Aberdeenshire Arable Monitor Farm

Andrew Booth
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OPEN EVENING REPORT
15 July 2014

Date of next meeting: Tues 11th November 2014 (FINAL MEETING)

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The Aberdeenshire Arable Monitor Farm Programme is an HGCA project supported by the Scottish Government SRDP Skills Development Scheme.

Peter Chapman welcomed the assembled company including a good number of new faces from as far afield as Dundee. Peter gave an overview of the operation of the Programme and Andrew then described it's impact on him, the farm and the group, and it's legacy for the future (see Appendix 1).

The group then split into 4 and progressed around 6 stations in and around Savock:

1. **Grain store – overview**
2. **Grain store design**
3. **Benchmarking and Marketing**
4. **Energy Efficiency**
5. **Agronomy**
6. **Precision Farming**

This was followed by supper at The Store.

1. Monitor Farm Programme and Farm Background

The Project's Objective

The overall aim of the project is to improve the performance and profitability of the host Monitor Farm and other arable farms in the region. A Monitor Farm helps us to share experiences, find out how others have tackled problems, try out new techniques, bring in the best specialists and do it all on a real farm. The project is funded by Scottish Government and HGCA. Meeting reports can be found on HGCA (www.hgca.com) and SAOS' websites (www.saos.coop)

Introduction to business

Andrew Booth farms a total of 324ha (800 ac) across 3 blocks, of which 282ha is owned (Savock, Ardgill and Westfield Farm), with the balance on short-term tenancies. Father, George, has recently retired from the business although he is still on hand to help.

Cropping 2013/14

The farm operates a number of rotations depending on the land and situation. The three blocks of land are up to 8-miles apart. The 2014 cropping is shown in the following table:

Crops	Area (ha)	Varieties	Av 3-yr yield (t/ha)
W OSR	63.0	Cracker and Compass	3.7
W Barley	100.0	Retreiver, Glacier & Harlequin	7.5
W Wheat	43.0	Viscount & Horatio	8.6
Sp Barley	12.5	Waggon, Odyssey	6.0
Sp Oats	64.0	Vok	5.6
Grass	24.3		
Fallow/grass margins	7.0		
Trees	10.2		
Total	**324ha**		

Soils and cultivations
A range of soils generally on heavy side with clay – which can be unforgiving. Natural drainage is poor. Improving the soil structure is an objective and use has been made of compost over the last 2-yrs. Need extra power to make good seedbeds, some spring cereals will be power harrowed in front of the one-pass drill. The grass weed sterile brome is increasingly common in some fields.
Operate 24m tramlines. Seed is mainly purchased to prevent the spread of brome. Utilise an independent agronomist - Ian Dalley. Have recently moved into full precision farming.

Crop Performance 2010-13 (tonnes /ha)

Crop performance has significantly improved over the project's life.

Crops	2013 Yield	2012 Yield	2011 Yield	2010 Yield
W OSR	4.2	3.4	3.5	3.1
W Barley	8.2	6.8	7.3	7.0
W Wheat	10.7	7.5	7.6	7.3
W Oats	-	4.2	6.1	7.2
Sp Barley	7.6	5.0	5.6	5.5
Sp Oats	6.8	4.2	6.0	5.1

Livestock
Finish 200-250 cattle per year, all AA crosses. Purchase yearlings which are kept for 6-12 mths Need to kill finished animals every fortnight for the Farmshop. Cattle are wintered inside at Savock in two cattle courts plus a dutch barn (hold 200+ hd). Winter rations are based on silage plus barley.

Labour & Contractors
Up to a few months ago, employed one full time man, due to loss of man now considering options. Last year employed a combine driver instead of a harvest student, plan to repeat this year.

Contractors are used for muck spreading, lime spreading and any other specialised jobs.
In addition, the business also carries out a fair bit of contracting work themselves. The aim is to make better use of machinery, to spread the cost.

Crop Marketing
All crops are grown for the open market except for a small tonnage saved for own use. Nothing is grown on contract although a percentage of the crops are forward sold. Oats are grown for the premium milling market. Due to the high fertility, no low N malting barley is grown.

The Monitor Farm's Gross Output Analysis. (Year end 31st May)

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	2010	2011	2012	Target %
Farm Gross Output	100	100	100	100
Variable Costs	28	25	32	30
Farm Gross Margin	72	75	68	70
Labour	8	9	10	30 to 35
Power	36	29	32	labour and power
Overheads	12	6	9	5 to 10
Gross Profit	16	31	17	30

Diversification into a farmshop – *'The Store'*

Based at Westfield, '*The Store'* was established in 2000 to supply the end consumer with beef and lamb grown on the farms as well as sourcing other local produce to sell through the shop. In July 2010 expanded into current building with the introduction of a coffee shop/restaurant with 45 covers and a larger retail space. Today the business has grown to employ 22 staff comprising a farm shop, butchery and coffee shop. In terms of retail outlets, supply 4 farmers markets, five Waitrose stores, local hotels & restaurants other local deli's and specialised food retailers.

Main challenges for the business (stated by Andrew at the start of the project)

- Improving the farm profitability
- What is the optimum grain drying & storage option for the business?
- Controlling production costs, particularly machinery costs
- Crop marketing, coping with market volatility
- Farming heavy land – how best establish the crops?
- Adopting new technology (Precision Farming)
- Improving record keeping and business analysis.
- To future proof the business - designing a system for the next 10-yrs.

2. Farm Tour Stops

Stations 1 and 2. Grain Store – Overview (Andrew Booth) and Design (Kenny Addison)

- 1,000t floor drying grain store
- 2 bays (500t each) split by the hot air plenum
- Mesh vents across entire floor leading out from the central plenum – 40% of the floor area is vents
- Biomass boiler (woodchip) provides the hot air
- Electronic control of vents along the length of the plenum, so can dry sections at a time and at different rates
- 4 auger stirrers in each bay. Very important part of the design as they aid drying and also house moisture and temperature sensors, so can monitor the bulk at all depths during drying and during the storage period. Can see the temperature and moisture profile of the bulk on screen. In the post harvest storage period

any hot spots can be identified early, and drying air applied without having to move any grain.
- Computerised control of entire system including the boiler

Why go for this design which combines the drier and the long term storage?
- Simplifies the drying and storage of the bulk commodity grains which Andrew grows, especially winter wheat and barley. Don't need to move once piled into store.
- Having two sides does mean that one side can be used like a tray drier with grain being shifted once dry to the old grain shed.
- Stirrers and allied monitors make this combined deep storage and drying (much deeper than you would with a tray drier) feasible and safer.
- Much more easily automated than batch drying, hence lower labour cost
- Suits a biomass boiler, which is economically attractive given the Renewable Heat Incentive (RHI) payments and the cost of oil.

Station 3. Benchmarking (Alan Grant) and Marketing (Robert Drysdale)

3.1. The Arable Business Group (ABG)

Summary
- In addition to the Arable Monitor Farm, HGCA supported an Arable Business Group (ABG) in the north-east.
- The ABG aims to bring progressive arable growers together to benchmark their businesses, meet regularly and consider ways how to improve their businesses performance.
- At the core of the ABG is benchmarking, calculating production costs and making comparisons with others.
- The benchmarking is undertaken utilising HGCA's *'CropBench'*. It is simple to use and ensures the figures produced use the same methodology which is very important.
- Although benchmarking is at the heart it is much more than that, the focus is on real practical issues so includes comparisons of systems, marketing, managing risk, new technology, succession, finance, etc.
- All commercially sensitive information is standardized, confidentiality is at the core of the group – Charterhouse rules
- There are 12 members in the closed group who meet 4 times a year.

Reasons why members joined the Group:
- *Improve my marketing - gathering experiences of others*
- *Hoping to improve my crop yields*
- *Identify how to reduce production costs*

- *Understand folks' production systems and how do you manage large complex businesses*
- *Better understanding of spray costs and their effective use*
- *Getting ideas from others /innovation*
- *The farm visits and going on learning journeys*
- *How do you improve the fertility and organic matter in non-livestock farms?*
- *Livestock options for arable farms*
- *Buying inputs, sharing information – maybe forming buying groups*
- *The discipline and peer pressure to actually carry out the costings!*

Some of the Learning

- ✓ Production costs higher than expected
- ✓ Two key factors impact on profitability; the final yield and average selling price.
- ✓ Huge variation in average selling prices across group – effective marketing (how achieve?)
- ✓ Successful establishment is crucial particularly for autumn sown crops
- ✓ Don't scrimp on inputs. Little scope to reduce variable costs – seed, fert, agrochemical
- ✓ Huge variation in fixed costs (overheads) particularly machinery & power costs
- ✓ Don't over-sell crops
- ✓ Watch cut-off sowing dates particularly for autumn crops
- ✓ Benefit of rotation and mix of crops
- ✓ Need to keep organic matter levels up in all-arable systems
- ✓ Timeliness and attention to detail is paramount

See Appendix 2 for an example of the output from the Aberdeen ABG.

3.2. Marketing

- 12 to 6 months before drilling the crop, if you see an obvious profitable price, consider selling 5% - 10% of normal production. Think; "if this is the worst price I sell at would I be happy?"
- April/May of planting year (i.e. 4 months before autumn sowing): Produce Budget and Cropping Plan, which will give anticipated tonnage based on area and average yield. Also gives a budget cost of production, which can be updated when the fertiliser price, the major variable, is known.
- Pre-drilling: Set a % that you are happy to sell which is profitable at the budget cost of production, suggest 10% to 15%.
- Post-drilling: Area now set and you have an idea of any downward impact on yield potential if there's been poor drilling conditions. Set a maximum to sell e.g. 25% - 30% until spring, and set a target price.
- March/April: assess crop survival and condition post winter and update production estimates and cost of production based on this. Revise sales limit to 40% of production.

- Pre-harvest: as confidence in yield increases, consider selling up to 35% to 70% depending on price. Cost of production is now more or less fixed, other than exact yield.
- Harvest: Tonnage and cost of production now fixed. Revise target price for selling the balance left to sell, in line with cost of production and current market price. Sell balance over next 6 to 9 months in line with market movements, cash flow and storage requirements.

Targets:

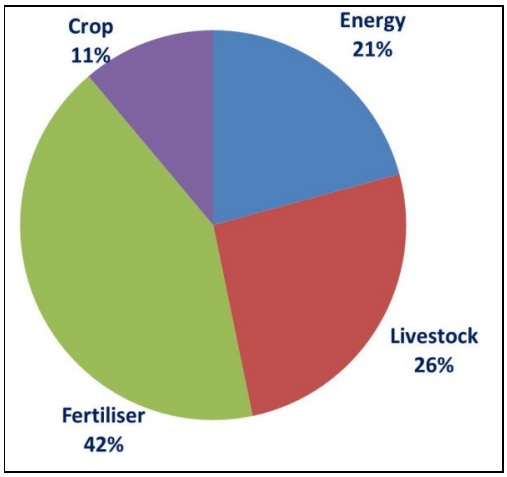
- Ideally profitable
- Realistic
- Sell into rising market in regular small chunks
- Consider selling £1/t below target if market is weak. This makes little difference to average compared to effect of a £10/t fall.
- If market is strong e.g. this March/April, revise target up, but if it starts to fall, ensure you sell some before it goes back to below the original target. This is not easy!
- <u>It's the average price that matters</u>
- Sell no more than 10% at once, unless you have a really good reason to do more.
- Beware of greed! If a price is good, do sell some.
- Do what you think is right and then move on.

Station 4. Energy Efficiency and Carbon Accounting (Rod McGovern, Farm Energy Consulting Ltd)

This presentation discussed ways to reduce costs, and lighten the farm's carbon footprint using energy efficiency and carbon accounting. The point was made that both these are likely to result from good farm management. However management requires data, so that the manager knows where he is starting from, allowing him to set targets, and measure progress towards achieving them.

Data was collected from this monitor farm in the previous summer. Some of the crucial data was not available, in which cases data was approximated, based on other sources. During the auditing process it was found that there are a number of different carbon accounting packages available. Each give different answers with some differing substantially. It was necessary to select the results that best matched other sources. The best results will be achieved by using the same system each year, so that the improvement is based on the same method of calculation.

The main carbon uses were shown in a pie chart.



From this it was concluded that whilst consideration should be given to reducing the amount of fertiliser use and minimising cultivation in crop production there is not much that can be done to reduce the carbon impact of livestock, if numbers are maintained.

It may be possible to reduce the amount of energy used by the farm which will directly reduce the amount of carbon dioxide released. Three different areas were considered:
Fuel usage in tractors is known to be reduced by up to 20% by careful driving. Close account of how fuel is used is necessary to minimise fuel use. The focus must be on selection of the most efficient machine for the work needing done.

Grain drying on this monitor farm will now have a lighter carbon footprint as heating oil has been replaced with biomass. For those with conventional driers a number of ways to improve their efficiency were discussed: speed control on the drying fans – as reducing the speed of a fan by 15% reduces the power usage by 50%, and so reduces the amount of air that needs to be heated; fitting stirrers to tray driers gives practical benefits but the improvements in energy efficiency can be limited; recycling heat from the exhaust of driers have been shown to reduce fuel usage by 30%.

Finally the energy usage of the farmhouse was discussed as a way of reducing fuel bills, but also improving comfort in the home by reducing draughts. Air tightness testing was suggested as a way to reduce air exchanges, typically around once every 5 mins in windy conditions. Reducing this by 50% will reduce heating bills considerably and keep the occupants more comfortable.

Station 5. Agronomy (Ian Dalley)

5.1. Beginning of Programme: Agronomy Challenges

- Heavy difficult soils – less muck than in past, no grass, wet seasons, late area. Trying compost (big trial) – does it have long term potential? Should we chop most straw? Min till rape help? How improve structure?
- Yields disappointing? – wet chunks/ endrigs, but are inputs high enough? Hedging bets too much?
- Establishment/ seedbed conditions absolutely critical
- Difficult to stick to a rotation – is this critical?
- Too many crops? Too much to get right?

- Winter oats got a place in the rotation? Margin? Volunteer oat problem?
- Choice of chemicals becoming more limited
- Sterile brome problem
- Outlying land on short term lease/uncertain future – low pH so only oats
- Drying capacity and single bulk store limits system?
- Can't hit SB Malting market. No premium markets except milling oats.
- No combine drilling of fert – negative impact?

5.2. End of Programme: Agronomy Strategy

Crop Nutrition

- Whole farm GPS nutrient mapping has had a massive impact. pH is key.
- Been round whole farm once, some twice. Now will regularize the re-mapping to 1 yr in 4 or 5. Need to repeat as the variation is not removed in one correction – it's basically about soil types.
- Big savings in P and K through move to field by field nutrient budgets
- Putting fertiliser down the spout still splits the group! Especially valuable for spring crop, well proven.

Compost and Organic Matter

- The compost trial results will be long term, not evident yet. Do tests yr 5.
- Feeling that soil structure is improving after 4 years of compost application
- Feeling that little (4t/ac) and often is the best way to use it, plus use best quality = food grade, to maintain P and K.
- Straw chopping needs to be part of the annual rotation (OSR and WW), plus all endrigs

Urea/Nitrate Inputs

- Trials showed that the optimum level of N application was well above the NVZ limit
- Yield data field by field would provide evidence to justify the higher N input, as it is being utilized.
- Over a field, the trial evidence suggests that some parts would justify much higher levels of N because these parts produce very high yields, while poorer parts should get less. The overall field rate could still be below the NVZ max. This targeting is surely the way forward both for the good of the environment and the economics of cereal production.

Crop Protection

- Winter Oat volunteers in Winter Wheat has been a big issue. Winter Oats are now out of the rotation.

- Specific weed problems we have had to deal with; groundsel, meadow grass, fumitory and especially brome. Telephone poles and endrigs continue to harbour brome.
- Chemical choice being limited by legislation

Varieties

- Been through hybrids and decided not working well for this farm
- Winter oats taken out of the rotation on performance and volunteer grounds
- Stuck with limited range of successful varieties for winter wheat – Viscount

Rotation

- Now have one!
- Simplified without winter oats. OSR – WW – 2 x WB (but not late sown WB, so leave for bit of SB if caught out at end Sept. Bit of SB will help Brome problem)
- Minimal SB on this heavy land. On lighter soil out-farms continue with spring oats and SB.
- This rotation should help avoid clubroot and hence the need to rely on Cracker.

Cultivations

- Seedbeds better due to operator and more organic matter
- Management of endrigs is critical as these have been a major drag on overall yield in the past. Use of the Sumo trio on the endrigs to break deep compaction when soil is dry is the key. Even consider bringing in a contractor to do the endrig cultivations after main chunk of fields are sown. Also chop straw on endrigs.
- Min till OSR using Sumo will continue, great success; stronger plants and faster, slightly cheaper establishment. Opportunity to subsoil a lot of the land if get the correct dry soil cracking conditions.

Station 6. Precision Farming (Lewis McKerrow, Agrovista)

<u>Overview of what's been done during the programme</u>

Soil sampling

- Most of the farm now been sampled by Soil Essentials
- 4 pH samples every Ha
- P & K samples over wider field areas
- pH ranges from 5.4 – 7.0 have been found
- Phosphate mostly medium to high
- Potash mostly low to medium
- Albrecht soil sample taken from 1 heavy field to look at soil balance

Soil Conductivity

- A couple of fields scanned to provide maps for variable rate seed

Variable Rate seed

- Demonstrator Horsch drill used in spring 2012 to sow seed variably
- Problems with compatibility of boxes so did seed rate trial strips

Variable rate fertiliser

- New Amazone fertiliser spreader in 2012
- Spreading variable P & K straights where required

Crop Sensors

- Scanned a few fields in 2012, one was the spring barley seed rate trial, the other a wheat field with a compost trial
- Sensor used was a Fritzmeier Isaria which is a new sensor on the market
- Yara N-Sensor (non ALS) was trialled in 2013 with mixed results – very mixed backwards crops not 'normal'?
- Scan maps were a good insight into where yield would follow

Yield Mapping

- New Holland combine has been yield mapping the farm since 2008
- Yield data being gathered but not currently being used for variable off-takes or target sampling

Autosteer

- 2008 John Deere 7530 fitted with Greenstar SF2
- Autosteer used for sowing and other cultivation work
- 2013 upgraded to new JD Starfire 3000 receiver
- Added JD screen to self propelled sprayer for manual guidance

Record Keeping

- Been using Farmworks software for cropping
- Otherwise largely paper based records
- 2014 trying new Cloud based Axis system from Agrovista
- System utilises smartphones and tablets to keep records

Outcomes of Monitor Farm

- Soil sampling working effectively
    - Far more knowledge of fields nutrient and lime status
- Questions over applying Phosphate variably on the soil surface (lock-up)
- Jury is out on the N-sensor – high price not to work reliably in every season
    - Used in tricky 2013 season with very backward crops
    - Limited applications for spring cropping

    - Satellite nitrogen services may fit better on this size unit
- Next stage is to try variable rate seed, big interest for Andrews variable soils
    - More conductivity scanning required to cover more of the farm
- Yield mapping – want to try and make best use of data
    - Wants an easy system to process and turn into fertiliser variable rate plans based on the last years crop removal
    - Axis system should deliver this for 2015
- Autosteer very good when working but needs competent owner to set up and use correctly

For the future

- Variable rate seed – would need new drill or retrofit
- Variable rate N – maybe when satellite services get better
- Variable rate P & K – based on previous crop removal (yield maps) & soil status
- Easier record keeping and data handling
- Biomass scans
- UAV (drone) use in weed mapping & management – sterile brome
- Use of MapIT Pro app to map out weed areas – brome/wild oats
- UAV (drone) – precision geese scaring!

Appendix 1. The Monitor Farm Legacy

1. Conclusions on Key Features of the Monitor Farm

What has the programme told us about the business to date?
These factors will shape future strategy.

- Output per hectare has historically been lower than for comparable arable units
- Variable costs are not high as a % of output
- Power costs are a bit on the high side
- Capital and management time are limited due to the demands of the management and expansion of the other business – The Store
- Overall the farm has heavy, difficult soils with bad bits in each field. This limits output, especially in wet years. It also makes timeliness of crop establishment even more critical than for other arable businesses on lighter soils. On these heavy soils poor establishment conditions permanently handicap the crop.
- The impression is that the soils are becoming more difficult to manage, partly due to a run of wet years, but also due to declining organic matter/soil structure/drainage as the farm has moved to mostly cropping.
- From outside it looks like you have scope to increase inputs to boost yield, but experience of lack of return on extra inputs holds you back
- Attention to detail is critical
- Andrew's father and mother will inevitably reduce their time input, which is currently substantial in The Store, and there will be succession/family issues to manage. Andrew's father, George, has now retired out of the business and most succession issues have been dealt with. Andrew will need to make decisions on where he puts his effort and where he buys in support.
- Arable Business Group comparisons have shown that marketing decisions have a huge effect on margin. Farm grain storage and drying have been very rudimentary for the tonnage produced.

2. Key aspects of Andrew's Future Strategy

EXPANSIVE FARMING GOALS
Modest expansion to say 1,000 acres. Economies of scale are real for arable farming. This scale justifies the labour and management structure Andrew needs to deliver other parts of his strategy. It's also a motivator.

BACK TO BASICS WITH NEW TECHNOLOGY
Improve the heavy soils with a clear rotation, little and often compost, chopped straw (OSR, WW) as a routine part of the rotation and on all endrigs, min till OSR, strategic use of 3 leg Sumo when soils are dry, separate cultivation/sowing of endrigs.
Get the best out of every square metre with ongoing soil nutrient and yield mapping, and precisely targeted lime, P, K and N. Field by field nutrient budgets. Feed to yield potential.

A MANAGEMENT AND THINKING TIME PLAN

Key learning point has been the importance of management time to measure, analyse, compare, think, plan. Decision has been made to employ a part-time management/ financial/ mentoring adviser to assist management of both The Store and the farm, freeing Andrew to have an operational role on the farm. That farm involvement is important for The Store image, to satisfy Andrew's interest and to provide thinking time. Will set aside a day a week for management.

TIMELY OPERATIONS

On this farm the timeliness of operations, especially sowing, drives profitability. The operational strategy is therefore driven by this need. Structure: one good full time employee, Andrew at the peaks, Ian Dalley on crop management and inputs, a full in-house machinery compliment, speedy min till where appropriate and contractor back-up.

MARKET CONTROL

The aim is to control the marketing decisions and not be forced into harvest selling of commodity grains. Hence the investment in a 1,000t floor drying store serviced by a biomass drier operating at low net cost after RHIs. Prior knowledge is key; cost of production per tonne, likely tonnes to sell, market trends. Spread marketing over a longer period to improve the average price. Use trigger prices to drive your decisions.

PLAN TO BE MOTIVATED

How? Expansion goal, set targets for KPIs, benchmarking group, scouring new ideas from around the world, social media interaction, trials, start succession planning early, don't have vacuum after end of MF programme. Ideally would like to continue the Arable Business Group and 2 community group meetings per year – one at Savock, one at another member's farm.

Appendix 2.

2013 Production figures £ per tonne before rent and interest.

Sp Barley 2013 Harvest year					
£ per Tonne	**Savoch**	**Av**	Low	Hi	**2012**
Seeds	9	10	6	17	12
Fertilisers	16	24	6	36	34
Sprays	11	12	5	16	13
Sundries	0	0	0	1	0
Total Variable Costs	**36**	**46**	**27**	**58**	**58**
Labour	14	20	12	36	22
Machinery	31	46	34	63	49
Property	5	5	3	8	7
Admin	9	7	1	16	8
Total Overheads	**58**	**78**	**59**	**129**	**87**
Production Cost before rent & K	**95**	**124**	**95**	**171**	**146**

W Barley 2013 Harvest year					
£ per Tonne	**Savoch**	**Av**	Low	Hi	**2012**
Seeds	8	11	5	23	12
Fertilisers	23	34	17	49	34
Sprays	13	16	12	26	13
Sundries	0	0	0	1	0
Total Variable Costs	**44**	62	44	76	58
Labour	13	19	12	24	22
Machinery	31	41	27	72	49
Property	2	5	2	7	7
Admin	8	6	1	18	8
Total Overheads	**55**	70	50	117	87
Production Cost before rent & K	**99**	**133**	**99**	**145**	**146**

Wheat 2013 Harvest year					
£ per Tonne	**Savoch**	**Av**	Low	Hi	**2012**
Seeds	8	7	4	10	13
Fertilisers	20	26	14	36	38
Sprays	14	15	12	23	22
Sundries	0	0	0	1	0
Total Variable Costs	**41**	49	36	69	73
Labour	10	15	10	22	22
Machinery	24	32	21	45	44
Property	2	4	2	7	6
Admin	6	5	1	11	7
Total Overheads	**42**	57	42	73	**79**
Production Cost before rent & K	**83**	**106**	**83**	**130**	**152**

OSR 2013 Harvest year					
£ per Tonne	**Savoch**	**Av**	Low	Hi	**2012**
Seeds	15	19	14	27	25
Fertilisers	53	70	40	96	87
Sprays	26	34	11	45	45
Sundries	0	4	0	2	1
Total Variable Costs	**95**	127	84	162	159
Labour	25	36	12	57	48
Machinery	61	75	56	115	124
Property	5	12	5	29	17
Admin	16	14	2	29	20
Total Overheads	**106**	137	85	194	209
Production Cost before rent & K	**201**	**264**	**169**	**330**	**368**

2013 Production figures £ per HA before rent and interest.

Sp Barley 2013 Harvest year						W Barley 2013 Harvest year					
	Andy						Andy				
£ per Ha	**Savoch**	AV	Low	Hi	**2012**	**£ per Ha**	**Savoch**	AV	Low	Hi	**2012**
Area (ha)	29	120	30	548	97	**Area (ha)**	82	82	5	235	97
Yield (T/ha)	7.6	6.8	5.0	81	6.0	**Yield (T/ha)**	8.2	7.6	5.6	9.3	6.0
Av Price	£ 132.0	£ 149.0	£ 132	£ 190	186	**Av Price**	£ 137.0	139	£133	£150	186
Crop Sales	£ 1,003	£ 1,013	£ 690	£ 1,221	1,117	**Crop Sales**	£ 1,123	1,057	£801	£1,379	1,117
Straw Value	26	75	0	247	52	**Straw Value**	99	80	0	219	52
Total Output	**1,029**	**1,088**	**705**	**1,354**	1,168	**Total Output**	**1,222**	1,137	£824	£1,493	1,168
Variable Costs						**Variable Costs**					
Seeds	65	70	50	111	70	Seeds	66	86	35	127	70
Fertilisers	123	169	47	218	201	Fertilisers	186	256	160	295	201
Sprays - Herbicides	29	27	20	37	23	Sprays - Herbicides	26	28	16	44	23
Sprays - Fungicides	58	64	42	100	58	Sprays - Fungicides	84	95	70	130	58
Sundries	0	3	0	7	3	Sundries	0	3	0	7	3
Total VC	**275**	**333**	**222**	**431**	**354**	**Total VC**	**362**	468	362	551	**354**
Gross Margin	**754**	**756**	**365**	**1,064**	815	**Gross Margin**	**860**	**668**	**277**	**1,021**	**815**
Overheads						**Overheads**					
Labour	103	130	75	161	135	Labour	103	139	75	178	135
Machinery						**Machinery**					
- Depreciation	69	85	19	124	85	- Depreciation	67	85	19	124	85
- Mach Repairs	53	63	28	131	48	- Mach Repairs	61	63	28	131	48
- Fuel & Oil	77	83	60	159	85	- Fuel & Oil	77	82	51	159	85
- Haulage	0	4	0	22	5	- Haulage	2	4	0	22	5
- 3rd party storage	0	4	0	34	4	- 3rd party storage	9	4	0	34	4
- Electric & gas	3	19	0	112	23	- Electric & gas	4	19	0	112	23
- Contractor	30	58	6	167	48	- Contractor	38	51	0	112	48
Property	38	36	20	59	44	**Property**	20	36	20	61	44
Admin	71	48	10	108	49	**Admin**	66	48	10	108	49
Total Overheads	**444**	**531**	**392**	**647**	525	**Total Overheads**	**447**	532	397	662	525
Total Costs	**719**	**864**	**722**	**1,031**	**879**	**Total Costs**	**809**	**1,000**	**809**	**1,213**	**879**
Margin before rent & K	**310**	**224**	**-282**	**582**	**289**	**Margin before rent & K**	**413**	**136**	**-120**	**413**	**289**