ENVIRONMENTAL & ECONOMIC IMPACT

Converting Crop Residues into High-Quality Feed for Farm Productivity

QUT Research leverages crop by-products to enhance livestock nutrition and reduce emissions

Poor pasture quality and the impact of drought on pasture availability present significant barriers to farmer wellbeing and economic opportunity, particularly in Sub-Saharan Africa and South Asia.

Crop residues, such as rice straw and sugarcane bagasse, typically have lower protein and higher fibre content compared to high-quality fodders like Lucerne or oat hay. To address this challenge, Professor Mark Harrison's research focuses on transforming low-quality crop residues into feed ingredients, a key pathway for sustainable livestock production and reduced greenhouse gas emissions.

Over seven years (2016-2022), the "Biorefineries for Profit" projects developed technologies to enhance crop residues. Phase 1 increased sugarcane bagasse digestibility in ruminants from 30% to 80%, making it equivalent to high-quality fodder.

Subsequent pilot-scale work, culminating in Phase 3, produced sufficient enhanced ingredients for a six-week sheep feeding trial, which demonstrated the safety and palatability of the sugarcane-based livestock feed.

Building on these successful pilot trials, the Bill & Melinda Gates Foundation invested AUD $6 million in Professor Harrison's research to further develop the technology for livestock feed in Africa and India. This investment created research jobs and is expected to lower feed costs for farmers, while also aiming to reduce greenhouse gas emissions by promoting efficient residue use over burning. The project is advancing both thermochemical and ammonia treatment R&D.

Impact highlights

- Developed technologies to improve the nutritional value of crop residues like sugarcane bagasse, transforming them into high-quality feed ingredients.
- Increased digestibility of sugarcane bagasse from 30% to 80%, achieving the equivalence to high-quality fodder.
- Demonstrated safety and palatability of crop residue-based livestock feed in a sheep feeding trial.
- Current research aims to reduce greenhouse gas emissions by using crop residues for feed, compared to burning or allowing them to remain unused in the field.