Discovery

Lowdown on drones

BELLS AND WHISTLES

The science of precision ag

This is the first in a new series featuring the latest trends in agriculture precision technology written by the scientists who are experts in their field.

It seems like utopia - over breakfast a farmer checks the phone. Already they've got a good picture of the pasture cover across the farm, a close-up image of the blown pipe in paddock 26 and a video of what's happening in the calving herd. All thanks to roving drones that were out at dawn.

You would have heard a lot about drones (Unmanned Aerial Vehicles or Remotely Piloted Aircraft Systems), in the last five years. Amazon is going to deliver books with them, Dominos will send its pizzas and a 7-Eleven in the United States has already delivered donuts.

So what can New Zealand dairy farmers expect from drones? Do they have a role on farm or are they just a fun toy?

Donuts and pizzas delivered to your farm may be a little unrealistic, but some farmers are already using drones to capture up-to-date photos of their farm, assess differences across paddocks that can be further investigated on foot or to just get a bird's-eye-view of their stock or crop status. So should you go out and buy one?

I'm part of a team at DairyNZ studying precision agriculture and what it might mean for the dairy industry. Much of the research is funded by the Transforming the Dairy Value Chain Primary Growth Partnership programme, a seven-year, $170 million innovation investment led by commercial partners, including DairyNZ and Fonterra, and partnered by the Ministry for Primary Industries.

As part of that work we've studied the use of drones and there are a few things to consider if you're thinking about employing these electronic eyes in the sky.

Essentially a drone is just a vehicle that might carry some useful technology, and like a tractor only really becomes useful when you attach something to it. That's generally some form of camera or sensor (although some researchers have looked at using drones to trim pine trees!).

We can therefore see drones as a more 'local' and manoeuvrable version of a light aircraft or satellite – which are also used to carry cameras for agricultural surveys and data.

What should you be aware of if you're considering a drone for your farm?

Well the first thing is return on your investment. One thing farmers around the globe are finding is that it's very easy to take images from the air but then what do you do with them? For farmers and consultants using drone imagery on a large scale, the image processing can take time and specialised (and potentially expensive) software.

There is a big future role here for specialised services and consultants involved in processing and interpreting imagery, but in the meantime think hard about what those photos might tell you that will help with farm management.

We are yet to see any commercially-available products that can interpret images to provide pasture cover and growth rate data that helps you put the fence in the right place.

While they've come a long way in ease of use, you still should be able to fly it, preferably without crashing it into the ground or your farm assistant.

Some models, particularly the fixed-wing options that look like a small plane or stealth bomber, have a form of auto guidance, and can follow a pre-set path determined by you. This is exactly what the future farmer ordered, where the drone can follow a similar path daily or weekly to check key features and avoid hazards such as powerlines, trees, and people.

Another consideration is range and battery life. We'll get to the rules that govern where and when you can fly in a minute, but for starters there are technology limitations to how long you can fly. Many of the off-the-shelf drones can only fly 10-20 minutes per charge. Some more professional models, such as those made by Raglan's Aeronavics, can fly for 40 minutes with a payload of over 1kg, which is impressive for a drone.

There are some rules to consider. Under Civil Aviation Authority (CAA) regulations you can't fly your drone above 120 metres, you must constantly be able to see it with your own eyes, you can't fly within 4km of an aerodrome and you can't fly it at night. There are other rules too, depending on the size of the drone and where you are flying it. It's all about keeping people (and your drone) safe. Check out the CAA website (Google: 'CAA UAV rules').

The questions to ask yourself, with drones or any technology, are: What are your goals, how's your current performance, what are alternative options, and how will the technology help you meet your goals?

If it's monitoring stock with a drone, think about what you will do with the images, how long it takes to collect and process the data and what tasks it will save you (remember you still need time to fly the drone and be able to see it at all times, at least for the near future).

If you want to inspect your pastures with a drone, how will the images be useful for making better grazing decisions, and could you improve performance in other ways, such as more and better communication with staff and getting them to take pictures of pre- and post-grazed pastures on their phones to send to you before breakfast?

It may be a few years before a team of drones is out working before you pour that morning coffee, and I wouldn't rush out and buy one just to improve your grazing management, but they're worth keeping an eye on.

And let's face it, they can be a lot of fun which has some benefit in itself.

Drones seem like an obvious fit for farming – a tool that allows you to keep track of a large operation while potentially profiting from the data generated. What's not to like? DairyNZ scientist Callum Eastwood takes a closer look at the bigger picture.

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Callum Eastwood

The bigger picture

They look pretty cool, can be fun to play with but there are a few things you may want to consider before buying that drone for your farm:

- Are you droning on or listening? What will the drone achieve that you couldn't do through better communication and practices with your farm team?
- Are they worth the buzz? Drones cost from $30 to $10,000+, in general you'll get what you pay for in terms of flight time, battery life, and payload.
- It's all geek to me
- How will you work out what that photo is really showing? Following up on foot or paying for a professional may be required.
- Remote chance of rules: The CAA has rules for drones - make sure you know them and keep the people around you safe.

■ Dr Callum Eastwood is a scientist in the Advanced Management Technologies team at DairyNZ. He has spent 15 years examining farmer use of new technologies.