

A win, win, win for dairy production in East Africa

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Adopting high yield dairy cattle breeds and improving feed would allow Tanzania to increase milk production, while reducing planet warming greenhouse gas (GHG) emissions and alleviating poverty, a new study reveals.

Tanzania has the second largest dairy herd in East Africa with 28 million cows. However, its dairy sector is poorly developed with mainly small-scale farms stocked with low-yielding breeds, using poor quality feeds. This, along with other supply chain problems around handling and refrigeration, results in poor productivity and the need to import processed [dairy products](#) leading to a \$23 million trade deficit.

A new research paper from an international team of researchers led by Lancaster University scientists and published in *Nature Food* is the first to find evidence that breeding higher yielding dairy cattle offers significant potential to help Tanzania to reduce its dependency on foreign food imports and at the same time help meet its climate commitments.

The findings show that two key targets of Tanzanian government policy—becoming self-sufficient in [milk](#) and cutting GHG emissions by a third—can be achieved simultaneously while increasing income in farming communities.

Researchers carried out a household survey of 1,200 [dairy farmers](#) in Tanzania which was used as a baseline for a sectoral modelling analysis. The survey, which extended across four districts and two agro-ecological zones, was used to estimate milk production, yields from different cattle breeds and how the cattle are managed—for instance what they are fed and how disease is managed.

Tanzania's local cattle cope well with high temperatures but produce little milk. New breeds, which cross local cattle with high yielding European cows, produce three times as much milk, while still coping well with heat.

The study takes as its starting point the Tanzanian Dairy Development Roadmap (DDR), a Government plan which, with support from

stakeholders, aims to achieve dairy self-sufficiency by 2030. Currently, Tanzania's low cost-competitiveness with trading partners results in the import of roughly 23 Million USD per year in dairy, and the DDR aims to replace these imports with domestic production. The researchers model how the Roadmap could be delivered through farmers changing from local to improved breeds of cattle, and feeding their cattle more nutritious, locally produced feed. Crucially, it assumes land that is already used in agriculture, mainly local pasture, is converted to grow feed crops, so farmers do not rely on imported feed and no forest needs to be cut down to grow it.

"The idea was to model the Tanzanian Government's planned interventions to increase milk production and also their targets for improved dairy breeds and feeding practices," said Dr. James Hawkins, an environmental economist from the Lancaster Environment Centre, and lead author of the study.

"What is very important is understanding the interactions between cattle management and productivity because the carbon footprint is strongly related to the productivity of dairy cows."

The combination of more nutritious feed and more productive cattle means that production can be increased while reducing herd size, and cutting the amount of land needed to support the cattle, the study found. Better feed can increase the milk yield for local cows by up to 179% and for the higher yielding breeds by up to 130%.

The study modelled a series of scenarios, with different levels of milk production and adoption of new breeds and feeds. All the scenarios showed increases in production and a decrease in GHG emissions. The analysis showed that fulfilling the DDR targets for adopting improved breeds would enable Tanzania to meet 70% of the target milk production level while also fulfilling the country's ambition to reduce GHG

emissions from dairy by a third. The main driver of emissions reductions was from avoided land use change. While the model showed improving feed requires more cropland, a much larger decline in grasslands would reduce carbon dioxide emissions from forest clearance.

"This is a win, win, win for Tanzania," said Professor Mariana Rufino, from the Lancaster Environment Centre, principal investigator in the study, who has been researching dairy production in Africa for almost twenty years.

"There have been a lot of studies showing how to mitigate emissions from the livestock sector that tell low-income countries what they should do, that they shouldn't have livestock etc. This study is special because we take Tanzania's own ambitions, a country level target, and work out how they can achieve it, and more.

"This Tanzanian policy only aims for food security, we find a way they can also improve incomes and meet their climate target at the same time.

"Dairy is very good for poor communities. It generates daily cash, instead of farmers having to wait for a crop to be harvested once a year. There is a market for feed and lots of small businesses develop around dairy, so it generates income and alleviates poverty. Drinking milk can make a big difference to children in poor communities, providing a little bit of protein and concentrated micronutrients which they cannot get in other foods. So dairy can have a very important societal impact."

The income benefits are not equally distributed, the study shows, with farmers who do not have the resources to invest in, feed and care for higher yielding [cattle](#) losing out. The authors warn that while overall incomes increase, these farmers' incomes could fall, especially if increasing production lowers the price they can charge for milk. Support policies should create safeguards for this key food sector, the researchers

say.

Dr. Amos Omore, Tanzania country representative for the International Livestock Research Institute, said: "The findings of this paper have huge implications. The same quantity of milk being produced in smallholder dairy farms that dominate in eastern Africa can easily be produced with less than a quarter the number of animals currently, given the large yield gaps. What is required is more investment in sustainable animal productivity in smallholder farms—a clear win-win for better lives and greener planet."

The findings are outlined in the paper "High yield [dairy cattle](#) breeds improve farmer incomes, curtail greenhouse gas emissions and reduce [dairy](#) import dependency in Tanzania." Partners in the study include the Center for International Forestry Research (CIFOR) and the International Livestock Research Institute (ILRI), both in Kenya, and the Universities of Reading, Queensland and Wisconsin-Madison.

More information: High yield dairy cattle breeds improve farmer incomes, curtail greenhouse gas emissions and reduce dairy import dependency in Tanzania, *Nature Food* (2022).

Provided by Lancaster University

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