

NTC SECTOR INTELLIGENCE

Cattle Tech Sector Map 2.0: A Global Look at Technologies for a Sustainable Beef Industry



NatureTechCollective

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Table of Contents

Acknowledgements	03
Foreword	04
Executive Summary	05
Introduction	07
The Taxonomy	08
Cattle Tech Sector Map 2.0	09
Regions of Interest	
Key Takeaways: LATAM	10-17
Key Takeaways: Europe	17
Key Takeaways: Australia & New Zealand	18
Key Takeaways: North America	19
Key Takeaways: China, India, Africa	21
Subcategories Definitions	22-28

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Tim Tensen

Foreword

Two years have passed since the first Cattle Tech Sector Map, and the landscape it described is unrecognizable. In April 2025 the USDA cancelled the \$3.1 billion Partnerships for Climate-Smart Commodities program and reissued it as Advancing Markets for Producers, removing the largest public subsidy the US cattle tech sector had ever had. Microsoft, which accounted for close to 90 percent of durable carbon removal purchases and had signed the largest soil carbon agreement on record, paused new buying in early 2026 and cut volumes roughly 80 percent in the first half of the year; existing contracts hold, but the sector's marginal buyer is gone. McDonald's USA, the USDA's Natural Resources Conservation Service, and suppliers including Cargill, OSI and The Coca-Cola Company committed more than \$200 million over seven years through NFWF's Grassland Resilience and Conservation Initiative, with a first \$32.8 million awarded in April 2026. Halter raised \$220 million at a \$2 billion valuation led by Founders Fund, the largest venture round in New Zealand's history, closed while global agrifoodtech funding sits roughly 70 percent below its peak. All of it against a US herd of 86.2 million head, the smallest since the early 1950s, beef cows at their lowest since the inventory series began in 1971, record prices, and packers closing plants in part due to compressed margins from relatively stable consumer prices. When we last interviewed experts, biodiversity and water measurement were the constraints they named most often in holding back the sustainable impact of beef systems. Today the conversation has moved to financing, genetics, methane-reduction technology and virtual fencing, innovations that pay for themselves rather than instrumentation still waiting for a buyer.

What remains true is the scale of the problem. Cattle account for roughly 38 percent of mammalian biomass on Earth (Bar-On et al., 2018). Livestock supply chains generate about 14.5 percent of global anthropogenic emissions, with cattle responsible for roughly two-thirds of that total (FAO GLEAM), and grazing and feed production occupy close to two-thirds of the world's agricultural land. By any measure, this is the largest unsolved industry challenge in agriculture. That is why we expanded the inquiry in three ways for this edition: beyond a US focus to the world's major cattle-producing markets, into how capital is actually flowing into the sector, and toward how regulatory, capital-structure and market conditions shape where innovation gets built.

This edition covers 427 entities across 4 markets, against 249 entities in the first. For the first time, patterns we had been tracking anecdotally show up in the market data itself. US entities concentrate on soil carbon quantification. European funding holds steady behind biodiversity monitoring and evaluation. Latin American companies emphasize traceability. Oceania-based firms, operating under comparatively stable regulatory and market conditions, invest further out on the innovation curve than their peers elsewhere.

We hope this map offers a shared and useful picture of what is defining sustainability innovation in the cattle sector to help us more clearly see what is possible, what is timely, and what is still missing in the work of making beef a net positive industry.



Executive Summary

The sustainable cattle technology sector can be divided into two broad groups of roughly equal size. About half of the organizations in the database build tools that help producers change what they do on the farm, and about half build tools that measure and quantify the effect of those changes. The division is close to even: 200 organizations fall on the on-farm action side, including feed additives, virtual fencing, wearables, breeding, and manure systems, and 210 fall on the measurement-and-modeling side, including footprinting calculators/LCAs, soil-carbon modeling, traceability platforms, and credit marketplaces. This balance indicates a market that is developing the means of change and the means of verifying it at a similar pace.

When organizations are grouped by primary category, the field is weighted toward quantification. Measurement (34%) and Modeling (28%) together account for 62% of all organizations, well above the categories that physically alter the animal/land or verify its change: Material Change (18%), Market Pressures (11%), and Monetization (9%). A large share of current activity is therefore instrumentation. The sector is investing in the ability to observe, measure, and model cattle systems, on the premise that reliable data is a precondition for carbon credits, sustainability premiums, regulatory compliance, and genetic progress. It's worth noting however, that this is a technology map which fundamentally excludes non-tech-enabled project developers, impact investors, and scientific research organizations who are major players in the transition itself.

The location where a given technology is developed varies considerably by region, and the pattern generally follows each region's dominant pressure rather than its herd size. Feed additives and methane inhibitors are developed most in Australia and New Zealand, which account for 40% of that subcategory despite being the fourth-largest region by company count. Deforestation and land-use compliance tools are concentrated in South and Central America, at about 55% of the subcategory, reflecting the EU Deforestation Regulation and national traceability requirements that bind beef exports. Biodiversity monitoring is largely a European specialty, at 81%, consistent with the region's corporate nature-reporting. Farm-level greenhouse-gas footprinting is also more common in Europe, while soil-carbon quantification and manure-and-waste systems are led by North America, which has both the most developed voluntary carbon markets and the most intensive feedlot and dairy operations.

Investment is distributed less evenly than company activity and should be noted that funding data especially for early stage companies was sparse - making up less than 50% of companies scoped. Setting aside two diversified-multinational totals that would otherwise distort the picture (DSM-Firmenich's Sustell and Alltech, both of which reflect parent-company figures rather than sustainable-cattle investment), roughly \$2.6 billion in disclosed venture funding is associated with the tracked companies. North America accounts for the largest share, at about \$1.34 billion.





On a per-company basis, Australia and New Zealand are the most capitalized, with the highest proportion of funded companies (38%) and the highest median round (about \$12.7 million), even after the region's single largest round, which represents 58% of its total, is set aside. South and Central America presents a clear contrast: it is the second-largest region by company count but among the least capitalized, with roughly one in five companies reporting funding and a median round near \$4.5 million. The Market Pressures category, though it includes 48 organizations, has attracted under \$30 million in total, which indicates that compliance and traceability tools are often built as services or shared infrastructure rather than as venture-scale businesses. This Market Pressure trend is expected to change as European Deforestation regulations reach enforcement over the coming years.

In the most sustainably positioned markets, patterns suggest a sector with an integrated tech stack: instruments that generate data, models that convert data into claims, and markets that convert claims into revenue. In less developed areas, that integration is forthcoming with reliance on single interventions, such as a feed additives or virtual fencing still prevalent. In these regions, research and policy are still needed to connect the different tech stack layers. Where these layers are the best connected, specialization is emerging along the lines of whichever pressure: regulatory, commercial, or ecological, is most significant locally. A question the data raises is whether the current emphasis on measurement will be matched by investment in the more capital-intensive work of changing conditions in the rumen and on the range.

Introduction

As investment in nature-positive and climate-resilient action expands across established and emerging asset classes, attention to commodity markets, and to beef and cattle in particular, has grown. This sustained focus has been accompanied by a proliferation of monitoring technologies, research and development, and financial instruments intended to support the transition. As the scope of the sector has widened, our taxonomy has expanded with it, adding subcategories that describe an increasingly differentiated market. Grouping information into categories inevitably obscures some of the nuance, and some of the connections between those categories, but a simplified and reasonably exhaustive view of the sector can still offer useful signals about the investment in, and the maturity of, each grouping. This is the basis for the gap analysis that follows.

The report is intended for four audiences:

Producers, supply chain companies, and other users of these technologies

Capital providers that seek to support increased sustainability in the beef sector

Researchers, tech providers, & other entities that generate tools for beef cattle sustainability

Field builders who may process this data for their own sustainability initiatives and cohorts

The cattle market has changed considerably in recent years, under pressure from corporate stakeholders, government policy, and emerging voluntary and regulated markets. Meaningful gaps remain, however, identified in our desk research and expert interviews, that continue to hold the sector back from advancing. These gaps appear in different forms and at varying intensity across geographies, which is why this 2.0 edition adds a regional layer: a solution established in one part of the world may offer a useful signal for other regions to address their own challenges.

Scope

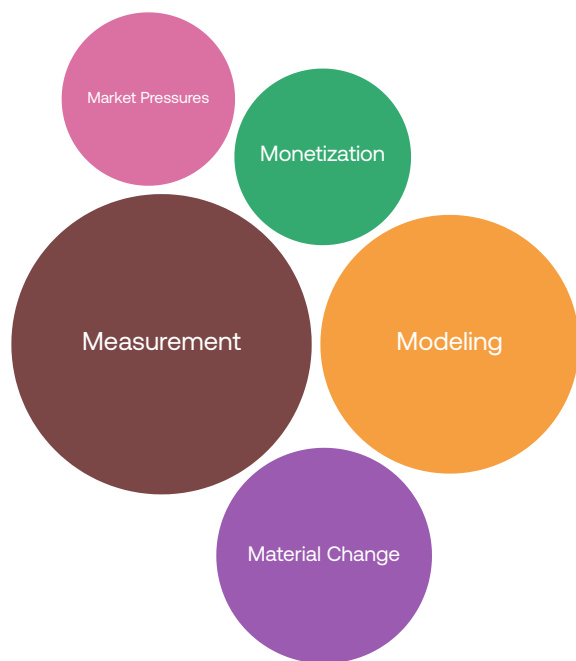
We define sustainable cattle production technology as the tools, platforms, and datasets that measurably improve at least one environmental outcome of cattle systems, including greenhouse-gas emissions, land-use change and deforestation, pasture health and soil carbon, water resource management, biodiversity, or efficient production, without eroding animal welfare or producer livelihoods. This encompasses technologies that reduce impacts directly, such as feed additives, virtual fencing, and sustainable manure management; those that make impacts visible and manageable, such as water sensors, GHG footprinting, remote sensing, and herd analytics; and those that translate outcomes into market or financial signals, such as traceability, certification, and credit platforms.

Sources

This report draws on interviews with professionals working in sustainable cattle, desk research, and the compilation and analysis of a database of 400+ sustainable cattle technology providers. It extends the scope of the previous edition to cover technology globally and, where the data is available, to consider funding stage and amount.



The Taxonomy



A major goal of the report is to reconfigure the existing taxonomy to fit within the structure of the Nature Tech Taxonomy. Though many of the categories remain the same, a global scope of cattle markets required the addition of categories such as Deforestation & Land-Use Compliance Monitoring and Outcome Verification and Certification Platforms.

Measurement

On-Animal Sensors & Wearables **30**
 Individual Animal Identification & Tracking **28**
 Enteric Methane Measurement & Monitoring **18**
 Biodiversity Monitoring **17**
 Water Monitoring **16**
 Soil Carbon Quantification & Modeling **35**

Modeling

Farm-Level GHG Footprinting & Lifecycle Assessment **28**
 Grazing Planning & Rangeland Modeling **43**
 Herd Analytics & Decision Support **15**
 Farm & Operations Management Software **23**
 Record-Keeping **10**

Material Change

Feed Additives & Methane Inhibitors **25**
 Vaccines & Biologics **5**
 Genetics & Breeding **8**
 Feed Optimization & Nutrition **15**
 Manure Management **15**
 Virtual Fencing & Grazing Automation **10**

Market Pressures

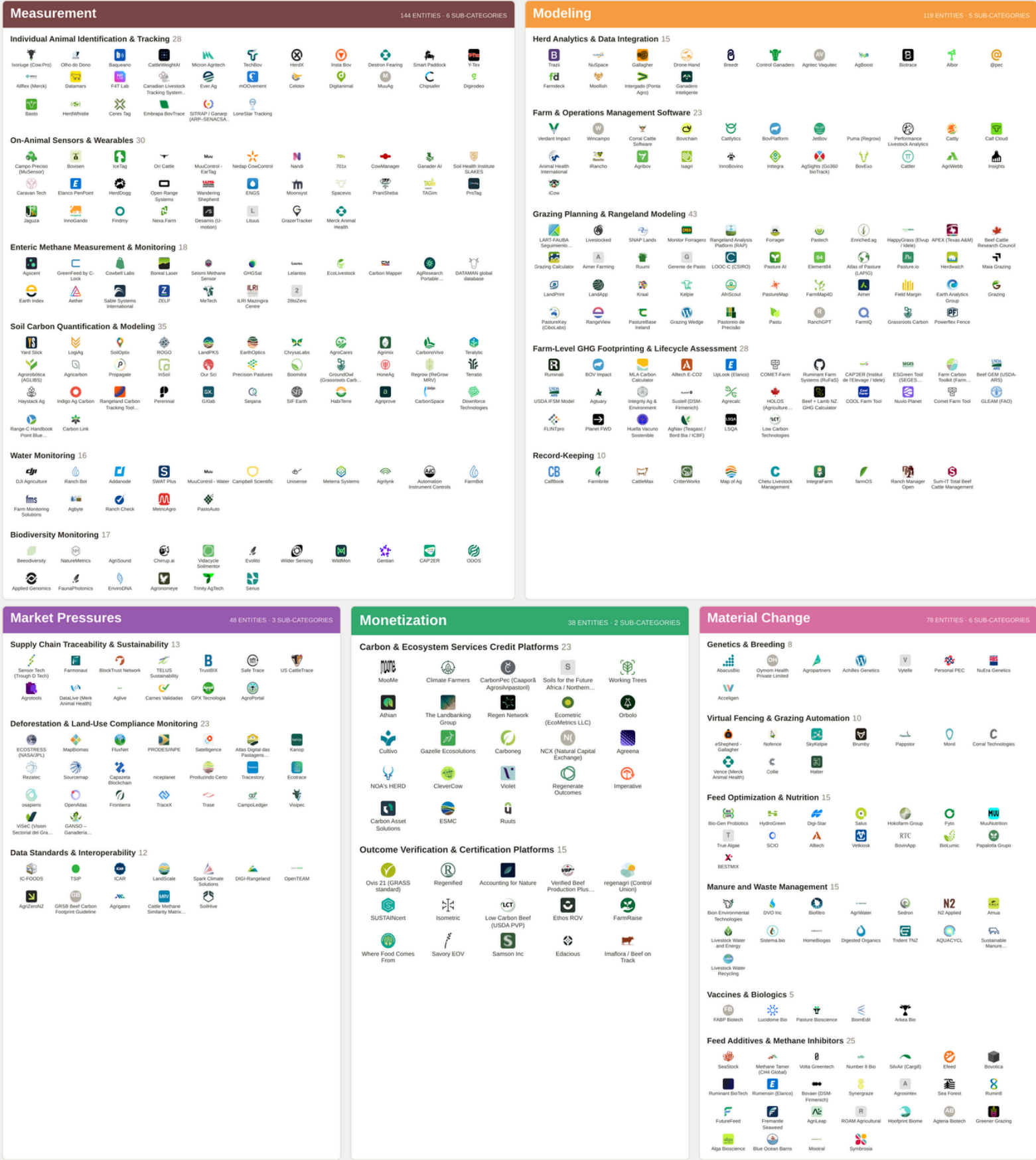
Supply Chain Traceability & Sustainability **13**
 Deforestation & Land-Use Compliance Monitoring **23**
 Data Standards & Interoperability **12**

Monetization

Carbon & Ecosystem Services Credit Platforms **23**
 Outcome Verification & Certification Platforms **15**

Cattle Tech Sector Map 2.0

Please find an accessible version of the cattle tech sector map [HERE](#)



Regions of Interest

In this section we view cattle technology through the lens of geography, contextualizing development within regional pressures for places with the highest intensive and extensive production systems.

Key Takeaways: LATAM

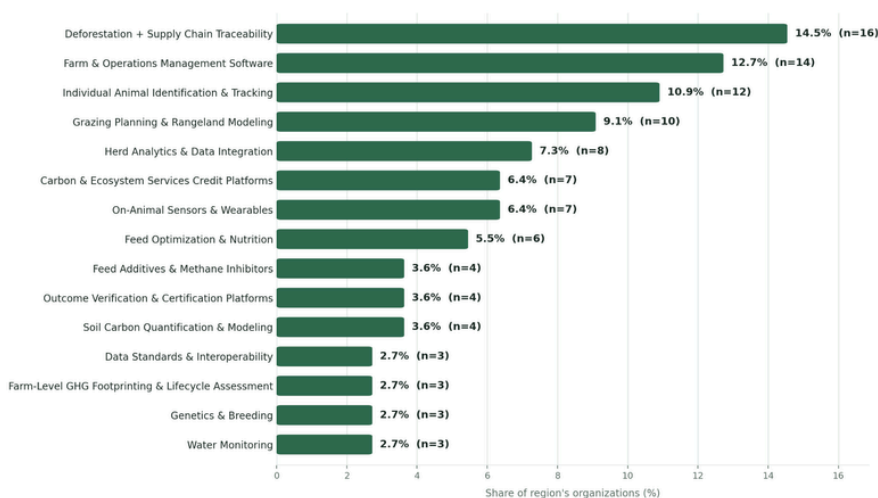
What the Landscape Map shows:

South and Central America is the second-largest ecosystem in the database, with 103 organizations, and its profile is shaped more by market and regulatory pressure than by capital. The region accounts for the largest share of technologies that connect cattle to compliant supply chains, including deforestation and land-use monitoring at about 55% of that subcategory, supply-chain traceability at about 56%, and individual animal identification at about 48%. This pattern reflects the pressure of the EU Deforestation Regulation and national traceability regimes that make verifiable provenance a condition of market access. On-animal sensors in the region often deliver grazing benefits through deliberate farmer intervention rather than through virtual fencing, and a group of blockchain-based platforms are emerging that enable the creation and farm-level verification of sustainability premiums (Violet, Capazeta, BlockTrust Network) though these premiums are yet to materialize at scale.

Latin America runs roughly a third of the world's cattle herd on the world's most ecologically consequential land base. Stretching through the Chaco, Llanos, Amazonian, Pampas and Cerrado biomes, beef cattle production systems impact these regions in dramatically different ways. We have allocated special attention to the LATAM region as countries like Uruguay, Paraguay, and Argentina produce the highest percentages of their beef cattle on extensive grazing lands¹. Extensives systems are generally easier to transition with pasture intensification² and benefit stacking, making LATAM ground-zero for sustainable cattle.

South America + Central America

Primary subcategory mix · n = 110 organizations · 15 significant subcategories shown



Only significant subcategories shown — those with 3+ organizations whose primary (first-listed) subcategory is that type. 5 smaller subcategories excluded, so bars sum to 95%, not 100%.

¹ <https://www.mdpi.com/2071-1050/15/13/10533>

² <https://www.leap.ox.ac.uk/environmental-impacts-intensive-and-extensive-systems>

Using technology as a lever for change, the continent has three main focal points:

Payment for Ecosystem Services:

The development of insetting and offsetting carbon credits for above and below ground biomass on grazed lands.

Traceability:

Traceability platforms have expanded from agriculture into livestock and from public into private offerings. While countries such as Uruguay have operated RFID traceability for years, newer private-sector entrants like VISEC in Argentina and SafeBeef in Brazil show private sector interest as well. This expansion has brought new tools like blockchain to support immutable farm-to-fork records. Forthcoming EUDR enforcement accounts for much of the momentum, though these systems also lay the groundwork for sustainability premiums in international markets.

On-farm management:

At the farm level, mobile-first platforms show the highest rate of development in Latin America, and in the Southern Cone in particular, where producers rely on them for pasture management, health/calving events, and feed management.

Although adoption ultimately turns on sociocultural and economic conditions, the binding constraint on large-scale deployment is technical: the digital infrastructure these tools presuppose (reliable connectivity, power, cloud bandwidth) is often absent in the places they would be most useful. The research suggests that closing that gap would lift uptake of the existing technology stack more than any new tool would, and Chile's recent Starlink investment will offer an early test of this thesis.

**This section draws on ~30 primary interviews with farmers, project developers, tech providers, wholesalers, and conservation orgs across ten countries; the IADB monograph *Adoption of Sustainable Livestock Innovations: Evidence from Latin America* (Blackman, Muñoz, Salazar & Winters, 2026); The Agtech Radar Brazil 2025 report; a ~200-row map of cattle-tech ventures with demonstrable applications in Latin America; and many other grey literature reviews.*



The Geography of Transition



Brazil

Brazil is the world's largest herd and the country where most layers of the sustainability stack have been forced to industrial scale by a single external pressure: the deforestation exposure embedded in its beef supply chain.

Traceability

Traceability is where Brazil has advanced furthest. [Ecotrace Solutions](#) has effectively become the packer-side backbone, moving something on the order of 40% of Brazilian bovine exports through a blockchain-backed platform integrated with JBS, Friboi, Seara, Minerva, and downstream buyers like Renner, and aligned to both EUDR and China's GACC protocols. [Produzindo Certo](#) works the other end of the chain, scoring rural properties against dozens of social and environmental indicators for buyer-side ESG diligence and layering deforestation and embargoed-area heatmaps on top of individual farms. The two together describe how Brazilian traceability is being built, not by federal mandate but by buyer pull, from packers and European importers pushing verification down the chain.

Carbon and ecosystem-service credits

Despite the striking asymmetry of Brazil's cap and trade system, with deforestation for ranching being the single largest emitter and also exempt from compliance, the beef sector will play an equally important role on the supply side. [CarbonPec](#), sitting inside [Grupo Caaporã](#), is one of the clearer examples of how that farm-level model gets translated into a credit stream: recovered degraded pastures produce both beef and soil/biomass carbon credits. Another salient example is [WorkingTrees](#), the tech-enabled project developer scaling silvopasture-based carbon credits across Brazil using smartphone-based measurement tools and internal models. The platform can verify carbon stored in trees and audit project activities.

³ <https://www.datacenterdynamics.com/en/news/starlink-expands-ground-infrastructure-in-chile-deploys-community-gateway-in-galapagos/>

On-field management

The Brazilian precision-livestock stack reflects the scale and intensity of the herd. Pastu applies satellite NDVI, herd, and financial data to large commercial operations, with tech-investors backing that position as the enterprise-scale platform. Intergado focuses on the individual-animal end and is one of the few Latin American precision-livestock tools used in international research alongside frontier work on genetics and methane. @pec (Arrobapec) takes a distinctly Brazilian angle: livestock as collateral, with herd data feeding a fintech that anticipates receivables against the animals themselves. Together they suggest that Brazilian on-field tech is being built around Brazilian production models and increasingly exported into the region.

Dominant Transition Issues

deforestation-linked traceability

sustainability premiums not reaching small producers

indirect-supplier visibility

consolidating at the packing level

Uruguay

Traceability + On-Field Management

Uruguay is the reference case for what state-led traceability looks like. Mandatory RFID for every animal, government-paid tags, and national data portal allows life-of-animal tracking from birth to slaughter, satisfying stringent U.S. and European import criteria. The geographic benefit Uruguay enjoys is its extensive grasslands; lack of deforestation exposure means EUDR pressure is muted. Traceability, therefore, is geared more towards generating sustainable “grass-fed and finished” premiums in Europe than meeting policy requirements. This is evident in emerging technology like RanchGPT which explicitly caters to carbon measurement and tracking alongside daily pasture and corral management. Since 80% of agricultural land is dedicated to extensive grazing, grazing forecasting technology is especially prevalent both as infield farmer-oriented platforms (Pasture AI) and from geospatial providers (Forrager).

Public technologies like the CONEAT- Index⁴ provides ratings on suitability of land for agrifood production practices so farmers and investors can assess ROI. Integrating forthcoming data on gains from rotational grazing and agroforestry in the region (productivity increase of 6%, stocking rates increase by 7%, income increase 12%)⁵ could encourage investment in and acceptance of pasture intensification at a land valuation level.

Carbon Crediting and PES

Technology for Credit verification remains low. However, global technology providers such as ChrysaLabs are being verified under Verra’s VM0042 for soil carbon projects. This becomes relevant for Uruguay as rotational grazing credits are being accepted under the same methodology⁶. Handheld sensors like Chrysa’s will reduce the measurement burden on farmers and enable easier access to the carbon markets.

While the development of pasture management and grazing technology is promising, the sustainable intensification (rotational grazing, silvopasture) technology adoption has lagged. While traditional electric fencing remains dominant, global systems like Halter with direct to satellite tech and a focus on smaller scale, remote farms - could overcome some of the barriers Uruguayan farmers face in a transition to regenerative agriculture. Statements from the big 4 virtual fencing providers (Halter, Nofence, eShepherd, Vence) indicate expansion to South America though none have been able to pull it off at scale.

⁴ <https://en.camposonline.com.uy/Articles/coneat-agricultural-productivity-index-in-uruguay-ref-31>

⁵ <https://www.fao.org/americas/regional-initiatives/top-pages/sustainable-livestock-farming-in-latin-america-and-the-caribbean/latin-america-and-the-caribbean-regional-overview-of-food-security-and-nutrition-2024/en>

⁶ <https://projecthub.terra.org/publiccomment/project/4725>

Dominant Transition Issues

moving from mandatory ID to real-time environmental traceability

monetising the country's grassland-biome advantage in export markets

Argentina and Paraguay

Argentina entered 2026 with a cattle herd of roughly 51.8 million head — the smallest in fifteen years after three drought years and heavy export slaughter of breeding females — and a technology stack that is being reshaped less by producer pull than by regulatory push.

Traceability

Platforms like [Carnes Validadas](#) and [CampoLedger](#) are pioneering blockchain technology for traceability to meet individual-level tracking requirements; deploying blockchain technology enables national level compliance for Argentina's mandatory electronic-ID rollout in 2026 as well as international standards like the EUDR.

On-farm Management

GPS ear tags and mobile management platforms present a number of opportunities for producers to improve stocking rates, pasture management, on-farm resources, and financial opportunities. Consider this [Cow.Pro](#) case study: a farmer in Paraguay with a 4–5,000-head herd started running Cowpro and saw within weeks what had been invisible for years: groups of cattle were walking two kilometers or more a day just to reach water, burning energy that should have gone into weight gain. Moving water closer to the paddocks cost roughly \$500. The recovered weight, meat that had been walked off in the heat, ran into hundreds of dollars a day. Cost saving is obvious but when integrating platforms like [Pastech](#) and CREA's [Monitor Forrajero](#), stocking rates, pasture health, and soil resilience is no longer a game of guesswork.

Financially, these technologies are providing opportunities that wouldn't otherwise exist: in Argentina, Cow.Pro is working with one of the top three banks to tie sensor deployment to improved credit terms for grass-fed producers. Using Cow.Pro's "Remote proof-of-life verification", a lender can see not just what a producer owns but where each animal is and how the herd is moving, turning a spreadsheet asset into an underwriteable one.

The kicker to all this is the changes that come out of "turning the lights on" for grazing information systems: better water placement, tighter reproductive windows, and stocking matched to forage are the same moves that lower emissions and resource intensity, improve soil health, and keep extensive grazing economically viable.

Carbon Crediting

Silvopasture and rotational management, long championed their soil-carbon, biodiversity, and animal-welfare returns, may finally be acquiring a monetization path through the voluntary carbon market: the SARA (South American Regenerative Agriculture) program, developed by Anthesis with [Ruuts](#) and local implementers including [Ovis 21](#), became one of the first grazing programs registered under Verra's VM0042 soil-carbon methodology and now spans roughly 130 farms and 150,000 hectares across Argentina, Paraguay, and Chile, with a projected pathway toward 500,000 regenerated hectares and more than a million tonnes of removals per year from 2028 onward. [Orbolo](#) is another salient example in Paraguay: a business model built around running "cowboy-as-a-service" which results in claimable outcomes for NGOs and corporate partners.



What this hints at for the industry more broadly is that traceability, satellite pasture analytics, animal wearables, and digital MRV appear to be converging into a single stack whose economics rest on outcomes buyers can actually price. Furthermore, institutional nature-capital investors of the Mirova archetype are becoming increasingly visible on the demand side. Seen this way, Argentina's transition looks less like a digitization of the herd and more like the patient assembly of an evidence base that lets extensive, well-managed grazing systems be paid for within supply chains and - should the premiums materialize - internationally.

Dominant Transition Issues

association-mediated tech capacity

sustainability-linked credit lines as the transition wedge

(in Paraguay) capital availability for regen land acquisition

Colombia

Though not part of the world's top producers even when considering extensive systems, Colombia houses many promising examples of a sustainable beef cattle sector. In June the country became the first tropical-forest nation to pass a cattle-traceability law explicitly designed to keep deforestation-linked beef out of supply chains, positioning ICA's SINIGAN system as the state-run backbone that private tools now have to plug into.

Traceability + On Field Management

The ICA's regulatory frame is what makes platforms like [Trazii](#) and [Moolish](#) more than herd-management apps, both start from the compliance layer Colombian ranchers now need (per-animal events, ICA-facing traceability) and extend outward into the operational data set that lets claims about origin, health, and sustainability be defended rather than merely asserted. This also provides cross cutting implications for markets: an initiative like [GANSO](#) sits somewhere between an assurance body, a deforestation-monitoring service, and a technical-assistance program, using the traceable record to certify sustainable management and route investment toward practices that restore ecosystem services. Colombia's sustainable-intensification playbook is more well developed than most: CIPAV's intensive silvopastoral systems, integrating trees, shrubs, and rotational grazing, remain a globally cited model for reconciling productivity with biodiversity and soil carbon. Initiatives like CarboGrass are intended to create the environment for on-field management tools through the development of reliable datasets and models.

Carbon Credits and Ecosystem Services

The carbon and PES layer itself has an unusually deep lineage here through the Ganadería Colombiana Sostenible partnership (TNC, FEDEGAN, CIPAV, Fondo Acción), which spent years establishing support for PES credits. This work has transitioned into real financial gains for farmers through [Boomitra](#)'s "Grassland Restoration in Colombia" project which issues Verra credits from silvopasture and rotationally grazed lands. Industry connection tools like [CarbonoVivo](#) increase trust in the market by connecting farmers with technical experts that can establish a defensible baseline for sustainable grazing projects.

What Colombia hints at for the industry more broadly is that in a tropical-forest context the real driver of tech adoption is less export margin or productivity than the political and financial cost of deforestation exposure: traceability, PES and carbon finance, and silvopastoral management are converging into a single stack because that is the only shape that lets a producer, a buyer, and a regulator answer the same question about the same animal. However, factors like full landowner ship are strong predictors of sustainable pasture management, hinting that market signals alone are not enough to transition farmers in the region.

Dominant Transition Issues

land-tenure formalisation as a prerequisite for any other transition finance

building continuity across political cycles

Mexico

Mexico's cattle industry sits in an unusual position: it is one of the largest herds in Latin America yet also a de facto extension of the U.S. beef supply chain, sending live cattle north for feeding and finishing. The 2025–26 screwworm outbreak and the resulting U.S. border closures underlined how much of that trade depends on health and traceability infrastructure.

Traceability

SENASICA operates the national identification and movement backbone through SINIIGA, and the past two years have seen the government rebuild the traceability scheme into a more integrated system as a condition of restoring cross-border trade. That regulatory reset is what a Mexican-native platform like Corral is built to sit on top of: herd management, SENASICA reporting, and CFDI invoicing bundled into one workflow so that a smaller producer can actually meet compliance. The parallel, external-facing layer is coming from tools like Frontierra, whose satellite-based deforestation analysis (already used for Mexican soy in Bacalar) points to the EUDR-style compliance stack that Mexican beef exporters will progressively need to interface with as European and downstream U.S. buyers extend zero-deforestation requirements beyond crops.

Carbon and ecosystem-service credits

The concrete, credited work is happening in the Chihuahuan and Sonoran rangelands, where developers like Boomitra are running regenerative-grazing projects across ejidos and private ranches. These projects pair soil-carbon issuance with documented biodiversity co-benefits under standards such as Climate, Community & Biodiversity, and draw high independent ratings that give buyers confidence to transact. Longstanding silvopasture research from Yucatán and Chiapas has already shown the carbon and habitat value of tree-integrated grazing in tropical Mexico, giving a scientific base that a credit market can be built on.

On-field management

Adoption is bifurcated. Northern, border-adjacent backgrounding and feedlot operations are the most digitized because they are effectively selling into a U.S. buyer that expects data, while the tropical and smallholder-heavy south is where pasture-management software of the Gerente de Pasto type arise. The absence of a dominant Mexican-native pasture platform is itself a signal: the pasture-management category may end up being served by regional Brazilian or Latin American software rather than home-grown tools, with local players like Corral holding the herd-management and compliance layer.

What Mexico hints at for the industry more broadly is that in a herd of this scale, tightly coupled to a single major export market and exposed to acute biosecurity shocks, sustainability tech does not advance as a coherent strategy so much as arrive in pulses: a border closure forces a traceability upgrade, a European regulation pulls in geospatial compliance, a rangeland carbon market opens a channel for ejidos.

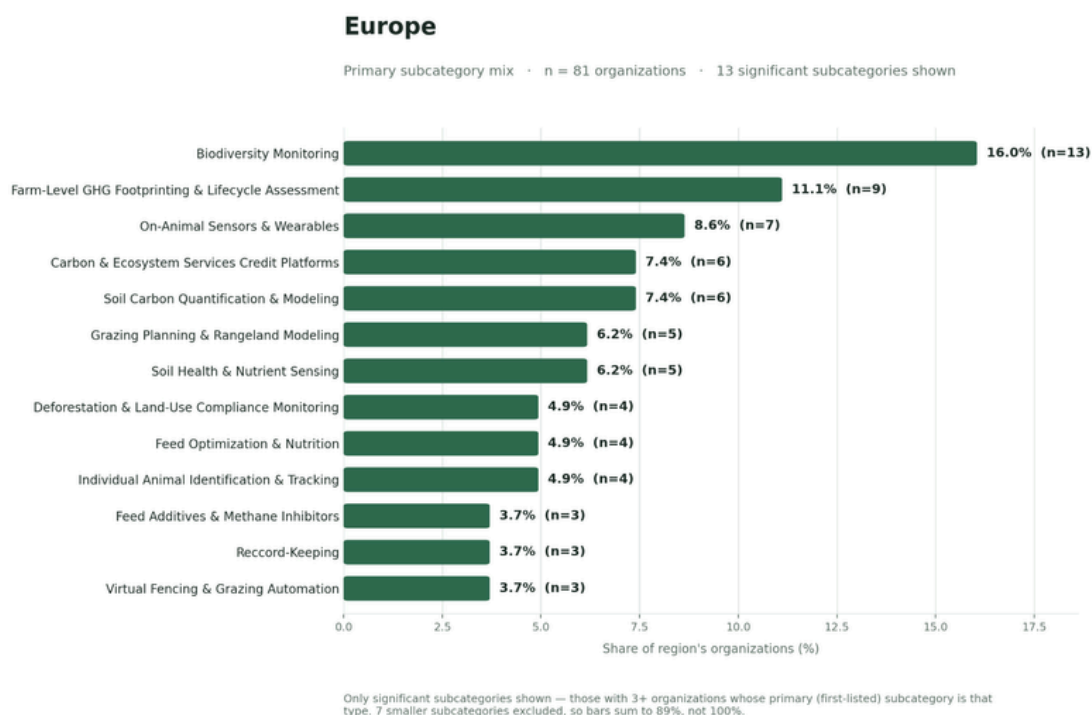
Dominant Transition Issues

ejidal-land governance reform

insurance-design reform to remove moral hazard

lease-based project-developer models as a workaround for structural tenure gaps

Key Takeaways: Europe



Europe reads less like a place where sustainable cattle technology is built and more like a place where it is verified. It is the third-largest ecosystem on the map, with 69 organizations and roughly \$354 million in disclosed funding, but what sets it apart is the shape of that portfolio rather than its size: at 43% measurement and 33% modeling, it is the most quantification-oriented region anywhere, home to the largest share of farm-level greenhouse-gas footprinting and lifecycle-assessment companies (~37%) and the overwhelming majority of biodiversity-monitoring firms (81%). That tilt toward environmental accounting and ecological monitoring soil-carbon programs, virtual fencing, eDNA-based biodiversity services, rather than the physical methane-reduction hardware and virtual fencing tracks a regulatory and corporate-reporting environment that rewards being able to prove an outcome. The same forces help explain why a region this invested in measurement is a comparatively modest beef exporter.

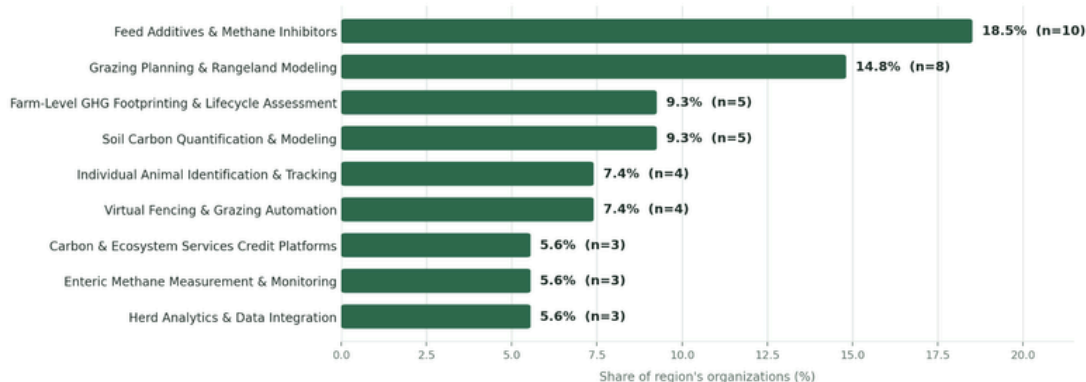
European production sits inside a policy stack, on-farm biodiversity requirements and a deforestation regulation that scrutinizes the land-use footprint of both domestic output and imported commodities, that pushes value toward demonstrating low-impact, nature-positive production rather than toward scaling volume for export. Just look to the European Roundtable for Beef Sustainability for examples of this: organizations like Chirrup, ODOS, and CAP'2ER are all named explicitly for livestock operations to measure their biodiversity with. In this context, sophisticated monitoring and verification tooling is less a nice-to-have than the ticket to market access in light of the ESRS, and it may position European companies well if natural-capital markets for sustainable grazing mature.

One structural caveat: much of Europe's beef never comes from dedicated beef herds. A large share originates in the dairy system, cull cows and dairy-bred calves finished for meat, whereas in South America, Australia, and other extensive-grazing geographies beef is far more often the product of purpose-raised suckler herds. Because this map is scoped tightly enough to exclude dairy, it captures Europe's measurement-and-monitoring layer cleanly but quietly understates the region's actual beef supply chain, since a meaningful portion of the animals, emissions, and land use that ultimately become European beef lives on the dairy side.

Key Takeaways: ANZ

Australia + New Zealand

Primary subcategory mix · n = 54 organizations · 9 significant subcategories shown



Only significant subcategories shown — those with 3+ organizations whose primary (first-listed) subcategory is that type. 9 smaller subcategories excluded, so bars sum to 83%, not 100%.

Australia and New Zealand are the most capital-efficient markets in the database. With 53 organizations it carries the highest proportion of funded companies (38%), the highest median round (about \$12.7 million), and roughly \$720 million in disclosed funding. What sets it apart is orientation rather than scale: a quarter of the portfolio is Material Change technology, the highest share of any region, and the market tilts toward technologies that physically reduce emissions rather than ones that only measure them. This tracks with the industry's commitment to net zero emissions in line with Australia's 2050 commitments. While much attention is paid to methane-reduction in extensive-systems in the research space, commercially, feed-additives for feedlots are the most viable and thus 40% of the subcategory. Moreover, layered benefits for this reduction from the national Australian Carbon Credit Units gives producers a direct financial reason to act on those constraints rather than simply document them.

Beyond the rumen, the prevalence of the extensive system also explains the region's strength in tools that make large paddocks manageable. Grazing-management software is well represented, and virtual fencing has become a real export, the leading collar platforms are expanding into the United States, making the region a net supplier of cattle technology.

GPS and on-animal sensing provide less expensive solutions to pasture and rotational decisions (with more labor required however) while also flagging heat stress and helping manage scarce water especially in Australia. Biodiversity is a quieter and, for now, coarser part of the picture: Meat and Livestock Australia reports that 160 of 290 million surveyed acres are managed for biodiversity outcomes, but that management concentrates in weed control rather than richer habitat or species results, which points to a natural-capital layer still closer to land stewardship than to a measurable, tradable asset. A dearth of biodiversity measurement tools in the map confirms this (with notable exceptions like [Agronomie](#)).

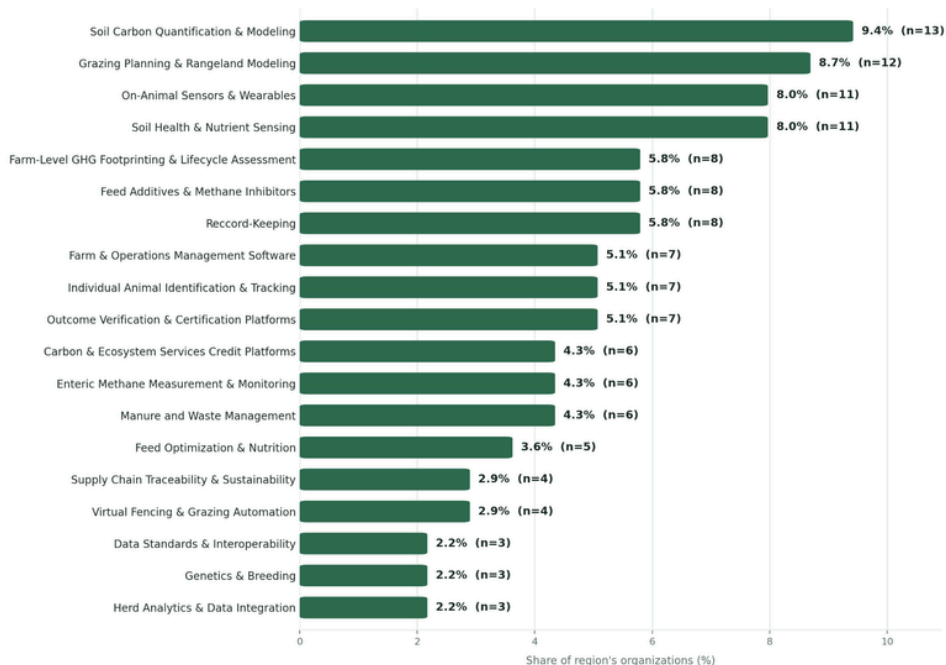
One dimension of the region sits largely outside what the map can show. Australia's carbon market is among the most developed in the world, yet that maturity barely registers in the database — and the reason appears structural rather than a shortfall in activity. Carbon crediting there runs through a government-operated national registry rather than the private marketplaces, registries, and verification vendors that make up the voluntary systems elsewhere. Every project and issued credit sits in a single public system open to inspection. Public money is used to incentivize carbon credits rather than to pay subsidies, and the country's largest emitters are obligated to buy offsets, which underwrites durable demand, to the point that graziers on perennial land can earn more from carbon than from cattle. Because sampling coordination, verification, and government reporting are consolidated into that public infrastructure, much of what would surface as a roster of private companies in another region is instead absorbed into the registry itself, and the firms that do appear tend to operate as integrated, end-to-end services working within the government framework rather than as standalone crediting or registry ventures. Methodology seems to be broadening in the same direction, toward integrated silvopastoral crediting that recognizes both above- and below-ground improvement under a single framework.

This points to a possibility worth holding in mind: the database may understate the maturity of carbon monetization in this region precisely because the market's backbone is public rather than commercial, and a publicly anchored registry produces far fewer mappable companies than a comparably developed private market would.

Key Takeaways: North America

North America

Primary subcategory mix · n = 138 organizations · 19 significant subcategories shown



Only significant subcategories shown — those with 3+ organizations whose primary (first-listed) subcategory is that type. 3 smaller subcategories excluded, so bars sum to 96%, not 100%.

North America is the largest ecosystem in the database, with 132 organizations and about \$1.31 billion in disclosed venture funding once the diversified-parent figures are set aside. Its portfolio is the most balanced of any region, split almost evenly between Modeling at 32% and Measurement at 30%, with a comparatively high Material Change share of 22%. The region leads soil-carbon quantification, at close to half of that subcategory, and dominates manure and waste management, holding roughly four-fifths of it, the first a function of expanding voluntary soil-carbon markets for regenerative agriculture (VM0042 verification applied to grazed and farmed land similarly), the second a function of the scale of intensive operations that make manure. It also leads in Enteric-Methane Measurement technologies. North American investors remain the most willing to fund capital-intensive material change: the largest rounds in the region sit in manure processing and soil-scanning hardware, and its median funding per company, about \$9 million, is the highest among the major regions.

These findings are supported by the industry interviews conducted; the fundamental tension in the US is that a vast majority of producers are below 500 head with little to no financial means to invest in cattle technologies (much less sustainable cattle tech). It's unsurprising then that a majority of US technology is built for large intensive feedlots and finishing operations, the margins are too small for "hobbyist" producers to make reasonable investment in technology.

The exception to this rule is virtual fencing technology which has demonstrated scalability in the past couple of years. The breakthrough is enabled by small-scale capabilities of organizations like NoFence which cater to medium-low footprint ranches across the US. This is also the rare technology with a real productivity argument rather than a pure cost: it lets producers raise stocking rates through rotational grazing, so it pays for itself. The economics behind this new market are observable and providers like MoniL are growing quickly despite relative immaturity (2022). A promising development for virtual fencing is the recent inclusion in EQIP and ECP cost-sharing program so federal dollars, not just producer cash, carry the uptake.

However, virtual fencing's success shouldn't be confused as a market signal for sustainability in the US. At a fundamental level, sustainability premiums have not materialized nor are they expected to under the national quality-based demand paradigms. While benefit stacking with carbon credits seems like a way to overcome this barrier on the producer side, land acquisition for data centers is creating a similar land-based pressure on grasslands in the US as rainforests in LATAM, conversion-by-acquisition rather than by clearing.

Currently, emissions technologies are effective tools for generating base data for large scale modeling platforms and LCA and there are some promising commercial initiatives for producer-level management being brought to market. Initiatives like CSU's AgNext program are using GreenFeed and spectral data to create the basic relationships that underpin models for cattle LCA, granting producers better, more granular data on how farm-level practice can impact emissions. These initiatives address some of the research needs laid out in the US Roundtable for Sustainable Beef's 2025 Roadmap⁷. However, these developments are not only research-based: commercial products like Zelp Sense deliver individual and herd-level emissions data for producers to better manage emissions inventory and assess efficacy of methane reduction technology like vaccines (Arkea Bio), boluses (Ruminant Biotech, number8bio), and feed additives (Rumin8, Hoofprint Biome, Volta Greentech, and many more).

⁷ <https://www.usrsb.org/our-work/sustainable-beef-research-roadmap>

Key Takeaways: China, India, Africa

China

China is one of the largest beef producers globally with 70-100 million head of cattle. However, they are a major blind spot in our map as much of the innovation revolves around upstream solutions for feed-production sustainability. A few innovations, like Beijing Aerospace Hengfeng Technology Co., Ltd. make the cut as they use biotechnology to process manure for agricultural nitrogen inputs.

India

Livestock technology in India is quite developed with a cow population of over 195 million, though due to many states having a legal ban on slaughter, few beef-specific options are being developed. Much of the livestock technology is isolated in the dairy industry which is outside the scope of this report.

Africa

While Africa holds a significant amount of the world's cattle (300m +), it produces a relatively small amount of sustainable technology. Notable exceptions to this rule include iCow, an online technology platform enabling farmers to transition to regenerative practices, Kraal which uses individual tracking technology to prevent overgrazing, and AfriScout Regen which enable pastoralists to restore degraded landscapes using satellite imagery and rotational grazing recommendations.



Measurement / Subcategory Descriptions

Entities in the Measurement category provide the tools that enable the collection of data and analytical insights for sustainable beef production

On-Animal Sensors & Wearables



Solar or battery powered hardware worn by or implanted in cattle that generates physiological or behavioral data for farm management decisions. GPS-enabled sensors increase a farmers' understanding of pasture movement and generate defensible data for more sustainable water resource and grazing decisions. These sensors can also generate geolocation data for regulatory tracking purposes. When equipped with accelerometers, wearables can detect estrus/heat events and disease/health indicators.

Individual Animal Identification & Tracking



Technologies that establish a unique, verifiable identity for each animal (RFID, EID, satellite tags), enabling chain-of-custody traceability from birth through processing.

Enteric Methane Measurement & Monitoring



Devices and sensor systems that measure methane emissions from individual animals, herds, or entire feedlots, providing the raw data required for LCA datasets and footprint modeling, compliance, or genetic selection.

Biodiversity Monitoring



Hardware and software that quantifies ecosystem health on grazing lands and surrounding areas.

*A few notes on how to read this section: some entities might be missing because no logo was available at the time of publication. Some entities appear in more than one subcategory where their offering genuinely spans both, and are counted once toward the 427 total regardless of how many subcategories they appear in. This section reflects a snapshot of our Airtable and Lovable database at time of publication; entities may have been added, removed, or recategorized since, so small discrepancies between this section and the live database are possible.



Measurement / Subcategory Descriptions

Entities in the Measurement category provide the tools that enable the collection of data and analytical insights for sustainable beef production

Water Monitoring



Sensors and telemetry systems that track availability and consumption of water across livestock operations. These tools reduce labor emissions and enable efficient water management in extensive systems.

Soil Carbon Quantification & Modeling



Platforms that combine field measurements with remote sensing and machine learning to estimate soil organic carbon stocks and sequestration potential over time. These tools are used mainly for carbon credit generation on agricultural field and most often caters to the VM00042 standard to quantify gains in soil carbon on grazed lands.

Modeling / Subcategory Descriptions

Entities in the Modeling category provide the tools that turn raw farm and herd data into forecasts, footprints, and decision-support insights for sustainable beef production.

Farm & Operations Management Software



Farm-level platforms for managing animals, pastures, finances, and regulatory records for sustainable resource use to lower the emission intensity per cow.

Record Keeping



Tools that support producers to track financial, labor, and other business data and enable more efficient and timely deployment of resources.

Grazing Planning & Forage Forecasting/Rangeland Modeling



Decision support tools that use geospatial and user-provided information to model carrying capacity, predict forage availability, and optimize rotational grazing schedules.

Herd Analytics & Decision Support



Software that supports individual animal level data to generate insights for financial decision making by verifying inventories, assessing health and estimating weight.

Farm-Level GHG Footprinting & Lifecycle Assessment



Software and online tools that calculates whole-farm or product-level greenhouse gas footprints across Scopes 1–3, enabling benchmarking, reporting, and supply chain claims.

Monetization / Subcategory Descriptions

Entities in the Monetization category provide the platforms that convert verified sustainability outcomes into carbon credits, certifications, or other market value for sustainable beef production.

Carbon & Ecosystem Services Credit Platforms



Marketplaces and programs that generate, verify, trade, and retire carbon or ecosystem services credits derived from grazing operations.

Outcome Verification & Certification Platforms



Technology platforms that collect, verify, and certify sustainability, regenerative, or deforestation-free outcomes at the farm level for market differentiation.

Material Change / Subcategory Descriptions

Entities in the Material Change category provide the products and interventions that directly alter animal, feed, or land management to reduce the environmental impact of beef production.

Feed Additives & Methane Inhibitors



Products added to feed or water that chemically suppress methanogenesis in the rumen, directly reducing enteric methane emissions per animal.

Vaccines & Biologics



Biotechnology approaches - vaccines and microbiome modification - that aim to achieve persistent methane reduction without continuous feed supplementation.

Genetics & Breeding



Genomic selection tools and breeding platforms that accelerate genetic progress toward cattle with lower methane output and higher feed efficiency.

Feed Optimization & Nutrition



Technologies for formulating, delivering, and monitoring feed to maximize productivity, feed conversion efficiency, and animal health. Precision feeding systems reduce resource waste and improve individual cattle livelihoods, lowering the emission intensity per animal.

Material Change / Subcategory Descriptions

Entities in the Material Change category provide the products and interventions that directly alter animal, feed, or land management to reduce the environmental impact of beef production.

Manure and Waste Management



Systems that process, treat, or convert livestock waste to reduce emissions, recover nutrients, or generate energy from manure streams.

Virtual Fencing & Grazing Automation



Virtual grazing combines GPS and sound-based collars with farm-management software to fence and move cattle without physical barriers. The collars capture real-time movement and cue animals to stay within set boundaries, while the app lets producers redraw grazing breaks remotely and flags any boundary breach as it happens, enabling precise herd positioning and screen-managed rotational grazing.

Market Pressures / Subcategory Descriptions

Entities in the Market Pressures category provide the tools that connect cattle supply chains to regulatory, compliance, and traceability requirements for sustainable beef production.

Supply Chain Traceability & Sustainability



Platforms that link direct and indirect cattle suppliers to processors, enabling meatpackers, retailers, and sometimes customers to verify compliance with emissions and circular economy regulations across the full supply chain.

Deforestation & Land-Use Compliance Monitoring



A subset of Supply Chain technologies that cater specifically to land-use claims. These technologies are explicitly oriented towards EUDR and deforestation-free claims in beef and cattle supply chains.

Data Standards & Interoperability



Organizations and frameworks working to make agricultural data portable, comparable, and exchangeable across otherwise siloed systems and national databases.



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