Science delivers a sustained return

The Stored Grain Research Laboratory within the Division of Entomology is a co-operative venture between CSIRO and the grains industry. It aims to develop cost-effective and safe means to maintain and enhance grain quality during storage and handling. Wheat alone is worth over $4 billion per year to Australia, and independent estimates of the returns generated by SGRL's research go as high as nine to one over a 20- year period.

A priority of the SGRL has been to support Australia's claims to being a clean and green food producer. It has developed new fumigation strategies, sealed storage, bunkers, new protectants, insect monitoring techniques and improved grain cooling. These have been based on the biology and ecology of stored grain insect pests, modelling and controlling the temperature, moisture and aeration of the stored grain, chemical controls of pests and dust control. It has also researched integrated control methods drawing together the results of research in different areas.

Stored Grain Research Laboratory: surmounting funds squeeze with industry's support

The Stored Grain Research Laboratory (SGRL) has helped sustain the Australian grains industry at the leading edge of storage technology for almost 30 years. Its almost seamless working relationship with the industry has prospered despite a dwindling base of appropriation funding, the pressures of raising external funding and massive restructuring and deregulation of the industry.

This close working relationship has enabled SGRL scientists to understand the commercial imperatives facing industry, and industry to value and support longer term, strategic research. Working as a team, SGRL staff and industry representatives have developed a research portfolio with a delicate balance between short term, commercially-oriented research projects and longer term, strategic research.

Industry involvement in the research has also facilitated rapid transfer of the technologies developed – there are few grain storage and handling systems in Australia that are not using a pest control system either developed by SGRL or incorporating key features that originated in SGRL research.

Project origins

The SGRL was established in 1969 in response to the worsening losses suffered by the stored grain industry from insect infestation. It was originally a joint venture between CSIRO's Division of Entomology and the Australian Wheat Board (AWB), which then had a total monopoly over wheat trading in both domestic and international markets.

Bill Bailey, a principal research scientist with CSIRO's Division of Entomology, was then one of the very few in Australia working on grain storage research. He was the driving force behind developing a strategic approach to what he then considered was going to be a major problem for the industry. After three-way discussions between CSIRO, the AWB and the Department of Primary Industries, the AWB and CSIRO mutually agreed to contribute 50% each of the required funding for a dedicated research program.

A Consultative Committee, composed of industry representatives, was formed to guide the research of the new Laboratory. The co-operative philosophy that underpinned the subsequent success of the Laboratory was thus in place from the start.

Dr Jonathan Banks took over as the fifth Head of the SGRL in 1989 and held the position for seven years. One of his first tasks was to re-negotiate the partnership between CSIRO, the AWB and the five mainland Bulk Handling Authorities (BHAs), which had then joined the SGRL as participants. The BHAs were logical participants as they were responsible for grain handling and storage in each State, and were actually implementing pest control measures. They had provided critical inputs and collaboration to the SGRL since it began operations. The BHAs now jointly shoulder about 50% of the SGRL's core funding.

As the partnership expanded, so did the scope of the Laboratory's work. From a limited 1970s brief of insect pest control, SGRL's work has expanded to include preserving grain quality through better harvesting methods and better management of the storage infrastructure. Work also expanded to include developing safer and environmentally sound pest control systems, with particular emphasis on reducing industry reliance on pesticides.

Anticipating industry needs

Because of the close working relationship, the views of industry representatives and SGRL scientists on research directions usually coincide. But, there are also occasions when industry participants have a different view of priorities. This is the time when the relationship has to be mature enough for these to be resolved through constructive debate, with the shared commitment to the industry as common ground.

"We respect industry decisions because they know better how such decisions would affect their bottom line. On the other hand, they reaffirm their support for the general thrust of our science because they recognise the excellent standard of CSIRO's research and our successful track record" said Dr Banks.

According to Dr Banks, the industry did not merely give its trust to the SGRL; the SGRL earned it. The Laboratory has established an ability to anticipate the industry's needs, and has been developing solutions to problems before they actually emerge. For example, when malathion, a widely used grain protectant, failed in the early 1970s, the SGRL already had alternative processes developed, tested and ready for

commercial use. Today, it is ready with alternatives to methyl bromide and phosphine, which are commonly used fumigants.

"It is a given that current pest control measures have a finite life span. Insects develop tolerance or resistance, while at the same time markets and regulations change. We know that we have to keep the shelf replenished with control measures so the industry can reach for them when the current one fails," says Dr Banks.

Part of the continuing success in meeting industry's needs comes from good intelligence gathering. Almost all of the 40 SGRL staff are involved in at least one field trial a year in collaboration with a major stakeholder. Many staff are in frequent, even daily, contact by phone with the BHA's and other staff in the grain storage business. Direct visits to head offices and field operations throughout Australia are common and a normal part of SGRL's operations.

"I think that by constantly listening and working with all our stakeholders, we are able to develop a good understanding of their needs, which we then use as a basis for drawing up our research priorities. We don't expect to be infallible, but up to now, we've been able to predict what they'd need well ahead. We've also demonstrated that we genuinely want their input and that we act on their advice. We are members of their team and the interaction is crucial to SGRL's success."

A balanced portfolio

The record of success of the Laboratory has led to industry support for a balance in the research effort between strategic research and more commercially focused research.
This balance has translated into a sustained flow of leading edge knowledge and an excellent return to Australia since the early 1970s. The SGRL and its participants are determined to maintain this balance in the face of further changes in the industry.

The research portfolio comprises equal parts of short-term research (less than one crop season), medium-term research (1-5 seasons), and long-term research (5 and above). Some of the short term research projects also act as stepping stones toward longer term research objectives.

Dr Banks, says, "We always aim to sustain long-term research to build up the knowledge required to tackle future industry problems – even if that means funding 10-year projects with three-year and even annual funds. Some may consider this a risky approach, but we've been successful in doing that for many years now. We've continuously produced new technology, and we've never been caught without a ready solution to any emerging pest problem in the grain industry."

Many research results are picked up rapidly by the industry. For example, a computer-controlled cooling system went from concept to 'battle honours' in only a few years. Others, however, have to wait their moment. For example, it was many years before its work on controlled atmospheres for grain storage was finally applied in places such as Newcastle and Port Kembla.

"Three years ago, there was a bumper harvest of sorghum after years of crop failure in Southern Queensland. About six weeks before the harvest, the industry approached the SGRL for an appropriate system to handle the grain. For climatic reasons, the grain was too wet to store safely. Fortunately, we had earlier developed the computer-controlled cooling system that can monitor and control bulk temperature and moisture. It was part of our longer term research program because we thought it would be needed, and needed quickly, at some time in the future. We were able to put the system in place, on short notice, because we had planned for it. That is what we're here for," Dr Banks said.

Continuity, Individual strengths and teamwork

During the seven years that he was Head of the SGRL, Dr Banks was prepared to entrust the standard of research to the research intuition of the Laboratory scientists. They are highly talented people, even visionary, and Dr Banks says others may label them 'prima donnas' because of the way they singularly pursue their ideas.

That trust has paid off. "In this program, we've always had product or project champions who have had the passion and emotional energy to drive their projects. When you look at the Australian grain industry today, you'd find that almost all the grain stored in the country has been treated by a process that has been championed and developed in collaboration with this Laboratory."

Although the scientists may be highly individualistic, the structures and procedures at the SGRL give them plenty of opportunity to work effectively in teams. A scientist may work principally on a project requiring his or her main competence, but he or she would also be involved in different phases of a number of other projects. This enables them to help shape the overall research effort.

"I believe in not telling people how to do things. The very basic thing to do is to hire the right person, agree on the key objectives and then let him or her to get on with the job. Our best outcomes have been produced through this process. We generally get the best person for a job through a world-class recruitment and selection procedure", said Dr Banks.

This approach has been a philosophical tradition of the SGRL. Six Heads of laboratory have maintained this approach, the latest being Dr Banks' successor, Dr Jane Wright.

Adapting to a changing environment

As in most other organisations, change has become a normal part of business at the SGRL: its work, structure and management are continually having to adapt to new circumstances. In recent years, the industry has been severely buffeted by the pressures of competition, deregulation and privatisation. The market has also been changing, with buyers demanding higher-quality grains and imposing more specifications on production and storage conditions. Handling and storage requirements have also been changing as new grain grades and varieties are

developed, and pests develop resistance to chemicals. CSIRO has also undergone a number of restructurings since SGRL was formed. SGRL has been maintained intact through each.

Another major factor driving change in the 1990s is the persistent reductions in both State and Federal budgets. Governments have keenly embraced privatisation and deregulation. As a result, the AWB's monopoly on domestic wheat trading has been dismantled. This has led to a massive increase in grain stored outside the BHA system, by farmers and private traders. The SGRL has responded by undertaking research on smaller scale storage, with approximately 23% of its total funding now coming from the growers, through the Grain Research and Development Corporation.

Caught in the midst of these massive and fundamental changes, the SGRL has managed to keep on an even keel. An important stabilising factor has been an immovable mission: that of developing new technologies to support the competitiveness of Australia's grain industry. The parameters of competition in the global grain market may change, but the participants in the SGRL have remained focused on this mission. This has meant that results have continued to flow, reinforcing support for the Laboratory.

Dr Banks says, "Industry is committed to this mission, which provides the framework for our short-term work. This enables us to keep a balance. We can prioritise the industry's longer-term needs, instead of being swamped by immediate imperatives."

Capturing some of the commercial returns

While the mission has provided a constant point of reference, the changing commercial imperatives imposed on its industry partners have not been lost on the SGRL. It recently established a sub-program specifically designed to maximise returns to industry partners through a more efficient administration of the research effort. There has been an increasing emphasis on direct commercialisation of research output through licensing to commercial organisations, often internationally, for direct profit. For instance, the Laboratory is negotiating international licences for its fumigation system, Siroflo.

SGRL staff are also increasingly concerned with getting the message out, by producing training materials, attending field days, organising technical meetings, and by participating directly in industrial participants' marketing efforts overseas. According to Dr Banks, international buyers are becoming more sophisticated and are demanding that the grain they buy follow their specifications. "I recently went to Korea to provide technical back-up to an AWB team, and make a presentation on the technology we use for maintaining high-quality and pesticide-free grain," he recalls.

Income from the Laboratory's commercial operations have substantially grown over the years. In addition to the direct funding by the AWB and BHAs that matches CSIRO appropriation funding, direct earnings from consultancies and the like, have risen quickly in recent years: from less than 2% in 1993-94, to nearly 15% in 1996-97. In 1996-97, non-CSIRO income for SGRL was 73%.

The SGRL has also documented the returns on its research to ensure the continued interest and support of its partners. An independent cost-benefit analysis carried out by the Sydney University has shown that every dollar invested in SGRL yielded between $3 to $9 extra sales income to the industry over the period 1971 to 1991.

Dr Banks, however says that the benefit derived from SGRL's work goes beyond the extra sales income. There is considerable benefit in terms of 'insurance' – making sure that there are alternatives available when one method fails and so avoiding costly interruptions to trade. There have also been considerable indirect benefits: to Australian consumers through higher-quality grain with reduced pesticide residues; to the environment through reduced chemicals use; and to the scientific community through the generation of additional knowledge and technology.

Science and deregulation: a future challenge

One question that hangs over the SGRL is the status of the AWB after 1999. This is when the Federal Government will decide whether the AWB will retain its export monopoly. Already, there is a strong push within government to free up the 'single-desk' status.

SGRL has made an active input to the debate, providing a scientific dimension to an issue that was seen as purely commercial. Dr Evans, the then head of SGRL put the case to the McColl Royal Commission looking into grain transport and storage, arguing that deregulation could jeopardise Australia's international reputation as a supplier of quality, pest-free and low insecticide-residue commodities.

Dr Banks: "We had a set-up that was unique in the world. A single controlling body had total accountability for pest control. When you deregulate, you'll see a number of companies setting up new storage operations. Some of these companies may try, as has been the experience overseas, to cut costs through inadequate pest control systems. When that happens, you won't be able to stop insects moving from one storage to another – they are 'deregulated' but they don't follow the rules of commerce. Poor storage can jeopardise those who do it properly," he says.

The submission failed to convince the Commission. But it shows just how integrated the SGRL is in the industry. "Science is often seen as irrelevant to these debates on trade and commerce, but of course, this isn't the case. In the long term, science has had more to do with the industry's competitiveness than internal marketing arrangements," said Dr Banks.

SGRL will continue to contribute to the debate on future arrangements. Dr Banks expects that it will be a difficult time. "Under deregulation, our relationship with industry will be more complex. There will be more players, and it will be harder to maintain consistent standards and practices. The communication task will be magnified many times. I also expect funding will continue to tighten, as it becomes more difficult to capture funds from an increasingly dispersed group of beneficiaries."

Whatever arrangements are put in place, SGRL is determined to keep long term research a priority. The key issue for the Laboratory is its capacity to continually generate intellectual capital. SGRL scientists remain determined to maintain their focus on their core research and are working assiduously to keep at least a third of its research portfolio in basic research.

“When that falls below one-third, I think we would have failed in our mission. But I think we’ll surmount these problems as we have in the last twenty five years,” says Dr Banks.