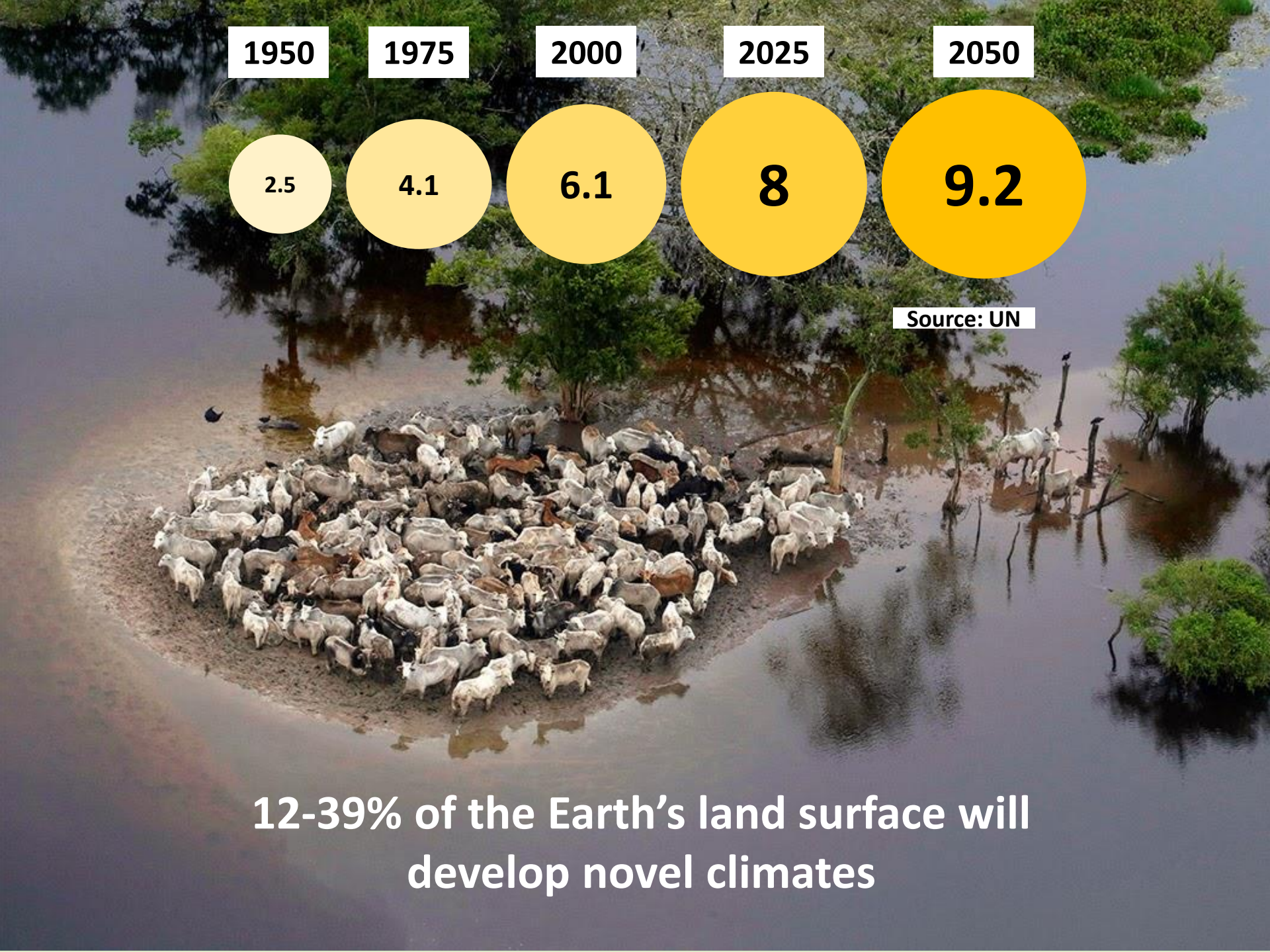
Modelling European Agriculture with Climate Change for Food Security

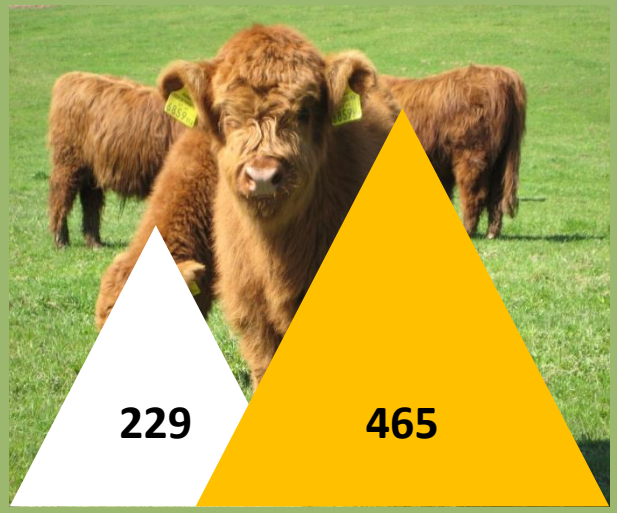
MACSUR

LiveM Highlights and outlook

Nigel Scollan, André Bannink, Richard Kipling,
Eli Saetnan, Jantine van Middelkoop



12-39% of the Earth's land surface will develop novel climates



Increase in meat production (million tonnes) from 2000 to 2050

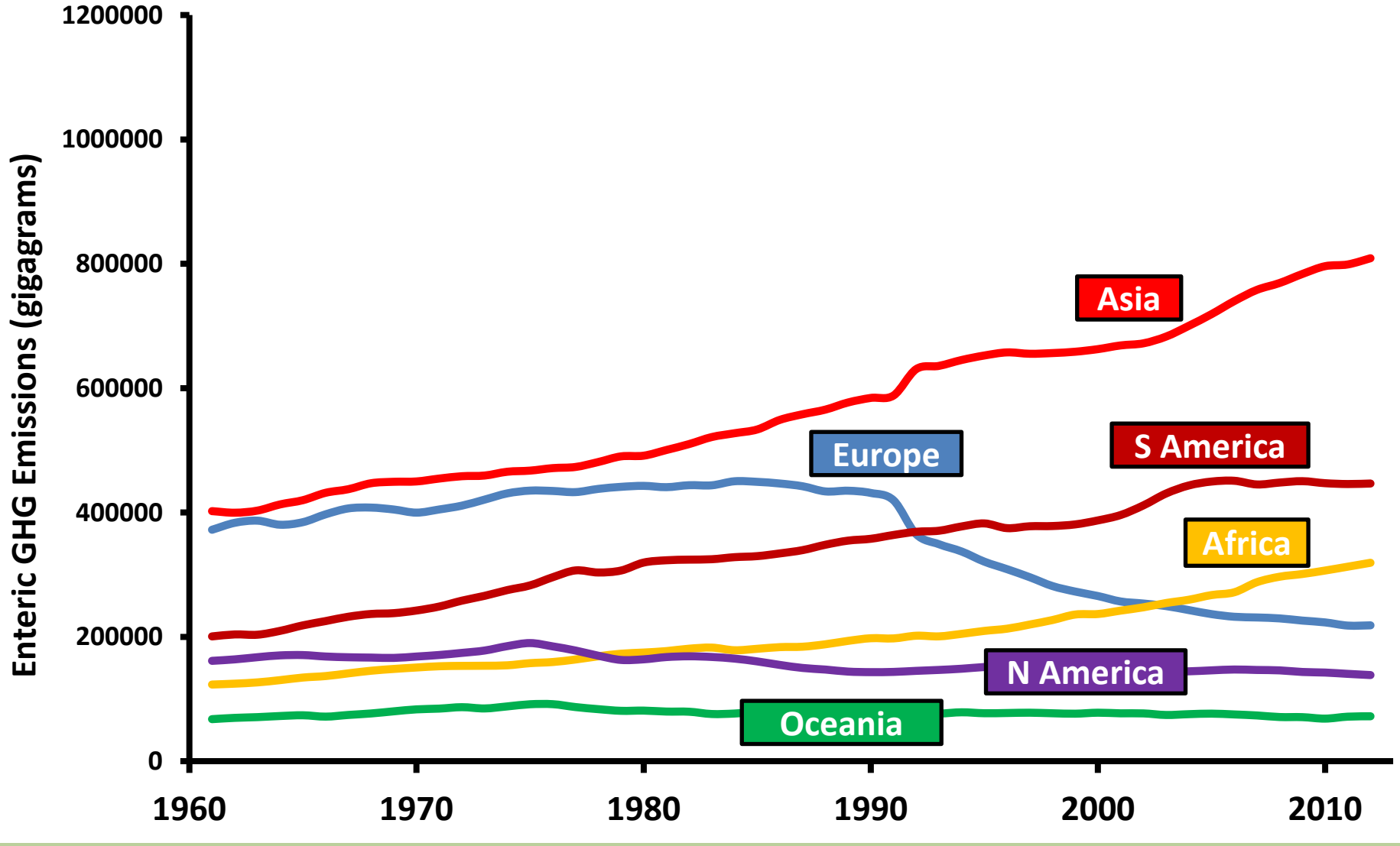
Land Surface

26 %

x19 to x48

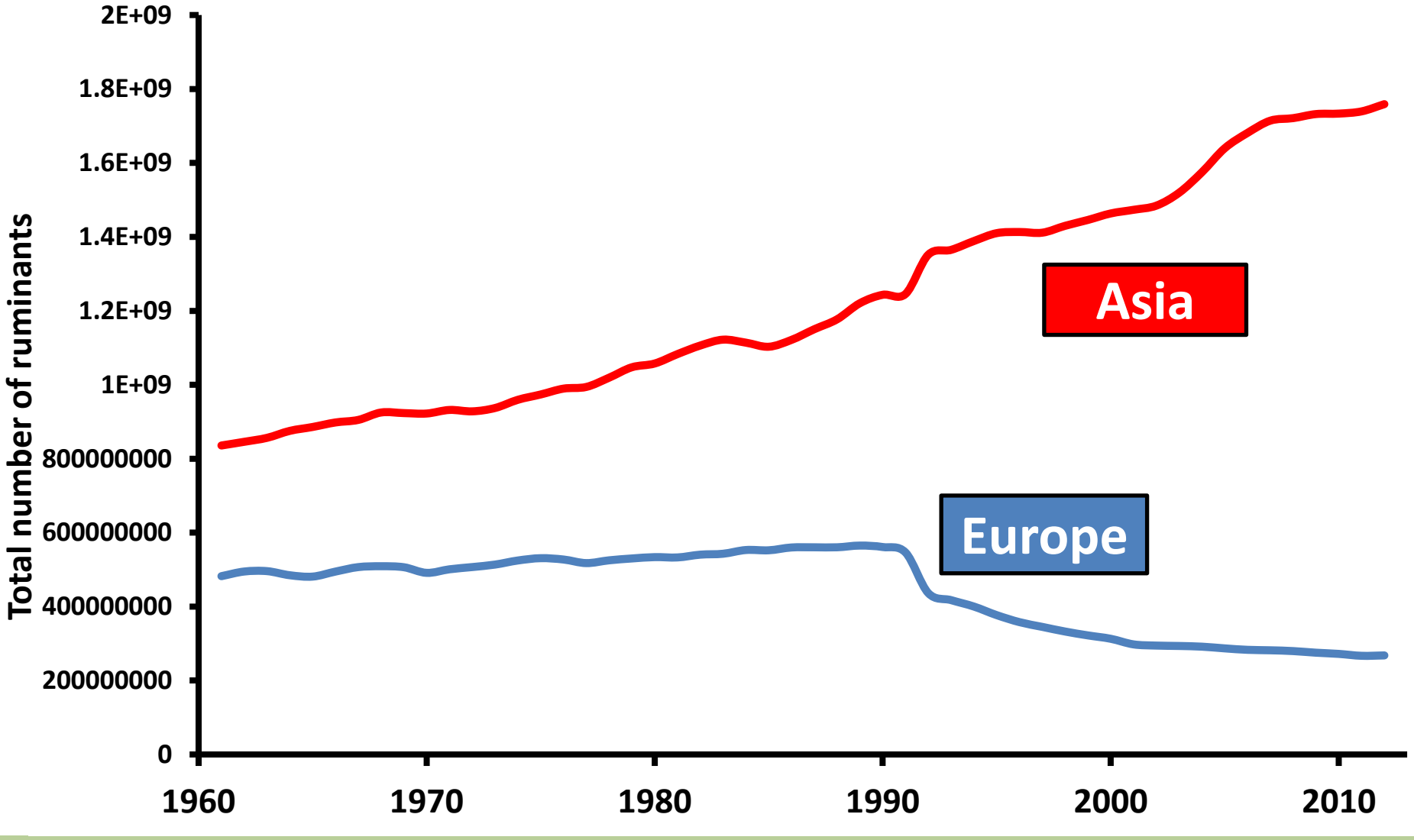
x3 to x10

Progress in mitigation of enteric GHG emissions



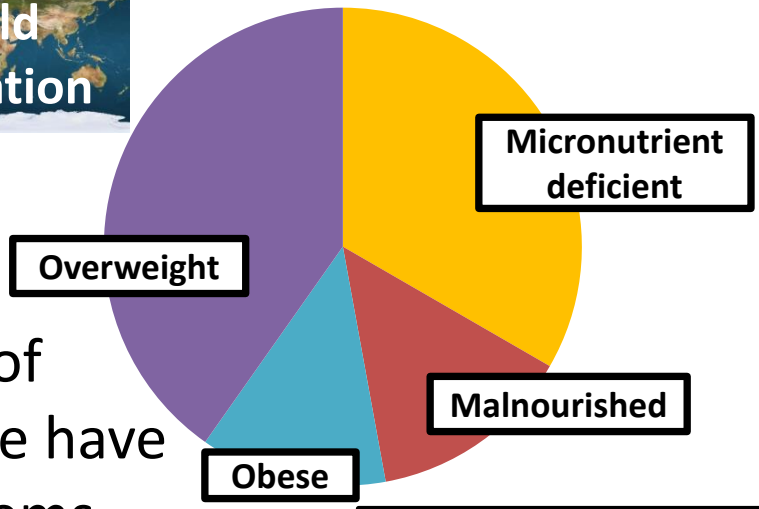
(FAOSTAT 2015)

Progress in mitigation of enteric GHG emissions

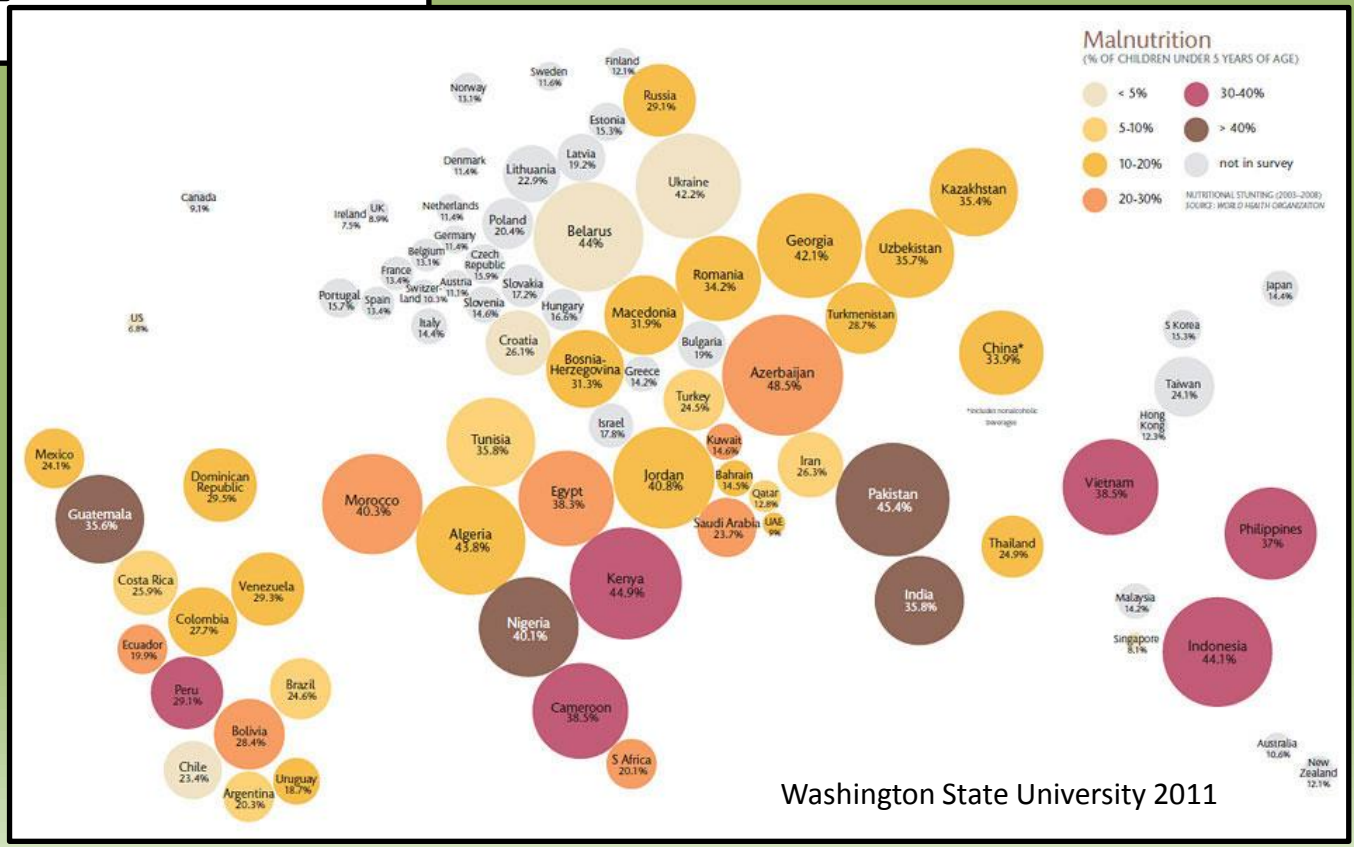


(FAOSTAT 2015)

The Nutrition Challenge



87 % of people have problems



ATF Priorities for livestock systems

Healthy Livestock and People

Animal disease prevention and control

Modulation of the immune system

Vector borne diseases & European border epidemiology

Improving animal food product quality

The microbiome – One Health perspective

Robust, resilient animal production

Integrated farming performance

Feed security I: Improving biomass and nutrient utilization

On-farm animal welfare performance indicators

Feed security II: Alternative feeds

Big Data: phenotyping and precision livestock farming

Value from grasslands

Agro-Ecology based livestock production systems

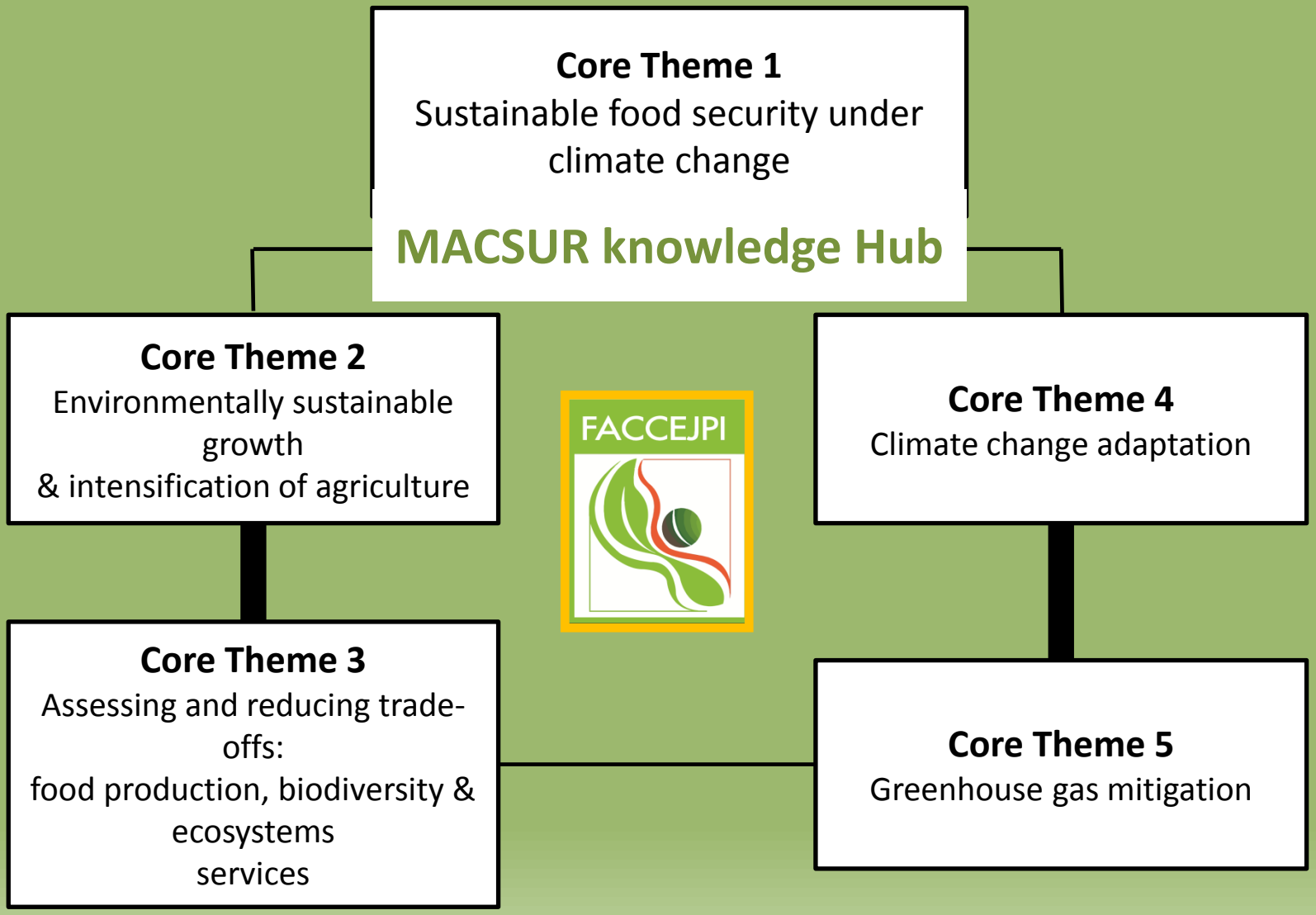
Innovation

Knowledge Exchange

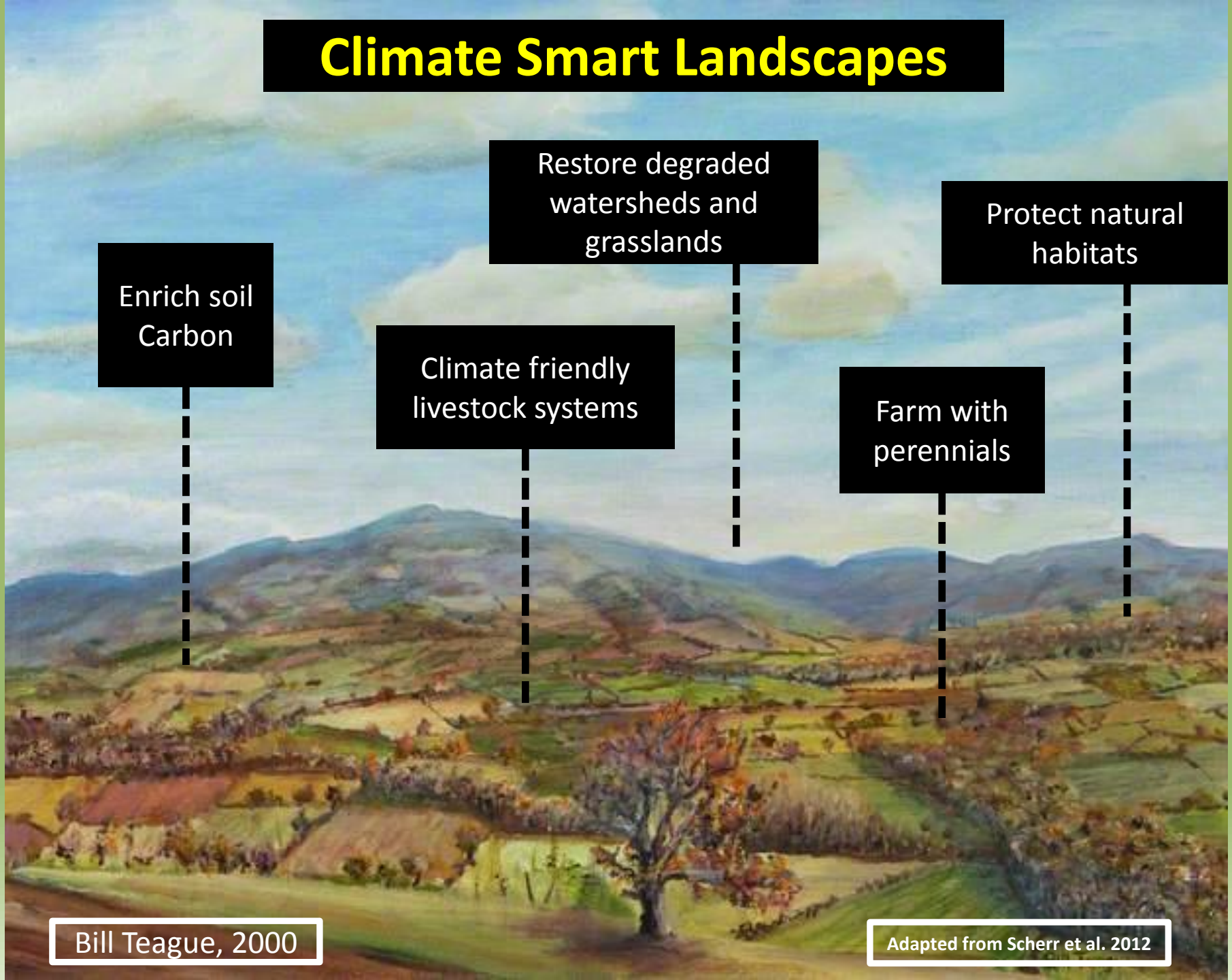
Resource Efficiency

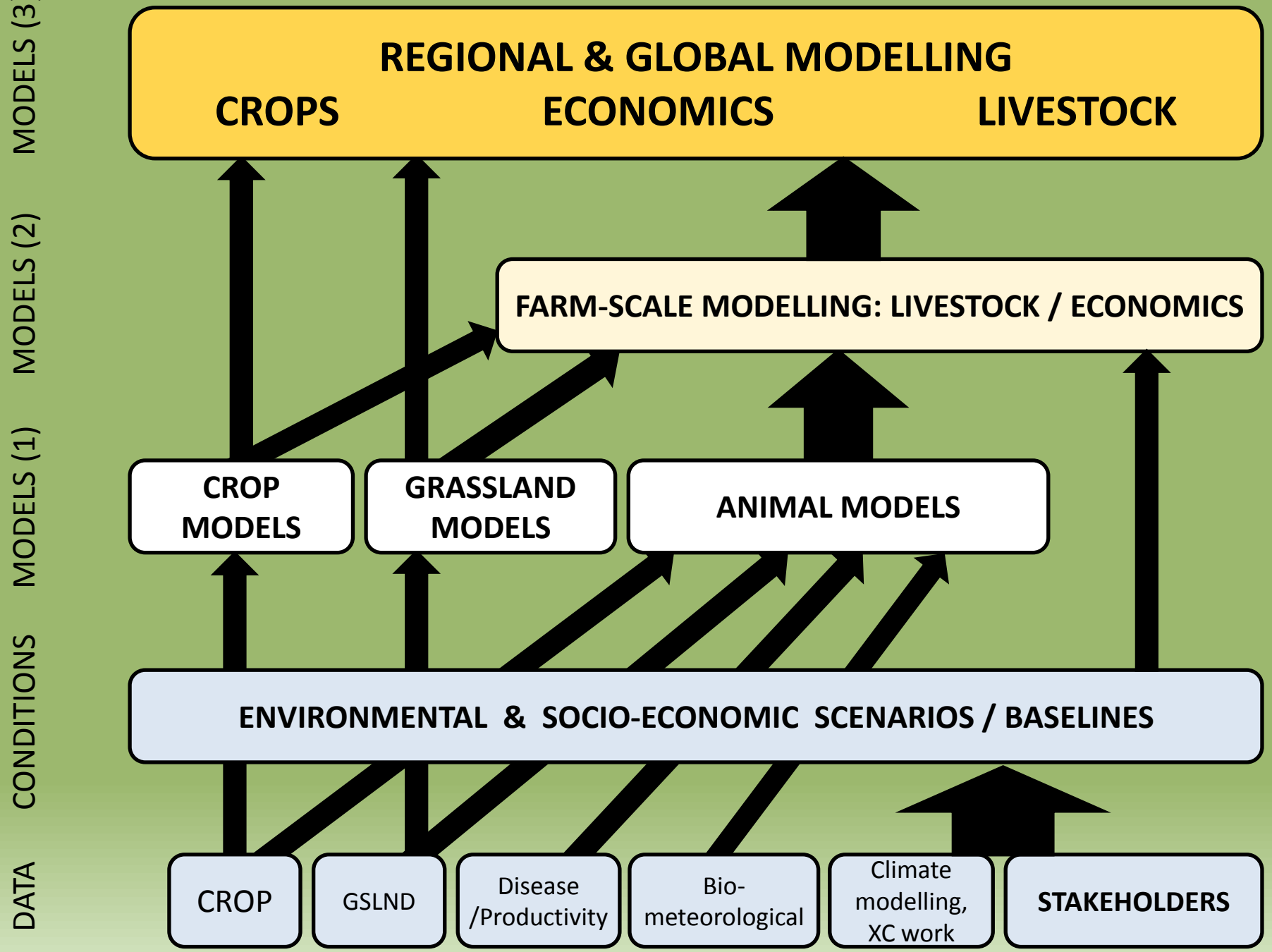
Responsible livestock farming

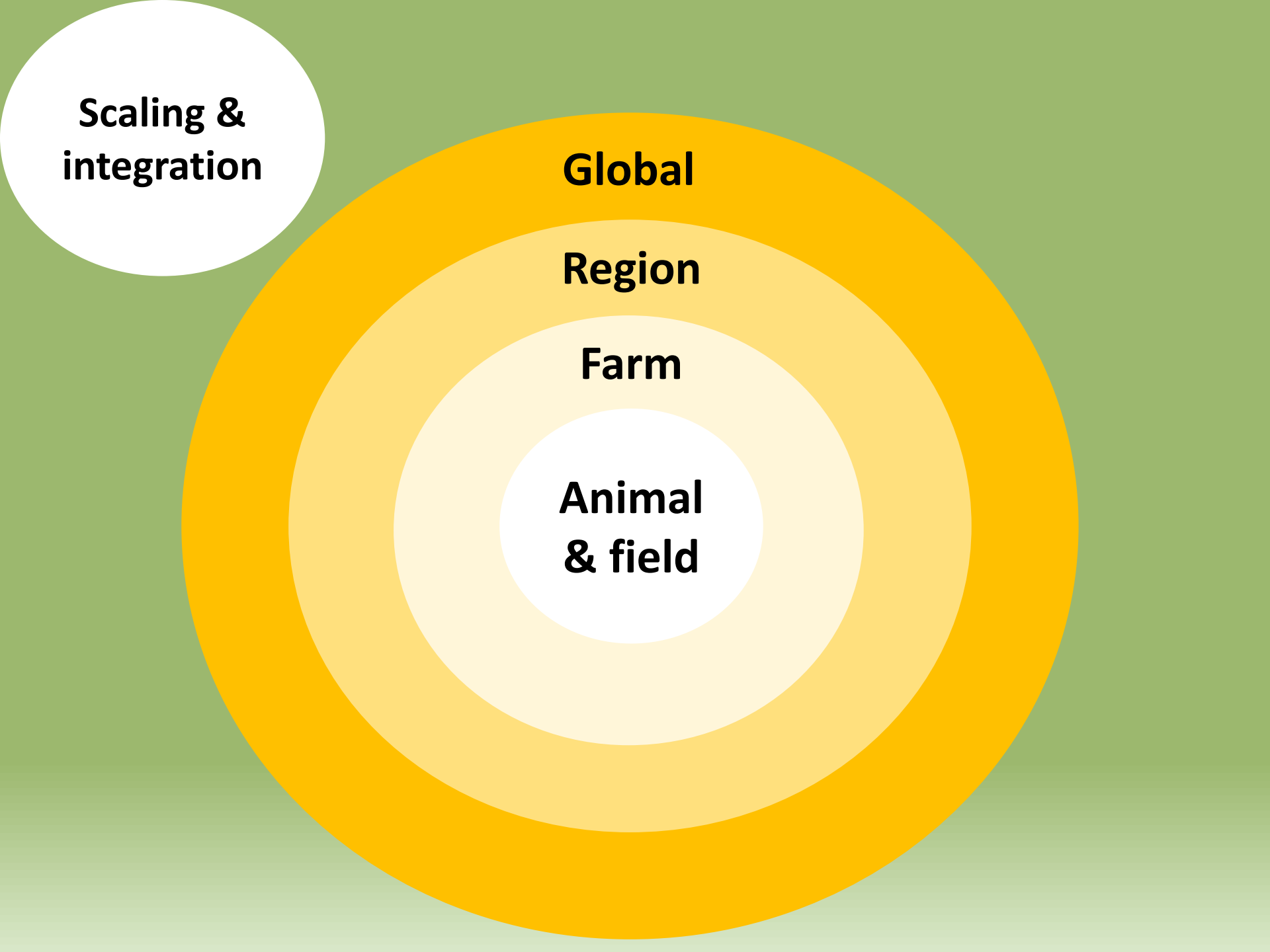
FACCE JPI Strategic Research Agenda



Climate Smart Landscapes




MODELS (3)
MODELS (2)
MODELS (1)
CONDITIONS
DATA
REGIONAL & GLOBAL MODELLING
CROPS
ECONOMICS
LIVESTOCK
FARM-SCALE MODELLING: LIVESTOCK / ECONOMICS
CROP MODELS
GRASSLAND MODELS
ANIMAL MODELS
ENVIRONMENTAL & SOCIO-ECONOMIC SCENARIOS / BASELINES
CROP
GSLND
Disease /Productivity
Bio-meteorological
Climate modelling, XC work
STAKEHOLDERS


Scaling &
integration
Global
Region
Farm
Animal
& field

Agricultural and Forest Meteorology
Volume 170, 15 March 2013, Pages 114–131
Agricultural prediction using climate model ensembles

Ensemble modelling of climate change risks and opportunities for managed grasslands in France

Anne-Isabelle Graux, Gianni Bellocchi, Romain Lardy, Jean-François Soussana

Agron. Sustain. Dev. (2015) 35:589–605
DOI 10.1007/s13593-014-0271-0

REVIEW ARTICLE

Deliberative processes for comprehensive evaluation of agroecological models. A review

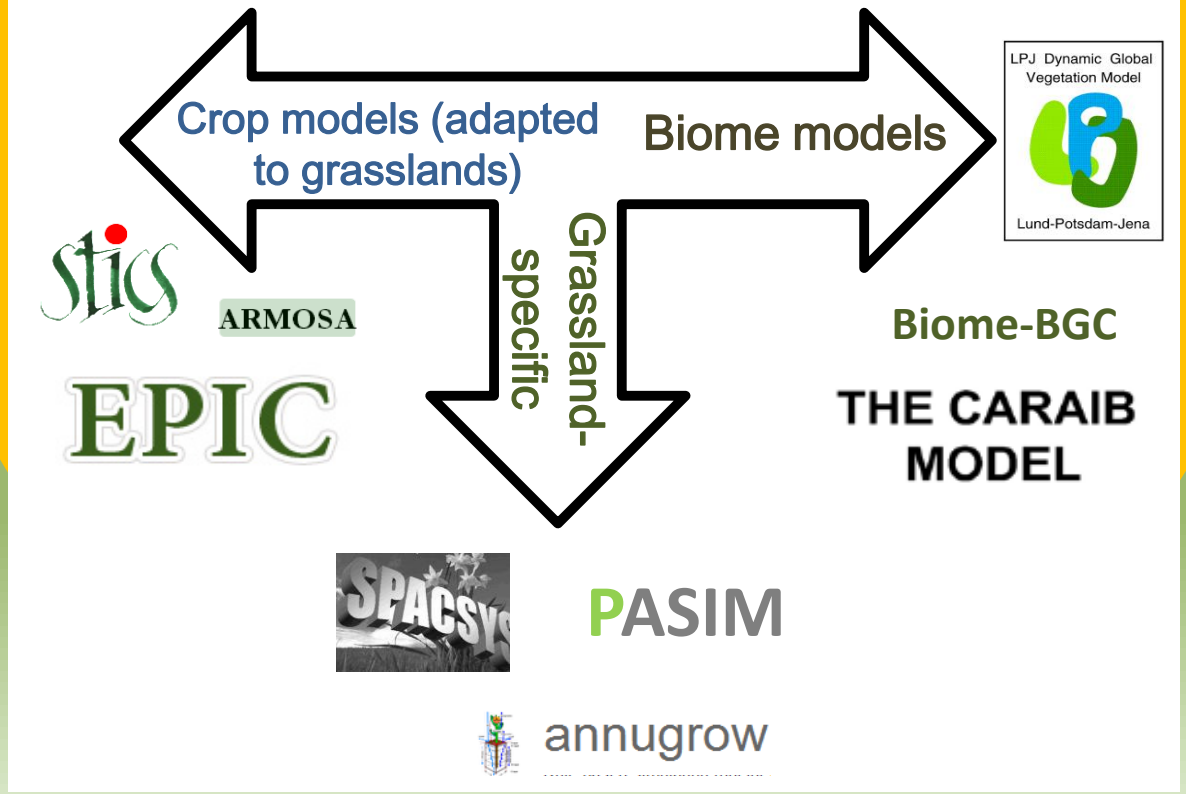
Gianni Bellocchi · Mike Rivington · Keith Matthews · Marco Acutis

Modelling the impact of environmental changes on grassland systems with SPACSYS

L. Wu[1†], A. P. Whitmore[2] and G. Bellocchi[3]

Uncertainty in simulating biomass yield and carbon–water fluxes from grasslands under climate change

R. Sándor[1], S. Ma[1], M. Acutis[2], Z. Barcza[3], H. Ben Touhami[1], L. Doro[4], D. Hidy[5], M. Köchy[6], E. Lellei-Kovács[7], J. Minet[8], A. Perego[2], S. Rolinski[9], F. Ruget[10], G. Seddaiu[4], L. Wu[11] and G. Bellocchi[1†]



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et[10], G. Seddaiu[4], L. Wu[11] and

Key Points

Model evaluation and inter-comparison exercises completed, increasing capacity

Approach developed to ensure stakeholder role in evaluation

Collaborations within and beyond MACSUR

THE Pirbright INSTITUTE

Preventing and controlling viral diseases

« Network project: MACSUR

LiveM disease workshop

Workshop: Modelling interactions between climate and livestock pathogen transmission

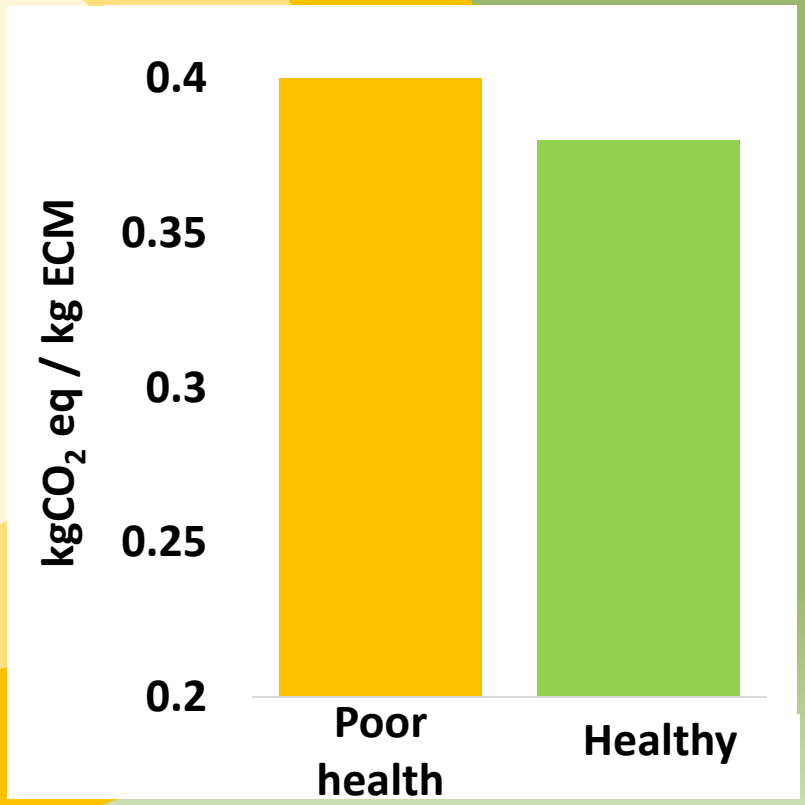
22nd January 2014, 10am-5pm

Modelling Parasite Transmission in a Grazing System: The Importance of Host Behaviour and Immunity

Naomi J. Fox, Glenn Marion , Ross S. Davidson, Piran C. L. White, Michael R. Hutchings

Impact of animal health on greenhouse gas emissions

Ş. Özkan[1,2†], B. V. Ahmadi[3], H. Bonesmo[4], O. Østerås[5], A. Stott[3] and O. M. Harstad[1]



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…nhouse gas emissions

…erås[5], A. Stott[3] and O. M. Harstad[1]

Key Points

Improving health and welfare is an important adaptation and mitigation strategy

Developing process based modelling, responsive to adaptation

Links to climate and land use change modelling are essential

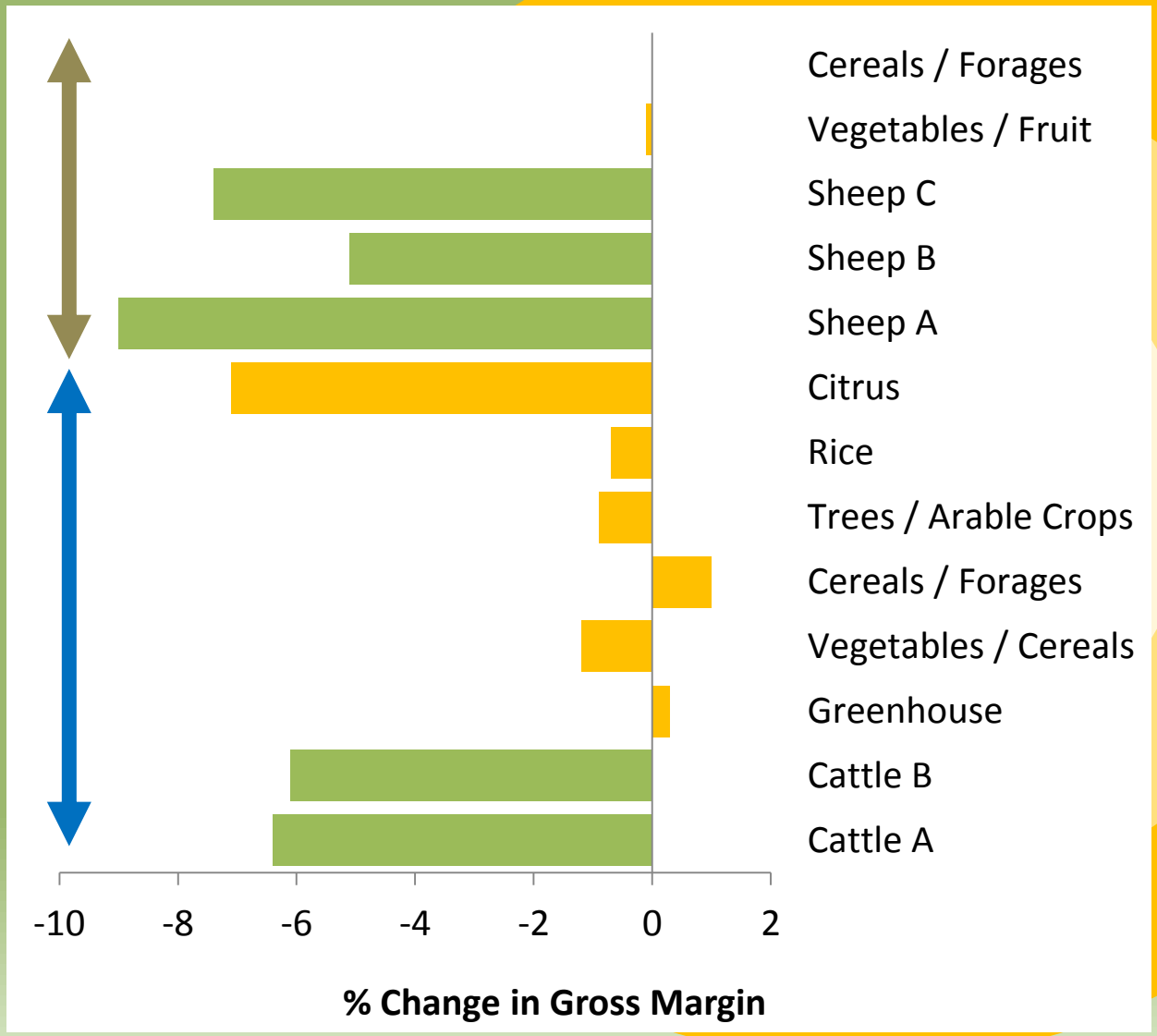
Seasonal variations in the composition of Holstein cow's milk and temperature–humidity index relationship

L. Bertocchi[1], A. Vitali[2], N. Lacetera[2], A. Nardone[2], G. Varisco[1] and U. Bernabucci[2†]

J. Dairy Sci. 97:471–486
http://dx.doi.org/10.3168/jds.2013-6611

The effects of heat stress in Italian Holstein dairy cattle

U. Bernabucci,* S. Biffani,† L. Buggiotti,* A. Vitali,* N. Lacetera,* and A. Nardone*[1]



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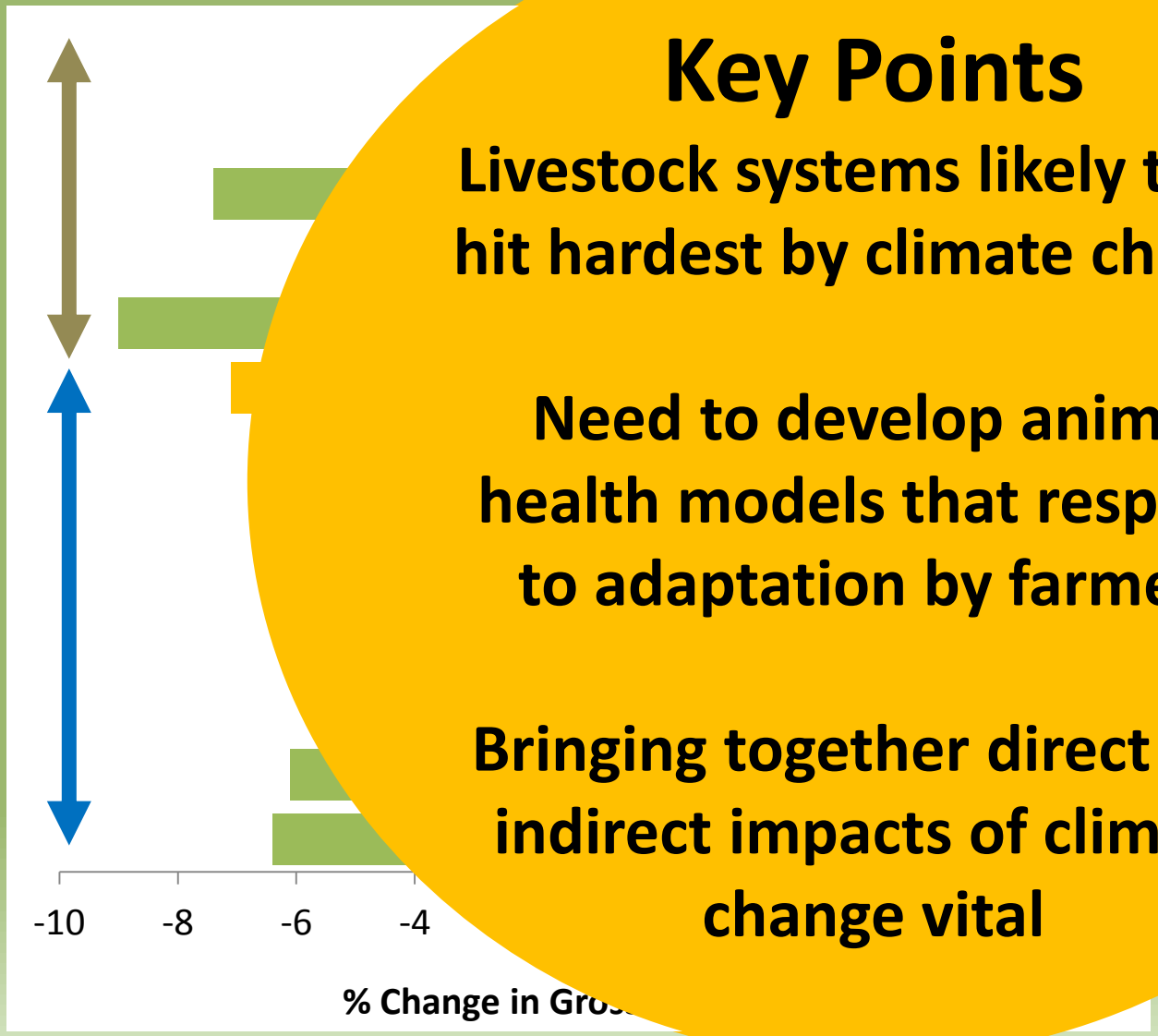


Key Points

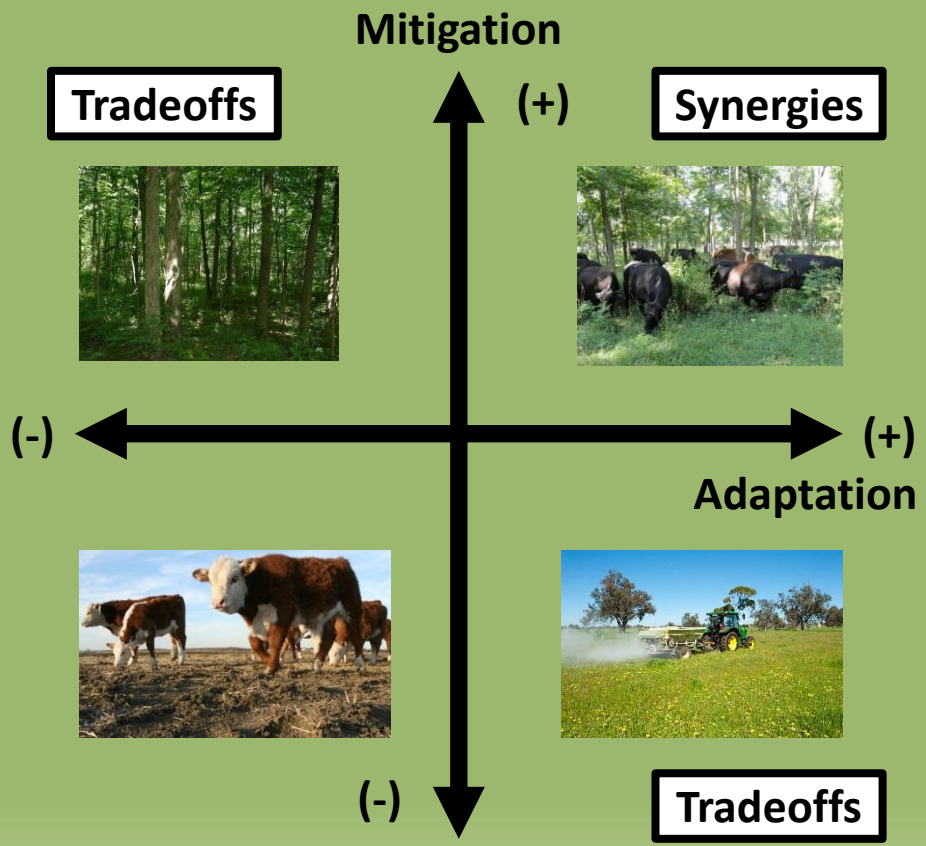
Livestock systems likely to be hit hardest by climate change

Need to develop animal health models that respond to adaptation by farmers

Bringing together direct and indirect impacts of climate change vital

Synergies between mitigation and adaptation to Climate Change in grassland-based farming systems

Del Prado A[1]., Van den Pol-van Dasselaar, A[2]., Chadwick, D[3]., Misselbrook, T[4]., Sandars, D[5]., Audsley, E[5]. and Mosquera-Losada, M.R[6].



Climate change mitigation through livestock system transitions

Petr Havlík[a,b,1], Hugo Valin[a], Mario Herrero[b,c], Michael Obersteiner[a], Erwin Schmid[d], Mariana C. Rufino[b,e], Aline Mosnier[a], Philip K. Thornton[f], Hannes Böttcher[a], Richard T. Conant[b,g], Stefan Frank[a], Steffen Fritz[a], Sabine Fuss[a,h], Florian Kraxner[a], and An Notenbaert[b,i]

Eco-DREAMS-S: modelling the impact of climate change on milk performance in organic dairy farms

A. Ruete[1], A. Velarde[2] and I. Blanco-Penedo[2†]

SOLID | Sustainable Organic and Low Input Dairying

Insight, part of a Special Feature on Multicriteria Assessment of Food System Sustainability

Key characteristics for tool choice in indicator-based sustainability assessment at farm level

Fleur Marchand[1,2], Lies Debruyne[1], Laure Triste[1], Catherine Gerrard[3], Susanne Padel[3] and Ludwig Lauwers[1,4]

Harvey et al. 2014

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Key Points

Adaptation and mitigation need to be considered and modelled together

Linking models across scales is important to support policy decisions

Learning between sectors carries potential for novel solutions and methodological advances

Effective communication of outcomes to stakeholders (how?)

Tradeoffs

(-)

Harvey et al. 2014

h livestock

id[d], Mariana C. Rufino[b,e], Frank[a], Steffen Fritz[a], Sabine Fuss[a,h],

limate change on milk

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sessment of Food System Sustainability

choice in indicator-based sustainability

Catherine Gerrard[3], Susanne Padel[3] and Ludwig Lauwers[1,4]

http://www.wired.co.uk/magazine/archive/2014/08/start/golden-assets

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WORKSHOPS IN 2015

Joint Livestock health and disease modelling workshop (with GRA Animal Health and GHG Emissions Intensity Network), Reading 24-25th June 2015

Grassland vulnerability and quality modelling workshop, Wageningen 17-19th June 2015

Workshops on modelling adaptation and model linkage, Braunschweig 27-30th October 2015

rpk@aber.ac.uk

Modelling European Agriculture with Climate Change for Food Security

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PRIFYSGOL ABERYSTWYTH UNIVERSITY

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