



AI in Agriculture: Transformations in farming that are feeding the world

March 2025

Mike Fox, Head of Equities at Royal London Asset Management discusses the latest advances in AI and how they are helping farmers boost crop yields and grapple with pests and diseases.



In what way can AI help boost crop yields to satisfy the growing food requirements needs of a global population?

When we talk about Artificial Intelligence (AI), most people think of Chat GPT and asking an AI machine random questions. But we think AI will impact every part of the global economy. According to the United Nations Food and Agriculture Organisation, by 2050 we will need to produce 60% more food to feed a global population of 9.3 billion. Smart farming, which is the use of advanced data analytics - including AI - for improved efficiency and higher yields, can help to boost crop yields in a number of ways. It could help accelerate breeding trials to be better able to develop more resilient varieties of crops and also provide farmers with better data to inform optimal decision making such as what to plant where or what inputs to use and when to use them. AI can use large datasets to offer decisions in real time. For example, Heritable Agriculture is trying to speed up improving plant genetics with AI.

Using traditional techniques can take decades but there is the potential to use AI to predict which genetic changes will improve a crop's yield for a given environment, as well as other properties, in just one year. This is increasingly important in the face of climate change.

Can AI help farmers face the challenges of pests and diseases?

Yes. In using more extensive soil health data and machine vision technology, fertiliser, herbicide and pesticides can be applied more precisely and only where it is needed. This can help to reduce soil degradation and resistance to these developing. Being able to predict pest infestation is another potential solution, meaning that crop loss and pesticide use could be reduced.

Can AI help farmers reduce the manual intensity of labour?

Absolutely - and we are already seeing adoption of this to various degrees. Farm labour is quite dangerous work, and the availability of workers is increasingly constrained. On the largest farms, which are seen across North and South America, automation is already being employed across the crop cycle. Tractors, combines and drones can already operate autonomously to perform tasks such as ploughing, planting, spraying and harvesting. Technology can also be harnessed for size, quality, ripeness assessments of crops, as well as sorting, to reduce labour intensity and even reduce food waste.

Can you name any companies that are already advancing in this space?

Many companies are advancing in this space: it is an arms race. The big three agricultural equipment makers – Deere, CNH and Agco – have precision agriculture at the heart of their strategies and are both developing their own capabilities and also buying up technological capabilities to fortify their ‘tech stacks’. Deere bought Blue River, CNH bought Raven Industries and Agco bought Precision Planting and Trimble’s agricultural capabilities. All have made additional smaller acquisitions in the space. SAP, Relx, Topcon and Microsoft have agricultural software offerings and collaborations. Alphabet also recently spun-out Heritable Agriculture, as discussed above.

What is the case for agriculture from a sustainability point of view?

Agriculture is a major contributor of greenhouse gas emissions and a driver of deforestation, desertification and eutrophication, among other environmental problems. However, we need to produce food. In the same way that heating and cooling buildings has a large impact, companies which have technologies that can perform these vital functions in more efficient, environmentally friendly ways, can result in very significant savings. Farm equipment which is more fuel efficient, compacts the soil less, and sprays crop protection only where needed, can result in material sustainability benefits.

What will be the key challenges for AI in the farming space?

Barriers to adoption primarily relate to the expense being prohibitively high, farmers being quite conservative and the lack of available sufficiently good internet connections. Farmers need to be able to see a clear value proposition before being willing to change the way they have done something over generations. Another challenge for some types of older equipment is that it is harder to retrofit with the most up-to-date technology. It might also be the case that additional functionalities are not compatible with what a farmer is already using elsewhere.

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Royal London Asset Management

80 Fenchurch Street,
London EC3M 4BY

For advisers and wealth managers

bdsupport@rlam.co.uk
+44 (0)20 3272 5950

For institutional client queries

institutional@rlam.co.uk
+44 (0)20 7506 6500

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Ref: TH RLAM PD 0084

