

Sustainable Animal Feed Additives

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\$2.3B

Total fund-raising by companies marketing seaweed products

The Technology

Feed additives are substances added to feed to improve growth, health, and / or feed efficiency. They can be used to reduce the use of antibiotics in animal farming. In addition, they have been used to cut methane emissions, from ruminant livestock. Using livestock feed additives can reduce antibiotic use, and thus combat antibiotic resistance, as well as reduce contamination of soil and water by antibiotic residues, and support healthier microbial communities in ecosystems. Additionally, it can be argued that natural feed additives, such as seaweed, contribute to a circular economy by utilizing renewable resources.

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Number of M&A deals involving our 67 seaweed specialists

Following are examples of mechanisms of action:

1. Prebiotics versus Probiotics:

- Prebiotics are non-digestible fibres that promote the growth of beneficial gut bacteria.
 - Biorigin is a Brazilian multinational company whose animal feed solutions are focused on prebiotics intended to improve gastrointestinal health, and therefore stronger disease resistance, based on *Saccharomyces cerevisiae* yeast strains.
- Probiotics are live microorganisms that, when administered in appropriate amounts, confer health benefits to the animal.
 - Locus Fermentation produces probiotics for animal feed, intended to improve gut health, digestion, and overall animal performance..
- Both types of feed additives improve gut health and reduce the need for antibiotics by enhancing the animal's natural immune system, making them less prone to infections.

2. Enzymes:

- Enzymatic additives break down anti-nutritional factors in feed, making nutrients more accessible to the animal. This improves digestion and reduces the occurrence of gastrointestinal diseases, which are often treated with antibiotics.
 - Agrivida says its Grainzyme technology produces beneficial enzymes such as phytase and glucanase in feed corn, optimising livestock feed conversion rates, and enabling livestock to excrete less phosphorus, nitrogen, and undigested carbohydrates into the environment.
 - Biogenic promotes nutritional solutions for animal production, focused on antibiotic-free nutrition. Its products include carbohydrase enzymes obtained by fermentation, phytase-based enzyme complexes, and probiotics based on *Bacillus subtilis* C-3102.

3. Seaweed-Based Additives:

- Seaweed contains natural antioxidants, vitamins, and minerals that reduce the reliance on antibiotics by preventing bacterial infections and supporting overall health.
 - Arramera Teoranta and Cascadia Seaweed grow and/ or harvest seaweed macroalgae, as a feed supplement for livestock, and for biostimulants.
 - BioAtlantis and Sea6 Energy both produce seaweed-based crop livestock feed supplements, intended to modulate the immune system and gut biome, to enhance immune response.
- Seaweed-based food additives for livestock have show some potential to reduce methane emissions, for example by inhibiting the production of methane during digestion.
 - Blue Ocean Barns produces burp suppressants for cows, as a red seaweed-based supplement. The company is in the process of developing a project to verify GHG emissions reductions, and therefore generate carbon credits, from use of its additive.
 - CH4 Global is developing a seaweed-based feed additive which the company says can mitigate methane burps by up to 90%.
 - FutureFeed was established by CSIRO, and says it holds the global IP for the use of *Asparagopsis* seaweed as a livestock feed ingredient.

4. PhytoGenics:

- Derived from herbs or spices, phytoGenic feed additives are said to have antimicrobial, antioxidant, and anti-inflammatory properties, and to help modulate the gut microbiota, reducing harmful bacteria and lowering the chances of infection, thus decreasing the need for antibiotics.
 - Phytobiotics produces phytoGenic feed additives, such as the company's Sangrovit® brand, to leverage bioactive substances from plants for animal productivity, as well as to reduce antibiotic use.
 - Delacon, headquartered in Steyregg, Austria, also specializes in phytoGenic feed additives, which the company says offers natural solutions to improve animal performance and health.

Figure 1. Annual Fund-Raising, Selected Animal Feed Market (excl Alltech and dsm-f)

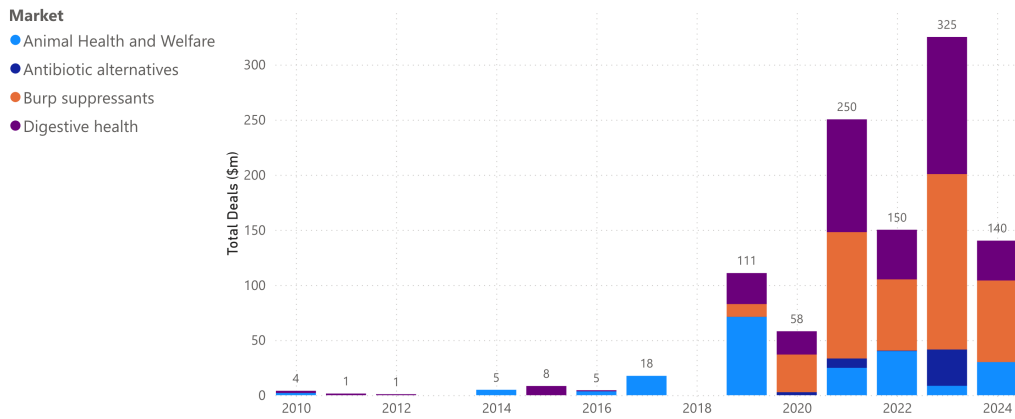


Figure 2. Cumulative Fund-Raising by Selected Animal Feed Markets

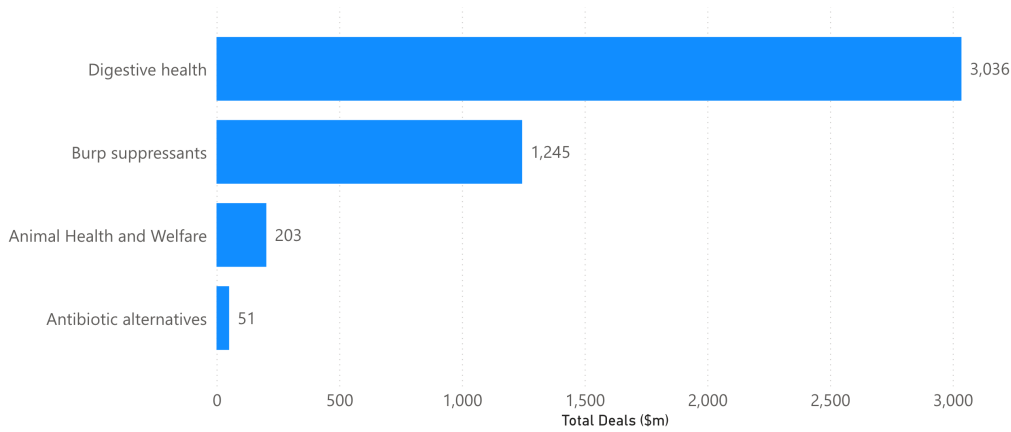


Figure 3. Effects of Probiotics vs Prebiotics on Gut Health

