Harnessing livestock for climate and food security: A strategic opportunity for Africa and the global south

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Climate-smart livestock production

ADAPTATION

- Appearance and conformation
- Use indigenous/adapted breeds
- Development of Early Warning Systems
- Alternative production systems (Crossbreeding)

→ **Maintain Production**

RESILIENCE

- Resilience to variation in climate
- Breed/genotype plasticity
- Epigenetics

→ **Recover quickly, bounce back, toughness**

MITIGATION

- Carbon sequestration (highest mitigation potential)
- Improved efficiency for lower methane emissions
- Rumen manipulation
- Feeding and grazing management

→ **Lower carbon footprint**

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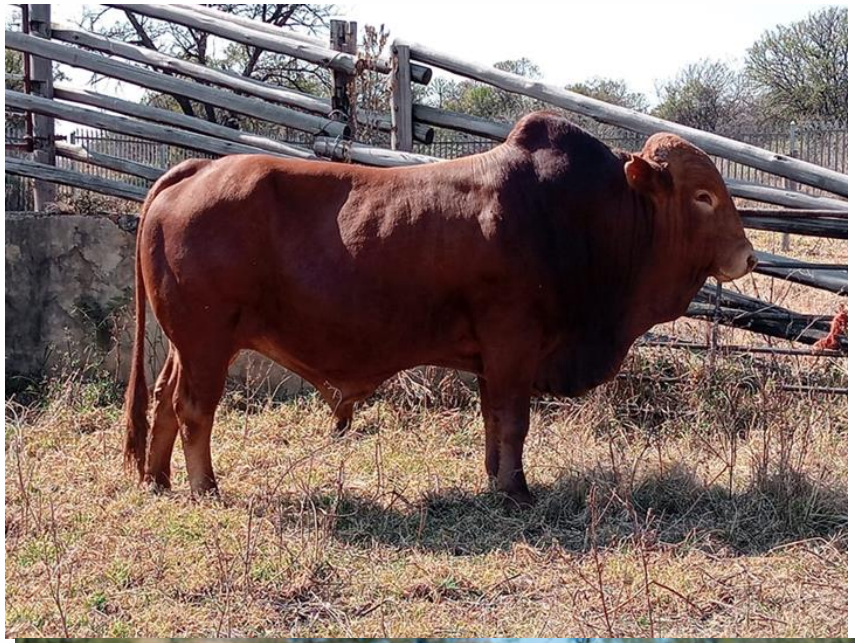
Appearance and conformation traits

- Limit body size (so that the animal can get rid of heat more easily)
- Change of the hair and skin color (lighter hair color and darker skin pigmentation)
- Larger skin surface area and longer limbs such as legs



Adaptation – Use of indigenous/adapted breeds

Indigenous breeds – Our heritage for food security

- Adapted to the local conditions - survive and reproduce under harsh environments.
- Disease and parasites (Ticks) resistance
- Less water dependent
- Very good meat quality in the case of indigenous breeds

Adaptation – Development of Early Warning Systems

Nutrition can maintain production

Aim to avoid this!!!

- **Short term (5 to 14 days):**
  - Licks/supplements formulated to ensure a proper cation-anion balance to counteract heat stress
  - Warning of floods – move animals to higher altitude

- **Seasonal (6 to 12 months):**
  - Reduce animal numbers to manage stocking rates
  - Storage of alternative feeds (e.g. boskos)
  - Heat stress compromise male fertility; in seasons with high predicted temperature - use multi-sire breeding and/or males from tropical adapted genotypes

Adaptation – Crossbreeding for smallholder farmers

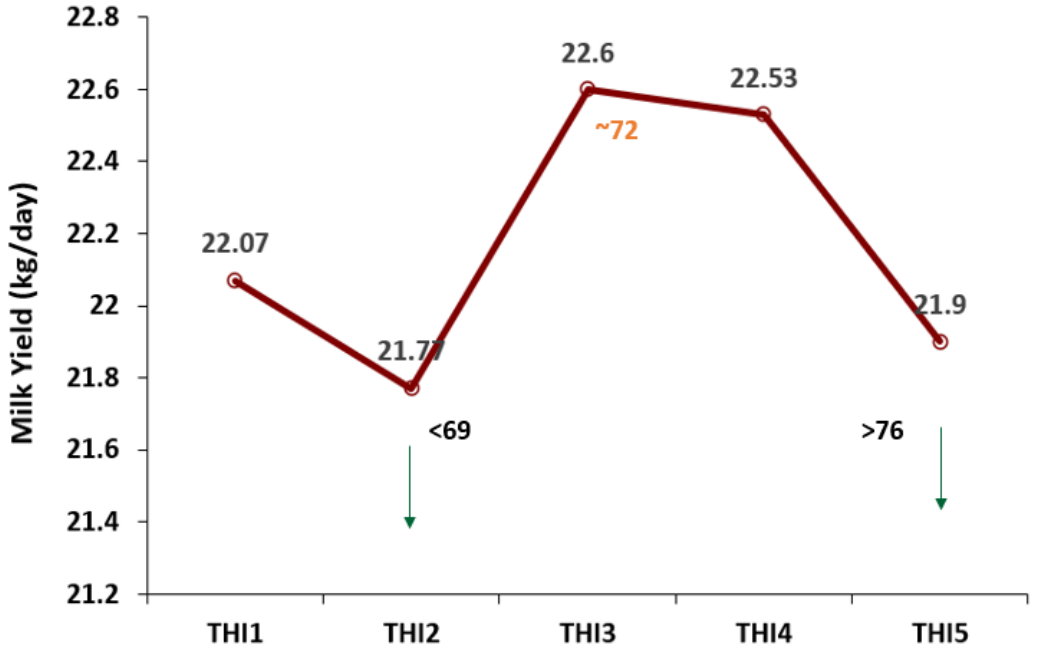
- Structured (rotational) crossing with indigenous breeds (Afrikaner, Bonsmara, Nguni) OR adapted breeds (e.g. Brahman, Tuli, Boran) can be beneficial for communal and smallholder farmers

- Increase cow productivity (without additional herd cost)
  - **27% increase in the value of the meat**
  - **27% less feed consumed from weaning to harvest**

Poor resilience or Vulnerability

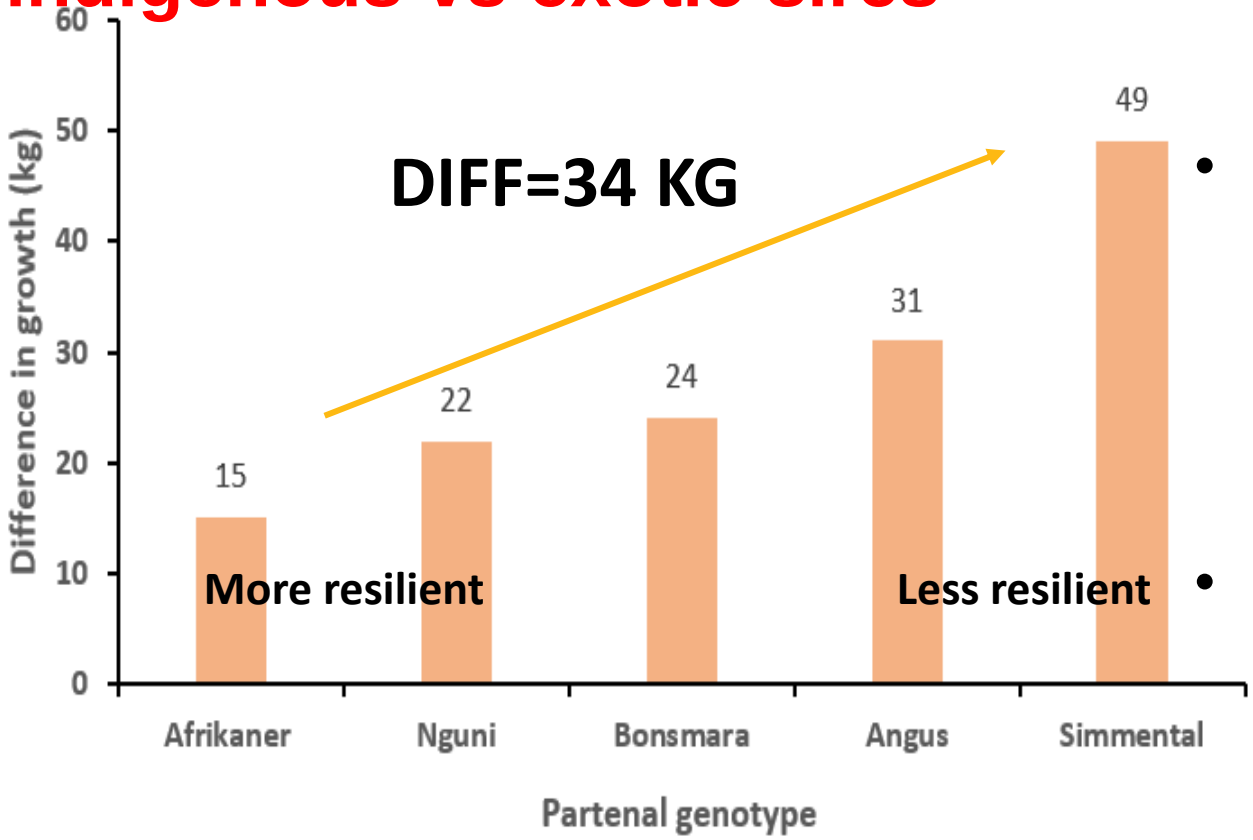
Non-adapted genotype

- Daily milk yield in response temperature humidity index (THI)
- **THI threshold of 72**
- Daily milk production is reduced in both **low and high THI**
  - Heat stress or discomfort



Breeding for less plastic/more climate resilient genotypes

Difference in weaning weight between years of calves from indigenous vs exotic sires



- Resilience is lower when the genetic effects show greater variation between years and higher when these interaction effects are smaller
- Traditional (locally adapted) genotypes – More resilient

Resilience – Breeding for less plastic/more climate resilient genotypes

- Adequately resourced commercial producers **provide external inputs to offset this environmental variation**
  - Purchase of feed during drought seasons/years
- Therefore, choose to use **breed resources/genotypes with high average genetic potential for production without regard to their plasticity**
- Some commercial producers and all subsistence producers – **choose less plastic breed resources/genotypes** that produce even under less favorable environmental circumstances

Mitigation

- Results from the Global North are not always applicable to the Global South – Identify system and region factors
  - **Emissions vary by system!**

- **Agriculture**: can achieve carbon (CO_2) sequestration, (highest mitigation potential) in various ways: Indigenous breeds can play a significant role
  - **Breeding for lower methane production:** Cost of reducing methane production through genetic selection in beef cattle (GGAA in Kenya)

New Research

- **Global Methane Genetics project (Bezos Earth Fund)**

- Identify **low methane producing** animals – optimize breeding systems
- **Validate methane emission factors** for cattle in the feedlot
- Include methane emissions in a phenotypic **selection index** of biological efficiency

- **Climate related projects that are funded by Department of Agriculture (DoA)**

- Development of THI and early warning systems as **adaptation and mitigation strategies** in beef and dairy cattle
- Effect of heat stress on milk production, udder health, milk composition and **methane emissions** in dairy cattle
- The **carbon and water footprint** of diverse beef cattle genotypes in South Africa
- **Measure the actual on-farm methane emissions** of beef cattle under different vegetation types over a whole production system

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Key recommendations for the G20 members

- Each country should prioritixe investment in Research and Development
- Invest and promote Collaborative Platforms for Knowledge, Innovations and Technology Exchange
- Support the development and validation of system-specific emission factors to inform targeted mitigation strategies (country-led)
- Advocate for fair and inclusive access to climate funding for developing countries
- Scale up climate finance for agriculture

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