2006 – A year to leave behind but not to forget

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Nobody is going to argue that 2006 was a disastrous year for agriculture in southern Australia. After a dream start in most areas, many farmers were saying that "the crop went in the best it had for years," but the absence of useful follow up rain, and in some cases damage due to frost, was a bitter pill to swallow.

The 2006 winter crop produced only about one-third of the tonnage produced in 2005 (which was not a spectacular year for the nation either) and the Australian Bureau of Agricultural and Resource Economics (ABARE) has warned that $6.2 billion will be wiped from the value of farm production, a 35% decrease. They further predicted that the drought would cut the country's estimated economic growth by 0.7 percentage points this financial year.

Never the less, many of us were amazed at how well the crops hung on despite the lack of rain and plenty of hot winds in spring. So to dismiss this as a year to be forgotten as quickly as possible would do farmers a grave injustice and bury some very valuable lessons.

We suggest that if the 2006 season had been experienced 30 years ago for example, the impact on the economy and the environment would have been far more dire.

So why was production in 2006 relatively better?

There were climatic factors. Some farmers were lucky enough to have some stored soil moisture from summer rains, others believe that the heavy frosts in June slowed the crops so that they produced fewer tillers and less biomass which enabled them to cope better with the tough spring. In other cases, the lack of windy conditions in winter meant that crops were not cut nor did they lose as much moisture. All of these factors were probably important.

But they don't explain why current farming systems produced better crop yields than those of the 1970's, especially the impressive differences in crop performance on the lighter soils. (No doubt, important gains have also been made on heavy soils and these gains are setting up much larger yield potentials in these areas, but in a season like 2006, their realisation was probably little better than they would have been in the 1970's, especially in the lower rainfall areas, simply because they ran out of moisture altogether).

Our conclusion is that production in 2006 was better, particularly on the lighter soils, mainly because of **"early seeding and better use of soil moisture".**

The background to such a conclusion is quite complex, and there are several reasons for the dramatically improved performance.

- The first was the introduction of cereal cyst nematode (CCN) resistant cereal cultivars. This gave farmers a low cost and easy to manage entry into controlling this scourge of the sandy soils of southern Australia. The improved production which followed these substantial reductions in CCN infections provided farmers with the cash flow to embark on reducing the second major bottle-neck to productivity.
- Superior grassy weed control. Tools such as grass selective herbicides and spray-topping pastures (especially important in low rainfall districts because of their lower cost and better

fit in their systems) controlled another major bottle-neck to increased productivity on these soils; namely grassy weeds. Although these techniques are also used on heavy soils, their impacts have been most dramatic on sandy soils which are the preferred environment for a range of particularly difficult to manage grassy weeds, e.g. the brome grasses.

Although both of these developments have generated enormous direct benefits in productivity (and usually profitability), their indirect impact of increasing the opportunities for **earlier seeding** are probably even more important, and very obvious in 2006.

Research has clearly demonstrated that in the temperate and Mediterranean climates of southern Australia where crops are maturing under increasingly hotter and drier conditions, early seeded crops will generally outperform those sown later. However, in 2006 on light soils, the benefits of early seeding were spectacular. Every district has stories of paddocks which produced economically positive yields right next to ones which were written off and the only apparent difference was the time of seeding.

Tools such as grass selective herbicides, pasture and crop-topping, herbicide-tolerant crop cultivars and no-till have all had a major influence on crop productivity and profitability by increasing the opportunities for seeding crops on the opening rains. This increases the length of the effective growing season for the crop, regardless of how the rest of the season plays out, and means that the crop has every opportunity to access stored and in-season water before losses occur to weeds, evaporation and drainage. Other tools such as wider seeders, more powerful tractors, guidance systems and auto-steer, more efficient boom spray units and better adapted crop cultivars have all added value to this fundamental change in farming systems since the 1970's. In the 1970's, there were very few situations where farmers could seed right on the opening rains because limited weed and disease control options meant that weed and disease control prior to seeding, often through cultivation, were essential for a productive crop. These days, even dry seeding of crops prior to the opening rains is a viable option for some situations. This gives the crop the entire growing season in which to grow and mature.

Another major benefit of the current farming systems, especially on the lighter soils, is the prevention of erosion. Even though the 2006 season was the driest on record for some districts in southern Australia (and in the bottom 10% for nearly all districts), most surveys of land condition which have been made suggest that land condition is remarkably good. This is the indirect spin-off from improved productivity (more biomass above and below the soil to protect the soil surface from wind and water erosion) and less "disruptive" crop establishment techniques (e.g. direct seeding with narrow points or discs). These benefits are important not only for long term sustainability, but also politically as those outside farming seek to regulate practices in the interests of the environment.

There have of course been other technical developments which have improved productivity.

Nutrient management has improved with better understanding of plant demand at different growth stages and improved soil and plant analysis which enables the farmer to better match the supply of various nutrients to plant demand and even potential yield. This is important given the rapidly escalating cost of fertilisers, and critical when cash is short following a drought.

There is a wider range of varieties to suit various situations, including improved drought tolerance. Farmers are now better able to match crop decisions to the season, as well as the soil type.

So in many respects, whilst farmers have every reason to feel disappointed with 2006, they should reflect on just what has been achieved since the 1970's.

However there is still much to do.

Although these developments have produced major improvements in productivity and in most cases profitability, many have involved increased risk (because they require increased investment in plant and raise input costs). The balance between increased revenue and increased costs is a dynamic one but generally has tightened as costs have increased relative to prices received.

Yes, technology will continue to play a role through new varieties with greater drought tolerance, new ways to conserve and better use soil water, better marketing systems, and the more profitable integration of livestock into the system.

But there will be need for greater attention to be paid to the containment of costs as farmers seek to generate reasonable profits at an acceptable level of risk. There will be greater attention to the economic rather than the technical aspects of farming businesses. This should include a reexamination of cropping intensity - have we gone overboard?

It will be increasingly important to achieve the right balance for the given season and environment. There is no such thing as the best farm system, even in a given area. What is good for one farmer will not suit another because of a different ability, capital structure, borrowings, attitude to risk, family situation, or simply how hard they wish to work.

This is where farming systems research is playing a vital role. The partnership of researchers with farmers through farming systems groups have become a vital cog in the adaption of research results and their adoption into commercial practice and they will continue this role into the future.

As climate change imposes more changes and pressures on agriculture, farmers will need to continue their evolution of current farming systems, particularly with respect to exposure to risk and optimising the conversion of water into a saleable commodity every year. Farming systems research with farmer groups will be in the vanguard developing these changes, not only in technology as such but particularly in the areas of business viability and natural resource management.