sardi

south australian research and development institute

a decade of achievement

1992 2002

celebrating a decade of achievement

At SARDI, research and development means the invention of South Australia's economic future.

At the heart of the Institute's ten years of achievement has been the commitment to provide the sciences and technologies which will carry the State's food production into the competitive markets of tomorrow.

By identifying and meeting future challenges and by using imagination and innovation to break the ground ahead, SARDI is already playing a vital part in developing the State's economic horizons. As markets open up and as worldwide food production becomes more efficient and competitive, only industry leaders will excel.

And SARDI is leading the leaders. In relatively new areas such as gene sciences, aquaculture development and sustainable resource management, the Institute is not just providing the tools business already needs to get on top, but anticipating those it will require to stay there.

In traditional areas such as horticulture, cropping and livestock, already strong and vital components of the State's economy, SARDI continues to work on improvements large and small which will maintain South Australia as one of the world's most efficient and successful producers.

SARDI's contribution to the State's economic growth and wellbeing is reflected in its own business performance with the Institute's turnover almost doubling to more than $40 million over the past decade. Private enterprise itself has not only supported, but fed that growth with investment now adding up to almost two thirds of the Institute's annual funding.

That investment is the big tick which affirms SARDI as the premier scientific partner in food production development and as a body which reaches beyond simple discovery and into real benefits for the real world.

And it will do for another ten years… and beyond.

1992

- In the first year of SARDI's operations, research was integrated within the primary industry portfolio to provide a cohesive, multi-disciplinary agency committed to providing a responsive, market-driven service.
- The tuna farming industry was developed in collaboration with the Overseas Fisheries Cooperative Foundation and the Tuna Boat Owners Association. Management and technical support by SARDI scientists established the feasibility of rearing and growing wild-caught Southern Bluefin Tuna.
- Industry guidelines to ensure expansion of oaten hay to the lucrative Japanese market were developed in association with Austrade.
- A kit which continues to be manufactured by SARDI was developed that allowed producers of dried apricots to determine sulphur dioxide levels in freshly sulphured fruit on-farm for the first time, enabling greater control over levels of the preservative in the final dried product.
- A milk-like powder with qualities that resist rotavirus, the most common cause of diarrhoea and death in infants, was successfully tested and registered.

1993

- SARDI helped pioneer a barramundi farming system in collaboration with West Beach Aquaculture. Its application in South Australia demonstrated SARDI's capacity to apply such technology in one of the most arid environments in the world.
- A computer software program designed for fisheries managers to view the consequences of their decisions on the abalone fishery was sold overseas.
- Research which found a way for farmers to safeguard weather-damaged wheat against leaf disease attack without jeopardising germination resulted in $18 million being saved by cereal farmers during the 1993 growing season – at a cost of $10,000.
- A DNA based diagnostic test was developed to track Bare Patch disease caused by *Rhizoctonia solani*. This disease can strike virtually all of Australia's agricultural crops. The test replaced previous tedious and imprecise methods.
- The cause of Bacterial Blight, a major disease afflicting the fledging coriander industry, was discovered.
- Barunga, a cereal cyst nematode resistant, Australian hard wheat to replace Molineux was released.
- A manual on how to grow, sulphur and dry stone fruit, particularly apricots, was written and supplied to all growers in association with the Dried Fruits Research Council and the dried fruit packers of South Australia.
- A new breed of sheep, Booroola, was developed with the potential to lift by 50 per cent the productivity of Australia's prime lamb industry.
- In a scientific first, development of a hybrid legume incorporating genes for aphid resistance had the potential to offer significantly improved productivity in pasture-cropping systems.

1994

- The first reliable quantitative information was collated on the relative catch of the recreational fishing sector in South Australia. This enabled issues concerning resource sharing between commercial and recreational fishers to be addressed and an effective economic assessment of the fishery.
- Research into developing manufactured aquaculture feeds revealed a 30 per cent improvement in abalone growth rates and resulted in significant reductions in costs for growers.
- Guard, a ryegrass variety resistant to annual ryegrass toxicity, a killer livestock disease, was developed. Northfield, a new red lentil variety designed for export markets was released, providing another cropping option for farmers and helping to re-establish the fledging South Australian lentil industry. Euro, a new premium quality milling oat variety for human consumption, that substantially improved the quality of oat exports from South Australia and provided higher returns, and Frame, a high yielding, cereal cyst nematode resistant, Australian standard white variety were both released.
- Developed new spear point seeding systems for broad acre agriculture incorporating new fertiliser placement methods, minimising soil disturbance and degradation during the seeding process.
- The book "Diseases and Pests of Grapevines" was published and released by SARDI researchers.
- Viticultural irrigation research highlighted new ways to enhance the quality of wine grapes, and to improve the quality of wine.
- New, large, sweet and crack resistant cherry varieties were released providing the South Australian cherry industry with an international marketing edge.
- A genetic source of blue-green aphid-resistance, incorporated into burr medics, was developed. The resistance facilitated millions of dollars of extra farm production and income each year.
- Guidelines for Grazing, a multimillion-dollar grazing advice program, designed to return higher profit to dairy farmers through research technologies was successfully launched.
- The Jindera lucerne, designed to curb soil erosion on roadside verges over dry summers, was released. The lucerne, which was developed for the world highway market, had great export potential.

1995

- The Industry Commission singled out SARDI as a model agency for State-based research through a national review into government research.
- South Australia took another step in establishing itself as a world leader in research and development with the opening of the innovative $30 million Plant Research Centre.
- Broodstock snapper were conditioned and spawned six months out of sequence from their natural spawning cycle, using a computer controlled environmental system developed by the South Australian Aquatic Sciences Centre (SAASC) – the first time this was successfully achieved in Australia. This provided a basis for year round production of fingerlings.
- Using grain as a base, SARDI scientists developed a nutritionally balanced diet for farmed abalone.
- A doubled haploid population of wheat for studies of high and low molecular weight glutenin alleles on dough rheology was produced.
- A screening method for identifying black spot in peas, *Ascochyta* and chocolate spot in faba beans to support breeding programs was developed. These were the first tests of their type in Australia.
- *Trichogramma sp* egg parasites were successfully mass reared for field evaluation as a biocontrol agent for native budworm in field pea crops in spring, and a quality assurance program developed for testing export oaten hay for annual ryegrass toxicity.
- Crown boring weevils were released to control Paterson's curse and this led to the establishment of the weevil in the Adelaide Hills.
- Postharvest and transport protocols for the shipment of fresh white onions to Europe were developed, facilitating access and expansion in trade to the European market.
- Postharvest storage treatments for Pink Lady and Sundowner apples were developed.
- High yielding clones of Valencia oranges, early maturing and late hanging Navel oranges and disease resistant rootstocks were identified to facilitate the expansion of markets for fresh fruit.
- A computer based decision support system on nutrient management for increasing yields of quality processing potatoes were developed.
- An irrigation schedule to minimise water use and improve the quality of Shiraz grapes grown for winemaking was established.
- SARDI scientists identified a group of mites on South Australian citrus as being not harmful to the United States citrus industry, overcoming potential import barriers to the United States and expanding export markets worth $13 million to the Australian citrus industry.
- The commercialisation of Herald, a new aphid resistant strand medic, well adapted to low rainfall cropping zones, improved both sustainability and productivity of farming systems.
- The effects of soluble non-starch polysaccharides in grain on pig and poultry growth was determined – this was a major breakthrough in defining the role of dietary fibre in monogastric nutrition.
- New sheep genotypes by genetic engineering were produced – establishing a significant milestone in the evolution of this technology.

1996

- Research was conducted on using growth rings in shells to age abalone. It was determined that abalone lay down different kinds of rings according to species and age and in response to attack by parasites. The results were applied to the local fishery and enabled the estimation of fishing intensity by revealing the age structure of the catch – an important advance for management.
- A study to develop artificial collectors for monitoring recruitment to abalone fisheries was highly successful. It became possible to measure the numbers of larvae that were available for settlement, and determine the timing of settlement and the environmental cues that trigger it.
- The Minnipa Agricultural Centre was upgraded with combined funds from the SA Government through SARDI, the Grains Research and Development Corporation (GRDC) and the University of Adelaide. Minnipa is a centre of excellence in dryland agriculture in southern Australia.
- A new isolated microspore technique was developed to accelerate production of new barley cultivars and their release 3-4 years earlier than by conventional methods.
- New tillage techniques using accurate seed placement and fertiliser banding systems resulted in grain yield increases of 10-20%. New methods were also developed for screening common root and crown rot.
- New diagnostic tests using the biotechnology of DNA probes were developed. The probes were used to establish field soil pathogen population levels. The service was launched in 1997.
- Two new pea varieties developed by SARDI researchers held great potential for the future and were capable of presenting the State with new export opportunities.
- The Field Crop Improvement Centre was officially opened. The centre supported full field evaluation of more than 70 sites throughout the agricultural districts of South Australia, as well as subsequent seed increase and release of new crop varieties.

- A system was developed for postharvest application of oil to control insect pests on navel oranges exported to the USA. The National Registration Authority issued a permit to allow the oil to be used during the 1997 export season. SARDI also successfully commercialised this for manufacture and distribution with an international oil company.
- As a result of research funding by HRDC, a fungus was developed as a biological control agent for *Rhizoctonia*, a disease of fresh potatoes.
- SARDI developed a non-chemical method for controlling the fungal disease powdery mildew which infects grapes. The innovative use of oil sprays ensured low pesticide residues and sustained a competitive advantage on overseas markets.
- The grape disease and pest management advisory service "Crop Watch" was introduced for Riverland grape growers after development by SARDI scientists.
- The Centre for Horticultural Crop Improvement was launched at the Plant Research Centre. The centre established linkages between the University of Adelaide, CSIRO, PIRSA and SARDI and their combined resources for horticultural crop improvement.
- SARDI, in partnership with industry, PIRSA and the University of Adelaide, established the Pig and Poultry Production Institute (PPPI) at Roseworthy to provide a major focus for animal health and nutrition studies.
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- In barley, the first doubled haploids generated by the new isolated microspore culture technology and grown in summer nurseries at Waite and Horsham were evaluated. These breeding lines were an important step towards the release of new disease resistant malting cultivars in collaboration with the University of Adelaide and Agriculture Victoria.
- SARDI was established as a major contributor to the CRC for Molecular Plant Breeding through leadership and the development of effective international alliances with the International Maize and Wheat Improvement Centre (Mexico), the International Centre for Agriculture Research in Dry Areas, Purdue University, and other research groups.
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- Sustainable systems for efficient use of water by the State's nursery industry were developed.
- SARDI scientists collaborated with CSIRO and University of Adelaide staff in developing new vineyard irrigation management practices which had the potential to significantly reduce irrigation requirements whilst improving wine grape quality.
- SARDI signed an agreement with the China National Germplasm Repository for Apricots and Plums (CNGRAP) to share improved genetic material for apricot breeding.
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- Minimum specifications for pig meat hygiene were developed for the national on-farm quality assurance program of the Pork Council of Australia.
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- By-catch was reduced in the SA prawn fishery by more than 60% which improved the commercial value of the catch by more than 10%. For the first time in Australia, an entire prawn fishery (Gulf St Vincent) voluntarily adopted by-catch reducing devices.
- A fungal leaf and stem disease of chickpeas (*Ascochyta rabiei*) was nationally identified in 1995. In the 1998 season the disease reached epidemic proportions as a result of a build-up of disease from previous years on susceptible varieties and a wet winter. This resulted in a 50% crop loss for South Australia. Thousands of lines, made up of Australian and international collections, were screened in the field and in the SARDI plant research quarantine facilities. Immediate assistance was given to grain growers through the development of a new DNA test for the fungus in the seed. The test, developed in association with the CSIRO Division of Entomology, was established in record time. Research on management methods was also undertaken to encourage grain growers back into the industry.
- In conjunction with Agriculture Victoria and GRDC, SARDI Entomology Unit produced a Ute Guide for Insects for the grain industry across southern Australia.
- Following extensive surveys of citrus in south eastern Australia by SARDI entomologists, it was established that there were no mites of quarantine significance (USA market) present in this region. USA authorities subsequently removed mites as actionable pests for Australian citrus.

- Four new pea varieties, Parafield, Mukta, Santi and Soupa were released by SARDI. All four varieties performed well in State-wide trials with Mukta being the outstanding variety yielding 41% higher than Alma across the powdery mildew infected sites and 17% higher across all sites. Parafield continued its exceptionally high yields, out-yielding Alma by at least 10% at most sites, and by 14% across powdery mildew infected sites. It was estimated that Parafield, after only two years, would be sown on 75,000 ha, and this constituted 25% of the Australian pea plantings.
- A shipment of Australian navel oranges arrived in the USA in excellent condition with a low level of mould wastage and rind blemish as a result of the application of transportation guidelines by SARDI.
- The CropTest potato crop nutrient evaluation system, a computer based decision support and information system for nutrient management of potato crops throughout Australia, was developed.
- SARDI scientists proposed that South Australian vines which survived the worldwide phylloxera (a louse) outbreak which began last century, could hold the key to the grape industry producing more flavoursome Shiraz of Grange Hermitage (and Hill of Grace) ilk.

1999

- A major program describing the marine and coastal biogeography of South Australia and identifying areas of high conservation value was completed and published, forming the basis for identification of high conservation and biodiversity value in South Australia's marine habitats.
- A joint program between SARDI and the Vietnamese government looked to develop aquaculture using polyculture systems which could remove nutrients in wastewater for reuse.
- A team of SARDI and Flinders University scientists explored the impact of using a range of fishing length limits in a new approach to managing greenlip abalone population at Waterloo Bay near Elliston.
- Commercialisation of three new wheat varieties in conjunction with the University of Adelaide – Yipti, an Australian hard wheat with cereal cyst nematode resistance which offers an alternative to Janz, Machete and Frame for SA growers; Anlace, a higher yielding, rust resistant, Australian soft quality alternative to Tatiara, Bowie and Buckley for eastern Australia.
- Minnipa Agricultural Centre's plant nutrition program demonstrated that fluid, multinutrient fertilisers are much more efficient than granular fertilisers in delivering nutrients (particularly P and Zn) to plants on calcerous soils.
- Three new oat varieties were released. Quoll was a new high yielding dwarf oat with resistance to stem and leaf rust in SA and Victoria; Glider was a new late maturing hay variety with a range of foliar leaf diseases and tolerance to stem nematode. Numbat was a naked grain type recommended for medium to high rainfall areas with the grain suited to pig, poultry and bird seed markets.
- SARDI's Citrus Handling Guide and Citrus Growing Manual were developed which provide the citrus industry with guidelines for growing and packing quality fresh citrus.
- Two new cherry varieties named after prominent South Australians, Sir Don and Sir Tom, and an apricot variety named Rivergem, were released to industry. The new varieties, which are larger, sweeter and resistant to rain-induced cracking, were developed by SARDI research scientists using molecular biology techniques to speed up the process.
- The Australian and New Zealand Field Guide to Diseases, Pest and Disorders of Table Grapes" booklet prepared by SARDI Horticulturists was released.
- Scientists put parasitic wasps into combat against mealybugs renowned for damaging citrus fruit and farmers' access to high value export markets.
- Researchers and advisers across Australia joined forces to help safeguard the production of grapes for the booming $1 billion export wine industry through the release of a package of diagnostic aids designed to provide maximum control of diseases and pests.
- Products and information systems were commercialised to ensure effective delivery of research outcomes, including a long acting B12 supplementation, in association with a pharmaceutical company, and a feed database for livestock with agribusiness and participating national R&D agencies.
- Equations were developed predicting the size, form and variability of phosphorus in water runoff from dairy pasture at sites in the Adelaide Hills. These offered the potential to simplify nutrient loss modeling from dairy pastures.

2000

- SARDI successfully developed technology for cryopreserving molluscan sperm. This technique benefits in crossbreeding populations or species that spawn asynchronously, in controlling disease translocation and in gene pool protection.
- Access to US markets for the Spencer Gulf prawn fishery was granted. The case for exemption was won largely on the basis of long-term studies and a report compiled by SARDI for the United States Department of Agriculture.
- Agreements were signed with three international companies to commercialise SARDI technology. The major initiative was the agreement with Aventis CropScience to deliver root disease testing services across Australia and internationally.
- Kukri, a prime hard quality wheat which was developed as part of the wheat breeding program at Roseworthy was released commercially.
- A new bait for the control of European wasp was widely tested in the field in early 2000 and excellent control was achieved.
- The first releases of a parasitic fly for the biological control of conical snails were made on Yorke Peninsula.
- SARDI continued to expand its viticulture R&D program with a significant role in the CRC for Viticulture and increased funding from the Grape and Wine Research and Development Corporation (GWRDC).
- The birth of Matilda, the first cloned Merino sheep in Australia, represented a milestone for the SARDI reproduction research team which was funded by the Cooperative Research Centre (CRC) for Premium Quality Wool.
- An early maturing balansa clover, Frontier (*Trifolium michelianum*), which extended the user of balansa clover to drier areas was commercially released.
- A multipurpose lucerne cultivar, Super 7 (*Medicago sativa*) pasture variety became commercially available. Super 7 is suitable for grazing and shows strong persistence under both irrigated and rainfed systems. Super 7 has good resistance to nematodes, phytophera, anthracnose, bluegreen aphids and spotted alfalfa aphids. It is less winter active (dormancy rating 7) than the SARDI cultivars Eureka and Sceptre.
- A new management system for pork production, in which sows are farrowed in batches and growing pigs are managed in age segregated groups in an all-in/all-out system, resulted in marked improvement in the health and welfare of pigs and in air quality within sheds. Improved air quality results in improved growth rates in pigs and reduced occupational health risks for humans.

2001

- South Australia was chosen as the headquarters for the new national Cooperative Research Centre for the Sustainable Aquaculture of Finfish, AquafinCRC, serving the Australian salmon and tuna culture industries through $70 million worth of programs in the areas of propagation, nutrition, fish health and quality, environment and education and training.
- Mulloway was touted as a possible addition to the growing South Australian aquaculture sector following the success of a captive breeding program at SARDI.
- Expanded tests were made available through the commercial root disease testing service.
- SARDI oat breeders produced Australia's first oat doubled haploid population.
- A new manual was produced for the root disease accreditation course and used in national training of over 400 agronomists.
- Specific barley scald resistance genes were accurately identified, various barley field nurseries looking for genetic resistance in yellow leaf spot, scald, septoria and net blotch were very successful and SARDI also identified the genetic location for another resistance gene for resistance to spot form net blotch in a Japanese line.
- With the support of SARDI, oaten hay processors in SA and Victoria formed a new company "AEXCO Pty Ltd" which negotiated licensing rights to new oaten hay varieties produced by SARDI's oat breeding program. The processors have applied an end point royalty of 50 cents per tonne on hay delivered for processing to help fund the breeding program.
- SARDI led a national effort and developed an insecticide resistance management strategy for the control of diamondback moth in brassica vegetable crops throughout the country.
- A photographic guide to the common postharvest diseases and disorders of navel oranges was prepared by SARDI staff to assist with diagnosis of out-turn problems with Australian citrus in overseas markets.
- A new cherry variety, Dame Roma, was released from the SARDI Cherry Breeding program at Lenswood.
- SARDI scientists produced three healthy lambs from Australia's first cloned sheep `Matilda', using JIVET (juvenile *in vitro* embryo transfer) technology which could have potential as a valuable breeding tool.
- SARDI entered into an agreement with China to improve the production and persistence of lucerne in adverse or degraded environments.
- The Livestock Systems Alliance was formally established at the Roseworthy Campus.

2002

- SARDI established a new initiative through the creation of the Sustainable Resources and Technologies Strategic Research Area.
- SARDI Aquatic Sciences established a new initiative with a principle focus on environmental sustainability through the establishment of the new Environment and Ecology Program.
- The wild fisheries research programs were restructured to support the shift towards ecosystems based management of fisheries and their supporting environments. Two new programs were established – the Great Australian Bight and Shelf Seas Program (incorporating rock lobster, abalone and pelagic resources) and the Gulfs, Estuaries and Inland Waters Program (incorporating marine scalefish, prawns, blue crabs and inland waters including the Murray Lakes and Coorong fisheries).
- Final negotiations were completed for the formal launch of the fully corporatised wheat breeding company, Australian Grain Technologies (AGT) Pty Ltd comprising the SA Government through SARDI, the University of Adelaide and the Grains Research & Development Corporation (GRDC).
- Australian Centre for International Agricultural Research (ACIAR) funding was approved for SARDI to commence an apricot and plum breeding program with China.
- Experiments during the 2001-02 production season demonstrated that pre-flowering sprays of molybdenum applied to cv Merlot wine grapes achieved large and significant (222-750%) increases in bunch yield per vine.
- During the last season, the SA Cherry industry invested in forward thinking R&D strongly focused on development of export market strategies to consistently deliver high quality fruit on to those markets.
- A new food safety program has been established to assist industry meet rising public health and trade access requirements. Projects were developed on prawns, tuna, cockles, eggs, pork, cereals and red meat.
- A major expansion of industry funded projects in the Meat and Wool area, including ovine gene markers for meat production, sustainable parasite control programs, identification and control of pigmented fibres in the Australian wool flock and meat quality and parasite projects in the sheep and beef CRCs.
- New programs are planned for effluent management, a high priority identified by industry to underpin sustainable expansion of pork exports.

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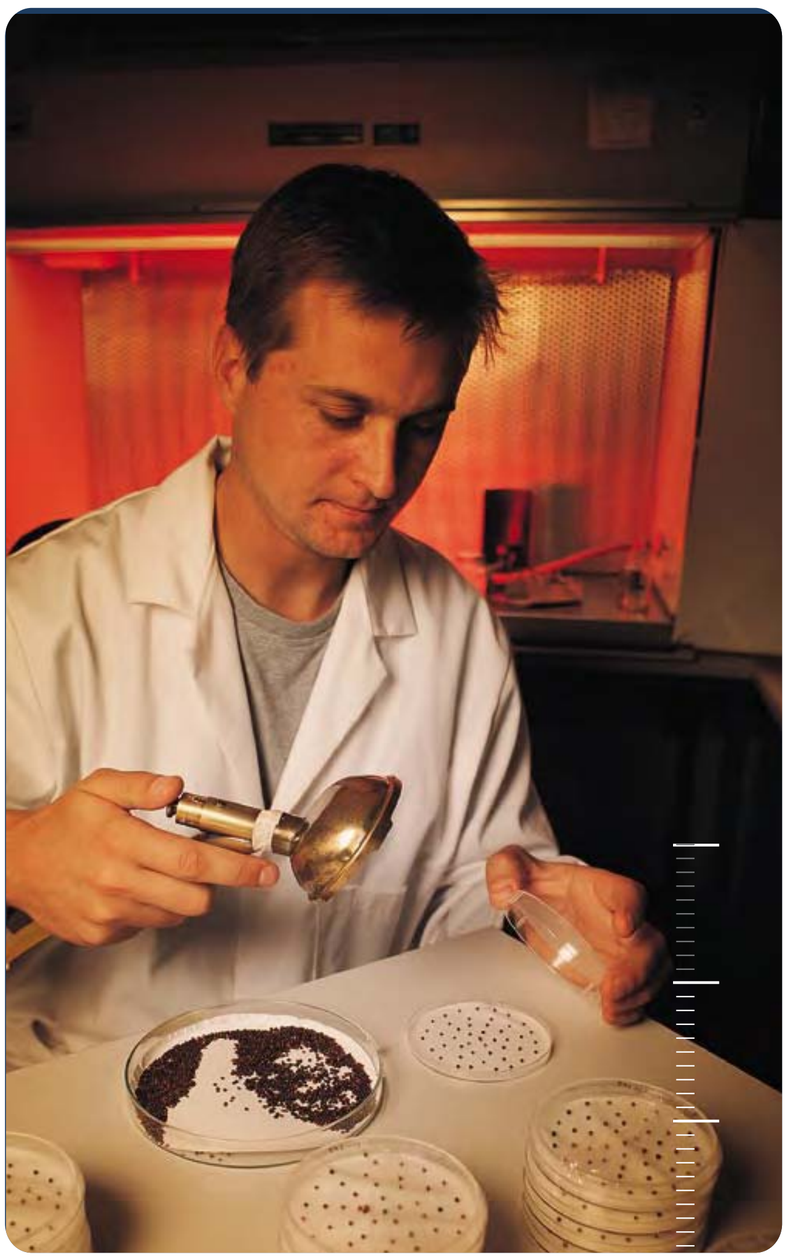

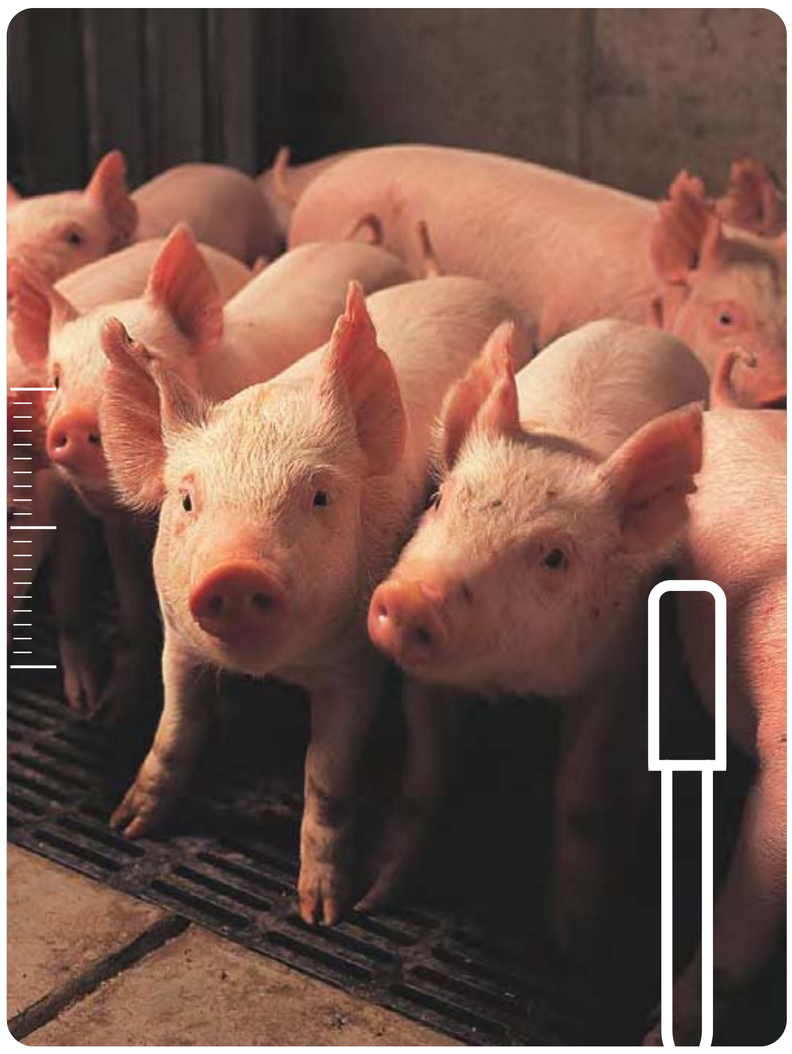

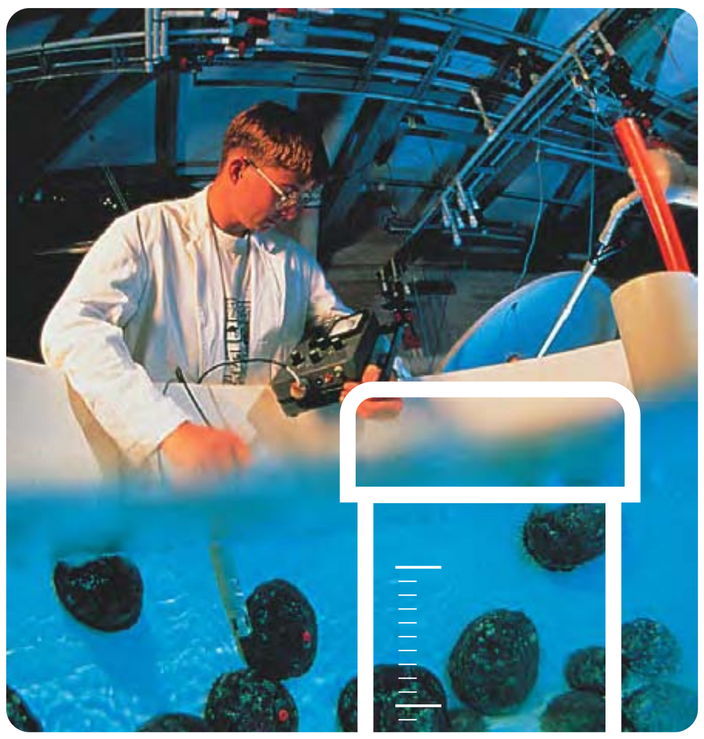

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