CLIMATE-SMART Agriculture 2015

Global Science Conference

March 16-18, 2015
Le Corum, Montpellier France

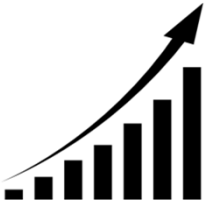
Additive impacts of climate-smart agriculture practices in mixed crop-livestock systems in Burkina Faso

Rigolot C[1-2], De Voil P[3], Douxchamps S[4], Prestwidge D[1], Van Wijk M[4], Thornton P[5], Henderson B[1], Medina Hidalgo D[1], Rodriguez D[3], Herrero M[1]

1 Commonwealth Scientific and Industrial Research Organization (CSIRO)
2 French National Institute for Agricultural Research (INRA)
3 University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI)
4 International Livestock Research Institute (ILRI)
5 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Key Messages

- **Interventions aimed to improve multiple components of the agricultural system show additive effects.**



- **Highest input alternatives are not the ones with highest cost-efficiency levels.**

- **Highest input alternatives increase downside risks.**

CLIMATE-SMART Agriculture 2015

About the study

- Identify the impacts of interventions aimed to **improve household income and food security**, against a background of **climate variability.**

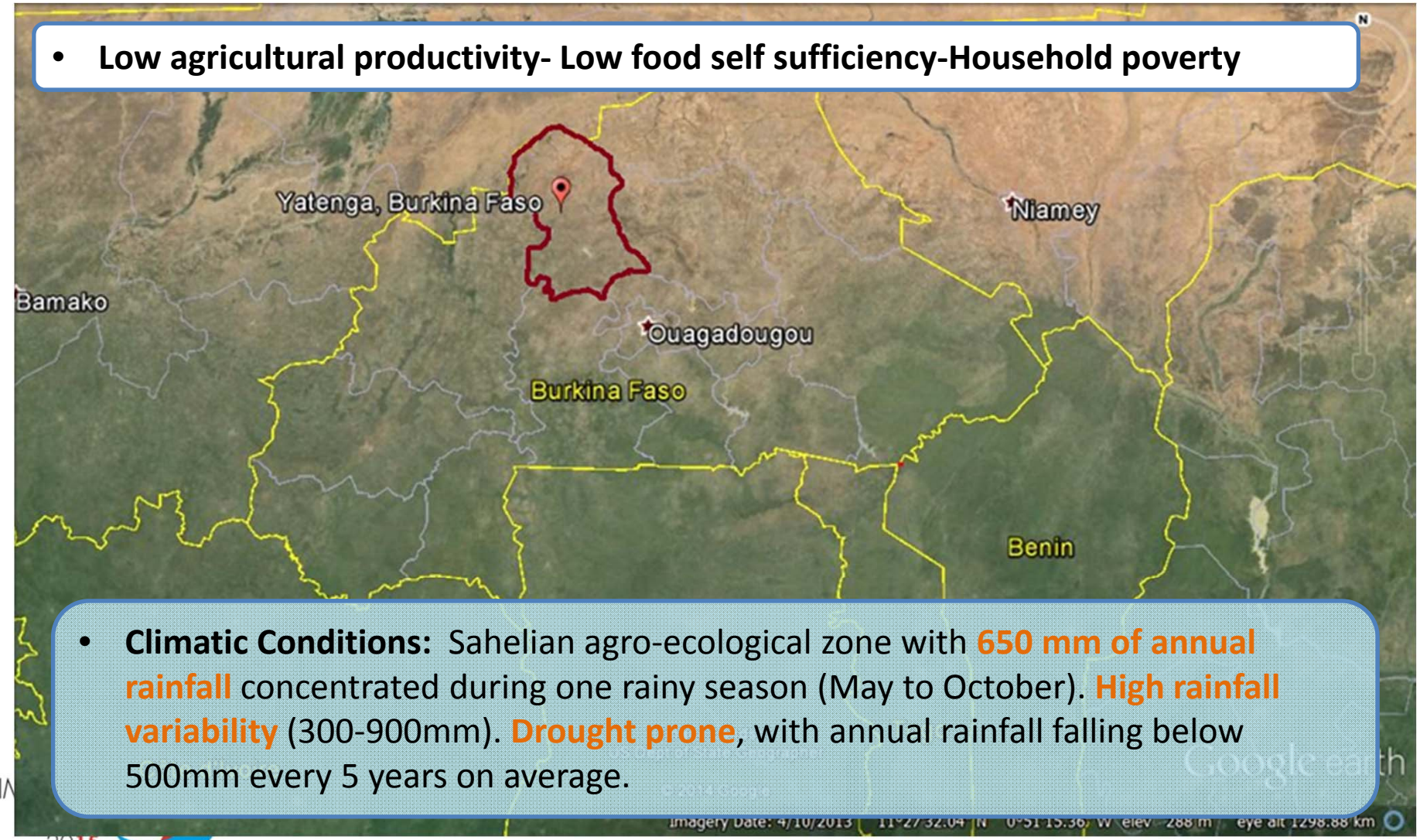
- Use of **whole farm models** to simulate crop and animal production, income and food security indicators in four representative farms.

- Part of the CCAFS sites in West Africa.

CLIMATE-SMART Agriculture 2015

Photo Credits: CCAFS

Context of the research area



- **Low agricultural productivity- Low food self sufficiency-Household poverty**

- **Climatic Conditions:** Sahelian agro-ecological zone with **650 mm of annual rainfall** concentrated during one rainy season (May to October). **High rainfall variability** (300-900mm). **Drought prone**, with annual rainfall falling below 500mm every 5 years on average.

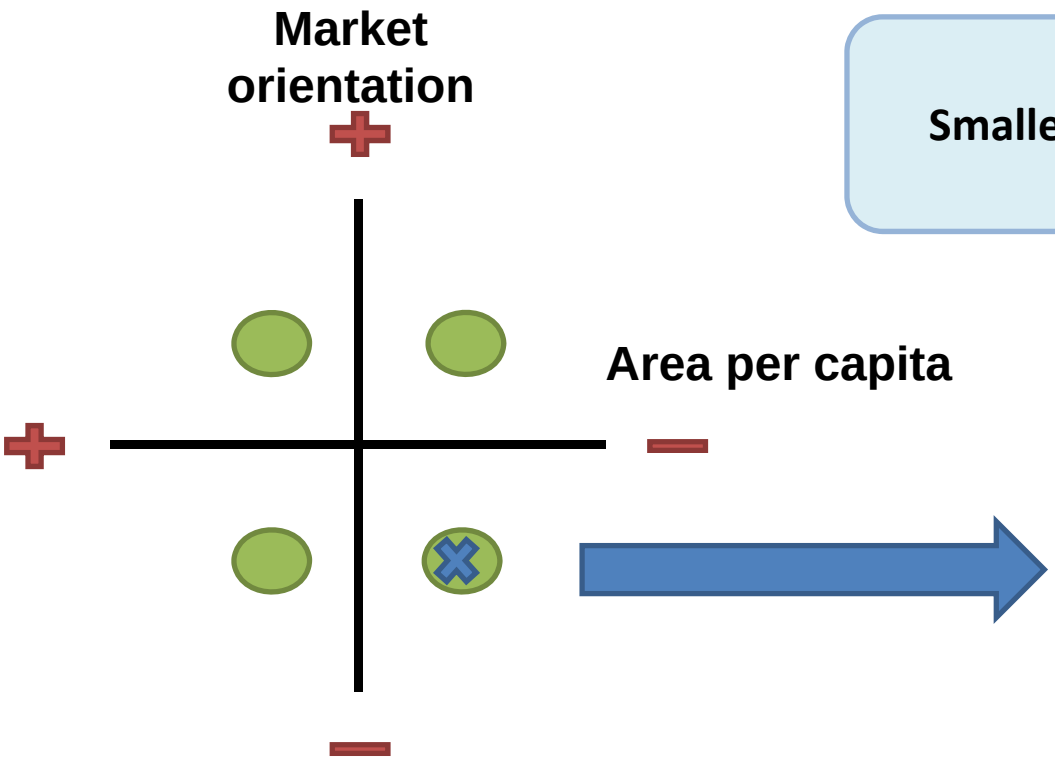
Identification of case studies

- A farm survey was performed in 2012 in a total of 200 households by CCAFS.
- Data were collected using the Impactlite standardized questionnaire.
- Four different households were selected based on food security indicators, relative area per capita and market orientation

CLIMATE-SMART Agriculture 2015

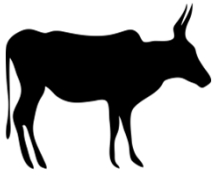
Photo Credits: CCAFS

Household Typology



SHC
Smaller area per capita oriented to home consumption

11 (4 adults, 7 children)

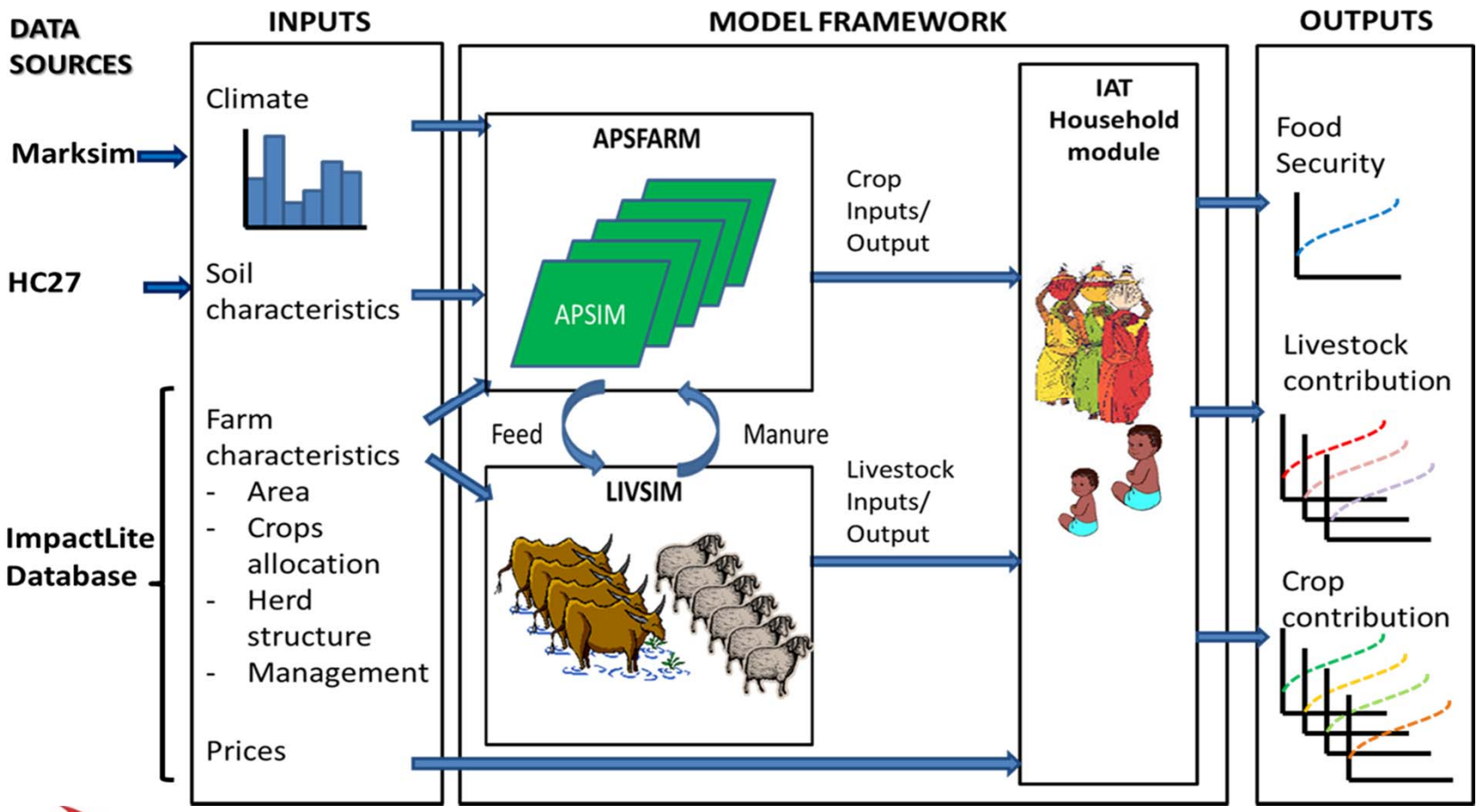


4 Livestock units

Millet (1Ha) Maize (0.25 Ha)

CLIMATE-SMART Agriculture 2015

Modelling Framework



CLIMATE-SMART Agriculture 2015

Simulated interventions

Cattle supplementation level +1kg/day | +2kg/day | +3kg/day

Fertilization level +30kgN/Ha | +60kgN/Ha

Feed allocation strategy Uniform | Target

Residues management Residue collection | Soil amendment

To integrate the effects of climate variability the simulation was developed over a long term climate series (100 years).

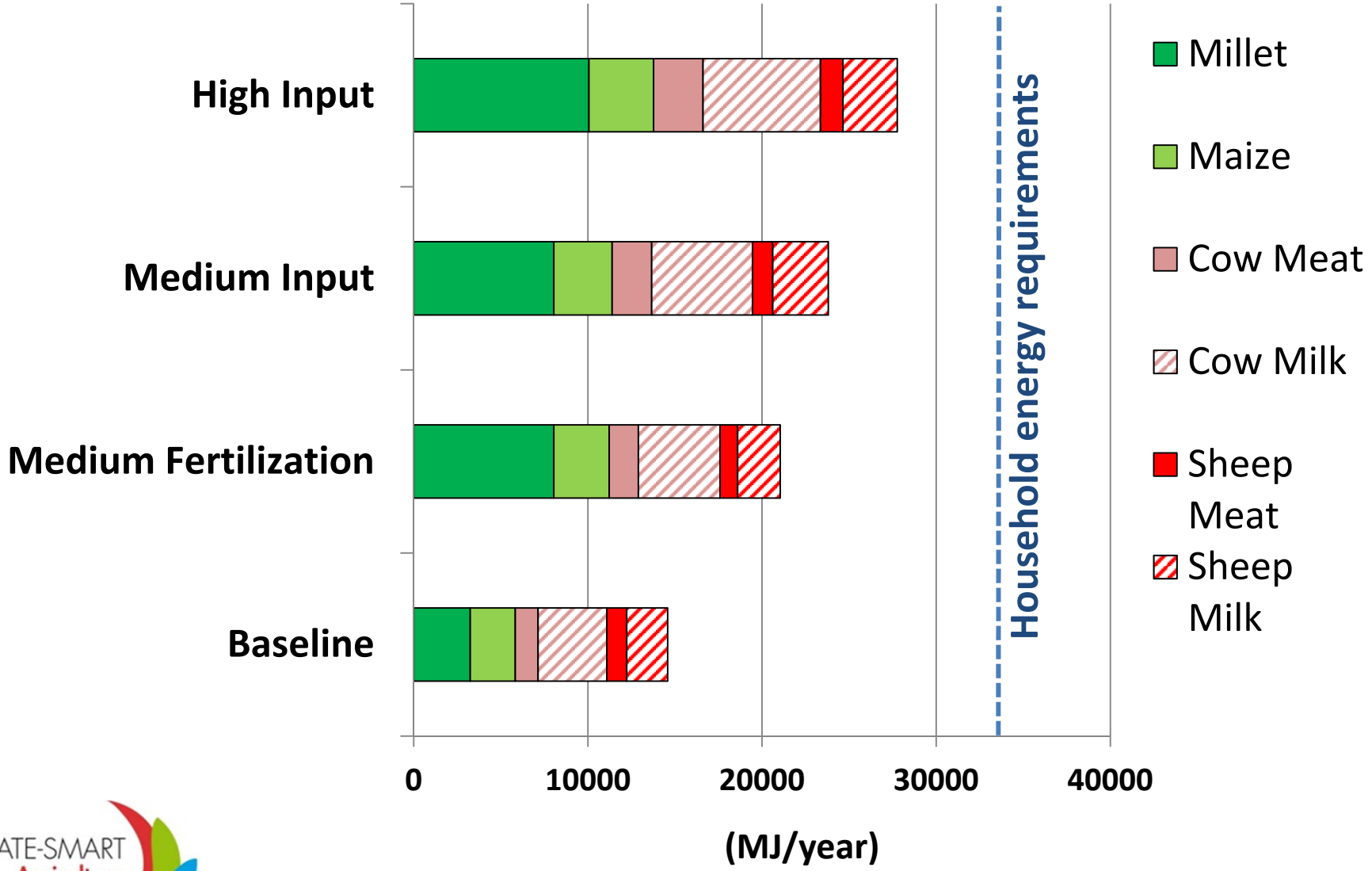
CLIMATE-SMART Agriculture 2015

Packages of Interventions

	Residue Collection	Fertilization Level	Animal Supplementation	Target Feeding
High supplementation and fertilization	**yes**	**+60kgN/ha cereal**	**+3kg/day**	**yes**
Medium supplementation and fertilization	**yes**	**+30kgN/ha cereal**	**+1kg/day**	**yes**
Medium Fertilization no supplementation	**yes**	**+30kgN/ha cereal**	**no**	**no**
Baseline	**yes**	**no**	**no**	**no**

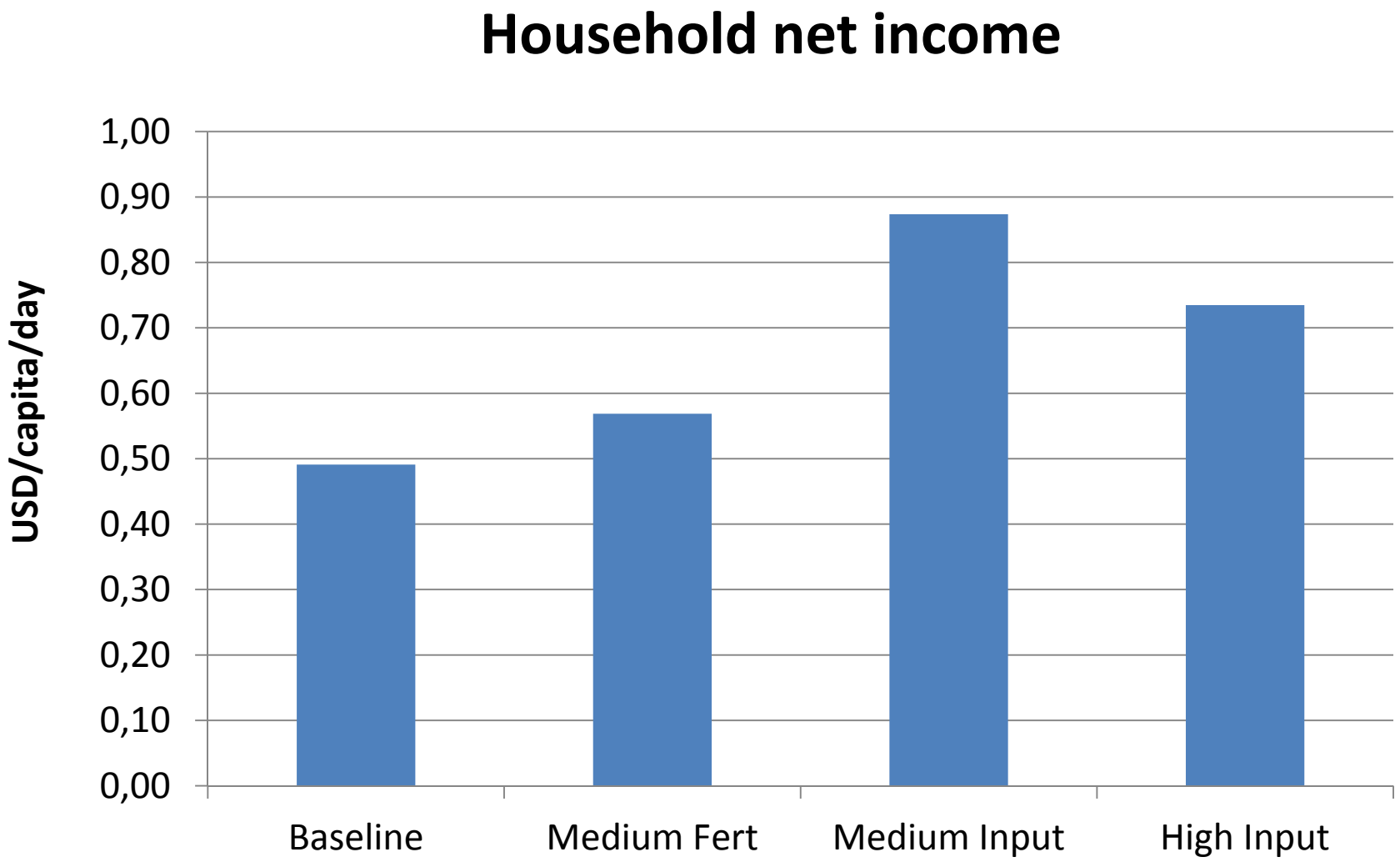
CLIMATE-SMART Agriculture 2015

Average household energy production



CLIMATE-SMART Agriculture 2015

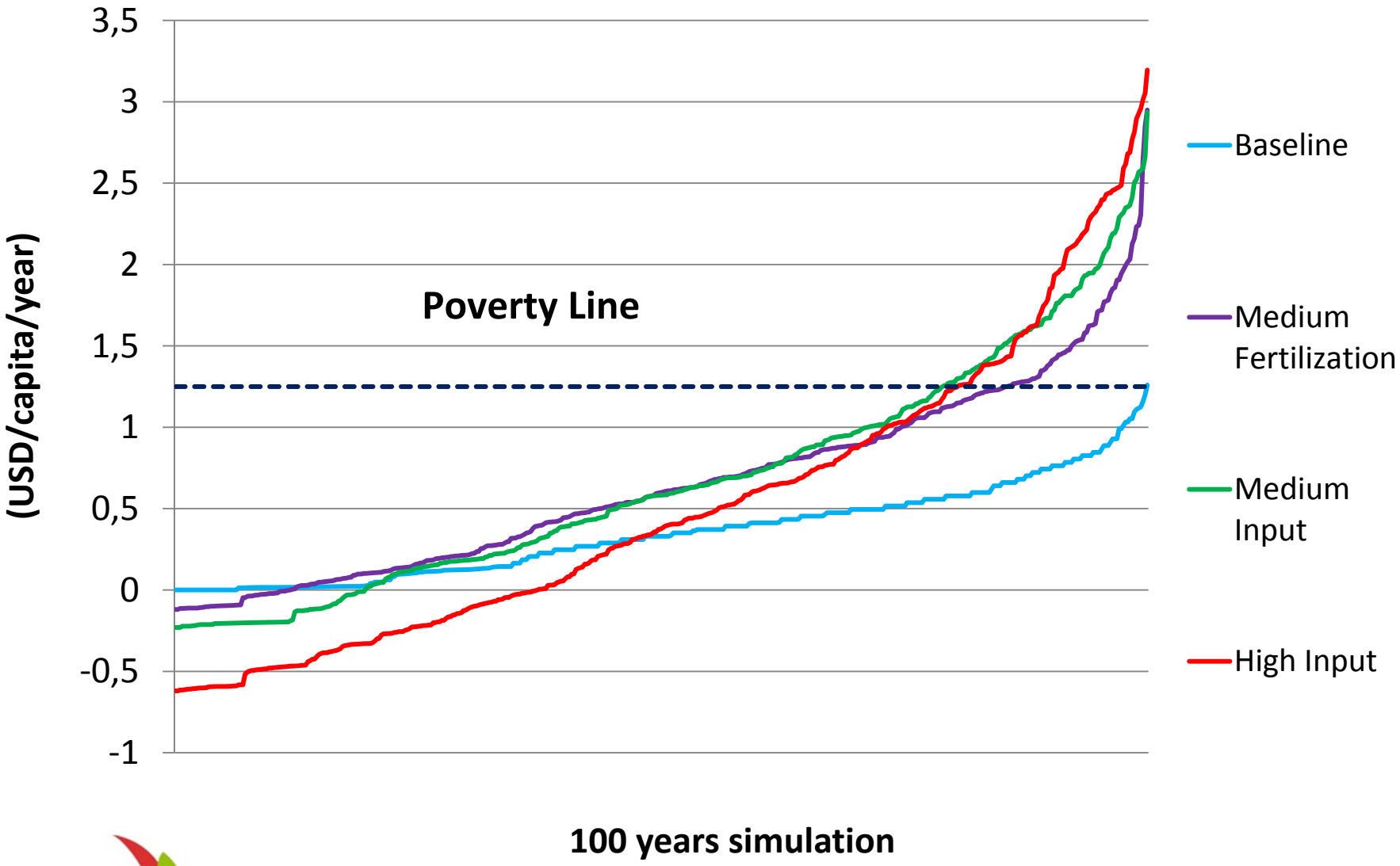
Average household income and costs



CLIM

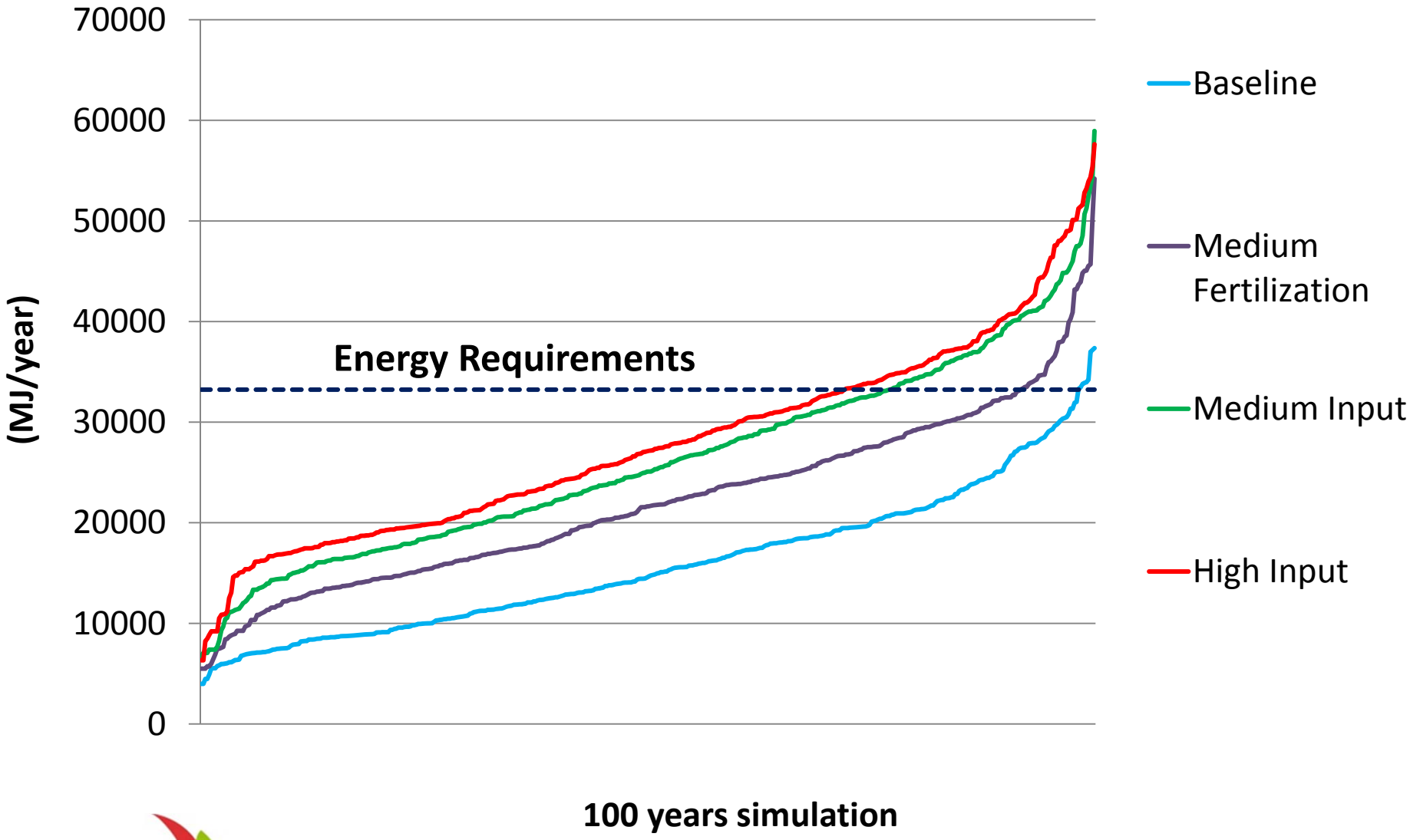
Agriculture 2015

Distribution of household income



CLIMATE-SMART Agriculture 2015

Distribution of household energy production



CLIMATE-SMART Agriculture 2015

Conclusions

- Integration of **multiple approaches and interventions** to enhance crop-livestock productivity and overall household resilience.
- Different households have **different levels of intrinsic resilience**, hence their performance varies under the simulated intervention packages.
- There is **no silver bullet** approach particularly in the face of increasing **climate variability and climate change**.

CLIMATE-SMART Agriculture 2015

Thank you

CSIRO

CGIAR

RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

CLIMATE-SMART Agriculture 2015

Photo Credits: CCAFS