(Right) Ms Zeynab Amini is completing her PhD at the Queensland University of Technology working within *Biorefineries for Profit* project. ***Picture by Anthony Waite, QUT.***

RESEARCH LOOKS TO PUT SOME NUTRITIONAL PUNCH INTO BAGASSE

When it comes to feeding livestock, bagasse isn't much better than cardboard.

Sure, livestock can eat it, but it contains a very high proportion of fibre and not much else, so it can only make up a small part of a complete feed ration.

But what if there were ways to make bagasse more digestible and nutritious for livestock?

For the last three years, researchers at QUT have been working to convert sugarcane bagasse into higher-value products including animal feed, feed supplements, aviation fuel, and chemicals as part of the *Biorefineries for Profit* project.

Pre-treated bagasse has higher digestibility but, even after it's been pre-treated, it isn't a complete animal feed and protein is needed to make pre-treated bagasse a complete feed.

Ms Zeynab Amini is completing a PhD in the project on the conversion of bagasse into a more nutritious and digestible animal feed.

"There are two main issues with bagasse," Ms Amini explained. "The first is low digestibility. And the second is nutrition, especially protein content."

"Pre-treatment improves the digestibility. My work is aimed at understanding how to increase the protein content."

Through her work, she has tested how well micro-organisms use the carbohydrates in the bagasse to grow and what that does to the overall nutritional content.

Micro-organisms are happy to grow on bagasse piles. Of course, none of these is suitable for animal feed. The micro-organisms that Ms Amini is using were carefully chosen to be completely safe for consumption.

Her work began with 16 different filamentous fungi and yeast, all of which can be safely eaten by livestock, and testing their growth in the laboratory in liquid culture.

As the micro-organisms grew, they produced protein. "We tried to add more value by adding low-cost nitrogen sources like ammonium-sulphate or urea. That way, the micro-organisms used both the carbohydrates and the nitrogen, and they grew much better."

Ms Amini and the research team made an assessment of the micro-organisms, leading to the identification of two micro-organisms which had the highest capacity to increase the protein content of bagasse-based feed.

Following the submerged fermentation tests, the work progressed to solid-state culture, which involved growing the two best micro-organisms directly on pre-treated bagasse and is a step closer toward understanding the adoption of the technology at a broader scale.

Dr Mark Harrison at QUT said the research was creating exciting opportunities for the industry.

"We know that we can't extrapolate results from a test tube in the lab to a factory, so we are transitioning into solid state fermentation and from there it is a relatively quick transition to pilot-scale experiments," Dr Harrison said.

"This work has the potential to change how we look at bagasse." ■

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