







Kapiti Research Station

INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE


A livestock, environmental and agricultural research station in southeastern Kenya.



Sixty kilometres southeast of Nairobi, on the road to Mombasa, lies the Kapiti Research Station, 13,000 hectares of pristine, semi-arid rangeland belonging to the International Livestock Research Institute (ILRI). The 85 staff working and living at Kapiti, most drawn from the local community, maintain several thousand head of livestock, including cattle, goats, sheep and camels.

Kapiti plains ranch, farmhouse and research centre

The ranch was acquired in parcels between 1981 and 1987 by the International Laboratory for Research on Animal Diseases (ILRAD)—a predecessor of the International Livestock Research Institute (ILRI)—to produce high-quality, disease-free cattle for research purposes, mainly the improved control of East Coast fever and African animal trypanosomiasis.

Since then scientists have used the station to conduct research on topics ranging from animal health, productivity and genetics, and rangeland and environmental science, to forage production and climate change. Kapiti is home to a vast array of wildlife, including giraffes, gazelles, antelopes and zebras, as well as predators such as hyenas, lions, cheetahs and leopards. These provide livestock scientists with unique opportunities to include wildlife in their research projects.

Owing to recent developments in the neighbourhood such as the construction of new highways and an anticipated high-tech industrial park known as Konza Technocity, Kapiti serves as a land-bridge between Nairobi National Park and the Amboseli and Tsavo parks, and is increasingly becoming a haven for the region's wildlife.

Kapiti's newly renovated farmhouse is available for workshops and to visiting scientists wishing to conduct research on the ranch. As a Contract Research Organization, or CRO, Kapiti offers a "fee for service" to conduct discovery research, pre-clinical or clinical trials with the commercial sector (as well as universities and research organizations) based on veterinary best practices, known technically as VICH GCP.

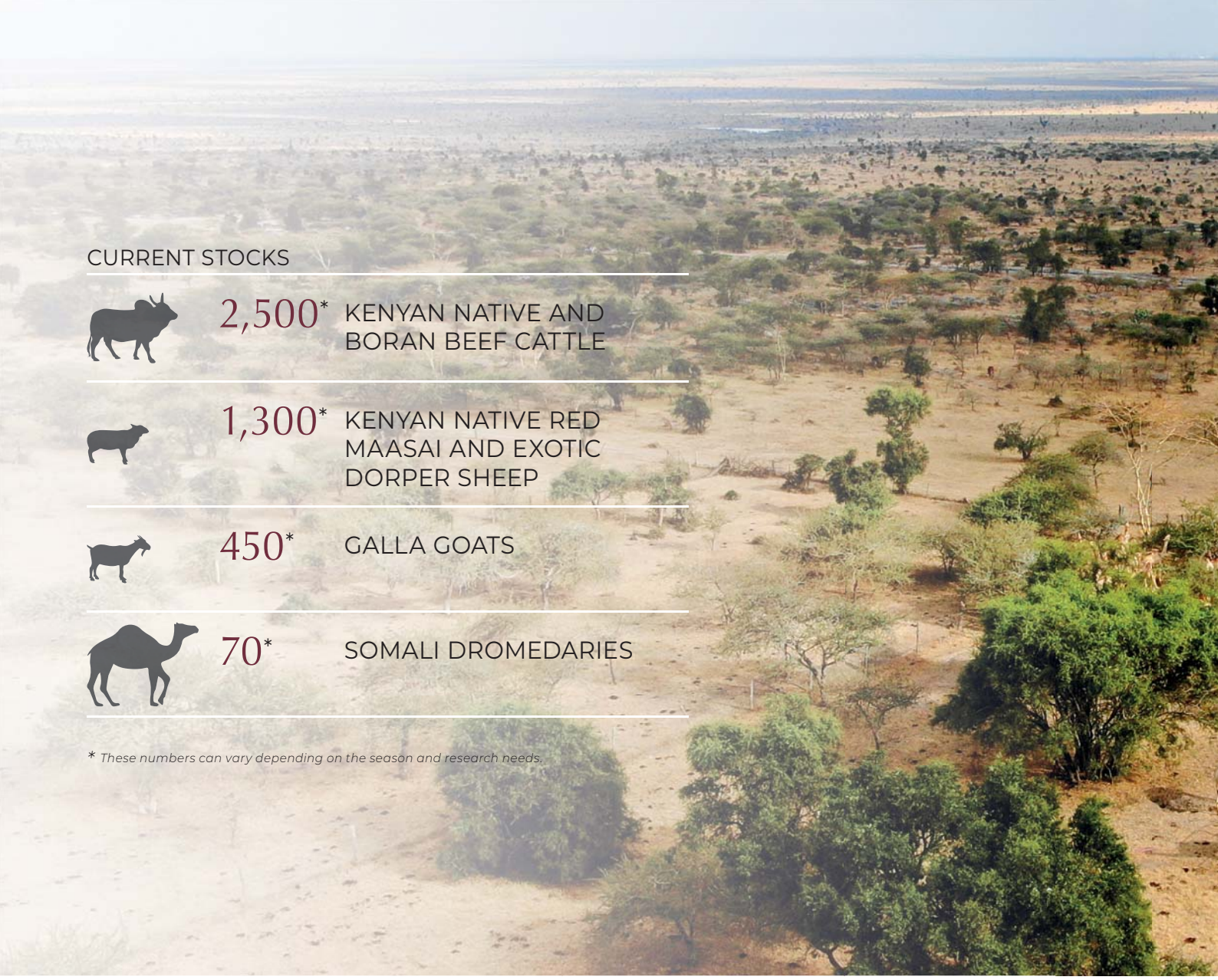
Situated in delightful surroundings, the charming traditional style farmhouse can host up to 18 people in nine en-suite bedrooms, and can accommodate many more people for day visits. Catering is provided by Kapiti's on-site chef. The farmhouse offers one large and one small meeting room, a fully equipped kitchen, and staff housing. Other infrastructure on the ranch includes offices, spray races, a newly designed cattle crush, two cattle yards—the second with a functioning laboratory—and various permanent structures and mobile cattle enclosures, or bomas, for housing livestock at night.

Kapiti is located in Kenya's semi-arid lands (550mm average rainfall) at an altitude of 1,650–1,900m above sea level, and is part of the Athi-Kapiti Ecosystem. The soils of the ranch are mainly black cotton (in the plains) and red cotton (in the ridges); they support diverse savanna grasses.

The ranch's pasture is usually adequate for its livestock farming and for accommodating the vast number of wildlife that roam the land. Three boreholes and nine water pans (the latter fully dependent on rainfall) currently supply the ranch with water.

Kapiti is a working dryland ranch, and produces heifers, bulls and other animals for commercial purposes. It has recently joined a consortium of agricultural research institutes known as the Global Farm Platform.

Scientists from more than a score of countries have conducted research in Kapiti, in some cases producing vital, path-breaking work. But Kapiti is also deeply rooted in the local community and provides a variety of services, educational and demonstration programs to neighbouring students at every level, from primary school to post-graduate.



CURRENT STOCKS

2,500*	KENYAN NATIVE AND BORAN BEEF CATTLE
1,300*	KENYAN NATIVE RED MAASAI AND EXOTIC DORPER SHEEP
450*	GALLA GOATS
70*	SOMALI DROMEDARIES

* *These numbers can vary depending on the season and research needs.*

A legacy of achievement

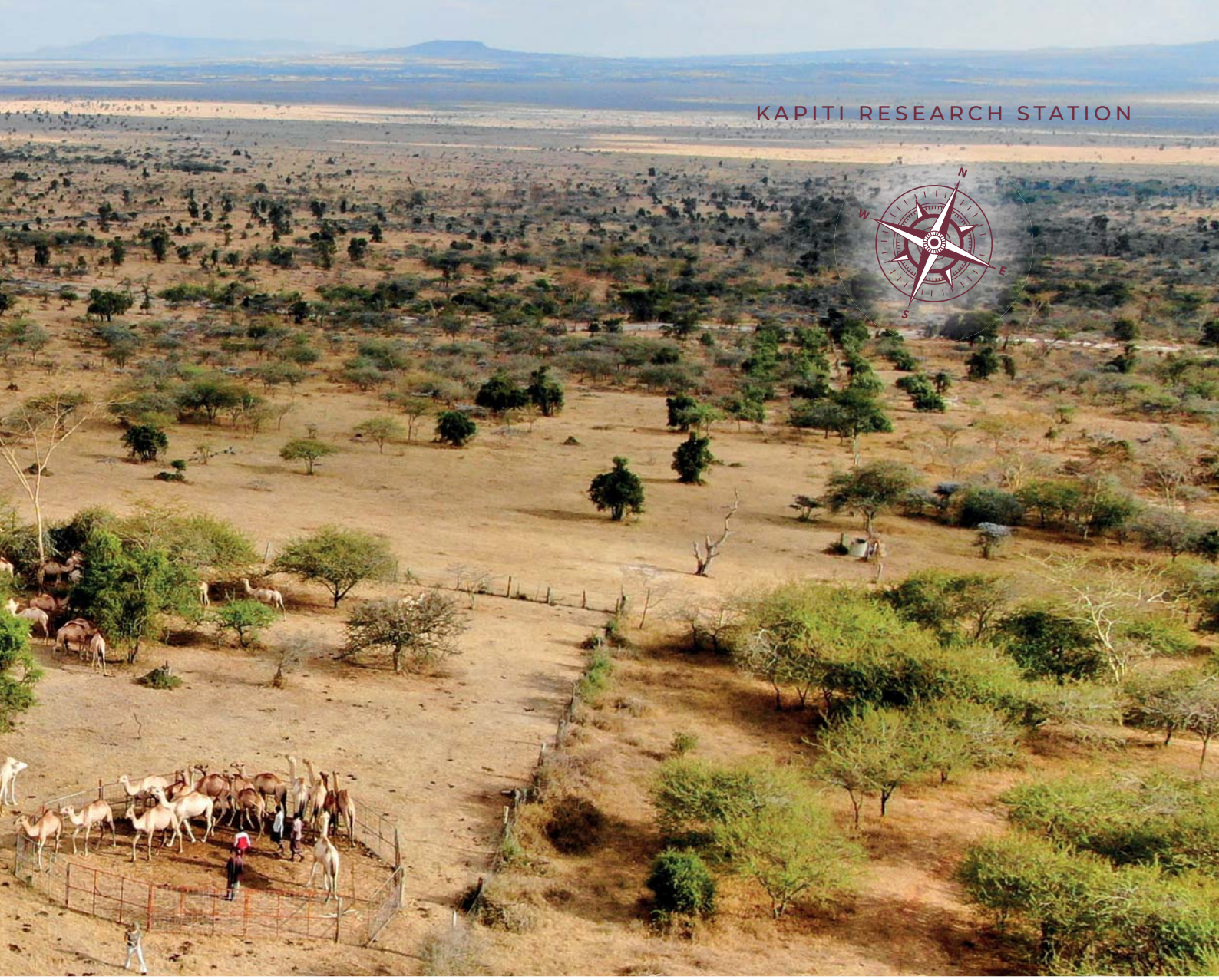
Kapiti's research on livestock contributes to farmers in Kenya and around the world. Here are just a few examples:

Vaccines

Vaccines: Research by local and international scientists contributed to the development, production and dissemination of a widely used and highly effective vaccine against East Coast fever in cattle, which kills an unvaccinated African animal every 30 seconds. Today, researchers at Kapiti are conducting vaccine trials against other animal diseases such as Rift Valley fever and malignant catarrhal fever.

Smallholder dairy incomes

Past work at Kapiti helped increase incomes for Kenya's small-scale milk producers, processors and sellers. Dairy is vitally important to Kenya's economy, contributing KES3.3 billion in related benefits as well as providing thousands of jobs for Kenyan youth and labourers. ILRI is currently investing in the development of a full-scale dairy facility at Kapiti. When fully established, sometime in 2020, the facility will not only serve as a research facility but also as a demonstration unit for farmers.



Livestock-wildlife ecosystems

The traditional co-existence of livestock and wildlife at Kapiti has enabled ILRI scientists to work closely for many years with partners and neighbouring communities to find ways to reduce wildlife-livestock-human conflicts. Efforts are underway to explore how livestock and wildlife can not only coexist but positively sustain each other.

Breed preservation

When a new breed of meat sheep from South Africa known as the Dorper was introduced locally in the 1970s, its greater size led to its widespread adoption and indiscriminate cross-breeding with the indigenous breed, known as the Red Maasai. But the Maasai sheep's resistance to gastrointestinal parasites and greater tolerance for drought proved critical. Today, scientists are at work developing a cross-breed that preserves the best characteristics of both.

Climate change

ILRI researchers at Kapiti are for the first time ever developing reliable estimations of greenhouse gas emissions from African rangelands. They are also testing new ways to feed and manage African livestock to help keepers better cope with, and mitigate, climate change.










An agenda for the future

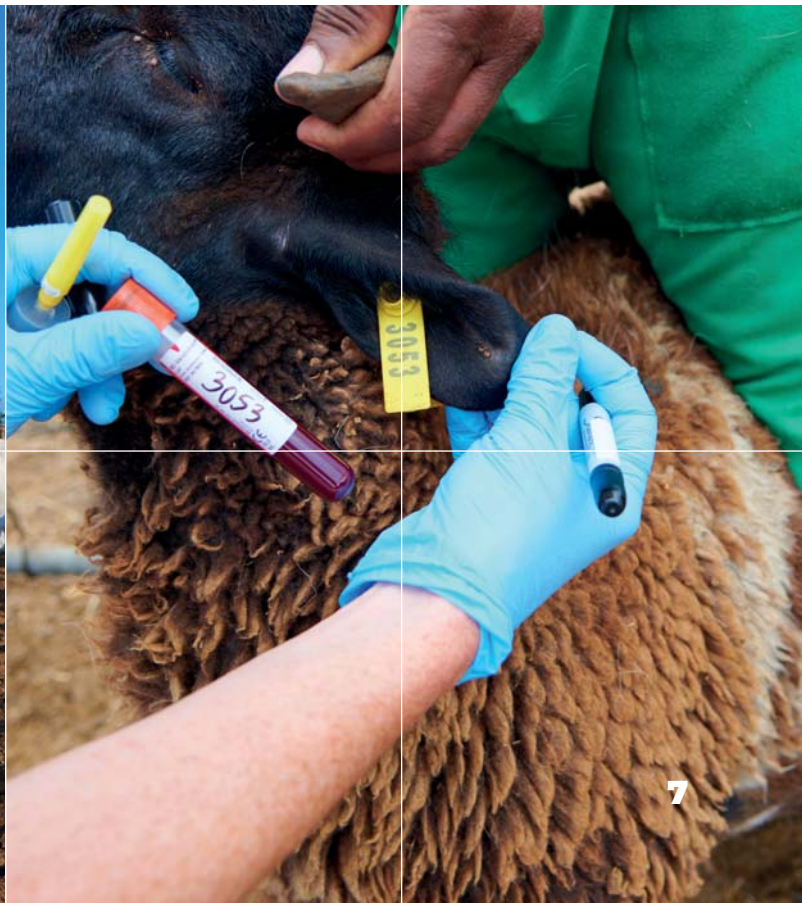
Kapiti's current research agenda takes on some of the most pressing issues facing farmers throughout the developing world. A few examples:

Malignant Catarrhal Fever: A disease spread by parturient wildebeest and their newborn calves, malignant catarrhal fever is nearly always fatal in cattle and can attack entire herds. Because the only way to prevent it is to keep cattle away from wildebeest during their calving season, pastoralists in regions where the disease is endemic are often forced to forgo prime grazing land.

ILRI scientists paired with the UK Moredun Research Institute and Global Alliance for Livestock Veterinary Medicines (GALVmed) to develop a vaccine trial of 146 steers 8–18 months old. Trials conducted at Kapiti have shown a vaccine efficacy rate of 86%. Work is underway to assess the current control methods for malignant catarrhal fever and to develop methods for the production of a commercial vaccine.

Rift Valley fever (RVF): Researchers are also conducting safety trials of vaccines against other animal/human diseases such as RVF, which primarily infects sheep, goats, cattle and camels, but can also be transmitted to people via contact with or consumption of contaminated meat or via mosquito bites.

The last major outbreak of RVF in Kenya occurred in 2006-07, when it infected 684 people, caused 234 deaths and cost the country KES3.1 billion, or USD31 million. (A more recent outbreak in northern Kenya in June 2018 sickened 26 people, killed six, and caused a high number of deaths and abortions in livestock, including camels and goats.) The disease has been primarily restricted to Africa, but its potential for further spread has prompted the WHO to consider it an emerging global health threat and to prioritize research into vaccine development.

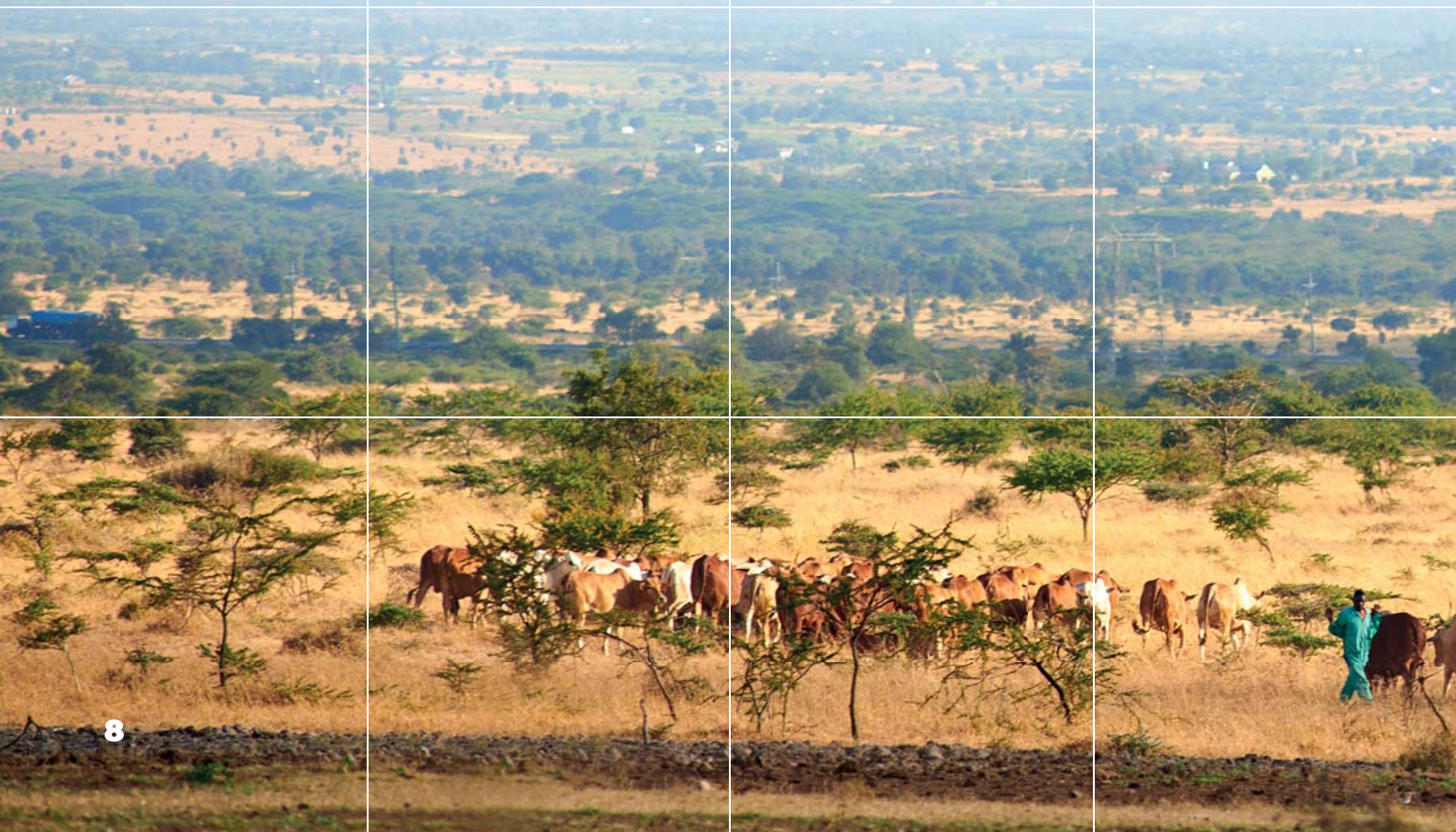


Global warming land surface temperature measurements

Researchers at Kapiti are using the only two eddy covariance towers in Kenya to observe the rangeland ecosystem. (The towers are, in effect, sophisticated weather stations that also measure GHG emissions; there are some 700 such stations globally, but no others in East Africa). The data is continuously relayed to the international space station and will ultimately enable researchers to assess the resilience of both crop and pastoral rangeland systems to climatic stress such as droughts and floods.

To understand the extent and intensity of global anthropogenic climate change a vast number of continuous, precise and accurate measurements are required. Some of the data are acquired from satellites, which allow observations at larger scales—but these data need to be validated with ground truth measurements. Until now, no sites where land surface temperatures (LST) are observed simultaneously on the ground and with satellites existed in East Africa, creating a critical knowledge gap regarding the temperatures being used to model climate change.

With funding provided by the UK Space Agency, scientists from Kings College London and ILRI's Mazingira Centre recently installed East Africa's first, international standard, land-surface temperature validation suite at Kapiti. The suite consists of four



towers up to 30 metres tall containing NASA-engineered radiometers and digital cameras to monitor land surface temperatures as well as cloud and vegetation cover.

These observations will be critical to understanding how individual ecosystems contribute to or compensate for climate change. Gathering this data is standard in developed countries but rarely achieved in the developing world. Until now, only eleven 'flux towers' were running on the African continent, each located in different ecosystems in southern or western Africa.

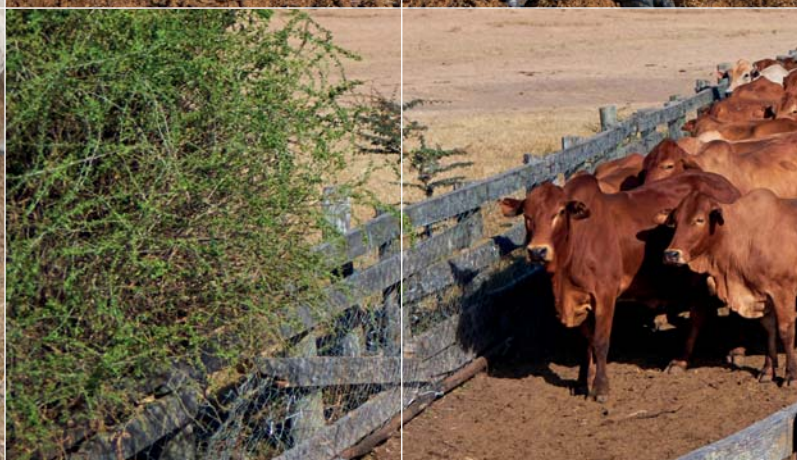
The land surface temperature validation suite is also being used to help predict pest outbreaks as part of the Pest Risk Information Service, or PRISE. PRISE uses a combination of earth observation technology, satellite positioning, and plant-pest lifecycle to anticipate and prepare for potential pest outbreaks.

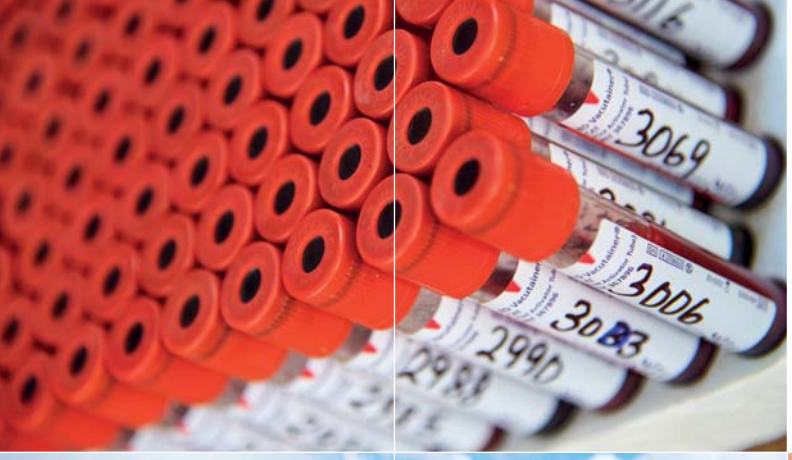
Genetic variation in responses to foot and mouth disease vaccines

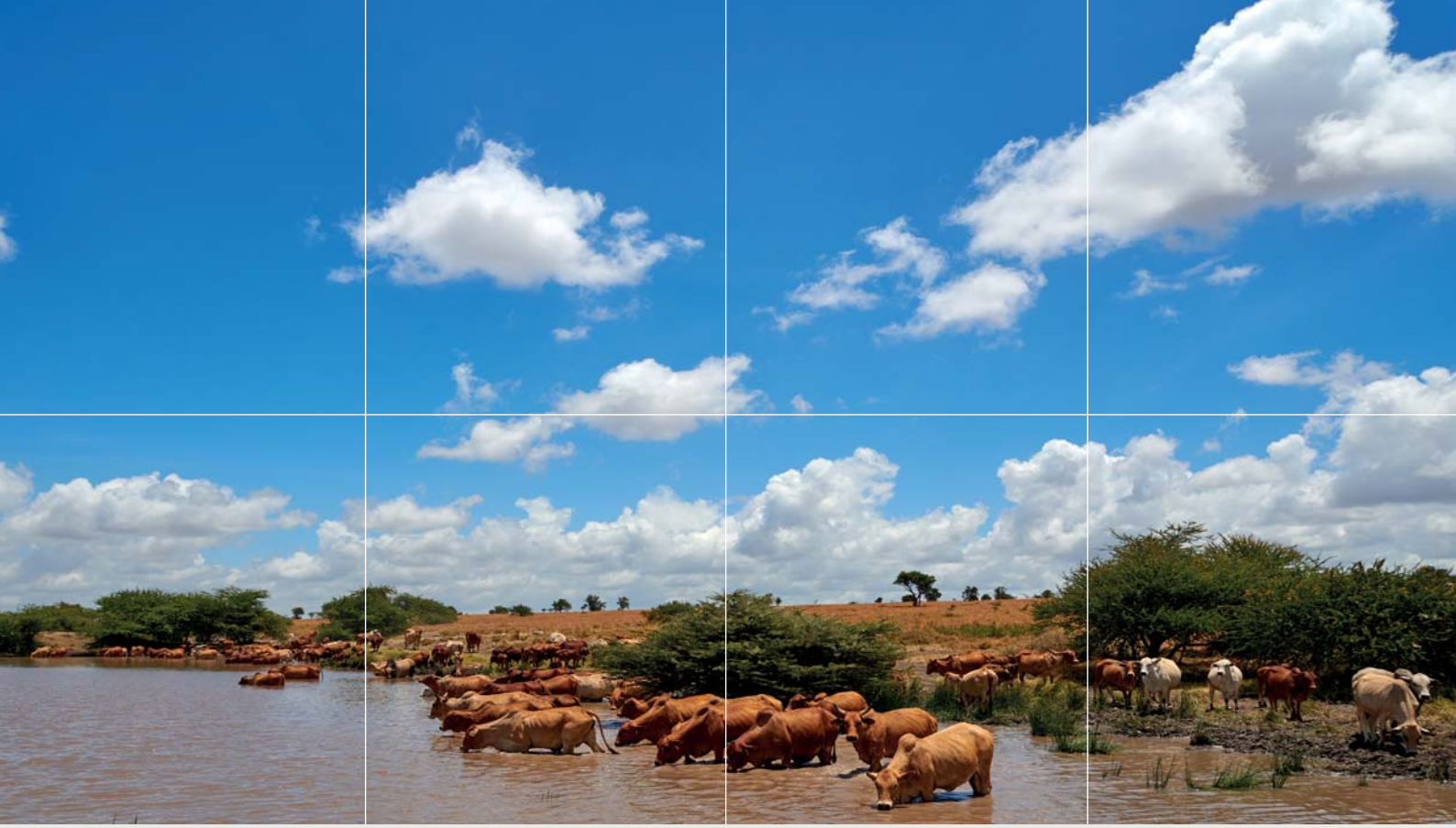
Foot-and-mouth disease (FMD)—a highly contagious disease of cloven-hooved animals—creates an enormous economic burden in regions where the disease is endemic. Control of the disease can be achieved by multiple vaccinations and by limiting the animal's movement, but the vaccines are prohibitively expensive for many livestock keepers in low- and middle-income countries.

Some animals, intriguingly, are far more responsive to vaccines than others. The fact that responses can vary so widely suggests the influence of genotype on their immune responsiveness. Identifying the genes associated with either strong or weak responses could help scientists develop animals more resistance to the disease and point to new ways to improve the efficacy of the vaccine.

A new project underway at Kapiti selected 200 previously unvaccinated calves and will assess their immune response for four months following vaccination. This information will be used to estimate antibody responses within and between sire groups, develop a model to estimate the fraction of susceptible animals, and identify the haplotypes associated with 'good' or 'bad' antibody response.




3069
3006
2990



About ILRI

The International Livestock Research Institute (ILRI) works for better lives through livestock in developing countries. We are co-hosted by Kenya and Ethiopia, have 14 offices across Asia and Africa, employ some 620 staff and have an annual operating budget of about USD80 million.

ILRI works in Africa and Asia to enhance incomes and livelihoods, improve food security, and reduce disease and environmental degradation.

Australian animal scientist and Nobel Prize laureate Peter Doherty serves as ILRI's patron. Organizations that fund ILRI through their contributions to the CGIAR Trust Fund make ILRI's work possible. Organizations that partner with ILRI in its mission make livestock research for development a reality.

For more information about Kapiti, or to learn about its contract research capacities, please contact Ilona Gluecks, at I.Gluecks@cgiar.org

Box 30709, Nairobi 00100, Kenya
Phone: +254 20 422 3000
Fax: +254 20 422 3001
ILRI-Kenya@cgiar.org

Patron: Professor Peter C Doherty, AC, FAA, FRS
Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996

ilri.org

better lives through livestock

ILRI is a CGIAR research centre

ILRI has offices in East Africa • South Asia • Southeast and East Asia • Southern Africa • West Africa

Box 5689, Addis Ababa, Ethiopia
Phone: + 251 11 617 2000
Fax: + 251 11 667 6923
ILRI-Ethiopia@cgiar.org