

Map of ILRI Kapiti ranch and the sheep flock kept at the ranch



# Adopting genomic tools for breeding indigenous sheep under semi-arid lands



## The challenge

- Approximately **67%** of **sheep breeds** in Africa are **indigenous breeds** reared mostly in Arid and Semi-Arid lands.
- **Phenotyping** and **selective breeding** of these indigenous breeds is a challenge.
- There is **little phenotypic information** and **under-representation of genomic resources** for indigenous sheep breeds.
- The **Red Maasai** is a fat-tailed sheep breed indigenous to East Africa known for its **genetic resistant** to gastro-intestinal worms

## The approach

- ✓ Evaluate the growth, reproduction and survival of the Red Maasai and its crosses to the Dorper sheep.
- ✓ Generate a high-quality reference genome assembly for the Red Maasai sheep, from a **trio of animals** (an ewe, ram and their fetuses) from the sheep flock at ILRI Kapiti ranch.

- Selective breeding for growth of indigenous sheep in semi-arid lands is possible.
- The lambs of indigenous sheep thrive well in semi-arid conditions compared to their crosses and exotic breeds.
- A high-quality reference genome assembly for the Red Maasai will provide resources for:
  - 1) Genomic selection
  - 2) Characterizing and conserving the breed
  - 3) Understanding the genomic control of resistant to gastro-intestinal worms



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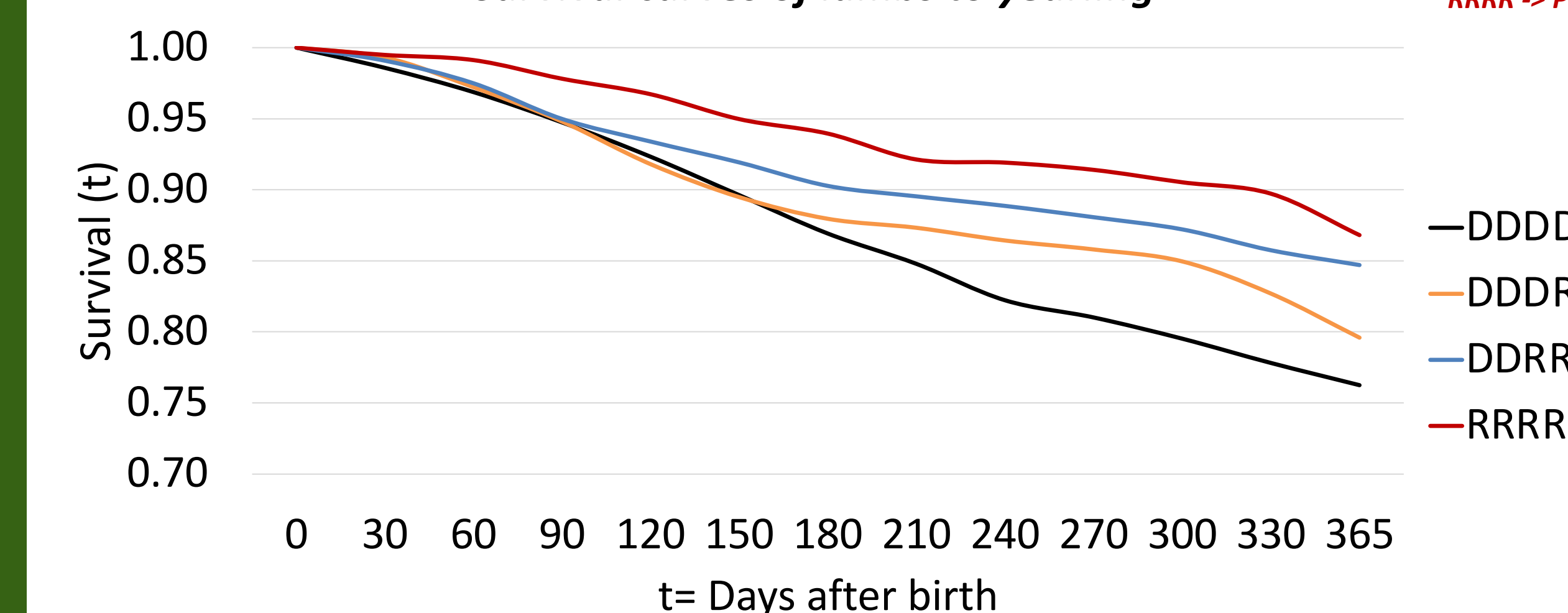
## Progress

Genetic gain for growth traits between 2003 and 2019

Breed	Traits (b±SE)		
	Birth weight	3 months weight	9 months weight
DDDD	0.006±0.006	0.047±0.033	0.069±0.044
DDDR	0.006±0.005	0.043±0.029	0.070±0.039
DDRR	0.012±0.005	0.100±0.032	0.128±0.041
RRRR	0.012±0.005	0.144±0.037	0.170±0.047

DDDD -> Pure dorper  
DDDR -> 75% Dorper-25% Red maasai  
DDRR -> 50% Dorper-50% Red Maasai  
RRRR -> Pure Red Maasai

Survival curves of lambs to yearling



Blood and tissue samples from a Red Maasai ram, two ewes and their fetuses (male and female) have been collected for sequencing.

## Next steps

- Use phenotypic and genetic information to develop models for the **breeding of Red Maasai sheep** that are more **resilient and productive**.
- Provide **fit-for-purpose new genomic resources** for Red Maasai sheep and sheep populations in the tropics.

## Partners



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