THEME REPORT

LOTHIANS MONITOR FARM
TO DRAIN OR NOT TO DRAIN ?

The issues of drainage are commonly discussed at monitor farm meetings and the group would like to establish the cost benefits of draining a field. The community group, with the help of soil specialist Mark Hodkinson (soils4life) went through the theoretical scenario of whether to drain or not to drain Cottage Field at Rosemains.

THE CHALLENGE

The primary challenge with draining, is establishing at what point does the farmer make the decision to go ahead and invest in a new drainage system. It is also important to establish what the limiting factors are within a field which are influencing crop yield and how to then determine the level of losses associated with drainage. There are a few of these limiting factors which should be investigated prior to making investment in drainage.

Establish the farm/field's potential and identify any limiting factors

- Nutrition
- Stones
- Lime
- Drainage

What is the potential and limiting factors for cottage field?

Mark Hodkinson estimated the yield of Winter Wheat potential from soil analysis and the soil pit to be 15t/ha, assuming drainage and all limiting factors were taken into account. Mark concluded that the limiting factors in cottage field are currently sulphur, potash and drainage which are resulting in a current yield average of 7.5t/ha

Can the Limiting factors be removed?

- Sulphur is very simple to address with N+S fertilisers or Sulphur granules
- Potash again very simple to address with Potash top dressings
- Drainage is having greatest effect on yield but is more complex and costlier to address

THEME REPORT

What effect is the poor drainage having on cottage field?

- Big fluctuations in average yield over ten-year cycle have been up to 2.5t/ha
- Total crop loss in areas of the field
- Cultivation costs increase with fuel, machine running costs and time
- Poor decomposition of organic matter
- Soil late to warm in spring, early to shut down in autumn
- Increased crop inputs e.g. slug pellets, seed, ag-chem
- Poor fertiliser and nutrient release

THEME REPORT

What is the value of these effects based on 8ha field size?

- Total loss of 1ha of crop =£1200
- Increased cultivation costs =£400
- Increased seed rates =£80
- Increased slug pellet use =£40
- Increased ag chem use =£160
- Poor Fertilises use =£80
- Total =£1,960 =£245/ha!!!!!

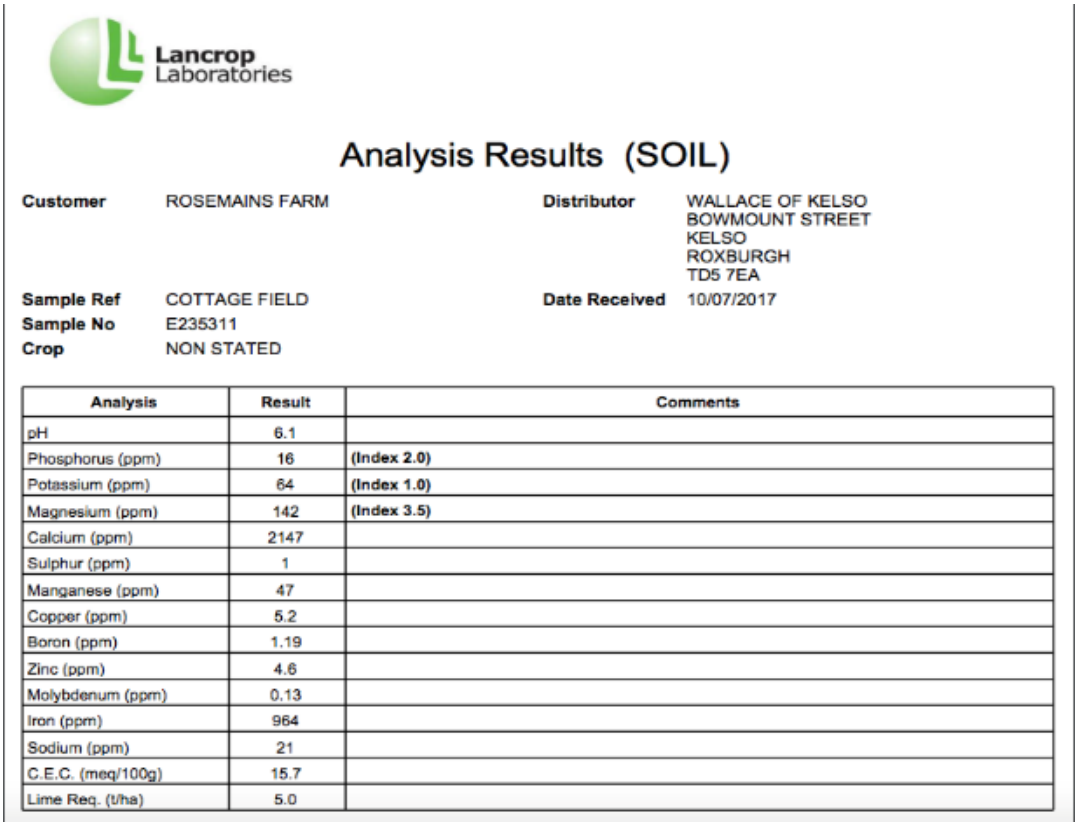
What effect is the poor drainage having on production costs?

Output from remaining (7ha @ 7.5t/ha = 52.5t @ £150/t)	= £7,875
Total output averaged over 8ha = 52.5t ÷8ha =6.6t/ha	= £990/ha
True production cost based on national data	= £1200/ha
True production cost for cottage field is therefore	= £181/t
Total loss for field is £1200 x 8ha=£9600-£7875	= £1,785

WHAT WE DID ON FARM

The group reviewed the base information from the farm and discussed broad spectrum soil analysis and excavated a soil inspection pit.
The following information was discussed and it was established that reviewing all the information below was best practice prior to doing drainage

- Broad spectrum soil analysis
- Soil pits
- Yield maps
- Soil maps
- Drainage maps
- Google earth



Lancrop Laboratories

Analysis Results (SOIL)

Customer ROSEMAINS FARM

Distributor WALLACE OF KELSO
BOWMOUNT STREET
KELSO
ROXBURGH
TD5 7EA

Sample Ref COTTAGE FIELD
Sample No E235311
Crop NON STATED
Date Received 10/07/2017

Analysis	Result	Comments
pH	6.1	
Phosphorus (ppm)	16	(Index 2.0)
Potassium (ppm)	64	(Index 1.0)
Magnesium (ppm)	142	(Index 3.5)
Calcium (ppm)	2147	
Sulphur (ppm)	1	
Manganese (ppm)	47	
Copper (ppm)	5.2	
Boron (ppm)	1.19	
Zinc (ppm)	4.6	
Molybdenum (ppm)	0.13	
Iron (ppm)	964	
Sodium (ppm)	21	
C.E.C. (meq/100g)	15.7	
Lime Req. (t/ha)	5.0	

Calculating the cost of Drainage

The group then estimated the cost implications of carrying out drainage work.

- Ditch cleaning at £1/m
- Drain jetting at £800/day
- Full replacement drainage system at £3,000-£5,000/ha

What is the cost to drain 8ha cottage field with full drainage system?

- Based on 8ha @ £5,000ha = total cost £40,000

THEME REPORT

What is the return on the investment on a per ha basis?

- Crop potential average of 12t/ha wheat with aim of achieving 15t/ha
- 12t/ha will represent an uplift of 4.5t/ha
- At £150/t this represents an uplift of £675/ha

What is the return on the 8ha of cottage field?

The following calculations were carried out by Mark to estimate the return on the full 8ha of Cottage Field if it were to be fully drained.

- We will now grow a full 8ha of crop at 12t/ha
- Total output of field is now 96t as opposed to previous 52.5t
- 96t at £150/t = an output of £14,400.
- Prior to drainage the gross output was 52.5t at £150/t =an output of £7,875
- This is an uplift of £6,525
- An uplift of nearly 90%

It was accepted by the group that the estimated yields were on the high side but the principles behind the calculations were correct. The less tangible savings associated with inputs and cultivations were also listed and the group accepted there would be some savings but not to the degree listed below.

What effect the drainage had on input costs?

- Cultivation costs reduced by £50/ha =£400
- Seed costs reduced by £10/ha = £ 80
- Reduced slug pellet use £5/ha = £ 40
- Reduced ag chem use £20/ha = £160
- Greater nutrient efficiency £10/ha =£80
- Total £95/ha =£760

THEME REPORT

THE RESULTS

Mark Hodkinson took the calculations which he had presented based on the assumptions above and estimated the input savings, plus the yield uplift would provide payback within 5.5 years

What is the accumulated increase in output?

- Increase from input savings £760
- Increase from yield uplift £6,525
- Total £7,285
- Increase in output/ha is now £910/ha
- Pay back on £5000/ha drainage investment is 5.5 years

What effect have we had on cost/t produced?

- Maintaining the £1200/ha standard cost of production
- We are now producing 12t/ha
- Cost of production is now £100/t as opposed to a loss making £181/t.

Theoretical Results Summary

- Cost/t produced reduced by £81/t to £100/t
- Cottage Field yield increased by approximately 90%
- We are now producing 90% more crop with lower input costs
- We have effectively bought 90% more land for the cost of £5000/ha [£2000/ac]
- The “extra land” is not costing anything for inputs apart from the drainage

Is drainage worth the investment?

- Payback period of 5.5 years on capital investment
- Drainage will keep working for at least another 20 years after payback period
- Effectively giving a return on investment of 15% per annum
- In addition, the extreme effects on cash flow from variable years have been reduced
- There is potential to achieve even higher yield which prior to drainage were only a pipe dream!

THEME REPORT

WHAT HAS CHANGED ON FARM

The drainage evaluation process, from information gathering and digging soil pits to the theoretical calculations has been of huge benefit to the group. Regardless of the figures used in the calculations, it was the decision-making process which helped the group understand what is required when deciding to drain or not to drain.

It was accepted, that drainage brings significant benefits and will provide good return on investment. However, with drainage historically financed from cashflow, many businesses struggle to find adequate funds for drainage. There was also discussion around drainage finance options which the group will continue to investigate. Currently, the Cottage Field has not been drained as the grain store project at Prestonhall Farms will take priority over the next 12 months.

FACILITATOR CONTACT DETAILS

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The Scottish Government

The European Agricultural Fund for Rural Development: Europe investing in rural areas

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