Plant-animal dynamics short course reveals grazing secrets

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ABOVE: Participants at a short course on plant-animal interactions discuss the challenges of selective grazing. (Photo: Dr Dean Revell)

Reducing input costs, transforming weeds into valuable forage and changing the eating habits of sheep and cattle are just some of the possibilities when armed with an understanding of the interactions between plants, animals and human practices.

FFI CRC and CSIRO researcher Dr Dean Revell came away from a short course in Utah in the United States (US) with this message, a commitment to think outside the box and to challenge conventions. The two-week-long event was hosted by internationally renowned researcher Fred Provenza, whose focus is the productivity and conservation of private land.

Dr Revell joined one other Australian researcher, Dr Joe Jacobs, FFI CRC/DPI Vic, three producers and 30 Americans at the forum in the in the north-eastern State.

key points

- Understanding the way plants and animals interact and react to human practices arms farmers with the solutions needed to protect their farms sustainability and bolster production
- Thinking outside the square and considering non-traditional forage plants as palatable unlocks a new set of natural resources and reduces the need for manufactured inputs.

Fred's passion is for sharing his knowledge of how producers can improve productivity and profitability, while at the same time nurture their land's biodiversity.

"The conference really was all encompassing, as is Fred's message," Dr Revell said.

"His message is for producers to understand how plants respond to grazing, how livestock respond to the plants they graze and what humans can do to make the most of the plants on offer.

"An understanding of the interaction between, soil, plants, livestock and humans will ultimately lead to practices that will improve the economics of a farm."

Understanding plants

"Plant species respond to being grazing in different ways — they have varying survival techniques and recovery rates," Dr Revell said.

By learning about their varying characteristics, producers can alter the grazing intensity and recovery times.

"Some plants inherently recover better than others and therefore will dominate pastures. A more strategic approach can ensure the performance of all plants and provide livestock with a more varied diet, which is ultimately better for their condition," Dr Revell said.

"Fred is an advocate of short, intensive grazing periods followed by long rest periods. This system fosters 'an eat the best with the rest' mentality among livestock, instead of the more commonly observed 'eat the best and leave the rest'."

To eat or not to eat

What an animal chooses to graze is not static and open to much manipulation. An animal's dietary preferences are influenced by what food they have been exposed to in the past, their mother's diet selection, the combinations of plants on offer, and what is in abundance. However, training livestock to eat plants that have traditionally been as viewed as unpalatable or undesirable is quite possible, according to Fred's theories.

For example, sagebrush, a widespread plant in the US, has a new persona as a livestock forage, following decades of being shunned by producers.

"In the mid-west basin, sagebrush grows prolifically. A number of producers have managed to incorporate it into their animals' grazing preference in combination with other plants and/or supplementary feed," Dr Revell said.

"Because it is in such abundance, sagebush has the potential to be a massive new resource for graziers.

"The key is to incorporate it with other plants.

"A traditional view of plants such as sagebrush is that animals will eat it if there is nothing else on offer.

"But to give livestock the choice of hungriness or eating a plant they think is unpalatable is not the correct approach to getting them to eat the plant regularly.

"We need to think more about what the animals need in terms of extra nutrients to help them cope with the less preferred plants.

"Hunger can help motivate them, but ultimately they must also have the 'metabolic capacity' to deal with the plant compounds."

Training the palate

In Australia, saltbush and other forage shrubs are examples of plants that have not always been thought of as livestock fodder.

"As strange as it might sound, there needs to be a culture built into the flock or herd, that a plant is considered good to eat," Dr Revell said.

"All plants have something that will limit intake by animals. So there are good reasons to think about the complementarily of different plants or supplements.

"A 'favourite' food on its own does not remain a favourite for long."

Working in the womb

Epigenetics is a new field of research that suggests an animal's physiology, and perhaps even its food preference, can be determined by what their mother eats while they are in the womb. Fred sees this as an exciting new opportunity.

"Research has found that up to one to two generations can be manipulated in this way. For example, maybe an animal's food preference is partly influenced by what its grandmother ate."

"Looking at programming in the womb is truly a new frontier of research and something the FFI CRC has been working on with three PhD candidates," Dr Revell said.

"The students have been looking at high-salt diets during pregnancy and the life-long impacts it can have on offspring.

"For example, feeding saltbush to pregnant ewes can influence their offsprings' capacity to eat and perform on the native plant.

When a weed is not a weed

Fred had high hopes for weeds and provided examples where some weeds have been reduced in the landscape or where they have been incorporated into the diet of grazing animals.

"Producers spend a significant amount of time and money ridding their land of weeds," Dr Revell said.

"A reverse approach of convincing sheep and cattle to eat weeds could open up a new plant resource."

In the US, the common weed larkspur has become a part of some livestocks' diet. In Australia, Dr Revell suggests weeds such as wild radish and even some species of thistles, could be worth looking at as forage.

"Herbicide-resistant weeds are perhaps the ones we need to focus on first," Dr Revell said. "Surprisingly the nutritional value of some weeds is quite high.

"Like any plants they have good and bad aspects and vary in nutrition each year.

"Fred's approach is all about lateral thinking. Instead of focusing on what you don't want on your grazing land, analyse what is on offer and how you can use it to its best potential.

"The traditional view point is that a single productive stand of a pasture is best for livestock. But how can one pasture satisfy the nutritional needs of an animal over time?

"They need diet diversity much the same as humans do."

The take-home messages

"It's fair to say all the Australian participants came away with a new perspective on the farm ecosystem," Dr Revell said.

"Instead of merely considering how plants can complement each other, their interaction with the whole environment needs to be contemplated."

For the Australian producers, who were already persuaded by Fred's results, the course confirmed they were on the right track.

"One producer runs cattle with goats because they both have very different grazing strategies," Dr Revell said.

"Goats are browsers and they like shrubs while cattle generally prefer grasses."

"Another producer has implemented what he calls the 'four-layered approach', which involves annual pastures, perennial pastures, shrubs and trees."

"Having a range of resources has allowed him to bolster his resilience to drought," Dr Revell said.

Adapting to challenges

Both Australian and US producers are feeling the pinch of increased input costs. Fred argues that by knowing how to use your natural resources most efficiently the need for such inputs such as herbicides can be reduced.

"Using a behavioural-based approach to livestock and land management can help us deal with new challenges," Dean said.

However adapting these practising and the arrival of the results will not happen overnight. So, if farmers are to take Fred's advice, they need to patient.

More information

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China breeds interest

An international selection of plant breeders gathered in China recently for the International Grasslands and Rangelands Society Conference. Among the participants was FFI CRC plant breeder Richard Bennett.

"It was the first time the congress was held in conjunction with the Rangeland Society conference," Richard said.

The five-day event was held in the Inner Mongolia city of Hohhot.

"Both intensive and rangeland grazing is practiced in the area so it was a logical place for the first joint congress."

Richard, whose role is working with native Australian plants and examining their suitability for introduction into intensive grazing systems, said there were parallels between the Chinese and Australian experiences.

"The Chinese are also trying to do the same with a lot of their plants.

"They are encountering similar problems as us, such as seed collection challenges and plant toxicity."

About 1700 delegates attended the conference, including more than 100 Australians.

"Some very interesting Australian research was presented, such as a paper looking at the intensive farming of kangaroos."

"Kangaroos are better at converting feed to meat and their soft feet obviously have advantages over hard-hoofed livestock.

"However, managing kangaroos is challenging."

A field trip into the rangelands was a highlight for Richard.

"We met with nomadic herdsman who told us about the Government's push for them to settle in one place and build fences and other farming infrastructure.

"The problem with nomadic farming is that no one farmer owns the land and as a result each producer tries to get the most out of the land while they are occupying it with no regard for the resulting degradation.

"They also seemed to have a lot more animals than is sustainable," he said.

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