



THE USE OF SEAWEEDS IN THE FORMULATION OF FEEDS FOR LIVESTOCK: PATENT ANALYSIS

Ahmed Fatimi ^{1,2 *}



¹ Department of Chemistry, Polydisciplinary Faculty, Sultan Moulay Slimane University, P.O.BOX 592 Mghila, Beni-Mellal 23000, Morocco

² ERSIC, Polydisciplinary Faculty, Sultan Moulay Slimane University, P.O.BOX 592 Mghila, Beni-Mellal 23000, Morocco

(*) a.fatimi@usms.ma

INTRODUCTION

Formulations of feeds for livestock are developing rapidly through the innovation and improvement of raw materials, additives, preparation process, as well as production technologies. This is also evident from the elevation in the number of patent applications filed each year worldwide in this area of livestock feeds research and development. Among, these novel formulations, the seaweeds could be used either as directly feeding supplement for livestock, or as additive for livestock feed. Rich in proteins and minerals, seaweeds can contribute and may help to enhance energy requirements of livestock, as well as livestock production and health. Most studies in this area confirm that the use/addition of seaweeds in livestock feed could reduce E. coli content of beef, as well as methane emissions from beef livestock. For example, a method of obtaining beef of increased shelf-life comprises the step of grazing cattle on forage into which seaweed supplement is incorporated during the feedlot finishing period.

AIM

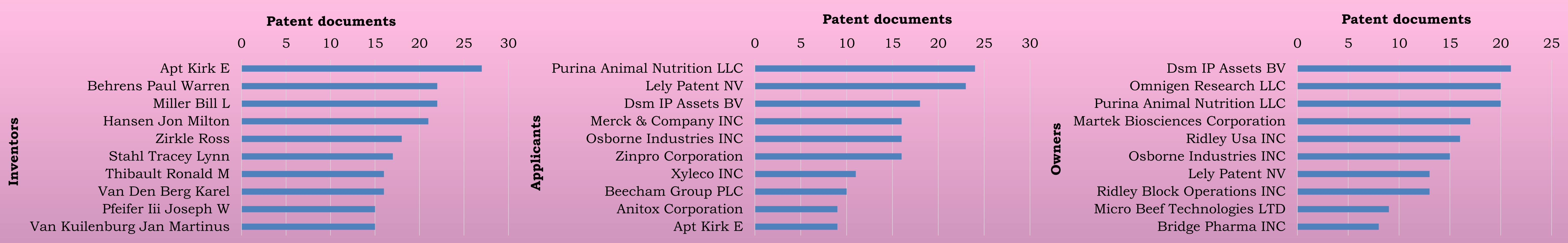
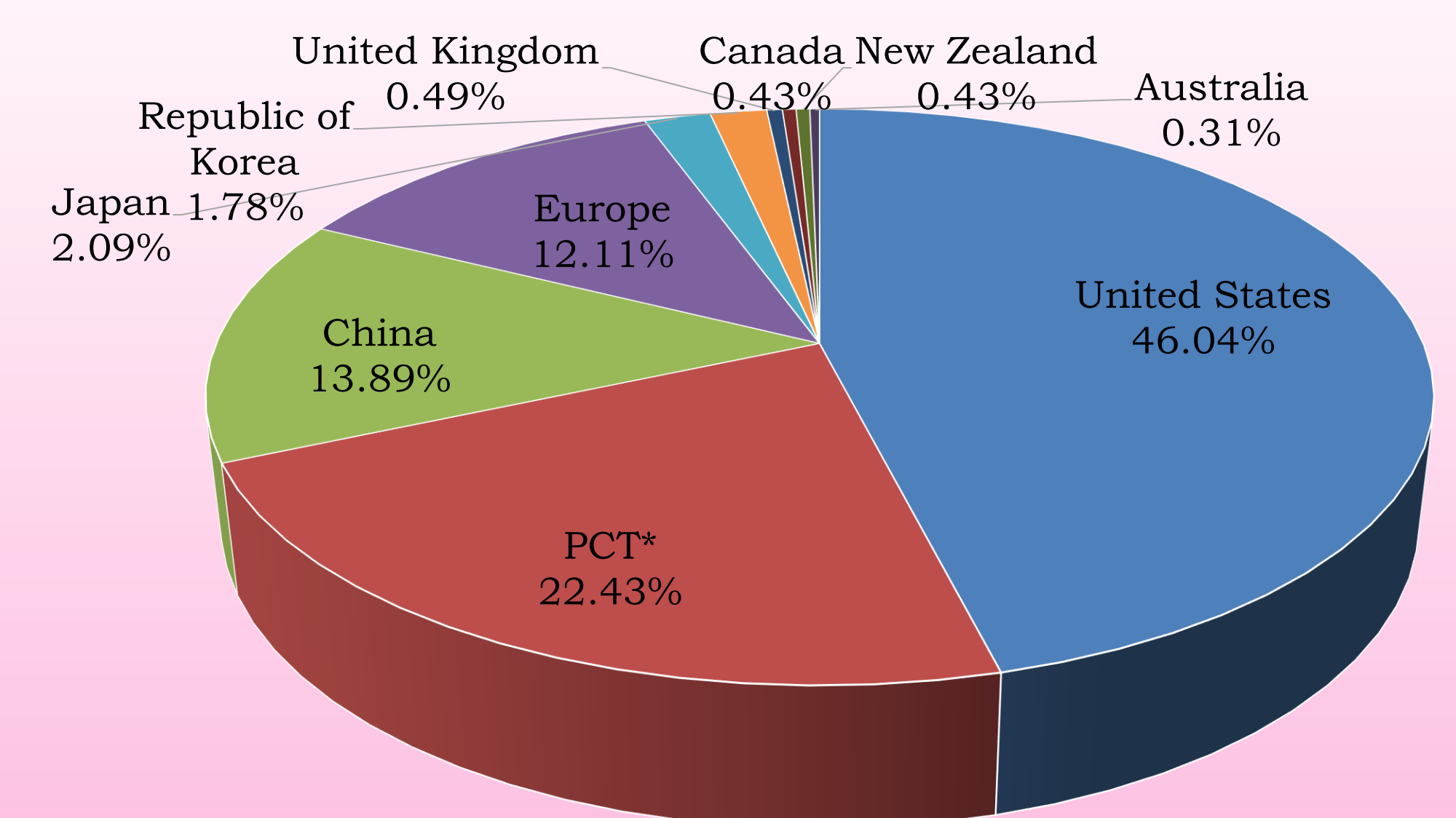
- This work, in the form of patent analysis, describes the state of the art by introducing what has been patented in relation to seaweed-containing feeds for livestock.
- Furthermore, a detailed analysis of the patentability of seaweed-containing feeds for livestock, their preparation methods and their formulations, will be provided by determining **publication years, patent classifications, inventors, applicants, owners** and **jurisdictions**.

RESOURCES AND METHODS

- The supported field codes used in this study was based on the Patentscope search service of the World Intellectual Property Organization and the Lens Patent Data Set.
- Different keywords and related terms were used and patents were searched according to **title, abstract** and **claims**.
- The search was then filtered to include only documents with the application date until 2020.

RESULTS

Code	Classification	Patents documents
A23K10/18	Animal feeding-stuffs obtained by addition of live microorganisms	223
A23K10/16	Animal feeding-stuffs obtained by addition of microorganisms or extracts thereof, e.g. single-cell proteins, to feeding-stuff compositions takes precedence	221
A23K10/30	Animal feeding-stuffs obtained from material of plant origin, e.g. roots, seeds or hay from material of fungal origin, e.g. mushrooms obtained by microbiological or biochemical processes, e.g. using yeasts or enzymes	157
A01K29/00	Other apparatus for animal husbandry	122
A23K10/14	Pretreatment of feeding-stuffs with enzymes	110
A01K5/02	Feeding devices for stock or game takes precedence feeding devices for poultry or other birds, such as automatic devices	106
A23K10/10	Animal feeding-stuffs	105
A23K50/10	Feeding-stuffs specially adapted for particular animals for ruminants	81
A23K50/80	Feeding-stuffs specially adapted for aquatic animals, e.g. fish, crustaceans or molluscs	75
A23K10/37	Animal feeding-stuffs obtained from material of plant origin, such as waste material from hydrolysates of wood or straw from molasses	73



CONCLUSIONS

A detailed analysis of the patentability of the use of seaweeds in the formulation of feeds for livestock was provided. It englobes only the innovation and improvement of formulations and process of seaweeds for livestock feed until 2020, which concerned especially raw materials, methods of preparation, as well as fabrication process. During search, 1640 patent documents have been found. United States was ranked first with 749 patent documents and 2020 was the year with the maximum number of patent documents (124).

The patent classification codes reveal that most inventions intended for animal feeding-stuffs obtained by fermentation of natural products, such as vegetable material and biomass. Knowledge clusters and expert driving factors indicate that the research based on pre-treatment of feeding-stuffs obtained by microbiological or biochemical processes is concentrated in the most patents.

REFERENCES

1. Makkar *et al.*, Seaweeds for livestock diets: A review. *Animal Feed Science and Technology* 2016, 212, 1-17
2. World Intellectual Property Organization. Patentscope. Available online: <https://patentscope.wipo.int> (accessed on September 21st, 2021)
3. Cambia Institute. The Lens Patent Data Set. Available online: <https://www.lens.org>, Version 8.0.14 (accessed on September 21st, 2021)
4. World Intellectual Property Organization. IPC Publication. Available online: <https://www.wipo.int/classifications/ipc/ipcpub>, IPCPUB v8.5 (accessed on September 2st, 2021)