1999 CWFS Condobolin Farming Systems Trial

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Overview:
CFWS have established a 160 ha long-term farming systems trial at Condobolin Agricultural Research and Advisory Station. A five year crop rotation has been established with four farming systems imposed: conventional tillage, reduced tillage, zero tillage and perennial pasture. In 1999 the conventional tillage long fallow crop had the highest yield and gross margin, however the conventional tillage stubble crop was particularly poor. The reduced tillage system had the highest estimated profitability in 1999.

Background

Low Commodity prices and rising input costs are forcing farmers to reassess their farming enterprises. If farming is to remain competitive with other business enterprises there must be a healthy return on capital. There must also be a balance between the financial returns and the risks associated with that enterprise. Traditional Wheat/Sheep farming systems are being challenged by alternative models on the basis of profitability and sustainability. In many ways farmers are at the cross roads and have to make a choice on which direction to head. This choice is made difficult as individual components of a farming system exhibit pronounced interaction with the season and with other components in the system. As farmers often mention "no two cropping years are the same" and the financial climate is volatile, which makes comparisons difficult. Hence there is a need to assess technology options from a farming systems perspective and assess their relative contribution to profitability and sustainability.

Traditional wheat/sheep systems rely heavily on mechanical cultivation for the control of weeds during the fallow period. Burning of stubbles is advocated to kill weeds, weed seeds and reduce pest and disease incidence. Improved pastures often consist of a mixture of lucerne/medic and subclover that is undersown with the second wheat crop. A first cross fat lamb enterprise can be conducted in association with the cropping program. A variation on this approach has been adopted by some farmers in the Lake Cargelligo area. Land is spray fallowed in August and worked in late Jan/Feb and a long fallow wheat crop is sown in May. Instead of growing a stubble wheat crop the land is left out for 12 months. Stock graze the stubbles and reduce weed growth. Extra water and nitrogen is accumulated for a second long fallow wheat crop with undersown pasture. Winter cleaning of pastures is carried out to promote legume dominance. A similar livestock enterprise can be run in conjunction with their cropping program.

Conservation farming has long been promoted as the way forward for farming in the Central West and is now gaining support in the east. Crop intensification is a trend that is been forced on small land holders in the east, where land values and rainfall are high. An essential element of this approach is the retention of stubble, the elimination of burning as a weed control option, to promote the build up of soil organic carbon. Pulses are used in the rotation to allow not only marketing flexibility but to provide nitrogen

benefits for subsequent cereal crops. Herbicides are extensively used to control weeds and annual crop rotations allows for rotation of herbicides. Stock are considered to have a deleterious affect of soil surface physical characteristics and with continuous cropping stock are excluded from this system. Wheat is direct drilled in to canola and field pea stubble and vise versa.

Many farmers, particularly in the west, believe that while returns from sheep are low they will cycle like they have in the past. Sheep are well suited to the Central West and the risks associated with livestock enterprises are lower than cropping. Furthermore, productivity gains from livestock enterprises can be made if attention is given to pasture productivity and quality. Stocking rates need to be adjusted to the availability of feed. Rotational grazing has been espoused as a method of making better use of pasture and ensure that desirable plant species persist.

Farming Systems Trial Methods

With financial support from the Grains Research and Development Corporation (GRDC) CFWS have established a 160 ha long-term farming systems trial at Condobolin Agricultural Research and Advisory Station. The trial aims to examine the strengths and weaknesses of the four above mentioned farming systems and document their relative profitability and sustainability. The full sequence of crops were grown in 1998 (Table 1), tillage treatments were imposed in 1999 and the livestock component in 2000. The trial is fully replicated with each phase of the rotation being present each year.

Table 1. The full five year rotation used in the CWFS farming systems trial

Farming System	Year 1	Year 2	Year 3	Year 4	Year 5
Conventional Tillage	Long fallow wheal	Short fallow wheat	Pasture	Pasture	Pasture
Reduced Tillage	Long fallow wheat	No Crop	Long fallow wheat	Pasture	Pasture
Zero Tillage	Canola	Short fallow wheat	Field peas	Short fallow wheat	Green manure
Perennial Pasture	Perennial Pasture	Perennial Pasture	Perennial Pasture	Perennial Pasture	Perennial Pasture

The Conventional Tillage was supervised by Gerry Black "Pinelands" Condobolin, the Reduced Tillage system was supervised by Ian Davis "Gapview" Lake Cargelligo, The Zero Tillage system was supervised by Peter Ledger "Argyle Downs" Trundle and the Perennial Pasture system by Peter Weston "Yalgo" Nymagee. Their advise formed the basis for how these systems operated.

Results and Discussion

Last cropping season was described by a late start (9/6/99), extremely dry conditions in September and a soft finish. Even paddocks that had been over-farmed on the Ag. station produced grain with >13% protein. Protein premiums decreased with each load brought to the silo and green grain frustrated farmers. Yellow leaf spot appeared to be the main biotic constraint that limited yield in the CWFS trial, particularly as Janz is susceptible and the flag leaves were partially chlorotic. The highest wheat yield in the CWFS trial was 2.6 t/ha in the conventional tillage long fallow crop (average 2.3 t/ha) and it also had the highest gross margin (Table 2). There was evidence that soil nitrogen was limited due to the lower grain protein than in other crops.

Table 2. Results from the wheat plots in CWFS farming systems trial in 1999 season

Farming System	Crop	Grain yield (t/ha)	Grain protein (%)	Screenings (%)	Variable cost ($/ha)	G. margin # ($/ha)
Conventional tillage	LFW 1	2.3	13.8	1.1	230	161
	SFW 2	1.1	15.2	1.0	203	-16
Reduced tillage	LFW 1	2.0	14.6	6.2	208	124
	LFW 2	1.9	15.2	5.0	255	72
Zero tillage	SFW 1	1.2	14.2	1.0	195	5
	SFW 2	1.4	15.1	1.2	195	39

Calculated to include interest on fanning machinery, depreciation and running costs

Despite very contrasting approaches to farming the variable costs were remarkably similar. By contrast, grain yields and gross margins varied appreciably. The poor performance of the conventional tillage stubble wheat crop is noteworthy. This compares to the better performance of the second wheat crop in the reduced tillage system. Screenings were only a problem in the reduced tillage system and dry conditions in September resulted in the yield potential of these crops not being met. The poor performance of the zero tillage wheat crops was due to the late start to the season and that 12" row spacing was used. These crops at flowering failed to have a closed canopy but yield per plant was as good as in the other systems. Wheat sown after field peas was better than wheat after canola which was better than wheat after wheat.

The estimated profitability of the entire farming system is given in Table 3. This budget assumes a stocking rate of 1DSE/ ha of pasture for conventional tillage and reduced tillage systems and 1.5 DSE for the perennial pasture system. These calculations do not include labour or overhead costs (field bins, augers & vehicles etc). In 1999, the reduced tillage system was found to be the most profitable.

Table 3. Estimated farm profitability

Farming System	Profitability 1999 ($/ha/farm)
Conventional tillage	40
Reduced tillage	47
Zero tillage	10
Perennial pasture	27

' Approach used as in NSW Ag. 1999 farm budget handbook

Future Plans

It is our plans to work with each of the system leaders and refine their programs to improve the performance of their systems. The grazing component of the trial has now been implemented and the trial is fully functional. The cell grazing component of the perennial pasture systems will shortly be operational using Peter Weston electric fencing system. Soil moisture will be monitored using a neutron probe to study deep drainage and crop water use patterns. Deep soil nitrogen sampling with again be conducted throughout the core trial.