

CLIMATE-SMART
Agriculture
20**15**



Global Science Conference

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Le Corum, Montpellier France

Modeling livestock production under climate constraints in the African drylands to identify interventions for adaptation

Mottet, A., Msangi, S., Conchedda, G., Ham, F., Lesnoff, M. Fillol, E., Ickovicz, A. Cervigni, R., de Haan, C. & Gerber, P.

FAO, World Bank, IFPRI, CIRAD, Action Contre la Faim

ILRI
INTERNATIONAL
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 **cirad**

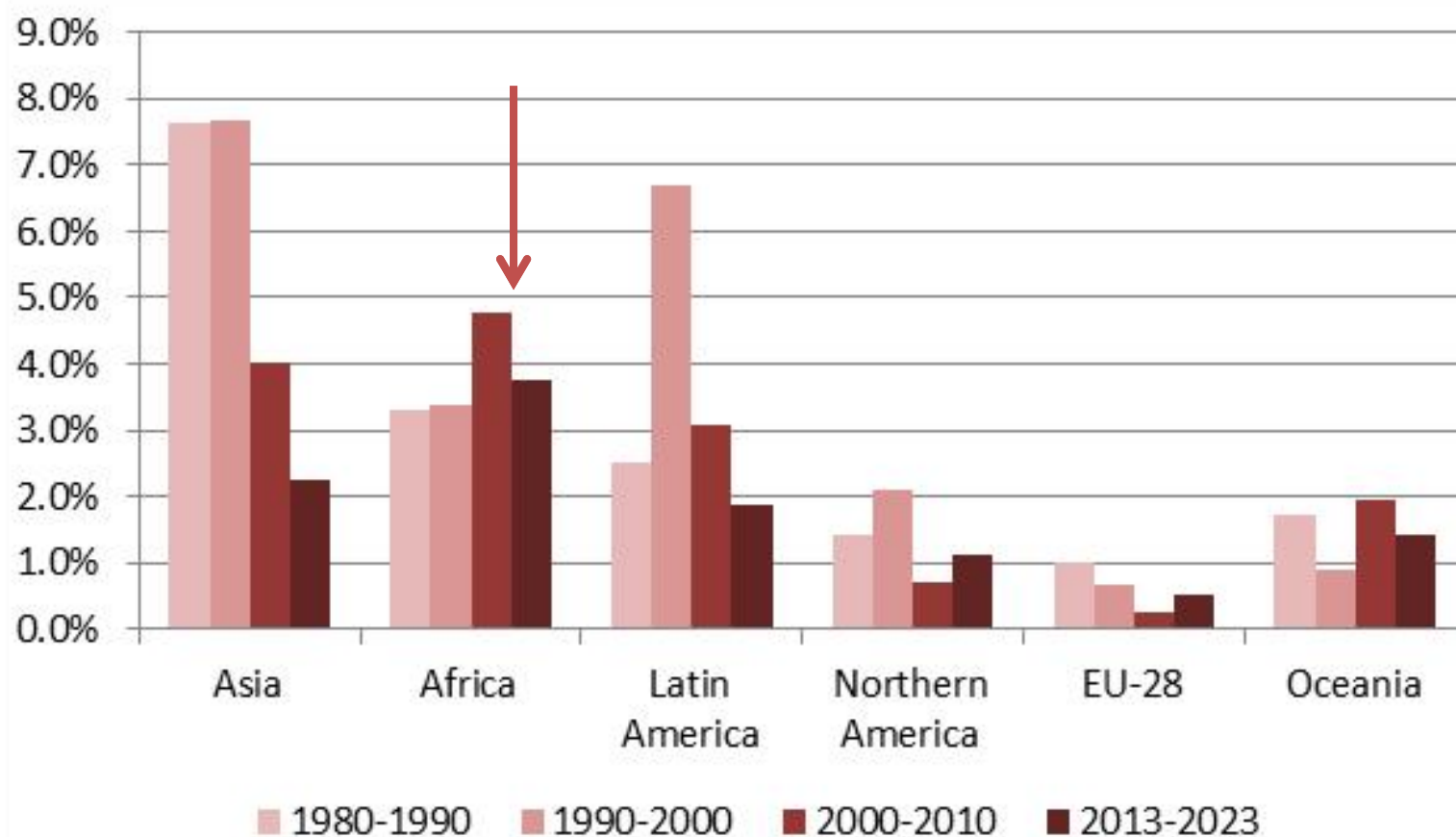


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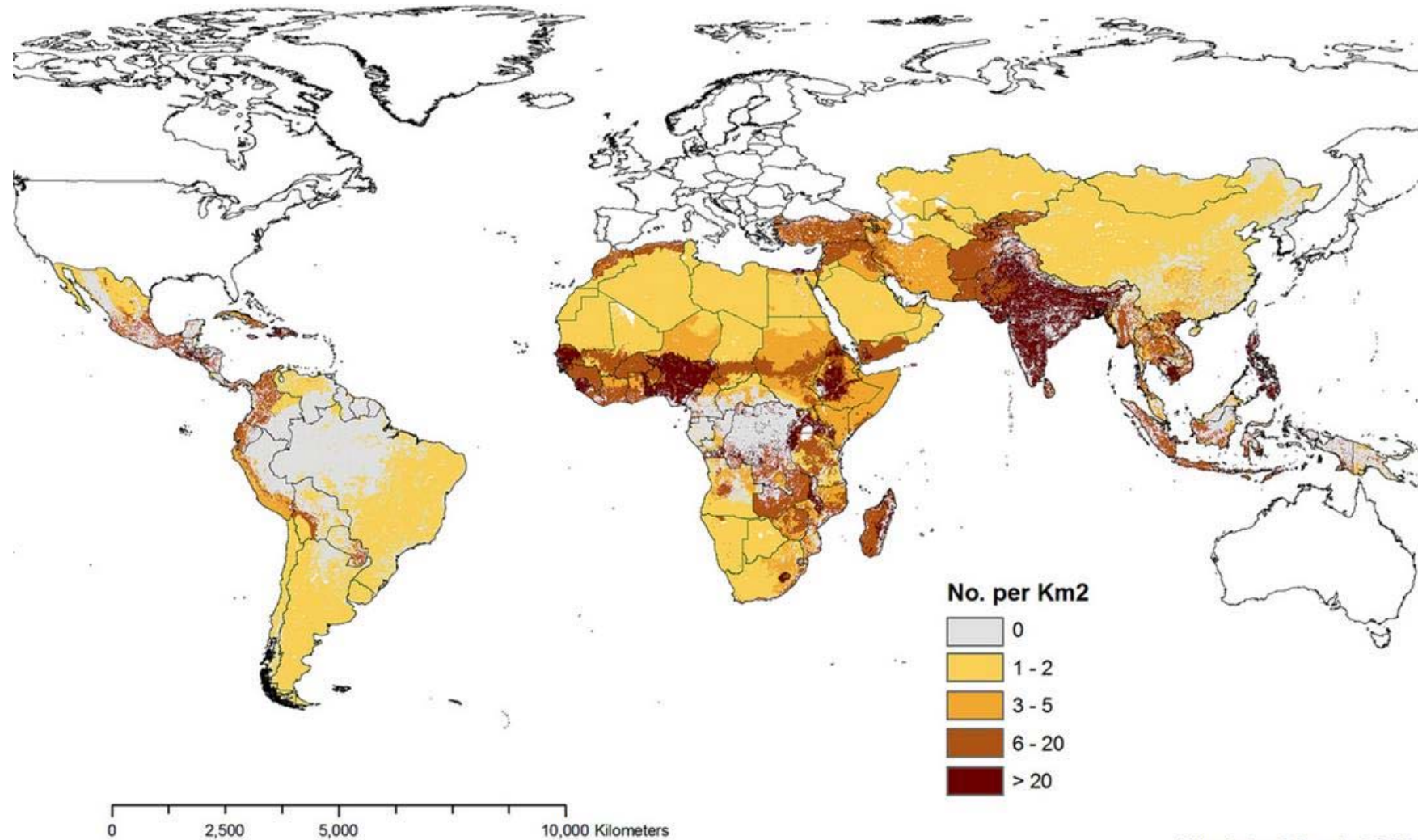
Montpellier

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Annual meat consumption growth rate



Density of poor livestock keepers

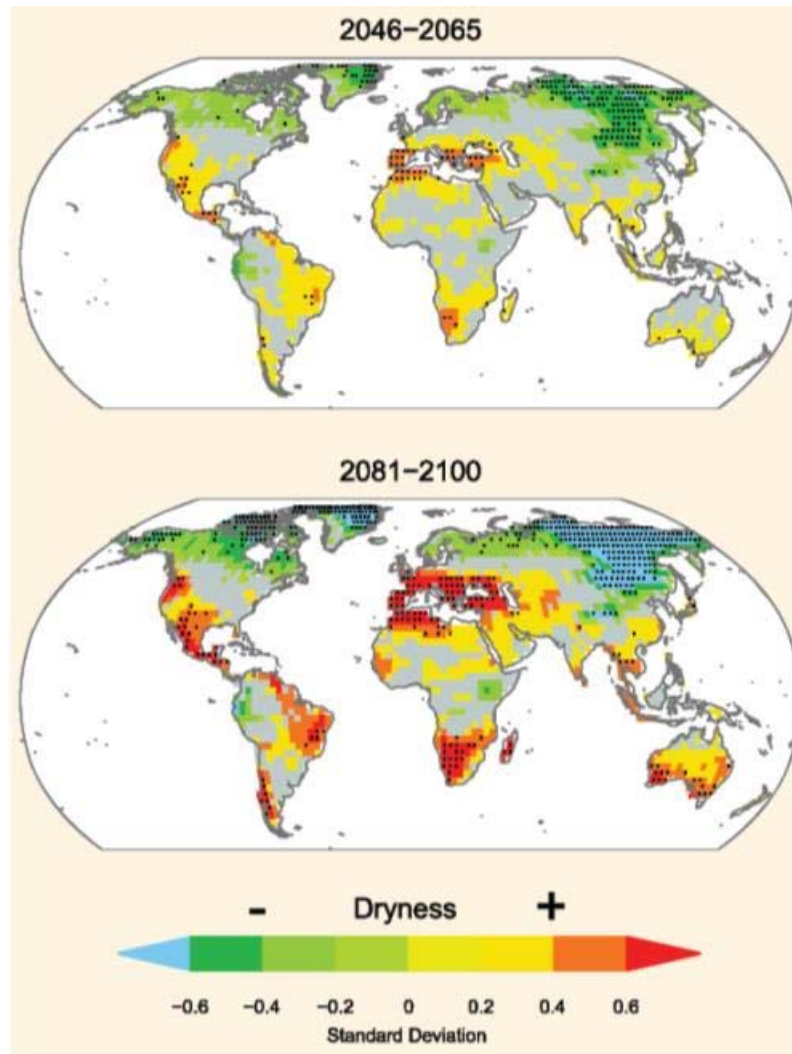


*Update: March 2012

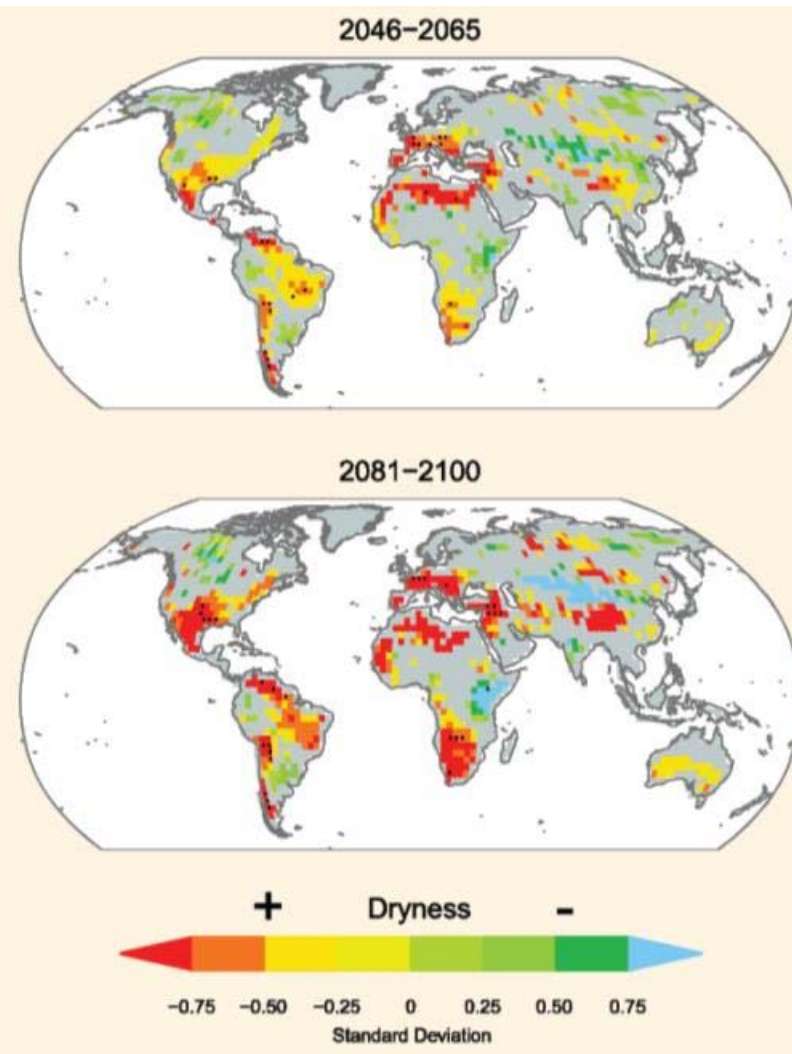
Source: ILRI

Extreme drought events in the future

Consecutive dry days



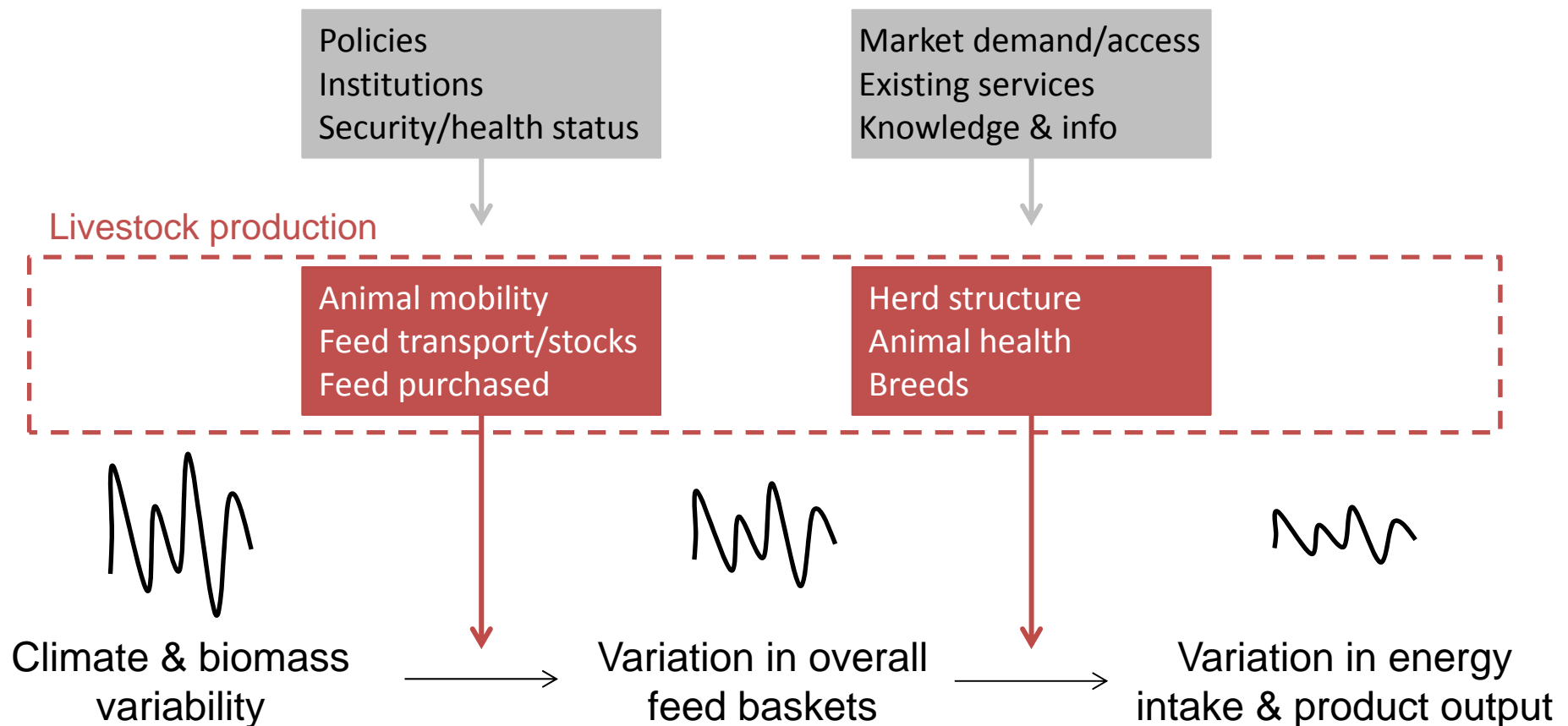
Low soil moisture



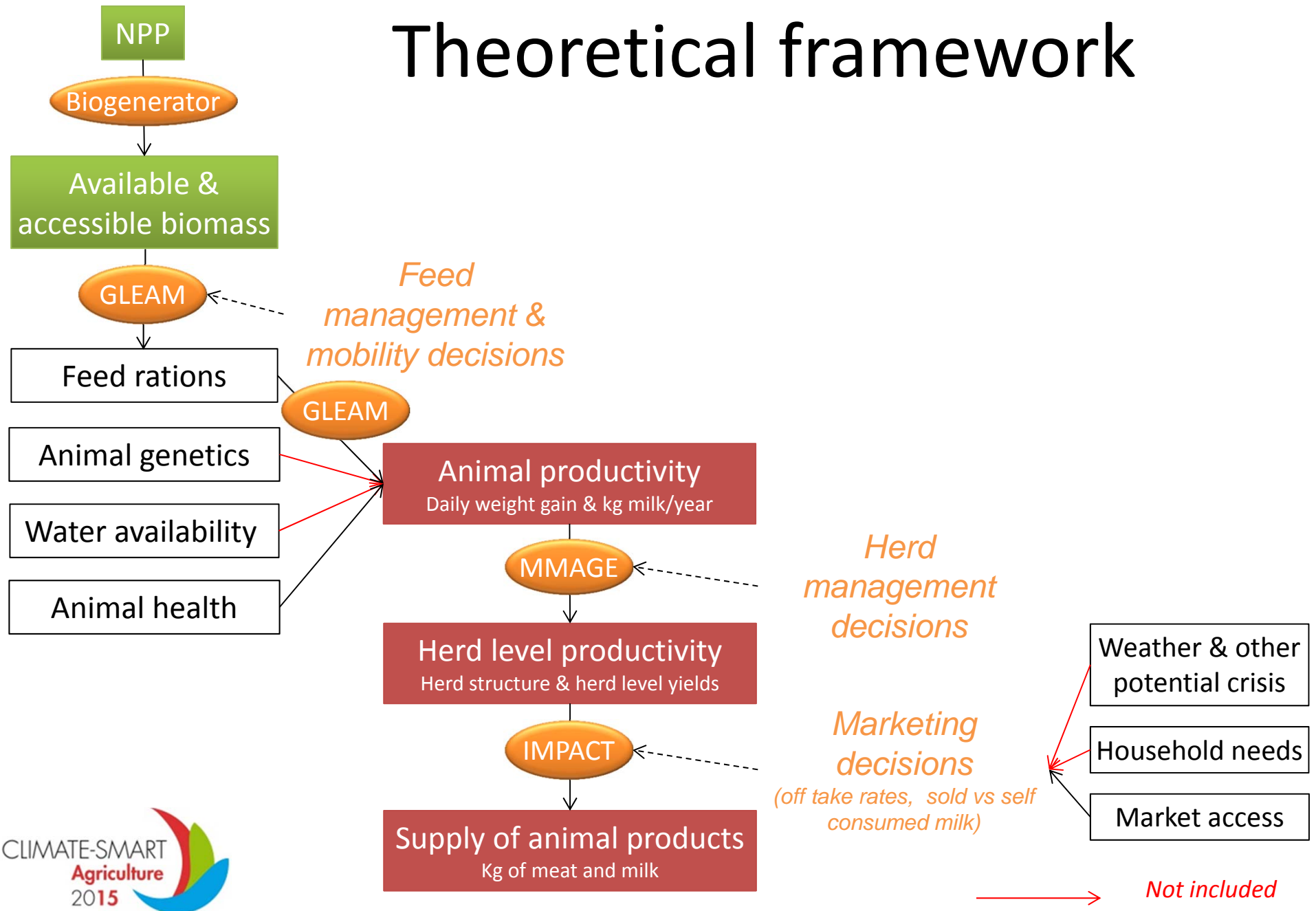
Assessing livestock productivity under climate constraints

- Livestock, a “natural adapter” ?
- Early warning systems (e.g. East Africa)
- But lack of information and data to guide interventions to move from emergency to policies building resilience
- Limited impact assessments (IPCC WG2) and no framework integrating biophysical data and management options
- Lack of integrative analysis of mitigation adaptation and food security

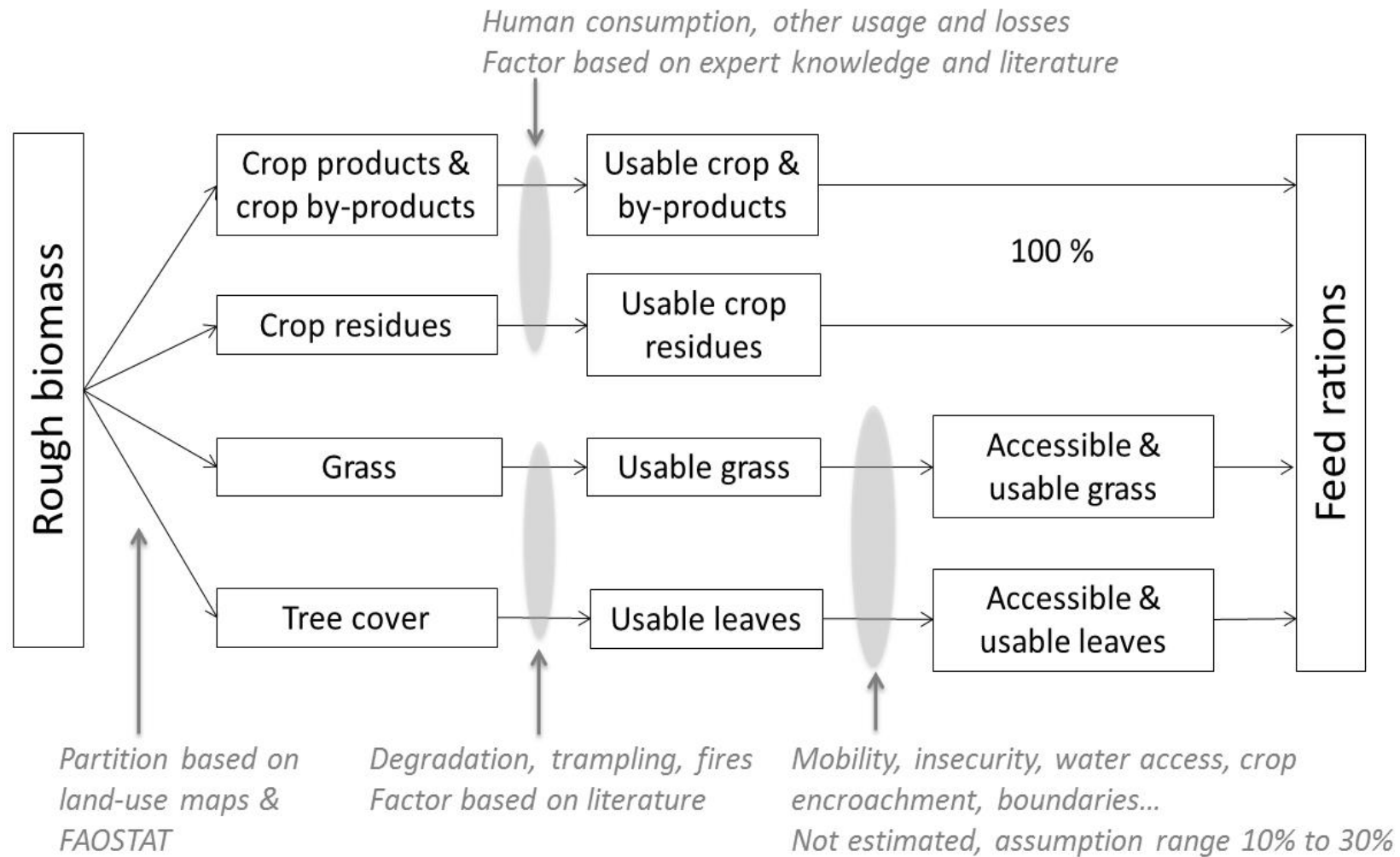
Attenuation of the effect of climate variability on herd performances



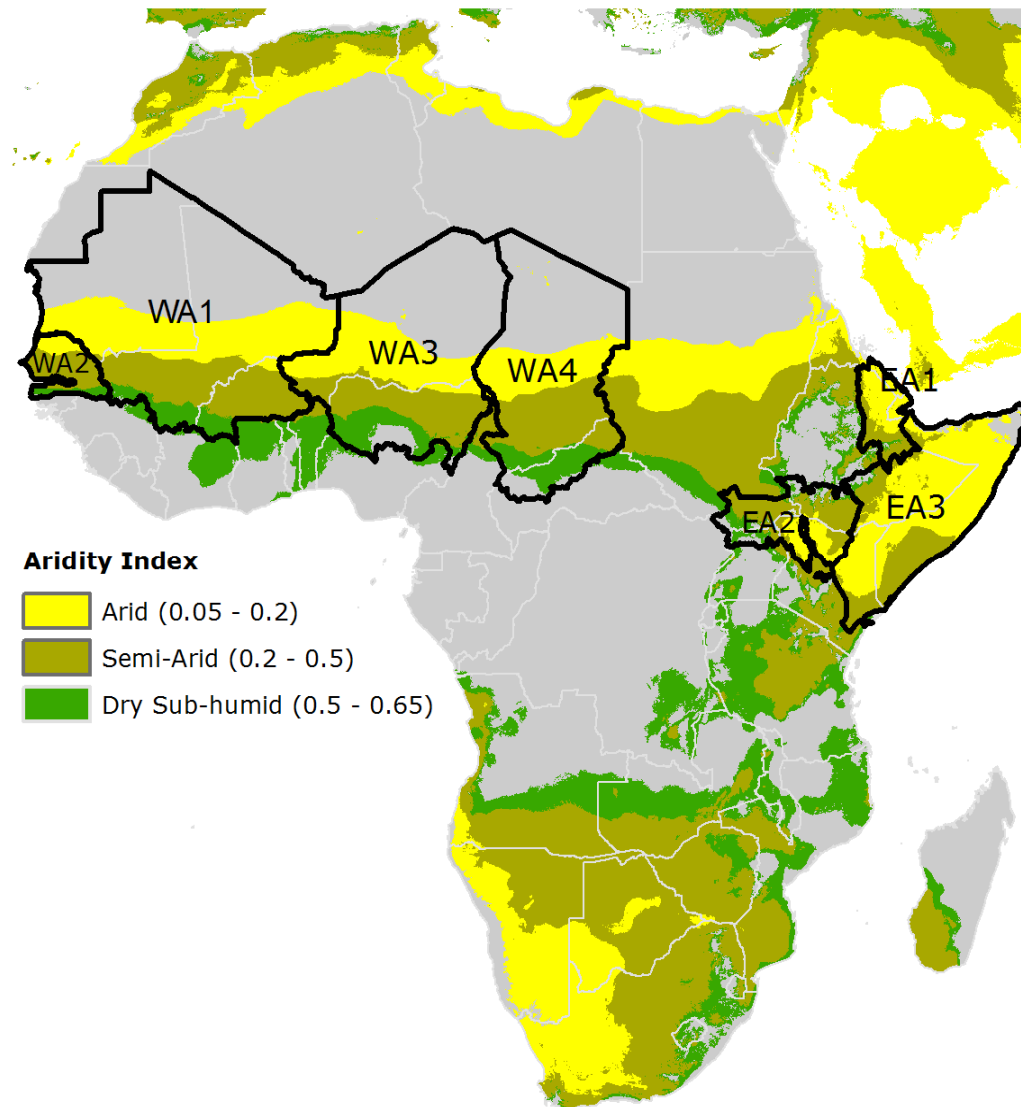
Theoretical framework



From biomass to feed



Animal mobility & spatial unit



Scenarios

Climatic patterns

X

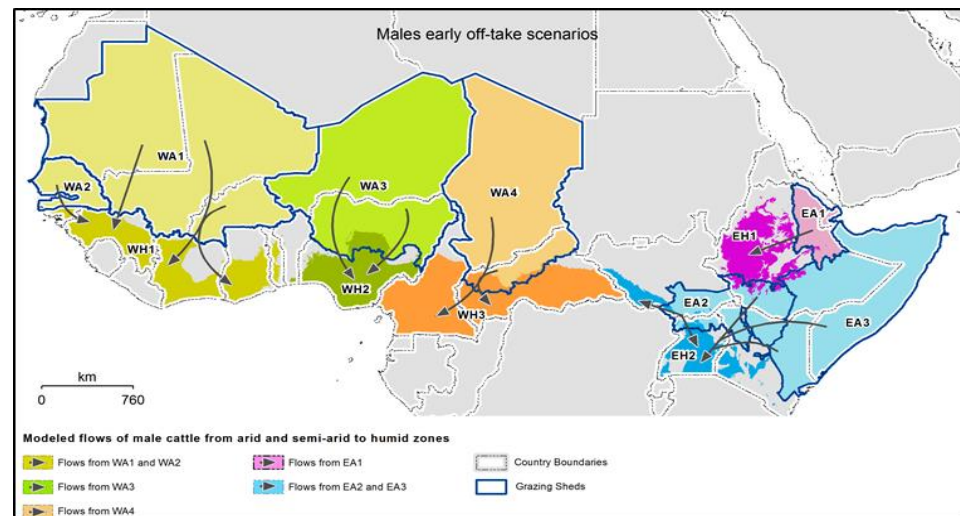
Management interventions

- *Stable Climate*
- *Mild drought*
- *Severe drought*

- *Health*
- *Early offtake of bulls*

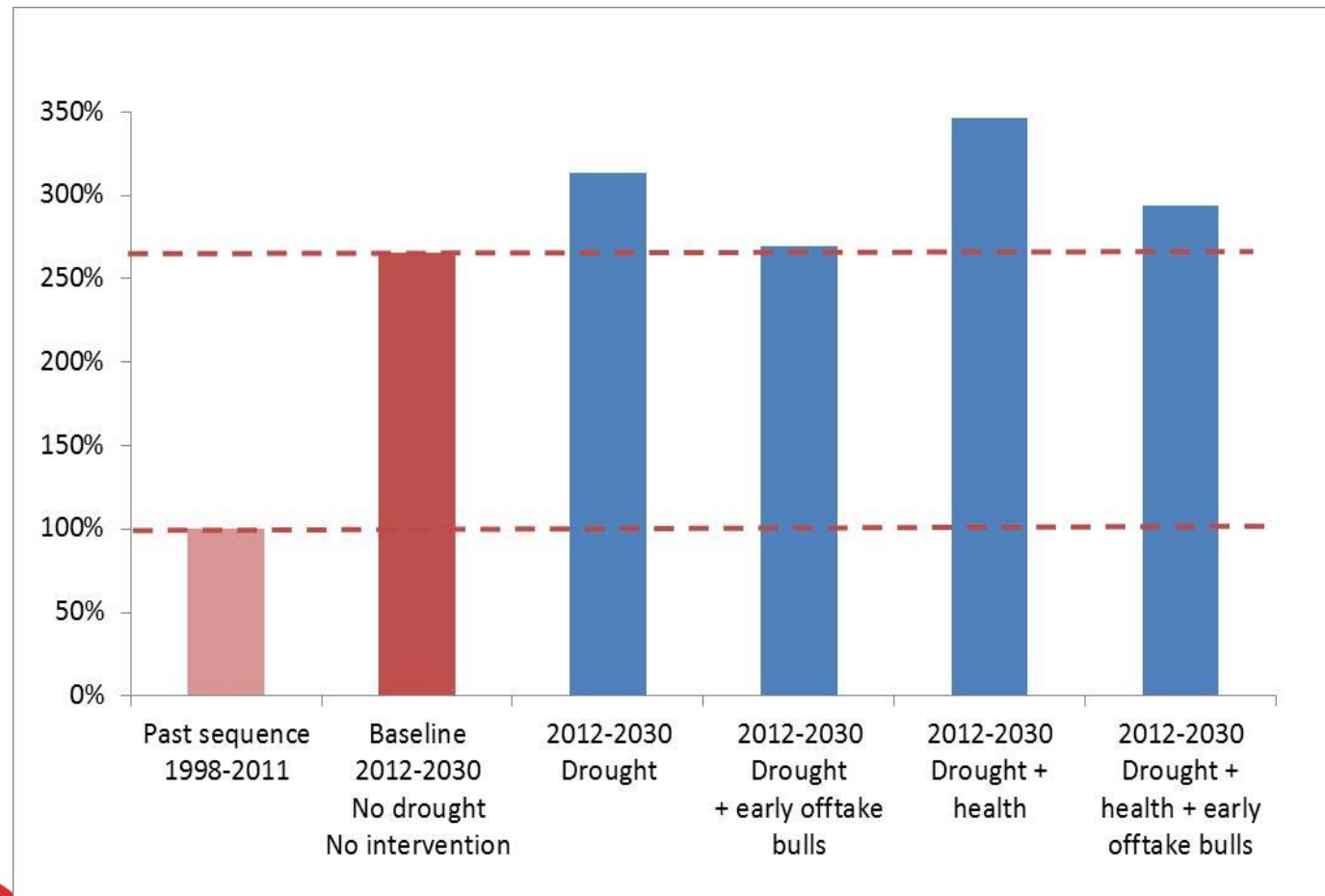
Mild drought: 10 years of mild drought, 3 years of average rainfall and 7 years of good rainfall

Severe drought: 3 years of severe drought, 7 years of mild drought, 3 years of average rainfall and 7 years of good rainfall



Feed deficit index

Annual average of the balance between usable biomass and animal requirements, using the sequence 1998-2011 as baseline (= 100) assuming full animal and feed mobility within grazing sheds



Absolute feed balances

Balances between biomass and animal requirements, assuming full mobility
and 10% and 30% accessibility to natural vegetation

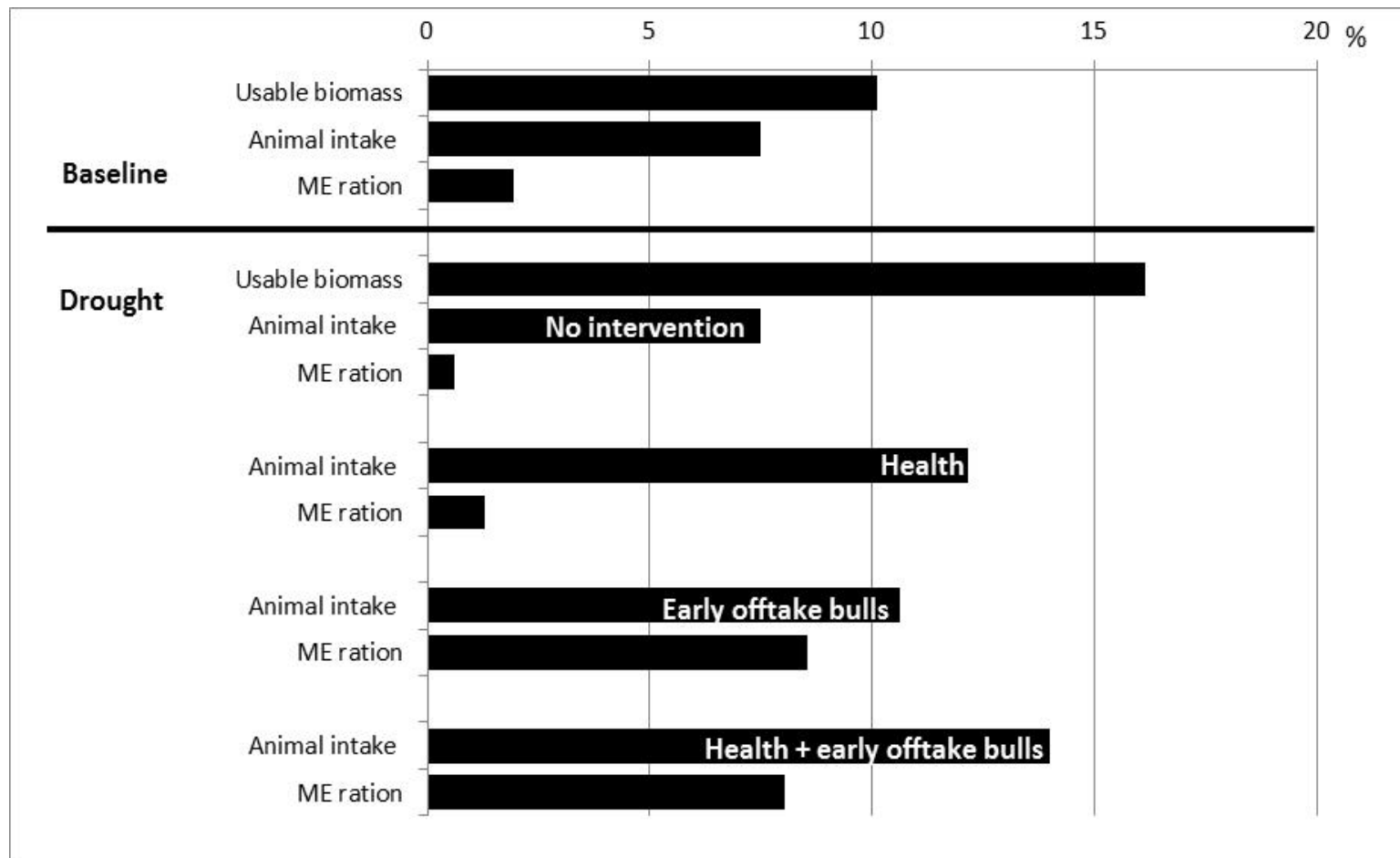
	Crops + by products	Crop residues	Natural vegetation (accessibility)		
			10%	30%	100%
Past reference	100%	100%	95%	75%	5%
Baseline	46%	100%	106%	86%	11%
Drought	56%	100%	109%	89%	13%
Drought + early offtake bulls	39%	100%	108%	88%	10%
Drought + Health	62%	100%	111%	91%	15%
Drought + Health + early offtake bulls	39%	100%	109%	89%	12%
Mild Drought	61%	100%	109%	89%	13%
Mild Drought + Health intervention	68%	100%	111%	91%	16%

Summary of average annual outputs for the different intervention scenarios compared to baseline

Scenarios	Animal output	DM requirement drylands	Extra DM requirements humid areas	Red meat production drylands	Red meat production incl. fattened bulls
Baseline	37 million TLU	428 million t	-	4.4 million tcw	4.4 million tcw
Drought	-14%	-26%	-	-14%	-14%
Drought + health	1% -26%	-4%	-	1%	1%
Drought + male	+7.7 million TLU -12%	-27%	6.8 million t	-26%	5%
Drought + health + bulls	+9.3 million TLU	-21%	7.1 million t	-12%	20%
Mild drought	-8%	-4%	-	-8%	-8%
Mild drought + health	7%	3%	-	7%	7%

Inter-annual relative variability

Relative standard variation of usable biomass, animal intake and metabolisable energy (ME) in the baseline and the drought scenarios with different levels of interventions.



Methods and data caveats

Area of knowledge	Caveat	In this study
Livestock technical performance data	Scarce and short term, little information of climate impact on individual performances High sensitivity of results	Extensive literature review and expert consultation during workshop
Natural vegetation accessibility for animal feed	Inexistent Nor is info on water points	Range of 10% to 30% accessibility assumed
Animal mobility	Partial knowledge, lack of regional assessments	Definition of the 'grazing shed', as a spatial unit self-contained in terms of animal mobility
Characterization of feed resources and their quality	Scarce information	Literature review and expert consultation during workshop
Livestock numbers official statistics	Inaccurate for pastoral systems	Relied on FAOSTAT data

Discussion & conclusion

- Baseline: 2.5 times more available resources, but not necessarily accessible. In some scenarios, this may go up to 3.5 times
- But potential for sector's growth is feed resources made accessible
- Calls for interventions in animal mobility (corridors, security, border regulations, health, tenure), feed management (storage, processing, transport) and stratification to reduce pressure in arid areas
- Rangelands: accessibility very low in some areas (Chad), not so low in other (Ferlo). Open new areas to livestock, without degrading the environment?
- Potential yes but with much less people (livelihood threshold analysis)
- Animal health interventions: to be coupled with interventions to increase access to feed. Otherwise full benefits not achieved + conflicts over resources increase
- Bulls early offtake: clear potential but practical obstacles (market access, infrastructure) & human factor (reluctance to sell, even if offered a higher price). On the ground experience and good practices (Morocco)?