A comparison of the organic and conventional livestock farming systems of Avalon Farming in West Otago

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Introduction

Organic farming in New Zealand is not considered a mainstream option for farmers. This paper compares organic and conventional farms running side by side at Avalon Farming and details why Avalon Farming is expanding its organic area.

Included in the paper are details of the conversion to organic farming and its success. Topics include:

1. Challenges of converting from a conventional to an organic system.
2. Comparing conventional and organic production and the financial returns.
3. Marketing options for organic farmers in New Zealand including the growth of farmers markets.

Approach

Conversion to Organics

There is a 2 year conversion period for AgriQuality standards. Conversion began in 1997 when the first step was to stop applying chemical fertilisers on 35 hectares. In 1998, an extra 90 hectares was added and the stock were farmed organically on this area. The full conversion timetable is outlined in Table 1. In February 2006 Avalon Farming gained organic status on the remaining 190 hectares, giving the whole farm of 500 hectares organic status.

Reactive Phosphate Rock (RPR) at 125 kg/ha plus elemental sulphur (ES) at 30 kg/ha was applied in 1997, followed by Foliafeeds Simply Organic foliar mix the next year. Probitas, a natural fertiliser which can be used

Table 1 Conversion timetable detailing the area of land in each part of the certification process (total farm area = 500 ha)

	Area of land in each part of the certification process (ha)		
Year	Conversion (year 1)	Transitional (year 2)	Organic (year 3)
1997	35		
1998	90	35	
1999		90	35
2000	76		125
2001	107	76	
2002		107	201
2003			308
2004	192		
2005		192	
2006			500

Table 2 Fertiliser applied to the organic farming unit

Year	Products	Rate	Area (ha)
1997	Reactive Phosphate Rock (RPR)	125 kg/ha	35
	Elemental Sulphur (ES)	30 kg/ha	
1998	Foliafeed Simply Organic	15 L/ha	125
1999	RRP	125 kg/ha	201
	ES	30 kg	
2000	Foliafeed Simply Organic	15 L/ha	220
2001	Lime and Minerals	125 kg/ha	220
2002	RRP	125 kg/ha	259
	ES	30 kg/ha	
2003	Probitas	150 kg/ha	236
	Lime	2.5 tonne/ha	
2004	Drought conditions	0	—
2005	Probitas	150 kg/ha	240
	Lime	1 tonne/ha	
	Lime and minerals	125 kg/ha	220
2006	Lime and minerals	125 kg/ha	460

Table 3 Conventional (Marks) and Organic (Parkhill) pasture mixes sown

	Sowing rate (kg/ha) Marks sown in 1988	Parkhill sown in 2004
Banquet LE ryegrass		15
Nui ryegrass	25	
Demand white clover		2
Sustain white clover		3
Huia white clover	4	
G27 red clover		3
Colenso red clover		2
Charlton Timothy		1
Tonic Plantain		1
Grouse Chicory		1
Maru Phlaris		.5
Yarrow		.5
Total	29	29

organically, has also been added to the programme. Fertiliser use is outlined in Table 2. Probitas is a lime based soil conditioner developed by Ewan Campbell, a Waihi sheep and beef farmer. It has amounts of silica, sea based minerals and paramagnetic rock. We have measured up to 82 worms per spade full since we started using this product, higher Omega 3 levels in our lamb and beef and a longer shelf life for our organic lamb and beef sold under Avalon Organic.

The stock had been selected for resistance to internal parasites for 10 years, so there was not a significant drop in performance. The initial results were promising and more land was converted as soil biology and problem weeds such as gorse were controlled.

Pasture composition

Pastures are grazed on rotation all year apart from lambing. High endophyte Nui ryegrass and Huia white clover were the traditional mixes until the mid 1990s when low endophyte ryegrass was used. Under organics, a herbal ley such as that sown in the Parkhill paddock (Table 3) is being used successfully. We are also finding more timothy and clover coming back into our pastures.

Results

The following results compare the soil fertility and herbage growth rates on two organic areas. A comparison of the animal performance between organic and conventional is also detailed. Finally a financial analysis of both systems based on sheep and beef operations but excluding the stud sheep operation is given.

Herbage growth rates

Two organic sites were established in October 2005 and they have been measured using the Meat and Wool NZ Pasture Plan monitoring protocol. Three plots per site were used with a residual dry matter of approximately 1200, 1500 and 2000 kg/DM. Ten measurements per plot were recorded using a Speedrite Grassmaster digital probe.

The following are the pasture growth trial parameters.

- Two sites
  - Parkhill altitude 400 m
  - Marks altitude 270 m
- Three plots per site 0.36 m^2 (600 mm x 600 mm) metal cages
- Starting cover
  - Parkhill 680 kg DM/ha
  - Marks 960 kg DM/ha
- Growth interval 15 days
- Cutting method lawnmower with clippings removed
- Age of pasture
  - Parkhill 1 year
  - Marks 18 years

The average pasture production on the organic pasture mix sown in the Parkhill paddock was 13,320 kg DM/ha over the 200 days measured, while the conventional mix in the Marks paddock only produced 10,110 kg DM/ha (Table 4). This relates to growth rates of 66 and 51 kg DM/ha/d on the new organic and old conventional pasture mixes respectively. The newer sowing in the Parkhill paddock also produced more when the residual pasture mass was increased. This would be expected due to the greater number of herbs and clovers that are included. The pasture growth patterns were similar at most times though the Marks paddock did produce more in the late autumn than the Parkhill paddock, probably as a result of the difference in altitude and relative contribution of herbs and clovers. These results compare well to the pasture production measured by the same technique on a conventional farm close by (Table 5).

Table 4 Total and average growth rates of the organic and conventional pasture mixes during the first 200 days (from 21/10/05 to 9/5/06) of monitoring.

Pasture mix	Organic (Parkhill)			Conventional (Marks)		
	Residual herbage mass (kg DM/ha)					
	1200	1500	2000	1200	1500	2000
Total (kg DM/ha)	12 807	13 052	14 086	10 831	9761	9746
Daily growth rate (kg DM/ha)	64	65	70	54	49	49

Table 5 Annual yields (kg DM/ha/annum) from Meat and Wool Innovations Pasture Plan Pasture Growth trials undertaken by Mr Donald Martin at "Mt Allen" 18 kilometres from Heriot (Period 15/06/02 – 15/06/05)

Period	New pasture south facing	5-year pasture north facing
15/6/02 – 1/6/03	14 952	11 000
1/7/03 – 15/6/04	8 545	11 359
1/7/04 – 15/6/05	10 771	13 603

Soil fertility

The soil fertility recommendations are based on reports completed by the Albrecht Base Saturation method, which measures base saturation of the soil cations. Two paddocks are detailed with three tests in 1998, 2002, 2005, as well as results from an organic dairy farm near Riverton, Southland (Table 6).

Mr Mike Thompson from Riverton, Southland is a dairy farmer, who has used Probitas (150 kg Probitas plus 2.5 tonnes lime per annum) and fish fertiliser (20 litres BioSeal Fish Fertiliser) over the past 2 years. One of his new grass paddocks was also tested by Ballance Agri Nutrients and their figures are in brackets in the last column in Table 6 to allow a comparison of the Albrecht versus traditional soil tests.

The whole farm has now had one application of Probitas plus lime. The exceptions are paddocks that have been cut for hay or silage which receive a second application of Probitas and lime. Young grass paddocks receive 250 kg RPR along with Probitas and lime. Our calcium, magnesium base saturation ratios are not high enough and a magnesium source will be included in our fertiliser program for 2006/07 to boost our magnesium levels. We are finding that we still need to apply trace elements, based on annual herbage testing, to maintain plant and animal performance.

Stock performance

Scanning and lambing data are presented in Table 7. The 2006 year only has the organic system as the entire farm is now accredited.

The 4-year average lambing percentage for the conventional system was 125% while it was 119% in the organic system. This was mostly due to slightly lower ewe liveweights at mating under the organic system compared with the conventional, as the fertility index was similar in each year. Part of this effect was also due

Table 6 Soil test results from a paddock converted in 1997 (Bridge) and in 1998 (Marks) and a dairy farm near Riverton, Southland (Standard NZ MAF soil test results in brackets where applicable).

	Bridge			Marks			Riverton
Date Sampled (mm/yy)	10/98	01/02	11/05	10/98	01/02	11/05	7/06
CEC *	13.64	15.2	14.43	15.99	18.47	13.97	14.23
pH	6.0	5.8	5.9	5.7	5.4	6.1	5.4 (6.0)
Organic Matter	4.5	5.2	4.8	4.3	5.7	5.6	10.04
N kg/ha	89	95	92	86	98	97	
Sulphate ppm	10	16	13	9	18	15	22 (13)
Bray Phosphate ppm	49	55	61	47	43	37	46 (14)
Ca kg/ha (MAF units)	1298(9)	1321(9)	1062 (9)	1130 (8)	1193 (8)	1149 (10)	3295(13)
Mg kg/ha (MAF units)	135(18)	134(18)	121 (28)	166(22)	145(20)	87(20)	437(35)
K kg/ha (MAF units)	157(9)	235(13)	128(9)	174(10)	182(10)	124(9)	195(12)
Na kg/ha (MAF units)	48(9)	57(11)	46(14)	46(8)	50(9)	39(12)	61(13)
Base Saturation %							
Ca	62.8	56.4	59.3	51.5	45.8	67.1	51.7
Mg	10.9	9.5	11.3	12.6	9.3	8.5	11.42
K	3.9	5.1	3.7	4.1	3.6	3.7	1.1
Na	2.0	2.1	2.2	1.8	1.7	2.0	1.92
Other Bases	5.4	5.8	5.6	6.0	6.6	5.2	0.86
Hydrogen	15	21	18	24.0	33.0	13.5	3.3
Trace Elements (ppm)							
B	0.7	0.73	1.18	0.4	0.86	1.01	
Fe	889	899	1662	883	909	1680	
Mn	47	40	38	55	43	44	
Cu	0.8	1.1	1.0	1.0	1.1	1.2	
Zn	2.8	3.1	5.3	3.5	3.3	3.8	
Co	1.67	1	3.68	1.32	0.99	3.82	
Mo	0.92	1.56	0.2	0.92	1.52	0.2	

* Cation Exchange Capacity

Table 7 The sheep reproductive data for conventional and organic farming systems at Avalon Farming

	2002		2003		2004		2005		2006
	[1]C	[2]O	C	O	C	O	C	O	O
Scanning %	150	151	150	140	170	160	157	155	160
Ewe weight at mating (kg)	55.5	55.7	59	53.6	62.9	59.2	58.9	58.4	59.2
Fertility Index (scanning %/LWT)	2.7	2.7	2.5	2.5	2.7	2.7	2.6	2.6	2.7
Drys (%)	3.7	4.2	2.6	6.7	2.2	3.1	2.8	3.8	2.9
Lambing (%)	127	119	116	110	134	127	124	121	

[1]C = conventional
[2]O = organic

Table 8 Lamb carcass weights and prices since 2003

	Carcass Weight (kg)		Prices ($)	
	C	O	C	O
2003 / 04 drought	stores	14.6	59.30	82.40
2004 / 05	15.9	14.8	57.60	75.88
2005 / 06 all organic		15.0		69.61

Table 9 The biological parameters and product prices used to estimate the financial returns from conventional and organic farming systems at Avalon Farming.

	Conventional	Organic
Lambing percentage (4-year average)	125	119
Lamb carcass weight (3-year average)	15.9	14.8
Number of lambs sold	3450	3300
Wool kg/sheep su	4.5	4.2
Total wool sold (kg)	20880	19490
Beef carcass weight (kg)	280	280
Total beef sold (kg)	14000	14000
Stocking Rate per hectare	11.0	11.0
Stock units (5260 stock numbers)	5260	5260
Ewes (3800)	3800	3800
Hoggets (1200)	840	840
Rams (40)	40	40
2 yr cattle (50)	300	300
1 yr cattle (70)	280	280
Sheep : Cattle ratio	90 : 10	90 : 10
Effective area	470 ha	470 ha
Lamb sales	100% prime	70% prime 30% store
Lamb price ($/hd)	$50	$70 $43
Beef price ($/kg)	$2.90	$3.60
Wool price ($/kg)	$2.68	$3.59

to a small increase in the percent dry ewes in the organic system (average 2.8 vs 4.4% for conventional and organic systems respectively).

Lamb carcass weights and prices

The lamb carcass weights from the organic system were 1 kg lighter than those in the conventional system in the 2004/05 season when the two groups were comparable, but the organic lambs still attracted a premium of over $12/head (Table 8).

Financial analysis

In order to make a fair comparison, the stud sheep operation has been removed from this financial analysis and a fattening system has been calculated. Because the whole property was farmed organically from February 2006, some of the conventional expenses are based on Ibbotson Cooney – Chartered Accountants (Alexandra) farm survey results.

The parameters that have been used are in Table 9 with expenses based on the 2005/06 year.

The total farm income from the organic system is estimated to be $55,570 more than if Avalon Farming continued to run a conventional system (Table 10). This is an increase in gross income of $118/ha and $10.56/su or 16%

Table 10 The income and expenditure from conventional and organic systems on Avalon Farming.

	Conventional ($)	Organic ($)
Income		
Lamb: Prime	172 500	161 700
Store		42 570
Ewes (600 culls)	21 000	21 000
Wool	56 000	70 000
Beef:	40 600	50 400
Total Income	290 100	345 670
Income/ha	617	735
Income/su	55.15	65.71
Expenditure[1]		
Purchases beef (50)	25 000	31 000
Animal Health (C $4/hd; O $1/hd)	21 000	5 200
Fertiliser (C $10/su; O $5/su)	52 000	26 000
Feed (C $4/su; O $2/su)	21 000	10 500
Weed and Pest (C $1.6/su; O $0.5/su)	8 400	2 600
Variable expenditure	127 400	75 300
Other expenses	159 000	159 000
Total farm working expenses	286 400	234 300
Expenses/ha	609	498
Expenses/su	54.44	44.54
Economic farm surplus		
Total	3 700	111 370
Per hectare	8	236
Per stock unit	0.70	21.17
Expenditure as a % of income	99%	68%

[1]Listed as those expenses, which differ between conventional and organic.

The expenditure on the organic system now running on Avalon Farming is estimated to be $52,100 less than if a conventional system was continued (Table 10). This is a saving of $111/ha or $9.90/su, an overall saving of 18%.

This then translates into an increase in economic farm surplus from $3,700 to $111,370 in the current organic system, with farm expenditure decreasing from 99% of farm income to 68% (Table 10).

Table 11 The price paid for lambs sold from organic systems over the past 7 years

Season	kg CW
1999 / 2000	$ 6.00 + pelt
2000 / 01	$ 5.90 + pelt
2001 / 02	$ 5.75 + pelt
2002 / 03	$ 5.65 + pelt
2003 / 04	$ 5.00 + pelt
2004 / 05	$ 5.00 + pelt
2005 / 06	$ 4.90 including pelt

Marketing

Lamb

Organic premiums for lamb have been paid by the meat companies since the 1999/2000 season. These premiums have decreased but are still significantly higher than conventional prices. Our lambs are processed by PPCS. They also paid a 10% premium on transitional year 2 lambs, during the conversion period. Contract price is for the full season and the recent history of prices paid for organic lamb are in Table 11. The average price for the 2005/06 season for a 15 kg YM carcass produced in a conventional system was $47.10 while the price for the same carcass from an organic system was $73.50.

Beef

The North Island export company, Outlands has been paying a premium for organic beef. This was only available in the North Island, but since 2006 they have included the South Island. This premium is variable depending on the time of year, so that they can supply 12 months of the year.

Wool

Avalon Farming has secured an organic premium for all its wool on a 3 year fixed contract. There are few if any contracts available for organic wool in New Zealand.

Farmers Markets

We are selling our Avalon Organic branded meat at the Otago Farmers Market every Saturday morning. Approximately 3 – 4000 people pass through the site at the northern end of the Dunedin Railway Station. Dunedin has the largest farmers market in New Zealand for food products.

This has been a great opportunity to meet the customer

and sell them your own meat products, something which 99% of farmers never experience.

A full range of lamb and beef cuts, vacuum packed and branded are sold to the public. We have also used the market to test new products, which we have created, such as gourmet sausages and organic ready-made meals.

Restaurants

We sell to a small group of top end restaurants in Otago and Southland, who are very happy with the quality and reliability of supply.

Summary

Organic farming has proven to be an achievable, credible and financially rewarding option at Avalon Farming.

Planning before and during the 2 year conversion period was crucial to a successful transition to organic farming. Changing from a chemical to organic fertiliser program improves the soil biology and has reduced the overall fertiliser requirements of the soil.

Soil fertility and pasture growth rates have been maintained, since starting organic farming 8 years ago.

Stock performance is not significantly lower in an organic system compared to conventional farming. Lambing percentages averaging 6% less and lamb carcass weights 1 kg below conventional levels are being achieved. Conventional stock has been farmed under a low input system, which may have limited their potential performance.

The use of worm resistant genetics has allowed the same stocking rate of 11/hectare to be maintained at a sheep to cattle ratio of 90:10. The selling of store lambs into the conventional store market does reduce the overall profitability of organic livestock farming.

Financially, organic farming is out performing the conventional farm. Premiums for lamb, beef and wool from a comparable performance base, have increased income by 16% over conventional returns. Costs are also reduced by 18%.

Based on the year 2005/06, an estimated economic farm surplus of $111 000 would be achieved ($21/su or $236/hectare), which is well ahead of the conventional area (estimated economic farm surplus $3700, $0.70/su, $8/hectare).