Gross margin analyses of crop rotation data sets from the Swellendam site for 2007 to 2011



Report by: JA Strauss and W Langenhoven, Institute of Plant Production, Western Cape Department of Agriculture (June 2012)

Contents

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Introduction

This report summarises income and expenditure data, and provides a basic economic analysis to the Gross Margin level, for each crop sequence being tested in the crop rotation trial located on the farm Middeldrif in the Napky region south of Swellendam, for the period 2007 to 2011.

The aim of the research at this site is to determine the effects of selected **long-rotation** crop/pasture production systems on crop yields and the economy of pasture/crop rotation systems in the Southern Cape. It must be noted that, due to practical constraints, the trial design allowed for the comparison of six crop-sequence treatments (each replicated 3 times) following five years of lucerne pasture. **In this design the effect of season on individual crop responses within the different crop sequences is lost. The effect of fluctuating prices of agricultural commodities is also not accounted for in the design.** However, the design allows for economic comparison of rotation "systems" within the same sequences of seasons - long-term result; and, in the short-term (annually), comparison among systems of the effects of that stage of the system on economic returns, weed dynamics, soil-borne disease complexes, nitrogen mineralization rates, soil organic carbon dynamics etc. In this way the results obtained are of great and of immediate value to the farming community, despite not being in a position to determine the effects of season and commodity prices on crop response variables.

This 2[nd] phase of the trial started in 2007. The six crop sequences being tested are shown in Table 1. Crop management is based on conservation farming practices.

Table 1 Crop sequences tested (following lucerne) at the Swellendam site. W = wheat, B = barley, Tr = Triticale, C = canola, L = lupin. The sequences represent crops in year 1 (2007) to year 5 (2011)

Region	System	Crop sequence
Swellendam(J Badenhorst)	1	W-B-C-W-B
	2	W-W-B-C-W
	3	W-B-L-W-C
	4	W-C-W-B-Tr
	5	W-B-B-C-W
	6 (SSK)	W-B-C-W-W (SSK)

Experimental Procedure: a summary

Each crop was managed according to the research protocols that were presented in the original project proposal and in the annual funding application documentation. Details of annual management inputs for each crop and crop sequence are presented in the annual reports. A summary of procedures and results relevant to the economic analyses of trial data is presented below.

Plot size

Each treatment plot is 0.5ha in extent. This plot size allows for the use of standard farm implements and machinery. In case of this (Swellendam) trial site, the no-planter being used was constructed by the engineers at Elsenburg with spring tines and press wheels for the first 3 years of the trial, while the AUSPLOW planter (used at Tygerhoek research site) was used in the last two years. The use of the spring tines had implications regarding the seeding action of the planter when planting in relatively dry, hard soils – a situation that occurs regularly in the dry

Napky environment. Normal farm implements and machinery are used for all other management inputs.

Soils

The soils at the site were tested and macro- and trace elements were corrected to above-threshold levels at the start (January/February 2007) of this the 2nd 5-year phase of the trial, to ensure that soil fertility would not limit crop production. Soil compaction layers were removed during land preparation at each trial site. The soils are typical of the area and are shallow, with a high stone fraction, and consolidated and unconsolidated rock layers at 20 to 30cm below the soil surface. The soils have a low water holding capacity that, together with the low and poorly distributed rainfall of the region, result in crops often experiencing moisture stress through the season.

Crop management

Protocols for the management of each crop are developed to ensure consistent application of the best available information on the production requirements of each crop over time. It must be stressed however that these protocols are updated, annually if necessary, as new technology becomes available regarding management requirements of each crop. For five of the crop sequence treatments a no-till, conservation farming approach has been adopted within the management system, implying that the soils are disturbed only during the planting action. Whilst the crop residues are retained following harvesting, they are grazed during the summer months.

An additional crop sequence treatment was included at the site (the so-called SSK treatment) to determine if a soil preparation action applied during late summer (as is the general practice for the district) would positively or negatively influence crop production and, ultimately the gross margins, of such a system when compared to the standard no-till treatments applied to all other plots at the site.

Crops are planted, protected against weeds, diseases and insect pests, and harvested using standard farm implements. Weed, insect and disease control measures are implemented by field staff in collaboration with the specialist associated with that crop.

The appropriate cultivar for each crop is used each year and managed according to the management protocols referred to above.

The crops are harvested using a combine harvester. The total yield of each treatment plot was bagged and weighed. Grain quality was determined at the SSK silo from composite samples that were taken from the yield of each treatment plot.

Detailed records of all real-time costs and income are maintained for each treatment plot.

Summary of management inputs 2007 to 2011

<u>Land preparation</u>

Before the planting season commenced the whole area of the Swellendam site was scarified to a depth of 150mm with a Trash field-span on two occasions (Sept/Oct 2006 and March 2007). The scarifying was done to loosen the soil and to assist with the removal of the old lucerne plants where herbicide application was planned for early 2007 prior to the planting season. Note however that this management action was not successful and many of the lucerne plants were not removed. The presence of lucerne plants during the cropping phase had a negative influence of subsequent crop production.

Lime and P were differentially applied as indicated from a detailed grid sampling of the site in January 2007

<u>Crop management</u>

2007 (refer to Appendix 1 for greater detail):

The whole site was sprayed with a broad-spectrum herbicide (Glyphosate) just prior to planting.

Wheat was the only crop planted. The converted no-till planter with spring tines (250mm row width) was used.

Granular fertilizer (N & P) was placed with the seed as part of the planting action.

Post emergence crop protection measures were necessary with applications of herbicides (broad-leaf), insecticides (aphid control) and fungicides during the season.

No nitrogen topdressings were applied.

The wheat was harvested directly by a contractor.

2008 (refer to Appendix 2 for greater detail):

The whole site was sprayed with a broad-spectrum herbicide (Glyphosate) just prior to planting. The main management activities (inputs) are presented in Appendix 2.

The crops (wheat, barley and canola) were planted using the converted no-till planter with spring tines (250mm row width).

Granular fertilizer (N & P) was applied as part of the planting action.

Post emergence crop protection measures were necessary with applications of herbicides (broad-leaf), insecticides (aphid control) and fungicides to the wheat and barley crops during the season (Appendix 2). A severe *Emex australis* (dubbeltjie) infestation in the canola plots and crop failure, the canola plots were killed off using Glyphosate and MCPA.

The extreme dry conditions that prevailed at the site in 2008 (and led to the failure of the canola) had a severe negative impact on wheat and barley production. The wheat and barley were harvested directly, again using a contractor as was the case in 2007.

2009 (refer to Appendix 3 for greater detail):

The whole site was sprayed during the summer and again just before planting with Glyphosate to combat broad-leaf and grass weeds. The main management activities (inputs) are presented in Appendix 3.

The crops (wheat, barley, lupin and canola) were planted using the converted no-till planter with spring tines (250mm row width).

Granular fertilizer (N & P) was applied as part of the planting action.

Post emergence crop protection measures were necessary with strategic applications of herbicides, insecticides and fungicides being applied during the season (Appendix 3).

All crops were swathed and later harvested with a pickup, using machinery and implements available on the farm, during October and November.

2010 (refer to Appendix 4 for greater detail):

The whole site was sprayed during the summer months to combat broad-leaf and grass weeds.

All crops (wheat, canola, barley) were planted with the hydraulic tine AUSPLOW planter at 300mm row spacing.

Granular fertilser (N & P & trace elements) were applied as part of the planting action.

Post emergence crop protection measures were applied during the season and included herbicide, pesticide and fungicide applications.

None of the crops were harvested due to poor rainfall and no yields were recorded during the 2010 season.

2011 (refer to Appendix 5 for greater detail):

Summer broad-leaf and grass weeds were killed with 2 glyphosate applications.

The hydraulic tine AUSPLOW planter (300mm row-spacing) was again used to plant all crops (wheat, barley, canola and triticale at the trial site.

Nitrogen, phosphorous and trace elements were applied during the planting action, while topdressing with LAN was given to canola and wheat plots during the season.

Post emergence crop protection measures were applied strategically during the season.

All crops were swathed and later harvested with a pickup, using machinery and implements available on the farm, during October and November.

Economic analysis: approach

Gross margin analysis of costs and income associated with each treatment plot of each research site was based on the following:

Gross income: Yield per ha x product price at the date when delivered to the silo (during harvest). Quality was taken into account.
Price per ton after silo and marketing costs

Directly allocatable variable costs

Actual price of products and services (e.g. contractors) at the date the product or service was supplied **for that research site** –these prices may vary from site to site depending on date supplied, supplier, amounts purchased etc.

In-directly allocatable variable costs

Fuel price = average (coastal) price per litre (diesel) for the period April to October as supplied by the AA for a specific year.

Fuel-use is based on calculations presented in the "Guide to Machinery Costs" for a specific year for the **actual machinery and implements used at each site.** The Guide calculates fuel use as: 0.14, 0.158 and 0.18 litres per kWhr for low, medium and high power out-put respectively.

Repairs and maintenance costs were also based on the replacement costs of machinery and implements provided in the Guide to Machinery Costs for a specific year for the **actual machinery and implements used at each site**

Refer to Appendix 6 for detail on "prices and costs" of replacement value of all machinery and implements, as well as the costs of all inputs used in each year.

Note that costs such as fuel and maintenance costs of transporting machinery, seed for planting, water for spraying etc to the trial site, from the farm "opstal" were not allocated to any of the treatments. Only expenditure that could be directly allocated to each treatment plot was included in the analyses.

Gross margin analyses of the Swellendam site data for 2007 to 2009: a summary

Land preparation

The direct and indirect allocatable variable costs associated with land preparation (scarifying), and spreading of lime and phosphorous for the research site in late 2006/early 2007, are presented in Table 2.

Table 2 Costs associated with land preparation for the Swellendam site including the cost of lime (late 2006/early 2007).

Site	Direct allocatable variable costs (R/ha)	In-direct allocatable variable costs (R/ha)	Total allocatable variable costs (R/ha)
Swellendam	869	80	949

Gross margin analysis for each crop produced in 2007, 2008 and 2009

It must be noted that the soils of the Swellendam research site are shallow, with a high stone fraction, and consolidated and unconsolidated rock layers at 20 to 30cm below the soil surface. The soils have a low water holding capacity that, together with the low and poorly distributed rainfall of the region, result in crops often experiencing moisture stress through the season. The site therefore has a below-average yield potential relative to the Swellendam production region and all crop production management inputs should be viewed in this context.

While direct and indirect allocatable variable costs per ha such as fuel usage and maintenance and repair costs of machinery and implements, may differ from farm to farm and region to region, the "prices and costs" used in the Gross Margin analyses of the different crop sequences allow for direct comparison between systems. The direct and indirect allocatable variable costs per ha used in these analyses are, however, considered to be very similar to those costs and prices experienced on farm (**but apply only to the activities directly attributable to that ha**).

Summary data showing the average direct and indirect allocatable variable costs, average Gross Income and Gross Margin per crop for each crop sequence in each of the five years, are presented in Table 3a and 3b.

Table 3a Swellendam research site average direct and in-direct variable costs, average gross income and average gross margin per crop - 2007 to 2009

	2007	2008	2008	2008	2008	2009	2009	2009	2009	2009	2009
	Wheat after lucerne	Barley after wheat	Wheat after wheat	Canola after wheat	Barley after wheat SSK	Canola after barley	Barley after wheat	Lupin after barley	Wheat after canola	Barley after barley	Canola after barley SSK
Fertlizer	233.82	382.40	415.86	415.86	382.40	637.22	353.43	352.22	352.22	353.43	637.22
Weed control	55.77	436.26	436.26	324.14	436.26	662.60	479.90	633.22	299.90	479.90	662.60
Pest Control	12.25	33.16	33.16	16.58	33.16	38.00	55.20	0.00	55.20	55.20	38.00
Fungicide	87.00	153.12	153.12	0.00	153.12	0.00	395.50	0.00	395.50	395.50	0.00
Fuel	58.98	96.03	96.03	96.03	145.64	147.28	138.86	130.45	134.66	138.86	179.21
Lime	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
seed	237.00	206.50	351.12	184.00	206.50	135.99	266.00	630.02	336.42	266.00	135.99
contractors	231.92	131.59	137.81	0.00	131.62	26.34	82.98	28.35	75.62	88.44	18.27
Rep and maint	52.34	65.59	65.59	66.52	89.77	141.82	133.15	122.99	128.07	133.15	168.47
Total variable costs	969.08	1504.65	1688.96	1103.13	1578.47	1789.25	1905.01	1897.25	1777.58	1910.47	1839.76
Yield (tons)	1.87	0.14	0.28	0.00	0.15	0.59	1.84	0.63	1.68	1.97	0.41
Quality	B4/UT	Feed	B4		Feed		Malt		B2/B3	Malt	
Price (Rands)	1700/2075	1545.00	1664.00	3500.00	1545.00	2900.00	2150.00	1955.00	1508/1638	2150.00	2900.00
Gross income	3533.40	215.27	473.69	0.00	227.12	1697.47	3964.60	1231.65	2643.16	4225.47	1177.40
Gross margin	2564.32	-1289.38	-1215.27	-1103.13	-1351.35	-91.79	2059.59	-665.60	865.59	2314.99	-662.36

Table 3b Swellendam research site average direct and in-direct variable costs, average gross income and average gross margin per crop - 2010 to 2011

	2010	2010	2010	2010	2011	2011	2011	2011	2011
	Wheat after canola	Wheat after lupin	Canola after barley	Barley after wheat	Wheat after canola	Wheat after wheat SSK	Barley after wheat	Canola after wheat	Triticale after barley
Fertlizer	446.62	446.62	446.62	392.59	692.40	692.40	400.00	759.53	692.40
Weed control	320.67	320.67	227.10	320.67	373.00	373.00	373.00	248.00	373.00
Pest Control	45.00	45.00	15.00	45.00	80.58	80.58	54.69	85.10	80.58
Fungicide	93.75	93.75	0.00	93.75	75.00	75.00	330.00	0.00	52.50
Fuel	83.69	68.94	59.40	68.94	209.38	246.00	209.38	209.38	209.38
Lime	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
seed	361.60	361.60	159.50	226.80	341.33	273.07	213.84	67.28	353.60
contractors	0.00	0.00	0.00	0.00	123.20	114.77	168.70	78.03	123.37
Rep and maint	78.88	68.50	55.69	68.50	149.91	170.06	150.79	149.91	149.91
Total variable costs	1430.21	1405.08	963.31	1216.25	2044.80	2024.87	1900.39	1597.22	2034.73
Yield (tons)	0.00	0.00	0.00	0.00	2.44	2.27	3.37	1.54	2.44
Quality					B2/B3	B3/B4	Malt		
Price (Rands)					2160/2045	2045/1930	2360.00	3700.00	2050.00
Gross income	0.00	0.00	0.00	0.00	5174.50	4558.00	7875.00	5710.00	5002.00
Gross margin	-1592.50	-1542.00	-1078.00	-1353.00	3130.00	2533.00	5974.00	4113.00	2967.00

<u>Direct and indirect allocatable variable costs</u>

The direct and indirect allocatable variable cost data given in Table 3 are shown in more detail in Figures 1 (a to i). Wheat was the only crop planted in 2007 (refer planned crop sequence treatments in Table1) and all therefore had the same input costs. Note that the additional soil preparation input planned for the SSK treatment (System 6 in Table 1) was not applied in 2007 as the soil had already been disturbed in early 2007 when converting the trial area from the lucerne to the cropping phase (Table 2). Fertilizer (Fig 1a), weed control (Fig 1b) and seed (Fig 1e) costs made the greatest contribution to total input costs per ha. Harvesting was undertaken by a contractor hence the relatively high costs for that activity in 2007, while no contactor costs were allocated to the 2010 season due to the failure of all crops in a season with only 74mm of rain.

The rise in fertiliser costs from 2008 onwards can also clearly be seen in figure 1a. The 2010 season recorded the highest fertiliser input costs and the reason for this was the excellent cropping season experienced in 2011, which required topdressings of LAN.

The lowest directly allocatable variable costs across all crops and years tended to be those used for insect (pest) control (Table 3 and Fig 1c).

Fuel cost increased dramatically in 2008 reflecting the approximate 70% increase in the diesel price when compared to 2007 and 2009. Fuel costs shown in Fig 1g are distorted for 2007 and 2008 relative to 2009 as the 2007 and 2008 costs are included in the contractor input costs.

The dramatic increases in total allocatable variable costs to the grain industry from 2007 to 2011 are clearly reflected in Figure 1i. This must, however, be considered in the context of the unusually high cost of combating weeds in 2008 and 2009, that can be attributed mainly to the failure of eradicating the lucerne in preparation for the cropping phase. The dry climatic conditions that prevailed when weed control had to be implemented also limited the efficacy of herbicides.

The relatively low input costs for canola in 2008 (Table 3 and Fig 1i) are due to crop failure resulting in late season input costs such as insect control, harvesting and transport of the harvest not being allocated to the crop.

<u>Gross income and gross margin</u>

There were small differences in gross income among treatments in 2007 (Figs 2 a to f) due to differences in the yield and quality of grain among plots – input costs did not differ among treatments (see above and Figure 1i). The gross margin recorded for barley production in 2011 was the highest achieved by any crop in any season (Table 3 & Fig 2).

Severe drought conditions resulted in crop failure in all treatments in 2008 and 2010 and hence the negative gross shown in Figure 2 for those years. Gross margin data shown for 2008 are based on estimated yields for wheat and barley, including the costs of harvesting and transport of the crop, and zero yields from the canola treatments. In the case of canola in 2008 therefore, the negative gross margin is equal to the total directly and indirectly allocatable costs incurred for that treatment. An additional analysis was done using an estimate of the grazing value of dry matter (forage) that was available on each treatment plot just before harvesting. This analysis therefore excluded harvesting and transport costs and included an income based on the value of the available dry matter (at R250 per ton). Negative gross margins were still recorded but not to the same levels at sown in Table 3.

In 2009 Barley showed the highest gross margin followed by wheat (Table 3 & Fig 2). The severe dry conditions at the start and during the growing season also resulted in negative gross margins for treatments where canola and lupins were produced (Table 3 and Fig 2).

Barley recorded the highest gross margin of all crops planted in 2011, followed by canola and wheat (Table 3 and Fig 2).

<u>Average annual costs, income and gross margin</u>

Average annual costs, income and gross margins per system over the five years under discussion are presented in Figures 3 a, b & c.

Average annual (total) allocatable variable costs over the five years were similar across all crop sequence treatments. The apparently "lower" average annual input cost for the WCWBTr crop sequence (Fig 3a) was due to crop failure of the canola resulting in late season input costs such as insect control, harvesting and transport of the harvest not being allocated to the crop.

Average annual gross income (Fig 3b) tended to be the lowest in crop the SSK crop sequence treatment where lupins were not included in the treatment and the soil of these plots were scarified before planting. This trend extended through to the average annual gross margins for each treatment (Fig 3c). While all the treatments show a positive average annual gross margin, most of these gross margins are lower than what would be required to cover the annual fixed costs/ha on the average farm in the district.

The land preparation costs must also be taken into consideration i.e. the R949/ha land preparation cost must be allocated to all treatments. This could be done by adding those costs to the costs for the first year of the cropping phase or spread over the five years of the cropping phase.

The average gross margin of the SSK system was 59% lower than system 1, 55% lower than system 2, 37% lower than system 3, 44% lower than system 4 and 56% lower than system 5 (Fig 3c). This was mainly due to slightly lower yields over the cropping phase, since the average total allocatable variable costs were very similar between all sequences.

Conclusions

The data discussed in this report derive from the second five year cropping phase following lucerne pasture the Swellendam crop rotation trial. It is clear that the direct and indirect allocatable variable cost data, together with crop management and yield data for each crop sequence being tested, will provide useful guidelines for producers regarding the management and economic implications of no-till grain production in the Napky farming district of the Swellendam region. It was clear from the data obtained over the five year cropping phase that the SSK system with its added scarifying action resulted in more moisture loss (in an already low rainfall area), which in turn resulted in lower yields and often poor quality. This in-turn resulted in lower gross margins when compared to the no-till systems tested.

Acknowledgements

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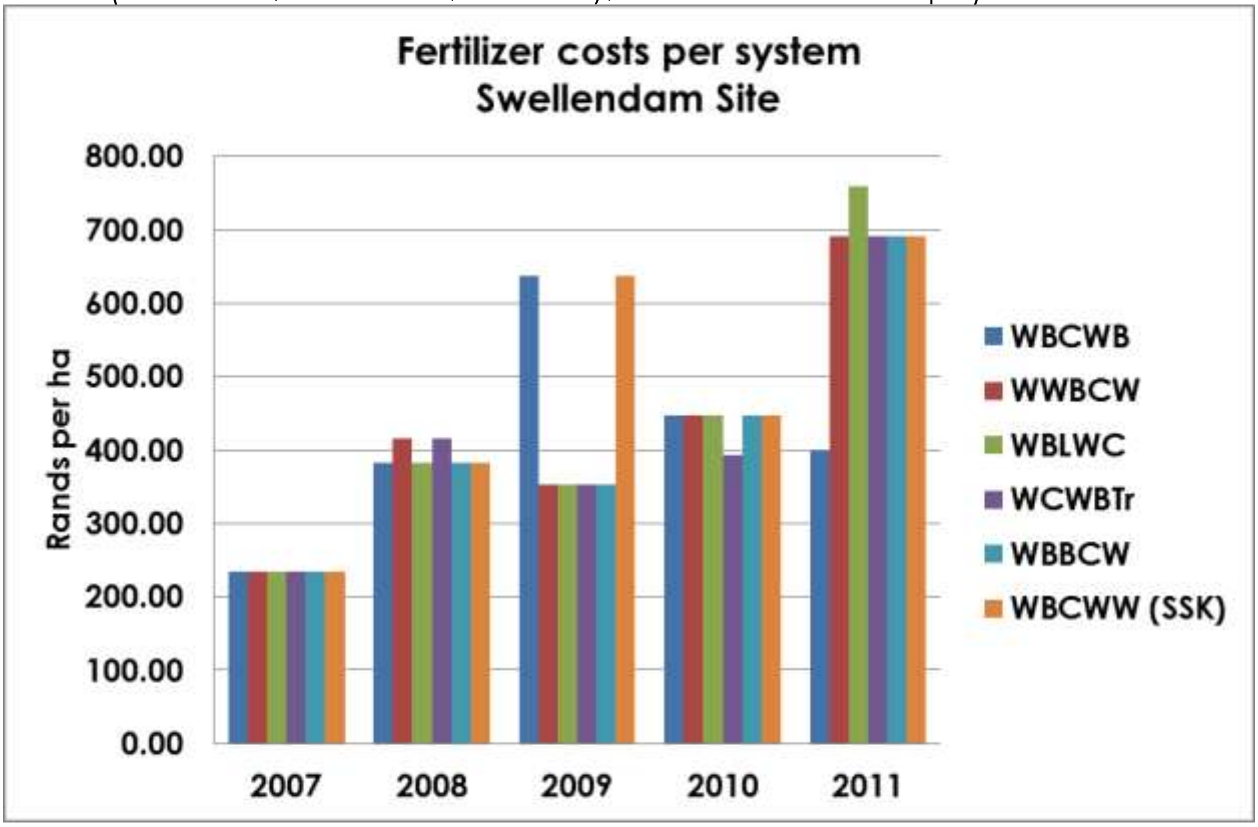
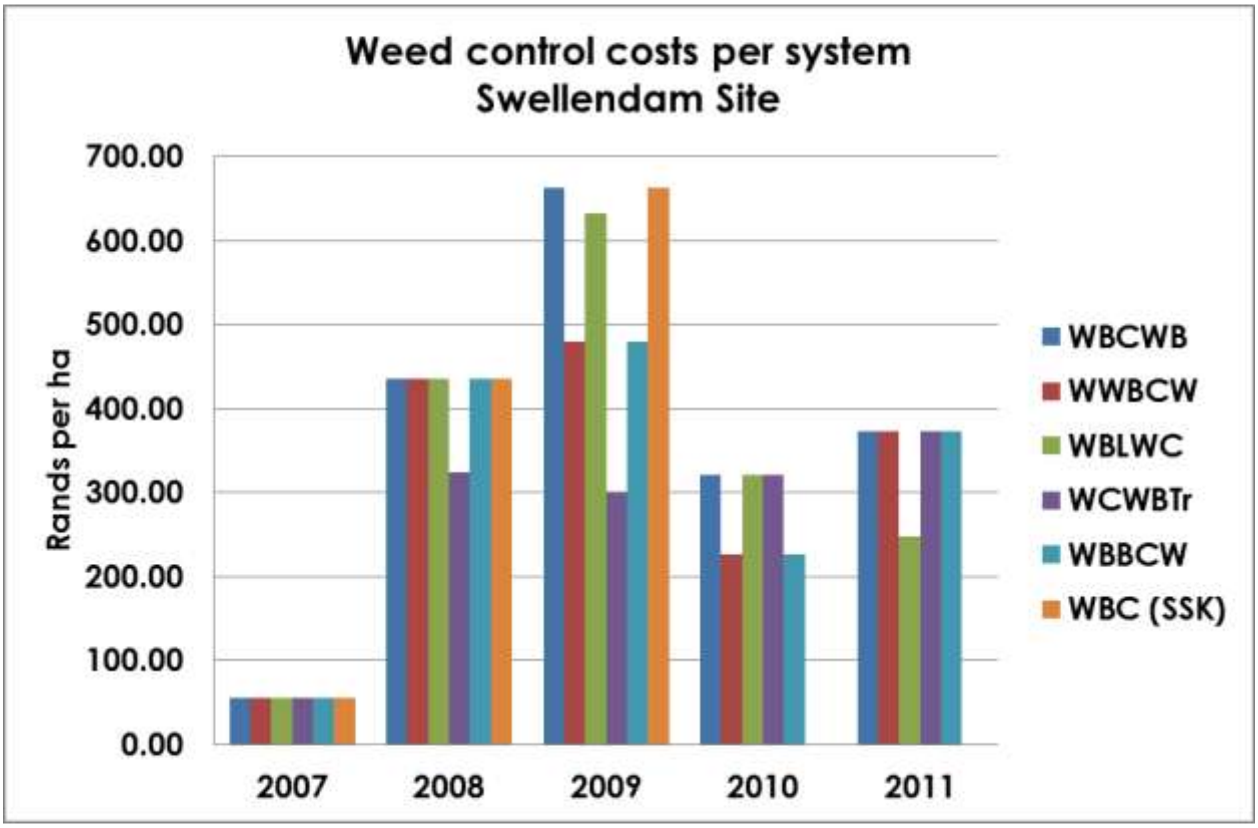
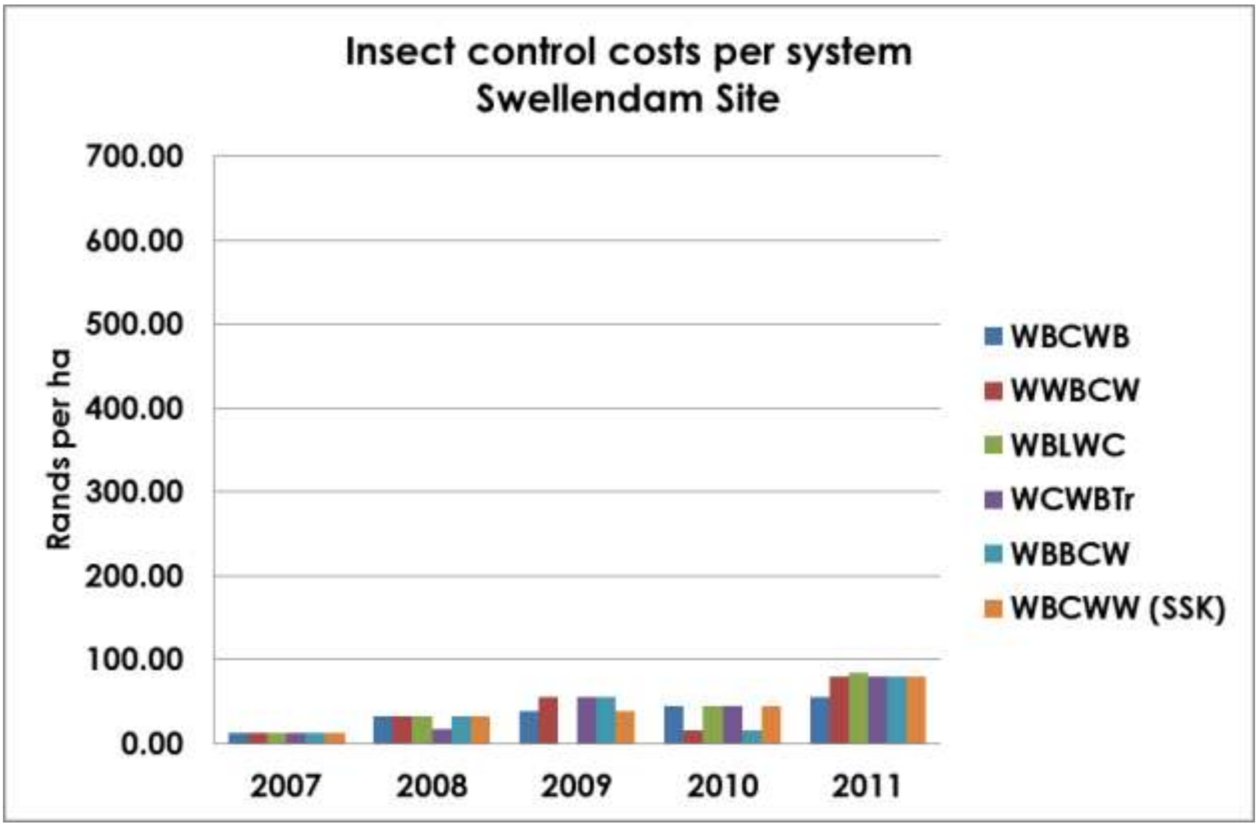
Figure 1 Direct and indirect allocatable variable costs per year for each crop in a system. The first column of letters in the ledgend are the crops planted in 2007; 2nd column = crops in 2008, the 3rd column = crops in 2009, the 4th column = 2010 and the 5th column = 2011 (W = wheat, C = canola, B = barley, Tr = triticale and L = lupin)



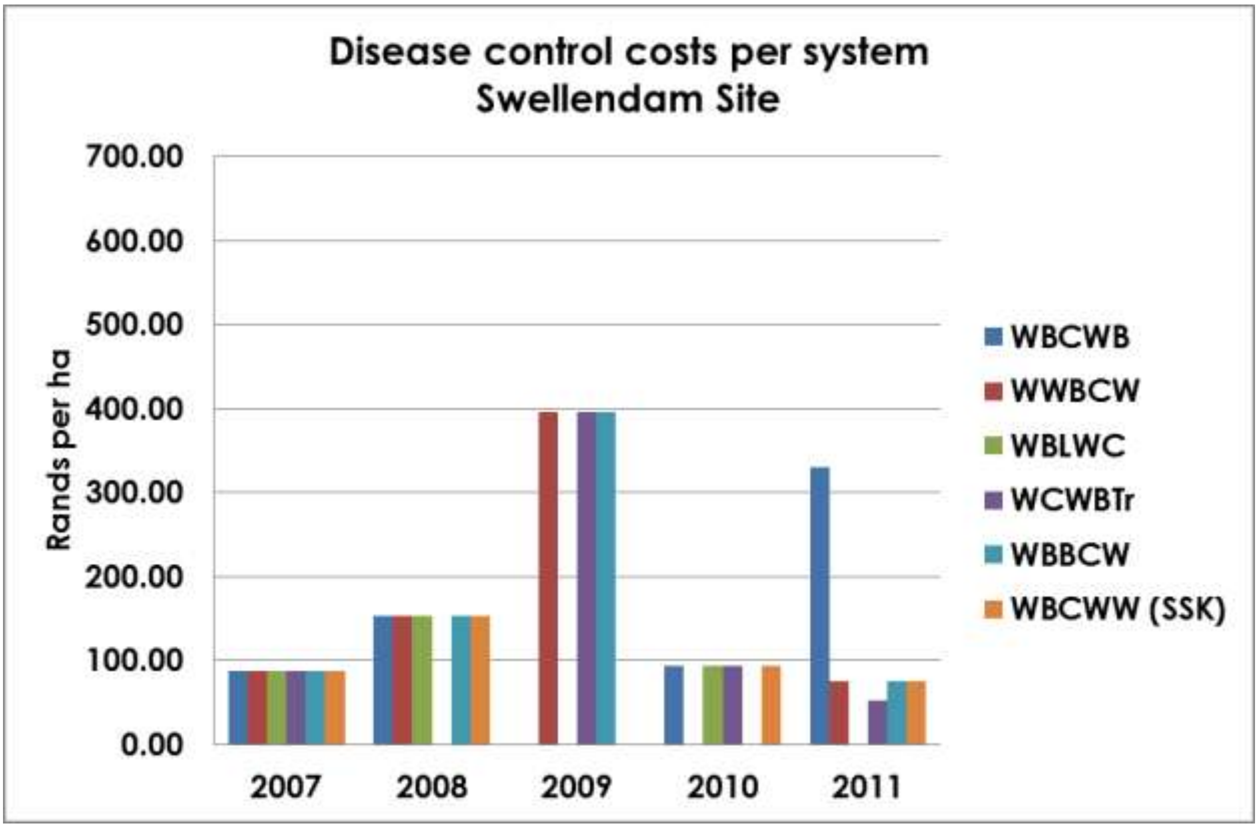
a



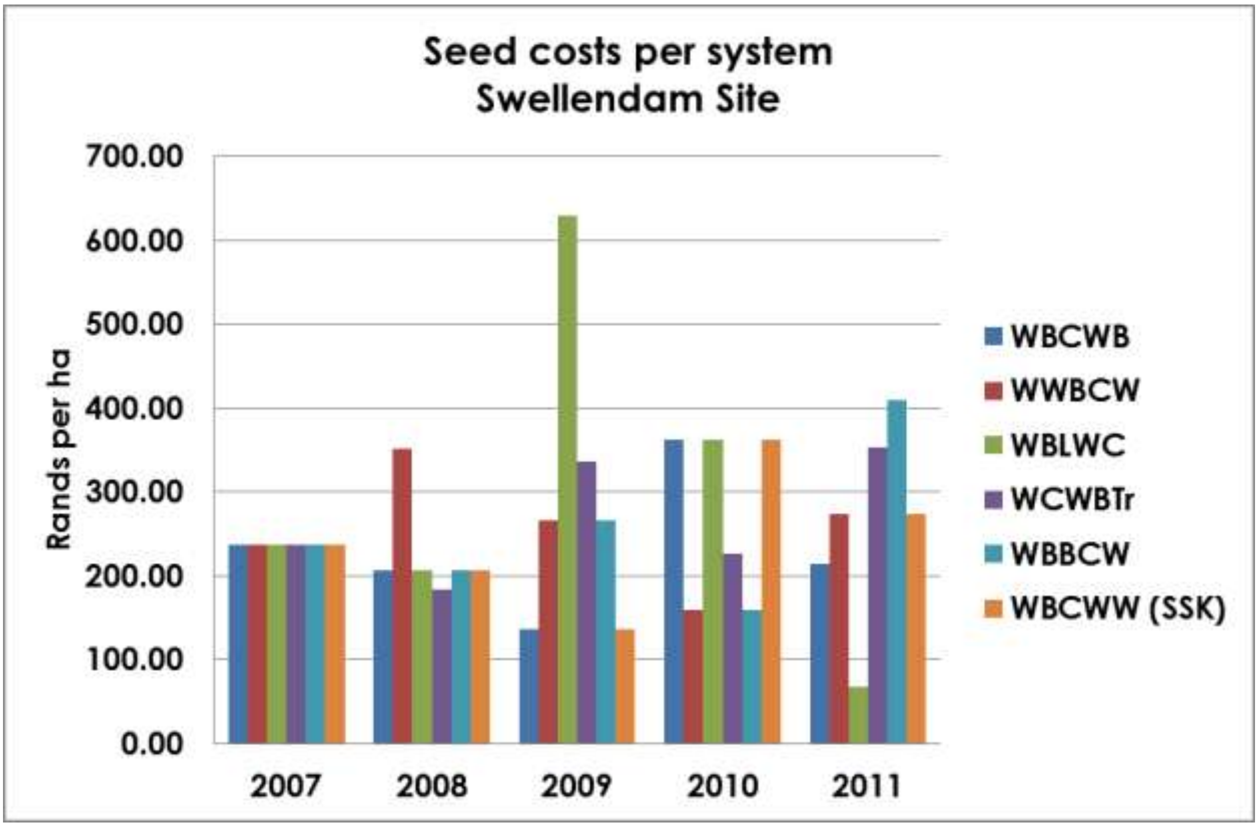
b


Insect control costs per system
Swellendam Site
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Rands per ha
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

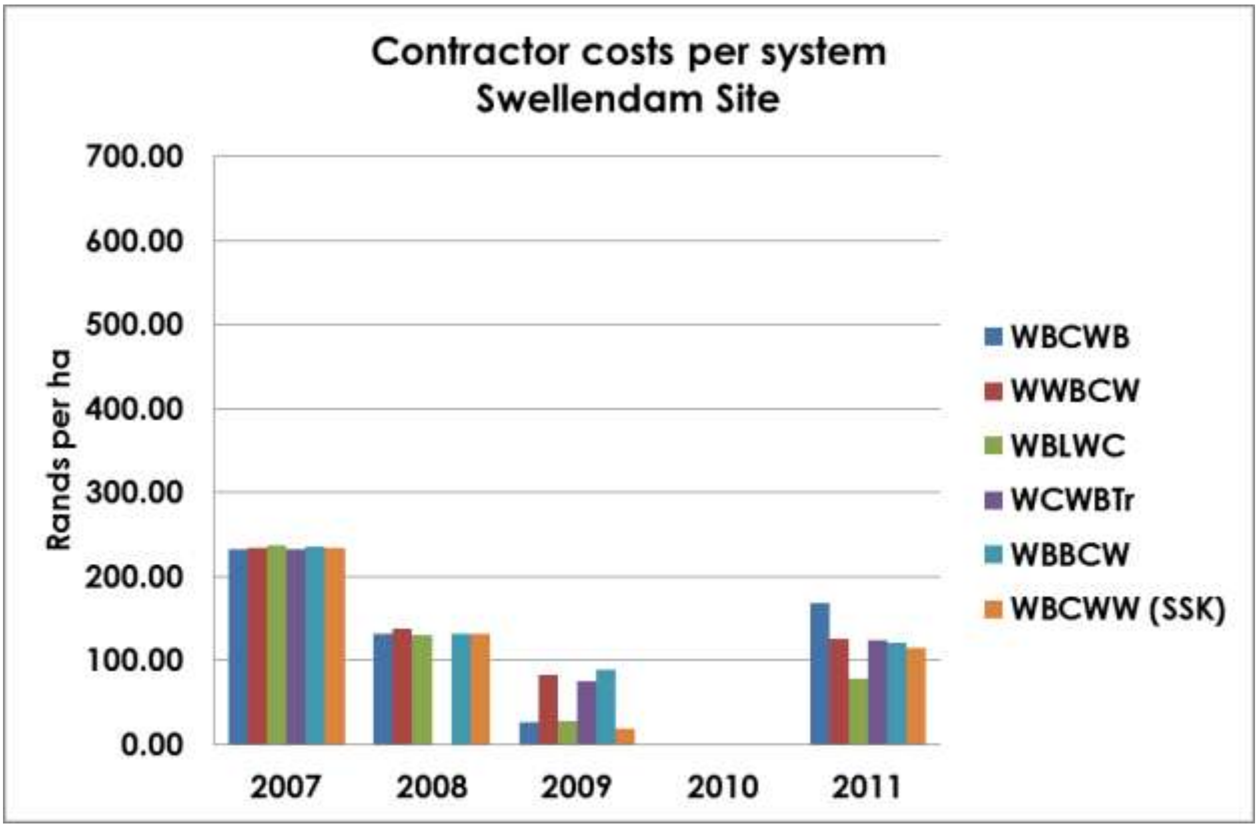
c


Disease control costs per system
Swellendam Site
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Rands per ha
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

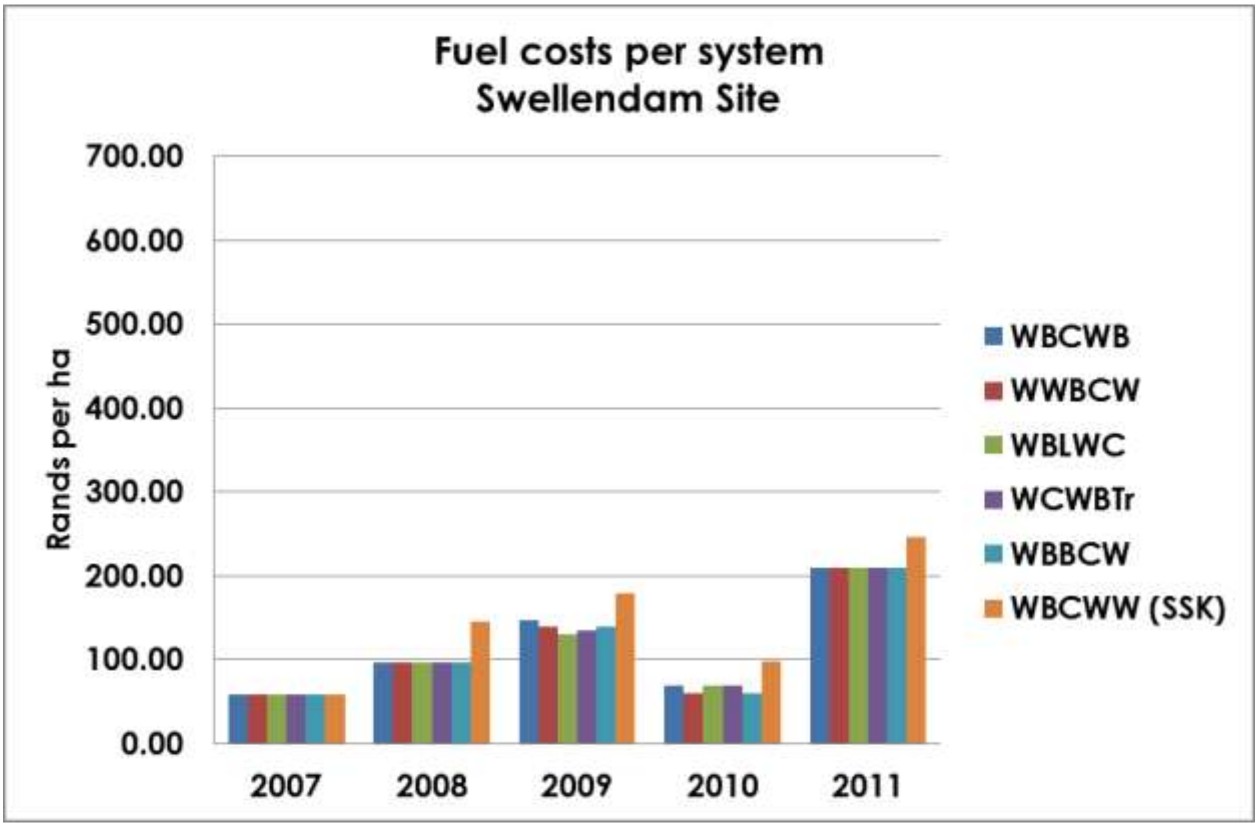
d


Seed costs per system
Swellendam Site
Rands per ha
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

e

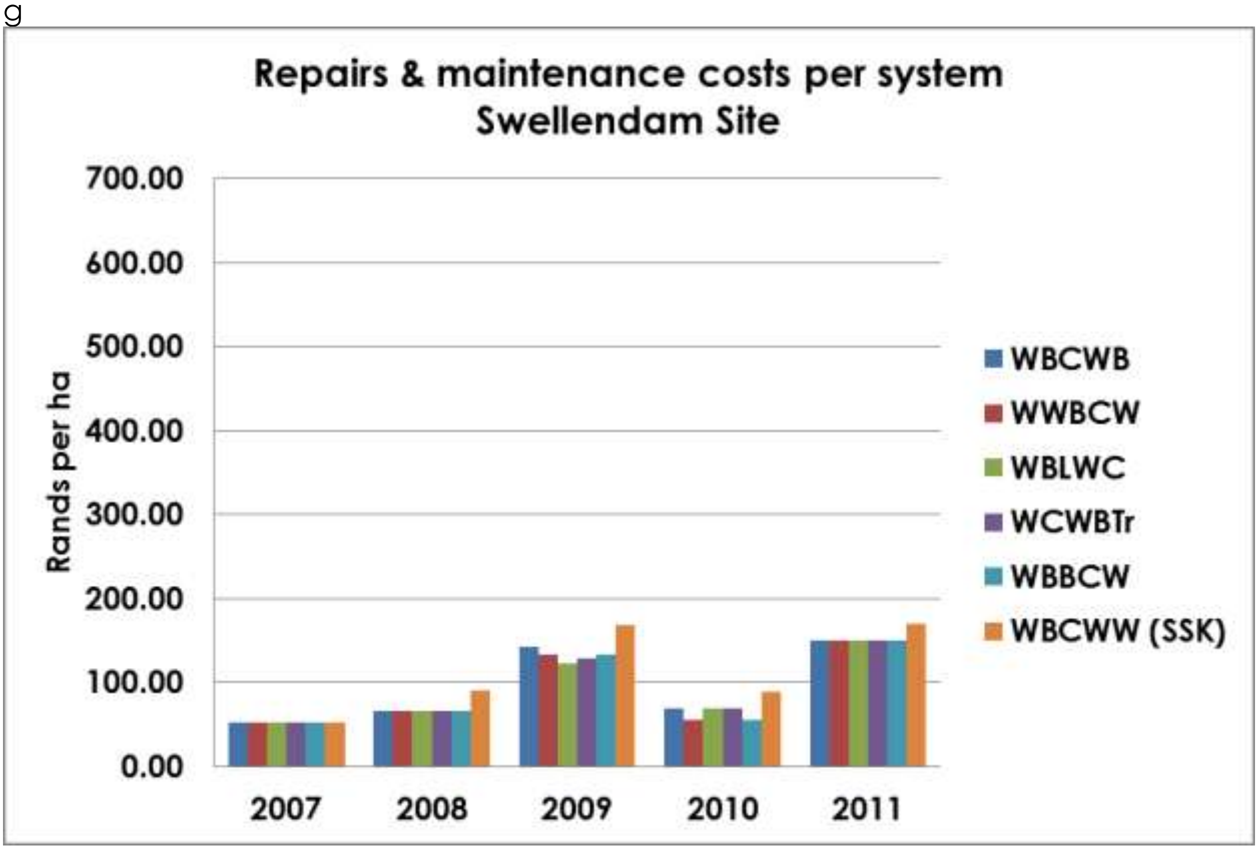

Contractor costs per system
Swellendam Site
Rands per ha
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

f



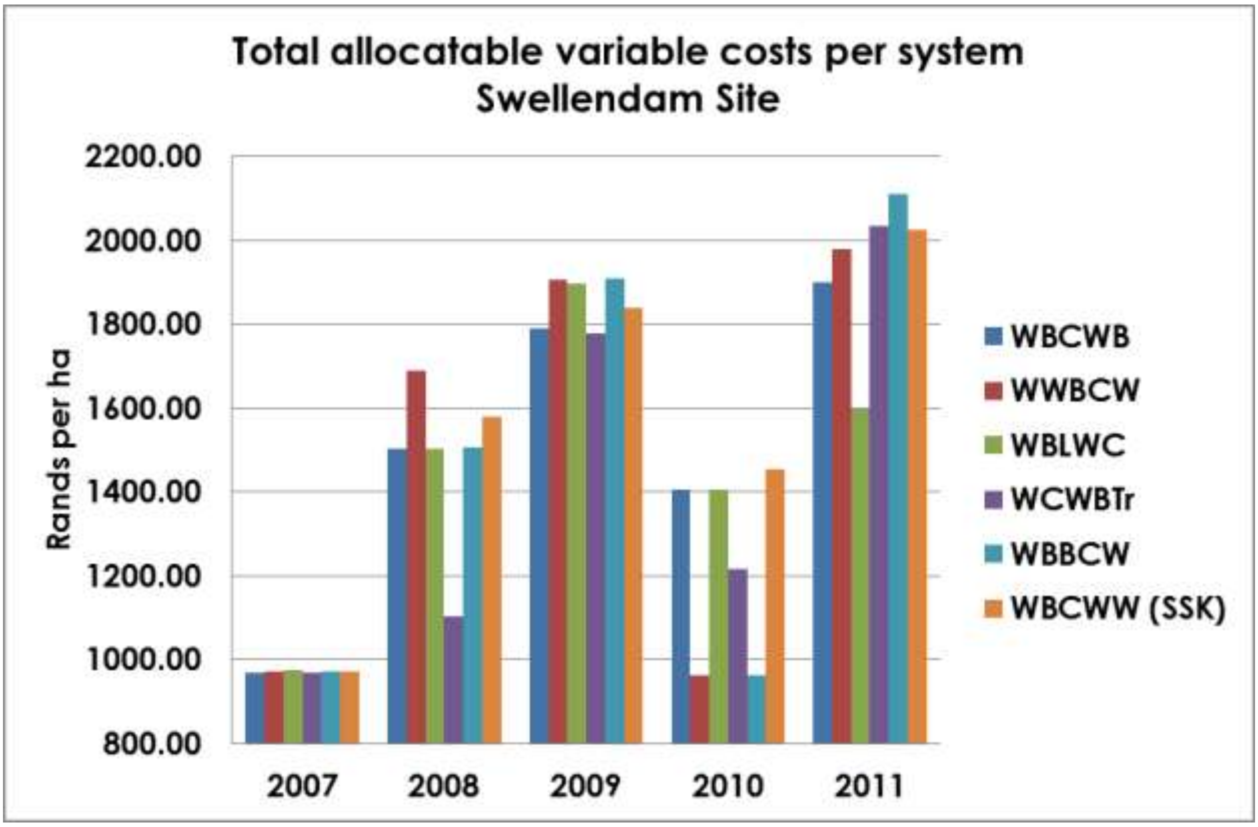
Fuel costs per system
Swellendam Site
Rands per ha
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

g



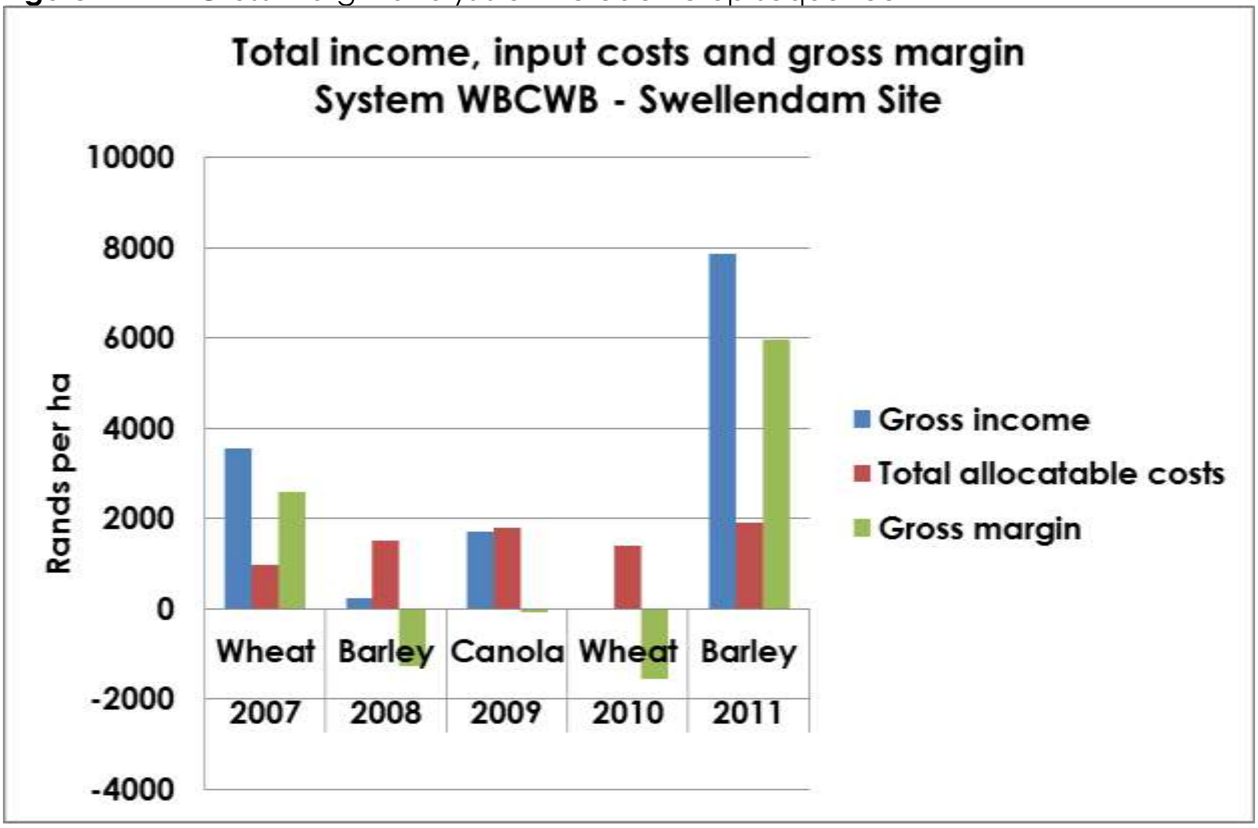
Repairs & maintenance costs per system
Swellendam Site
Rands per ha
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
2007
2008
2009
2010
2011
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW (SSK)

h

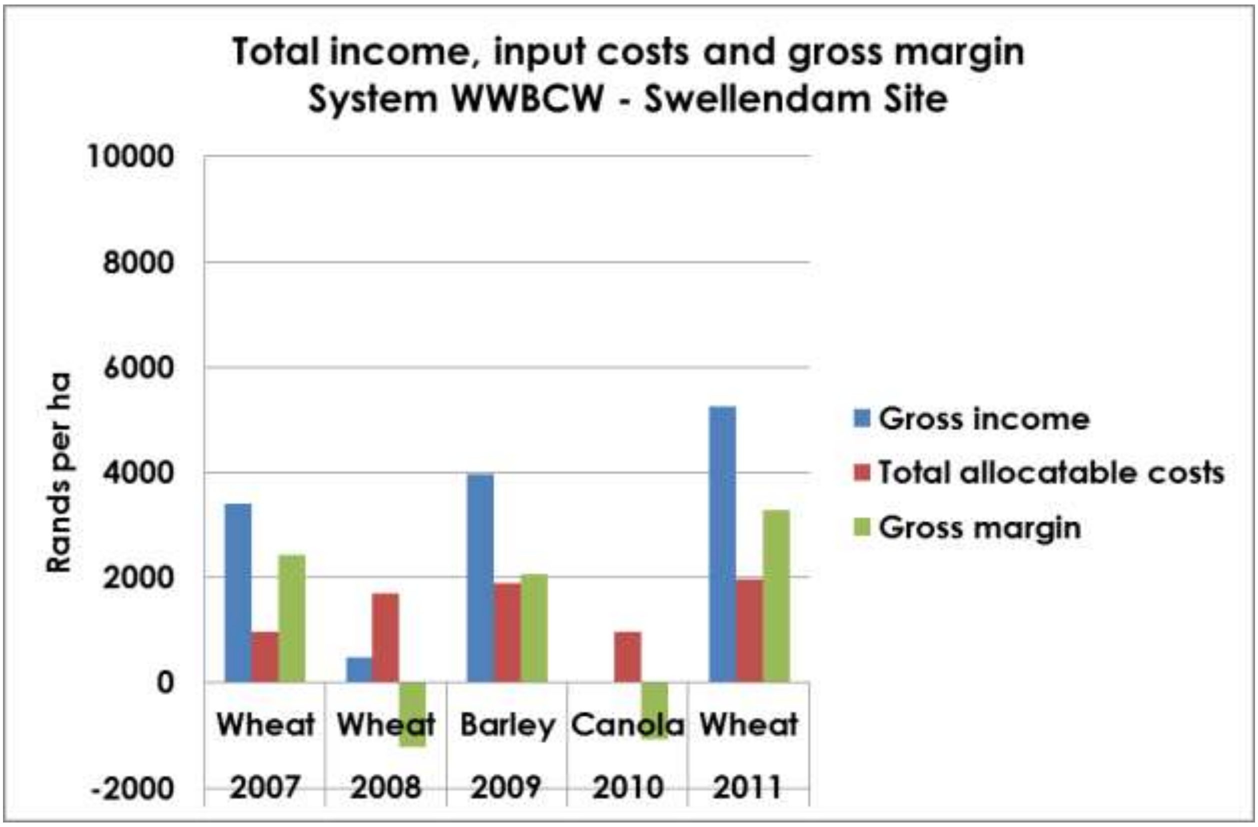


i

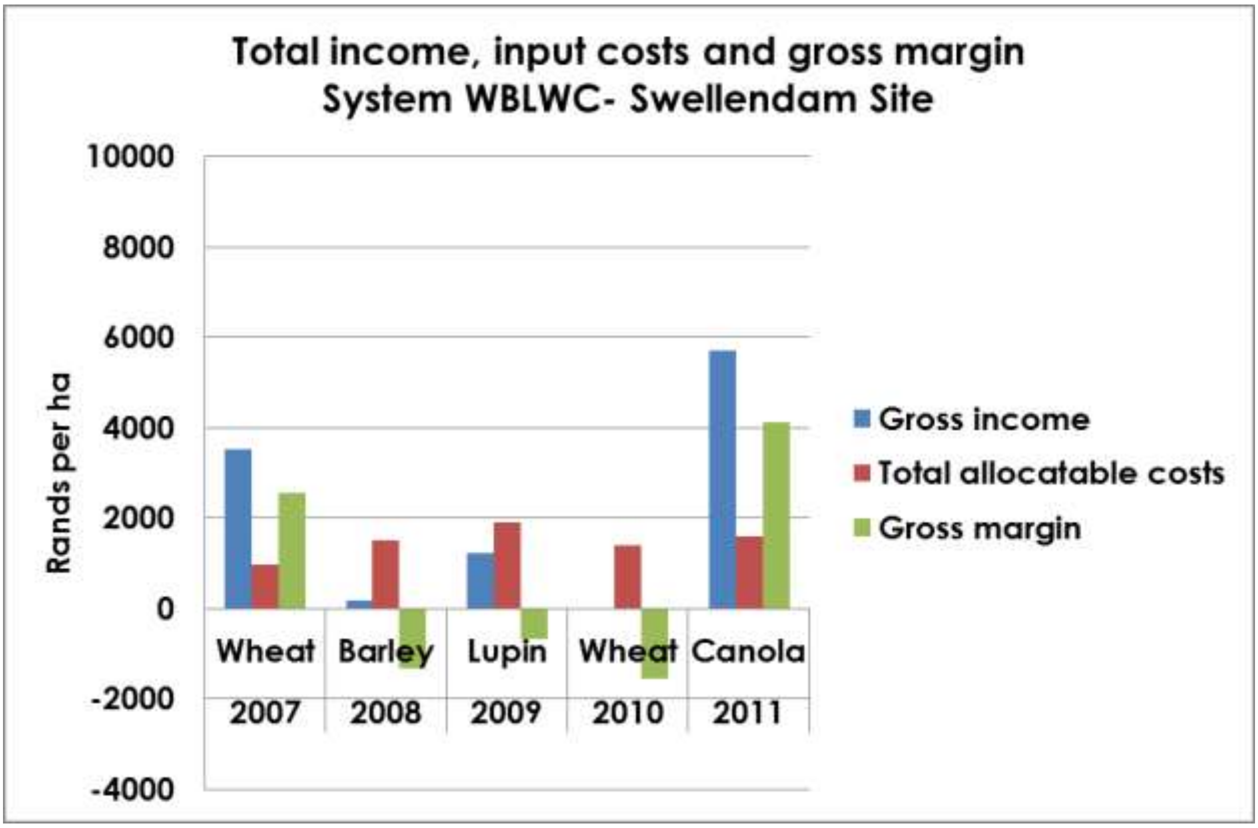
Figure 2 Gross margin analysis of the each crop sequence



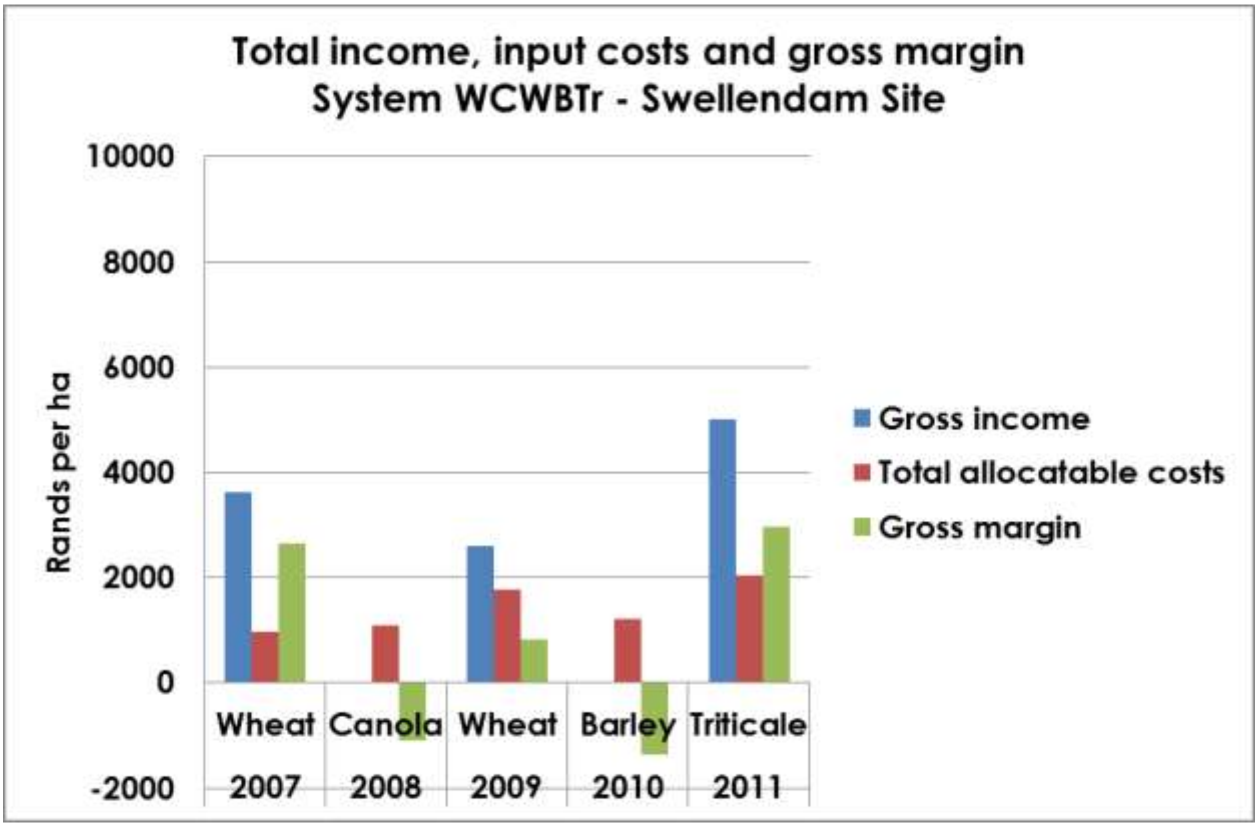
a


Total income, input costs and gross margin
System WWBCW - Swellendam Site
10000
8000
6000
4000
2000
0
-2000
Rands per ha
Wheat
Wheat
Barley
Canola
Wheat
2007
2008
2009
2010
2011
Gross income
Total allocatable costs
Gross margin

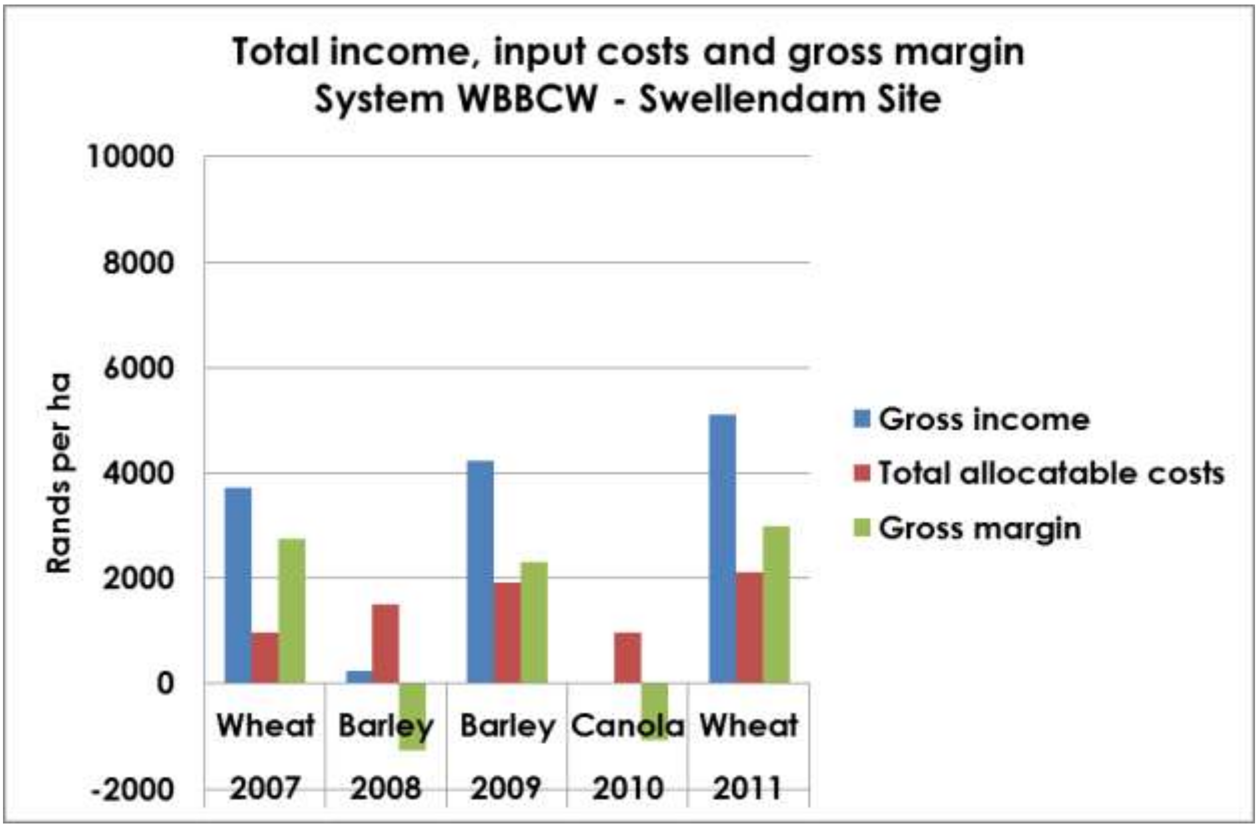
b


Total income, input costs and gross margin
System WBLWC- Swellendam Site
10000
8000
6000
4000
2000
0
-2000
-4000
Rands per ha
Wheat
Barley
Lupin
Wheat
Canola
2007
2008
2009
2010
2011
Gross income
Total allocatable costs
Gross margin

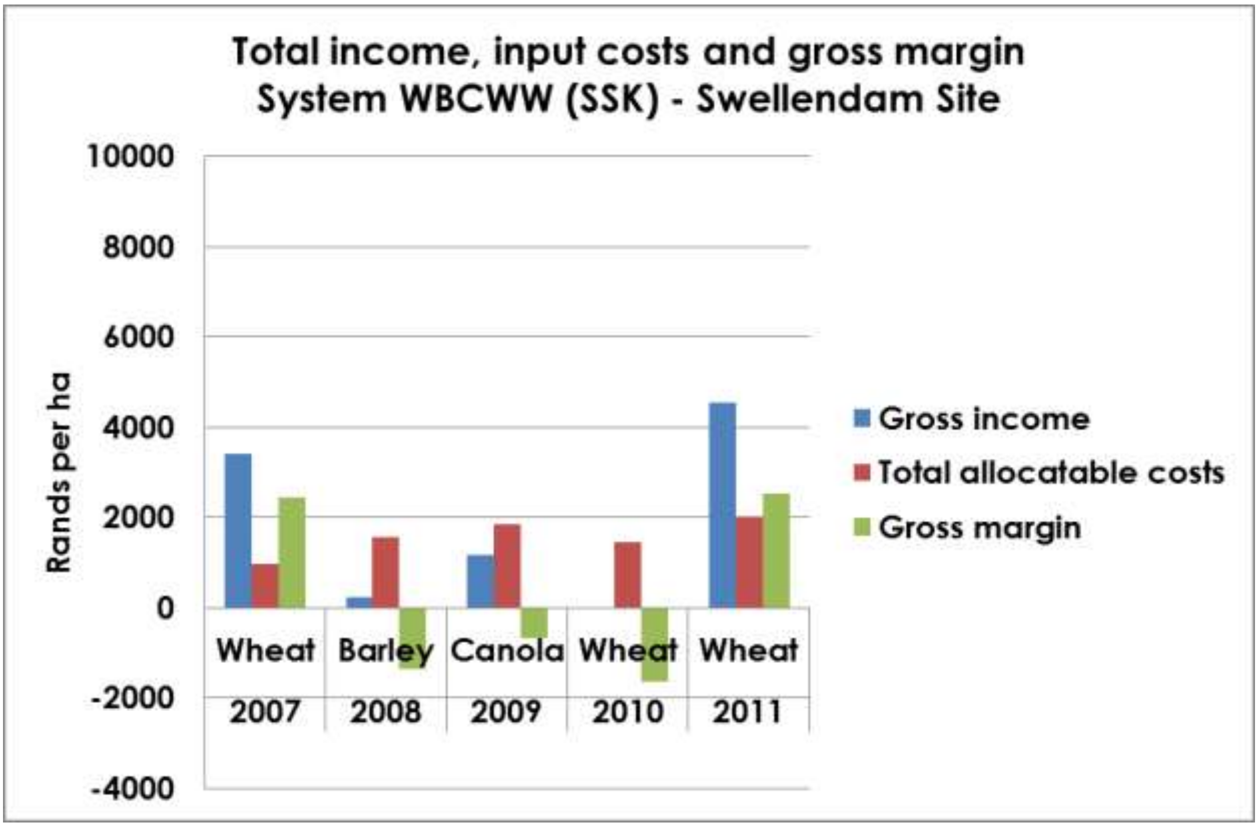
c


Total income, input costs and gross margin
System WCWBTr - Swellendam Site
Rands per ha
10000
8000
6000
4000
2000
0
-2000
Wheat
2007
Canola
2008
Wheat
2009
Barley
2010
Triticale
2011
Gross income
Total allocatable costs
Gross margin

d

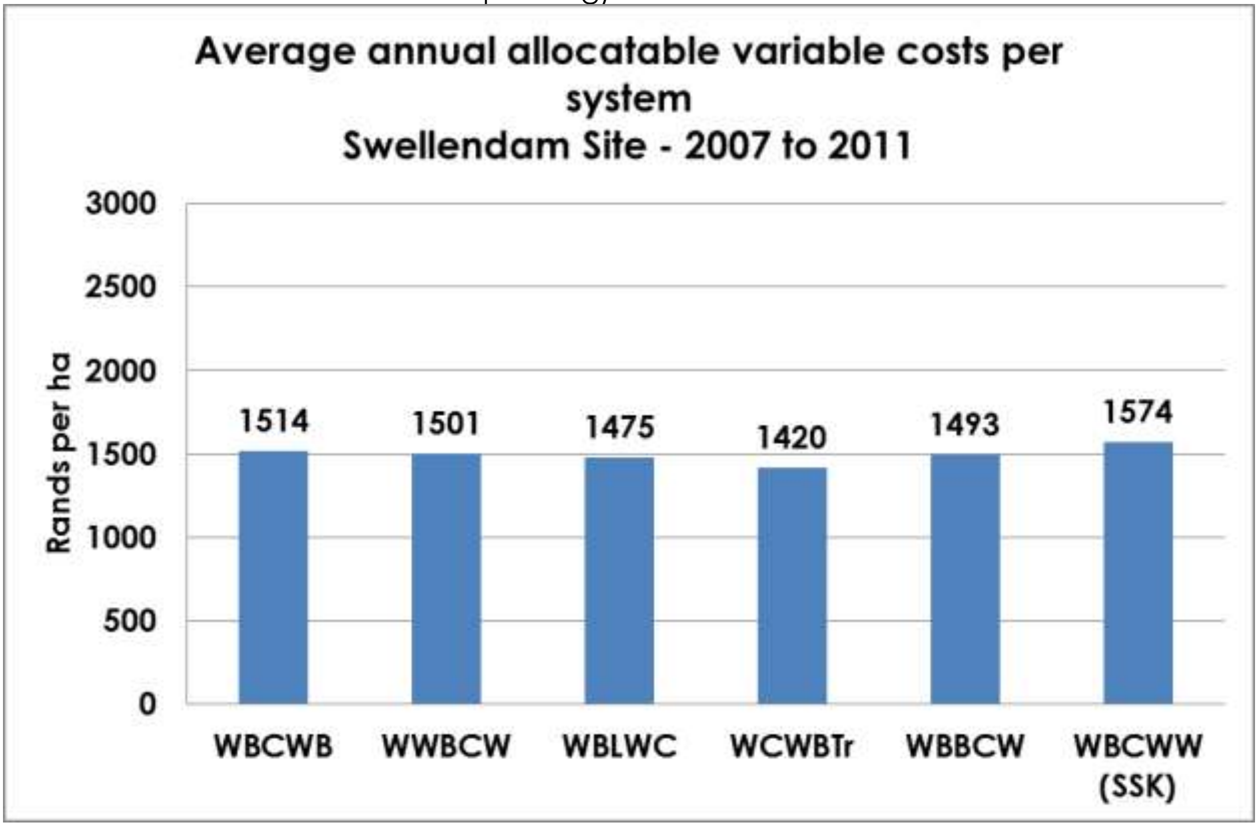

Total income, input costs and gross margin
System WBBCW - Swellendam Site
Rands per ha
10000
8000
6000
4000
2000
0
-2000
Wheat
2007
Barley
2008
Barley
2009
Canola
2010
Wheat
2011
Gross income
Total allocatable costs
Gross margin

e

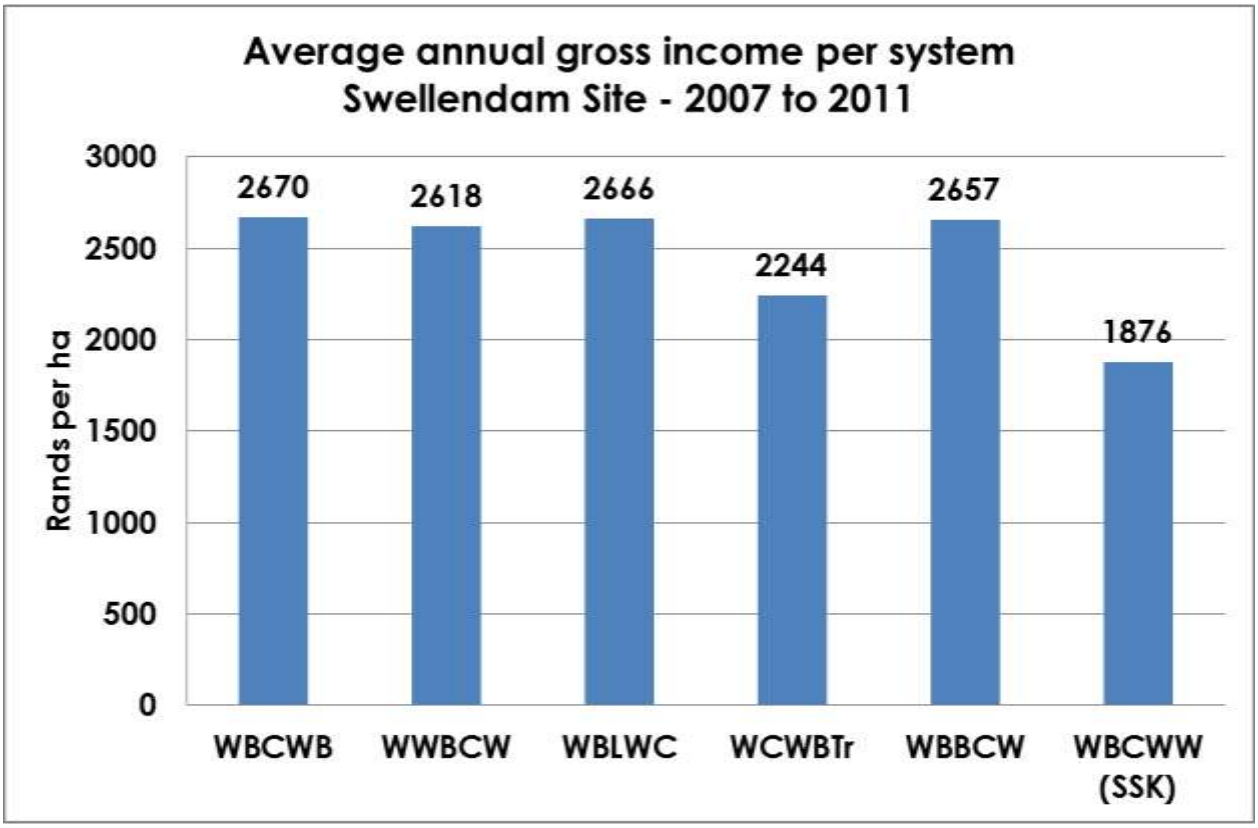

Total income, input costs and gross margin
System WBCWW (SSK) - Swellendam Site
10000
8000
6000
4000
2000
0
-2000
-4000
Rands per ha
Wheat
2007
Barley
2008
Canola
2009
Wheat
2010
Wheat
2011
Gross income
Total allocatable costs
Gross margin

f

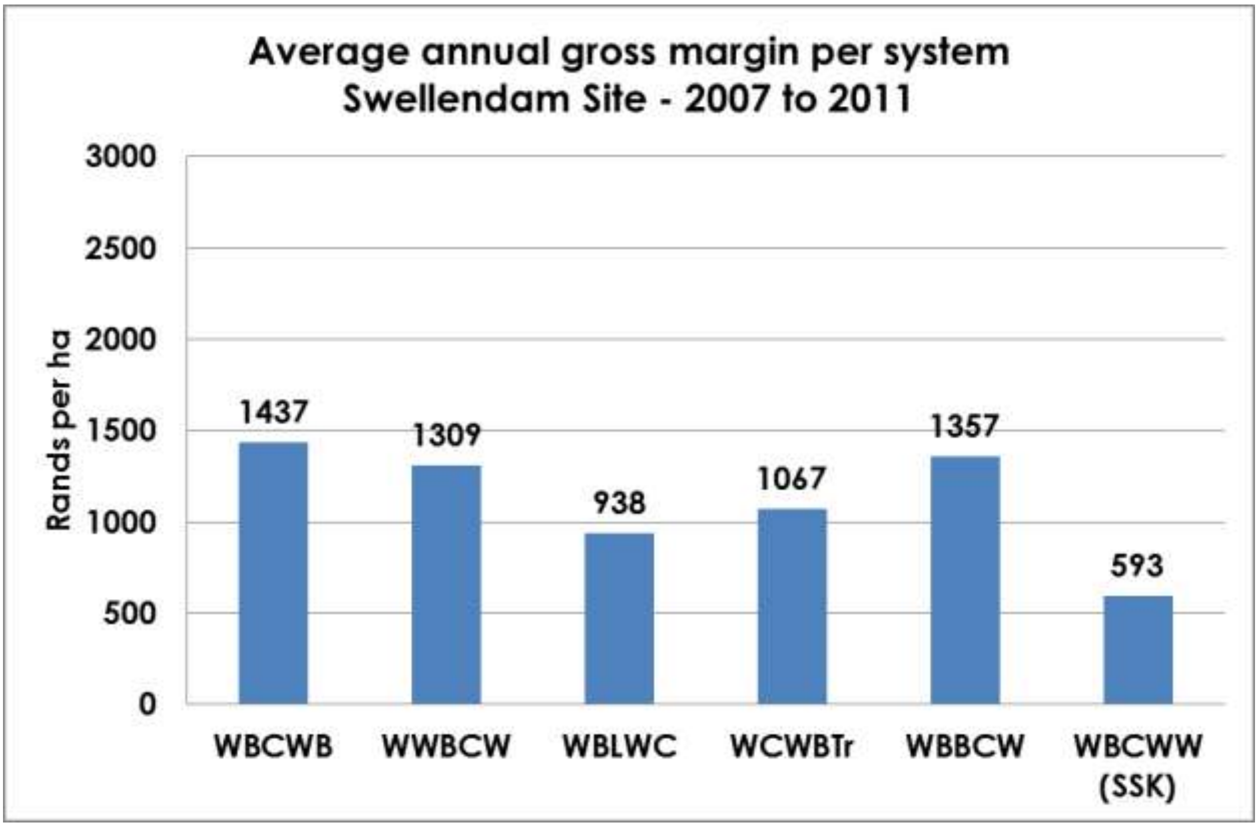
Figure 3 Average annual costs, income and gross margins per system from 2007 to 2009. a = average total allocatable costs; b = average gross income; c = average gross margin. Note that the x-axis shows the crop sequence for 2007 to 2009. (W = wheat, C = canola, B = barley and L = lupin; SSK refers to the treatment where soils are scarified before planting)



a



b


Average annual gross margin per system
Swellendam Site - 2007 to 2011
Rands per ha
3000
2500
2000
1500
1000
500
0
1437
1309
938
1067
1357
593
WBCWB
WWBCW
WBLWC
WCWBTr
WBBCW
WBCWW
(SSK)

C

Appendix 1. Management of crop planted at the Swellendam site during 2007

Crop	Cultivar	Planting date	Seeding rate (kg/ha)	Fertilisation rate at planting (kg/ha)	Top dressing (kg/ha) (application date)	Crop protection Product
Wheat	SST 015	08/05	75.0	19.4 N + 7.2P + S – all plots	Nil	Glyphosate MCPA Glean Brushoff Fetron Fetron Duett

Appendix 2. Management of crops planted at the Swellendam site during 2008

Crop	Cultivar	Planting date	Seeding rate (kg/ha)	Fertilisation rate at planting (kg/ha)	Top dressing (kg/ha)	Crop protection Product
Wheat	SST 015	13/05	77	26N + 7.5P + trace elements	Nil	Glyphosate Buctril Trigras Fetron Fetron Opus
Barley	SSG 564	24/04	59	21N + 9P + trace elements	Nil	Glyphosate Buctril Trigras Fetron Fetron Opus
Canola	Jade	25/04	5.0	24N + 7P + trace elements		Glyphosate Gallant Fetron Gyphosate MCPA

Appendix 3. Management of crops planted at the Swellendam site during 2009

Crop	Cultivar	Planting date	Seeding rate (kg/ha)	Fertilisation rate at planting (kg/ha)	Top dressing (kg/ha)	Crop protection Product
Wheat	SST 027	01/05	63	20N + 7.4P + trace elements	Nil	Mamba 2.4D Roundup 480 Glean Ally Dimet Dimet Dimet Aratia Tilt
Barley	SSG 564	01/05	50	17.5N + 7.4P + trace elements	Nil	Mamba 480 2.4D Crew Glean Ally Dimet Dimet Dimet Aratia Tilt
Canola	Jade	01/05	3.0	20N + 7.4P + trace elements	20kg N	Mamba 480 2.4D Crew Lomex Gallant Dimet Dimet Cypermetrine Cypermetrine Methonyl Micro elements
Lupin	Mandel up	01/05	109	20N + 7.4P + trace elements	Nil	Mamba 480 2.4D Roundup 480 Metribuzin Focus Ultra

Appendix 4. Management of crops planted at the Swellendam site during 2010

Crop	Cultivar	Planting date	Seeding rate (kg/ha)	Fertilisation rate at planting (kg/ha)	Top dressing (kg/ha)	Crop protection Product
Wheat	SST027	01/06	80	25N + 8P + trace elements	Nil	Rondup 480 Hoelon Dimet Logran Enhancer Dimet Tebuzole Dimet
Canola	AVGarnett	01/06	2.9	25N + 8P + trace elements	Nil	Rondup 480 Gallant Dimet
Barley	SSG564	01/06	54	20N + 9P + trace elements	Nil	Rondup 480 Hoelon Dimet Logran

						Enhancer Dimet Tebuzole Dimet

Appendix 5. Management of crops planted at the Swellendam site during 2011

Crop	Cultivar	Planting date	Seeding rate (kg/ha)	Fertilisation rate at planting (kg/ha)	Top dressing (kg/ha)	Crop protection Product
Wheat	SST027	02/06	80	25N + 8P + trace elements	60	Rondup 480 2.4D Rondup 480 Ravenger Campatop Dimet Dimet Tebuzol Dimet Methomax
Canola	AVGarnett	02/06	2.9	25N + 8P + trace elements	80	Rondup 480 2.4D Rondup 480 Gallant Dimet Alfatrin Boron Dimet Alfatrin Methomex
Barley	SSG564	02/06	54	20N + 9P + trace elements	Nil	Rondup 480 2.3D Rondup 480 Ravenger Campatop Dimet Amistar Aratia Dimet

Appendix 6. "Prices and costs" of replacement value of all machinery and implements, as well as the costs of all inputs used at the Swellendam site each year

		2007	2008	2009	2010	2011
Mechanization		**Rands**	**Rands**	**Rands**	**Rands**	**Rands**
Tractors	**75 kW**	412800	477760	525536	538649	529374
	92 kW	544400	677940	745734		610476
Harvestors	**125 kW**			1260000		1524600
Implements						
	18m Boom sprayer 2000l	186320	277600	305360	481200	284000
	Modified No-till Planter: 4m	182800	201080	221188	243307	267637
	Ferliser spreader 3t 18m					150700
	Swather 8m					215380
	Trash Field span: 5.7m		98805	108686		
	Trash Field span: 7.4m	96095				
Product prices:	**unit**	**R/unit**	**R/unit**	**R/unit**		
Wheat: B1	**ton**			1728		2275
Wheat: B2	**ton**			1633		2110
Wheat: B3	**ton**			1508		2045
Wheat: B4	**ton**	2075	1664			1930
Wheat: UT	**ton**	1700				
Wheat: Class other	**ton**	1700				
Barley (feed grade)	**ton**		1545	1550		
Canola	**ton**		3500	2900		3700
Lupins	**ton**			1955		
Barley (malt)	**ton**					2360
Triticale	**ton**					2050
Wheat (pasture)	**ton**		250			
Barley (pasture)	**ton**		250			
Canola (pasture)	**ton**		250			

Appendix 6 (continued). "Prices and costs" of replacement value of all machinery and implements, as well as the costs of all inputs used at the Swellendam site each year

Seed prices:	**Unit**								
SST 015	**kg**				**3.16**	**4.56**			
SST027	**kg**						**5.34**	**4.52**	**5.12**
US2007	**kg**								**4.16**
Jade	**kg**					**36.80**	**45.33**		
AV Garnett	**kg**							**55.00**	**23.30**
SSG 564	**kg**					**3.50**	**5.32**	**4.20**	**3.96**
Mandelup	**kg**						**5.78**		
Fertilizer	**Unit**								
Plant fert 31Z	**t**				**3203.00**	**4780.00**	**5257.00**	**4802.00**	**5100.00**
Plant fert 21Z	**t**					**4780.00**	**5275.00**	**4907.00**	**5000.00**
MAP	**t**				**3033.00**				
KAN (27N+3S)	**t**						**3160.00**		**3635.00**
Blaarvoeding	**liter**						**24.00**		**18.66**
Lime: Calcitic	**t**				**160.00**				
Herbicides	**Unit**								
Glyphosate	**kg**				**29.41**	**46.00**	**72.00**	**36.70**	**36.00**
MCPA	**liter**				**24.04**	**31.74**			
Glean	**g**				**1.18**		**1.55**		
Brushoff	**g**				**1.24**				
Gallant	**liter**					**216.80**	**212.00**	**234.00**	**248.00**
Buctril	**liter**					**139.00**			**58.00**
Trigrass	**liter**					**145.41**			
Hoelon	**liter**							**141.00**	**135.00**
Logran	**liter**							**2000.00**	
Enhancer	**kg**							**1080.00**	
Ally	**g**						**1.15**		
24D	**liter**						**33.00**		
Crew	**liter**						**120.00**		
Lomex	**kg**						**3123.33**		
Metribuzin	**liter**						**154.88**		
Focus Ultra	**liter**						**256.10**		
Bladbuff	**liter**						**42.75**		

Appendix 6 (continued). "Prices and costs" of replacement value of all machinery and implements, as well as the costs of all inputs used at the Swellendam site each year

Fungicides:	**Unit**					
Duett	**liter**	**108.75**				
Opus	**liter**		**191.40**			
Artea	**liter**			**226.00**		**200.00**
Tebuzole	**liter**				**125.00**	**100.00**
Amistar	**liter**					**460.00**
Tilt	**liter**			**565.00**		
Insecticides:	**Unit**					
Fetron	**liter**	**24.50**	**33.16**			
Cypermetrine	**liter**			**98.00**		
Methomex	**kg**					**140.00**
Alfatrin	**kg**					**90.90**
Demet	**liter**			**36.80**	**30.00**	**36.46**
Metomyl	**kg**			**168.00**		
Contract work:						
Harvesting	**R/ha**	**150.00**	**125.00**			
Aero spray:	**R/ha**					
Transport:	**R/ton**	**45.00**	**45.00**	**45.00**		**50.56**
Lime application	**R/ha**	**105.00**				
P application	**R/ha**	**105.00**				
General information:						
Interest rate:	**Notes: Average interest on capital for year**	**14%**	**14%**	**14%**	**14%**	**14%**
Diesel (R/litre)	**AA website average price for April - October**	**6.24**	**10.16**	**6.54**	**7.41**	**9%**
Regular labour cost: R/dag	**Minimum daily rate: farm labour**	**54.00**	**54.00**	**54.00**	**54**	**54**