Animal production in low- and middle-income countries (LMICs), predominantly smallholder systems, faces considerable challenges. Low productivity, exposure to multiple pathogens, and climate-related stresses all cause major animal health and welfare issues. Unless addressed, these challenges will continue to negate initiatives aiming for sustainable animal production. To address this, the Royal (Dick) School of Veterinary Studies jointly established the Centre for Tropical Livestock Genetics and Health (CTLGH) with partners in Nairobi and Edinburgh (https://www.ctlgh.org/) to apply genetic improvement for improved animal productivity, health, and welfare in LMICs.

CTLGH aims to apply the advances in genetics, genomics, animal breeding, and data science driving livestock genetic progress in advanced economies, in partnership with a global network of farmer-facing organizations. A priority has been improving genetics to enhance resilience to infection, thereby improving animal welfare and production. Research has targeted establishing the genetic basis of tolerance to key cattle and chicken diseases and assessing the applicability of such traits to improvement through selective breeding or via gene editing.

Key CTLGH advances include tolerance to East Coast fever (ECF) and ticks. ECF is caused by the protozoan Theileria parva and annually kills approximately 1 million cattle in eastern Africa. Research identified a lineage of cattle that were significantly less likely to die from an infection challenge that killed most susceptible counterparts. Analyses identified the genomic region containing DNA variants conferring this tolerance; this is now a tool for predicting cattle tolerance. For ticks, CTLGH has united global efforts to identify the genetic basis of resilience, resulting in the identification of genomic regions that are amenable to breed improvement through genomic selection.

A further key need is field-applicable disease-monitoring tools, ideally usable by veterinarians and farmers. CTLGH research has developed high-throughput diagnostic tools that capture the spectrum of pathogens infecting African and Asian cattle and chickens.

To address ongoing biodiversity loss challenges, CTLGH has developed stem cell innovations coupled with advanced reproductive technologies to enable preservation through biobanking and resurrection of endangered poultry genetic resources. This safeguards poultry genetic resources, ensuring future breed improvement to address climate-related and other challenges that compromise adaptation, resilience, health, and welfare in LMIC poultry production systems.

Therefore, since its establishment, CTLGH has demonstrated the potential of novel strategies to genetic improvement and informed breeding strategies. CTLGH continues to invest in genetic approaches to tackle animal health and welfare, focusing on important pathogens of LMIC ruminants, poultry, and pigs. The integration of cutting-edge research with farmer-facing programs is a critical route to achieving the planned impact enhancing animal welfare and production in this globally important sector.