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Easy dairy & beef cattle diets

# Investing in a sustainable, low-carbon feed and livestock sector in East Africa

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2<sup>nd</sup> VIV-Africa Conference and Exhibition 2024, Kigali, RWANDA



## Background

- Regional economy
- Employment
- Nutrition
- Farmer income & Livelihood
- Environmental & Climate impact
- Food security
- Increasing demand for animal sourced food and other livestock products

Challenge the region is facing to develop feeding strategies with low climate impact, increase in farmer income, and positive contribution to national economies in the light of population increase





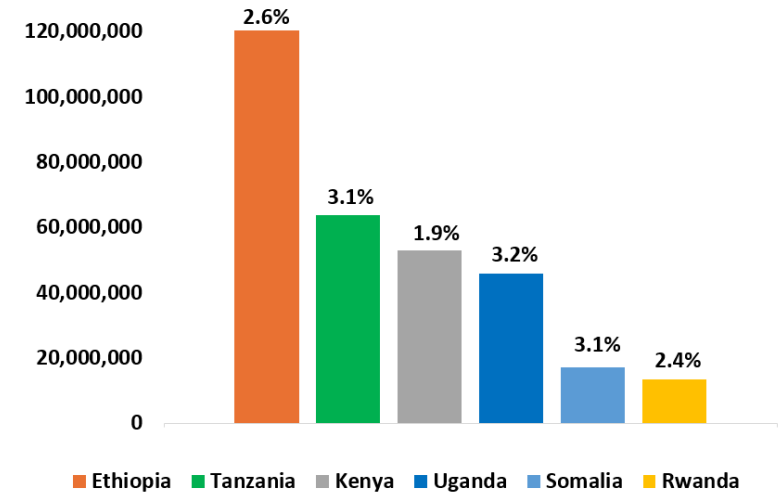
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The figures presented reflect the year 2021

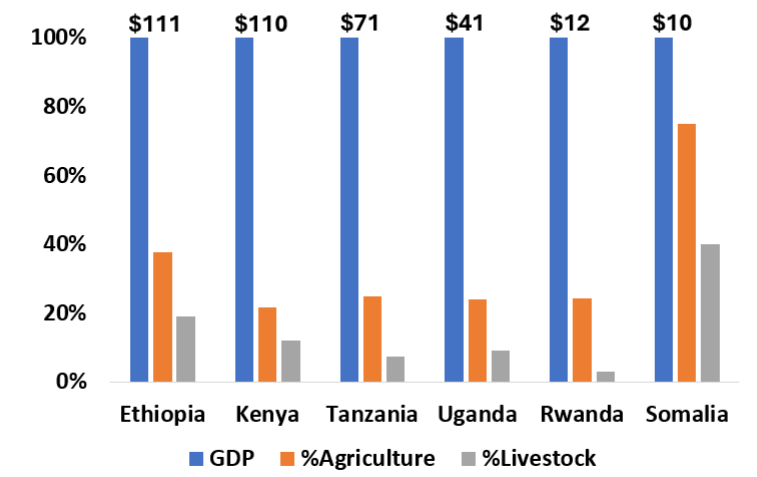
- Population in the region is in total 313 million people.
- Population growth rate ranging between 1.9 – 3.2%.
- GDP ranges between 10 – 111 billion USD.
- Livestock contributes between 3-19% and Somalia 40% of GDP.

### Population and population growth



Source: United Nations, World Population Prospects (2022)

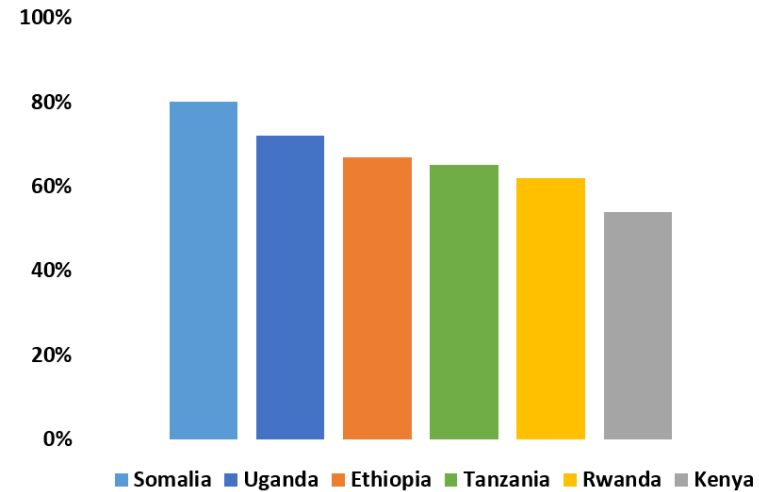
### Contribution of livestock to the economy



Source: World Bank (worldbank.org – 2024)

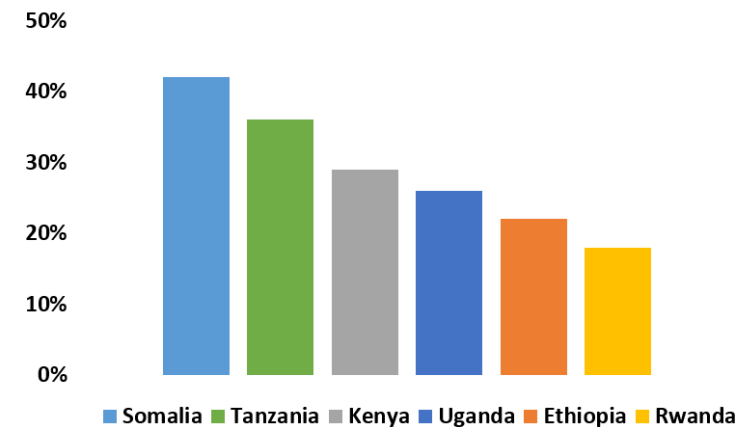
- Employment in agriculture is highest in Somalia at 80% - lowest in Kenya at 54%
- Urbanization ranges between 18% in Rwanda and 42% in Somalia

## Employment in agriculture



Source: United Nations, World Population Prospects (2022)

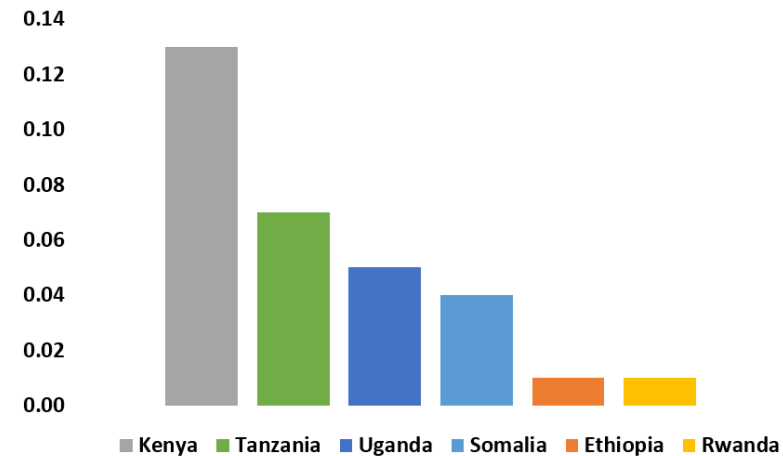
## Urbanization



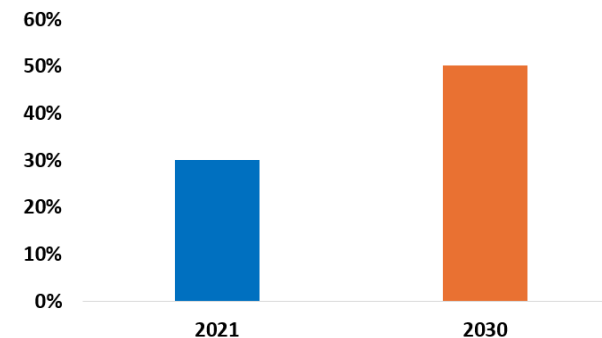
Source: United Nations, World Population Prospects (2022)

- The level of mechanization is low in all countries
- The Global average is 1.3 hp/1000 ha
- Policies to stimulate mechanization at different scales of production

## Mechanization (hp/1000 ha)



## Level of motorized power in agriculture in Kenya



Source: Kenya's Agricultural Mechanization Policy 2021

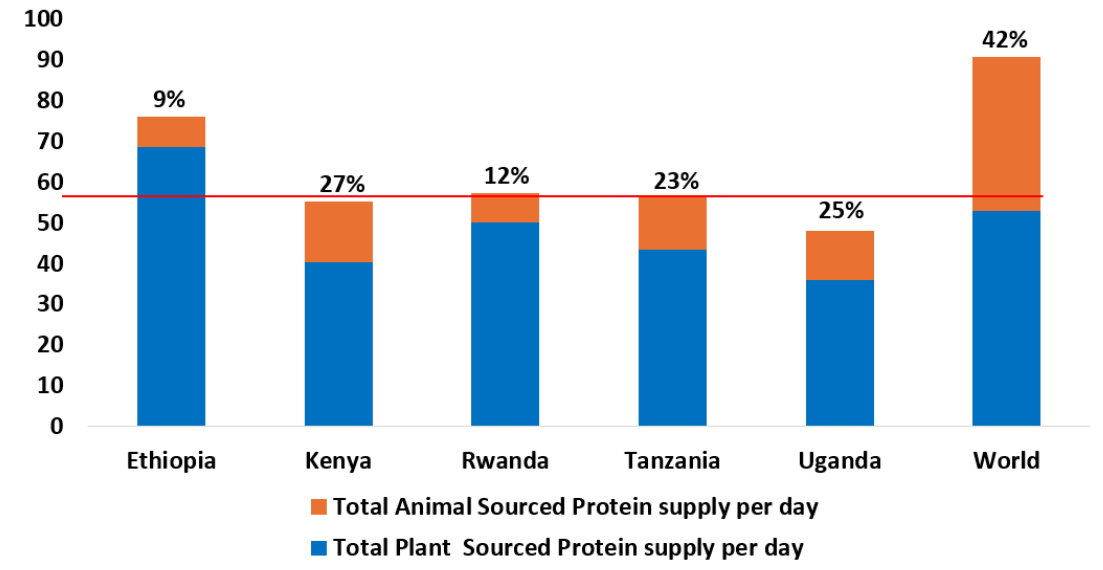


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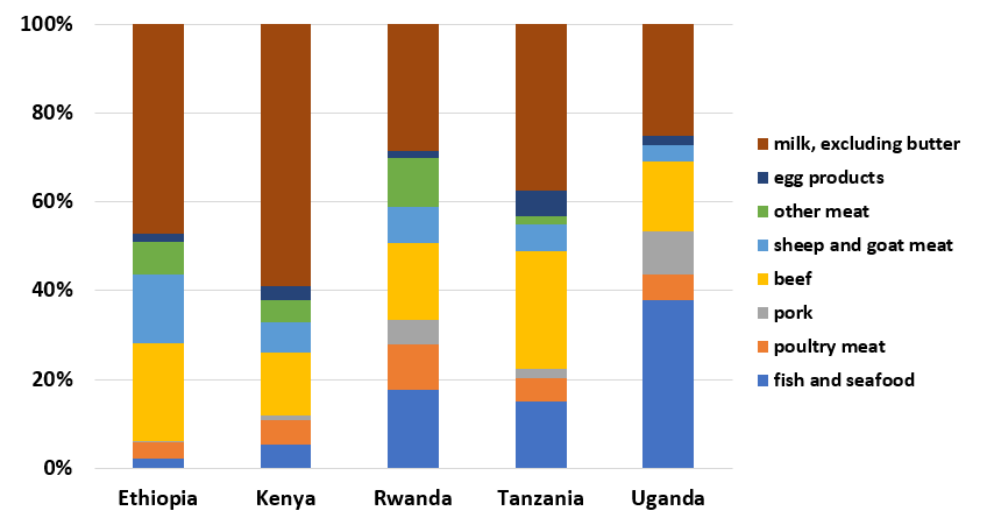


- Worldwide protein supply is 92 g/person/day
- 42% is Animal Sourced Protein
- 56g is recommended protein supply in the diet
- In East Africa ASP ranges between 9-27%
- ASP demand is expected to increase, nearly double by 2050 in East Africa.

### Source of protein supply (g/day)



### Source of animal protein supply



Source<sup>1</sup>: FAOSTAT

Source<sup>2</sup>: Harvard University -0.8 g/kg BW - recommended protein supply in the diet. Adult male 70 kg BW = 56 g protein. Adult females when breastfeeding 71 g protein. The world supply/capita ratio Animal - to Plant-sourced protein is 40%:60%

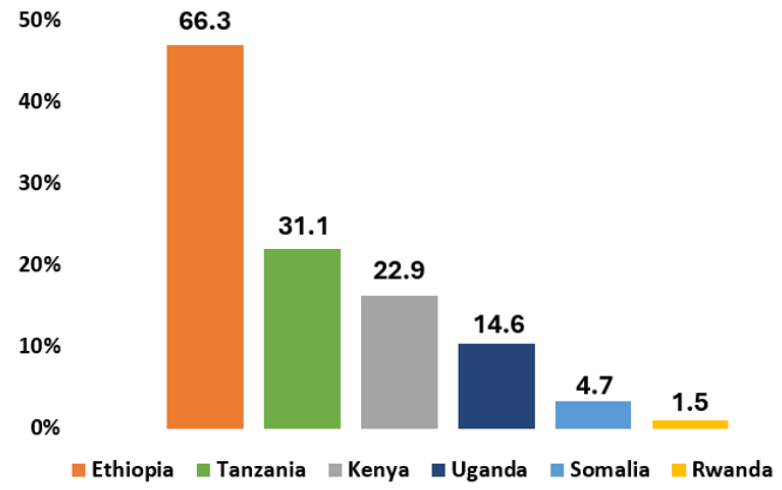


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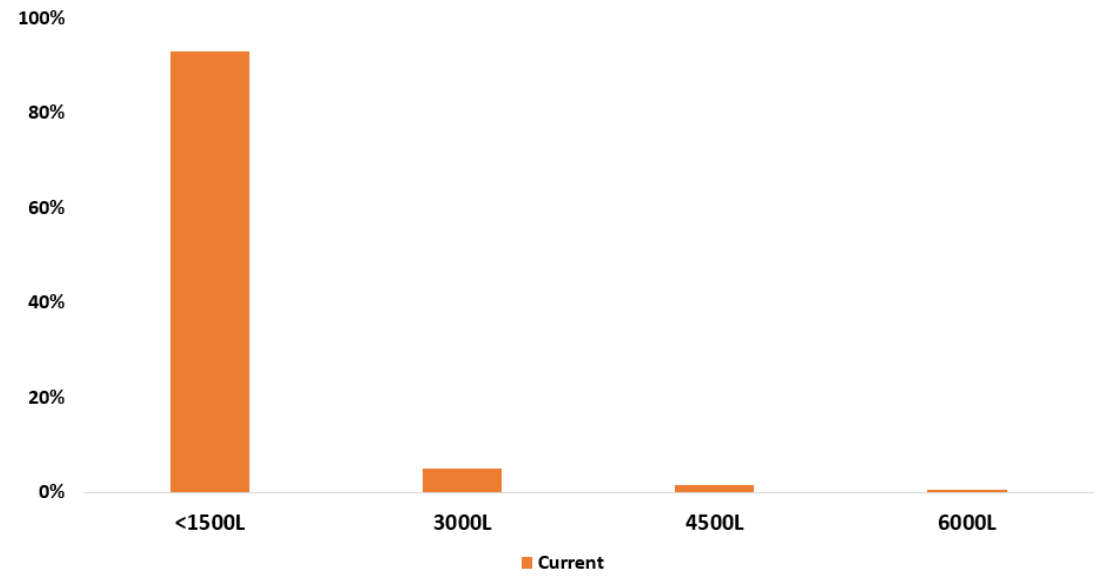
- Cattle population in East Africa is 141 million cattle
- Ranging from 66.3 million cattle in Ethiopia to 1.5 million in Rwanda
- Annual milk production in all countries is below 1000L/year for national herd average
- Dairy cows: milk production of 4-9L/day are reported in Kenya, Uganda and Ethiopia

## Cattle population



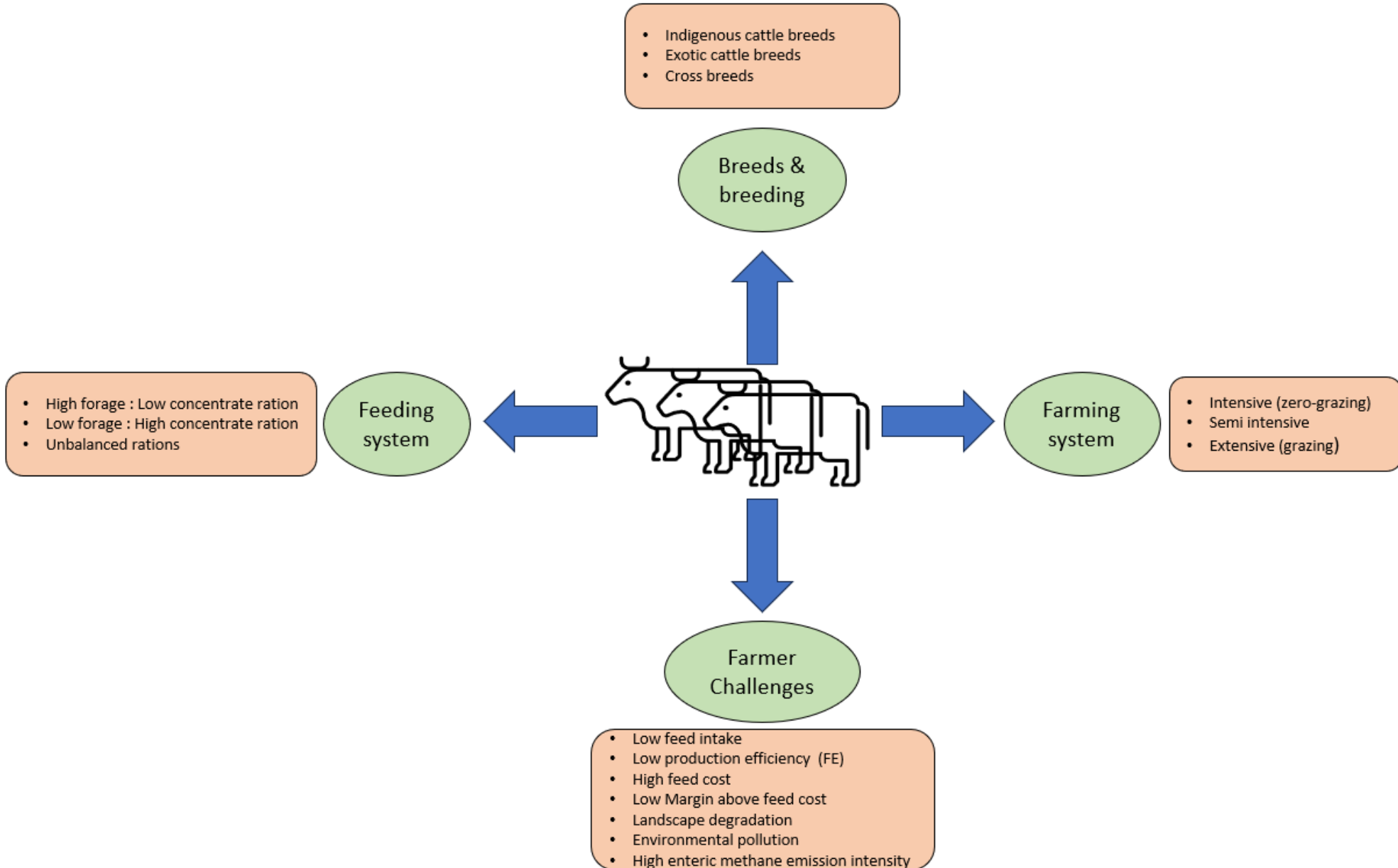
Source<sup>1</sup>: FAOSTAT

## Farmers per milk production level in Kenya



Adapted from: Africa Dairy Genetic Gain, ILRI, 2017

## Status of cattle farming in East Africa





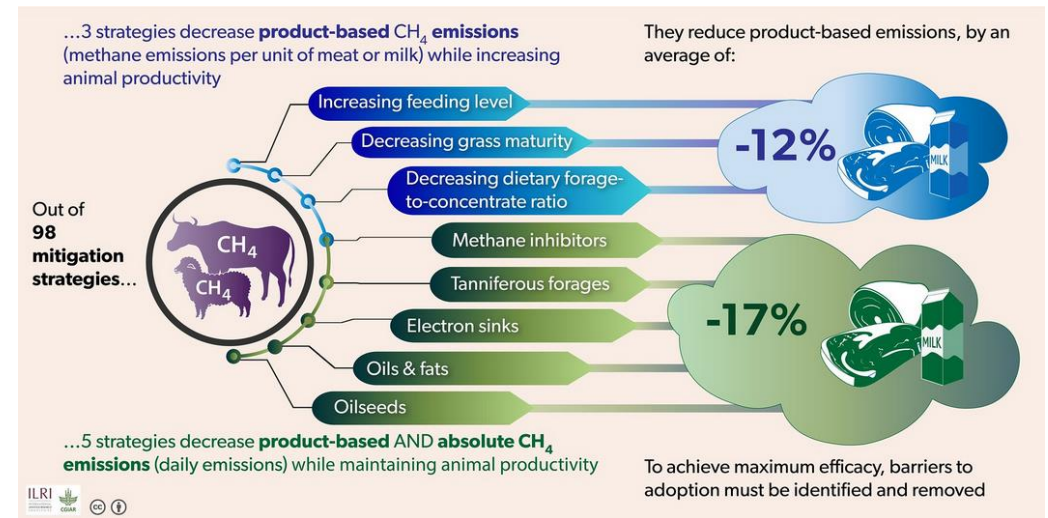
## Eight strategies to reduce emissions of enteric methane

Important for East Africa are:

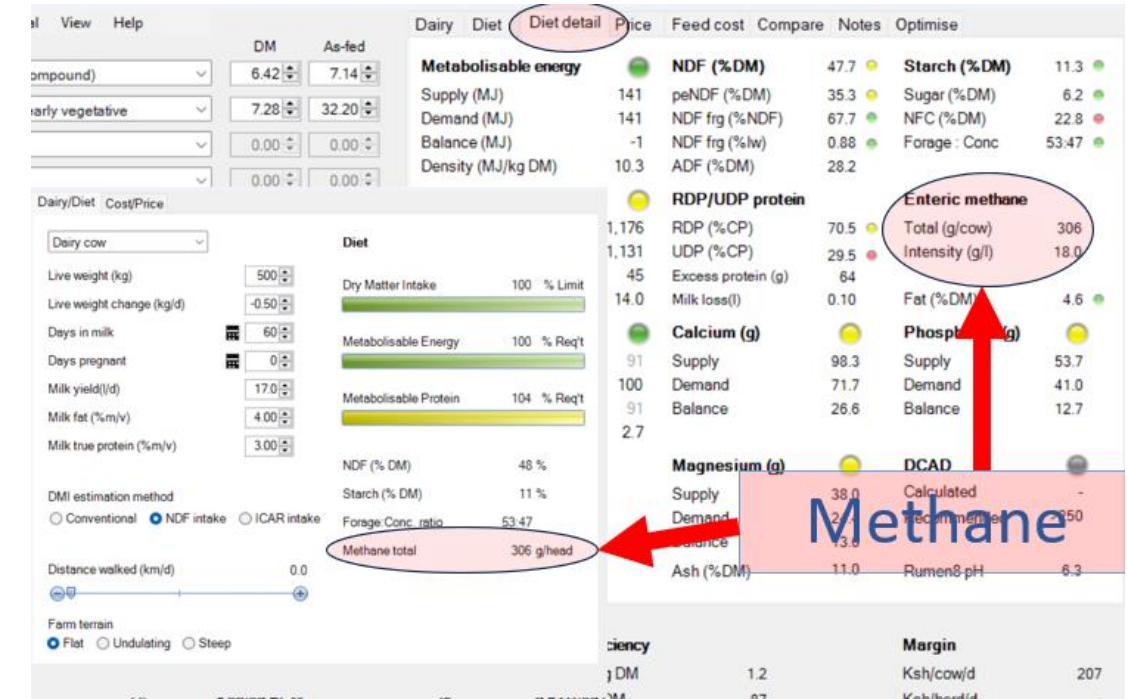
Three strategies decrease product-based CH<sub>4</sub> emissions while increasing animal productivity

- Increased feeding level
- Decreased grass maturity
- Decreasing dietary forage to concentrate ratio

➤ Feed cost-effective balanced rations



Created by Annabel Slater a.slater@cgiar.org 2022 based on Arndt ea 2022: <https://doi.org/10.1073/pnas.2111294119>



Source <https://www.rumen8.com.au/training/>

## Feed inventory and feed balance

- Feed intake (DMI) estimate at 2.5% DM of LW
- Requirements of Tropical Livestock Units
- Feed balance based on actual feed availability and use.

	DM %	ME %	CP %
	Balance	Balance	Balance
<b>Ethiopia</b>	-21%	-56%	-48%
<b>Kenya</b>	-56%	-70%	-58%
<b>Uganda</b>	103%	38%	15%

Source:<sup>1</sup>National Feed Inventory and Feed Balance Assessment: The Case of 47 Counties of Kenya, 2021  
<sup>2</sup>Report on feed inventory and feed balance of Ethiopia, 2018  
<sup>3</sup>Feed Inventory and Feed Balance Assessment for Ruminants, National Report, Volume II, Uganda, 2022

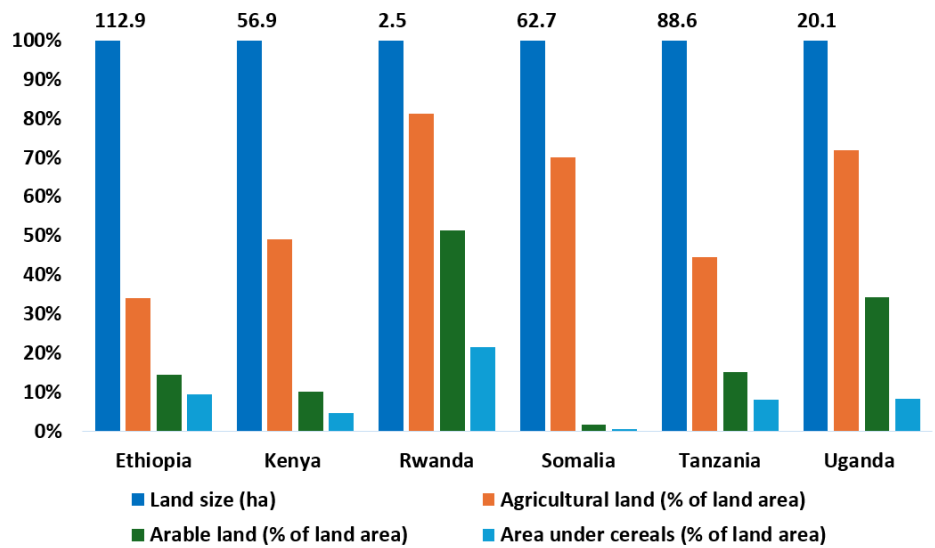


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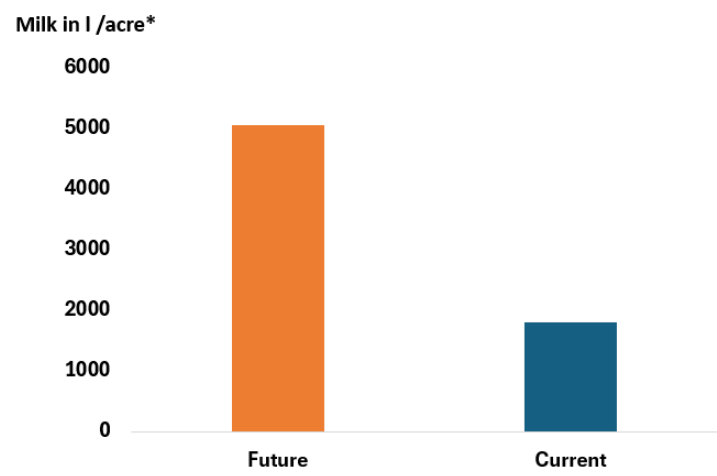
- Land size varies between 112.9 million hectares in Ethiopia and 2.5 million hectares in Rwanda
- Arable land as % of total land size ranges between 2% in Somalia and 51% in Rwanda
- Most arable land is subdivided, and majority of farmers own less than 5 acres in high potential areas.
- Commercial forage production therefore needs to produce potential biomass yield, nutrient dense forages at low-cost

## Land size and land under cultivation



Source<sup>1</sup>: FAOSTAT

## Silage investment case



\* 1 kg Milk Solids (MS) needs 135 MJ ME fed

Source: F. Ettema Assessment of KMDP Forage Interventions in North Rift, Kenya The Case of Agricultural Contracting and Baling of Maize Silage

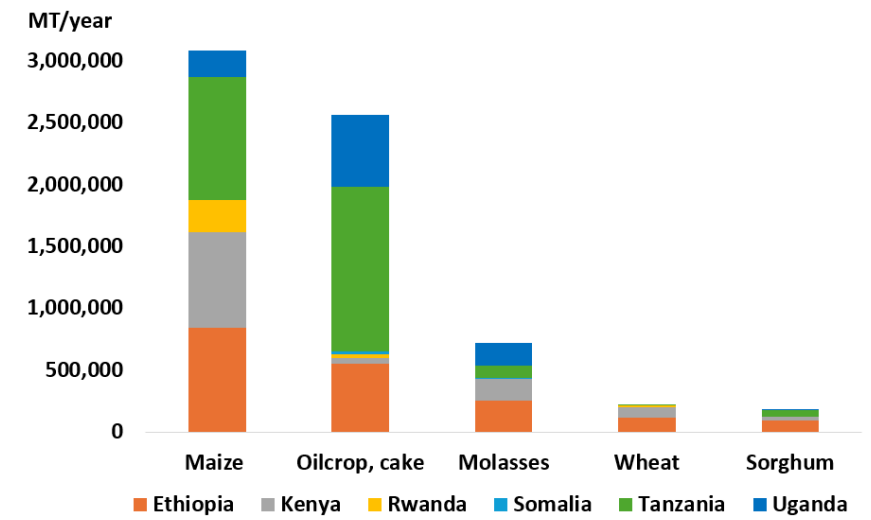


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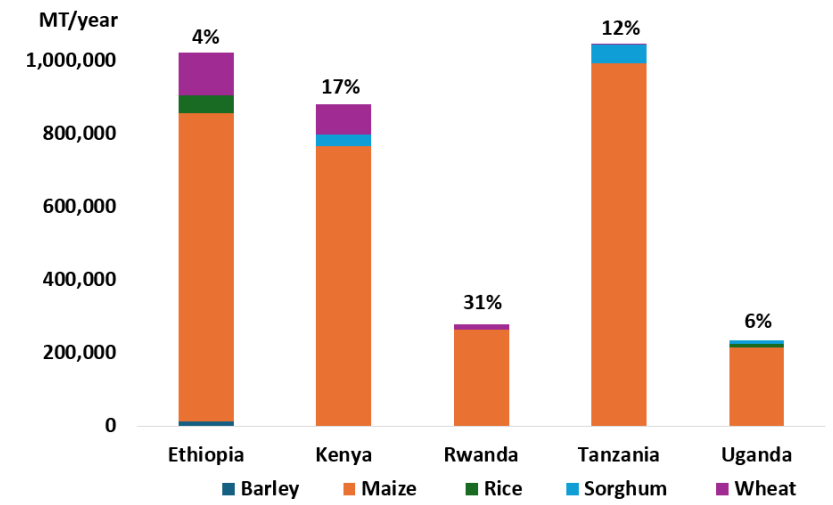


- Maize, Oil crops (cake equivalent), Sugar cane (molasses equivalent), Wheat, and sorghum are the top 5 crops used for livestock feed
- In all countries maize is the most used cereal crop in livestock feed
- The share of cereals used in livestock feeds ranges between 4% in Ethiopia and 31% in Rwanda
- In compound mixes for ruminant livestock mostly Agro-by products of cereals are used.

## Feed production (used for animal feed)



## Cereals used for animal feed

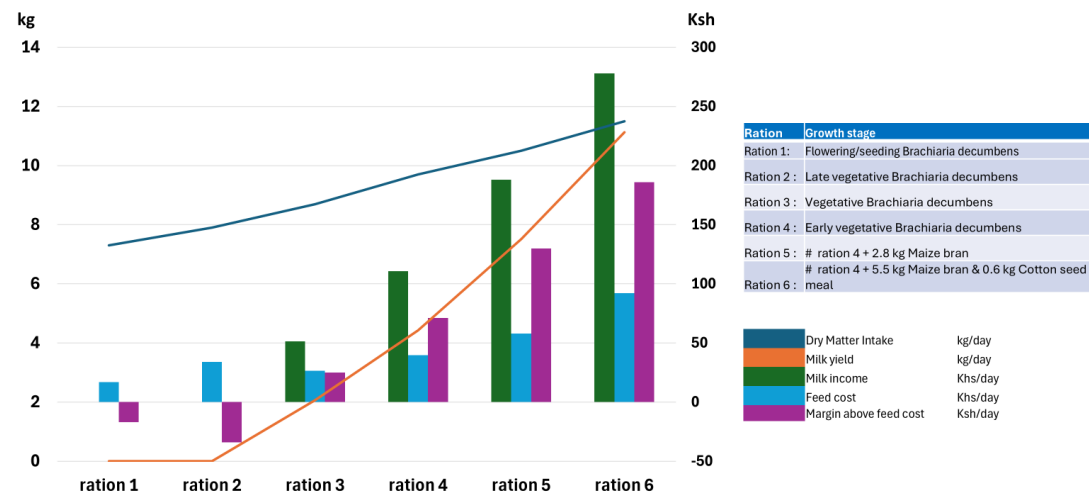


Source: Food and Agriculture Organization of the United Nations (2023)



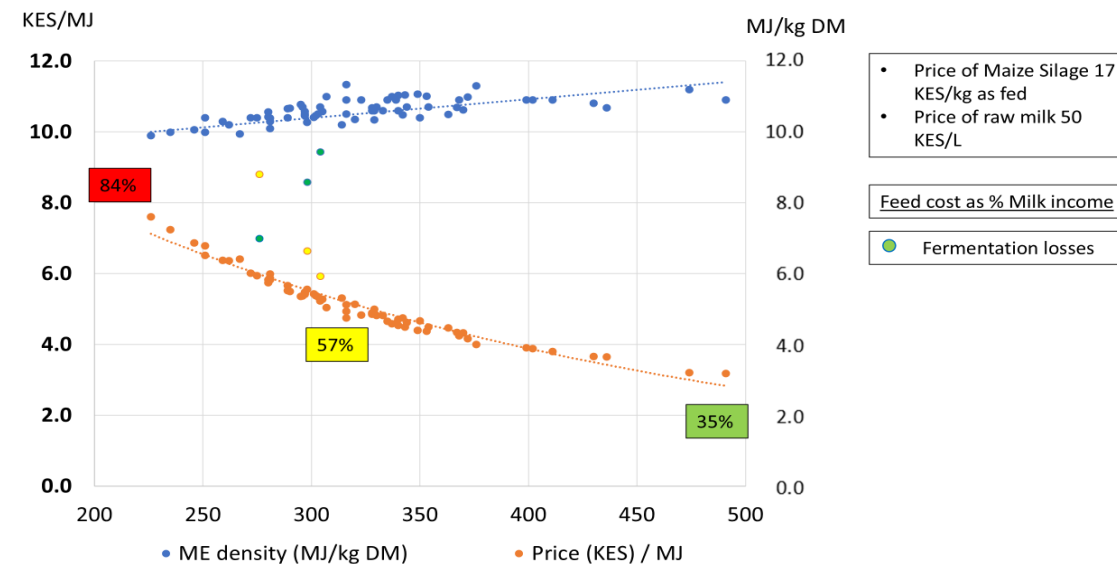
- Harvest tropical grasses in an early stage of growth.
- Maize is to be harvested in the dough-ripe stage and legumes in the flowering stage or later.
- Balance diets and lower Forage/Concentrate ratio (as compared to BAU).
- Raises profitability; slightly lowers g CH<sub>4</sub>/day and tremendously lowers g CH<sub>4</sub>/L.
- Introduce a sector-driven price/quality payment system for livestock feed.
- Create awareness amongst farmers and other stakeholders (e.g. financial institutions) about the benefits of quality forage production.

## Affordable versus cost-effective feed



Source: Perdok, H., Creemers, J., Rumen8 (2023)

## Price – quality of maize silage in the forage market



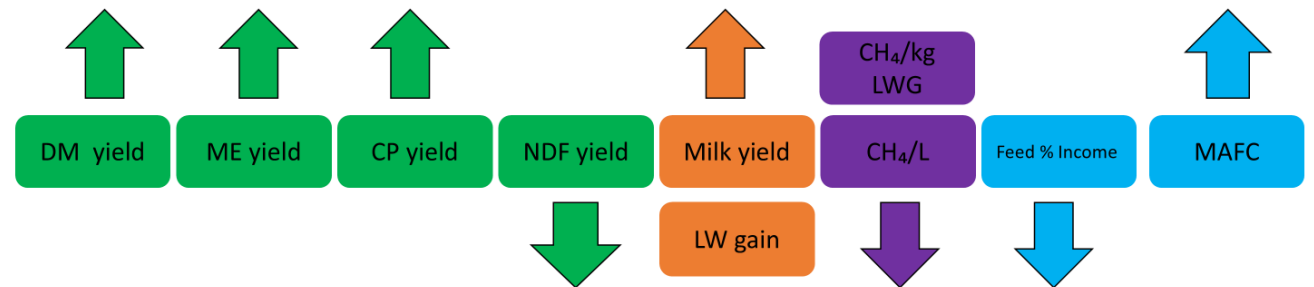
Source: ProDairy EA, Creemers, J., (2023)

- Interventions needed in all segments of the forage value chain
  - Availability of seeds of high potential annual and perennial forage crops.
  - Optimum yield (biomass with high nutritional value).
  - Better and more storage capacity for forages of high quality (silage & hay).
  - Link forage production to livestock production to ensure cost effective dairy and beef cattle diets.

## Forage value chain



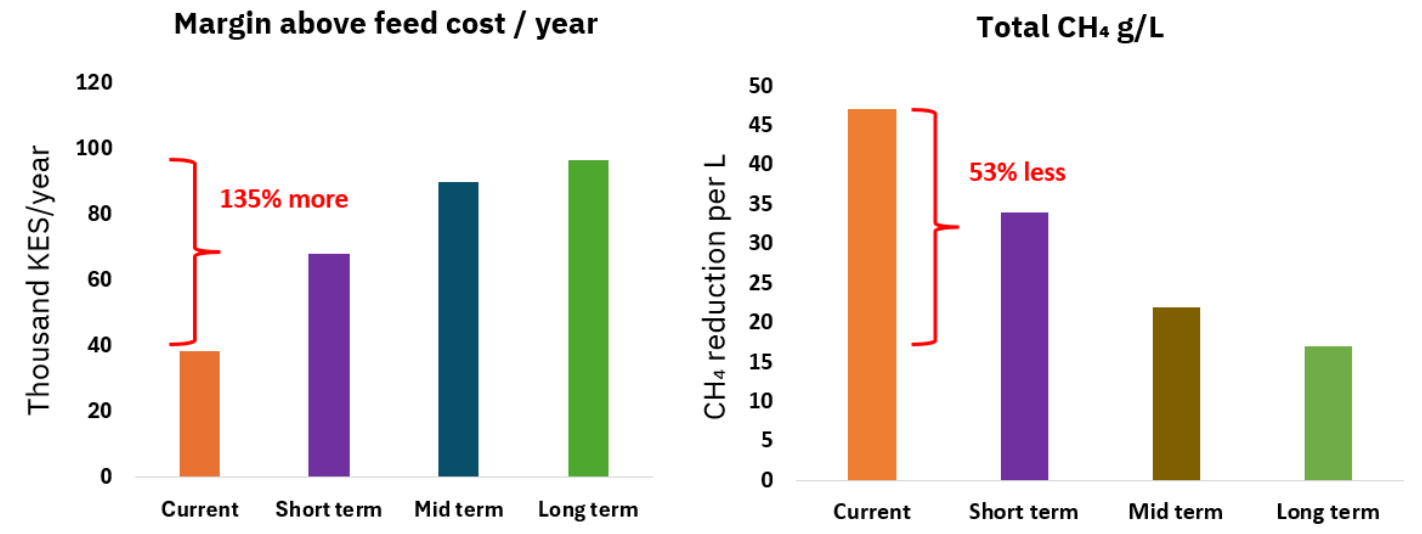
Linking forage and livestock production with higher income



## More and better-quality forages in balanced diets:

- Increase milk production
- Increase farmer income
- Slightly lowers g CH<sub>4</sub>/day and tremendously lowers g CH<sub>4</sub>/L

## Dairy farmer MAFC vs emissions





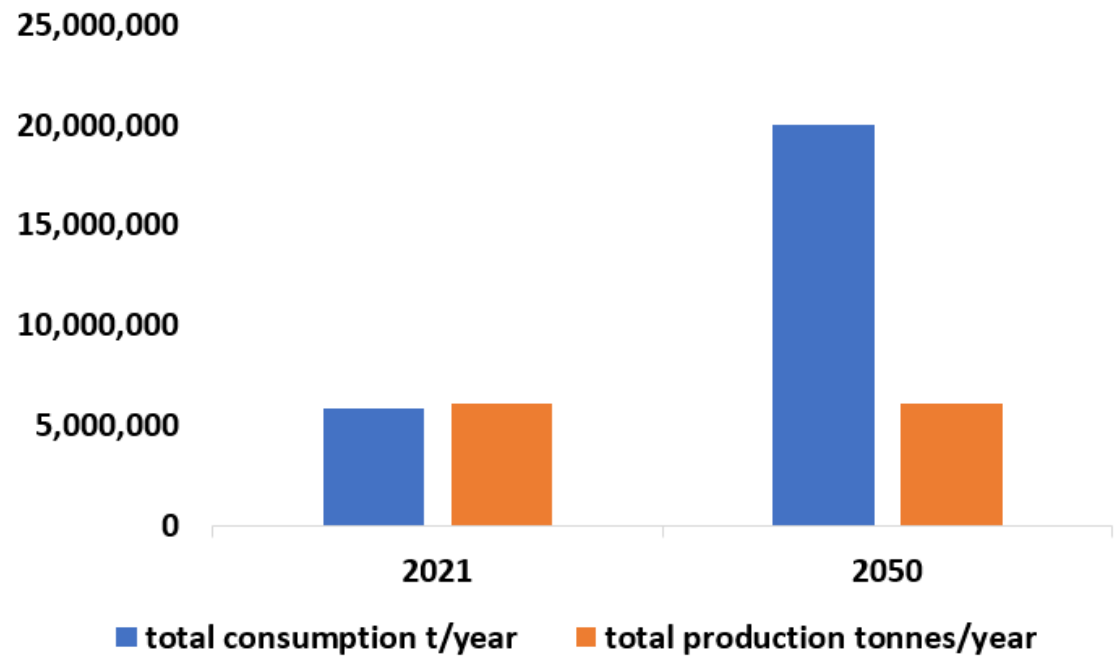
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# Growing market

- East African countries to meet growing demand
- Production stays behind in a Business-as-Usual scenario

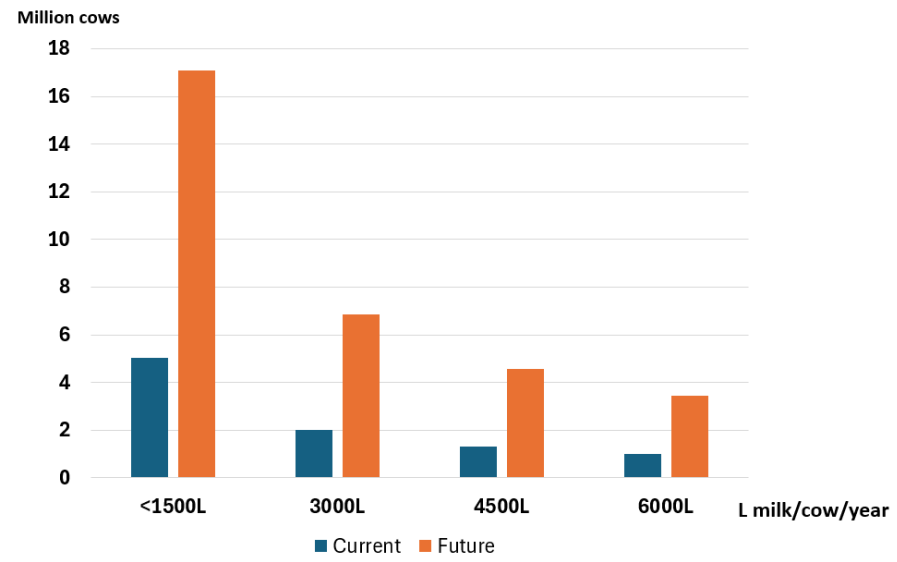
Projected milk consumption vs production Kenya



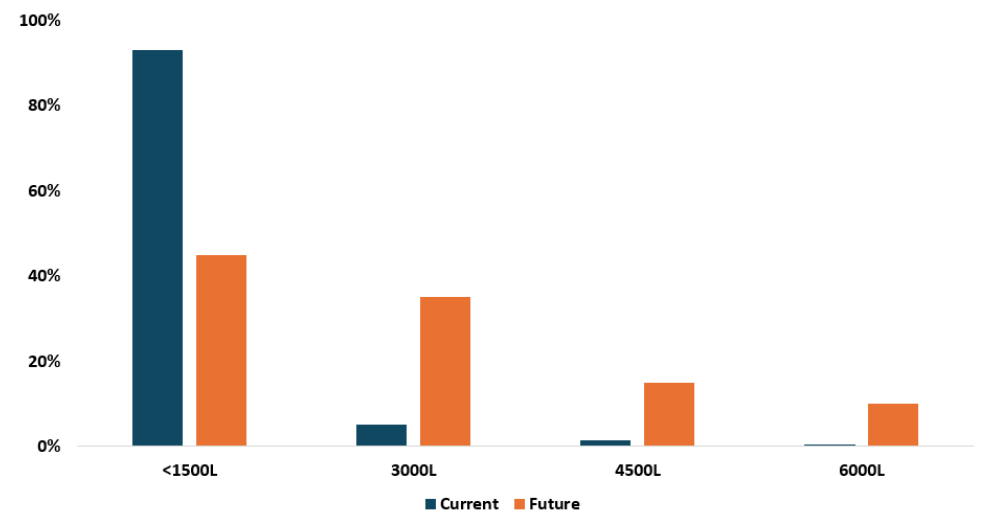


- Kenya to meet future demand with around 5 million dairy cows the production needs to increase to 4500L milk/cow
- Transformation of the sector towards increased productivity is possible with optimum yields of high-quality forages, AND adopting forage conservation technologies
- Use of technologies that make the feed market transparent, functional and as a result more vibrant.

### Livestock numbers with improved milk production (to meet domestic demand)



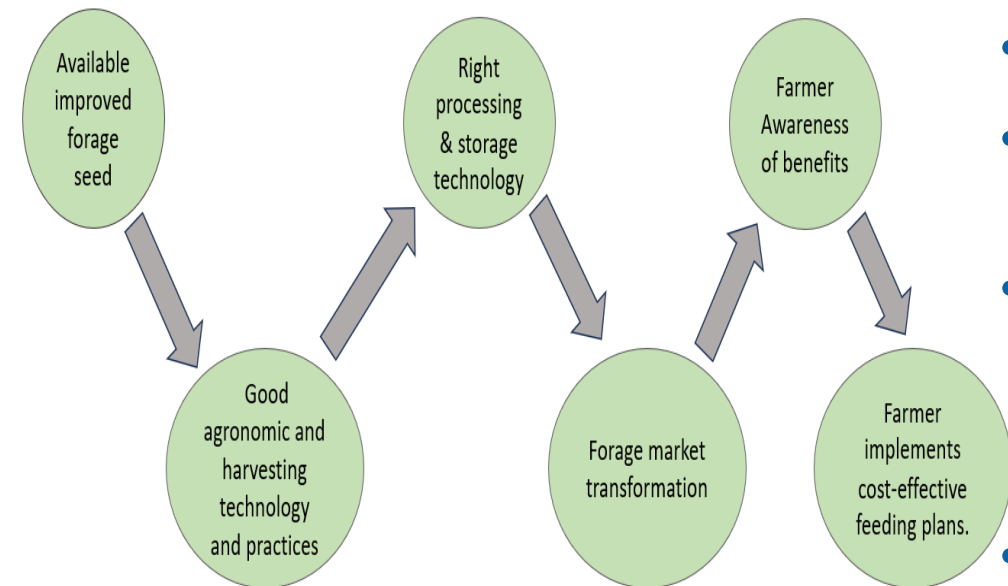
### Farmers per milk production level



Adapted from: Africa Dairy Genetic Gain, ILRI, 2017

## Opportunities

- Pasture commercialization from seed to feed.
- Cultivation of high value (nutrient dense forages at, for dairy & beef cattle farmers cost effective prices
- Mechanization & storage infrastructure
- Production of cattle feeds with low environmental and climate impact
- Technologies that make the feed and food markets transparent, functional, safe and payments are based on measurable quantities and qualities.
- Awareness of farmers and farm advisors through access to credible information platforms
- Quality seed, feed and livestock products will make the regional markets more vibrant with increased access to farmers



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# Thank you for your attention

For more information on dairy and beef cattle farming in East Africa and training on Rumen8, contact

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