



Parliamentary Inquiry into Agricultural Innovation – Public Hearing (22 Feb 2016)

Southern Farming Systems and the Australian Controlled Traffic Farming Association

Southern Farming Systems (SFS) is a farmer-driven, non-profit organisation focusing on sustainable farming systems in the higher rainfall regions of southern Victoria and Tasmania (www.sfs.org.au). It has five regional branches. The geographic spread of these branches reflects the diversity in soil types, production systems, climate, seasonal rainfall patterns, and market opportunities that occurs across the region. SFS has over 500 financial members. The main focus of SFS is on-farm management and improving on-farm production systems. SFS undertakes research and trials for research and development corporations, private companies and federal and state government stakeholders.

The **Australian Controlled Traffic Farming Association (ACTFA)** aims to improve the profitability and sustainability of Australian agriculture through the promotion and support of controlled traffic farming (CTF) systems (www.aftfa.net). ACTFA's aims and activities are relevant to all cropping industries – grain, cotton, sugar, fodder and horticulture. Since its formation in 2006, ACTFA has hosted 9 conferences, including the First International CTF Conference in 2013, each one drawing a mix of farmers, technology and service providers, and researchers. ACTFA is leading substantial projects for GRDC and the Department of Agriculture and Water Resources.

SFS

Yield

- Narrowing the gap between potential yield and actual yields in all production zones
- Key to this is the National Variety Trials
- New varieties, new crops new cropping systems

Resource use efficiency

- Crop protection technologies – efficient and safe use of inputs
- Natural resources such as soil and water – Water Use Efficiency
- Nutrient efficiency – macro-nutrients (including NP and K) and micro-nutrient efficiency
- Foster soil microbiology to enhance above
 - efficient use of on and off farm sources of organic matter (composting, stubble management)
- Energy and field efficiency

Deeper, softer soils

- Controlled Traffic Farming – Raised beds (SFS cut its teeth on this technology)
- Hardware solutions, stubble incorporation, deep rip and gypsum (rip and gyp)
- Composting and crop sequencing (including pasture and livestock systems)
- Using roots to “break through”

A value chain approach

- There are high-value international and domestic markets for regional products
- The “key” is for farmers and their rural communities to participate along the chain so the value that a customer is willing to pay for is demonstrated

- The breeding system has to know what is demanded at the farm end as well as the customer end of the chain (e.g. red wheats can play a significant role in HRZ cropping systems and present significant market opportunities overseas in countries such as India)

A digital platform for decision making and records

- Soil mapping (EM 31 & 38)
- Yield mapping, NDVI & Infra-red imaging
- Satellite imaging, UAVs, smart phones
- Soil probes and understanding of soil profiles
- Weather and climate data

ACTFA

Controlled Traffic Farming (CTF)

The basis of CTF systems is that all cropping machinery is configured to allow all load-bearing wheels to be confined to permanently defined traffic lanes. This eliminates soil compaction from the crop-growth zone, and concentrates it in the traffic lanes, optimising performance of crops and machinery.

Farm layout to facilitate effective drainage is an important element of CTF. With a foundation of confined traffic and efficient layout, the productivity, reliability, resilience and sustainability of cropping systems can be raised significantly – well beyond that which is possible without these practices in place. Practices like zero-till are easier and more effective. The spatial repeatability and permanence of CTF systems provides an unsurpassed platform for the use of precision agriculture techniques and technologies.

The following points provide an overview of the benefits of CTF that have been proven in research and commercial application in a range of cropping industries and production environments:

Resource use efficiency

- Nitrogen losses reduced by 10 – 25%, meaning more efficient use of fertiliser and lower environmental impact
- Reduced run-off (up to 90%), and soil erosion (up to 40%)
- Higher infiltration (70%)
- More plant available water (30%)
- Higher, more uniform yield (10 – 20%)
- Reduced energy use through lower tillage requirements (zero-till in many cases) and improved tractive efficiency (30% - 70%)
- Reduced capital investment in machinery (>50%)
- Improved timeliness and greater opportunities for double cropping in suitable environments
- Significant productivity improvements (estimated up to 2-fold in some cases)

Improved soils

- Significant, permanent improvements in soil structure and porosity
- Improved soil biology
- Long-term retention of benefits from practices such as sub-soil manuring

Value chain

- As the foundation of sustainable cropping, CTF will be an important element of the value chain when environmental sustainability is valued by markets and consumers. Australia has a unique opportunity to enhance the adoption of CTF in its cropping industries, and hence promote its benefits through the value chain.

Digital technology

- Digital technology is both an enabler and opportunity for CTF. The permanent and repeatable spatial framework of CTF provides unparalleled opportunities to make the most of digital technologies and data gathering in cropping, leading to the potential to crops with high precision and provide unsurpassed QA data.

For some industries (e.g. grain, sugar) the benefits of CTF are well proven in both research and commercial experience. However, even after 20 years of commercial experience, uptake remains at early adopter levels, and the priority is to support and enable more wide-spread adoption of the system. In other industries (e.g. horticulture, mixed farming) there are many challenges to integration and adoption. In these cases, support for research, development, demonstration and adoption is a high priority.

Under the innovation agenda currently sweeping the nation, a lot is made of the need to develop new technologies to address productivity and sustainability. It is important to have a development pipeline to remain competitive in the long run. However, in the short to medium term it is important that existing, well-proven production systems are promoted and adapted to new situations, so that more producers and industries can benefit from current knowledge. If the most advanced production systems available (e.g. based on CTF) were to be adopted across the majority of producers, rather than a minority, the national increase in productivity would be enormous.

Recommendations

1. That the committee recognise that innovation is not just about development of new technologies, but also about the adaptation of proven technologies and systems to enable adoption in other industries and regions.
2. That the Government support a farming systems approach to all facets of the research, development, demonstration and adoption continuum.
3. That the Government provide leadership in the recognition and promotion of CTF as a priority foundational technology for crop production systems in Australia.
4. That all Government decisions relating to agriculture and regional development be made through the prism of the agricultural value-chain; i.e. Governments must consider the impact of all policy decisions on Australia's capacity to target high-value global markets and the flow-back effects throughout the value-chain.
5. That a major research initiative to address industry and regional development in Australia be established, led by regional (SFS) and cross-industry (ACTFA) farming systems groups in partnership with governments, industry and academia.

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Addendum to material supplied to the Committee at the hearing of February 22, 2016

At the invitation of the Committee Chair, as recorded in the Committee Hansard, some supplementary material is provided below:

John McPhee:

In response to a question from the Hon. Clare O'Neil MP, regarding the slow uptake of CTF, further to the comments recorded in the Committee Hansard, an additional consideration is that CTF is what would be considered to be a 'knowledge intensive' innovation, rather than a 'knowledge embedded' innovation. By way of explanation:

- A 'knowledge intensive' innovation requires the adopter to engage in a learning process, make mistakes, find solutions through adaptation etc. This is very much the path to adoption for CTF.
- A 'knowledge embedded' innovation has the innovative knowledge 'embedded' in the product. For example, a new variety or agri-chemical would be based on innovative knowledge usually developed by someone in a research organisation or a large private company. The end user (the grower) buys access to the innovative knowledge in a bag or a container, and the changes to management required to reap the benefit of the innovation are small, or may even be non-existent. The method of using the innovation may be no different from that used for previous varieties or agri-chemicals.

It is unlikely that CTF will ever be a 'knowledge embedded' innovation, but there are some things that would take it closer to that end of the spectrum – machinery standards being one, wherein if standards were in place, a user wouldn't have to do CTF just because compatible machinery was available, but it would be easier if they wanted to. To some extent, a lot of the spatial technologies now used in agriculture have moved along the spectrum towards being 'knowledge embedded'. There is still a lot for a new operator to learn, but on the whole, the technologies are a lot more user friendly than they were 15 years ago.

The implication of this distinction is that, apart from the need for additional R&D based on the needs of different sectors or regions identified in our original submission and recorded in the Committee Hansard, one of the critical factors to enable greater uptake of CTF is support for adoption and practice change. This is generally considered to be different from extension, in that practice change usually requires one-on-one work with the grower, at least until a sizable portion of the grower population has adopted the innovation, and services may be more widely available through commercial providers.

CTF is the foundation of a continuous improvement regime, so it could be argued that the journey never ends. However, it is reasonable to expect that once a grower has adopted the fundamentals of CTF (i.e. machinery integration, farm layout) they will probably be sufficiently committed to follow their own path of continuous improvement, with support from appropriate service providers or networked grower groups.

Kim Russell:

On Page 3 and 4 of the transcript, where Ms Nola Marino MP joined the proceedings, it interrupted a train of thought that I was trying to articulate. I welcomed the presence of Ms Marino of course and the questions from Mr Rick Wilson MP but the point I was trying but failed to make was;

“Yes it was picked up in the... Agricultural White Paper process, SFS and many other farming systems groups put a great deal of effort into submissions. The SFS submission provided government with levers it could pull. With mechanisms for delivering policy without vast expense.

At the program level the announcement of an extra \$100 Million for agricultural research was widely welcomed. This will be delivered on the ground by the Rural R&D for Profit programme in four key areas

1. Advanced Technology
2. Bio security

3. Soil Water and NRM
4. Adoption of R&D

This program can only be delivered through RDC's. That is fine but this structure is an impediment to, farming systems groups banding together, identifying priorities, monitoring and controlling the research and commercialising the outcomes. The capacity of farming systems groups in Australia is remarkable, there are no better organisations in the world to deliver farmer priorities on the ground.

I welcome Mr Wilson's suggestion of directly funding farming systems groups but it could be at the risk of a vegemite approach, spread very thinly with little impact. A solution to this would be to facilitate a process for farming systems groups to come together with special interest groups, identify the opportunities and threats and develop action plans to deliver profit to farmers through research. Ideally because they are inexorably linked Natural Resource management issues could be addressed simultaneously. Cross industry collaboration would be a key to this, it is why SFS and ACTFA have been working together. There are mechanisms for this to happen on a broader scale, the Victorian Grower Group Alliance has a membership of Southern Farming Systems, Victorian Farmers federation (grains group), Australian Controlled Traffic Farming Association, Irrigated Cropping Council, Mallee sustainable Farming, Riverine Plains and the Birchip Cropping Group. Victorian by name but the alliance members spread into Tasmania, South Australia and New South Wales and have a significant and very productive landscape covering all industries, dryland and irrigated; annual and perennial horticulture, cotton, rice, livestock and of course grains.

The Rural R&D for Profit programme has the opportunity to foster innovation which leads to increased farm profitability. An intention of the program is to facilitate cross industry collaboration I believe the collaboration should be facilitated by farming system groups. Recognition of the programs developed by the RDC's should of course take place. But they do not have a good record of collaboration. Grain and Graze between GRDC and Meat and Livestock Australia (MLA) is a good example but it has been a pretty torturous path. Particularly because of the mismatch between application dates and processes. Let farming systems groups come together, set priorities and then let the RDC's work out how they need to work together to make it happen.