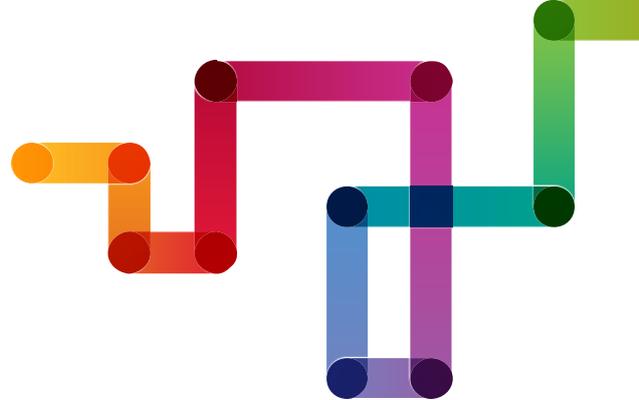


# Animal feed that doesn't cost the Earth



Meeting the world's demand for protein is a development challenge and an environmental priority. Production of animal protein (both meat and fish) needs to be put on a sustainable footing where it does not compete with humans for food, and makes more efficient use of the planet's resources.

## Our vision

Everyone should have access to a safe and healthy diet that meets their nutritional needs. Achieving this goal when the world population is growing and becoming more prosperous will be increasingly difficult with our current model of food production. We need to get more protein from plants – but we also need to make meat and fish production more sustainable. Radical innovations should displace soy and fishmeal from animal feeds, replacing them with insects, microbes and algae, so that livestock no longer compete with people for food.

## The challenges and their context

Despite falling birth rates, the world's population continues to rise, and is projected to hit 10 billion in the second half of this century.<sup>1</sup> Meanwhile, economic growth and rising living standards mean people expect a better diet than their forebears.

Feeding these extra mouths well is a huge challenge.

While carbohydrates are relatively easy to produce, protein, an essential component of a healthy diet, is more difficult. Aside from soy (largely used for animal feed), our main food crops are relatively low in protein. Much of the world's demand is met through animals, both farmed and wild.

Farming of animals is inefficient – the conversion ratio of weight of food in to the amount of edible flesh in the animal's body ranges from over 6:1 for beef to a little over 1:1 for certain fish.<sup>2</sup> Moreover they compete with humans for much of their diet. Our main source of wild food – fish from the oceans – is already overexploited, while fish farming is currently over-reliant on wild fish as an ingredient in its feeds.

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<sup>1</sup> United Nations, Department of Economic and Social Affairs, Population Division (2015). 'World Population Prospects' ST/ESA/ SER.A/377 Available from: [http://esa.un.org/unpd/wpp/Publications/Files/WPP2015\\_DataBooklet.pdf](http://esa.un.org/unpd/wpp/Publications/Files/WPP2015_DataBooklet.pdf) [accessed 4 March 2016]

<sup>2</sup> Shike, D (2013). 'Beef Cattle Feed Efficiency' Available from: <http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1027&context=driftlessconference> [accessed 4 March 2016]

## CHALLENGES BRIEF

As well as being an inefficient use of feed, farming currently relies heavily on soy. As well as diverting a valuable crop from the human food supply, soy is not a sustainable crop. 90% of the world's production comes from just three countries (the USA, Brazil and Argentina), it is implicated in damage to ecosystems through intensive monocultures, and it is potentially under threat from climate change.<sup>3</sup>

Solving the challenge of extra protein for human diets will therefore come in part from finding new and more sustainable ways to produce meat and fish.

State-of-the-art fish farming is already showing the way, with impressive conversion ratios and sustainably sourced feed ingredients. Farming of animals for meat could do the same, with innovative thinking and new technologies.

### Current innovation

- The PROteINSECT project is focusing on using fly larvae in animal feeds.
- Calysta's FeedKind™ sustainable protein uses bacteria to create protein for animal feed from sustainably sourced biogas.
- Forum for the Future's Protein Challenge 2040 is an initiative to bring corporations and nonprofits together to solve major challenges in future protein provision, including sustainable animal feeds.
- The Blue Economy Challenge is an Australian government-funded initiative to fund testing and development of innovative technologies in aquaculture, including sustainable feed.
- AquaBounty AquAdvantage Salmon is a genetically modified salmon that grows significantly faster and therefore requires less feed per kilogram produced.

### The potential for challenge prizes

Challenge prizes could help address specific barriers holding back systemic change in the meat and fish production systems. Prizes could include:

- Demonstrate low-cost, reliable technologies which allow raising the stocking density of freshwater fish farms without increasing their impact on local water systems
- Develop a blend of protein that is nutritionally optimised for an economically important animal (such as chickens, cattle, pigs), uses no land-grown crops or fishmeal, and which competes with soy protein on cost
- Develop a protein concentrate for use in animal feed which captures and uses a previously wasted source of protein, such as post-consumer food waste or protein sludge from starch manufacture
- Develop a fishmeal-free feed for Atlantic salmon which is cost-competitive with, and has similar performance to currently available feeds

Prepared for the Nesta Challenge Prize Centre by Olivier Usher. Last updated 04/03/2016.

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<sup>3</sup> Forum for the Future (2016). 'The Future of Protein' Available from: [https://www.forumforthefuture.org/sites/default/files/The\\_Protein\\_Challenge\\_2040\\_Summary\\_Report.pdf](https://www.forumforthefuture.org/sites/default/files/The_Protein_Challenge_2040_Summary_Report.pdf) [accessed 4 March 2016]