BREAK CROP ECONOMICS
Kwinana East RSCN

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Prepared for

GRDC

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Break Crop Economics for the Kwinana East RSCN

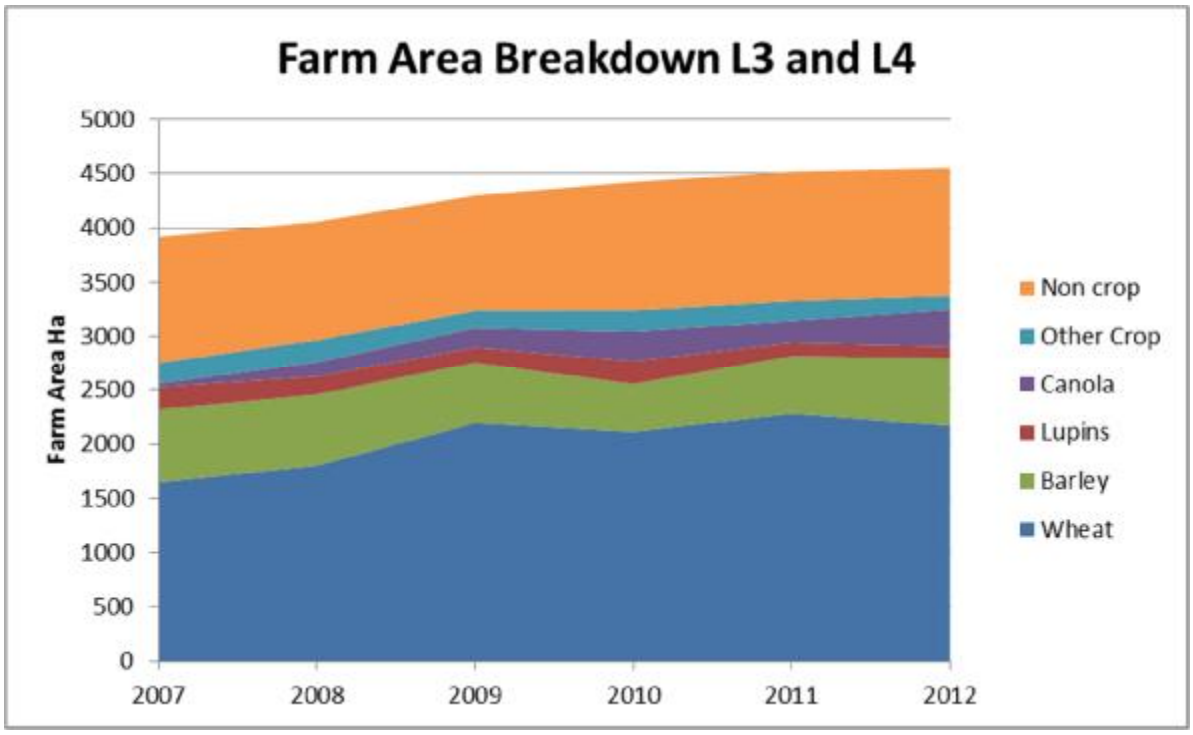
Farming profitably in the eastern wheatbelt in recent years has been a very difficult outcome to achieve. The aim of this project was to consider the activities and practices of those farmers with a long term track record of achieving above average results. This group of farmers has invariably generated positive results despite the recent difficult years – with this comes the implication that while our environment may be changing, there are methods of managing our farming businesses in these regions that can not only cope, but prosper in this environment. Ultimately our aim was to consider one element of the performance of these farmers (being the break crops and rotations in use) to establish if their formula for success was vastly different from others. What follows is not a prescription for rotations in the eastern wheatbelt, rather an example of systems that can work well if applied correctly.

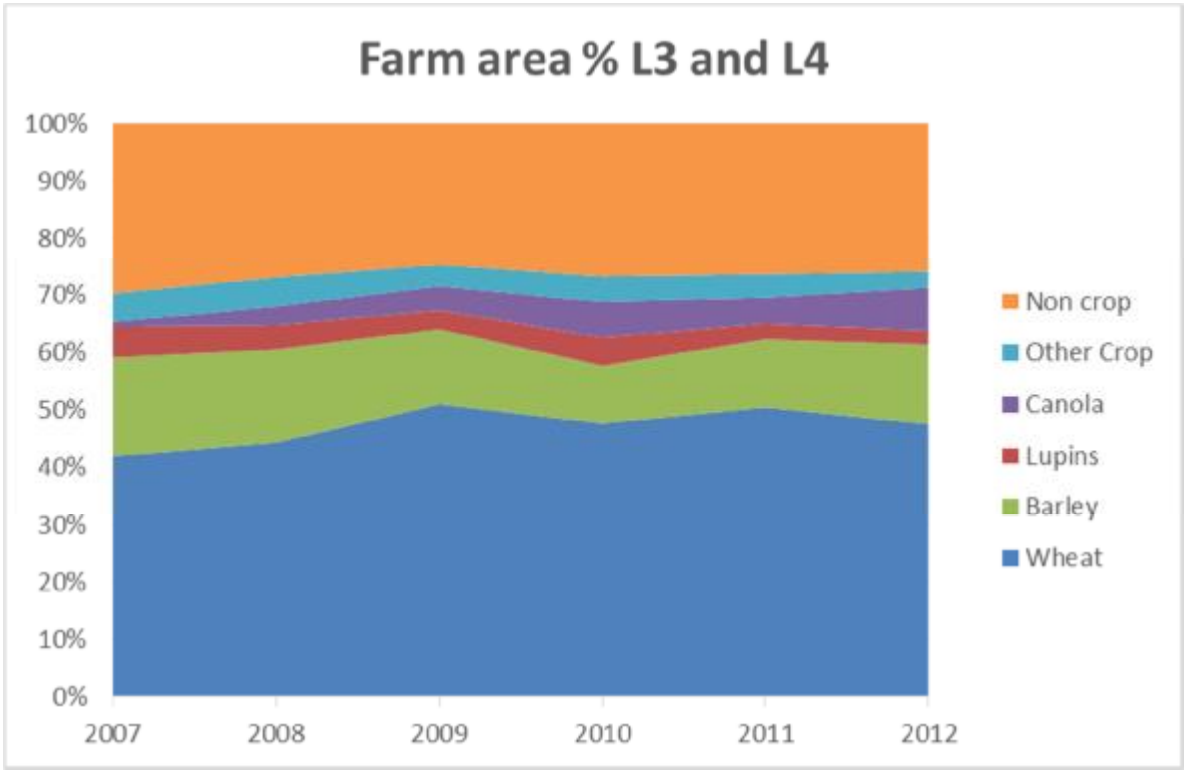
Also obvious in the analysis was that there was not just one way to achieve a positive outcome. Many of these farmers analysed here had very different approaches, depending on their personal preferences, past experience, attitude to risk etc. This is reflected in the variations seen in some of the margins. For example, the Merino sheep margin varied from $25/ha to 95/ha even within the high performing group. On this result alone, it is likely that the optimal rotation will be different for each of these growers, with the former more likely to adopt a continuous crop rotation.

The results presented in this report are based around reconstructed margins, but based directly on the results of our benchmarking analysis, individual margin analysis and discussions with the better performing farmers.

Please also note the businesses used in this analysis were only from the Planfarm client base. The data set used in the Eastern Wheatbelt GRDC project currently being completed includes a number of other consulting firms and therefore a larger farmer group.

To put the use of break crops in perspective we have added the following charts to show the relative changes in area of each land use in recent years. These charts reinforce the fact that break crops make up between 9 and 16% of arable farm area and while pasture (including fallow) comprises the primary break from the cereal rotation at 25% to 30% of farm area.





1. Methodology

Planfarm have identified what the top 25% of farmers are doing in terms of rotations in the Kwinana East zone, considering how these clients have performed over a 6 year period. This has been achieved by combining all qualified low rainfall clients from our database. We utilised the measures we typically adopt in benchmarking (operating profit/ha/mm growing season rainfall; operating profit per ha; return on capital and other analyses) to determine the top 25% of farmers in the low

rainfall zone of the WA wheatbelt. After finding the top 25% of farmers, the data from these higher performing businesses was analysed at a gross margin level for each crop, taking into account yield responses, fertiliser rates and herbicide use at different stages in the rotation. Discussions were held regarding the project with each grower, along with revisiting the gross margins of each business for the purpose of this project.

A summary of the gross margin worksheets has been attached to this document as appendices to act as a guide. For the individual gross margin calculations we utilised each growers 6 year grain averages and their current costs on a $/crop Ha basis.

As mentioned above, please note these gross margins are reconstructed from those of the better performing businesses. In doing this we have used relatively generic fertiliser and herbicide applications targeted at $/ha rather than the detail of a specific regime. Constant costs across all Gross Margins were depreciation, Interest on working capital and plant capital, Fuel and Repairs and Maintenance. In the underlying analysis, costs such as fertiliser, chemical, seed dressing and crop insurance were all varied to reflect each grower's different management strategies.

2. Gross Margin Summary

The dominant break phases identified include Pasture, Chemical fallow, Canola and Lupins. The grey area between fallow and pasture in the eastern wheatbelt is difficult to gauge. We have endeavoured to separate chemical fallow from pasture (Pasture disguised as Fallow and vice versa). The fallow gross margins relate to growers with what we would describe as a total fallow, with little or no grazing value coming from these hectares, and a multiple spray strategy to keep the paddock free of mature weeds for 18 months.

We note that the situations where fallow was working well were more to the northern limits of the region considered in this study, where growers appeared to be able to achieve a larger benefit from the crop following fallow than those located further south and east.

The table below outlines the reconstructed gross margin across all of the growers surveyed. Crops that have been excluded are Export Hay (only 1 grower in the survey) and other minor crops such as chick peas. Crops such as field peas are included, although comprise a very small portion of the total area of the growers surveyed.

CROP TYPE	CODE	SHORT CODE	INCOME	VAR COSTS	GM $/HA	YIELD/DSE	PRICE
Wheat on pasture	WP	W	$ 364.00	$ 217.65	$ 146.35	1.40	$ 260.00
Wheat on Canola	WC	W	$ 377.00	$ 217.76	$ 159.24	1.45	$ 260.00
Wheat on Lupin	WL	W	$ 325.00	$ 204.90	$ 120.10	1.25	$ 260.00
Wheat on Field Peas	WFP	W	$ 325.00	$ 204.90	$ 120.10	1.25	$ 260.00
Wheat on Wheat	WW	W	$ 286.00	$ 217.00	$ 69.00	1.10	$ 260.00
Wheat on Fallow	WF	W	$ 377.00	$ 217.76	$ 159.24	1.45	$ 260.00
Barley Malt	BM	B	$ 318.50	$ 214.99	$ 103.51	1.30	$ 245.00
Barley Feed	BF	B	$ 270.00	$ 212.26	$ 57.74	1.35	$ 200.00
Canola	CA	C	$ 306.00	$ 203.90	$ 102.10	0.60	$ 510.00
Lupins	LU	L	$ 154.00	$ 195.25	$ (41.25)	0.70	$ 220.00
Field Peas	FP	FP	$ 137.50	$ 209.19	$ (71.69)	0.55	$ 250.00
Fallow	FA	F	$ -	$ 122.22	$ (122.22)	-	$ -
MO SHEEP	MS	P	$ 104.32	$ 35.37	$ 68.95	2.68	

NB: The Codes and Short codes above identify the crops in rotations below.

While these margins are reflective of the group analysed, many will believe that we have been too harsh on Wheat on Wheat when compared to Barley or even Pasture. This a judgement call and needs to be considered by individual growers in light of their own situation.

In terms of sequencing of the gross margins above, we have put them into typical rotations given by the surveyed growers. A sample of the rotations in use is shown below.

Anecdotally, the growers surveyed indicated that yield response in wheat after a fallow was between 0.15t/ha and 0.5t/ha. We should also note that the range in sheep margins was substantial with results from $25/ha to $95/ha, both of which obviously influence the individual farmer's view of their preferred rotation.

Please also note that wheat and barley were considered to be largely interchangeable in the rotations used, dependant on soil type, frost risk and personal preference. Given the focus of this project is on break crops, the differences between wheat and barley was not considered critical. Within the group analysed, there was substantial variability in preferences for wheat or barley subject to soil, climate and agronomic factors.

The rotations shown below suggest that a Canola Wheat Barley rotation was the highest ranked, although Pasture Wheat Canola Wheat was a close second.

We must note that the calculations below cannot be taken as absolute. Across the group of top performers there was a range of long term yields for each segment of the rotation. As a result for some growers in the top group pasture dominated rotations performed best, while for others Canola was a better option. These biases will of course change with grower's perception of risk, related to both production and marketing.

As a result of this we do not want make a judgement on the sustainability or suitability of these rotations to any individual farm. These rotations need to be taken as guidance only, with much further analysis to be undertaken by a manager before they apply these rotations on their property, particularly in relation to suitability to soil type and paddock condition.

NB: That the number in the same column as the rotation description is the ranking of that rotation.

No.	Column1	Rank/Short desc	Rotation Margin	Year 1	Year 2	Year 3	Year 4	Year 5
1	Crop	P,W,		MS	WP			
	Result	6	$ 107.65	$ 68.95	$ 146.35			
2	Crop	P,W,W,		MS	WP	WW		
	Result	8	$ 94.77	$ 68.95	$ 146.35	$ 69.00		
3	Crop	P,P,W,W,		MS	MS	WP	WW	
	Result	9	$ 88.31	$ 68.95	$ 68.95	$ 146.35	$ 69.00	
4	Crop	C,W,W,		CA	WC	WW		
	Result	4	$ 110.11	$ 102.10	$ 159.24	$ 69.00		
5	Crop	C,W,B,		CA	WC	BM		
	Result	1	$ 121.62	$ 102.10	$ 159.24	$ 103.51		
6	Crop	P,C,W,W,		MS	CA	WC	WW	
	Result	7	$ 99.82	$ 68.95	$ 102.10	$ 159.24	$ 69.00	
7	Crop	P,C,W,B,		MS	CA	WC	BM	
	Result	5	$ 108.45	$ 68.95	$ 102.10	$ 159.24	$ 103.51	
8	Crop	L,W,W,		LU	WL	WW		
	Result	15	$ 49.29	$ (41.25)	$ 120.10	$ 69.00		
9	Crop	L,W,C,W,		LU	WL	CA	WC	
	Result	10	$ 85.05	$ (41.25)	$ 120.10	$ 102.10	$ 159.24	
10	Crop	P,W,C,W,		MS	WP	CA	WC	
	Result	2	$ 119.16	$ 68.95	$ 146.35	$ 102.10	$ 159.24	
11	Crop	P,W,C,W,B,		MS	WP	CA	WC	BM
	Result	3	$ 116.03	$ 68.95	$ 146.35	$ 102.10	$ 159.24	$ 103.51
12	Crop	F,W,W,W,		FA	WF	WW	WW	
	Result	17	$ 43.76	$ (122.22)	$ 159.24	$ 69.00	$ 69.00	
13	Crop	F,W,B,B,		FA	WL	BM	BM	
	Result	13	$ 51.22	$ (122.22)	$ 120.10	$ 103.51	$ 103.51	
14	Crop	L,W,W,		LU	WL	WW		
	Result	15	$ 49.29	$ (41.25)	$ 120.10	$ 69.00		
15	Crop	FP,W,W,		FP	WL	WW		
	Result	18	$ 39.14	$ (71.69)	$ 120.10	$ 69.00		
16	Crop	FP,W,B,		FP	WL	BM		
	Result	14	$ 50.64	$ (71.69)	$ 120.10	$ 103.51		
17	Crop	W,		WW				
	Result	11	$ 69.00	$ 69.00				
18	Crop	P,		MS				
	Result	12	$ 68.95	$ 68.95				

Actual rotations in use

	Canola
	Fallow
	Pasture
	Field Pea/Lupin

Rank/Short desc	Rotation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6			Cereals	BCs
F,W,W,		FA	WP	WW						2	1
L,W,W,		LU	WL	WW						2	1
C,W,W,		CA	WW	WW						2	1
P,W,W,		MS	WP	WW						2	1
L,W,W,		LU	WL	WW						2	1
C,W,W,		CA	WC	WW						2	1
C,W,L,W,		CA	WC	LU	WL					2	2
C,W,W,W,		CA	WC	WW	WW					3	1
W,		WW								6	0
F,W,W,W,W,		FA	WP	WW	WW	WW				4	1
F,W,W,W,		FA	WP	WW	WW					3	1
F,W,W,		FA	WP	WW						2	1
P,W,P,W,		MS	WP	MS	WP					2	2
C,W,W,W,W,		CA	WC	WW	WW	WW				4	1
L,W,W,C,W,W,		LU	WL	WW	CA	WC	WW			4	2
W,		WW								6	0
P,W,W,P,W,		MS	WP	WW	MS	WP	WW			3	2
P,W,W,		MS	WP	WW						2	1
FP,W,W,		FP	WF	WW						2	1
L,W,W,		LU	WL	WW						2	1
FP,W,B,		FP	WF	BM						2	1
FP,W,B,		FP	WF	BF						2	1
L,W,C,W,W,B,		LU	WL	CA	WC	WW	BM			4	2
P,W,W,W,		MS	WP	WW	WW					3	1
C,W,W,FP,W,W,		CA	WC	WW	FP	WF	WW			4	2
P,W,W,		MS	WP	WW						2	1
F,C,W,W,W,B,		FA	CA	WC	WW	WW	BF			4	2
F,C,W,W,W,B,		FA	CA	WC	WW	WW	BM			4	2
F,B,B,B,B,B,		FA	BF	BF	BF	BF	BF			5	1
X,W,L,H,W,		XX	WP	LU	HA	WW				3	2
P,W,W,W,		MS	WP	WW	WW					3	1
P,W,W,		MS	WP	WW						2	1
P,P,W,W,		MS	MS	WP	WW					2	2

The table above outlines the Rotation sequence under the column Rank/Short Desc. The overall rotational margin column calculates the average gross margin of the rotation. Please also note that as described above we considered Wheat and barley are largely interchangeable in the rotations used, dependant on soil type, frost risk and personal preference. As a result we have shown the cereals in these margins mostly as Wheat.

3. The Most Common Break Crop

Growers were asked for their most common rotations on their dominant soil types. The most common rotations include a pasture component. The rotation description in the table refers to the break crop utilised in a rotation. Some rotations utilise 2 break crops during the sequence. Of the 34 rotations surveyed, only 2 did not include a break crop (were continuous cereal). It is difficult to

determine the occurrence of each break crop, we have tried to focus on the dominant rotations described by the growers.

Canola and Fallow/Pasture account for the majority of break crop hectares. From the overriding region data for L3 and L4 shown earlier in this report, this is dominated by pasture, although current gross margins suggest that canola should be playing a greater role as a break crop. Much of the reason that it doesn't, is the increased risk associated with this crop.

None of the growers have used or intend to use roundup ready canola, with the majority using TT varieties. We suspect that the additional cost of GM seed and with relatively low and volatile yields is the primary reason for this. Most seemed confident in the performance of Clethodim for grass control and Atrazine for radish control.

To give some perspective; 70% of the businesses surveyed maintain a sheep flock. Characteristics of the pasture rotation are a self-replacing sheep flock, with a fair quality pasture composition. The pasture composition allows these growers to use robust herbicide tools to remove weeds during the growing season.

4. Common Agronomic Behaviours

Herbicide use is an interesting area to look at. Firstly, none of the growers surveyed are using RR or IT chemistry. All are using TT canola, and Fops and Dims to control grasses in all break crops. All are focused on controlling weeds in the break crop phase as cheaply as possible. The minority of the group will seldom use an expensive grass selective in the cereal phase. We expect that this reflects that the farmers in this group are generally not early adopters but will follow when technology is proven and that cost / capital at risk is an equally important consideration.

Phosphorus application in cereals across the surveyed growers varied from just over 10 units/Ha to as low as 4 units/Ha. Phosphorus applied to break crops varied from the same as cereals right down to nil. In only 1 instance canola received more P than wheat, and it was only 2 units more. As an average Cereals received 8.23 units, Canola 7.75 units and Lupins 7.31 units. None of the growers surveyed applied Phosphorus to fallows or pastures.

Additional Nitrogen application varied greatly from nil to 40 units/Ha in Canola. Nitrogen application was dictated by seasonal conditions. None of the growers surveyed applied any N to any other break crops.

All of the growers that have livestock are willing to run a stocking rate lower than average for their region in order to have the flexibility to manipulate pastures and spray top early to achieve 100% control of weeds in the pasture phase. Most growers noted that they use this phase to clean up weeds, and the success of the clean-up sees none of them using grass selectives in the subsequent wheat crops.

5. Conclusions

These Gross margins and rotation margins shown here are not designed to be absolute, but rather a starting point from which to consider the performance of your own property

From the sequences gathered from the survey group, 70% of the hectares planted were to cereals, with the balance to break phases. This appears to be a little higher than the average at around 60% to cereals. All growers surveyed noted flexibility as important to each rotation. Meaning longer sequences were often subject to change. Rotational changes are predominantly driven by weeds burdens and seeding conditions/seasonal outlook.

Cost control is seen as very important to maintain profitability in the type seasons experienced over the analysis period. Critical to achieving a low cost structure is maintaining the right rotation for your farm, soil type and approach to management. Most of the rotations used allow for low cost in crop treatments, with changes in rotations and approach made when issues emerge.

A good example of this is the relatively high cost of GM seed has meant the slower adoption of GM technology in the region where the yields may not be there to achieve sufficiently economic returns.

It is clear from this and previous exercises that there is much more to becoming a top 25% farmer than just choosing the right rotation. We will explore this in greater detail within the Eastern Wheatbelt project currently being completed.

	Wheat-Pasture	Wheat-Canola	Wheat-Lupin	Wheat-F.Peas	Wheat-Wheat	Wheat-Fallow	Malt Barley	Feed Barley	Canola	Lupins	Field Peas	Fallow
INCOME												
Yield	$ 1.40	1	$ 1.25	$ 1.25	$ 1.10	$ 1.45	$ 1.30	$ 1.35	$ 0.60	$ 0.70	1	$ -
Price ($/t Farmgate)	$ 260.00	$ 260.00	$ 260.00	$ 260.00	$ 260.00	$ 260.00	$ 245.00	$ 200.00	510	$220.00	$ 250.00	$ -
Total	**$ 364.00**	**377**	**$ 325.00**	**$ 325.00**	**$ 286.00**	**$ 377.00**	**$ 318.50**	**$ 270.00**	**$306.00**	**$154.00**	**138**	**$ -**
EXPENSES												
Seed	$ 15.95	16	$ 15.95	$ 15.95	$ 15.95	$ 15.95	$ 13.75	$ 11.50	$ 2.53	$ 20.00	34	$ -
Fertiliser	$ 50.00	$ 50.00	$ 38.00	$ 38.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	50	$ 26.00	$ 26.00	$ -
Herbicides	$ 45.00	45	$ 45.00	$ 45.00	$ 45.00	$ 45.00	$ 45.00	$ 45.00	$ 45.00	$ 45.00	45	$ 70.00
Crop Insurance	$ 2.91	$ 3.02	$ 2.60	$ 2.60	$ 2.29	$ 3.02	$ 2.55	$ 2.16	3	$ 1.23	$ 1.10	$ -
Repairs & Maintenance	$ 19.00	19	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	19	$ 19.00
Fuel & Oil	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	$ 19.00	19	$ 19.00	$ 19.00	$ 19.00
Cropping Labour	$ 10.00	10	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	10	$ 10.00
Interest on Working Capital	$ 5.78	$ 5.78	$ 5.35	$ 5.35	$ 5.76	$ 5.78	$ 5.69	$ 5.60	5	$ 5.01	$ 5.49	$ 4.22
Interest on Plant Capital	$ 25.00	25	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	25	$ -
Depreciation	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	25	$ 25.00	$ 25.00	$ -
TOTAL	**$ 217.64**	**218**	**$ 204.90**	**$ 204.90**	**$ 217.00**	**$ 217.75**	**$ 214.99**	**$ 212.26**	**$203.90**	**$195.24**	**209**	**$ 122.22**
GROSS MARGIN	**$ 146.36**	**$ 159.25**	**$ 120.10**	**$ 120.10**	**$ 69.00**	**$ 159.25**	**$ 103.51**	**$ 57.74**	**102**	**$ (41.24)**	**$ (71.69)**	**$(122.22)**