



# McDonald's Europe Flagship Farms Cereals – Autruy-Sur-Juine, France

The focus of this case study is to show how European cereal production can yield high-quality milling wheat whilst undertaking practices which protect and enhance the local natural habitat and reduce the environmental impact of modern farming.

The McDonald's Flagship Farms scheme has been developed in co-operation with the Food Animal Initiative to showcase good agricultural practices which are environmentally sound, economically valuable and ethically acceptable. A limited number of 'flagship' farms have been selected from within the McDonald's supply chain to represent progressive agricultural practice.

The following matrix has been developed by McDonald's to help assess sustainability within the agricultural supply chain. Farms selected demonstrate good practice in at least one of the matrix key areas, whilst also operating to generally high standards in all other areas.

Symbols are used to highlight good practice in environmental, economical and ethical issues.

## McDonald's Good Practice Matrix

### Ethical (acceptable practices)

**Human health & welfare** ✓  
 i Employee health & welfare  
 ii Food safety ✓

**Animal health & welfare**  
 i Nutrition  
 ii Medication & growth promoters  
 iii Genetic selection  
 iv Animal cloning  
 v Husbandry  
 vi Transport  
 vii Slaughter

**Business ethics & supplier relationships**  
  
**Rural landscape preservation**

### Environment (protecting the planet)

**Climate change**  
 i Greenhouse gas emissions  
 ii Energy efficiency & renewables

**Natural resources – water** ✓  
 i Water pollution ✓  
 ii Water usage efficiency

**Ecosystem protection** ✓  
 i High conservation Value Land (HCVL)  
 ii Habitat & species preservation ✓

**Natural resources – soil** ✓  
 i Soil fertility & health ✓  
 ii Soil erosion, desertification & salinisation  
 iii Soil contamination

**Natural resources – air**  
 i Air emissions  
  
**Agrotechnology**  
 i Agrochemical usage  
 ii Bioconcentration & persistent organic pollutants  
 iii Genetically modified organisms

**Waste**  
 i Production waste  
 ii Hazardous waste  
 iii Waste to landfill

### Economics (long-term economic viability)

**Sufficient high quality production** ✓  
 i Producer income security & access to market ✓  
 ii Agricultural input costs ✓  
 iii Crop & livestock disease

**Community investment** ✓  
 i Local employment & sourcing  
 ii Support for community programmes ✓

✓  
 Good practices demonstrated in this case study

## Executive summary

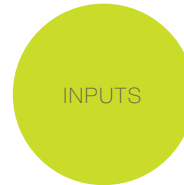
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### Key areas of good practice:

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A purpose-built facility stores all of the farm's plant protection products. This locked, bunded and heated facility ensures that no stored chemicals can leak into the natural environment.



One of the most expensive fertiliser inputs is nitrogen and it is also one of the most easily leached from the soil. The farm therefore undertakes soil testing for nitrogen at the beginning of spring to calculate forthcoming application rates.



The farm is a member of the Arvalis Charter farm assurance scheme which requires the farm to comply with specific standards relating to the environment, production methods and food safety.

Later in the season crop stem samples are tested to calculate plant nitrogen levels, which are used to determine final application requirements, which ensure protein levels in the grain are suitable for milling.

The farm has also undertaken the commitment to join the Exploitation Qualifiee scheme, which is an integrated farm management approach, enhancing the positive impacts of the agricultural practices on the environment and reducing adverse effects, without jeopardising the economics of the farming enterprise.

Cooling stored grain (target <12 °C) with ventilation fans helps eliminate the need to treat the grain to control storage pests (which can rapidly multiply, causing extensive damage and quality losses in grain). Cooling the grain reduces the risk of mould formation, which is most likely at ranges of 15°C to 25°C, and is a risk to food safety.

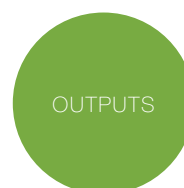
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### Additional areas of good practice:

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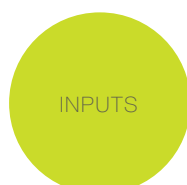


The farm has been a member of a local cooperative for over five years. The cooperative provides technical advice and assistance. It also purchases all the required farm inputs which are sourced at discounted rates due to their purchasing power. All the grain is marketed through the cooperative which ensures the farm receives the best market price for their products.






The farm has made the most of its geographic position and soils to produce a high-quality, in-demand milling wheat and receives a premium price for this product.

This also allows the millers to be able to source high-quality locally-grown wheat, avoiding importing wheat from the USA and Canada.



Both the sprayer and fertiliser spreader are regularly calibrated to ensure that the products applied by these machines are placed as accurately and precisely as possible.

## Summary of actions and benefits

Action		Benefits		
		Environment 	Economics 	Ethics 
<b>Management</b>	Member of Arvalis Charter farm assurance scheme and Exploitation Qualifiee	Standards in place which protect and enhance natural habitats on the farm	Product is more marketable to the manufacturer and consumer	Aspects of food safety included within standards
	Member of a local cooperative		Plant protection products, fertilisers, seed etc are purchased by the grower association with cost savings passed onto the farmer. Grain is also marketed achieving a higher price for the farm	
	Owner attends regular training courses and is a member of Agriculture Raisonnee, a farmer's working group sharing ideas on best practice		Ensures technical knowledge is up-to-date and based on the most recent research	
<b>Inputs</b>	Testing soil Phosphate, Potash, and trace element levels	Reduces risk of environmental pollution via over application	Testing is carried out every five years and ensures these expensive inputs are targeted to soil indices and crop requirement	
	Annual soil and plant Nitrogen testing undertaken	Reduces the risk of Nitrogen leaching out of the soil and into surface waters	Nitrogen testing ensures applications are closely linked to plant requirements and uptake	
	Air cooling stored grain and temperature monitoring	Eliminates the requirement to use chemicals to control storage pests (insects)	Cheaper alternative to chemical control	No chemicals used on stored grain and reduced risk of mould increases food safety
	Sprayer and fertiliser calibration	Avoids over-application of products leading to potential pollution	Ensures that plant protection products and fertilisers are applied precisely and accurately	
<b>Operations</b>	Purpose built pesticide store	All required plant protection products are stored in the safest method and any potential spillages are securely contained		
	Correct disposal of sprayer washings	Decreases the risk of environmental pollution		
<b>Resources</b>	Working closely with neighbour to share machinery		Reduces the need to have an extensive range of equipment	
	The farm is within an EU area designated The Natura 2000 Network	This network makes up part of the largest coherent network of protected areas in the world and is a testament to the importance that the EU attaches to biodiversity		
<b>Outputs</b>	Producing high quality milling wheats	Reduces the need to import high quality wheat from outside of Europe (reduced food miles)	Producing a quality marketable product	Producing a quality marketable product
<b>Community</b>	Local farmers organise a litter picking day			Improves the areas visual aspect for all local people and visitors

## Introduction

France's agriculture continues to be a very important segment of the economy, although it only provides 4% of the employment. France is the only European country to be fully self-dependent with regard to food production and is the European Union's leading agricultural exporter, accounting for about 17% of all agricultural land within the EU-27. Agriculture and related food industries accounted for 2.0% of France's GDP in 2006. French agricultural production grossed \$86 billion, or about 23% of the agricultural production of the European Union in 2006. Northern France is characterised by large grain farms. Dairy, pork, poultry, and apple production is concentrated in the western region. Beef production is located in central France, while the production of corn, fruits, vegetables, and wine ranges from central to southern France.

Christophe Guerton's parents originally started farming 155 hectares of rented land in the region of Autruy-Sur-Juine and in 1982 they purchased 133 of these hectares. In 1993 Christophe took over the running of 155 hectares from his parents and in 2002 he rented another 40 hectares of land to bring the total farmed area to 195 hectares.

The main rotation over the chalky clay soils is winter wheat, barley and oil seed rape, peas and carrots which are grown for seed. The two wheat varieties grown are Courtot and Galibier, which are grown for their suitability as milling wheats.

The farm is a member of a cooperative which has over 120 members farming in excess of 12,000 hectares.



## Management

Modern day farming is now a business which abides by strict rules and regulations and becoming a member of the Arvalis Charter farm assurance scheme ensures that guidelines are independently inspected and verified by a third party. This gives assurances to the purchaser and consumer of the wheat that the regulations have been met throughout the growing and storage process.

Exploitation Qualifiee is a scheme which recognises the importance of Integrated farming. This is a holistic approach to farm management, enhancing the positive impacts of agricultural practices on the environment and reducing any undesirable results, without adversely affecting the economics of the business. The requirements cover record keeping, fertiliser storage and applications, crop rotations and pesticide storage (along with justification for use). All practices or operations carried out must limit any risks to human health and the environment. Other aspects cover protecting the landscape and maintaining biodiversity on the farm.



Membership of independently-audited assurance



schemes and a local cooperative enable the farms to work to high environmental standards whilst also benefitting financially.

The farm is a member of a local cooperative which has over 120 members, farming over 12,000 hectares of land. This collaboration enables the farm to potentially increase its income in a number of ways, including raising the general price for the grain marketed, reducing the costs of supplies purchased, and reducing handling or processing costs by assembling larger marketable volumes of grain. By amalgamating supply purchases, sales, handling and selling expenses, the cooperative works more efficiently and at a lower cost per unit than the farm can individually. Another important aspect of this partnership is the technical advice and help offered on issues such as plant protection products and fertiliser use, giving the farm a valuable source of information.

Christophe Guerton attends regular training courses to improve and broaden his knowledge and skill base. This allows him to maintain the competence required in this diverse industry. The training enables Christophe to undertake his role effectively and accurately and allows him to acquire non-technical knowledge and skills, such as management techniques, communication, health & safety, environmental and employment law, which can improve the business. To date, Christophe has attended courses on good spraying practices, safe use of pesticides, harvesting equipment settings and adjustment, business cost analysis and environmental protection.

## Inputs

### Soil testing

The farm carries out soil testing for Phosphate, Potash, Magnesium and pH on all the fields every five years. The soil test reports provide information influencing annual fertiliser recommendations and application rates which optimise fertiliser input. This approach maximises yields and returns, whilst avoiding over-application, which wastes time and money and substantially increases the risk of environmental pollution due to nutrient runoff. This provides a great management tool which potentially increases wheat yields and provides superior environmental risk management. This is especially important for the farm as it operates within the strict environmental criteria laid down by the schemes it participates in.

*"Annually several million Euros are spent on farm fertilisers and the cost of soil testing is relatively inexpensive in comparison to the costs of the products being applied."*

### Sulphur application

The farm also applies liquid Sulphur to the growing crop, as this element is an integral part of the plants proteins, and deficiency results in poor crop growth and quality. The need to apply Sulphur is due to the large reductions in emissions from industry which has led too many soils (light to medium) becoming deficient in this important element. Trial work has shown that significant yield increases can be achieved via applications of sulphur, although the research suggests the best responses were found to be on lighter sandy soils.

### Nitrogen application

Nitrogen is the nutrient with the greatest influence on crop yield and quality, through effects on chlorophyll and protein production. It is of primary importance environmentally as well as economically. To this end the farm undertakes routine annual soil testing for nitrogen concentrations in the early part of the year (February), enabling the farm to calculate an application programme which meets the demands of the plant. The testing ensures that ideal nitrogen levels can be maintained in the soil to optimise plant growth and yields whilst avoiding the potential of over-application which is damaging to the environment and economically costly.

The next step in nitrogen planning is the testing of wheat plant tissue which is sent for nitrogen analysis. This then gives a recommended application rate for the final amount of nitrogen required. The nitrogen level in the plant is crucial at this period as it directly affects the protein levels in the grain, which are vital if the grain is to be of milling quality.

*"One way to reduce N losses is to develop and apply technologies that enable farmers to more accurately match the amount and timing of input application to crop growth needs. Soil and tissue N tests are designed to reduce uncertainty about available N. So long as the benefits from this information exceed the cost of obtaining it, adoption would improve farm profitability and reduce environmental costs."*

**(Source: American Journal of Agricultural Economics, Economic and environmental implications of soil nitrogen testing: a switching-regression analysis by Keith O. Fuglie, Darrell J. Bosch, November 1995)**

### **Air cooling grain**

Air cooling grain is easily the most simple and effective way of controlling insect activity within stored grain. The farm's wheat is stored in six round bins with a 600 tonne capacity. Once the grain is harvested and any necessary cleaning and conditioning has been carried out, the first temperature target is to cool the grain to below 20°C and then below 15°C. Temperatures below 15°C prevent the saw-toothed grain beetle from developing. This is one of the most serious bulk grain storage pests as it has an exceptionally high breeding potential and severe infestations can cause localised temperature increases, leading to sprouting and high economic losses. The final temperature target is below 12°C. At these temperatures insect breeding stops and therefore populations cannot increase. The stored grain temperature is monitored constantly and checked regularly to ensure that targets are being achieved and to see if aeration fans need further running.

*"Blowing ambient air through the bulk store is a low cost way to cool grain, 5–10 pence per tonne."*

**(Source: HGCA, The Grain Storage Guide, 2nd Edition)**

Another advantage in reducing the temperature of stored grain is that it limits the growth of moulds which may produce mycotoxins.

*"Insects are a major cause of damage. Field insect pests and some storage species damage grain on the head and promote fungal growth in the moist environment of the ripening grain. In storage, many insect species attack grain, and the moisture that can accumulate from their activities provides ideal conditions for the fungi. To avoid moisture and mould problems, it is essential that numbers of insects in stored grain be kept to a minimum."*

**(Source: Food & Agriculture Organisation of the United Nations, Mycotoxins in Grain)**

### **Equipment calibration**

Currently in France there is a legal requirement that all agricultural sprayers are professionally calibrated every 5 years. The farm has increased this frequency by undertaking the tests every 3 years; an added expense, but one that can be justified by the knowledge that the sprayer is working efficiently and accurately, ultimately leading to improved environmental protection. As the plant protection products are accurately applied they should be expected to return an economic benefit to the business. Inaccurate application, whether due to operator error (see Management) or most likely sprayer error, is usually very expensive and results in squandered chemical, poor pest control, or even crop damage. For these reasons the farm feels that increasing the frequency of calibration is an overall benefit.

*"Studies have shown that many application errors are due to improper calibration of the sprayer. A North Dakota study found that 60 percent of the sprayers were over or under applying pesticides by more than 10 percent of their intended rate. Several were in error by 30 percent or more. A study in another state found that four out of five sprayers had calibration errors and one out of three had mixing errors."*

**(Source: Vern Hofman and Elton Solseng "Spray Equipment and Calibration" Agricultural and Bio-systems Engineering, North Dakota State University, 2004)**

The farm regularly calibrates their fertiliser spreader with the use of collection trays. A working pass is made in the field with the tractor and spreader over the trays; a proportion of the fertiliser will fall into the trays which is then collected and weighed. From this data the Coefficient of Variation (CV) can be calculated for the spread pattern and any necessary adjustments can be made. The benefit of the farm undertaking this process is that the spreader can be set up for different fertiliser types and regular testing can be easily undertaken in the field. Fertiliser prices have risen dramatically over the last few years and the need to reduce costs has become critical. This demonstrates that the farm's approach to applying fertilisers is correct, ensuring this expensive product is applied accurately and precisely to get the best possible economic return for the investment.

Applying 200kg N/ha of a SP5 34.5% N fertiliser trading at £325/t (€362/t) (source: Farmers Weekly Fertiliser Update 2009). Using a fertiliser spreader with a CV over 20% would cost £28/hectare (€31/ha) of nitrogen lost to leaching due to inaccurate spreading.

The farm's fertiliser spreader has a headland kit fitted to the machine to avoid spreading fertiliser into the field margins and hedges when working on the field perimeters. This equipment reduces the distance the spreader throws the fertiliser and keeps it on the cropped area. This is extremely important as this fertiliser may find its way into areas where it is not required (wasteful) or may potentially cause environmental pollution.

**Why Calibrate?** (See table 1)

"A comprehensive calibration could cost as little as 79p (88 € cents) per tonne on a typical farm using 150 tonnes of fertiliser a year. This is very cost-effective when you consider the loss of yield from under applying, or the extra cost of unnecessary fertiliser associated with over application. Calculation of the effects of poor spreading suggest that, for cereal crops, a relative low CV (Coefficient of Variation) of 15% will increase nitrate leaching by 8% compared with 'perfect spreading'. This increases to approximately 13% at a CV of >20%. These results indicate that fertiliser spreader calibration is effective in reducing nitrate leaching."

(Source: WAgriCo fertiliser spreader calibration results)

Norbert Rauch says: "All current twin-disc spreaders work using large overlaps. This means that a spreader with a working width of 24m may actually throw fertiliser across 48m in any given pass. So, if you don't have a headland spreading kit, and you're working on a 12m-headland tramline, you'll end up throwing quite a bit of fertiliser across the boundary." For example, at an application rate of 300kg/ha, a typical twin disc machine can throw as much as 40kg of fertiliser into a hedgerow over a length of just 100m!"

(Abstract from Irish Farmers Journal 06/12/03, New spreader standard aims to cut waste.)



Regular soil and nitrogen testing, and calibration of spraying equipment, enables accurate application of optimal amounts; reducing the risk of environmental damage and saving unnecessary costs.



## Operations

The farm has a purpose-built pesticide store. This is situated near to the machinery shed, which allows easy access and delivery of products while also being close to the point of use. The store is constructed of metal and has one entry door which is secure and locked. The store itself is insulated and heated with rows of banded shelves available for storage, and the integral floor is also banded. The store is constructed of metal so will resist fire and contain any spillages that may inadvertently occur, offering the highest possible environmental protection.

**Abstract from: Key features of Pesticide Storage (Voluntary Initiative, Pesticide Storage Leaflet)**

**Well Sited**

- Convenient access for delivery and collection
- Away from ponds, watercourses, wells, boreholes and areas liable to flooding
- Separate from buildings housing: hay, straw, fertiliser, fuel and other combustible materials

**Easy to use**

- Easy access for the spray operator
- Good lighting so that labels can be read
- Comfortable shelf heights
- Readily accessible shelves
- Capacity large enough for peak requirements and for rinsed empty containers awaiting disposal
- Well ventilated
- Dry and frost-free
- Containers and their labels protected from sunlight

**Secure and safe**

- Capable of retaining spills and leaks i.e. bunding
- Lockable
- Marked with a warning sign
- Proof against theft and vandalism
- Made from fire resistant materials

Once spraying has been completed a small amount of water is placed back into the sprayer and circulated around the system. These washings are then sprayed back onto the treated field (whilst guaranteeing that maximum dose rates are not being exceeded), ensuring that the disposal of sprayer washings reduces the risk of any environmental impact.

*"The best place to clean the sprayer is on an unsprayed or under dosed area of the field last treated. The field is also the best place to clean the exterior of the sprayer."*

**(Source: The Voluntary Initiative, Sprayer Cleaning. October 2008)**



Well-designed storage and pesticide handling areas prevent environmental contamination.

## Resources

Working closely with a neighbour, machinery resources are shared. This allows capital intensive equipment to be used in the most cost-effective manner, and means a full complement of agricultural machinery is not required to be purchased to operate the farm efficiently.

The farm is part of the Natura 2000 network which is an EU initiative committed to the protection of biodiversity. There is a political commitment to halt biodiversity loss within the EU by 2010. Over the last 25 years a vast network of over 26,000 protected areas covering all the Member States (around 850,000 km<sup>2</sup>) has been developed, representing more than 20% of total EU territory. This vast array of sites is the largest coherent network of protected areas in the world.

*"The legal basis for the Natura 2000 network comes from the Birds Directive which dates back to 1979 and the Habitats Directive from 1991. Together these Directives constitute the backbone of the EU's internal policy on biodiversity protection. But protected nature areas do not exist, and certainly cannot thrive, in isolation from the rest of the land. We need to ensure that our agriculture as well as our regional, energy and transport policies are sustainable and that Europe's natural capital- its biodiversity, is conserved and protected."*

**(Source: The EUROPA website)**

Being a part of the Natura 2000 network shows the importance of the farm's geographic location and the biodiversity already on site. The farm has adopted some new concepts such as planting herb/grass strips along river banks which helps reduce the risk of pollution entering the water course.



Participation in Natura 2000 demonstrates the farm's commitment to protecting the biodiversity of the local environment.



## Outputs

The key to growing good quality milling wheat is the choice of variety. The farm uses Courtot and Galibier which are both excellent milling wheat varieties and consistently achieve a milling premium. The farm has identified the importance of understanding local and national wheat demands, and by consistently achieving these high-quality requirements has achieved a reliable market for their product with strong economic returns.

*"The shortage of milling wheat has led to UK farmers being offered a premium of as much as £50 a tonne (approximately €57 at today's rates) for their best quality crops."*

**(Source: BakeryandSnacks.com, 09/12/08)**

## Community

The farm is involved in an organised litter pick and clean up of the local and surrounding areas with other likeminded farmers. This goodwill expressed by the farming community has tangible (as the area is visually cleaner) and intangible (by community engagement and spirit) benefits.



Support for local community programmes bring benefits to the local environment and the community.



## Future Plans

The farm plans to construct a concrete bunded filling area for the sprayer. The sprayer will be parked on the pad and filled with water and any necessary plant protection products. If any spillages do occur, however minor, they will be retained in a secure collection tank.

*"A significant proportion of pesticides reaching ground and surface water may come from pesticide handling areas. Water is vulnerable from tiny splashes and spills that occur when filling the sprayer and when rinsing the container. Inappropriate wash down, cleaning and disposal activities can also have significant adverse environmental impact. Just one dropped foil seal can contain enough pesticide to increase residues above the 0.1ppb standard in 30 km of stream. In one study it was possible to reduce the pesticide residues coming from the handling area by 99%."*

**(Source: The Voluntary Initiative, Pesticide Handling Areas. October 2007)**



## Appendix

The principal France agriculture products, status in the European Nation, world position and capacity are given below in a tabulated form:

Principal France agriculture products	Status in the European Country	World Position	Capacity (in million tonnes)
Oilseeds	1st	-	4.1
Cereals	1st	8th	12.5
Beef and Veal	1st	6th	1.8
Sugar beet	1st	2nd	29
Wine	2nd	2nd	5.3
Milk	2nd	5th	23.3

**Table 1**

Results from the 18 spreaders tested in 2007 showed:	Results from the 17 spreaders tested in 2008 showed:
Of 18 tested, 60% required some form of adjustment/repair	All bar two machines had either worn parts, unbalanced rate application or incorrect spread pattern
5% were in such poor condition realistically they should be replaced	65% required replacement of wearing parts, e.g. vanes
10% required mechanical repair to perform accurately	6% required mechanical repair before they spreading correctly
22% required replacement of wearing parts to improve spread pattern	53% required an adjustment of the spread pattern
22% required static calibration for application rates to balance	18% of the machines needed to be balanced for rate of application across the bout
	42% of the machines presented were applying SP5 rated product with standard machine settings
	68% of the products tested used a variety of blends and compounds that have no setting

*"The challenge for modern day farming is working in a way which benefits both the environment and the economics of the farming business. The work and practices being implemented on this farm show that this can be achieved whilst still being able to produce a quality product which is very much in demand.*

*Being part of the Natura 2000 network and Exploitation Qualiffee has not been detrimental to the business but has been used as an opportunity to improve working practices, reduce input costs and increase returns.*

*Not all farms have the soil type or climatic conditions to be able to grow milling wheats, but this is as much about using the available resources and producing a product that the market wants and is willing to pay a premium for. The farm has a focus and direction which will steer it long into the future."*

**Karl Williams, Flagship Farms Programme Manager, FAI**