

Senate Standing Committee on Economics
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation, Science, Research and Tertiary Education Portfolio
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AGENCY/DEPARTMENT: COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

TOPIC: Food Futures Flagship

REFERENCE: Written Question –Senator Bushby

QUESTION No.: AI-98

What does CSIRO consider have been the most tangible, practical achievements of the Food Futures Flagship over the course of its existence?

ANSWER

There have been numerous achievements and impacts from the work of the Food Futures Flagship. The following are a number of selected highlights.

- **BARLEYmax:** A natural wholegrain with enhanced nutritional benefits which contains twice the dietary fibre of regular grains, four times the resistant starch and has a low glycaemic index. BARLEYmax grain is used in food products that reduce risk factors for heart disease and stroke, promote bowel health and potentially reduce the risk of the onset of diseases like bowel cancer and type 2 diabetes. Eight products are now on the Australian market. The global market is estimated at \$11 million to \$52 million per annum, with current product sales (2012) greater than \$20 million per annum.
- **Crop yields increased:** Research involving the genes that control starch development in cereal grains has led to the discovery of a novel way to increase grain yield and plant size in wheat crops. Reducing the expression of the glucan water dikinase gene in wheat caused an unexpected beneficial change in plant growth and development. This work is now undergoing field trials and has major potential for increasing crop yield and improving sustainability. The global market is estimated at \$429 million to \$1,989 million per annum.
- **An experimental wheat variety:** Provides the potential to deliver benefits in the areas of bowel health, diabetes and obesity. The wheat has a significantly altered starch composition, increasing the amount of amylose (resistant starch) from about 25 to 70 per cent. The \$12.5 million joint venture, Arista Cereal Technologies, has been formed through the Food Futures Flagship between CSIRO, Limagrain Céréales Ingrédients, and the Grains Research and Development Corporation. Arista Cereal Technologies will conduct research and development into high-amylose wheat from core technology developed by CSIRO and Limagrain. The global market is estimated at \$136 million to \$656 million per annum.
- **Development of a new automated technique:** Enables the measurement of glycaemic index and an important type of dietary fibre called resistant starch in foods and cereals, the technique has been licensed to *Next Instruments* and a bench-top device has been developed. The global market is estimated at \$68 million to \$72 million per annum.

- **The first plants that produce Omega-3 docosahexaenoic acid (DHA) oil:** Omega-3 DHA is a component vital for human health and normally only available from fish sources. This will provide consumers with cheaper and more varied sources of healthy Omega-3 DHA and benefit those with fish allergies or who do not normally eat fish. An additional benefit is reduced demand on natural fish stocks as a source of DHA. The technology has an estimated global market value of \$138 million to \$762 million per annum.
- **Developing wheat, barley and rice high in dietary fibre:** The High Fibre Grains Collaboration Cluster aims to boost the amount of beneficial compounds that contribute to the soluble component of dietary fibre in the various grains, which will offer health benefits to consumers and value to industry. The global market is estimated at \$19 million to \$181 million per annum.
- **Development and commercialisation of wheat and barley varieties requiring significantly less nitrogen fertilizer to produce:** The work is being carried out by CSIRO, Arcadia and the Australian Centre for Plant Functional Genomics. The global market is estimated at \$235 million to \$665 million per annum.
- **New aquafeeds based on the bio-conversion of agricultural plant wastes:** As well as adding value to what would otherwise be a waste product, these feeds deliver improved growth, survival and feed conversion. The products are being developed in Australia and also via global partners in Asia and the middle-east. The Australian industry has a projected impact value of \$30 million per annum, and potential to generate substantial royalties to Australia.
- **Selectively improved stocks of Atlantic salmon, prawns, oysters and abalone:** These stocks deliver improved growth, survival, feed conversion and disease resistance to the Australian aquaculture industry. Realised impacts on farm profitability and sustainability commenced in 2008. Total realised impact to date is \$25 million. Projected impact of \$100 million per annum by 2022.
- **Elite stocks of selectively bred Black Tiger prawns:** Ongoing research has resulted in a step change in commercial performance and the generation of world record harvests. At one 50 hectare Gold Coast farm, the average pond harvest in 2010 was over 17 tonnes per hectare – more than double the best yield achieved anywhere in the world for farmed Black Tiger prawns. Estimated annual impact is \$100 million by 2022.
- **Selective breeding research and development services:** Provided to the global prawn farming industry with contracts in Vietnam and Thailand. Projected royalties to Australia are \$20 million per annum by 2022.
- **Testis cell transfer technology for beef producers:** Developing a technology so beef producers in northern Australia can produce valuable cross-bred calves without the use of costly artificial insemination. The testis cell transfer (TCT) technology will give producers the opportunity to breed their cows using British or European genetics, in areas where those bulls would not perform as well. Estimated impact by 2030 is \$50 million per annum.
- **Novel livestock genomic evaluation technology:** Designed to enhance the efficiency of selective breeding in cattle and other livestock. Projected realised impacts are \$21 million per annum by 2022.
- **Oyster industry collaboration:** Measuring and mapping the regional differences in oysters grown in South Australia, New South Wales and Tasmania. By developing a sensory ‘language’ to describe the appearance, aroma, taste and texture of oysters, researchers can measure and analyse how oysters stimulate the senses. This sensory information can be used to guide growing, harvesting and processing to improve product quality and deliver the right product to the right consumers.

- **Extending the sensory range of electronic noses:** Devices designed to detect odours and chemicals by developing a system for comparing their performance against the much superior nose of the vinegar fly. Although e-noses already have many uses, such as detecting spoilage in the food industry and monitoring air quality, current devices are not as discriminating as biological noses. The new system enables comparison of technical sensors with biological sensors which is helping design better e-noses and improving our understanding of how biological systems work.

In addition, as part of a review of CSIRO's impact in 2010 ACIL Tasman undertook an analysis of the Flagship program. The Food Futures Flagship prawn breeding and novel feed supplements research was one of the case studies in the analysis which found that value increases delivered in prawn yield were of the order of \$430 million with the additional option to extend the improvements to other species. A copy of the full ACIL Tasman report is available on the CSIRO website at: <http://www.csiro.au/en/Portals/About-CSIRO/How-we-work/Budget--Performance/Performance-reviews/Impact-and-Value-2010.aspx>.