
Grass production can be doubled with high-density grazing.

Seventy small-scale and commercial farms in South Africa were interviewed about nutrient circulation. Farmers were asked about circular practices, focusing on how high-density grazing can increase feed production, enhance manure recycling, and improve animal health.

High-density grazing involves livestock grazing closely together on a smaller area for a shorter period before being moved. The animals are moved once a day (high-density grazing) or once every hour (ultra-high-density grazing). After grazing, the area is left to recover for twelve months.

“This amount of time gives the grass enough time to grow and recover. Grass production can be doubled within high-density grazing systems, allowing farmers to feed more animals from the same area,” says Ernest Makua.

As a master student at the University of South Africa he has examined to what extent circular practices are implemented on small-scale emerging farms and larger commercial farms. His master's postgraduate degree is funded by the New Zealand Agricultural GHG Research centre (NZAGRC), and is a part of the CircAgric-GHG research project.



Ernest Makua, along with Mr. Oosthuizen on his farm in Potchefstroom, Northwest province, South Africa. The farm employs a high-density grazing system, utilizing electrified polywire to regulate the cattle's grazing area. According to Mr. Oosthuizen, the cattle take approximately 15 to 20 minutes to adapt to the electric fence system.

Benefits both the environment and the farmers economy

The method mimics the natural movement of wild herds. Cattle consume grasses and return nutrients to the soil through manure, urine, and saliva, which are rich in nitrogen and growth-promoting substances. This boosts soil fertility and stimulates plant regrowth. Combined with proper grazing management, this natural nutrient recycling enhances pasture productivity and soil health, creating a sustainable system without relying on external fertilizers.

“By closing the nutrient loop, farmers can reduce reliance on synthetic fertilizers and promote eco-friendly systems like high-density grazing. This method promote the economic viability of cattle farming by enhancing pasture efficiency and livestock productivity. It also contributes to circularity by improving nutrient cycling and soil health,” says Makura.

Preliminary results revealed that only 10 % of commercial farms in South Africa practice high-density grazing. The method is mainly practiced by commercial farmers because it is labour-intensive and require investments in electric fences powered by a solar panel.

In his master thesis Makua also collects data about other circular farm practices. Preliminary results show that 35% of commercial farmers utilize compost made from manure, bedding, and wasted feed. Whereas only 10% of small-scale farms actively participate in manure recycling, indicating a significant gap in sustainable practices.

“Results highlight the urgency of raising awareness and providing support to encourage widespread adoption of nutrient circularity practices for sustainable agriculture,” says Makua.



Commercial farmer Monique Helm has not yet adopted high-density grazing due to its labor-intensive nature. The farm is located in the Eastern Free State Province of South Africa.

Increased reproduction

The alternatives to high-density grazing are called rotational and continuous systems. In a rotational system cows are moved to a new area every one to three months, while in a continuous system, cows remain in the same area indefinitely.

Keeping cows in the same area for a longer period may lead to overgrazing, resulting in a lack of naturally produced feed, and a greater need for external inputs. Additionally, when cows can choose their own diet from a larger area, they tend to select the sweet grass, leading to an unbalanced diet and an unbalanced regrowth of pasture.

“When the cows have lower access to grazing, the farmers keep them for longer hoping that they will conceive. In high-density systems the cows have better health and conceive more often. Methane emissions may be high in such systems, but for a shorter duration per cow because it is a more intensive production system.”

Improved fertilizing due to cows trampling on the ground

“In terms of circularity, the nutrients are not that good in less intensive systems, and the trampling effect are not that effective. The grasses are not given enough time to regrow and recover.”

The trampling effect that Makua refers to occurs when many animals graze on a smaller area and fertilize the area it with their saliva, urine and manure.

“Cattle are grazing and producing fertilizer for their own feed at the same time. When many cattle step on the ground in a smaller area the soil becomes softer and their manure are better infiltrated into the ground, which improves pasture growth. That is circularity,” says Makua.

This also leads to deeper root systems with enhanced water retention, as well as increased carbon capture from the atmosphere.





Farmer William Harvey to the right, together with Ernest Makua. The farmer uses structured fences with electric wire on top and noted a reduced need for tick dips due to lower tick infestation. High-density grazing helps minimize dense vegetation that ticks favor, keeping pastures more open and limiting their hiding spots. The farm is located in Piet Plessis, North West Province, South Africa, and in the sweetveld of South Africa. Sweetveld is veld which remains palatable and nutritious when mature, whereas sourveld provides palatable material only in the growing season. These two types of grazing land are quite distinct, with large areas predominantly having one type or the other.

Improved animal health and fewer tickborne diseases

In general, animal health is better in high-density systems, due to access to quality feed. Tickbites and tickborne diseases are also less prevalent because the short and intensive grazing period disturbs the tick's habitat. The concentrated livestock trampling on a small area destroy tick eggs and larvae in the ground and on low vegetation, and the tick's life cycle is interrupted because the long absence of animals leaves many ticks without a host.

“The farmers confirm that there are less problems with ticks in high-density grazing systems. The ticks feed on the blood of animals, and when they graze so quickly it is not enough time to reproduce. In continuous grazing systems they will have more time to eat blood, lay eggs and reproduce,” Makua explains.

Better animal welfare means that the farmers can save money on inputs, such as vaccines and veterinary visits.

“The results from commercial farms using high-density grazing demonstrate significant benefits, including enhanced sustainable resource use, increased productivity with conception rates averaging around 80% in the sweet-veld regions of South Africa, and improved profitability, partly due to the reduced need for tick control,” says Makura.



Ernest Makua with Danie Slabbert (Farmer) collecting data from Van Rooyenswoning farm in the Reitz area of the eastern Free State province, South Africa. The system comprises two strands of braided electric fencing for each length (strip). The strips, which are 100m apart, run parallel to each other for up to 1 km. Connecting the two strips is a single strand of electrified polywire, called a chop-line. This is used to control how far ahead the cattle may graze within the confines of the two strips. To achieve non-selective UHDG, the stockmen move the chop-line forward between 10m and 50m every hour, with the distance depending on how well the fodder has been utilised. The chop-line is opened at 6am every morning and moved for the last time at 5pm. The strips should preferably not be more than 1km long. The farm is in the sourveld of South Africa. While the results from Makuas study mention specific success in sweetveld areas of South Africa, it doesn't necessarily mean that the high-density grazing method is limited only to such regions.

Communicating results to farmers and government

In addition to being a master's student Ernest Makua also holds a position as an advisor for the Red Meat Industry Services (RMIS) in South Africa. In his daily work he is in close contact with the red meat producers and provides advice on issues such as breeding, health, pasture and feeding. This position has made it easy to recruit farmers for the study.

"The farmers know that we don't just come for the data. I give advice for free, and I will also go back to them and share what we found in this study", says Makua.

He says that the farmers are more than willing to participate in the study, even though their work schedules are very tight.

“They were very excited to have us there and to receive information from the study and about what others are doing. The farmers are eager to implement circular changes on their farm, given that they can increase their profits or save money on inputs such as feed.”



Ernest Makua collecting data on circularity of nutrients from small-scale farmer at Welkom in the Free State Province (South Africa).



Collecting data from small-scale farmer at Polokwane in Limpopo Province (South Africa).

Before his study is finalized Makua will collect more data about how small-scale emerging farmers handle cattle manure, and whether it's part of a circular farm practice. The pictures in this photo gallery are from his visits to small scale farmers.

Ultra – and high-density farming is labor intensive and requires solar panels and electric fences. This is a major obstacle, especially to small-scale farmers. To increase the use of these pasture methods, the farmers need funding support and access to advisory services.

Makua reports that both researchers at the University of South Africa and Pretoria and the Red meat industry have a good dialogue with the government. Results from this study will be presented to relevant government representatives.

“They are very interested in our feedback about how they can support the farmers most efficiently.”

“We hope to also encourage small-scale farmers to practice this method, especially because over grazing is a common problem.”

By; Anette Tjomsland Spilling

Photos; Helpful farmers along the way.

Published 20.10.24

 News archive
(<https://www.circagric.org/news/>)

If you're interested in more details about the subject in this article you may watch this webinar with Ernest Makua, about Optimizing nutrient circularity for profitable and sustainable cattle farming.

RMIS Webinar Optimising Nutrient Circularity for Profitable and Sustainable ...



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