Ferme de Bulas – France

One Step Ahead with Sustainable Agriculture

Bayer Forward Farming

“Farming and sharing is at our heart”

Swathes of crops punctuated by woods and villages boasting opulent farmhouses: this open, rural landscape is the Beauce plain, one of France’s most fertile agricultural areas.

At the heart of this region we find Ferme de Bulas. The farm, dedicated to field crops, is managed by Dominique and Pascale Pétillon, alongside their son Jérôme and employee Stéphane Souchay. Located in Houville-la-Branche, near Chartres, the farm represents 440 ha of sustainable production, fortified by the knowledge of three generations of farmers.

“Opening up our farms is essential to changing the public image of our business,” says Dominique. “Whenever I receive groups, whether they are politicians or consumers, they are astonished at the level of technology we use to manage our crops, even if nature remains our number one tool. This educational approach means that stereotypes soon fade away. Our explanations are backed by concrete proof of our actions to protect biodiversity and water, and preserve our soils, all the while providing quality agricultural produce.”

“Our day-to-day challenge is dealing with the vagaries of the weather while meeting the requirements of our customer specifications, thereby maintaining our technical and economic results while progressing with the other aspects of sustainable farming. This flexibility is built into our DNA, as we are the third generation to manage this farm.”

“Our watchwords? Providing quality, diversified production while building a sustainable legacy. We not only want to communicate better, but also to progress, and this chimes perfectly with the Bayer ForwardFarming program. This path allows us to constantly question and evaluate our practices using a systemic approach.”

Dominique, Jérôme and Pascale Petillon,
Ferme de Bulas

ForwardFarmer Dominique (m), together with his father Fernand (l), and his son Jérôme (r)

Sustainable Farming at *Ferme de Bulas*

Farm Profile

Location:
Houville-la-Branche, Eure-et-Loire, near Chartres, France

History:
Ferme de Bulas has been family-run for three generations. This legacy continues as Jérôme, the son of Pascale and Dominique, joined the farm in 2016.

Farming Land:
450 ha of cultivated farmland, mostly silty clay. Half is dedicated to certified seed production, with demanding specifications on sanitary quality.

Crops:
Cereals, canola, sugar beets, protein peas, potatoes

Partners:
Fédération des chasseurs d'Eure-et-Loir (Eure-et-Loir hunters' federation), beekeepers, Hommes et Territoires (sustainable agriculture association), Laboratoire d'Eco-Entomologie d'Orléans (Orléans Eco-Entomology Laboratory), Axereal (grain cooperative)

Key Elements

1 ***Precision farming:***
GPS-guided work tasks (sowing, spraying, fertilizing and harvesting) to optimize fuel and input use.

2 ***Rational crop protection applications:***
In cereals, fungicide applications are made with the help of an advisor supported by a decision-making tool called Positive®.

3 ***Innovative application techniques:***
Sprayers equipped with drift control and automatic boom section control.

4 ***Fertilization management:***
Optimized nitrogen application taking into account evaluations made with the FARMSTAR decision support tool provided by the Axereal cooperative.

5 ***Integrated weed management:***
Adjusted weed management program and extended crop rotation (integration of pea protein) in the areas with resistant black-grass.

6 ***Good sowing practices:***
Implementing measures to limit the presence of grain on the soil surface which could be eaten by wild animals when sowing.

7 ***Farming and beekeeping:***
The farmer and beekeeper have signed an apiculture and agriculture best practices charter to protect bees on the farm.

8 ***Biodiversity:***
Monitoring of biodiversity such as flora, birds, worms, pollinators, beetles etc. Hedges and strips of corn have been integrated into fields to benefit wildlife.

9 ***Safe product storage and handling:***
Modernization of the product storage and sprayer filling area to improve working conditions and safety for workers and the environment.

10 ***Phytobac:***
The bioremediation system ensures optimal on-farm wastewater management.

11 ***Partnerships:***
Bayer ForwardFarming builds on existing partnerships to leverage expertise and skills.

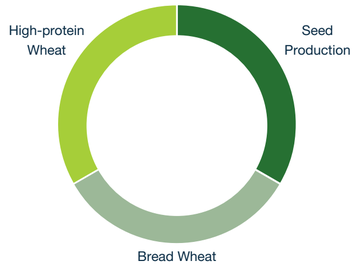
Tailored Solutions Proactive Stewardship Partnerships

Matching quality *with yields*

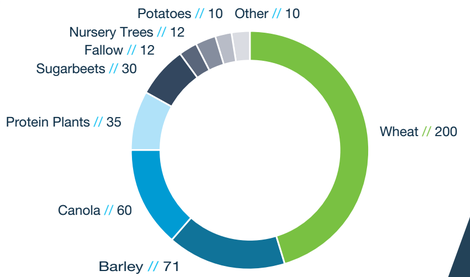
"Although the farm once had sheep grazing cereal stubble, the focus is now firmly on arable crops," says Dominique Pétillon. "We have two strong production focuses – seed production and producing high-protein wheat. Both of these are very demanding in terms of crop care and the quality required by the market. The crop rotation includes potato, sugar beet and canola."

All crops in the rotation are subject to the same objectives: yield, quality and maintaining soil fertility. To achieve this, crops must also be in good health and weeds controlled. Fertilization is adjusted according to the plant's nutrient needs.

200 ha dedicated to wheat:



240 ha dedicated to other crops:



"Crop rotation is important to me because of both its agronomic benefits and the fact that it gives my income a broader and more secure basis."

Dominique Petillon, Ferme de Bulas

Seeking
protein rich wheat

To ensure crops cope best with specific soil, water and climatic conditions and minimize pest and disease damage, the farm uses high quality seeds with appropriate traits and seed treatments. This boosts crop efficiency and enables plants to develop their full genetic potential. In turn, it also helps to optimize use of resources such as soil, water, fertilizer and crop protection.

The final use of the harvested crop also has an influence on crop management. The flour-milling sector, for example, requires protein-rich wheat to guarantee bakers-quality dough. Protein level is also the number one criterion for crops destined for export, either within the European Union or further afield. Dominique has developed his expertise and farming focus on producing high quality wheat. His objective is to produce 'premium' wheat with a protein content of 11.5% or above, allowing him to secure a higher level of income. To achieve this, he precisely controls nitrogen fertilization, providing just the right quantity and positions fertilizer inputs according to the crop's need and to avoid nutrient losses to water sources. Plants must be able to ensure their foliar growth at the end of winter and avoid any nitrogen deficiency during grain filling.

The FARMSTAR tool, offered by the Arvalis technical institute, in conjunction with technicians from the Axereal cooperative, analyzes crop growth using satellite or drone images. It measures the fraction of solar energy reflected by the crop canopy and this data, combined with agronomic models, integrates the meteorological and crop characteristics of the fields. Prescription cards are generated and can be used directly by farmers. The key element is an in-field variation in the nitrogen dose for late wheat inputs. This variation is managed by GPS during fertilizer application. Using remote sensing during harvest makes it possible to verify the adequacy of the variations in nitrogen doses.

Ensuring the
highest quality standards

"Protecting my crops against weeds, diseases and pests is essential to securing my yields and meeting quality standards – I do this in an integrated manner," Dominique explains.

Seed production is an important source of income at Ferme de Bulas and the requirements of this sector are demanding. There must be no weed contamination in seed crops and their health must be exemplary. A regrowth of wild oats in wheat, for example, guarantees that the entire batch of seeds harvested in that plot will be rejected! The reasoning is similar for potato crops: if there is a risk of late blight contamination, the slightest blip in protection makes the crop unmarketable. The solution is unwavering attention, following changes in disease and pest pressure and monitoring weed growth through regular field inspections and using decision support tools.

A rigorous integrated pest management approach also applies to crops destined for processing. For example, durum wheat must be guaranteed to be free of the mycotoxins which can develop with Fusarium wilt. The protection of the wheat ears is meticulous. With high-end crops such as high-protein and bread wheat, there is no question of compromising the yield by allowing septoria to set in. Taking meteorological conditions into account via a weather station at the farm's headquarters ensures that treatments are conducted under optimal temperature and hygrometric conditions.

Integrated Weed Management –
providing tailored solutions

Over the centuries, many types of mechanical or chemical means have been used to control weeds. But weeds are constantly adapting to new environments, requiring continuous improvement of techniques. Today, weeds are still one of the biggest challenges for farmers, competing with crops for light, soil nutrients and water while threatening the quality and volume of farmers' harvests. To manage weeds sustainably, an Integrated Weed Management (IWM) Program provides a well-balanced combination of three components: diversity in chemistry, cultural methods and crop rotation. Ferme de Bulas has developed an advanced IWM Program, which has reduced the weed seed bank and increased the farm's productivity.

At Ferme de Bulas, black-grass has become problematic because of its resistance to the ALS family of herbicides, which appeared in 2012. It's a situation often found in rainfed fields with rotations involving only winter crops: canola, wheat and barley. As part of the partnership with Bayer, weed management has been thoroughly reviewed, with priority given to agronomic practices that supplement weed control. In the past, the false seedbed technique was used before sowing to deplete the number of weeds germinating in the autumn. This involved shallow tillage to stimulate premature black-grass germination, which was then destroyed mechanically. This practice is no longer employed, as intermediate nitrate trap crops are sown before winter crops in line with the 2016 Nitrates Directive. Spring cereals such as barley and corn have been introduced into the rotation to break the black-grass biological cycle. Winter peas are planted, because weeds can be controlled with an herbicide from a different family. Plowing is scheduled for every three to four years to deeply bury weed seeds to decrease black-grass seed survival. This agronomic approach combined with the alternation of chemical solutions has slashed the number of black-grass plants per m^2 by 95%.

Protecting fragile
but highly fertile soil

The soil at Ferme de Bulas is deep and rich in organic matter, with the level maintained by the incorporation of cereal straw and intermediate crop residues.

Dominique pays special attention to soil texture because silty-clay makes the use of machinery difficult on wet ground as there is a risk of soil compaction and capping. This makes tillage a challenge as it remains dependent on the weather conditions. To retain the soil structure as much as possible, plowing is conducted judiciously and reserved for plots with weed problems. As part of a canola-wheat-barley rotation, plowing is practiced every three years.

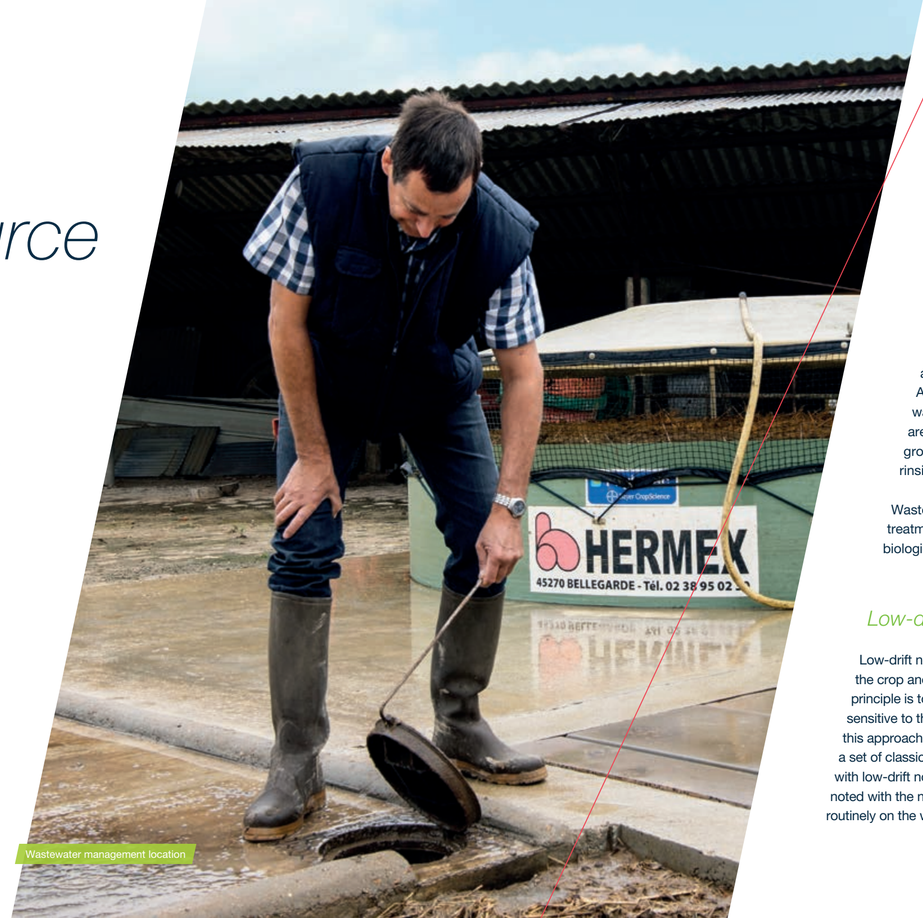
Annual subsoiling aerates the soil and encourages the circulation of water and air, stimulating the soil's biological activity and improving root growth.

Water:
preserving a valuable resource

The Beauce water table is Europe's largest reserve of drinking water, covering an area of almost 9,000 km². There are more than 4,000 catchment points, including boreholes used by farmers. Beauce is also one of France's driest regions. The high level of agricultural activity in the area not only means that irrigation needs to be used judiciously, but also soil run-off needs to be avoided so that nutrients and crop protection products are not carried into water bodies.

"We've found that using low-drift nozzles makes it possible to cut drift by at least a factor of three compared with conventional nozzles."

Dominique Petillon, Ferme de Bulas



Wastewater management location

Spring crop irrigation

Ferme de Bulas has a pumping station to irrigate an area of 100 ha. Water must be used efficiently and is primarily reserved for sugar beet and potato. Cereals may also be irrigated if the spring is dry, especially during grain formation.

Smart wastewater management

Improving on-farm water preservation was the first project undertaken when Ferme de Bulas joined the Bayer Forward-Farming network. With the help of the company's sustainable agriculture engineer, an Aquasite© diagnostic offered by the Arvalis technical institute made it possible to better manage waste water. As a result, a sealed sprayer filling and cleaning area has been created. This sealed platform, with an underground tank, recovers all the effluents from the washing and rinsing of tanks, sprayers and containers.

Wastewater is stored and directed to a Phytobac® biological treatment system. This system contains microorganisms in a biological bed, which degrade the residues within five months.

Low-drift nozzles or nothing!

Low-drift nozzles target applications more efficiently towards the crop and avoid drift to field borders or water bodies. The principle is to spray with larger diameter droplets which are less sensitive to the wind. Wisely, Dominique first experimented with this approach in larger fields, equipping part of the boom with a set of classic nozzles sensitive to drift and the other section with low-drift nozzles to compare. No decrease in efficacy was noted with the new-generation nozzles and they are now used routinely on the whole farm and for all applications.

Comparing drift behavior

Working hand in hand
with nature

Ferme de Bulas works hand in hand with nature. While cultivation practices must preserve biodiversity, they also benefit from the health of the surrounding ecosystems. Shelters and flowering plants provide food and accommodation for pollinators and beneficial species and Dominique, an occasional hunter, has created what he calls animal 'hotels' in partnership with the Eure-et-Loir hunters' federation.

A haven for wild animals

Pheasants are back! Their favorite spot is a 400 m hedge located in the heart of the fields. Rich in plant species producing seeds, this hedge has been home to birds, pollinators and other wildlife since 2011. Partridges are getting used to it since their first release in the spring of 2018. In addition to hedgerows, 200 m long strips of corn separate the cereal fields, offering bed and board during the fall. Two herds of deer are big fans!

Ground beetles are welcome here

Ground beetles have the final say on choosing the most judicious locations for planting hedges and grass strips! A study carried out on the farm with the Orléans entomology laboratory has shown that these beneficial beetles, who snack on slugs and aphids, cohabit with many other insect and earthworm species on the farm. Landscaping elements are strategically placed so that the entire farm can take full advantage of the service provided by these crop beneficials.

Working together for healthy bees

Bees collect pollen and canola nectar to make honey. In return, they are essential for successful crop pollination. This strong link between apiculture and agriculture encourages professionals to work together and better communicate about their practices so that everyone can benefit from this nature-driven synergy. In 2012, Dominique and a beekeeper signed a charter committing them to good agricultural and apicultural practices. Through collaboration and regular information exchange, all are involved in respecting good practices in order to protect these vital insects.

"We also pay special attention to ensuring coated seeds are well-incorporated into the soil and have GPS-guided machinery to ensure seeds are released only in the row."

Dominique Petillon, Ferme de Bulas

Ground beetles are beneficial insects as they feed on crop pests. These beetles eat slugs, snails, aphids, worms and caterpillars. They patrol on the ground in the fields.

Demonstrating
safe handling practices

Ferme de Bulas strives to be nothing less than exemplary, and the protection of the applicator must be beyond reproach. Clothing, gloves and masks meeting regulatory standards are always used when preparing mixtures and for any intervention that exposes the farmer. A self-propelled sprayer is equipped with a closed cab with an active carbon air filter system.

The easyFlow M closed transfer system, installed at the beginning of 2018 in the sprayer filling area, prevents the applicator from being in contact with the product.

Proper storage and disposal

The safe storage and handling of crop protection products is an absolute priority and begins with a storage facility built in compliance with the current standards. After use, crop protection product containers are rinsed and drained before being stored in transparent 'big bags' next to the store. These bags are collected twice a year by the agricultural distributor, in partnership with the eco-organization Adivalor. Adivalor manages the recovery of agricultural waste and its recycling or destruction and currently takes over 95% of empty crop protection product packaging across France.

Obligatory and voluntary certification

Dominique and Jérôme both have Certiphyto certificates, which demonstrate that users have sufficient knowledge to rationalize applications and manipulate plant protection products. In addition, the vigilance given to all stages of crop protection has enabled Dominique to obtain a GLOBALG.A.P. certification for his potato crops.

Collaboration for shared success

Partnerships are crucial at Ferme de Bulas, not only to improve agricultural practices but also to deepen the dialogue around agriculture. This dedication to collaboration on and off the farm also helps reach younger generations.

Communication

Following a scientific study by the Orléans Eco-Entomology Laboratory, Ferme de Bulas has created educational panels on ground beetles and the richness of the farm's biodiversity. And such communication efforts enjoy a broad audience because as part of the Bayer ForwardFarming partnership, Dominique's farm regularly receives visits from farmers from all around the world. Each year, nearly a hundred foreign and French visitors take home a little of the know-how gleaned from this farm in Beauce!

Adapting practices

The Hommes et Territoires Association, which promotes sustainable development and biodiversity, conducted a diagnosis on the ecological quality of the field margins at Ferme de Bulas in 2012. This diagnosis led Dominique to modify his maintenance practices on field margins. Maintenance work is now conducted later in the season to leave vegetation in which beneficial insects can develop and provides flowers for foraging pollinators.

Training

Knowledge sharing completes the focus on collaboration adopted by Ferme de Bulas. Students from the Nermont-Chateaudun Agricultural High School, studying to become agricultural technicians, spend a day on the farm every year. It's a good way to raise awareness about innovative approaches among these young people and to emphasize the agility farmers must show in order to maintain their income. Dominique also hosts a student on work experience.

Innovation – Paving the way
for a sustainable future

The mantra of Ferme de Bulas is about improving production practices while increasing business performance. Whether it is related to technology or crop management, there are no taboos at Ferme de Bulas. Any solution can be tested and then adopted, provided that the result is economically, environmentally and socially satisfactory.

Precision agriculture: good for the planet, good for the pocket!

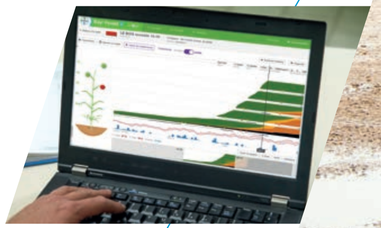
GPS has been a revolution in agriculture, taking some of the strain out of work and management, and also allowing inputs to be used at just the right dose in just the right place, saving money and providing better environmental protection. Thanks to an autoguide system coupled with GPS technology, overlaps, in other words the portion of the field over which tools pass twice, can be decreased. Research institutes have estimated that these overlaps may concern 15% of the surface area during tillage, 2% during sowing, 17% during spraying and 5% during harvesting. These results have been confirmed during sowing at Ferme de Bulas. In addition, this technology improves safety at work and reduces fatigue, providing greater comfort and considerable savings in working time.

Digital farming: an expert eye

While Dominique routinely uses the Arvalis FARMSTAR decision support tool, he is not averse to experimenting with the other digital tools available. In 2016, he joined the Farmers' Club, which connects to Bayer's digital platform. This tool provides alerts when treatment is needed and suggests the correct moment to intervene, with the key benefit of reducing the product used with no loss in efficacy. It tracks wheat disease cycles at the farm scale and produces fungicide rate modulation maps for treatments in the field.

Innovative management approaches: only the beginning!

The possibilities are endless when it comes to ways to improve crop management techniques, taking into account the complex farm ecosystem. Introducing biocontrol solutions and reinforcing prophylactic measures are all emerging methods that Dominique is keen to try with his advisors. And he won't be shy about talking about them!



Modern GPS steered sprayer

Bayer ForwardFarming
makes sustainability tangible

Bayer ForwardFarming provides an up-close look at how farmers are practicing modern and climate-smart sustainable agriculture around the world. Unique in its global reach the Bayer ForwardFarming network serves as platform for knowledge sharing and dialogue. ForwardFarmers deploy technologies and best practices to improve productivity, reduce agriculture-related greenhouse gas emissions, decrease the environmental impact of crop protection, promote biodiversity and conserve natural resources.

On the ForwardFarms, progress towards the Crop Science sustainability commitments truly comes to life.

Bayer ForwardFarming demonstrates solutions that support sustainability in agriculture across the following three components:

// ***Care for Crops –*** Every farm is different, and every field within a successful farming operation is unique. **Tailored Solutions** are needed to meet the needs of the individual farmer and their specific field – from the right seeds and traits to the correct type and amount of crop protection, to the digital tools and services that allow for good decision making and precision.

// ***Care for the Planet and People –*** Bayer ForwardFarming promotes and demonstrates **Proactive Stewardship** to protect human health and preserve the environment. Examples include addressing the safe and responsible use of crop protection products; soil health, biodiversity, and water conservation; and offering training in all of these areas.

// ***Care for Partnerships –*** Bayer FowardFarming fosters Partnerships with value chain actors, research centers, universities, and other institutions to strengthen sustainable farming development.

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SBS-18-1036

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