Cropping Environmental Management

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Crops are becoming an integral part of the dairy system. They can offer increased resilience for the farm, but they come with their own set of environmental challenges.

Farmers are concerned about the impact Regional Rules will have on their farm businesses. Most have strong desires to do the best for the environment, but they often don't know if their management systems are causing problems and if they are, what they can reasonably do about it.

A farm environment plan is a good place to start

Many regional rules require a FEP to be developed- usually by a farm consultant at a considerable cost. Farmers may view these as a necessary evil with no real benefits for the farm. This is not so, these plans provide a starting point to understanding how to manage environmental losses. The planning process identifies where the environmental risks are on the farm and then provides an opportunity to develop a structured plan to reduce the risks.

Many farmers find that the risks on their farms are quite low, leaving them with a small area to focus on.

The assessment of environmental risk requires some thought about the biophysical characteristics of the farm – soil, and topography, the climate and the management practices associated with the farm system.

Once you know what you are working with, then you have a chance of managing them.

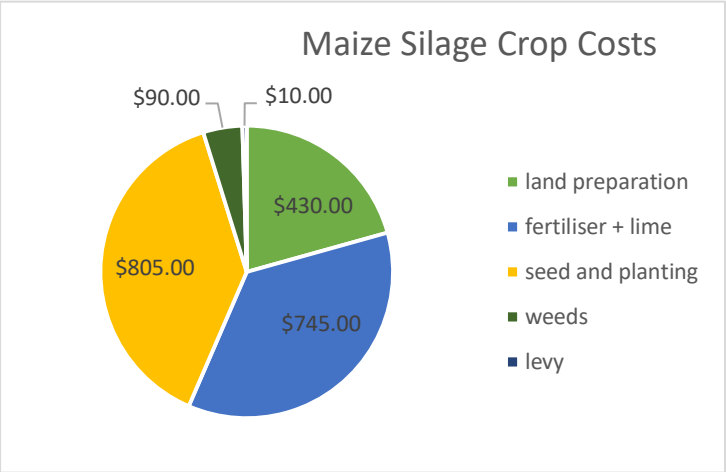
Environmental risks associated with crops - using maize as an example

The environmental risks associated with cropping arise from soil, nutrient and irrigation management. This applies to all crops, including grazed crops and pasture.

A strong mitigation to reduce environmental losses for crops is to manage the crop to reach its potential yield. Every farmer plans for a top yield, but sometimes things go wrong and the planned yield is not achieved. When this happens, there will be unused nutrients in the soil and consideration must be given to how these will be captured by the next crop.

Most management practices that optimise productivity also optimise environmental performance. When considering how to optimise the performance of a crop a good starting place is the gross margin.

The maize silage GM



Planting and establishment

39% of the maize silage production cost is associated with the purchase of seed, seed treatment and planting.

It makes sense to pay attention to ground preparation and the planting operation to ensure there is good establishment of the crop.

Paddock selection

Soil condition is important, maize is deep rooted - 1.8m, compacted soils constrain yield, by restricting root growth and altering drainage. Maize does not like wet feet.

Sloping paddocks have a high risk of soil loss during the crop establishment phase and during harvest. Consider minimum tillage practices.

Timing

Maximum yield is achieved by maximising the interception of sunlight by the leaves. Crops planted before the end of October intercept the most sunlight**.**

Crops planted too early in cold, wet soils are slow to germinate and may be uneven in their maturity.

Crop monitoring

Keep an eye on the crop during early establishment for pests such as slugs, greasy cutworm, and weeds. If weeds germinate after crop establishment, treat them sooner rather than later with an appropriate post-emergence herbicide programme.

Nutrient management

36% of the cost of production is associated with fertilisers and their application. Poor nutrient management is associated with nutrient losses to the environment, mainly nitrogen leaching and nitrous oxide emissions.

Efficient N management can be achieved by developing a fertiliser mass balance for the crop. This requires a crop demand number and an estimate of the soil supply.

A maize silage crop removes 12.8 kg N/T DM (8% crude protein) - a 25 T crop of maize silage removes 320 kg N.

Potential yield is the maximum possible yield provided there are no limitations to the crop. Limitations include: climate, weed and pest, soil limitations, water and nutrient shortages.

The soil supply is estimated by soil testing methods. Mineral N tests and AMN – potentially available mineral N tests are important. Quick test N strips can also be used for estimates of soil mineral N levels.

The amount of N supplied as fertiliser = Crop demand – soil supply.

High fertility soils

Cultivation after long term pasture releases N into the system from mineralisation processes, as much as 500 kg has been measured in cultivated soils following long-term pasture. Reduced tillage practices, slow this process down so the flush of N into the system is more controlled. Effluent paddocks also have high N loads.

In these circumstances soil testing is crucial and it is possible to grow the crop without any N fertiliser inputs.

Land management

21% of the cost of production is associated with land management. It is important that the soil environment doesn't constrain the crop's growth, so issues such as compaction and poor drainage must be dealt with before planting. However, if there are no constraints it is possible to reduce tillage practices and use strip tillage or direct drilling. FAR long-term cultivation trials have shown there are no yield constraints from reduced tillage and there are benefits to the environment, the crop and the farmer's pocket from reduced soil losses, better water holding capacity and reduced cultivation costs.

There is a poor environmental outcome if a crop managed for a high potential yield, fails to meet that yield. Nutrients supplied for the crop are available for the next crop in the rotation but are at a risk of being lost, if drainage occurs before the next crop has had a chance of mopping them up.

The benefit of crops in the dairy system

Two major pieces of FAR funded work have looked at the inclusion of crops in a dairy system as a method of increasing DM production.

At the Waimate West demonstration farm the aim of having 10% of the farm in crops improved the operating profit by $1000/ha. The benefits included the pasture renewal process - pests and weed cycles were disrupted, nutrients made available from mineralisation processes, the benefits of being able to feed maize silage when grass DM was in short supply.

A SFF project "The Other Side of the Coin" looked at maximising DM production over a twelve month period with a summer (maize) and winter crop. We found we could get high levels of productivity in our trials, 48.8 T DM production at the Waikato sites. This was achieved by manipulating the planting and harvest dates of the winter crop to maximise its DM production, sometimes at the cost of the maize yield. More information about these trials can be found in the FAR Focus "Crops for Cows".

Useful resources for dairy farmers learning about cropping.

- Crops for Cows. https://www.far.org.nz/assets/files/uploads/FINAL_Focus_10_-_Crops_for_Cows_sprds.pdf..
- Best Management Practices for Managing Maize on Dairy Farms. https://www.far.org.nz/assets/files/uploads/FAR+best+management+practices+-+web_2.pdf
- Browse our website for additional information about cropping: https://www.far.org.nz/