



COBREY FARMS

Farm Fresh PO Ltd

CASE STUDY:

CO₂ solution future-proofs refrigeration for Cobrey Farms



CASE STUDY: COBREY FARMS / COOLING FX

A strong working relationship between HRP and Bristol-based commercial refrigeration specialist Cooling FX has helped deliver a sustainable CO₂ solution for fresh produce on a 3,500-acre farm near Ross-on-Wye.

Cobrey Farms is a family-run business specialising in the farming of potatoes, asparagus, green beans, blueberries, and rhubarb, and Cooling FX have been looking after its refrigeration systems for many years.

As a result of increasing refrigerant costs the customer decided to commission a new system and specified a future-proof solution that would be sustainable, efficient and cost-effective, thus protecting the investment. The system also needed built-in redundancy in each room in case of breakdown.



BETTER BY DEGREES °

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The project involved replacing an existing refrigeration system linked to a single multi-compressor pack holding around 650kg of R404A refrigerant. This system had provided over 20 years of reliable service and the client wanted to protect the rooms ability to operate while the new equipment proved its reliability. Cooling FX integrated the latest design into the cold rooms whilst the existing system operated, providing a back up while the CO₂ system was commissioned.

CO₂ refrigerant was selected as the ideal solution and HRP supplied the evaporators, control panels and installation materials, GB Controls designed and built the control panels, Coolers & Condensers in Fareham manufactured the evaporators and condensers and ADA (Gloucester) provided the design brief.

The project covered four rooms, which needed to be adaptable to suit the product of the season. The rooms hold four core products, potatoes, asparagus, blueberries and green beans, each with their own requirements.

- **Potatoes:** Cooled from ambient to 8°C at a rate of 1/2°C per day
- **Asparagus:** Immediately chilled from harvest temperature to 1°C using a specialist water drenching system and stored at 1°C
- **Green beans and blueberries:** Stored at 5°C.

Two containerised packs are cross-linked to the evaporators in each room, i.e. in three of the rooms there are two new evaporators (around 100kW per room), one linked to pack A the other to pack B. The fourth room saw two new evaporators added alongside four existing evaporators, in order to increase cooling capacity. In the event that one system has an operational issue, the other system is designed to hold the temperature on its own across all four rooms until the issue is resolved.

The Coolers & Condensers evaporators are fitted with EC fans that can be speed controlled. These provide efficient operation, but Cooling FX has taken the advantages offered a step further by designing a control logic to match the needs of each crop. For example, when potatoes are stored once room temperature is satisfied, instead of switching the fans off, they are set to run at 20% capacity to keep the air in circulation over the crops. The control system senses a 'real' room temperature which improves control and product quality. Once the system detects the temperature increasing, normal operation resumes.

Given that the system has to operate in a number of different modes, defrost control needed particular attention. A bespoke design was created by ADA, Cooling FX and GB Controls which automatically selects a different defrost logic according to the product being stored. Cooling FX set up the final parameters and say they are very pleased with the system performance.

The logic is as follows:

- If the room temperature required is below 1°C (asparagus), electric defrost is enabled.
- If the room temperature is above 7°C (potatoes), the system defaults to no defrost.
- Between 2-7°C the system uses off-cycle defrost with the fans running at 30% of normal speed to pass air through the heat exchanger during the defrost period.

Danfoss CCMT CO₂ electronic expansion valves were installed to provide each room with programmable temperature control automatically set by the control system according to the product being stored.

The location of the evaporators had to be such that the storage height was not compromised. The drain pans are configured to allow water to drain out of the side of the pan, rather than out of the base, so water can flow out of the room without dropping below the depth of the evaporators.

The control panels feature RDM's latest PLC programmable controllers using their Touch Central Control Manager. This provides the farmer and installer remote access to a range of data and allows remote engineering access.

Eight Coolers & Condensers CF range ceiling-mounted evaporators were selected, finished with white casework and stainless-steel drain pans, hinged fan plates for ease of cleaning, lift-off end covers and fan isolators. The use of EC fans allowed Cooling FX to enhance their defrost logic even further with reduced fan speeds (as low as 20%) under certain conditions.

Cooling FX have declared themselves very pleased with the performance of CO₂ as the refrigerant.

A spokesman said: "Why wouldn't you use CO₂, it's a great refrigerant."

If you would like to consider CO₂ as a refrigerant for one of your projects please contact your local HRP branch.