



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Rural Innovation

The Rural Innovation branch of the Science and Research Division uses genetics and biotechnology to underpin profitable and sustainable primary industries.

This branch contains six program areas, operates from locations across the state and has an impressive multidisciplinary research capability that includes agronomists, geneticists, molecular biologists, chemists, physiologists and economists.

Beef Genetics and Improvement

The Beef Genetics and Improvement Unit undertakes research and development to achieve continuous improvements in genetics and production technologies in beef enterprises in NSW. This function is essential to maintain long-term industry competitiveness and achieve sustained economic growth in rural NSW. The beef industry is the most significant livestock industry in NSW, accounting for 16% of the value of agricultural production in the State.

Key research infrastructure

Resources include unique cattle populations selected for divergence in net feed intake and muscling, access to co-operator herds and industry data, and a comprehensive research database.

Key research collaborations

University of New England, Meat and Livestock Australia, Cooperative Research Centre (CRC) for Beef Genetic Technologies, industry co-operators, breed societies, CSIRO, Australian Greenhouse Office, Australian Lot Feeders Association and other state agencies.

Biotechnology

The Biotechnology Unit provides biotechnology tools to core breeding programs and conducts other molecular biological and genetic research. The unit focuses on provision of Marker Assisted Selection expertise to the plant breeding programs.

Key research infrastructure

Core capabilities include most molecular biological and recombinant DNA technologies including cloning, mutagenesis, DNA sequencing, bioinformatics, ELISA (enzyme linked immunosorbent assays) protein and antibody technologies, molecular phylogenetics, mapping and molecular diagnostics.

Key research collaborations

Value Added Wheat CRC, NSW Agricultural Genomics Centre, Grains R&D Corporation (GRDC), Charles Sturt University, Murdoch University, Melbourne University, Australian Proteome Analysis Facility, CSIRO, EGA and Plant Health Australia.

Cereal Genetics and Improvement

The Cereal Genetics and Improvement Unit provides germ-plasm accession and curation for Australian researchers and breeders through the Australian Winter Cereals Collection; and develops new varieties of wheat, durum, oats and rice. Cereal breeding teams seek to develop varieties which improve yield, disease resistance, tolerance to hostile environments and quality attributes. These activities underpin the productivity and profitability of the 4,200 NSW grain growers who annually produce approximately 11 million tonnes of cereal grain, worth \$3.5 billion.

Key research infrastructure

- The Australian Winter Cereals Collection is maintained at Tamworth and services researchers across Australia.
- Cereal breeding is conducted at Tamworth (durum), Wagga (wheat) and Yanco (rice). The breeding teams have access to farm facilities, molecular biology, pathology, biometric, economic, agronomic and extension support, as well as four well equipped cereal science laboratories.
- Wheat breeding is conducted through Enterprise Grains Australia, a commercially oriented alliance with the Queensland Department of Primary Industries & Fisheries and the Grains R&D Corporation.
- The rice program works in close conjunction with the Rural Industries Research and Development Corporation (RIRDC).

Key research collaborations

Value Added Wheat CRC, NSW Agricultural Genomics Centre, EGA, growers, NSW Farmers Association, Australian Wheat Board, Australian Flour Millers Council, International Maize and Wheat Improvement Centre,



Durum Industry Association, pasta manufacturers, International Centre for Agricultural Research in the Dry Areas, GrainCorp, Queensland Department of Primary Industries and Fisheries, Grains R&D Corporation, RIRDC, Interstate Renewable Energy Council, International Rice Research Institute, graziers, South Australian R&D Institute, all winter cereal breeding programs, researchers using winter cereal germ plasm for genomics and genetics research, and the Australian Centre for International Agricultural Research.

Pasture Genetics and Improvement

The Pasture Genetics and Improvement Unit develops new cultivars of pasture legumes and grasses that contribute to improvements in soil fertility, herbage production, grazing value and profitability of livestock enterprises in NSW. This pasture breeding work also contributes plant-based solutions to the environmental problems of land degradation, drought, soil acidification and salinity. The Unit provides NSW farmers with the capacity to improve the pasture feed-base and produce livestock and crop products to market specifications, while enhancing the agricultural environment.

Key research infrastructure

The Unit comprises teams at three major breeding stations: Wagga (annual legumes), Tamworth (Lucerne) and Glen Innes (perennial grasses and legumes). Each of the breeding stations maintains a 'germ-plasm resource centre' comprising working germ-plasm collections, seeds laboratory/glasshouse complex and field facilities. Skills include quantitative genetics, germ plasm conservation, specialist disciplines to support research ranging from eco-physiology to animal nutrition, and general pasture agronomy applicable to species/variety evaluation.

Key research collaborations

Meat and Livestock Australia (MLA), Agricom (New Zealand) Limited, GRDC, National Landcare Program, Australian Wool Innovation (AWI), National Annual Pasture Legume Improvement Program, RIRDC.

Pulse and Oilseed Genetics and Improvement

The Pulse and Oilseed Genetics and Improvement Unit leads the national breeding programs for chickpeas and broad-leafed (albus) lupins, and participates in other national programs for narrow-leafed lupins, faba beans, field peas, lentils and mungbeans. The principal objective is to improve resistance to root and foliar diseases, particularly ascochyta blight, anthracnose, rust, phytophthora and pre-harvest weathering, and thus reduce the risk of crop failure. The unit also breeds new canola varieties that

have improved yield, oil and protein content, and blackleg resistance levels, and new soybean varieties that have improved yield, protein content and tolerance to phytophthora disease and weathering.

Key research infrastructure

The Unit conducts major breeding, selection and evaluation activities at a range of DPI facilities including Grafton (soybean), Narrabri (soybean and faba bean), Tamworth (chickpeas, canola and mustard), Wagga Wagga (albus and narrow leaf lupins, field peas, canola) and Yanco.

Canola breeding is conducted within an unincorporated joint venture with Nugrain and Planttech known as the Canola Alliance. Pulse breeding is conducted within the auspices of the National Pulse Breeding Program.

Key research collaborations

National Pulse Breeding Program, GRDC, Canola Alliance and other state agencies.

Sheep Genetics and Improvement

The Sheep Genetics and Improvement Unit researches new knowledge designed to improve productivity, profitability and sustainability of sheep production and quality of products. Efficiencies are achieved through improvements in genetics, nutrition and grazing management, use of information, meat science, reduction in ruminant methane production and the integration of wool and meat production systems.

Key research infrastructure

Large-scale sheep breeding, grazing and animal house experiments are conducted primarily at DPI facilities at Trangie, Orange, Cowra and Armidale, with research also done on-farm and in commercial abattoirs.

Key research collaborations

Australian Sheep Industry CRC, Sheep genetics service providers, MLA, advisors and consultants, AWI, seed stock breeders, Australian Greenhouse Office, sheep producers, and meat processors.

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