

# Barns have big footprints

The study found barn systems have an 18% higher carbon footprint than pastoral systems because machinery use and feed.

**I**N A New Zealand first new research from Lincoln University doctoral researcher Hafiz Muhammad Abrar Ilyas is estimating the carbon footprints of pastoral or grass-based and barn dairy systems based on their energy consumption.

This study was done on 50 conventional dairy farms in Canterbury – 43 pastoral and seven barn systems.

Hafiz said the difference between the two systems indicates the barn system has an 18% higher carbon footprint than the pastoral system per hectare of farm area and 11% higher footprint per tonne of milksolids.

Barn dairy systems have been a relatively recent introduction in New Zealand as a solution to animal welfare, soil structure damage and wider environmental challenges.

"The use of barn facilities, however, requires further intensification of the system in terms of the use of energy inputs to make the system profitable, making it difficult to achieve both financial and environmental benefits simultaneously."

The greater carbon footprint of the barn system is caused by greater use of imported feed supplements, machinery use and diesel and petrol consumption for on-farm activities.

In the pastoral system fertiliser is a

significant contributor to emissions.

He included emissions released during the production of materials used to make indirect energy inputs in fertiliser, machinery and equipment, which are rarely considered.

"What is not accounted for is overseas production and import of these inputs to the agricultural sector.

"As production of imported feed supplements involves fossil energy consumption and releases carbon dioxide emissions into the atmosphere it is considered as an indirect source of carbon emissions in this study."

The same is true for fertiliser.

Overall, the carbon footprints of indirect energy inputs are higher than the carbon footprints of direct inputs in both systems.

The use of imported feed supplements is higher in the barn system because of the higher stocking rate and more intensive nature of the system.

And the use of barn facilities increases stocking rate and input consumption to produce more milk per cow. That, in turn, has increased cow weight, increasing methane emissions because bigger cows produce more enteric methane from their higher feed intake.

International studies have recommended the pastoral system as the ultimate solution to environmental challenges such as climate change.



**Lincoln University doctoral researcher Hafiz Muhammad Abrar Ilyas has been studying the carbon footprint of barn and pasture systems.**

In NZ reducing environmental emissions from farming systems is a critical issue for the dairy industry.

"Although methane emissions from enteric fermentation and nitrous oxide emissions from soils make up the majority of greenhouse gas emissions from agriculture, energy use within the agricultural sector directly in terms of fuel combustion and indirectly through the increasing use of synthetic fertilisers and other inputs is also of concern.

"It is also an area that is perhaps more easily addressed.

"In this regard, minimising carbon footprints associated with energy consumption will be helpful to achieve NZ's emission reduction targets and will also help to reduce overall greenhouse gas emissions from dairy systems and move towards more climate friendly or sustainable farming systems," Hafiz said.