https://journals-sagepub-com.bd.univalle.edu.co/home/tra (accessed on 20 April 2022)
Vaccine	1	https://www.sciencedirect.com/journal/vaccine (accessed on 20 April 2022)
Viruses	1	https://www.mdpi.com/journal/viruses (accessed on 20 April 2022)
Zoonoses and Public Health	1	https://onlinelibrary.wiley.com/journal/18632378 (accessed on 20 April 2022)
Transboundary and Emerging Diseases	1	https://onlinelibrary.wiley.com/journal/18651682 (accessed on 20 April 2022)
Journal of Advances in Management Research	1	https://www.emeraldgrouppublishing.com/journal/jamr (accessed on 20 April 2022)
Research in Veterinary Science	1	https://www.sciencedirect.com/journal/research-in-veterinary-science (accessed on 20 April 2022)
European Journal of Clinical Nutrition	1	https://www.nature.com/ejcn/ (accessed on 20 April 2022)
Journal of Consumer Affairs	1	https://onlinelibrary.wiley.com/journal/17456606 (accessed on 20 April 2022)
Journal of Agribusiness in Developing and Emerging Economies	1	https://www.emeraldgrouppublishing.com/journal/jadee?id=JADEE (accessed on 20 April 2022)
Journal of Food Protection	1	https://meridian.allenpress.com/jfp (accessed on 20 March 2021)
CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources	1	https://cabidigitallibrary.org/journal/cabir (accessed on 20 March 2021)
International Journal of Operations and Production Management	1	https://www.emeraldgrouppublishing.com/journal/ijopm?id=ijopm (accessed on 20 April 2022)
Australian Journal of Experimental Agriculture	1	https://www.publish.csiro.au/an/content (accessed on 20 March 2021)
Veterinary Record	1	https://bvajournals.onlinelibrary.wiley.com/journal/20427670 (accessed on 20 March 2021)
Total	146	

4. Literature Review and Discussion

4.1. Category 1—Global Warming

4.1.1. Climate Change

The climatic impact of livestock production increases every day due to the increase in productive units, especially in developing countries. Evaluating the environmental impacts generated by livestock production in terms of each supply chain echelon is important for identifying the magnitude of the effects so that controls can be implemented to mitigate the negative consequences on the environment [34].

4.1.2. Meat Consumption

Nutrition in Western society is based on beef consumption. There are small groups of people aware of this economic sector's impact on the environment. Initiatives to reduce or simplify processes in the livestock supply chain are hampered by consumer beliefs, personal behaviors, social and family pressures, health, and preferred tastes. Vegans and vegetarians are aware of meat consumption's harm to the environment [35]. Generally, young people and women limit their meat consumption, especially in Europe, Asia, and the United States of America [36].

The introduction of other food sources, such as insects and cultivated meat, are alternatives that can reduce meat consumption [37]. Studies conducted on the impact of livestock on the environment generally support the concept that reducing beef consumption and promoting the intake of vegetables and fruits are beneficial [38]. A reduction in meat consumption could mitigate the emissions of GHGs and the burden of diseases on humans [39]. Consumer awareness of environmental sustainability and animal welfare are expressed concerning producers of beef and dairy products; thus, the demand by consumers for high-quality meat products has increased as consumer awareness has increased. Several studies seek to identify a consumer's willingness to pay for these quality attributes, and the results showed that there are differences in consumers' perceptions; therefore, it was difficult to standardize the estimates of the attributes [40].

4.1.3. Greenhouse Gas Emissions

Manure is considered a waste that generates environmental impacts, and it can be reused for the production of fertilizers and biogas. Biogas production involves various processes, including obtaining raw materials, transporting materials, industrializing the production process, implementing a technology structure, and establishing a plant in an area that has a drinking water supply, energy, and supplies. The environmental impacts of each of these processes that produce biogas must be evaluated to establish sustainable production strategies [41]. Farmer awareness of the importance of protecting the environment increases, and they are adopting sustainable strategies for nutrient management and manure treatment [42]. GHG emissions should not supersede the other impacts generated by the meat industry, whether negative or positive; thus, it is necessary to identify, characterize, and analyze each impact. Emission reports can omit details in the data, preventing their reliability and credibility.

Debates around the definition of carbon dioxide equivalence metrics should consider each impact individually to improve the evaluation of GHG emissions from the agricultural sector, thus benefiting research efforts [43]. Policy-makers focusing on reducing GHGs focus on animal nutrition and manure management through anaerobic digestion [44]. There are differences between globally modeled GHG estimates and those obtained in the field, where higher emission factors [45]. It is necessary to standardize GHG measurement methods and instruments and the presentation of the reports integrating the data [46]. The GHG emission factors of beef cattle are the highest compared to those of other types of meat when analyzing the production processes from birth to the cooking process [47]. In terms of ammonia emission rates, farm type, air temperature, and crude protein content in the diet are considered important factors; similarly, for methane emission rates, energy

intake and feed digestibility are important factors. Enteric food efficiency and increased productivity mitigate the emissions of these two GHGs [48].

4.1.4. Industrial Processes

Industrial plants that process the different components of livestock produce products and byproducts that add value to the supply chain economically, environmentally, and socially. The leather industry uses raw materials for the leather goods sector; tallow is used for butter, soaps, cosmetics, paints, and other animal products. The industry has made technological advances in software and hardware, which are expected in product quality [49].

4.1.5. Water Resources

The production, transformation of products and byproducts, and generation of inputs for the livestock sector require a supply of water, generating a water footprint. Therefore, it is necessary to identify alternatives that allow water use optimization. There are different metrics for quantifying water consumption; however, the results are isolated from the important objectives that need to be measured, such as environmental impact, water quality problems, water sources, and how they are measured and presented results [50].

4.1.6. Waste

Reusing the waste generated in meat processing plants provides an energy source for the biorefinery industry. This alternative use makes it possible to progressively change the current practices of disposal and incineration in landfills, which are incompatible with improving the environment. Research has been conducted to identify the different technologies that enable the conversion of biomass [51]. Wastewater from livestock processing plants and milk industrialization require treatment to reduce environmental impacts; technologies such as electrocoagulation are alternative options that achieve these environmental objectives [52]. Pretreatment processes for wastewater anaerobic digestion in livestock processing plants are other alternatives that can mitigate environmental impacts, and the related important variables to evaluate are costs and energy balance [53].

4.1.7. Soils and Plants

Livestock grazing has negative, positive, and neutral effects on natural ecosystems, especially concerning forest conservation [54]. The production of animal protein involves using nonrenewable resources and intense land use; the yields of these livestock species, in terms of gain per kilogram in cattle, are higher in dairy cattle than in beef cattle [55].

4.2. Category 2—Culture

4.2.1. Spirituality

Judaism, Islam, and Christianity have rules related to the production, distribution, and consumption of meat products, and the objective of these rules is to guarantee food security so that needs are met at nutritional and spiritual levels. Halal and kosher products must certify the quality of the production processes across the supply chain of different types of livestock [56].

4.2.2. Origin and Evolution

Young people and women are influenced to try to dissociate meat consumption and its origins [57]. Identifying pregnant female cattle prior to slaughter is essential to mitigate the pain generated in the process [58]. The supply of nicotinamide to humans from consuming large amounts of meat improves health, longevity, and intelligence, although the impacts on fertility are moderate; in contrast, if meat consumption is low, then fertility is high, and diseases can occur [59].

4.3. Category 3—Tanneries

4.3.1. Occupational Health

Working in tanneries can affect the skin, lymph nodes, joints and bones, and eyes and lung parenchyma, mainly from the effects caused by sarcoidosis, a disease that can occur in environmental and work environments [60]. Worker exposure to the nano papers emitted in the production process generates health damage, cardiac arrest, skin and eye allergies, cancer, DNA damage, and platelet alterations [61].

4.3.2. Conservation

The use of inorganic, natural, organic, and other chemical antiseptics; sodium chloride preservation; and physical preservation are leather curing methods that could reduce the environmental impacts of tanneries and improve the effectiveness of these efforts [62].

4.4. Category 4—General Agricultural Sector

4.4.1. Strategic Alliances

Coordination and stability, continuous improvement, power, commitment, trust, adaptation, collaboration value, and exchange activities are key factors for stakeholder cooperation in an agri-food supply chain [63].

4.4.2. Foods

Governance of the soybean value chain, public and private initiatives, consequences and potential barriers, and economic, social, and environmental challenges are the themes that define the proposed conceptual framework for managing the global supply chain of soybean [64]. The consumption of phosphorus fertilizers for food production will increase in the coming years, phosphate rock reserves are being depleted, and there are geopolitical limitations on the production and supply of P chemical fertilizers, which will lead to an increase in their prices could affect farmers. There is evidence of waste and loss of P to water bodies at different geographical scales, which will affect fish and cause algal blooms [65].

In comparison to the production of ruminant livestock, the production of fruits and vegetables, available products, dairy products, and nonruminant livestock have a lower impact on GHG emissions [66]. Strategic alliances, the definition of structural and naming guidelines, communication, and joint efforts among academia, the state, and business organizations are strategies that need to be implemented to reduce corruption in food supply chains [67].

The production of legumes contributes to increasing socioeconomic levels and protecting the environment by reducing GHG emissions. The fixation of atmospheric nitrogen, the release of high-quality organic matter to the soil, water retention, and the facilitation of nutrient circulation to the soil are some of the positive characteristics that make legumes necessary for agri-food systems in the future [68]. Knowledge about nutrition and food choice suggests that nutritional education and the provision of information through labels are the most common strategies used to alter processes related to the selection and purchase of food products [69].

Designing appropriate architecture and tracking and quality monitoring of food products involves the Internet of Things in the supply chain to ensure food safety. Temperature, humidity, and location are monitored by sensors, radiofrequency identification, and wireless sensor networks [70]. Managing, monitoring, and controlling the temperature in cold chains reduce food waste. The greatest consumption and abuse of energy are recorded in developed countries, for which there is not much information. Inappropriate practices by operators, poor location of products in storage areas, and poor refrigeration equipment designs are the main problems in the cold chain [71].

The agri-food chains that generate waste and loss are vegetables and fruits; however, in comparison to livestock production, fruit and vegetable production creates less environmental impacts and a smaller water footprint [72]. The development of efficient technologies and strategies for the reprocessing of environmentally friendly waste and public accep-

tance prevent the transformation of food waste into added value [73]. Physicochemical and biological treatment, including anaerobic and membrane treatment technologies, are techniques used to treat waste generated in food industries [74]. Children's cognitive development is altered by exposure to pesticides used in the production of food products, and antibiotics are used in livestock production.

Benefits to human health can be found in consuming organic products that could reduce the diseases associated with being overweight and obese and the risk of acquiring allergic diseases [75]. Approaches for modeling using operations research for sustainable risk management in the food supply involve the following concepts: consumer preference, the global sustainable food supply chain, the sustainable regional food supply chain taking into account food centers, sustainable distribution with controlled temperatures, nonprofit supply chains to alleviate food insecurity, farmer welfare, animal welfare, food supply chains based on traceability, sustainable agriculture, new modeling approaches and solution methods, application in developing countries, application of digital technologies and data analysis, and sustainable risk management [76]. The primary research has addressed the safety and food quality of perishable products, application of information technologies to logistics, optimization of losses generated in the industrialization of different foods, and climate change management; for the five actors in the supply chain: farmers, processors, retailers and final consumers [77]. Reduction of waste among farmers, wholesalers, and retailers, together with the support of government entities that design policies and consumer awareness, are vital axes to reduce hunger and malnutrition. Designing an integrated transportation system and road infrastructure improvement will allow optimization of the value chain. Adjusting demand and supply through prediction will reduce waste, disaggregating and studying all types of products [78].

4.4.3. Diets

A vegan diet has less environmental impact than vegetarian and omnivorous diets [79]. Greater consumption of animal-derived food products has a more significant estimated impact on the environment than consuming plant-derived products with a lower estimated environmental impact [80]. However, eliminating the consumption of meat and dairy products results in a decrease in the supply of micronutrients necessary for a healthy diet [81]. A cost model has been structured to minimize the diet cost, use linear programming, and meet nutritional requirements, including for those with low incomes [82]. The adoption of sustainable dietary standards allows for reducing GHG emissions and optimizing land and water use, ensuring. Western countries are aware of the changes they can make in their diets and the benefits they would have on the environment [83]. A strategy to encourage the consumption of plant products has been to highlight their benefits in reducing environmental impacts, benefiting human health, and reducing types of cancer and cardiovascular diseases [84].

4.4.4. Inputs

Emerging technologies will allow effective management of the supply of inputs to fields with high precision [85]. Soil and plants benefit from biofertilizers that improve soil's physical, chemical, and biological characteristics, crop quality; mineral and physiological nutrition; and phytosanitary control [86]. For example, water hyacinth has been used as a substrate for the production of compost and biogas, and fodder for different types of livestock, improving the yields of the different productive units [87].

4.4.5. Greenhouse Gas Mitigation

Minimization of food waste, support between countries to eliminate deforestation, incentivizing sustainable production in consumption patterns, anaerobic digestion of waste, and optimization of grazing practices are challenges to mitigating the generation of GHGs [88]. Redesigning production systems of goods and services, managing waste, and obtaining commitments from environmental and institutional leaders are requirements

for achieving environmental sustainability. In addition, GHGs, water, energy, ecosystems, phosphorus, nitrogen, terrestrial footprints, and biodiversity are proposed as factors to consider in environmental footprints [89].

4.4.6. Industrial Processes

Eliminating uncertainties and introducing ecological and lean practices, safety, quality, collaboration, and innovation are strategies that allow agri-food supply chains to improve their economic indicators [90]. Industrial wastewater treatment involves hybrid and constructed wetlands that integrate surface, horizontal, and vertical flows and subsoil to mitigate environmental impacts [91]. Statistics, data mining, machine learning, and optimization are techniques through which big data can be analyzed and applied in the management of green supply chains, ecological purchases, green strategic alliances with consumers, and the management of the entire supply chain and internal environment [92]. Analysis of the food value chain, deployment of the quality function, and value chain mapping is lean tools used to analyze the agri-food supply chain to identify and reduce waste in each process [93]. The impact of greenhouse gas emissions, production, distribution, traceability, standards, and safety are the main axes to manage in the supply chain of the agricultural food industry, especially in small and medium-sized companies [94].

4.4.7. Prospective

The use of different plant species will positively impact soil and plant conditions, which will allow an increase in plant productivity and stress tolerance and, consequently, will have a positive contribution to climate change [95]. Ecosystem services related to pastures consist of erosion control, carbon sequestration, and forage production, and their evaluation is carried out through field experiments, statistical modeling based on processes, and field surveys [96].

4.4.8. Water Resources

Consequently, various barriers in agri-food supply chains and water management related to the classification of the water resource management have been studied, which favors the integral management of water in sustainable agricultural supply chains [97]. The agri-food sector is the leading consumer of water, with livestock and wine production being the main consumers of primary freshwater generators of pollution. A framework for strategic, tactical, and operational decisions has been established that allows agro-industrial food production organizations to manage water consumption correctly [98].

4.5. Category 5—Quality Management and Control

4.5.1. Consumer

Tenderness, juiciness, and flavor are traditionally three of the most critical indicators when evaluating the quality of meat; however, it is necessary to expand the evaluation of the concept of quality to reduce subjectivity in evaluating beef palatability [99]. Consumers of beef are willing to pay an increased price, given it is guaranteed that the production processes have been respectful in terms of the management and welfare of the animals, that information that can be found on the product labels, and that rearing cattle in pastures is a priority [100,101]. Cancer of the esophagus, endometrium, breast and bladder, oral cavity and oropharynx, glioma and non-Hodgkin's lymphoma, lung and stomach, and colon have been considered. Besides, diabetes, obesity, and cerebrovascular accidents are diseases generated by consuming fresh and processed red meats [102]. Low-income consumers are limited in purchasing organic meat products due to high prices. Public policies of some European countries in different social contexts promote green contracting to democratize the consumption of organic products [103].

4.5.2. Safety

Meat color, external or intramuscular fat, brand, and information on a label are the main attributes that define the safety of meat; however, price is the main attribute that consumers consider when deciding to purchase meat [104]. Focusing on fruits and vegetables, reducing diseases and pollution, developing technologies for traceability systems, and conducting risk management are topics of working groups for safety in agri-food supply chains [105]. Implementing Good Manufacturing Practices and HACCP principles are essential to reducing Salmonella bacteria in fresh or processed meat products. There are microorganism controls approved during benefit and processing and others validated in the laboratory or pilot plants that require field validation [106].

4.5.3. Temperature

Monitoring and tracking temperature are parameters that need to be managed throughout the agri-food supply chain to reduce waste, improve quality, and control the organoleptic characteristics of food products in real-time. Emerging technologies such as radiofrequency and data management obtained from control and surveillance allow variable food behaviors to be predicted in real-time [107].

4.6. Category 6—Veterinary Medicine

4.6.1. Cattle Welfare

Meat quality, behavior, physiology, and morphometry are categories in which animal welfare indicators are classified from their departure from breeding areas to their arrival and internal management at processing plants [108]. Body temperature, respiration rate, feeding, and resting behavior are heat indicators that help estimate and project the sensitivity of animals [109]. The mathematical modeling of animal welfare allows data processing to project parameter scenarios, which help decision-makers; however, interdisciplinary work with researchers on sustainability and food safety is necessary [110].

Human responsibility, technological development in terms of the relationship between animals and humans, emotions and abilities, noninvasive evaluations, and improvements in the animal welfare process are necessary issues to be addressed to achieve animal welfare [111]. Reducing the number of animals, improving health and longevity, and managing land, food, and manure can be implemented to balance the environmental impact generated by livestock production systems and improve animal welfare [112]. Trailer design, the population in feedlots, water supply limitation during transport, understanding the risk factors for the primary livestock diseases, and the impact of the technologies used for the fattening process are topics that are of great importance to consider in the future, especially for the creation of new animal welfare indicators [113].

There is no animal welfare protocol within the processing plants that everyone accepts; however, small plants have designed and implemented practices that respect animal welfare, complemented by practices and methods that evaluate welfare within the production process that could provide benefits for this process if there is published scientific support [114]. The mortality rate of calves increases due to climate impacts, farmer care, poor nutrition planning, high herd numbers, and lack of vaccination against diseases [115]. Intensive calf rearing occurs in these production systems, where a lack of space, state of the infrastructure, and insufficient hydration units harm the well-being of calves and fatten cattle [116]. The free and thyroid hormones of cattle are sensitive to environmental conditions and transportation stress. Iodothyronines contribute positively to stress reduction; their evaluation ensures better production yields and energy homeostasis, providing well-being to cattle [117]. Weaning calves and providing nutrition with hand and confined feeding improve growth rates and morbidity in feedlots and adaptation during slaughterhouse transport. Mixing cattle before slaughter creates stress for cattle and negatively affects meat quality [118].

4.6.2. Disease

Low cattle production for meat and milk typically occurred due to the increased mortality of calves in the perinatal and neonatal stages and slaughtered cows due to diseases [119]. Dairy cow lameness is one of the primary diseases for which they have to be slaughtered, and this impacts the economy of farmers and animal production [120]. The identification, control, and management of zoonosis disease are essential within the livestock supply chain; however, farmers in Africa lack support to address this problem, and they do not have sufficient information to fight diseases [121].

Research on animal health and production yields is becoming increasingly important in the scientific community due to the impact on environmental sustainability. Researchers are formalizing reviews, presenting results, and all research methods related to the livestock supply chain [122]. Influenza D, the evolution of influenza A, spread throughout the world, generating uncertainty for farmers regarding its identification and control, mainly due to the costs generated [123].

The lack of definition of temperature control limits, contamination during the production process, and nondairy ingredients affect the birth and proliferation of the bacterium Clostridium botulinum, present in packaged dairy products and fresh dairy products, and packaged meat [124]. Modeling Johne's disease has allowed the study of the interaction between the infection and livestock, the definition of guidelines, and the identification of the animals that will be the subject of the experimentation process [125].

The surveillance and control of zoonotic tuberculosis during production, transport, processing and delivery to the final consumer are actions needed to eliminate the causes of its spread throughout the supply chain [126]. The defined methodologies for vaccinating against pinkeye lack information to validate the results' quality [127]. Workers in livestock processing plants and farmers are exposed to bovine tuberculosis through direct contact with livestock; similarly, approximately 1% of cattle across all Caribbean and Latin American regions are infected [128]. Eliminating the tapeworm Taenia saginata is difficult, even in countries with high control standards and strict and recognized quality management standards; there is also not enough data to establish identification and surveillance protocols [129].

Paratuberculosis represents a risk to human health and cattle; there is no evidence of zoonotic potential, and it is suggested that it be identified and controlled in the dairy sector [130]. Some data allow an analysis of indicators for the presence of bovine cysticercosis; however, they are not consolidated and must be obtained from different sources, which do not allow for the integration of the information; an objective is to consolidate a single health system, which will help manage the presence of the disease [131].

Weight reduction, cirrhosis, a decrease in the price of leather, low milk production and fertility periods, diagnosis and treatment costs, mortality, and abortions are impacts of diseases caused by parasites that generate economic losses in the livestock sector [132]. Joint work between the private and public sectors is essential to establish programs that optimize the costs associated with the entire supply chain of cattle to evaluate the impact on the economic and financial system generated by bovine diarrhea [133]. Managing livestock in the field, during transport, and in processing plants generates risks to those who have contact with the animals, thus generating minor and severe accidents that sometimes lead to human death [134]. Cattle fever caused by the parasite Theileria Parva has been identified in different parts of Africa. There is a method to combat the infection and prevent its expansion through vaccination with live viruses. However, logistical and quality control difficulties prevent its diversification [135].

4.6.3. Internal Medicine

Diagnosis of diseases, animal health, and identification of biomarkers and bioproducts are some of the applications of metabolomics, and they can be applied to different types of livestock. In addition, there are opportunities to apply this technique to predict the behavior of these parameters at different scales [136].

4.6.4. Nutrition

A life cycle analysis can evaluate the environmental impacts generated by livestock, and the analysis indicates that the category with the most significant impact on the environment is climate change. Climate change impacts biodiversity, and ionizing radiation is another category evaluated to a lesser degree. It is essential to increase interest in these topics on the part of the scientific community, mainly due to the impacts generated by extensive production systems [137]. Between organic and conventional livestock production, there are differences in the indicators when comparing them; if a hybrid between these production systems is achieved, then better results can be achieved; however, more data and consensus between the interested parties are needed to establish a roadmap [138].

Production increases are essential for farmers, so they use feed additives; however, farmers do not know the environmental impact generated by their use; it is possible to reduce these impacts on the environment, especially GHGs and ammonia [139]. In southern Africa, livestock production by small farmers is experiencing problems related to the animal food supply, inequitable marketing, and high rates of diseases and parasites, although regional livestock breeds are resistant to conditions adverse to their welfare. Farmers' training systems are vital in improving their production systems, as research processes consider integrating and coordinating activities throughout the supply chain [140].

The sedentary lifestyles of some cultures and climatic factors cause land degradation. By planning grazing in the environment where livestock farmers live, livestock may improve the fertility conditions of the land [141]. Improvements in meat quality and feed transformation ratios and increases in animal weight productivity are some of the improvements that occur when cattle are fed pangola grass forage, either as silage or hay; similarly, there is great potential for the use of this type of grass [142]. Despite the controversy regarding the nutrition of recently weaned calves with forage, there is evidence of benefit in improved rumination and fermentation of the feed. This objective is achieved depending on the quality and quantity of milk and concentrate supplied [143].

The indicators of average daily gain, feed efficiency, and dry matter consumption are improved with monensin in the forage of cattle feed, a product used in the different production stages, from the animal's birth to the benefit stage [144]. The use of plants as plant bioactive improves the health of animals while providing high-quality derivatives thereof, whether meat or dairy. Benefits for human health can be obtained as well [145]. The biosolids obtained from the filtration of household wastewater become fertilizer for pastures for animal production, which reduces economic and environmental costs [146].

Human health can obtain benefits when their diets incorporate products that contain antioxidants and antimicrobial peptides from products and by-products derived from different types of livestock [147]. The industrial production of chestnuts generates several types of by-products and residues, which can be converted into raw material to produce different products, covering economic sectors such as cosmetology, health, food in general, and especially the conservation of meat products. The use of these chestnut by-products improves the health of humans due to their antioxidant and anti-inflammatory characteristics and improves neurological disorders and cardiovascular diseases [148]. The animal feed industry generates large amounts of waste, and reusing this waste benefits the value chain, such as by-product hydrolysates, which are a source of protein for the nutrition of weaned calves and serve as raw material for obtaining other products [149].

When inspecting the milk transported in tank trucks and finding the presence of tetracycline and sulfonamides, it was decided to discard the product. This milk can be used to feed calves to avoid a total loss. However, to neutralize the risk of detecting drugs in them, it is essential to wait twenty days of quarantine so that the residue tests come out negative [150].

The pastoral production system has benefits for sustainability. However, it is necessary to integrate functions with market systems and long-term purchase and sale commercial agreements. Indeed, the entire supply chain benefits, especially the quality of life of the shepherds, given that they are the most important management variable [151].

Increasing sustainable beef production can be achieved by integrating stakeholders from across the value chain, with public institutions defining policies that help small producers [152]. Reducing greenhouse gases, animal health, feed efficiency, meat quality, digestion, and growth of livestock are benefits obtained from using biochar as an aggregate for forage [153]. Air, water, and soil quality, cultural impact, deforestation, and lack of regulation to protect species of fauna and flora are some of the ecosystem services and characteristics affected by livestock production.

Improving production practices increases the well-being of all those involved in the supply chain [154]. Critics of meat production from different types of livestock are based on the negative impacts that this economic sector generates for human health and the environment. However, they are unaware of some nutritional benefits from its consumption and are a primary ranchers' primary source of life. There are significant advances in improving production systems that allow balancing the balance, both positive and negative [155]. Increasing livestock productivity and reducing the effects on the environment of its operations are objectives of the economic sector. Mathematical models for predicting nitrogen efficiencies are strategies to achieve these environmental and economic commitments [156].

4.7. Category 7—Perspectives

4.7.1. Future and Current Context

The demand for beef cattle in Australia is sustained, especially by the guidelines defined by the economic sector, which consists of uniting the interested parties and working together to develop strategies for technological improvement, marketing, product quality assurance, biosecurity, genetic improvement, strategic planning and efficiency in production systems in each echelon of the supply chain. This approach will make that country continue to be one of the leading meat producers in the world [157]. Although Europe is one of the leading meat producers globally, its export market is not. The challenge is to achieve homogeneity between the countries of the European Union, improving their production systems at a technical, economic level. Social and environmental, to produce beef of high quality and in the necessary quantities [158].

The demand for beef cattle is greater than the supply. Indeed, it is necessary to improve the technologies for cattle breeding, technology transfer, training for farmers, and integration of other types of crops into livestock nutrition to reduce this gap [159]. Japan is recognized worldwide as a producer of one of the highest quality beef cattle. To achieve this position, they assume high costs of importing feed, with risk to food safety due to diseases inherent in this raw material; therefore, its purpose is to increase the national nutrition production and develop metabolic programming and implementation of information and communication technologies [160].

The consumption of beef cattle in Thailand is growing, and its total current production is consumed locally. In order to meet the forecast demand, it has been established to structure a breeding and fatten production system, integrating all the participants from each link in the supply chain [161]. The import of beef cattle in China is greater than the export, for producers it is important to look for strategies to increase the internal production of cattle, given the consumption growth that is expected for the following years; therefore, depending on achieving this supply objective will improve the technological platform, the pregnancy system, and feeding management [162].

The analysis of the process, products, environmental management, waste management, and water and energy consumption are work axes that allow us to offer environmentally friendly industrial practices. For this aspect, it is crucial to involve all the echelons of the supply chain [163]. Compared with the ecological-environmental, socio-anthropological, and neuroeconomics, the technical-biological epistemological aspect, due to its approach to contemplating the three pillars of sustainability, social, environmental, and economic, will allow production systems in livestock to be sustainable, preferably, farm-to-consumer practices are implemented [164].

4.7.2. Innovation and Competitiveness

Developing strategies to promote innovation in the meat product processing industries is essential to achieving competitiveness in the economic sector; some are oriented to managing the organization's capabilities, consumer management, and developing and implementing new technologies [165].

4.7.3. Developing Countries

Developing countries are challenged to balance urbanization and food security with social needs, especially with low-income people, generating a connection between all participants in the livestock supply chain and not only from production and consumption [166]. South Africa's low-income countries are struggling to meet sustainability targets. It is necessary to structure sustainable development programs at a technical, technological, and modernization level, defining a general framework for monitoring sustainability goals to ensure that the different production systems of each echelon in the cattle supply chain are friendly to the environment [167].

4.8. Category 8—Technology

4.8.1. Infrared Spectroscopy

Prediction of the quality of carcass fat, product quality, technological parameters, sensory attributes, chemical components, and identification and classification of meat products are some of the applications of near-infrared spectroscopy used to improve the quality control and monitor the process of beef cattle products [168].

4.8.2. Nanotechnology

Vaccine development and dietary supplementation are the two main areas of application of nanotechnology, whose objective is to increase production by improving growth performance and reducing the severity and frequency of animal and zoonotic diseases. The use of nanotechnology in livestock is growing and will guarantee food safety and the commitment of technology to sustainability [169].

4.8.3. Emerging and Innovative Technologies

Smart stretch and Pivac, ultrasound, pulsed electric field, shock waves, and high-pressure processing are technologies used to achieve meat tenderization and increase the shelf life and quality of meat products. Consumers are willing to bear the additional cost of using these technologies [170]. Consumers want to know the traceability of meat products. Radiofrequency identification per animal and DNA fingerprinting per product are two alternatives. These technologies allow managing information from the farm to delivery to the final consumer, helping to guarantee the origin and quality of the products [171]. The anaerobic digestion of livestock and poultry sector waste through biodigesters for biogas production shows positive yields for implementation in farms and industrial plants; likewise, the contribution to the environment is significant by reusing manure as a source of raw material [172].

4.8.4. Artificial Vision and UAV (Unmanned Air Vehicles)

Tracking cattle is one of the goals of artificial vision; in this way, specific animal information would be obtained for proper characterization. Combining different identification and tracking algorithms allows us to reach this objective. Communication and interdisciplinary work, improving the presentation of research reports in articles, and tracing knowledge gaps defined in previous works, will ensure that this area of research has a prosperous future [173]. The processing of images obtained by uncrewed vehicles allows the identification and monitoring of livestock. However, to speed up the process, more tools are required. Autonomous learning is another additional technique to the previous two that increases its technological advance [174].

4.9. Category 9—Transportation

4.9.1. Road

The precedent processes of the land transportation of cattle, such as the conditions in the farms, nutrition, surveillance, monitoring, and mixing with unknown animals, among other factors, are essential concerning animal welfare and are interrelated to the adjacent problems which occur throughout the supply chain [175]. Road transport is a multifactorial problem in which several factors are responsible for animal welfare and meat quality; animals in better conditions suffer less during the transport process [176]. Mortality, physiological analysis, weight loss, fever, behavior, meat quality, distance and time, and climatic factors are structural axes that require analysis and evaluation to mitigate stress to cattle during road transport to processing plants [177].

4.9.2. Sea

The transportation of livestock by sea represents one of the critical problems in animal welfare; they are subjected to climatic conditions not suitable for this export marketing process, heat, humidity, lack of ventilation, and elimination of heat generated by their metabolic processes and population density cause mortality. This fact allows the entire process to be measured, in the sense that from it, economic expectations are generated in the marketing process [178].

4.9.3. Air

Transportation begins from the farm, or pre-export center, to the airport, where the cattle are packed, and ends with unloading at the importing country's facilities. The information on practices, procedures, and protocols of this means of transport is minimal, especially during the trip, for reception and unloading. Therefore, it is unclear how some factors, such as nutrition, air quality, air turbulence, travel time, cage design, pre-flight and post-flight inspection facilities, influence animal health. Studies conducted on land and sea transport to assess animal welfare have not been conducted for air transport [179].

5. Concluding Remarks

This systematic literature review has been performed to holistically identify different disciplines that investigate cattle supply chain issues, organize them according to their approach to propose categories that would allow classifying different areas of scientific research, and was oriented to identify specific information articles, authors, and journals. Consequently, the referenced articles were described, the disciplinary categorization was carried out, and synthesized findings that allowed specific information of interest to be observed and compared. Additionally, it is evident in all the analysis criteria that the category of veterinary medicine is the one that has the best results in the indicators. Therefore, additional research is required in the other categories, especially in culture, technology, management, and quality control. Tanneries and transport have been less studied. It is encouraged to develop research mixing the different proposed categories.

For future research, proposed gaps were identified and grouped according to the similarity of the proposed categories and the levels of the strategic direction of companies [180]. Generalities of the agricultural sector, perspectives, and culture correspond to a strategic level; according to Worldometers, for the year 2050, the population would amount to 9.73 million [181], creating a projection instrument for the consumption of bovine meat in parallel, would allow generating productive expectations for ranchers. The development of this research gap will allow bovine livestock science to improve cost structure, plan and program its production; state policies would be created to encourage the sector and measure sustainability indicators. Production costs, maximization of cargo capacity, and the emission of greenhouse gases could be optimized by using the results of these projections. For future research, it is suggested to incorporate variables such as informed consumers with intercultural and religious differences, alternative organic inputs, and freshwater management.

Technology and preventive medicine are related to the tactical level, decentralized from strategic managerial functions. An objective could be to know the state of health and well-being of animals by country in real-time. Creating a global cattle entity that captures and manages the data obtained using present and emerging technologies would allow it to control indicators of diseases, nutrition, welfare, and animal production, among others. The linking of all the countries would allow the establishment of common objectives at the environmental level, mitigating adverse effects on the environment, improving the quality of life of the immersed society, and making strategic marketing alliances that improve its economy. It is suggested for consequent research to create new indicators for measuring animal welfare such as the impact of resting time in pens prior to processing in the area near the plant, design new technologies for standing diagnosis, anti-theft, monitoring by state entities such as the police, reuse of waste in real-time to new alternatives for use in different processes of the production system.

Management and quality control, transport, and tanneries belong to the operational level, processes that execute the strategies proposed at the strategic and tactical level, an instrument could be had during transport that allows monitoring the status of the animals. By controlling and managing the risks associated with the transportation of cattle, such as stress, injuries due to fights, suffocation, and dehydration, among others, by the driver or another mechanism, the possibility of improving sustainability indicators is increased. It is recommended in future research to evaluate the driver-animal relationship in the quality of the product and the welfare of the two entities, deepen the analysis of the organoleptic losses of the products and by-products, design trailers with protection under the four seasons of the year and with technologically controlled food supply. It is essential to develop research mixing gaps from the different proposed categories. Finally, it is considered significant to carry out a multicriteria selection methodology prioritizing the categories proposed in this review to guide future research work.

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Appendix A

We have performed a bibliometric analysis by using VosViewer 1.6.18 and SciMAT (GPLv3) software using 34 papers from Scopus database. The following figures summarize the obtained results of the bibliometric analysis.

Figures A1–A4 show that the information provided is clear and valuable. VosViewer manages articles from Scopus, WoS, Pubmed, and Dimensions, while we have considered 16 additional databases. SciMAT performs a complementary descriptive statistical analysis; however, it is elementary, and we have not considered it part of the literature analysis review.

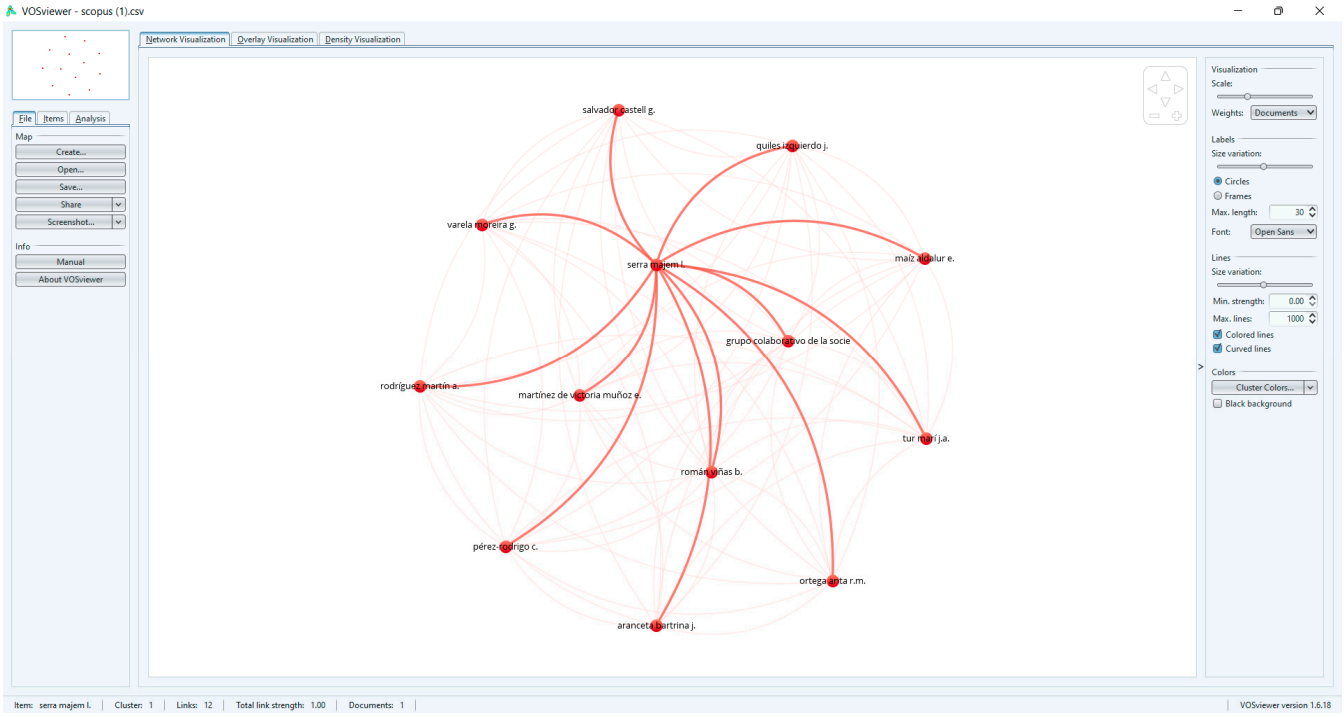

Figure A1. Network visualization of papers. Source: Generated by VosViewer.

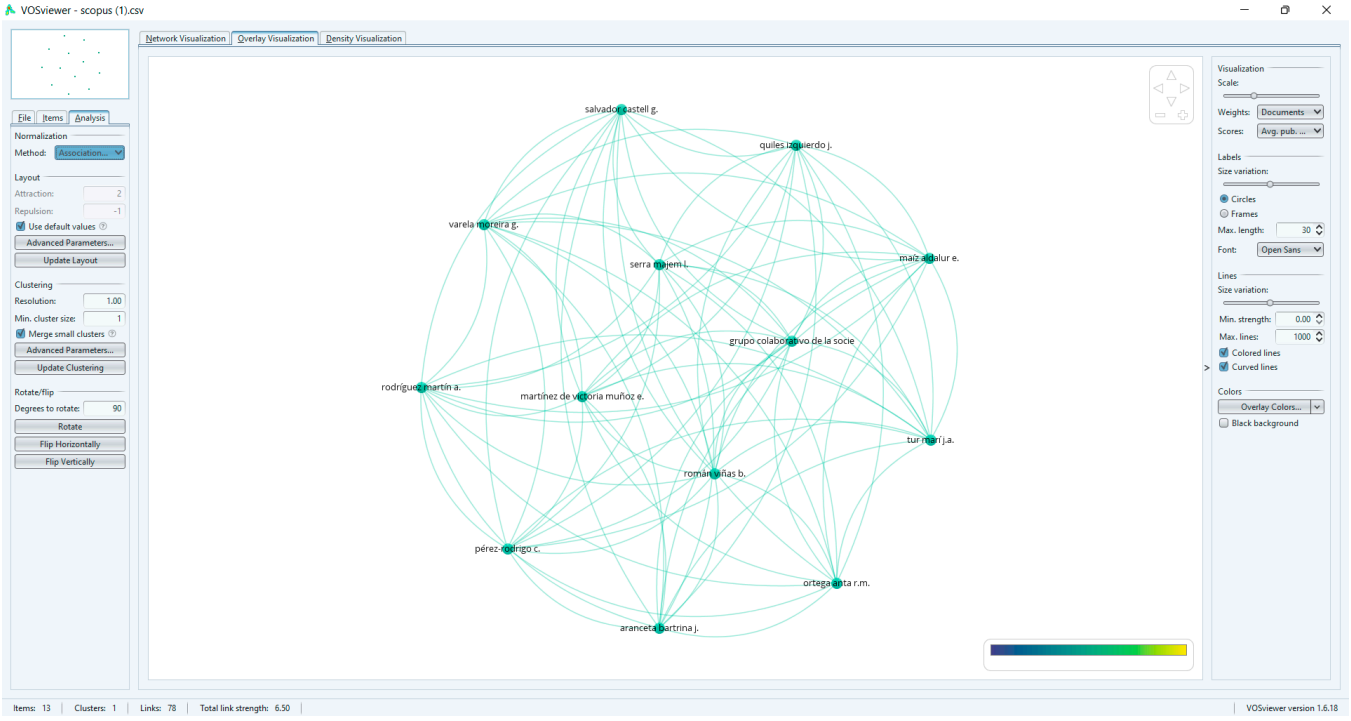

Figure A2. Overlay visualization of papers. Source: Generated by VosViewer.

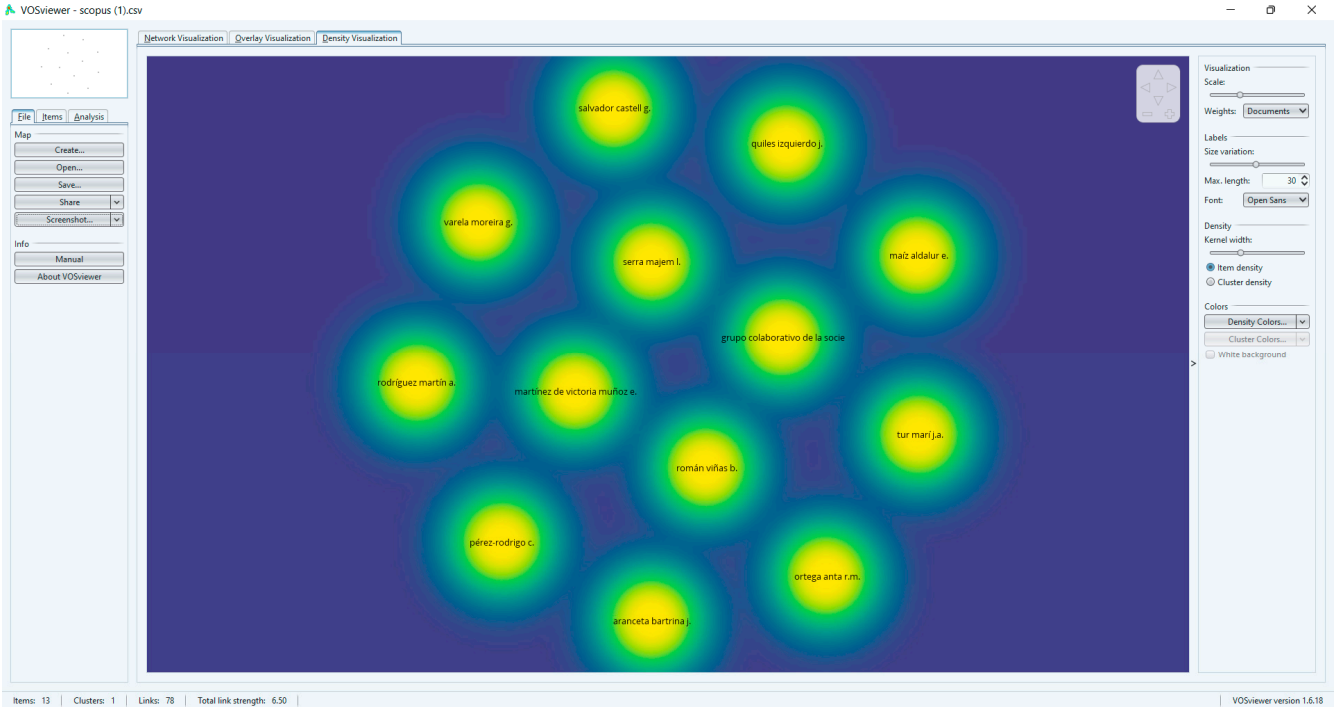

Figure A3. Density visualization of papers. Source: Generated by VosViewer.

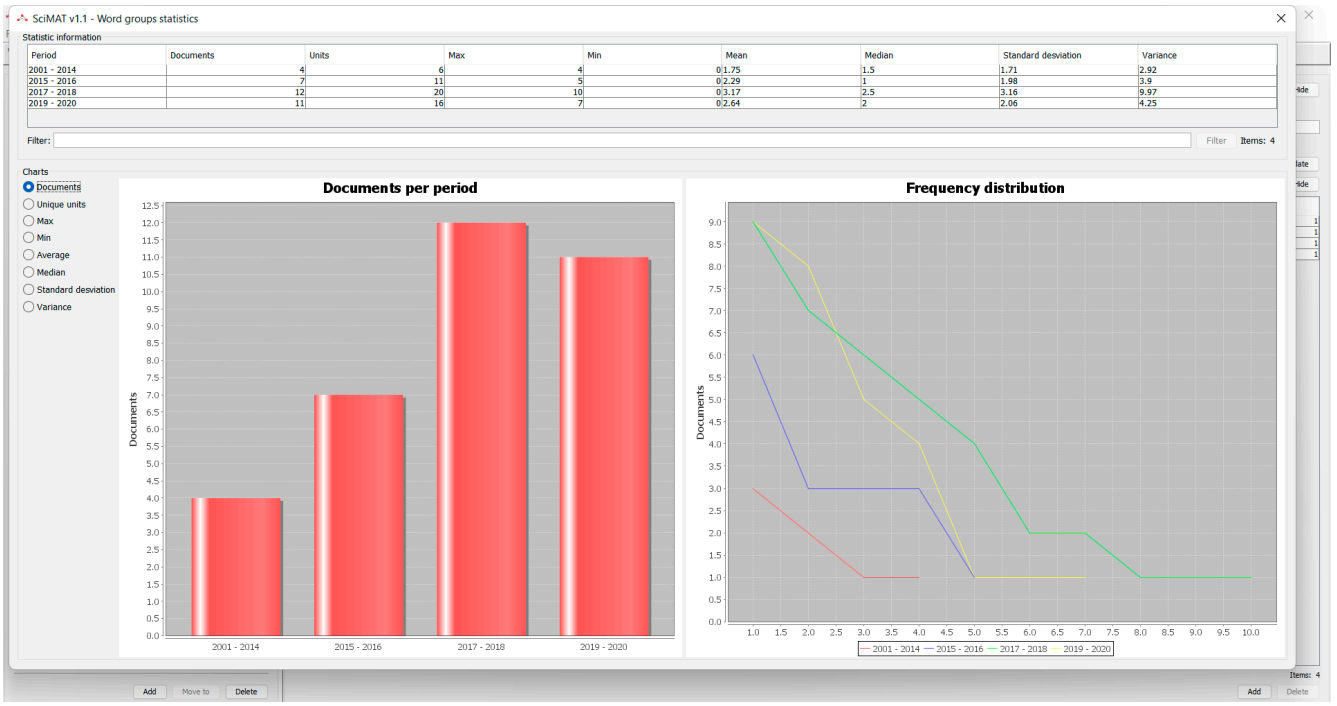

Figure A4. Word group statistical analysis. Source: Generated by SciMAT.

We have decided to plan, schedule, and present our document according to the PRISMA methodology.

Table A1. PRISMA 2020 Main Checklist.

Topic	No.	Item	Location Where Item Is Reported
	1	Identify the report as a systematic review.	1
Abstract	2	See the PRISMA 2020 for Abstracts checklist	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	2
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	3
Information sources	6	Specify all databases, registers, websites, organizations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	4–5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	3
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	2–3
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	5
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	5–14
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item 5)).	3–4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	N/A
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	N/A
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	N/A
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	4, Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	3–4
Study characteristics	17	Cite each included study and present its characteristics.	N/A
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.	5–14
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	N/A
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A

Table A1. *Cont.*

Topic	No.	Item	Location Where Item Is Reported
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	14–23
	23b	Discuss any limitations of the evidence included in the review.	N/A
	23c	Discuss any limitations of the review processes used.	N/A
	23d	Discuss implications of the results for practice, policy, and future research.	23–24
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	N/A
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	N/A
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	24
Competing interests	26	Declare any competing interests of review authors.	24
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	N/A

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