

International Conference on Sustainable Animal Agricultural for Developing Countries (SAADC 2023)

SUSTAINABLE ANIMAL AGRICULTURE FOR A SUSTAINABLE TOMORROW

SIDE MEETING

**Interdisciplinary approaches to support food safety, market
access, genetic improvements, and climate change in livestock**

Vientiane, 24 November 2023





**SAADC
2023**



Sustainable smallholder crop-livestock systems: farm diversification and intensification as pathways to development

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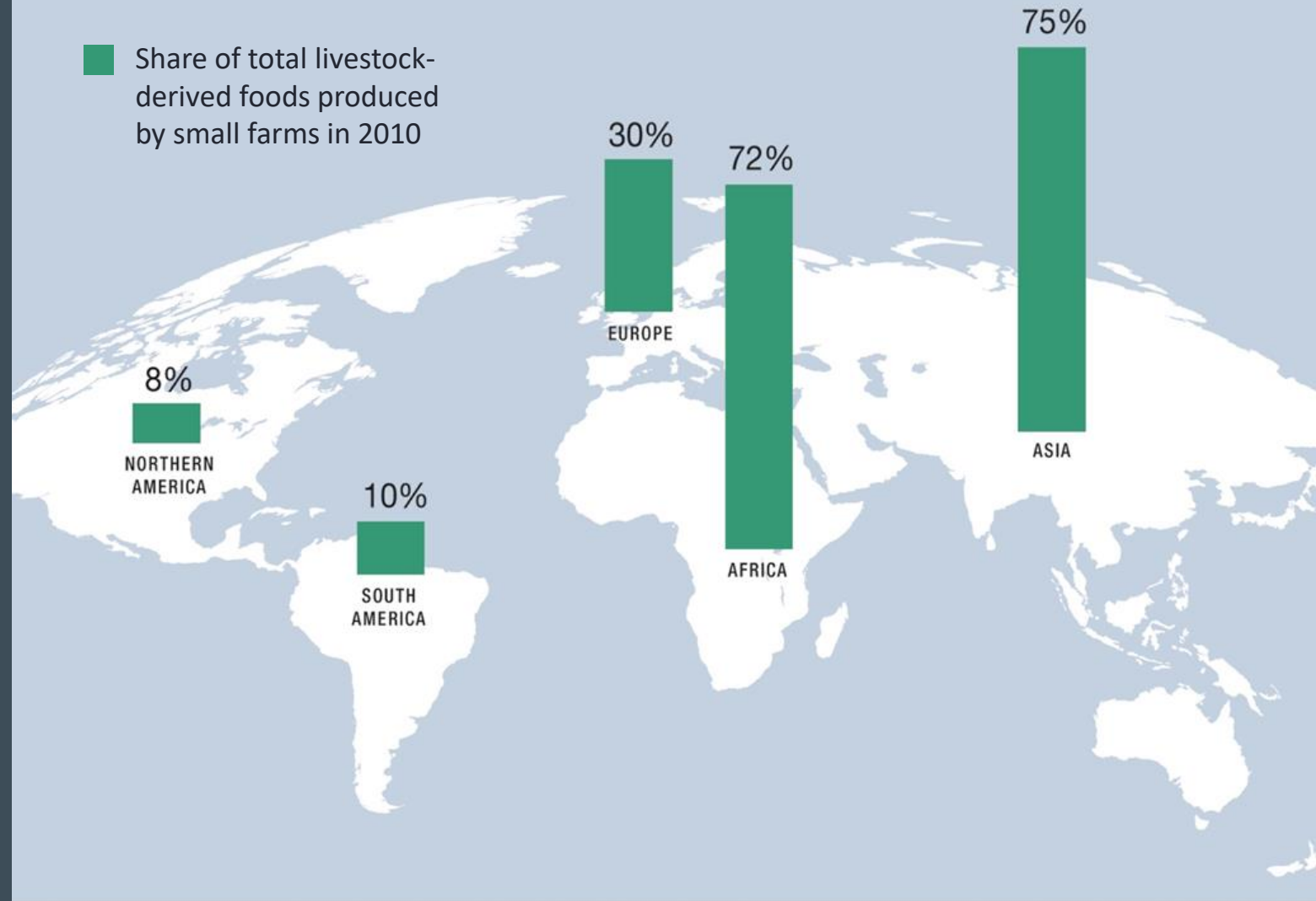
Sustainable
Intensification of
Mixed Farming Systems



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Smallholder farmers currently provide most of the meat, milk and eggs AND staple cereals in LMICs

- **1.7 billion people** derive some livelihood from livestock; over half a billion depend on livestock
- **Livestock are fundamental** to many economies; provide income, jobs, and supporting risk mitigation
- Livestock are the basis for **farm sustainability**, integrated livestock-food farms make food crop farming even possible for many in the Global South – circular bioeconomy in action!



Farms of less than 20 hectares provide:

Nearly 50% of the world's livestock and cereals, and close to 70% of the livestock and cereals in emerging and developing economies

Did you know...

Livestock are integral to 'circular bioeconomy' which is the basis for most livestock production in LMICs

Sustainable intensification-diversification of smallholder crop-livestock systems: a win-win-win-win

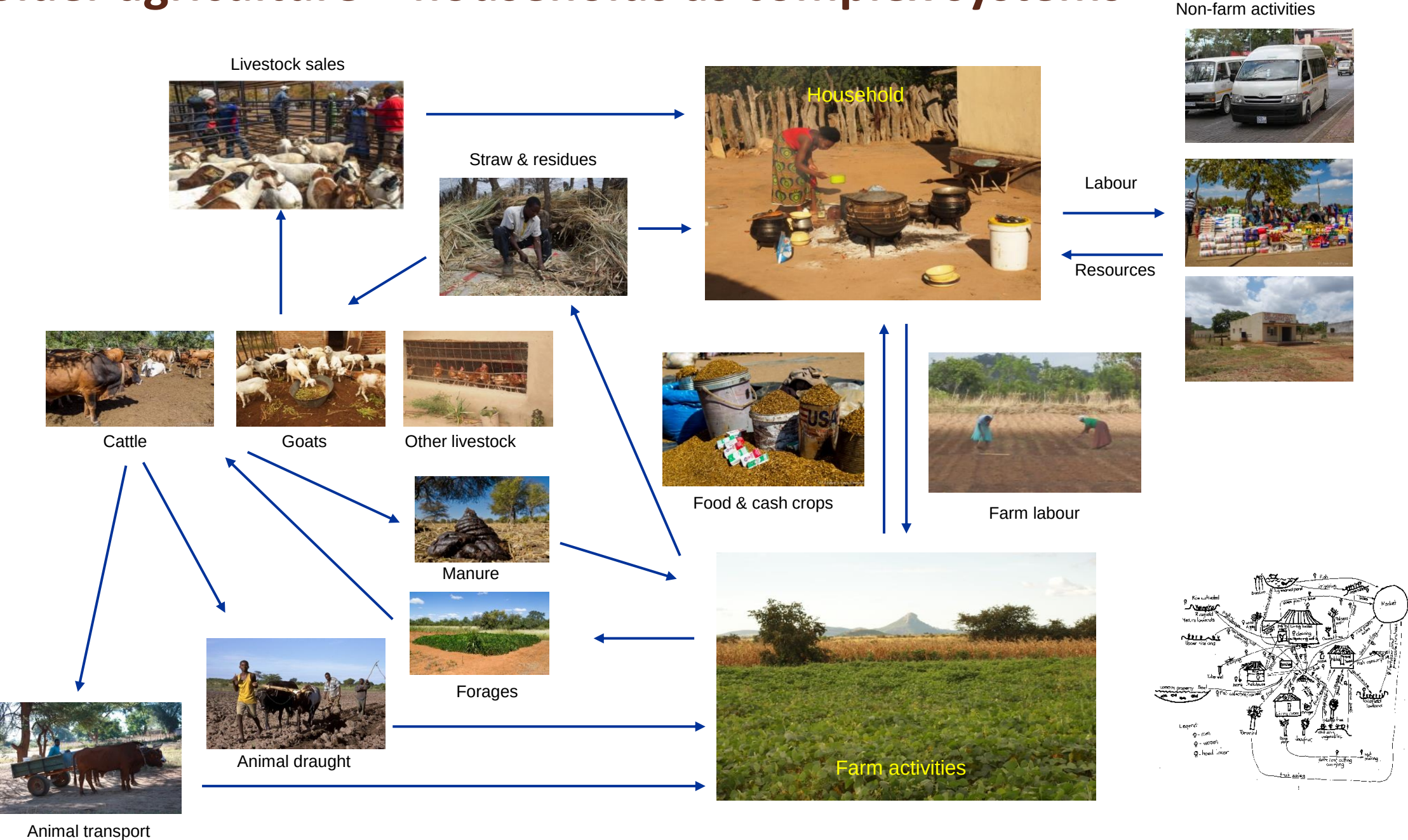
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+++ Livelihoods, nutrition and the environment +++

1. Crop residues, forages as **feed sources** and fertilizer/cover.
2. Livestock contributions to **resource use efficiency** for the whole farm system e.g., through nutrient cycling and exploitation of a range of agro-ecological niches
3. The contribution of livestock to household **nutrition**
4. Demand for livestock products drives **markets and agribusiness**



Smallholder agriculture – households as complex systems



Bioeconomic analysis (IAT) –Zimbabwe

6

S1 Baseline situation:	US\$ 188
S2 Fertilize Maize:	US\$ 467
Crop GM increase by ca.	US\$ 200
ALSO increase Livestock GM by	US\$ 70
Total HH GM increase by	US\$ 270
S4 = increase groundnuts 1.0ha using local varieties.	US\$ 456
S5 = S4+ CG7 groundnuts for local varieties	US\$ 529
S6 = increase farm gate price of groundnuts by shelling locally	US\$ 613
S8 = improved market access (both cattle and goats)	US\$ 902
S11 = improved market access goats only	US\$ 1052
S12 = improved market access cattle only	US\$ 868
S13 = S1 Baseline + access to livestock markets alone	US\$ 206



Significant outcomes after 10 years

- Price of animals increased **\$8** in 2006 – **\$60** to \$80 in 2015.
 - Price incentives drove investments in housing, feeding and vet inputs
 - Investments reduced, mortalities and increased animal condition
 - Markets reacted by paying for quality further driving investments
-
- Large abattoirs showed interest and reduced transactions costs
 - NGOs started establishing sale-pens
 - NGOs promoted fodders to reduce dry season mortalities and fatten animals for markets
 - Forage seed markets developed.

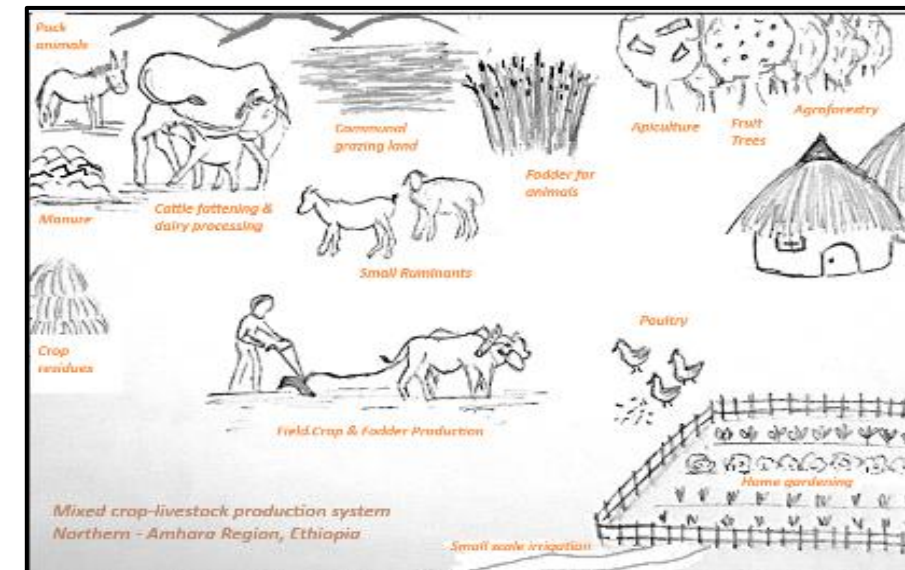


c/ van Rooyen et al.

Overview of the Africa RISING Project – a remarkable example of diversification and intensification as pathways to development



- Africa RISING was a multidisciplinary and integrated research USAID project that focused on the Sustainable Intensification (SI) of mixed farming systems.
- Focus areas: Climate smart development, gender integration, improved nutrition, inclusive agricultural sector growth, private sector growth, research and capacity building.
- The project used a variety of approaches to improve smallholder farming systems, including:
 - Farm systems analysis
 - on-farm research to develop and test new technologies
 - innovation platforms
 - policy advocacy
 - capacity development.



- The project reached over 455,000 beneficiaries with validated technologies
- >600 project outputs since 2012, including 51 journal articles.

Africa RISING innovations: Examples

a) Feed and forage innovations

Fodder tree



Forage grass



Herbaceous legumes
/grass mixture



Feed trough



Introduced and validated different feed and forage technologies to improve livestock productivity.

Generated biophysical and socioeconomic data under on-farm environment - example

- Biomass yields from forage crops fill feed gaps (oat/ vetch- 12 t DM ha⁻¹; fodder beet- > 20 t DM ha⁻¹; tree lucerne, 4-7 t DM ha⁻¹).
- Supplementation of oat/vetch mixture and fodder beet increased milk yield from 30–50%.
- Feeding trough and storage shed have reduced feed wastage by 30- 50%.

b) Improved crop varieties and management practices



Introduced and evaluated over 127 improved crop varieties (cereal, pulse, oil, potato and enset varieties) through PVS and crowdsourcing approaches.



Yield increase c/w national crop yield: bread and durum wheat (52- 89%), faba bean (90%), malt and food barley (120-132%), field pea and lentil (83-111%), chick pea and linseed (36-83%) and potato (171%).





C) High value fruit trees

Varieties

Introduced and validated 5 avocado and 2 apple (Anna and Princissa) varieties.

Fruiting

Avocado varieties provide fruit <2 years

Yield

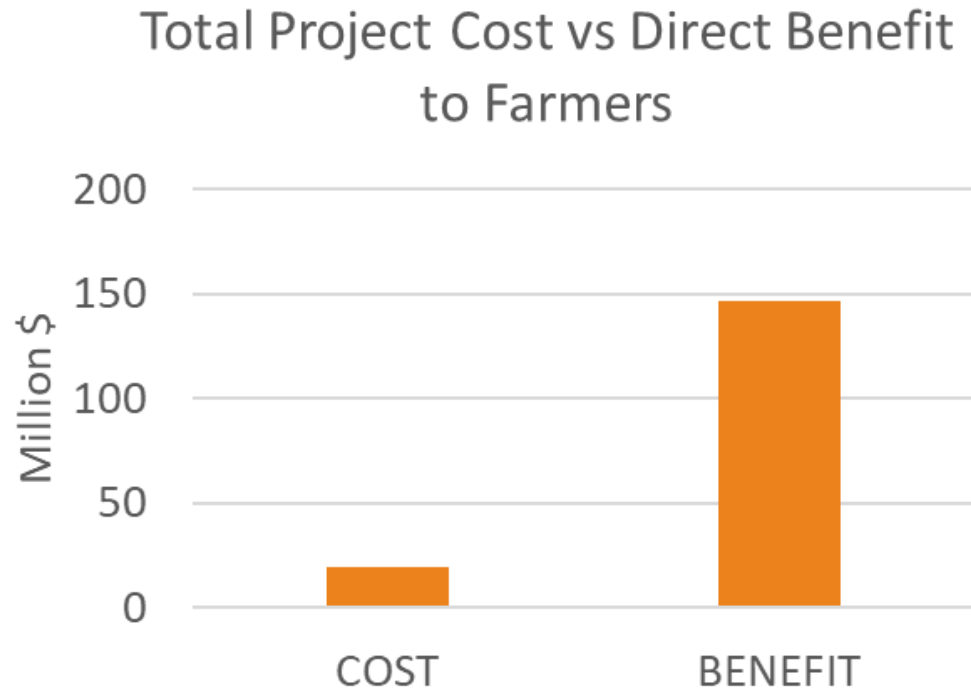
Fruit yield per avocado tree ranges from 50 kg for Ettinger to 181 kg for Nabal.

Quality Test

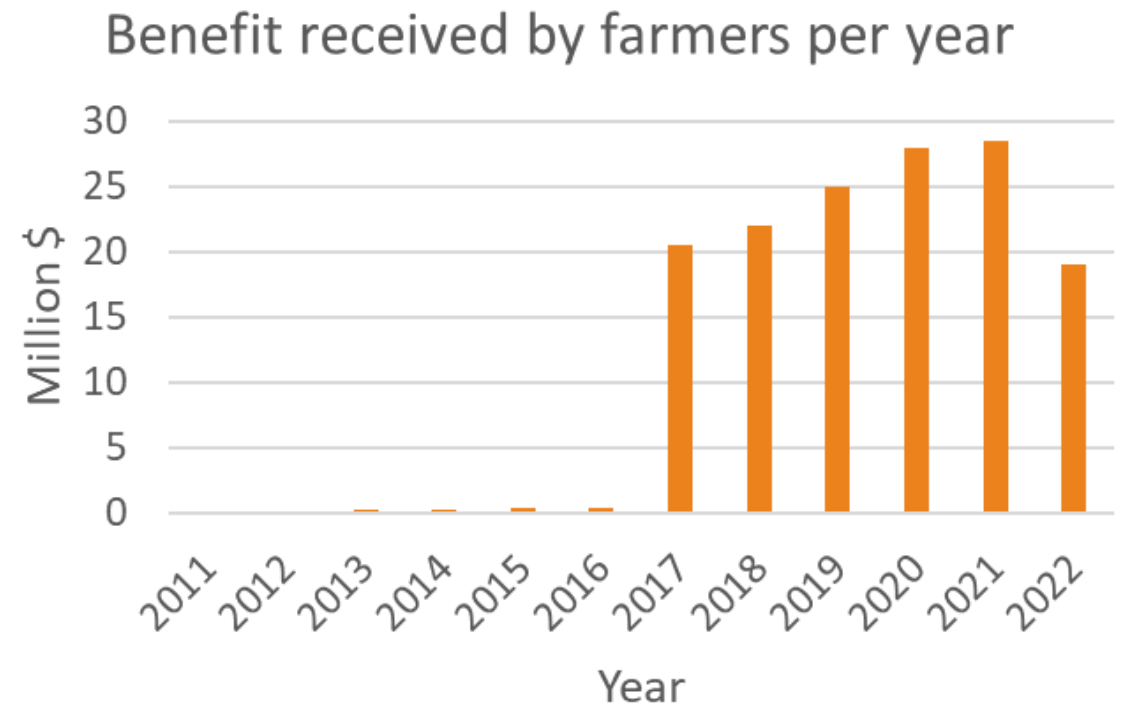
Quality (test, shelf life, oil content) for avocado var.: Hass > Ettinger > Fuerte > Reed > Nabal.



Financial Return on Investment – cost benefit ratio of 7.8



A 10-15% increase in annual household income, over the 455,000 households engaged.
Total cost \$19M, direct benefit \$146M
Some practices were more financially valuable (e.g. wheat), some more synergistic (e.g. feed troughs), or environmental (e.g. watershed restoration).



The scaling phase (post 2016) achieved the big returns in terms of impact. This underlines the importance of continuing to scale these validated technologies.

Method: The impact and adoption of promoted technologies was established using household surveys in 2018 and 2022, in reference to program records, and productivity impacts cross-checked with experimental data where available. The value of production gains was converted to USD\$ in purchasing power parity (PPP) taking 2021 as the reference year. Mean increases in farm income were then extrapolated to the project and scaling kebeles according to adoption rates. No indirect or future benefits are included.

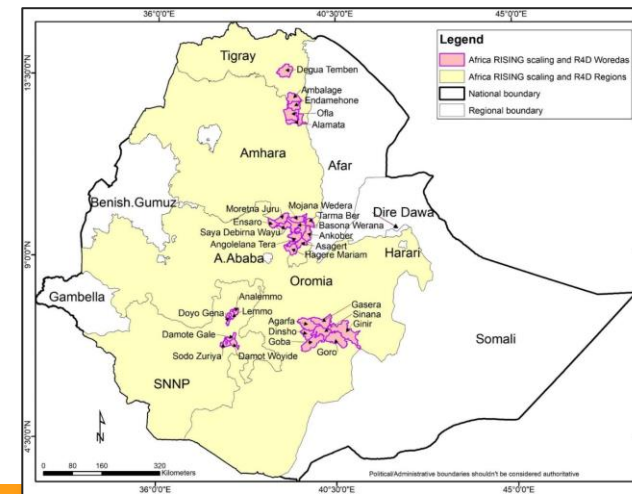
Potential for scaling Africa RISING Innovations

- Africa RISING scaling reach : 455,000 beneficiaries
- Scaling partnership development
 - Mapping and recruiting development partners
 - Training development partners on AR validated technologies
 - Embedding AR validated technologies in partners operations
- Awareness and demand creation
 - Training of public and NGO extension staff
 - Reaching farmers through community radio
 - Dissemination of technical notes and extension manuals
- Strengthening technology multiplication and delivery
 - Scanning and sourcing planting materials from national pool
 - Multiplying seeds with seed producing farmer cooperatives
 - Financing through project seed fund, revolving schemes, farmer



Diversification and intensification as pathways to development

1. **Markets** (esp. livestock) can drive on farm investments into technologies, inputs, management.
2. **Integration** of dual-purpose germplasm (cereals and legumes) and forages can provide multiple product options and tactical decisions.
3. **A farming systems perspective** helps to identify the potential for layered-multi-livelihood approaches which bring real systems change.
4. **Climate adaptation, livelihood resilience, circularity (incl. GHG) and nutrition** are linked and the 4x wins.
5. Scaling requires longer term layered investments by donors and governments





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15

THANK YOU



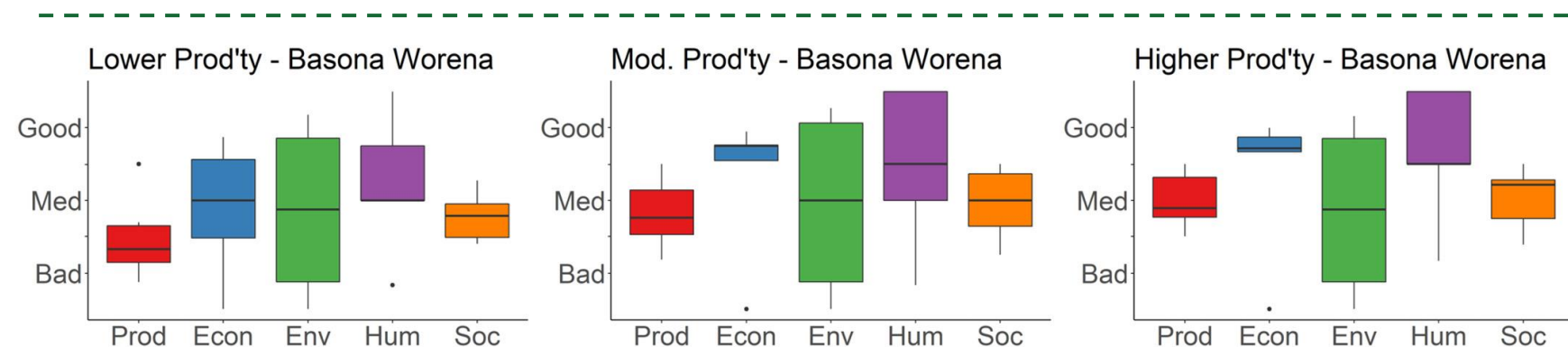
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Farming System Description and Analysis of Sustainable Intensification

Woreda	Crop land (ha)	Crop Diversity (count)	Livestock (TLU)	Main Crops	Main Livestock	Liters of Milk	Income: Crops (USD/yr)	Income: Livestock(USD/yr)	Income: Off-Farm (USD/yr)
Basona Worena	1.6	5.5	4.1	Bread wheat, fava bean, barley, teff, malt barley	Cattle, sheep, donkeys, chicken	1,400	900	1,200	200
Lemo	1.5	8.4	4.0	Bread wheat, teff, fava bean, maize, enset, barley, chat	Cattle, donkeys, chicken, goats	650	500	330	70
Sinana	3.6	5.5	6.4	Bread wheat, barley, field pea, maize	Cattle, horses, sheep, chicken	800	10,000	730	550



Analysis of the net effects of intensification via AfricaRISING technologies showed improvements in agricultural production, household economy, human welfare, and social indicators. This analysis adapted the SIAF framework.