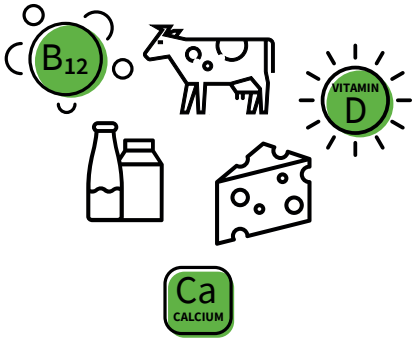
Centre for
Tropical Livestock
Genetics and Health

Part 01

Why is livestock important for human health?



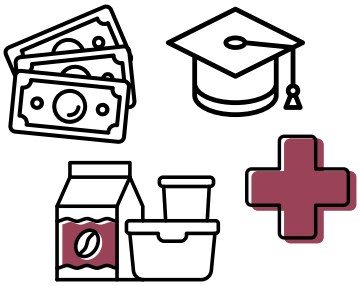
Nutritional Benefits

Livestock provides a valuable source of essential nutrients, including vitamins (such as B12) and minerals (such as iron and zinc). These nutrients are crucial for proper growth, development, and overall health of human beings.

Livestock products contribute about 40% of global calorie intake and fulfil approximately 50% of our dietary micronutrient requirements (National Research Council (USA), 1988).

Protein Source

Livestock is a significant source of dietary protein, which is vital for building and repairing tissues, producing enzymes and hormones, and supporting various physiological functions in the body. Proteins derived from livestock are generally complete proteins, meaning they contain all essential amino acids required by the human body.



Economic Access

Livestock serves as a valuable source of income and livelihood for many communities, especially in developing countries. Access to livestock and their products can improve economic conditions, leading to better access to healthcare, education, and overall well-being.

However, while livestock can provide important nutrients, sustainable and ethical livestock farming practices are crucial to minimize environmental impact and ensure animal welfare.

What is sustainable Livestock?

What is Livestock?

Livestock are domesticated animals raised for human consumption. Some common livestock products include meat, dairy, and eggs.

While some definitions exclude poultry, the Centre for Tropical Livestock Genetics and Health (CTLGH) recognizes poultry as livestock and even has a dedicated unit for them.

Livestock systems vary widely, from small family-owned operations supplying meat, dairy, and eggs for personal use, to large-scale commercial farms specializing in one product, such as dairy. Industrial farms can house up to 15,000 cows. (USDA, 2010)

Pastoralism, pastoral farming, or animal husbandry involve the rearing of animals for livestock products, as opposed to crop cultivation (Gibson, 2020). Typically, this definition applies to non-commercial livestock production.

Pastoralism means that farmers move with their livestock to find new areas to graze. This means looking for areas of fresh grass and other vegetation that their livestock can feed on. Movement can be seasonal or continuous (Gibson, 2020)

Seasonal or rotational pastoral systems are more sustainable than intensive land use, which can deplete soil nutrients and lead to challenges in livestock survival. (Rodríguez-Hernández, 2023)

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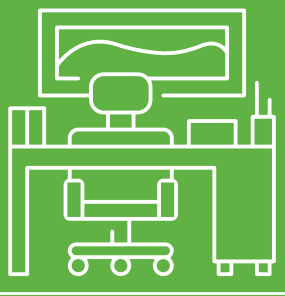
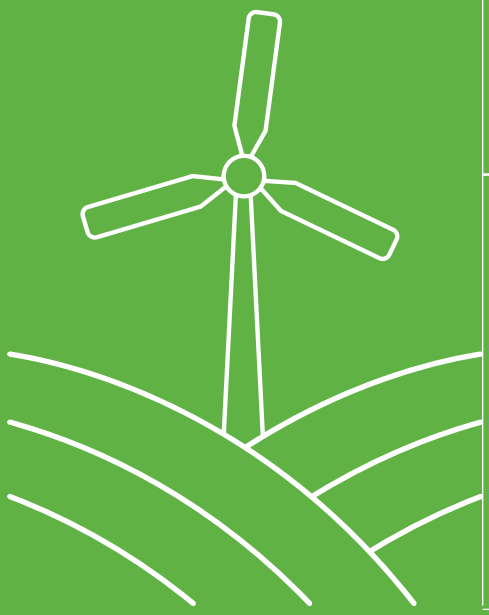
What is Sustainability?

Sustainability means being able to continue an activity indefinitely without depleting resources. Clean and renewable energy sources like solar energy are often associated with sustainability.

Sustainable practices are vital for food systems to ensure adequate nutrition for all. Proper livestock management is crucial as it plays a significant role in providing nutrition to a large population.





Sustainability is a hot topic as the world grows more concerned about climate change and polluting industries.

Policymakers advocate for “sustainable development.” The United Nations has established the Sustainable Development Goals (SDGs), consisting of 17 goals that address global issues like poverty, hunger, inequality, and climate change (Global Goals, 2022).

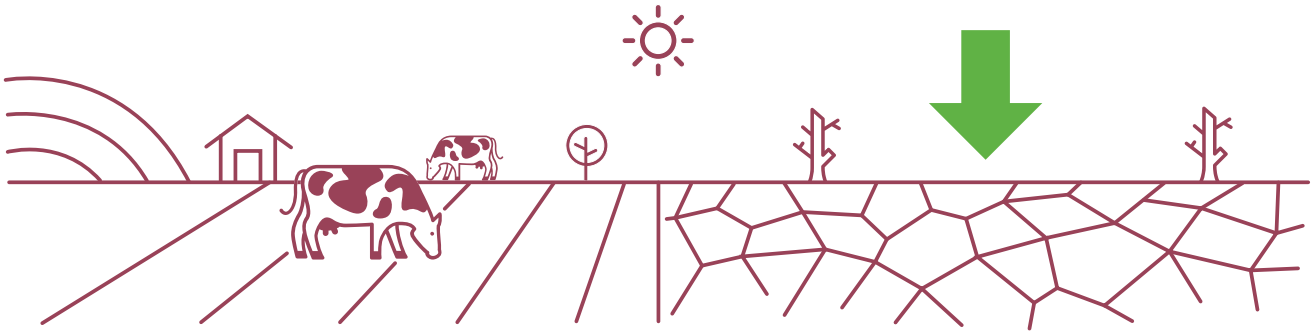
These goals are complex and require collaboration and participation from various actors, including the public. They build upon the Millennium Development Goals, formulated at the start of the century, and outline specific and time-bound targets for each goal.

SUSTAINABLE DEVELOPMENT GOALS

What are sustainable livestock practices?

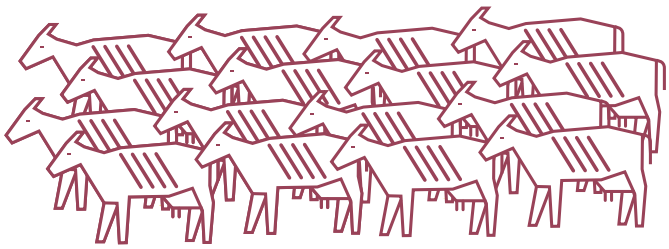
- Sustainable livestock practices are crucial across all production levels, but CTLGH primarily targets pastoral livestock systems.
- Approximately 500 million pastoralists, including 1 billion impoverished individuals, depend on livestock for sustenance and income (World Bank, 2021).
- Livestock products contribute to 25% of global protein consumption (FAO, 2017).

Why do we need sustainable livestock practices



Livestock production, especially at an intensive, commercial scale, is a major cause of land-use and climate change (FAO, 2017). Deforestation and overgrazing in regions like the Sahel lead to "desertification," rendering the land unsuitable for agriculture.

> With rising incomes in the developing world, demand for animal products will continue to surge; 74 percent for meat, 58 percent for dairy products and 500 percent for eggs. Meeting increasing demand is a major sustainability challenge.
>
> (FAO, 2017)



Intensive livestock systems endanger animal and human health. These settings increase the likelihood of disease outbreaks, reducing animal longevity and productivity while promoting the transmission of infections between humans and animals. Around 65% of emerging human diseases originate from animals, as per the FAO estimates (2017).

To prevent disease outbreaks, livestock producers make heavy use of antibiotics, which can lead to antimicrobial resistance, meaning that diseases can no longer be controlled by the antimicrobial therapies that we currently have access to. This can be very dangerous for our health.

How can sustainable livestock practices benefit people?

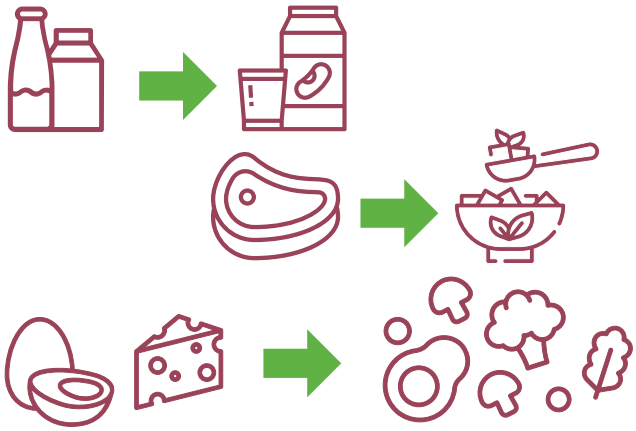
- Improved food and income security
- Sustainable livestock systems can reduce carbon emissions by up to 30% compared to traditional livestock systems (Varijakshapanicker et al., 2019)
- Converts uncultivable land into production areas for highly-nutritious protein sources. Thereby supporting the nutrition and livelihoods of millions of people

Part 01

Why is livestock important for human health?

What can you do to support sustainable livestock practices?

To achieve sustainable livestock practices, everyone must contribute, including you. It's essential to recognize that as consumers, we are all part of the global food production system.



As a consumer, you can contribute in several ways. One is by reducing your consumption of livestock products, which not only reduces demand but also has potential sustainability benefits. However, it doesn't automatically lead to a shift towards more sustainable production. It's also important to acknowledge that cutting out livestock products entirely may not be feasible or desirable for everyone.

To take a more active role in promoting sustainable livestock practices you can:

- Consume meat and dairy from pasture-raised animals. If you're based in the UK, you can look out for 'Pasture for Life Certified' products. Learn more here:

  www.edin.ac/3Jz2NwF

- Eat organically grown livestock products. Find out more about organic certification here:

  www.edin.ac/3Jwbdot

Hold producers accountable for ensuring sustainable practice by:

- Promoting pasture and crop-livestock systems
- Supporting an animal-focused system that prioritizes welfare through healthy and safe rearing, feeding and production conditions
- Encouraging demand among consumers for clear information on the origin and production method of livestock products

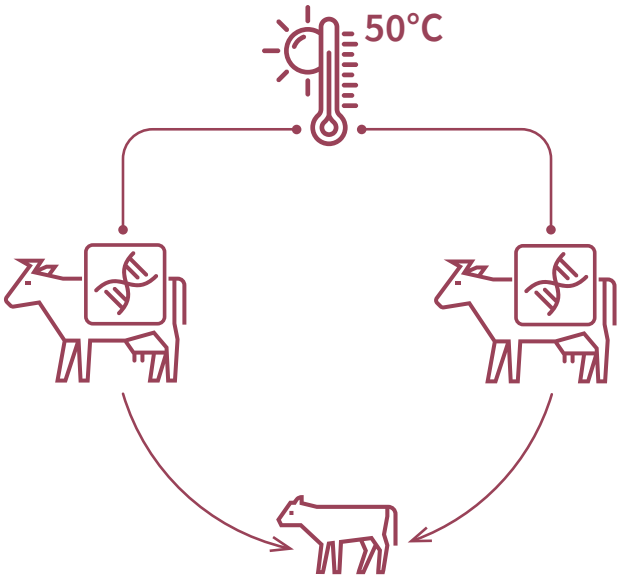
Rethinking GMO

Genetic modification has a bad reputation, but we think it is quite misunderstood. Genetic modification or GMO is just a process by which the genetic material of an organism is altered in some way, usually to improve a characteristic or 'phenotype' The genetic makeup of organisms can be altered in various ways, including through natural processes that have occurred over thousands of years, leading to the evolution of species.

Phenotype means the observable characteristics of an organism that arise from the interaction between its 'genotype', or genetic makeup, and the environment.

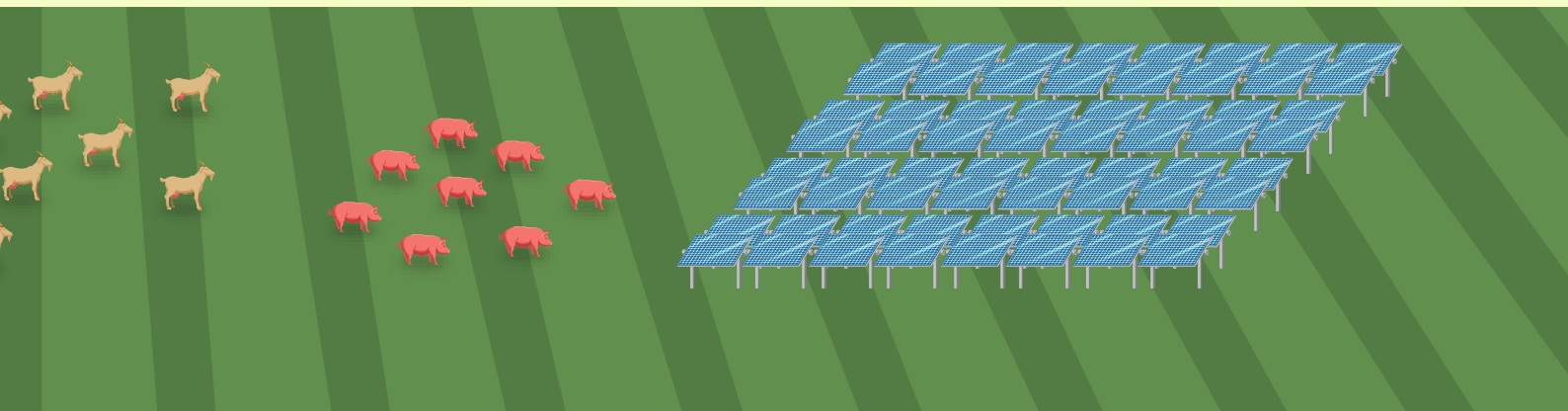
Genetic modification can also be achieved artificially using technologies to manipulate DNA by adding, removing, or cutting genes for specific purposes. Concerns arise regarding this type of GMO, as certain genetically modified foods may pose risks such as an increased likelihood of developing diseases and other adverse effects on human health (Bawa and Anilakumar, 2012).

CTLGH takes a unique approach to genetic modification by delving into the DNA of livestock species to identify genes that enable optimal adaptation to harsh conditions like extreme weather and diseases.



Through this process, known as selective breeding, animals with favourable genes and traits can be chosen and bred to produce highly adapted offspring.

This combines advanced genetic research with natural processes to create sustainable and productive livestock systems that ensure food and income security for people. To learn more about our specific projects, please refer to Part 2 of this brochure.



Part 02

What is CTLGH doing?

As a leading company in the field of livestock genetics and breeding, our organization is dedicated to achieving the targets outlined and serving our intended users. Our research falls under three main areas.

1. Trait Development Tools for Improved Productivity and Adaptation

This is perhaps the most integral research component at CTLGH. Understanding the genetics behind favourable traits in livestock, that can help them be healthier and more productive, is essential to developing optimized livestock systems. When we understand why some individual animals are more productive, we can use this information to guide breeding programmes. Here are some of the things we do to support this process:

Conduct Research

Through our research, we strive to deepen our understanding of genetic variants associated with adaptation, productivity, and disease resistance in various animal breeds.

Develop Genetic Tools

Using our research findings, we develop cutting-edge genetic tools and innovative breeding strategies to enhance livestock adaptation to environmental stressors, optimize productivity, and improve the lives of smallholder farmers.

Publish Advice for Breeding Programs

We compile our research and expert recommendations into comprehensive guidance for breeding programs. We provide practical insights and best practices to help make informed breeding decisions.

Develop an open access platform for genetic information

We are developing an open access platform that allows relevant actors, including breeders, researchers, and other stakeholders, to access and utilize genetic information in their breeding and research programs. This platform will provide comprehensive and up-to-date genetic data, tools, and resources to facilitate informed decision-making and accelerate genetic advancements in livestock breeding.

Create a Mobile Database

CTLGH researchers are developing an accessible mobile database that serves as a comprehensive resource for genetic variants facilitating adaptation and productivity in dairy cattle. This user-friendly database is designed to be easily accessible to farmers, veterinarians, breeders, and researchers, providing them with valuable genetic information at their fingertips.

Publish Reports

We regularly publish reports on identified genetic traits that have the potential to revolutionize livestock breeding. By sharing our findings in reputable scientific journals and platforms, we not only contribute to the global knowledge base but also facilitate easy access to information for scientists and breeders worldwide.

Generate Stem Cells

Our cutting-edge research and development efforts include the generation of stem cells that can be utilized for breeding specific traits in dairy cattle.

Gene Editing

We actively explore gene editing techniques to manipulate and enhance the resilience traits of selected African cattle breeds.

Disease Risk Assessment

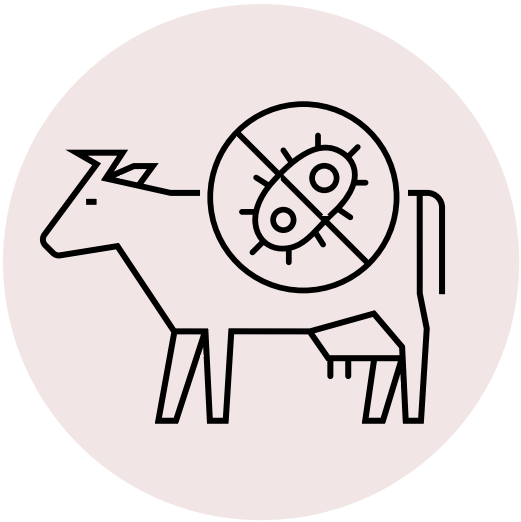
We conduct rigorous assessments of disease risk associated with specific infections in dairy cattle in Africa. Our comprehensive studies provide valuable insights into disease prevalence, impact, and potential genetic markers for resistance. We collaborate with policy makers, breeders, and veterinarians to ensure that our research informs evidence-based decisions and proactive disease control strategies.

Part 02

What is CTLGH doing?

2. Identifying Genetic Resilience Traits to Promote Adaptation to Extreme Conditions

A parallel research area is that of advantageous traits in extreme conditions. Here, our researchers investigate the genes which support adaptation to very hot or dry environments, and resistance to infectious diseases. Here is how we do it!



Develop tools to research the genetic makeup of livestock and its interactions with climate conditions.

Develop genetic profiles of livestock in high-stress environments, such as extreme climates or areas with a high risk and burden of infectious diseases. By studying these resilient animals, we aim to identify specific genetic traits that contribute to their ability to adapt and thrive in challenging conditions

Develop selective breeding tools for genetic advantages. These tools may include genetic screening methods, advanced breeding technologies, and predictive modelling to help breeders identify and select animals with desirable genetic traits.

Part 02

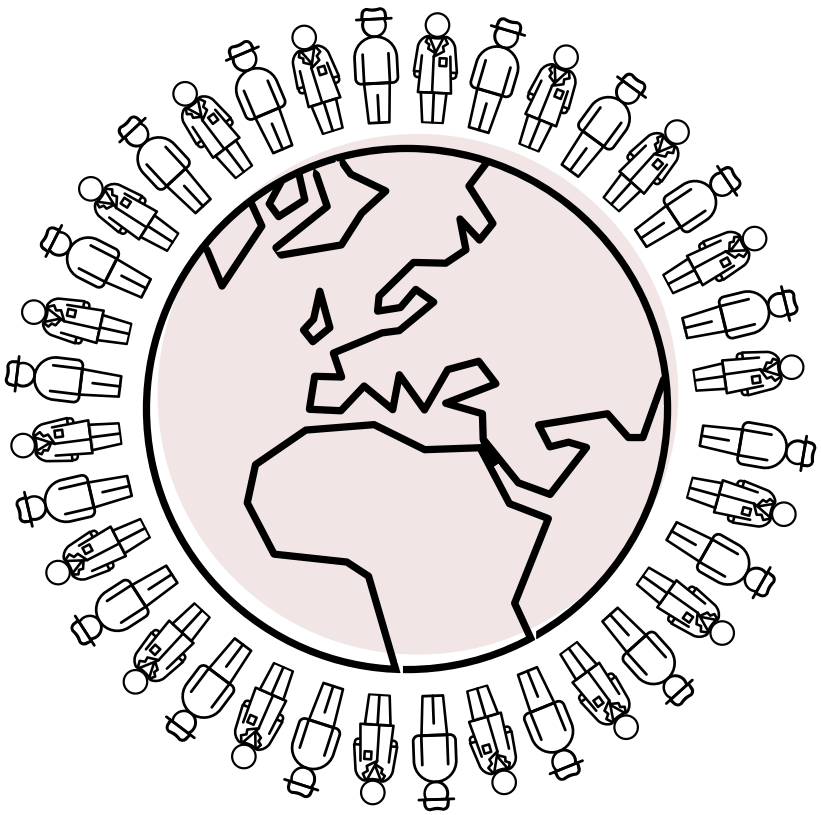
What is CTLGH doing?

3. Improving Human Capacity and Technical Skills to Realize Targeted Genetic Improvement for Breeding Programmes

Our research contributes to genetic advancements, improved productivity, and sustainable agriculture, but this means nothing if we don't connect with real people working with livestock. By fostering connections between stakeholders, we bridge the gap between research and practical application in livestock breeding.

We aim to promote collaboration through:

1. **Forming a global network of scientists** to facilitate knowledge exchange and promote interdisciplinary collaborations. CTLGH finds it particularly important to connect scientists from the Global North and Global South.
2. **Developing a platform for worldwide genetic research sharing** and access to guide breeding programmes and facilitate future research.
3. **Providing technical support and training programmes** to support genetic research capabilities.
4. **Fostering connections** between researchers, breeders, and farmers.



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