



**Submission to the  
Joint Committee on  
Agriculture, Food  
And  
The Marine**

**15<sup>th</sup> May 2018**

## Conservation Agriculture

Conservation Agriculture (CA) is an approach to managing agricultural ecosystems in a more sustainable and productive way while simultaneously regenerating previously degraded agricultural soils. CA offers increased family farm viability and local food security while preserving and enhancing the environment and ecosystems for all who inhabit them. The system is based on three key principles

Conservation Agriculture – 3 Key Principles (FAO, 2015)

- 1) Minimum soil disturbance (*Direct Drilling, little or no cultivation*)
- 2) Permanent soil cover with residues and living plants
- 3) Diverse crop rotations and the use of cover crops

It is widely practised farming system across the world on over 155 million hectares<sup>1</sup>. In Ireland Base Ireland members are practising these techniques on over 9500/ha, each year this is rising as our membership grows and starts the conversion process.

The revival of the interest in agricultural production already became evident during the Health Check as a consequence of climbing commodity prices in 2007/08. It is therefore no surprise that “rising concerns regarding both EU and global food security” is the first topic to appear in the list of justifications for the need for a CAP reform. Other challenges mentioned in this list such as sustainable management of natural resources, climate change and its mitigation, improvement of competitiveness to withstand globalization and rising price volatility.

The increased consumer interest in the sustainability of the food they are consuming has become evident in recent years with growing calls for increased environmentally sustainable approaches to production. The European Parliament in its communication to the Council, the European Economic and Social Committee and the Committee of the Regions, the European Commission defined the 3 general objectives for the future CAP:

- Objective 1: Viable food production
- Objective 2: Sustainable management of natural resources and climate action
- Objective 3: Balanced territorial development

We believe CA can help with all 3 objectives, it offers a viable alternative production system for both livestock and crops with reduced costs of production, a more sustainable integrated approach with a strong focus on the most important resource on any farm- the soil.

One of the main themes of CA is the protection of the soil. We often speak of food security and the potential impacts on food supply but the argument that it is soil security is of a larger importance. The soil underpins the whole production cycle of the foods we consume. This critical resource is under threat from our current farming practices. Advances in technology have allowed no-tillage seeding for example to become a viable alternative for crop establishment. Reduced cultivations as well as constant soil cover will help reduce soil loss through wind or run-off following heavy rain, which we are told will be a more regular occurrence under climate change.

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<sup>1</sup> Anon. 2018. *FAO:AG:Conservation Agriculture*. [ONLINE] Available at: <http://www.fao.org/ag/ca/6c.html>. [Accessed 11 May 2018].

## **Benefits of the CA Model**

### **1. Cleaner water.**

Reduced soil runoff and erosion through better soil aggregate stability, improved water infiltration, and a constant protective cover of the soil by crops and/or crop residues, this all helps reduce the environmental dangers of eutrophication and nitrates in drinking water etc.

A 1% increase in soil organic matter in the top 30cm will increase the water holding capacity by 144,000 L/HA (based on a bulk density of 1.2g/cm<sup>3</sup>)



**Picture: A field drain from a conventionally tilled field (L) vs a drain from CA field (R)**

### **2. The Sequestration of Carbon**

One of the main aims of CA is to get more carbon into the soil through increased soil organic matter and plant root exudates. Soil carbon levels can be increased through retaining crop residues, and the use of organic manures and composts in place of inorganic chemical fertilisers. Holistic grazing techniques can be used and more diverse cropping and grazing leys, using different plant species often in combination with each other in the same field for maximum benefits using plants with different root structures, especially deep roots which release exudates into an area of the soil where stable humus can be stored. More carbon in our soils means less in our atmosphere. Also from a soil physical side, carbon is important for soil structure, aggregate stability and fertility, allowing farmers reduce the fertiliser inputs required to grow crops and grass.

Soil cultivation by its very nature is designed to introduce oxygen into the soil. This oxygen causes the oxygenation of carbon in the soil (adding O<sub>2</sub> to C to form CO<sub>2</sub>, a gas which is lost to the atmosphere). No-till seeding technology has given the ability to reduce the need for heavy tillage systems based on the plough. CO<sub>2</sub> emissions are on the rise with the increased levels of economic activity in Ireland. The potential of farmland in Ireland to increase the amount of carbon stored in the soil is one which should be explored. The CA model is based on the positive effects of carbon, which provides an important food source for the soil microbiome, nutrient storage and cycling and soil structural benefits.

By reducing soil cultivation less carbon is released from the soil and also less carbon is used in the form of fossil fuels because of reduced diesel requirements. The CA system also places emphasis on the use of continuous soil cover through cover cropping in periods in between the cash crop. These cover crops capture sunlight through photosynthesis and nutrients which

otherwise would be either lost from being under increased risk of runoff.

Another key focus of Base Ireland members is the use of organic manures from a variety of sources including

- Farmyard manures and slurries
- Spent mushroom composts
- Poultry manures
- Brown bin composts from domestic and commercial sources
- Chopped straw and woodchips

The use of these organic forms of manure offers increased sustainability to the farming system. Organic manures contribute positively to improved soil health and provide a food source for a wide range of soil life, in stark contrast to using artificial fertilisers alone. While organic manures alone are beneficial when combined with the principles of conservation agriculture dramatic improvements in soil health and fertility are observed and the need for artificial fertilisers and chemicals are much reduced. CA farming in conjunction with organic manures will increase the carbon levels in the soil while also allowing farms reduce their dependence on inorganic chemical fertilisers which in the case of nitrogen is a very large part of farming's carbon footprint.

A 1% increase in soil organic matter in the top 30cm will increase the carbon by 132 Tons/HA (based on a bulk density of 1.2g/cm<sup>3</sup>). The potential to help offset carbon emissions will help Ireland to meet its targets which have been set for a reduction of 20% on 2005 levels.



**Picture: Catch Crop Sown in between 2 cash crops in flower**

### 3. Increase in soil life

Earth worms, beetles and other beneficial creatures all have their role in the circle of life in the ecosystems of our fields. We aim for a balanced ecosystem within our fields not the domination of one species which often would be an unwanted pest, aphid or slug for example which would then require control.



Picture: Diverse soil life under catch crops

### 4. Improved habitats for wildlife

A key part of CA is the rebalancing nature and promoting biodiversity through improved habitat provision, the absence of soil disturbance, protective soil shelter and diverse crop rotations including cover crops and companion cropping and multi species herbal leys. This all leads to an improved food source provision for birds and pollinators and other species, all the way up to apex predators like birds of prey.



Picture: A bee foraging on a flowering oilseed rape plant

## 5. Lower carbon footprint.

Savings in diesel requirements, a reduction in synthetic fertilizers and less wear on machinery all lead to a reduction in the carbon footprint of CA farms. This is also enhanced by the growth of cover crops, reduced tillage and livestock integration.



**Picture: Farmer sowing directly into a overwintered catch crop**

## 6. Reduced dependence on insecticides.

This is due to the promotion and preservation of the natural predators of these pests. All achieved due to measures detailed in points 1-4.

## 7. Farm Profit and overall farm viability.

CA model maintains productivity but delivers more from less. Reduction in the cost of production through using less inputs of energy, labour, machinery, fertilizers, water and pesticides are vital, (we detail this a bit more a little further in the submission) With recent reports of 1000 farmers a week leaving the industry across Europe, conservation agriculture has a role in helping to slow this decline through increased farm profitability. This increased profitability is centred on reducing the farms business models' exposure to factors out of control outside the farm gate. We are operating in a high cost environment and while we can't control what happens outside the farm gate we can however control our costs inside. The reduction of the Cost of Production (COP) can help to increase farm profitability and reduce the exposure of the grower to low farm gate prices.

The initial outlay for machinery required for a CA system is much reduced with one machine required to sow compared to traditional systems with a plough, cultivator and seed drill. Farmers who are practising this system are taking steps to reduce the exposure of their business with less capital tied up in depreciating assets.

With a large energy requirement from the use of cultivations on farms and the volatility of the price of diesel inputs, the savings potential from the switch to CA in fuel are quite significant. This information has been collected directly from our members comparing the traditional establishment pattern of plough followed by a one-pass of a rotary powered cultivator and seed drill in one compared to one establishment pass of a no-till drill (Table 2.).

<b>Traditional Establishment</b>	<b>Diesel Use (litres per hectare)</b>	<b>Diesel Cost * (€/hectare)</b>	<b>Conservation * Agriculture</b>	<b>Diesel Use (litres per hectare)</b>	<b>Diesel Cost * (€/hectare)</b>
Plough	15-25	11.25-18.75	No-till Drill	5-12	3.75-9
One-Pass (Till and Seed )	14-18	10.50-13.25	Roll	4-6	3-4.50
Roll	4-6	3-4.50			
<b>Total</b>	33-49	24.75.-36.50		9-18	6.75-13.50

**Table 2. Diesel use per hectare in 2 contrasting crop establishment systems**

\*based on diesel price on €0.75/litre

## **Climate Change, Agriculture and Conservation Agriculture.**

Agriculture in Ireland contributes approximately 30% of Ireland's greenhouse gas emissions (GHG). With current estimates showing a 5-7% rise in emissions mainly due to expansion of the dairy sector operating in the post quota environment. The EPA has reported that Ireland is set to miss targets set under the 2015 Paris agreement. Conservation agriculture offers a viable alternative to current production systems in many sectors of agriculture. The system is based on the protection of the most important resource on any farm- the soil.

The soil is an important pool of active carbon and plays a major role in the global carbon cycle. The carbon is stored mainly as soil organic matter (SOM). This comprises of both living and the remains of previously living organisms and plants. It plays an important role in maintaining soil quality as it influences a wide range of processes including nutrient cycling and storage, water retention and release, reduced risk of compaction and erosion. The practice of cultivation tends to reduce SOM as oxidation occurs during cultivation. The decline is gradual over time and has a detrimental effect on the processes on farm.

Possible climate change effects

- Rainfall patterns changing- organic matter will help hold water (reducing flooding) better structured soils will allow roots to travel deeper to access water. It is vital for water management in wet and dry soils.
- Temperatures- The soil will be insulated with the continuous cover as part of the system therefore offering protection from direct sunlight and snow/frost.
- Rainfall protection of soil surface reducing the harmful effects of heavy rainfall due to interception of raindrops before hitting a bare soil surface.
- Pest and disease pressure should decrease under CA.

## **Research and Scientific Support**

We feel that this alternative is not getting the attention it needs to help with the wider adaption and the promotion of the benefits to farmers, the environment and consumers of conservation agriculture.

We also feel that the research support of the Department of Agriculture, Teagasc and the Universities is required to help offer support when problems are encountered. The need for research funding to help generate data in an Irish context cannot be understated and it is essential to help support this system of food production while providing positive environmental benefits. This data will be useful in helping to develop future policy, marketing of Irish food and drink exports and providing family farms with a viable profitable farming system.

## **Conservation Agriculture and CAP post 2020**

Currently on our farms, BASE members are already going above and beyond the greening requirements as they stand in the current CAP in fact on some farms they have qualified for GLAS payments without doing anything more than they were already doing, some are even hindered in progressing their environmental improvements as they find the scheme restrictive on some levels.

There seems to be quite a swing in interest by many farmers into a more 'sustainable' way of farming, the problem is quite often people do not know where to start as there is little or no research done and the agricultural supply industry in the main are not supportive of the approach as in general it means farmers are spending less on farm inputs.

So, the question is how we come up with a CAP policy for 7 years beyond 2020 that will allow farmers to push on with Conservation Agriculture? For us it comes down to managing risk. We are convinced more would engage in practices such as low disturbance drilling, cover and companion cropping, diverse rotations, herbal leys, holistic grazing, wild flower margins and beetle banks to name a few, only for the fear that they will harm their profitability.

Research and Education are vital. We believe in the carrot rather than the stick approach. Research will need to be carried out in a way we have yet to see being done in Ireland, we need to devote resources to research with a systems approach rather than one single hypothesis. Education and knowledge transfer is key to enabling farmers about the natural capital which biodiversity brings, how we can create ecosystems within our fields to help combat our common crops pest whilst they will remain within our fields, they will not dominate in a way that we needed to control them using agrochemicals. We need to educate farmers, our advisors and our research agencies on soil fertility and mineral balancing, and how healthy soils grow healthy crops which feed healthy animals and provide humans with nutritionally better foods. We need more work on Integrated Pest Management (IPM), as it seems we are too quick to rely on the solution to our problems from a can of agrochemicals or the bag of inorganic fertiliser that we have become accustomed to turning to without thinking of the cause. We do feel that these 'tools' have a place necessary to keep up production levels which may sometimes fall off under some organic systems, but they should be tools of last resort. We feel much of the current farming models being pursued are based on spending more to maximise output, but it is not necessarily the road to farmers profit. This we feel is a dangerous game and not the right approach to ensuring family farm viability.

We would like to mention a few ideas that could be examined under a new CAP including

1. A support to new entrants to CA, one like Organic Conversion. This would allow farmers to drop inputs and allow a rebalancing of ecosystems within their fields and reduce the risk/fear of a temporary drop in production. We do not anticipate a large drop, and indeed many have converted with no drop and even an increase but as in all things mistakes can be made in learning a new system and it seems to be a barrier to new entrants in an ever-tightening financial environment in agriculture.
2. TAM's has allowed farmers to invest in machinery and technology such as No-Till drills and Precision Ag equipment. This should be continued.

3. Environmental schemes should as GLAS should be retained but improved upon and more people should be encouraged to join.
4. Better funding into researching lower input systems, using more natural solutions to our agronomy or animal health issues on farms, examples could be, nitrogen fixing crops, pollinator strips, beetle banks, low disturbance crop establishment systems, cover and companion cropping, herbal leys with natural anthelmintic properties. These are a few examples but there are many more ideas.
5. Funding for the wider knowledge transfer benefits of the CA system
6. The direct payment scheme should be flexible to allow farmers to be opportunistic in putting in for example, wild flower areas or beetle banks without farmers feeling they may be penalised by an inspector with a measuring tape.
7. Direct payments should continue to farms, but obviously we would like and we think the EU and the taxpayer also would like to see more funding diverted into farms practicing more sustainable/environmentally friendly systems like CA. We would ask for similar recognition that the organic farmers receive under pillar 1.

### **Conclusion**

Going forward we would like to engage with necessary stakeholders to help develop and promote CA to the wider farming community. We believe this system will provide a much needed beam of hope for an industry which is suffering at a time of high costs of production in a challenging farming environment. We would like to gain some support and reward for the positive farming methods we are employing on our farms as this is offering a real solution to reducing our environmental impact.