
A Literature Review on the Animal Feed Industry Management

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doi.org/10.51505/IJEBMR.2023.71009 URL: <https://doi.org/10.51505/IJEBMR.2023.71009>

Received: Sep 22, 2023

Accepted: Oct 02, 2023

Online Published: Oct 17, 2023

Abstract

The article conducts a literature review on the topic of the animal feed industry management. The author has compiled and analyzed 109 papers via WOS (Web of Science) using the bibliometrics method. Results are drawn based on the following criteria: keywords, author, country, journal, and citations, and obtained from the literature review show that this is a topic receiving great attention among researchers. There are many research models on factors affecting the feed production process, the efficiency of enterprises in the feed production industry, and factors affecting production efficiency, price, and quality of feed source. Each research model presents different influencing factors.

Keywords: animal feed industry, literature review, bibliometrics

1. Introduction

Animal feed become more and more important in the food processing industry. This industry combines and blends raw material inputs that are products of the farming industry, such as cereals, corn, potatoes, cassava, oilseeds such as soybeans, peanuts, sesame, and other by-products of the food processing industry, livestock, poultry, and seafood into a diverse, nutritious industrial food source for livestock development. Thus, the animal feed processing industry's input raw materials and output products belong to the agricultural sector. Many researchers believe that the animal feed production industry is a supporting industry of the agricultural industry. Developing the animal feed processing industry, producing other agricultural materials, along with the food processing industry, manufacturing agricultural machinery and equipment, etc. is the most important in implementing industrialization and modernization of agriculture and rural areas of countries.

Conducting a literature review on this topic serves two main purposes. First, find out what theories, policies, researchers and have paid attention to, what methodologies have been used, and what achievements have been achieved. Second, find out what future research trends can inherit and use to further develop the results of previous research.

2. Methodology

The systematic review approach selected keywords for the search including “Feed manufacturing”, “Policy” and “Management”, on the Web of Science. With this method, the

subjectivity of researchers in data collection is eliminated. The method proposed by Becheikh et al. (2006) considered only empirical articles published and published in academic journals; Therefore, non-experimental studies (internet sources...) were excluded from the review. The first result for the literature search for the keywords “Feed manufacturing” AND “Policy” OR “Management” in the topic (title, abstract, and keywords), the selected language is English, excluding conference papers, 384 results were obtained. The next step is to determine the article conditions suitable for the research (for example, just using keywords to search for articles is not enough, because without checking the entire text there will be errors). Many articles can be returned that do not address the topic of state management of the animal feed production industry). Then perform the filtering steps through "summary" and "full text", the total number of articles selected is 209 (table 1).

The systematic review process for research will include the following stages:

1. Perform analysis based on the criteria (research location, research method, classification of factors affecting animal feed production, policies introduced) in the study.
2. Performing a bibliometric analysis on selected articles will reveal the clusters of interest to authors and readers around the world in the animal feed industry.

Table 1. Search results on the selected database

Database	Web of Science
Keywords _	Feed manufacturing, Policy, Management
Search _	Topic (Title, Abstract, Keywords)
Document Type	Articles
Year of publication	1997 -2022
Language _	English
Research area	All
Web of Science Categories	All
Results _	109 articles

Bibliometric

Bibliometric analysis methods use quantitative information from bibliographic databases WOS to identify influential previous articles. The bibliographic co-citation analysis method is based on citation data in the field of animal feed production to determine the structure of the theoretical foundations of the current literature.

Bibliographic data from the WOS for the 109 reviewed articles were published and a co-citation analysis to reveal the theoretical underpinnings of the study of state management in animal feed production was performed. Co-citation is a measure of similarity between articles, authors, or journals (Zupic and Čater, 2014). In co-citation analysis, one counts the number of times two certain articles are cited in articles published later than the two cited articles above. The fact that

two articles are cited by a newer article may indicate a certain quantitative relationship between the two previously published and co-cited articles. The higher the number of co-citations, the higher the relationship between the two articles (Cao Minh Kiem, 2009).

3. Discussion and Results

Across the 109 selected articles, there are 50 countries where businesses were surveyed and empirical research was conducted. Table 2 lists the 10 countries with the highest publication rates from 1997-2022. The country with the highest rate of articles is the US with a total of 24 publications and also achieved the highest number of citations with 434. After the US, the UK is the second country in terms of the number of research articles with a total of 10 articles, with a total of 191 citations. Close to the UK is another European country, Germany with a total of nine published articles related to animal feed production. The next four countries with eight articles published are Australia, India, the Netherlands, and China, respectively. Among them, the Netherlands is the country with the highest number of citations 155 times and is also the country with the highest citation rate per article with 19.38 citations per article. Next are China, Australia, and India with 18.50 citations per article respectively; 12.63; 11.75. The remaining three countries include Canada, Denmark, and Spain, each with five published articles. Spain has the lowest number of citations with 47 citations.

Table 2. 10 countries with the highest publication rates

Research position	Quantity	Number of citations	TC/Art	Total Link Strengths (TTL)
America	24	434	18.08	4 65
Older brother	ten	191	19,10	285
Virtue	9	85	9.44	68
Australia	8	101	12.63	273
India	8	94	11.75	11
Netherlands	8	155	19.38	285
China	8	148	18.50	320
Canada	5	93	18.60	156
Denmark	5	78	15.60	249
Spain	5	47	9.40	218

Source: Author's analysis of WOS data

A co-citation cluster map was created to drill down further into the country analysis and any connections between them (Figure 1). The frequency of occurrence of representative phrases for each country determines the formation of clusters; The more frequently terms tend to appear together, the more they are colored into clusters. The size of the circles represents the number of products a country has produced, but the width of the lines indicates the level of cooperation. VOS viewer map of cross-national research collaboration between countries identifies six clusters with minimum contributions from 23 countries that have published at least two articles out of 50 countries that have published at least one article. Among them, the strongest research cooperation is between Australia and the UK, with a connection strength of 185 and forming a

strong link. The second strongest link is between the US and China with a link strength of 142, demonstrating the level of attention paid to state management of the animal feed industry. Figure 1.1. also pointed out the countries with the earliest research on the animal feed industry, notably India, the Netherlands, and Italy, with research related to the field decades ago. Recent countries that tend to research are Taiwan, Uganda, and Spain.

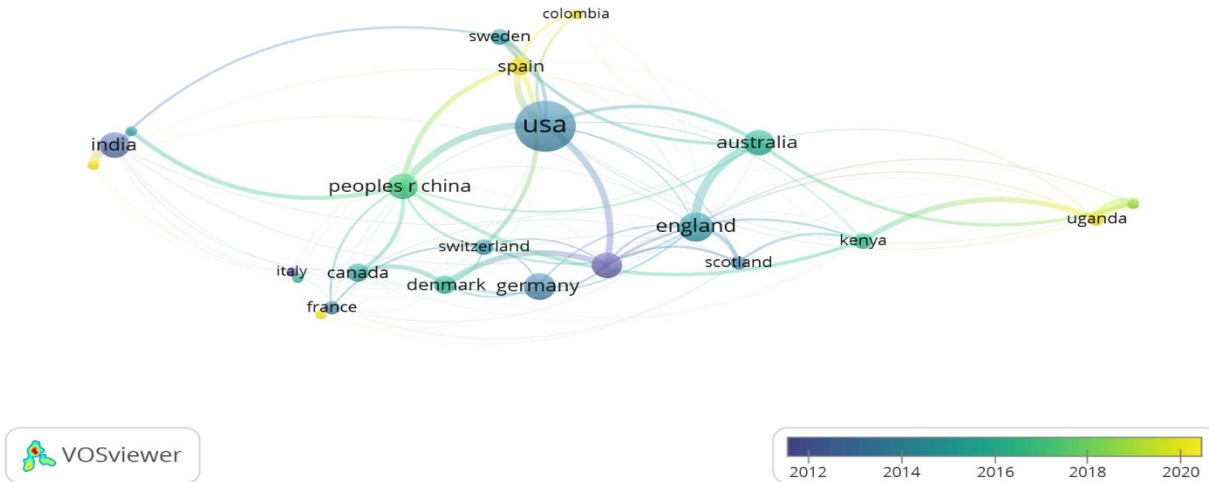


Figure 1. Overlay visualization map of the country

Analysis of Research Organization Allocation

After studying the list of the most productive countries, their institutions and schools appear prominently in the rankings of institutions published on the Web of Science database. According to Table 3, the top eight establishments contributed 28% of the total 197 organizations named in the research field of animal feed production. The University Of Georgia ranked first with 7 published articles, with the highest total number of citations of 76 times, an average of 10.86 citations per article from this university. Two universities, Aarhus University and Swedish University Of Agricultural Sciences, share second place with a total of 4 published articles, however, Aarhus University has a higher number of citations with a total of 76 citations. In joint third place are five institutions including the University Of Copenhagen, International Livestock Research Institute Ilri, Wageningen University Research, the University Of Wisconsin Madison, and Johns Hopkins Bloomberg School Of Public Health, with Johns Hopkins Bloomberg School Of Public Health taking the top spot. total citations 70 times, and also the organization with the highest number of citations per article with over 23 citations per article.

Table 3. Institutions with the highest number of published articles

No	Organize _	Country _	Quantity _	Quote _	TC/Art
1	University Of Georgia	America	7	76	10.86
2	Aarhus University	Denmark	4	76	19.00
3	Swedish University Of Agricultural Sciences	Sweden _	4	40	10.00
4	University Of Copenhagen	Denmark _	3	40	13.33
5	International Livestock Research Institute Itri	Kenya	3	28	9.33
6	Wageningen University Research	Netherlands	3	46	15.33
7	University Of Wisconsin Madison	America	3	18	6.00
8	Johns Hopkins Bloomberg School Of Public Health	America	3	70	23.33

Source: Author's analysis of WOS data

Distribution of Leading Publication Journals

Analyzing the leading journals for each field is extremely important. In the research field of state management of animal feed production, we collected 10 journals with the highest number of published articles out of 109. articles are collected. From Table 4, we can see that the *Indian Journal Of Animal Sciences* is the leading journal with a total of 4 related articles out of 109 articles, but the citation level from this Indian journal is not equally high. At that time, the Impact Factors index also ranked last among the 10 selected magazines. Ranked second are the six journals *Agricultural Systems*, *Frontiers In Veterinary Science*, *Journal Of Cleaner Production*, *Journal Of Dairy Science*, and *Land Use Policy* magazine with three articles each. Among them, the *Journal Of Cleaner Production* is the magazine with the highest Impact with 11.90 points, and is also the magazine with the highest number of citations with 73 citations. Among the 10 journals with two articles published, the study selected three journals with the highest citation index to include in Table 4 including *Environmental Management*, *Animal Production Science*, and *Animals*, in which *Animals* magazine has the highest number of citations with 36 times.

Table 4. Leading magazines in the animal feed industry

Magazine	Quantity	Quote	TC/Art	Impact Factors
Indian Journal Of Animal Sciences	4	29	7.25	0.35
Agricultural Systems	3	65	21.67	7.02
Frontiers In Sustainable Food Systems	3	14	4.67	4.69
Frontiers In Veterinary Science	3	12	4.00	3.14
Journal Of Cleaner Production	3	73	24.33	11.90
Journal Of Dairy Science	3	50	16.67	3.70
Land Use Policy	3	28	9.33	7.38
Environmental Management	2	26	13.00	3.42
Animal Production Science	2	13	6.50	1.43
Animals	2	35	17.50	3.18

Source: Author's analysis of WOS data

Distribution of Leading Research

To fully understand research on state management of the animal feed industry, an analysis of the distribution of the most cited articles was used. Only 10 articles out of 109 articles were selected (table 5). Through the table, we can see that the majority of these articles focus on analyzing the current status of animal feed use and production, through which the authors also provide recommendations and policies related to key topics. including:

Table.5 Summary of factors affecting the animal feed production industry

Influences No	Economy	Society	Environment
1	Profit	Cultural traditions	Carbon emissions
2	Tax proportion	Nutrition and health	Water quality and treatment
3	Food supply	Rights and Safety	Animal and plant health
4		Animal welfare	Biodiversity
5		Organizing agencies	Toxins
6			Food waste and loss

Source: Author's analysis of WOS data

Table. Top 10 studies with the highest citations

Author	Title	Quote	Method	Policy
Lulijwa, Ronald et al	Antibiotic use in aquaculture, policies and regulation, health, and environmental risks: a review of the top 15 major producers	252	Review	In terms of policy, the main actors are the European Commission, the Food and Drug Administration, the European Medicines Agency, the Norwegian Veterinary Institute, the Norwegian Food Safety Authority, Codex, and other ministries. government. In particular, the Norwegian Food Safety Authority and the Norwegian Veterinary Institute have proven that the management mechanism for antibiotic use in aquaculture needs to be strictly managed. The future of aquaculture lies in ensuring the supply of safe seafood products to the growing consumer market. Therefore, international coordination of the policy and regulatory environment is needed, and increased investment in research for alternative aquatic health management strategies is needed. Future technologies should focus on reducing antibiotic use to protect the environment and ensure the safety of consumers, the feed industry, and aquaculture workers.
Tacon, AGJ, et al	Aquafeeds and the environment: policy implications	108	Experiment	In the study, the authors pointed out that to limit the potential negative environmental impacts of feed on aquaculture wastewater, the main methods used by government agencies in producing countries are: Large aquaculture applications include (1) requiring treatment of farm wastewater before discharge, through the use of settling tanks, specific filtration equipment, wastewater treatment systems, etc., (2) limit the concentration of dissolved inorganic/organic substances and/nutrients in farm effluents, (3) establish maximum allowable amounts of specific nutrients (e.g. such as total nitrogen or phosphorus) that the farm can emit in a fixed period of time, (4) limit the total number of permits that can be issued and/or the size of the farm, depending on the vicinity of the other farming activities and the assimilation carrying capacity of the receiving aquatic ecosystem, (5) limit or fix the total amount of feed that the farm can use in a given period of time, (6) set maximum levels of specific nutrients allowed in compound feeds that are to be used to feed the species in question, (7) prohibit the use of specific high-risk feeds such as fresh fish/trash fish and invertebrates, (8) prohibit the use of certain chemicals on the farm, including specific chemotherapeutic drugs/drugs and chemicals (i.e., herbicides and potentially toxic pesticides, etc., (9) prescribe minimum feed performance criteria, such as specific levels of dust/fine particles allowed, feed efficiency or ability to nutrient digestion, (10) requires the use of specific Codes, including Good/Best Management Practices appropriate to farm operations, including feed production and use, and environmental management, (11) require the development of appropriate on-farm/pond sediment management strategies for sediment storage and disposal, or (12) require the implementation of monitoring programs environment.
Anderson, James L. et al	Economics of Aquaculture Policy and Regulation	84	Experiment	With the growth of aquaculture, several major concerns have arisen, including pollution, feeding practices, disease management and antibiotic use, habitat use, and non-native species. geography, food safety, fraud, animal welfare, access to water and space, market competition, and genetics. As the author points out, managing these concerns requires policies and regulations that are thoughtful and designed with practical shortfalls in mind. The study relied on aquaculture farmers - who are the main policy influencers - to analyze and propose appropriate policies.
Coyne, Lucy, et al	Characterizing Antimicrobial Use in the Livestock Sector in Three South East Asian Countries (Indonesia, Thailand, and Vietnam)	61	Experiment	In the study, the authors mentioned a lot about policies and monitoring of antibiotic use. In there, <ul style="list-style-type: none"> • During the study period, Indonesia, Thailand, and Vietnam adopted and implemented policies to control antibiotic use in livestock production and monitor AMR. • Thailand appears to have the most intensive, modern, and strictly regulated livestock farming system regarding antibiotic use and has more developed policies and implementations such as requiring and prescribing HP -CIA when compared to Indonesia and Vietnam. • Thailand quantified antibiotic sales using the

				<p>ESVAC method. It is likely that this method and approach will be adopted by other LMICs and could be applied to data already collected and provided to OIE. Policies regulating antibiotic use should be incremental with the ultimate goal being just prescribing.</p> <ul style="list-style-type: none"> • Currently, among the case study countries, Thailand appears to be further along in its journey to develop antibiotic use and resistance policies for livestock than Indonesia or Vietnam.
Kebede, Haftom, et al	Current status of major mycotoxin contamination in food and feed in Africa	59	Experiment	Mycotoxin contamination is becoming a serious problem in Africa because of its negative impacts on human and animal health, the economy, and trade. Most countries and regions have established maximum tolerance limits for mycotoxins in food and feed due to the high risk to human and animal health. However, most countries in Africa lack effective strategies to control mycotoxin levels in food and feed. Mycotoxin levels in Africa regularly exceed the maximum limits set by the European Union. Therefore, the author has made relevant recommendations for all African countries to develop effective strategies and methods, while formulating strong management policies and implementing standards. Strict standards for monitoring harmful mycotoxins in the food chain.
Gu, Baojing, et al	Nitrogen use performances in Chinese agricultural systems and implications for food security and environmental protection	59	Experiment	Although China has significantly increased crop production, the country is experiencing a major feed shortage to support its growing consumption of animal protein. Therefore, the proposed policy of reducing animal protein demand should be one of the fundamental measures to achieve the goals of food security and environmental protection in the future.
Descheemaeker, Katrien; et al	Improving water productivity in mixed crop-livestock farming systems of sub-Saharan Africa	47	Experiment	Management measures are divided into three categories related to feed, water, and animal management. Feed-related strategies for improvement include careful selection of feed types, improving feed quality, increasing feedwater productivity, and implementing grazing management practices. Evidence shows that successful interventions can be achieved if institutions, policies, and gender are considered.
Graham, Jay P. et al	Managing waste from confined animal feeding operations in the United States: the need for sanitary reform	37	Experiment	US policies in improving management include <ol style="list-style-type: none"> (1) U.S. concentrated wildlife feeding operations (CAFO) regulations apply (2) Apply waste management strategies (3) Standards for animal feed production inputs (4) Standards for production locations (5) Use other alternatives (6) Strengthen production research
Winter, M. et al	European agricultural policy and farm animal welfare	25	Experiment	The authors point out that the application of advanced technologies to improve productivity or production efficiency remains the primary goal of agricultural R&D and the main goal of agricultural policy. Technologies that improve productivity have increased business net profits and reduced food costs for consumers. Up to a certain level, productivity improvements can lead to improvements in farm animal welfare.
Tacon, Albert G. J et al	Future Feeds: Suggested Guidelines for Sustainable Development	16	Theory combined with experiment	Research has shown recommendations to improve food sustainability: <ol style="list-style-type: none"> (1) Sustainability issues related to feed formulation and ingredient selection (2) Sustainability issues related to feed production and feed quality (3) Sustainability issues related to on-farm feed use and impacts (4) Sustainability issues related to seafood quality and food safety

Analysis of the Distribution of Leading Authors

352 authors contributed to the 109 documents selected for evaluation. The authors own at least two published articles related to animal feed production management. According to Table 7, Centner TJ is the leading author with the highest number of published articles with seven articles related to state management of the animal feed production industry of more than 120 articles related to fields such as agriculture, environmental science, ecology, and water resources, with an h-index of 14 points. Next, the second author in terms of the number of published articles is Nachman KE with a total of three published articles specifically related to policies for the animal feed industry in general and the agricultural industry. United States in particular. Next are five authors with two published articles: Singh M, Singh RR, Tacon AGJ, Van Keulen H, and Vogeler CS. Among them, Tacon AGJ is the author with the highest number of citations with 123 citations, an average of over 60 citations per article. In addition, there are 35 authors with two published articles, however, "Kraus, Sascha" is the author with the highest total number of citations with 147.

Table. Top 10 international authors with the highest number of articles

Author	Quantity	Number of citations	Total link strength
Centner TJ	7	76	74
Nachman KE	3	70	1380
Singh M	2	15	150
Singh RR	2	8	102
Taco AGJ	2	123	188
Van Keulen H	2	40	96
Vogeler CS	2	31	153

Source: Author's analysis of WOS data

For the Vietnamese market, there have not been many studies related to state management of the animal feed production industry, but the authors often only analyze the current situation of animal feed production for the animal feed industry. a typical feed industry production company and provide recommendations. However, there are still some typical authors such as author Nguyen Duc Hai (2017) with two important studies related to the animal feed industry including: Developing the animal feed industry in Vietnam and Completing the animal feed industry. Vietnam's animal feed industry development policy. The author has focused on clarifying the attractive nature of Vietnam's animal feed market and the scale structure of businesses. Besides, the author also pointed out challenges for the animal feed industry in Vietnam including (1) increasingly high requirements for animal feed, (2) Too much dependence on imported raw materials, and (3) increasing production costs. From there, the author has offered suggestions and solutions for domestic businesses, and at the same time has policy implications for state management agencies towards developing a sustainable animal feed production industry. Sustainability includes (1) Developing products that meet biosafety standards, (2) Reducing

dependence on imported raw materials, (3) Increasing the application of technologies that reduce production costs, and (3) Developing a circular economy model.

Analyze Keyword Research

Co-word analysis of keywords appearing in each article allows authors to identify research trends or prominent topics in each field. The keywords used by the study's authors provide information about the most important research topics (NJ Van Eck & Waltman, 2014). Therefore, the present study examines the co-occurrence of keywords, which may originate from the title, abstract, or author. VOSviewer checked a total of 758 keywords appearing at least once and also pointed out the 20 most appearing keywords (≥ 4 times) listed in Table 8. From the table, we can see that the three main keywords in the study include "Policy" appearing the most 29 times, "Management" appearing 17 times, and the keyword "Livestock" appearing 15 times.

Table 4. Keywords with the highest frequency

No	Keywords	Keyword	In turn	TLS	No	Keywords	Keyword	In turn	TLS
1	Policy	Policy	29	130	11	Animal feed	Cattle hunting	8	23
2	Management	Manage	17	91	12	Animal welfare	Animal welfare	7	22
3	Livestock	Cattle	15	79	13	Performance	Efficiency	7	26
4	Agriculture	Agriculture	8	51	14	Common agricultural policy	Common agricultural policy	6	11
5	Environment	Environment	8	48	15	Environment policy	Environmental policy	7	23
6	Agriculture Policy	Agricultural policy	7	29	16	Food security	Food safety	6	22
7	Cattle	Cattle	7	34	17	Antimicrobial Resistance	Antibiotic resistance	5	28
8	Sustainability	Lasting	7	33	18	Cows	Cow	4	23
9	Systems	System	7	33	19	Regulation	Regulations	4	22
ten	Aquaculture	Aquaculture	6	31	20	Water quality	Water source quality	6	21

Source: Author's analysis of WOS data

Table 9 presents a comprehensive summary of the concept network by identifying five distinct clusters, each represented by a corresponding term and number of keywords, characterized by a set of nodes and links.

Table 5. Clusters are identified in the keyword network

No	Name of cluster	Vietnamese name	Number of keywords	Featured keywords related to the cluster	
				English	Vietnamese
1	Agriculture	Agriculture	27	Livestock waste; Nutrient; Nutrient management; pollution; regulation; subsidies; water; water; water pollution; water quality	Livestock waste; Nutrients; Nutritional management; Pollution; Regulations; Subsidize; Water source; Water pollution; water source quality
2	Animal	Animal	21	Agricultural policies, animal health; animal husbandry; animal production; animal welfare; Biodiversity; Climate change; program; program; service	Agricultural policy; Animal health; Breed; Animal products; Animal welfare; Biodiversity; Climate changes; Programme; Service
3	Animal feed	Animal feed	16	Agri environmental policy; climate change; animal feed; feed; feed resources; nutrients; resources; safety; maize	Agricultural environmental policy; the climate changes; animal feed; climate changes food; food source; nutrients; source; safety ; corn
4	Policy	Policy	14	Agricultural policy; economic policy; animal welfare; cattle; cattle; European union; farm animals; welfare; perceptions; products; sustainable development; Value chain; attitude; attitude; behavior. behavior	Agricultural policy; economic policy; animal welfare; cattle; European Union; farm animal welfare; awareness; products; Sustainable Development;

					Value Chain
5	Management	Manage	13	Impacts; Efficiency; Waste management; trends; trends; permit; permit; performance; performance; demand; demand; food waste; food security	Impact; Effective; Waste management; trend; allow; efficiency; demand; food waste; food safety
6	Livestock	Cattle	12	Animal breeding; dairy cattle; milk; production systems; public policy; sustainability	Breed; dairy cow; milk; production system; public policy; Sustainability

Source: Author's analysis of WOS data

Cluster 1 –*Agriculture*: The first cluster includes 27 keywords with the strongest spread. The term “Agriculture”, appears in 8 articles and has a total link strength of 51 to other keywords on the cluster map. This is evidence of its close relationship with the keywords in the research article on the topic of animal feed production. Regarding the topic of Agriculture in animal feed production, the sub-topics that receive attention include the treatment of waste in livestock farming, closely related to keywords such as *livestock waste*. In addition, nutrition in animal feed is also given special attention, expressed in keywords such as *Nutrients; and Nutritional Management*. Next, is the issue of pollution in agriculture, mentioned by words such as *Pollution, Water Pollution, and Water Quality* are issues of concern from the agricultural sector that affect animal feed production.

Cluster 2 – *Animal*: The second prominent cluster is shown with 21 keywords. This cluster's map is closely linked to animal-related issues. Notably, four consecutive phrases were mentioned including *Animal Health; Breed; Animal products; and Animal welfare*. Demonstrate the influence of animal-related characteristics appropriate to the type of animal feed, thus making it possible to adjust feed production to suit each type of animal and livestock. In addition, the policies also mentioned in this second cluster include agriculture-related policies and environment-related policies to ensure a suitable environment for production and expansion of production for domestic consumption. with the animal feed industry.

Cluster 3 –*Animal feed*: with sixteen keywords. With typical keywords referring to issues related to the animal feed production industry such as *food sources, nutrients, safety, and feed*. Besides, there are also external factors that affect animal feed production activities such as *the environment, weather changes, or eutrophication*.

Cluster 4 –*Policy*: includes fourteen keywords that represent the need for state management of the animal feed industry. Among them, the keyword " *Policy* " stands out, appearing 29 times, and is also the keyword with the strongest influence and connection to other keywords. Next are keywords related to specific policies such as *agricultural policy, economic policy, animal*

welfare, adoption, European Union, or farm animal welfare. In addition, factors such as the attitude or behavior of business owners receiving and implementing policies from the state also directly affect the process of improving the animal feed production process.

Cluster 5 – *Management*: The final cluster with 13 keywords focuses on management issues in implementing state policies for the animal feed production industry. Typically, the keyword *Management* appears 17 times with a total link power of 90, proving the level of influence on other keywords in the topic. Next, keywords with the same expression appear in the same cluster including impact, need, performance, acceptance, and trend. Along with that, waste management is also mentioned for the second time in the cluster, showing the level of interest of researchers as well as readers related to waste treatment in the animal feed production process.

Cluster 6 – *Livestock*: The final keyword phrase includes 12 words, referring to cattle breeds and their raising process. Include keywords such as *Livestock; dairy cow; milk; and production system*. At the same time, an important keyword also appears in that cluster: *sustainability*, the development of a sustainable animal feed production industry is an extremely important factor for any country's policy. With at least 7 appearances and 33 links, it proves the importance of sustainability in any industry.

4. Conclusions

There are some ideas throughout the literature review. First, the researched documents have systematically identified several basic theoretical issues regarding the attraction and challenges for the animal feed production industry in both approaches to problems and system-building, assessment, assessment models, and research methods. Second, there are many research models on factors affecting the feed production process, the efficiency of enterprises in the feed production industry, as well as factors affecting production efficiency, price, and quality of source. Each research model presents different influencing factors. Third, most practical studies use research models and statistical analysis of the performance of enterprises' animal feed production.

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APPENDIX

No	The writer's name	Article name	Method	Number of citations	Magazine published	Source
1.	Nath, P.C.; Ojha, A; Debnath, S; Sharma, M; Nayak, PK; Sridhar, K; Inbaraj, B.S	Valorization of Food Waste as Animal Feed: A Step towards Sustainable Food Waste Management and Circular Bioeconomy	Quantitative (statistics)	0	MDPI	http://dx.doi.org/10.3390/ani13081366
2.	Carulla, P; Villagra, A; Estelles, F; Blanco-Penedo, I	Welfare implications on management strategies for rearing dairy calves: A systematic review. Part 1-feeding management	Systematic Literature Review	1	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fvets.2023.1148823
3.	Chan, I.R.; Franks, B; Hayek, MN	The 'sustainability gap' of US broiler chicken production: trade-offs between welfare, land use and consumption	Quantitative	5	ROYAL SOC	http://dx.doi.org/10.1088/rsos.210478
4.	Wallinga, D; Smith, LAM; Davis, M.F.; Casey, J.A.; Nachman, K.E	A Review of the Effectiveness of Current US Policies on Antimicrobial Use in Meat and Poultry Production	Mixture	17	SPRINGER NATURE	http://dx.doi.org/10.1007/s40572-022-00351-x
5.	Khanal, P; Dhakal, R; Khanal, T; Pandey, D; Devkota, NR; Nielsen, MO	Sustainable Livestock Production in Nepal: A Focus on Animal Nutrition Strategies	Quantitative (Regression)	3	MDPI	http://dx.doi.org/10.3390/agriculture12050679
6.	Wray-Cahen, D; Bodnar, A; III, CR; Siewerdt, F; Kovich, D	Advancing genome editing to improve the sustainability and resiliency of animal agriculture	Qualitative	4	SPRINGER NATURE	http://dx.doi.org/10.1186/s43170-022-00091-w
7.	Nakaishi, T; Takayabu, H	Production efficiency of animal feed obtained from food waste in Japan	Quantitative (DEA)	7	SPRINGER HEIDELBERG	http://dx.doi.org/10.1007/s11356-022-20221-1
8.	Blake, L.J.; Haesler, B; Bennani, H; Mateus, ALP; Eastmure, E; Mays, N; Stark, KDC	The UK Antimicrobial Resistance Strategy 2013-18: A Qualitative Study of International and Domestic Policy and Action Related to Livestock and the Food Chain	Qualitative	0	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fsufs.2022.819158
9.	Ding, W.Q.; Jimoh, S.O.; Hou, XY; Shu, XH; Dong, HB; Bolormaa, D; Wang, D.B	Grassland Ecological Subsidy Policy and Livestock Reduction Behavior: A Case Study of Herdsmen in Northern China	Quantitative (t-test and) Binary Logit model	5	SOC RANGE MANAGEMENT	http://dx.doi.org/10.1016/j.rama.2022.01.002
10.	Lopez-Bao, JV; Mateo-Tomas, P	Strengthening livestock welfare policies to mitigate human-wildlife conflicts	Qualitative	0	WILEY	http://dx.doi.org/10.1111/conl.12857
11.	Gill, M; Garnsworthy, P.C.; Wilkinson, J.M	Review: More effective linkages between science and policy are needed to minimize the negative environmental impacts of livestock production	Qualitative	6	ELSEVIER	http://dx.doi.org/10.1016/j.animal.2021.100291
12.	Buitrago, PAE; Hernandez, L.M.; Burkart, S; Palmer, N; Arango, JAC	Forage-Fed Insects as Food and Feed Source: Opportunities and Constraints of Edible Insects in the Tropics	Qualitative	2	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fsufs.2021.724628
13.	Martin-Hernandez, E; Hu, Y.C.; Zavala, V. M.; Martin, M; Ruiz-Mercado, G.J	Analysis of incentive policies for phosphorus recovery at livestock facilities in the Great Lakes area	Qualitative	5	ELSEVIER	http://dx.doi.org/10.1016/j.resconrec.2021.105973
14.	Dzwonkowski, W	PROCESSED ANIMAL PROTEIN IS ONE OF THE ELEMENTS OF THE POLICY FOR REDUCING GMOS IN THE FEEDING OF LIVESTOCK	Quantitative (descriptive statistics)	0	Inst Agricultural and Food Economics-Natl Research Inst	http://dx.doi.org/10.30858/zer/142769
15.	Krzyzanowski, J	FARM TO FORK STRATEGY AND ITS IMPLICATIONS FOR THE DEVELOPMENT OF THE BEEF PRODUCTION SECTOR IN POLAND	Qualitative	0	Inst Agricultural and Food Economics-Natl Research Inst	http://dx.doi.org/10.30858/zer/142846
16.	Yu, C.J.; Du,	The Impact of the Clean Water Act on	Quantitative	0	WESTERN	http://dx.doi.org/10.22004

	XD; Phaneuf, D	Farm Practices: The Case of US Dairy-Concentrated Animal Feeding Operations	(descriptive statistics)		AGRICULTURAL ECONOMICS ASSOC	/ag.econ.307457
17.	Habiyaremye, N; Ouma, E.A.; Meter, N; Obare, GA	A Review of the Evolution of Dairy Policies and Regulations in Rwanda and Their Implications on Inputs and Services Delivery	Systematic Literature Review	2	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fvets.2021.611298
18.	Martyniuk, E	Policy Effects on the Sustainability of Animal Breeding	Qualitative	2	MDPI	http://dx.doi.org/10.3390/su13147787
19.	Torok, VA; Luyckx, K; Lapidge, S	Human food waste to animal feed: opportunities and challenges	Qualitative	6	CSIRO PUBLISHING	http://dx.doi.org/10.1071/AN20631
20.	Tsai, W.T.; Lin, Y.Q	Analysis of Promotion Policies for the Valorization of Food Waste from Industrial Sources in Taiwan	Quantitative (descriptive statistics)	5	MDPI	http://dx.doi.org/10.3390/fermentation7020051
21.	Tacon, AGJ; Metian, M; McNevin, A.A	Future Feeds: Suggested Guidelines for Sustainable Development	Quantitative (statistics)	15	TAYLOR & FRANCIS INC	http://dx.doi.org/10.1080/23308249.2021.1898539
22.	Musundire, R; Ngonyama, D; Chemura, A; Ngadze, RT; Jackson, J; Matanda, M.J.; Tarakini, T; Langton, M; Chiwona-Karltun, L	Stewardship of Wild and Farmed Edible Insects as Food and Feed in Sub-Saharan Africa: A Perspective	Quantitative (statistics)	9	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fvets.2021.601386
23.	Erdal, H; Erdal, G; Ayyildiz, B	ARE SUPPORT POLICY FOR SUSTAINABLE LIVESTOCK IMPORTANT? CAUSALITY BETWEEN ANIMAL EXISTENCE AND SUPPORT POLICY: VECM ANALYSIS FOR TURKEY	Quantitative (Statistics)	2	PAKISTAN AGRICULTURAL SCIENTISTS FORUM	http://dx.doi.org/10.36899/JAPS.2021.1.0212
24.	Delaby, L; Finn, J.A.; Grange, G; Horan, B	Pasture-Based Dairy Systems in Temperate Lowlands: Challenges and Opportunities for the Future	Quantitative (statistics)	twelfth	FRONTIERS MEDIA SA	http://dx.doi.org/10.3389/fsufs.2020.543587
25.	Filippelli, R; Termansen, M; Hasler, B; Timmermann, K; Petersen, J.K	Cost-effectiveness of mussel farming as a water quality improvement measure: Agricultural, environmental and market drivers	Quantitative (mixed integer cost minimization model)	6	ELSEVIER	http://dx.doi.org/10.1016/j.wre.2020.100168
26.	Balzani, A; Hanlon, A	Factors that Influence Farmers' Views on Farm Animal Welfare: A Semi-Systematic Review and Thematic Analysis	Systematic Literature Review	35	MDPI	http://dx.doi.org/10.3390/ani10091524
27.	Mikus, T; Marzel, R; Mikus, O	Early weaning: new insights on an ever-persistent problem in the dairy industry	Qualitative	12	CAMBRIDGE UNIV PRESS	http://dx.doi.org/10.1017/S0022029920000503
28.	Gomera, P.M.; Mafini, C	Supply chain management enablers, barriers, and disruptions in the animal feed industry in the Western Cape Province of South Africa	Qualitative	1	POSTS	http://dx.doi.org/10.4102/jtscm.v14i0.510
29.	Vogeler, CS; Hornung, J; Bandelow, NC	Farm animal policymaking welfare in the European Parliament - a social identity perspective on voting behavior	Quantitative (Multivariate Regression Analysis)	8	ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD	http://dx.doi.org/10.1080/1523908X.2020.1778458
30.	Maina, K.W.; Ritho, CN; Lukuyu, BA; Rao, EJO	Socio-economic determinants and impact of adopting climate-smart Brachiaria grass among dairy farmers in Eastern and Western regions of Kenya	Quantitative (PSM Propensity Score Comparison Method)	14	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.heliyon.2020.e04335
31.	Lulijwa, R; Rupia, E.J.; Alfaro, AC	Antibiotic use in aquaculture, policies and regulation, health, and environmental risks: a review of the top 15 major producers	Qualitative	252	WILEY	http://dx.doi.org/10.1111/raq.12344
32.	Kebede, H; Liu, XM; Jin, J; Xing, F.G	Current status of major mycotoxin contamination in food and feed in Africa	Qualitative	59	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.foodcont.2019.106975
33.	Noll, D; Lauk, C; Gaube, V; Wiedenhofer, D	Caught in a Deadlock: Small Ruminant Farming on the Greek Island of Samothrace. The Importance of Regional Contexts for Effective EU Agricultural Policies	Quantitative (Sensitivity Analysis)	6	MDPI	http://dx.doi.org/10.3390/su12030762
34.	Swarnathilake, C; Weerahewa, J; Bandara, YMWY	Productivity Growth in Food Manufacturing Industry: Empirical Evidence from Post-reform Sri Lanka	Quantitative (Cobb–Douglas)	1	SAGE PUBLICATIONS LTD	http://dx.doi.org/10.1177/0972150919884405

			Production Function)			
35.	Schliffka, W; Zhai, H.X.; Calvo, E.P.; van Cauwenberghe, S; Walsh, MC; Lopez-Ulibarri, R	Safety and efficacy evaluation of a novel dietary muramidase for swine	Quantitative (Statistics)	2	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.heliyon.2019.e02600
36.	Lam, Y; Fry, J.P.; Nachman, K.E	Applying an environmental public health lens to the industrialization of food animal production in ten low- and middle-income countries	Qualitative	16	BMC	http://dx.doi.org/10.1186/s12992-019-0479-5
37.	Coyne, L; Arief, R; Benigno, C; Giang, VN; Huong, LQ; Jeamsripong, S; Kalpravidh, W; McGrane, J; Padungtod, P; Patrick, I; Schoonman, L; Setyawan, E; Sukarno, A.H.; Srisamran, J; Ngoc, PT; Rushton, J	Characterizing Antimicrobial Use in the Livestock Sector in Three South East Asian Countries (Indonesia, Thailand, and Vietnam)	Quantitative (Descriptive statistics)	61	MDPI	http://dx.doi.org/10.3390/antibiotics8010033
38.	Vogeler, CS	Why Do Farm Animal Welfare Regulations Vary Between EU Member States? A Comparative Analysis of Societal and Party Political Determinants in France, Germany, Italy, Spain and the UK	Qualitative	23	WILEY	http://dx.doi.org/10.1111/jcms.12794
39.	Groenestein, CM; Hutchings, N.J.; Haenel, HD; Amon, B; Menzi, H; Mikkelsen, M.H.; Misselbrook, TH; van Bruggen, C; Kupper, T; Webb, J	Comparison of ammonia emissions related to nitrogen use efficiency of livestock production in Europe	Quantitative (Econometric Model)	36	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.jclepro.2018.11.143
40.	Appleby, MC	We demand compromise: which achieves more, asking for small or large changes?	Qualitative	2	UNIV FEDERATION ANIMAL WELFARE	http://dx.doi.org/10.7120/09627286.28.1.083
41.	Anderson, J.L.; Asche, F; Garlock, T	Economics of Aquaculture Policy and Regulation	Quantitative (Statistics)	84	ANNUAL REVIEWS	http://dx.doi.org/10.1146/annurev-resource-100518-093750
42.	Stojkov, J; Bowers, G; Draper, M; Duffield, T; Duivenvoorden, P; Groleau, M; Hauptstein, D; Peters, R; Pritchard, J; Radom, C; Sillett, N; Skippon, W; Trepanier, H; Fraser, D	Management of cull dairy cows- Consensus of expert consultation in Canada	Qualitative (expert PP)	17	ELSEVIER SCIENCE INC	http://dx.doi.org/10.3168/jds.2018-14919
43.	Dennis, E.J.; Schroeder, TC; Renter, D.G.; Pendell, D.L	Value of Arrival Metaphylaxis in the US Cattle Industry	Mixture	17	WESTERN AGRICULTURAL ECONOMICS ASSOC	
44.	Eriksson, M; Ghosh, R; Hansson, E; Basnet, S; Lagerkvist, C.J	Environmental consequences of introducing genetically modified soy feed in Sweden	Quantitative (Sensitivity Analysis)	18	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.jclepro.2017.12.113
45.	Samboko, PC; Zulu-Mbata, O; Chapoto, A	Analysis of the animal feed to poultry value chain in Zambia	Quantitative (Statistics)	7	ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD	http://dx.doi.org/10.1080/0376835X.2018.1480932
46.	Veeck, G; Li, Z;	Contemporary changes to herding	Quantitative	2	SPRINGER	http://dx.doi.org/10.1007/

	Yu, F.W.; Emerson, C	systems in China and effects on pasture quality: a case study in Gansu Province, 2000-2012	(OLS Linear Regression Analysis)			s10661-017-6303-x
47.	Egan, AR	Animal Nutrition and Feed Science	Qualitative	0	ELSEVIER SCIENCE BV	http://dx.doi.org/10.1016/J.ENG.2017.05.025
48.	Dizyee, K; Baker, D; Rich, K.M	A quantitative value chain analysis of policy options for the beef sector in Botswana	Quantitative (System Dynamics Model)	21	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.agsy.2017.05.007
49.	Margalida, A; Perez-Garcia, J.M.; Moreno-Opo, R	European policies on livestock carcasses management did not modify the foraging behavior of a threatened vulture	Quantification (Mann Whitney U test and analysis of variance (ANOVA))	22	ELSEVIER	http://dx.doi.org/10.1016/j.ecolind.2017.04.048
50.	Ragkos, A; Abraham, E.M.; Papadopoulou, A; Kyriazopoulos, AP; Parissi, Z.M.; Hadjigeorgiou, I	Effects of European Union agricultural policies on the sustainability of grazing land use in a typical Greek rural area	Quantitative (MNL and TSCA models)	14	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.landusepol.2017.04.049
51.	Yuan, Q; Song, GB; Fullana-I-Palmer, P; Wang, Y.X.; Semakula, H.M.; Mekonnen, M.M.; Zhang, SS	Water footprint of feed required by farmed fish in China based on a Monte Carlo-supported von Bertalanffy growth model: A policy implication	Quantitative (Sensitivity Analysis)	19	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.jclepro.2017.03.134
52.	Sumberg, J; Awo, M; Kwadzo, GTM	Poultry and policy in Ghana: Lessons from the periphery of an agricultural policy system	Quantitative	5	WILEY	http://dx.doi.org/10.1111/dpr.12223
53.	Gu, B.J.; Ju, X. T.; Chang, S.X.; Ge, Y; Chang, J	Nitrogen use performances in Chinese agricultural systems and implications for food security and environmental protection	Qualitative	59	SPRINGER HEIDELBERG	http://dx.doi.org/10.1007/s10113-016-1101-5
54.	Gradinaru, I; Mocuta, D	Agriculture in The European Union and Romania	Mixture	0	INT BUSINESS INFORMATION MANAGEMENT ASSOC-IBIMA	
55.	Koester, U	Food Loss and Waste as an Economic and Policy Problem	Qualitative	ten	EMERALD GROUP PUBLISHING LTD	http://dx.doi.org/10.1108/S1574-871520170000017018
56.	Urrutia, MES; Castaneda, F.E.M.; Garcia, JAE; Rodriguez, G.B	Contribution of the livestock sector to the Mexican economy. An Analysis of the Matrix Input Product	Quantitative (Statistics)	6	INIFAP-CENID PARASITOLOGIA VETERINARIA	http://dx.doi.org/10.22319/rmcp.v8i1.4308
57.	Jaber, LS; Diehl, K.E.; Hamadeh, SK	Livestock and food security in the Arab region: policy framework	Qualitative	2	SPRINGER	http://dx.doi.org/10.1007/s12571-016-0608-4
58.	Williams, J; van Grinsven, H.J.M.; Jacobsen, B.H.; Jensen, T; Dalgaard, T; Westhoek, H; Kristensen, IS	Why do Danish pig farms have far more land and pigs than Dutch farms? Implications for feed supply, manure recycling, and production costs	Quantitative (Statistics)	30	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.agsy.2016.02.002
59.	Wang, J.J.; Baerenklau, KA	How Inefficient Are Nutrient Application Limits? A Dynamic Analysis of Groundwater Nitrate Pollution from Concentrated Animal Feeding Operations	Quantitative (structural dynamic model)	6	OXFORD UNIV PRESS INC	http://dx.doi.org/10.1093/aapp/ppu023
60.	Hu, B; Tian, Q.C.; Chen, Z.Z.; Xiong, G; Wang, X; Wang, Q	Research on Animal Feed and Animal Waste Detection based on Computer Vision	Quantitative (Algorithm)	0	IEEE	
61.	Makkar, HPS; Ankers, P	A need for generating sound quantitative data at national levels for feed-efficient animal production	Qualitative	7	CSIRO PUBLISHING	http://dx.doi.org/10.1071/AN14377
62.	Wani, SA; Shaheen, F.A.; Wani, M.H.; Saraf, SA	Fodder budgeting in Jammu and Kashmir: Status, issues and policy implications	Quantitative (Statistics)	3	INDIAN COUNC AGRICULTURAL RES	
63.	Huacuja, F.E	Agricultural Policy and the Feed Industry in Mexico	Quantitative (Statistics)	2	UNIV CALIFORNIA	http://dx.doi.org/10.1525/msem.2013.29.1.61

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64.	Yeates, J.W	Individualism and Nonindividualism in the Application of Nonhuman Animal Welfare to Policy	Qualitative	3	ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD	http://dx.doi.org/10.1080/10888705.2013.768918
65.	Tripathi, H; Maurya, R.K	Alternate Feed and Fodder Management Practices Followed by Dairy Farmers in Drought Prone Areas of Bundelkhand Region of Uttar Pradesh	Quantitative (Statistics)	0	ANIMAL NUTRITION ASSOC	
66.	Scheid, J.F	Management of animal feed safety in the USA	Qualitative	1	WOODHEAD PUBL LTD	
67.	Schmitt, W	Charta for agriculture and consumers - the future challenge of animal production	Quantitative (Statistics)	1	EUGEN ULMER GMBH CO	
68.	Centner, T. J.; Newton, GL	Reducing concentrated animal feeding operations permitting requirements	Qualitative	5	AMER SOC ANIMAL SCIENCE	http://dx.doi.org/10.2527/jas.2011-4256
69.	Centner, T.J	Addressing water contamination from concentrated animal feeding operations	Qualitative	6	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.landusepol.2010.12.007
70.	Woods, A	A Historical Synopsis of Farm Animal Disease and Public Policy in Twentieth-Century Britain	Qualitative	36	ROYAL SOC	http://dx.doi.org/10.1098/rstb.2010.0388
71.	Sabapara, GP; Desai, P.M.; Kharadi, V.B.; Saiyed, L.H.; Singh, R.R	Housing and feeding management practices of dairy animals in the tribal area of South Gujarat	Quantitative (Statistics)	11	INDIAN COUNC AGRICULTURAL RES	
72.	Strydom, D.B.; Taljaard, P.R.; Willemse, B.J	ETHANOL BLENDING POLICY AND THE SOUTH AFRICAN ANIMAL FEED INDUSTRY	Mixture	1	AGRICULTURAL ECON ASSOC SOUTH AFRICA	http://dx.doi.org/10.1080/03031853.2010.491309
73.	Descheemaeker, K; Amede, T; Hailelassie, A	Improving water productivity in mixed crop-livestock farming systems of sub-Saharan Africa	Qualitative	47	ELSEVIER SCIENCE BV	http://dx.doi.org/10.1016/j.agwat.2009.11.012
74.	Cabrera, V.E	A large Markovian linear program to optimize replacement policies and dairy herd net income for diets and nitrogen excretion	Quantitative (Linear Equation)	13	AMER DAIRY SCIENCE ASSOC-ADSA	http://dx.doi.org/10.3168/jds.2009-2352
75.	Graham, J.P.; Nachman, K.E	Managing waste from confined animal feeding operations in the United States: the need for sanitary reform	Qualitative	37	IWA PUBLISHING	http://dx.doi.org/10.2166/wh.2010.075
76.	Shlosberg, A	IMPROVED ANIMAL FEED CONTROL AND FARM TO FORK FOOD SAFETY POLICY	Qualitative	0	ISRAEL VETERINARY MEDICAL ASSOC	
77.	Yasar, S; Orhan, H	Analysis and Classification of Nutritional, Husbandry, and Health-Related Indicators to Define Specialist Dairy Farming: Nutritional and Production Measures at Dairy Farming	Quantitative (Statistics)	0	MEDWELL ONLINE	
78.	Zhang, D.G.; Ren, J.Z.; Hua, L.M.; Squires, V	Agro-Pastoral Integration in NW China: A New Paradigm?	Qualitative	2	SPRINGER-VERLAG BERLIN	http://dx.doi.org/10.1007/978-90-481-9622-7_9
79.	Heberer, T	Zero tolerance of chemical pollutants in food and animal feed: European policies and public health	Qualitative	5	BMJ PUBLISHING GROUP	http://dx.doi.org/10.1136/ech.2008.083865
80.	Sinha, R.R.K; Dutt, T; Singh, R.R.; Bhushan, B; Singh, M; Kumar, S	Feeding and housing management practices of dairy animals in Uttar Pradesh	Quantitative (Statistics)	8	INDIAN COUNC AGRICULTURAL RES	
81.	MacRae, R; Martin, RC; Juhasz, M; Langer, J	Ten percent organic within 15 years: Policy and program initiatives to advance organic food and farming in Ontario, Canada	Quantitative (Statistics)	6	CAMBRIDGE UNIV PRESS	http://dx.doi.org/10.1017/S1742170509002531
82.	Gerber, P.J.; Steinfeld, H	Global environmental consequences of the livestock sector's growth	Qualitative	ten	SAGE PUBLICATIONS LTD	http://dx.doi.org/10.5367/000000008783883555
83.	van de Ven, GWJ; van Keulen, H	A mathematical approach to comparing environmental and economic goals in dairy farming: Identifying strategic development options	Quantitative (mathematical method)	14	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.agsy.2006.09.002
84.	Serences, R; Rajcaniova, M	Food safety - public good	Qualitative	2	CZECH ACADEMY AGRICULTURAL SCIENCES	http://dx.doi.org/10.17221/899-AGRICECON
85.	Centner, T.J	Governmental oversight of discharges from concentrated animal feeding	Qualitative	8	SPRINGER	http://dx.doi.org/10.1007/s00267-005-0130-5

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86.	Centner, T. J.; Feitshans, TA	Regulating manure application discharges from concentrated animal feeding operations in the United States	Qualitative	twelfth	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.envpol.2005.09.003
87.	Kirschke, D	Coping strategies of cattle producers to a new agricultural policy framework	Quantitative (SEM)	0	EUGEN ULMER GMBH CO	
88.	Schultheiss, U; Jager, P; Dohler, H; Eurich-Menden, B	Effects of water protection measures on the profitability of farms	Quantitative	0	IWA PUBLISHING	http://dx.doi.org/10.2166/wst.2005.0613
89.	Deoras, R; Nema, R.K.; Tiwari, SP; Singh, M	Feeding and housing management practices of dairy animals in Rajnandgaon of Chhatisgarh plain	Quantitative (Statistics)	7	INDIAN COUNC AGRICULTURAL RES	
90.	Christensen, T	Natural Resources Conservation Service (NRCS) involvement in animal nutrition management	Qualitative	0	AMER SOC ANIMAL SCIENCE	
91.	Tacon, AGJ; Forster, IP	Aquafeeds and the environment: policy implications	Qualitative	108	ELSEVIER	http://dx.doi.org/10.1016/S0044-8486(03)00476-9
92.	Yarwood, R; Evans, N	Livestock, locality and landscape: EU regulations and the new geography of Welsh farm animals	Qualitative	13	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/j.apgeog.2003.08.003
93.	Berentsen, PBM; Tiessink, M	Potential effects of accumulating environmental policies on Dutch dairy farms	Quantitative (Sensitivity Analysis)	20	AMER DAIRY SCIENCE ASSOC	http://dx.doi.org/10.3168/jds.S0022-0302(03)73685-6
94.	Centner, T.J	Regulating concentrated animal feeding operations to enhance the environment	Qualitative	19	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/S1462-9011(03)00071-6
95.	Phan-Huy, SA; Fawaz, R.B	Swiss market for meat from animal-friendly production - Responses of public and private actors in Switzerland	Quantitative (descriptive statistics)	20	KLUWER ACADEMIC PUBL	http://dx.doi.org/10.1023/A:1022992200547
96.	Aarestrup, F.M	Veterinary drug use in farm animal production and the antibiotic resistance problem	Mixture	2	WAGENINGEN ACAD PUBL	
97.	Hilhorst, G. J.; Oenema, J; van Keulen, H	Nitrogen management on the experimental dairy farm 'De Marke'; farming system, objectives, and results	Quantitative (statistics)	26	ROYAL NETHERLANDS SOC AGR SCI	http://dx.doi.org/10.1016/S1573-5214(01)80003-8
98.	Centner, T.J	Evolving policies to regulate pollution from animal feeding operations	Qualitative	18	SPRINGER-VERLAG	http://dx.doi.org/10.1007/s002670010246
99.	De Gasquet, O	The role of oilseeds in substituting vegetable proteins for animal proteins	Qualitative	0	JOHN LIBBEY EUROTTEXT LTD	http://dx.doi.org/10.1051/ocl.2001.0274
100.	Vargas, B; Herrero, M; van Arendonk, JAM	Interactions between optimal Replacement Policies and feeding strategies in Dairy Herds	Quantitative (Dynamic performance model)	twelfth	ELSEVIER SCIENCE BV	http://dx.doi.org/10.1016/S0301-6226(00)00250-5
101.	Tielen, M.J.M.; Den Hartog, J	Feed safety for high-quality food of animal origin	Qualitative	0	WAGENINGEN ACAD PUBL	
102.	Centner, T.J	Animal feeding operations: encouraging sustainable nutrient usage rather than restraining and proscribing activities	Qualitative	8	ELSEVIER SCI LTD	http://dx.doi.org/10.1016/S0264-8377(00)00022-3
103.	Rowe, J.B.; Corbett, J.L	Production and use of feed for sustainable animal production in Australia - Review	Qualitative	1	ASIAN-AUSTRALASIAN ASSOC ANIMAL PRODUCTION SOC	http://dx.doi.org/10.5713/ajas.1999.435
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