

## 1 The dawn of artificial fertiliser 1840s to 1860s

English agriculturalist and founder of Rothamsted John Bennet Lawes patented a manure formed by treating phosphates with sulphuric acid. In Germany, chemist Justus von Liebig established that plants feed on nitrogen compounds supplied to roots in the form of ammonia and invented the first nitrogen-based fertiliser. Augustus Voelcker, professor of chemistry at the Royal Agricultural College, introduced British farmers to the use of potassium salts.



## 2 The production of ammonia 1905 to 1915

German chemist Fritz Haber first pioneered the process of converting atmospheric nitrogen to ammonia. The process was bought by BASF who assigned Carl Bosch the task of turning it into an industrial process at the company's Oppau plant. Production shifted to explosives during World War I. It is believed British spies captured secret plans for the Haber-Bosch process on a train in Germany and bought them back to England.



## 3 Development of granular compounds 1920s to 1930s

Ground-up powder mixtures of mineral rocks, gypsum, guano and the like were replaced by true artificial fertilisers, such as ammonium sulphate, nitrate and phosphate. These were eventually granulated, improving accuracy of application. Brunner Mond set up the first ammonium nitrate plant in 1920 at Billingham, commissioned by the government. The first UK-manufactured ammonia was produced on Christmas Eve 1923. Brunner Mond was one of four companies that became ICI in 1926. Triple super phosphate was introduced by Fisons in 1929.



## 4 UK manufacturing grows 1930 to 1950

The industry was regulated by government during World War II. A number of nitrogen plants were commissioned and run by ICI, while Fisons led in phosphate production, to reduce reliance on foreign imports. Capacity and production grew quickly. During and after the war fertiliser played an integral role in the huge government drive to boost agricultural production. The formation of the National Agricultural Advisory Service (NAAS), latterly ADAS, improved skills on farm, and fertiliser was subsidised.

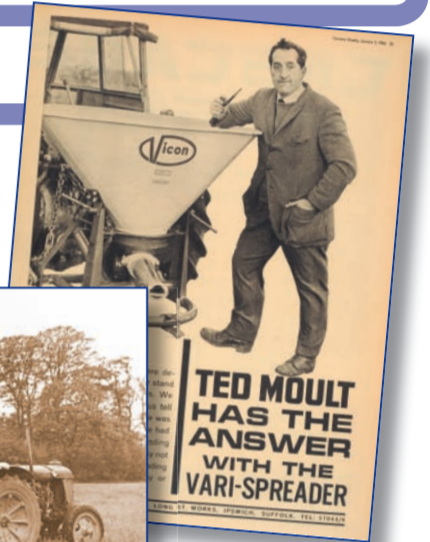
## 5 The dawn of fertiliser agronomy 1950 to 1960

ICI and Fisons both involved farmers in costing and agronomy groups, aimed at improving production efficiency. ICI led groups looking at the economic returns from use of nitrogen. This first benchmarking initiative appealed to business-minded farmers. Fisons focused on research and trials sites, buying Levington in 1953 and adding North Wyke in 1955. The scientific approach developed farmer understanding of P and K use.



## 6 Advances in spreader technology 1950s

The launch of Vicon's pendulum fertiliser Variespreader proved a breakthrough against the crude and inaccurate spinning disc and drill-based systems. It was the first to spread efficiently and accurately to 12 metres, allowing adjustment to rate, height, and fertiliser type. The Variespreader became the world's best-selling spreader and increased bout widths followed, along with tramlines, stimulating better fertiliser quality.



## 8 The packaging revolution 1965 to 1980s

Hessian, jute or paper bags were replaced by plastic. J & H Bunn introduced the IBC (Intermediate Bulk Container) half-tonne and one-tonne big bag in the mid 70s. The innovative ICI dumpy package was better suited to farm forklifts, but the three-quarter tonne size proved awkward for some. Kemira's Weatherpack was the first with a fully waterproof inner lining fixed to the loop in a half-tonne size and was the forerunner to today's standard 600kg bag.

## 7 The birth of prilled nitrate 1960s

ICI Nitram was the first ammonium nitrate fertiliser, launched in 1964 to supersede Nitro-Chalk, with prills replacing granules. In this period there were huge advances in production efficiency as natural gas became the feedstock and better catalysts were used. Apparently the word prill stuck when a secretary was asked to type pearl.



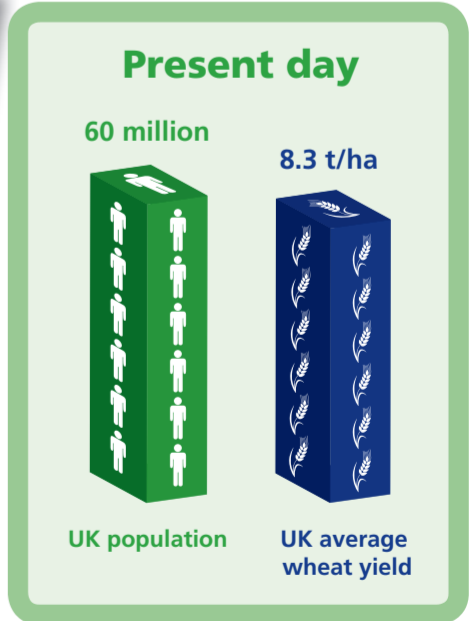
## 9 Scientific advances 1970 to 1980s

As subsidies were finally removed from fertiliser purchases new methods of measuring nutrient requirement evolved. The government-funded RB209, first published in 1973, set the standard for calculating recommended rates. Utilisable Metabolisable Energy (UME) established the basis for response curves from grass and paved the way to a more scientific approach to stocking rates and ultimately to complete diet feeding. T<sup>o</sup>-Sum calculations improved timing to optimise fertiliser applications. Sulphur deficiencies occurred following clean-up of power stations and products containing sulphur returned.



## 10 A sustainable future 1990 to present day

The spotlight falls on nitrate leaching as Europe introduces a 50mg per litre limit in groundwater. Nitrate Vulnerable Zones are introduced, prompting closer measurement of the nutrient content of organic manures. N-Min takes greater account of plant-available mineralised nitrogen in arable soils. Wider access to computers enables development and uptake of software such as PLANET, EnCompass and MANNER to plan applications. GPS-mapping of nutrient availability and satellite images to gauge variance in leaf area index ensure the industry can apply a crop's exact requirements with increased precision.



## The story of GrowHow

**1926**  
Imperial Chemical Industries (ICI) formed from Brunner Mond, Nobel Explosives, the United Alkali Company, and British Dyestuffs Corporation.

**1965**  
Shell and Amour Star develop Shellstar, a joint venture at a site near Shell's Stanlow Oil refinery at Ince, manufacturing fertilisers from petroleum feedstocks.

**1975**  
Shellstar becomes UKF, a wholly-owned subsidiary of the Dutch conglomerate DSM Agri.

**1988**  
UKF is acquired by Finnish company Kemira, and later becomes Kemira GrowHow.

**1998**  
North American Terra Industries buys the Severnside and Billingham fertiliser plants from ICI.

**2007**  
Kemira GrowHow and Terra Industries enter into a joint venture creating a new business - GrowHow. The head office is based at Ince near Chester and manufacturing is focused on two sites at Ince and Billingham - the only sites in the UK.



"Whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together."  
Jonathan Swift, Gulliver's Travels, 1726

