

Welfare impacts of goat ownerships amongst smallholding farmers in Malawi (programme evaluation),
and the skillset we can offer at BVS Food Security Group

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Ruminants

- ❖ Largest sources of GHG emissions attributable to agriculture
- ❖ But the most efficient method of food production on soils where human-edible crops do not grow

Estimated impacts when all ruminants in the UK (across species) produce 20% more products (meat/milk) from the current input

	Economic impact
Wholesale price of live animals	- 17.91 %
Consumer price of meat	- 3.92 %
Meat import	- 11.39 %
GDP	+ 0.08 %

Unit: % change from today's (pre-Brexit) UK economy

Method: Single-country general equilibrium modelling with international trade

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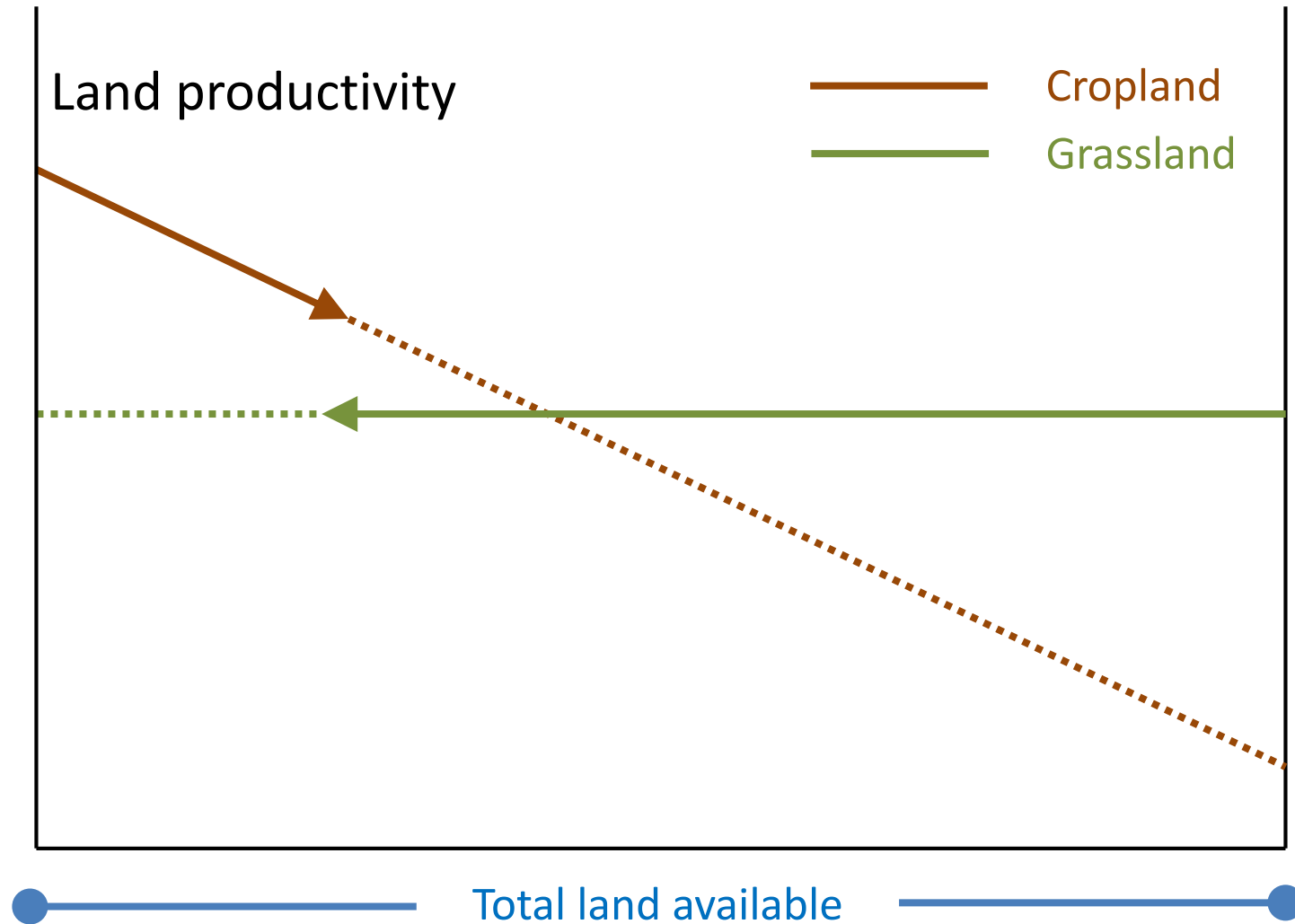


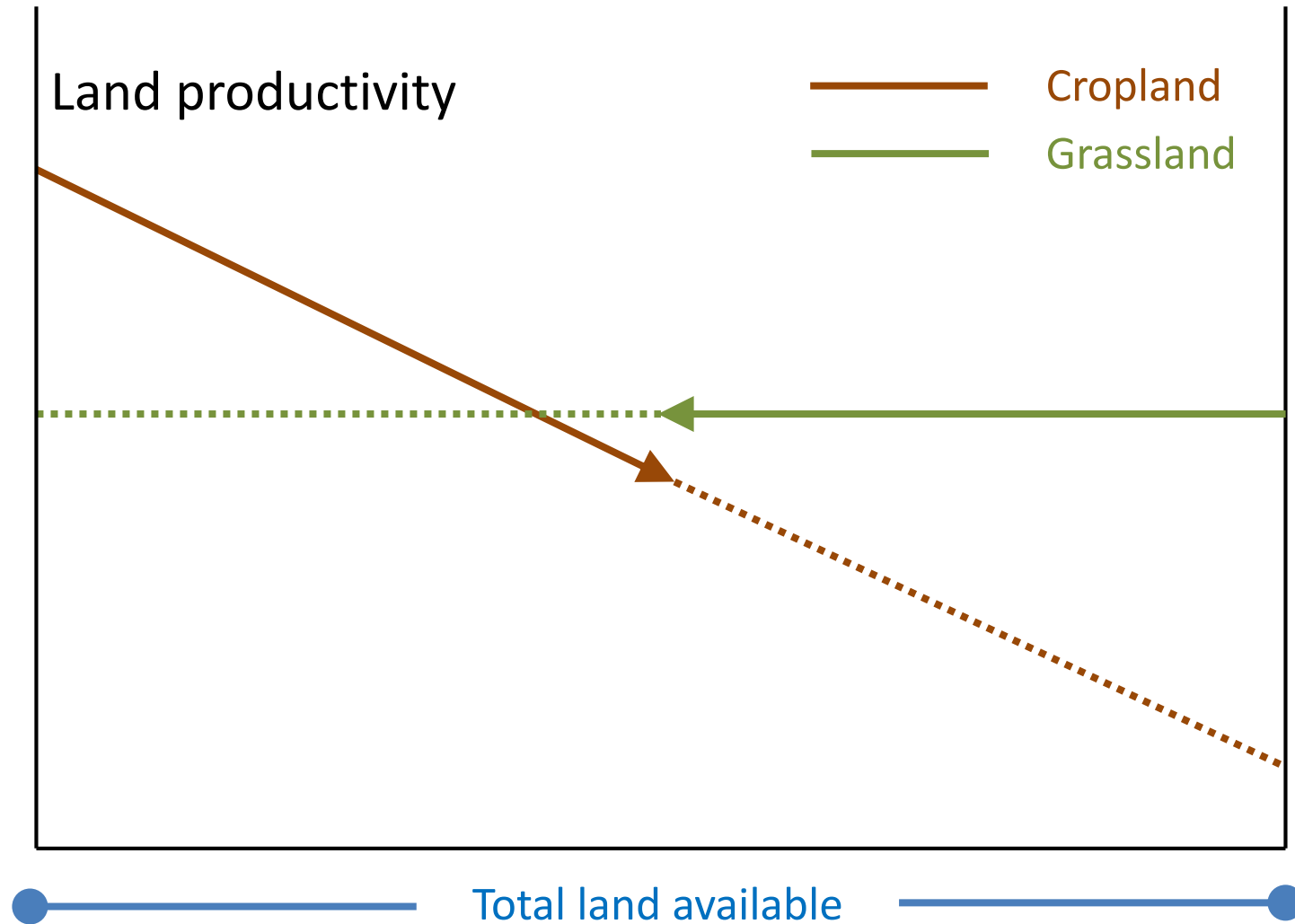
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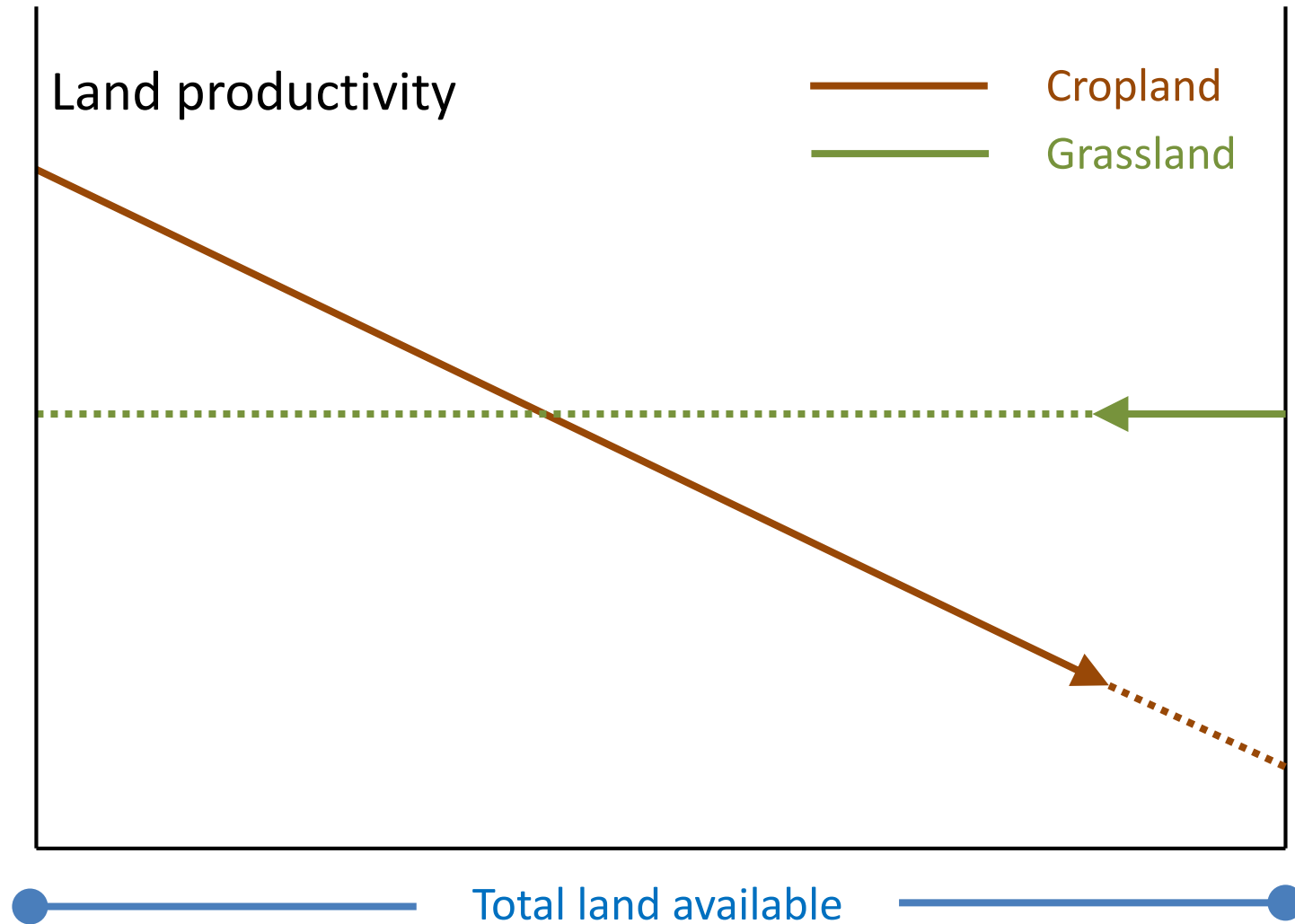
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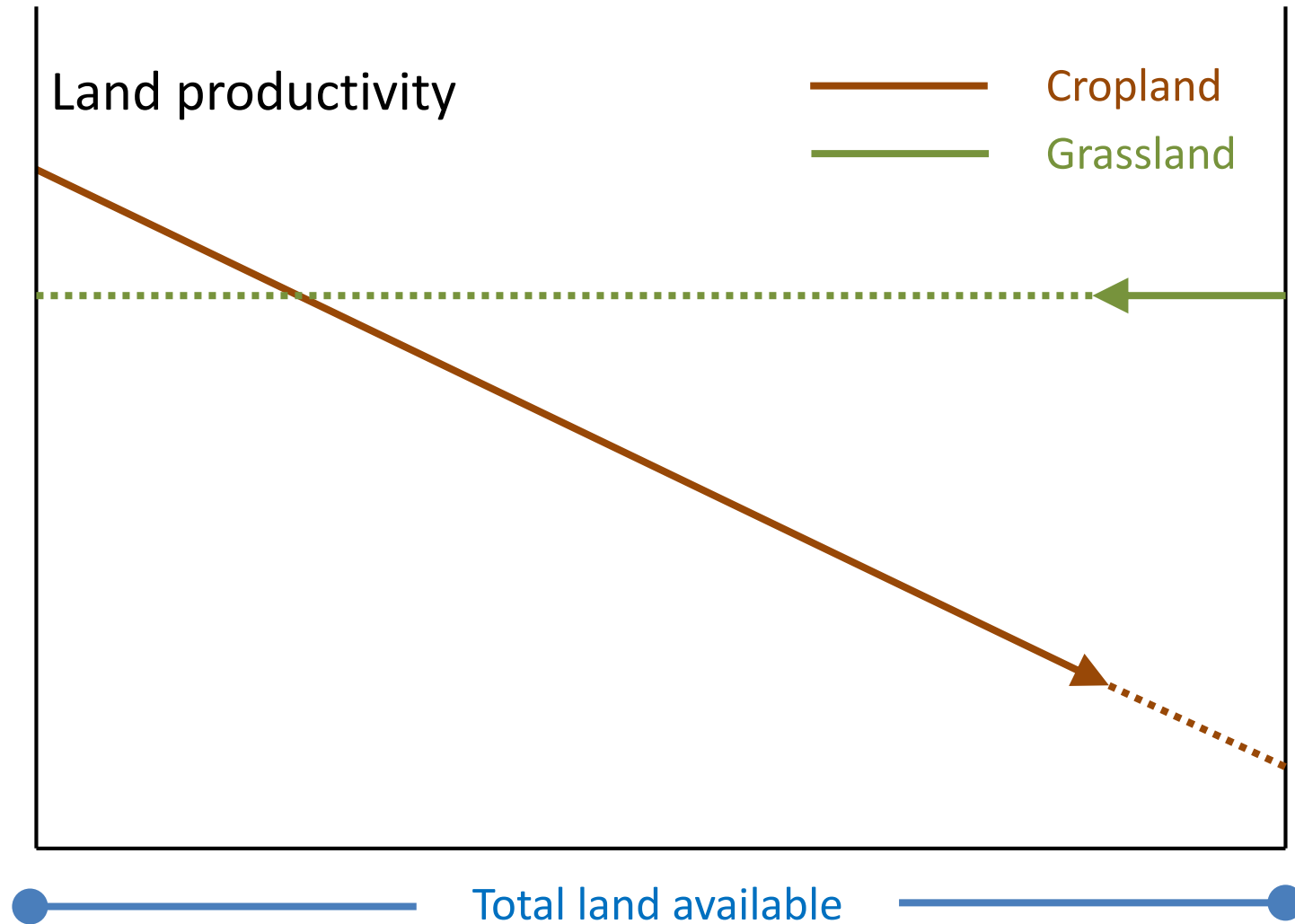
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- Conservatively speaking (without considering economic impacts of R&D activities themselves), annual investment of up to £1.4 billion (0.08% of UK GDP) can be justified
- However, farmers will lose revenues under this scenario by 1.5% as the slaughtering price will go down with an increased supply









Ruminants

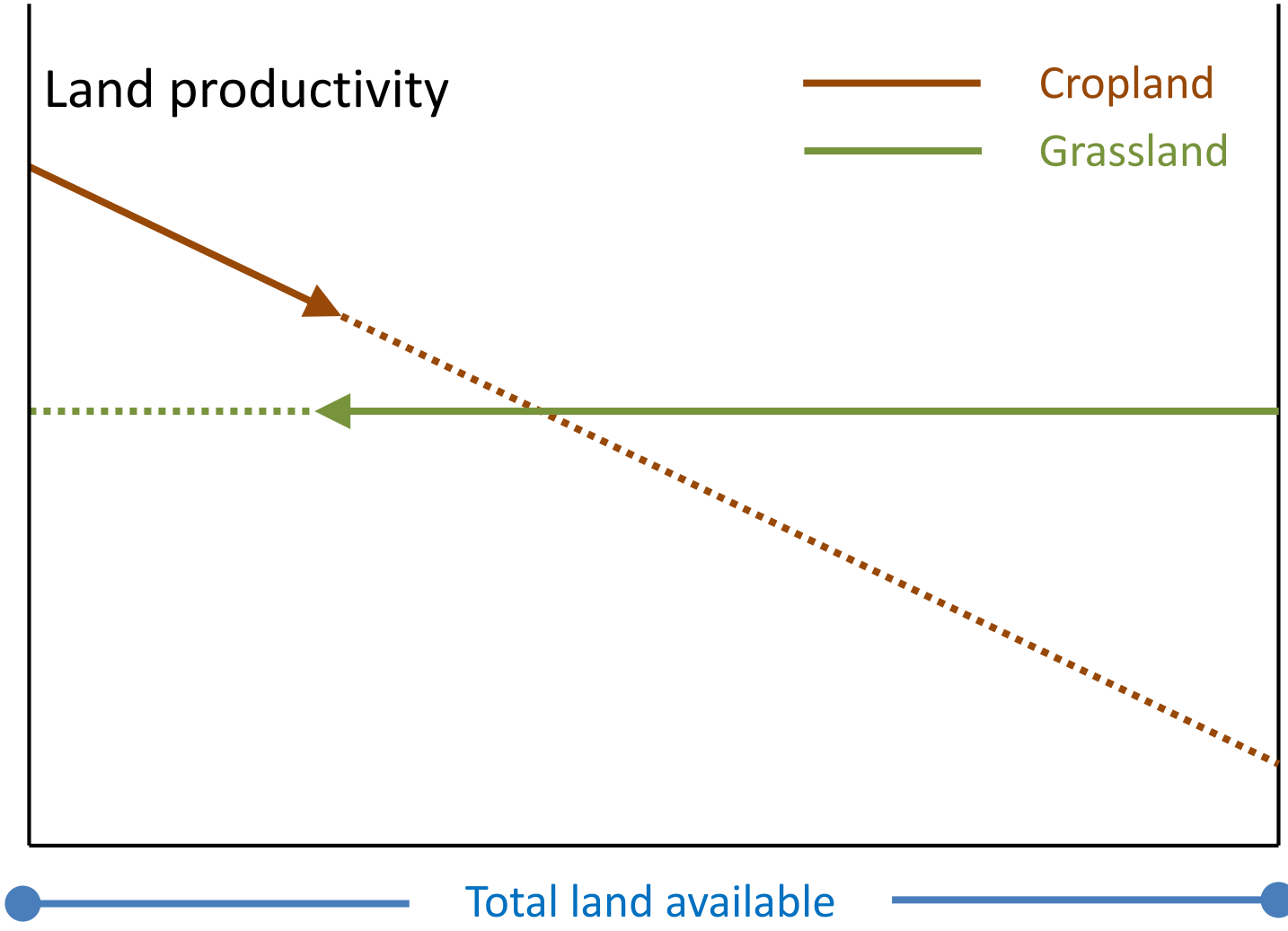
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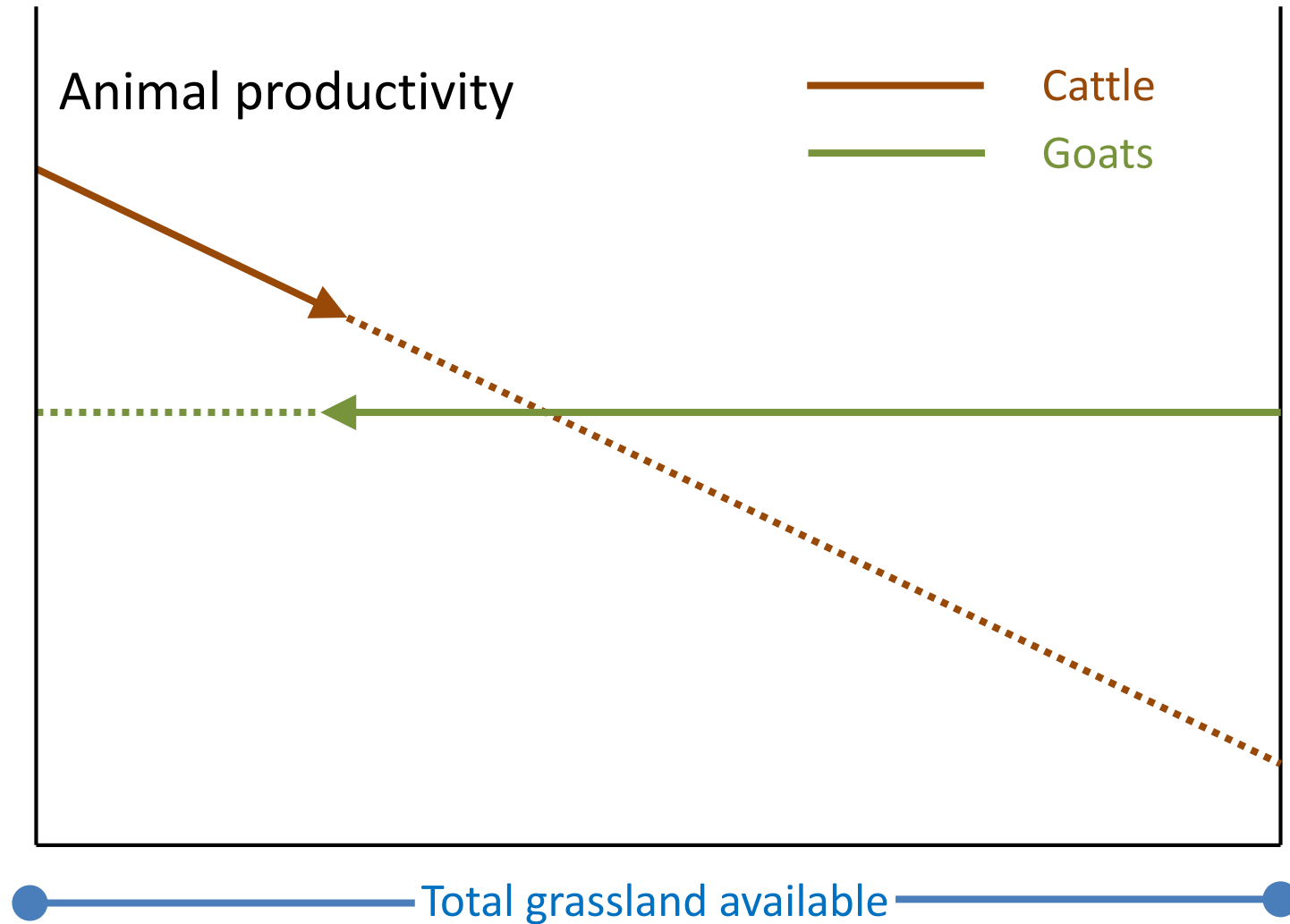
Ruminants

- ❖ Largest sources of GHG emissions attributable to agriculture
- ❖ But the most efficient method of food production on soils where human-edible crops do not grow
- ❖ Initiative to enhance smallholding farmers (in Africa and Asia) through ruminants — mostly focused on cattle
- ❖ But cattle are generally: (1) big, (2) susceptible to extreme weather conditions, and (3) do not perform well when feed quality is low

Goats

- ❖ Can survive on poor-quality forages
- ❖ More tolerant against climatic variation
- ❖ More adept to water-limiting conditions
- ❖ Greater meat and milk output per unit of bodyweight
- ❖ Small
- ❖ (But do not generally elevate one's social status)





Objective of the study

- ❖ To quantify welfare impacts of goat ownership amongst smallholding farmers in Malawi, with the view to create evidence-based, interdisciplinary research plan for GCRF and other opportunities

Data

- ❖ Fourth Integrated Household Survey (IHS4)
- ❖ Carried out by the National Statistical Office, Malawi, under the World Bank LSMS (living standards measurements survey)
- ❖ Stratified random replica ($n = 12,447$, 82% in 'rural' areas)
- ❖ Screened households with farming activities ($n = 10,234$, 91% in 'rural' areas)

Descriptive statistics

- ❖ 2,102 households (21%) own goats
- ❖ 80% own 5 or less, 95 % own 10 or less
- ❖ 72% own them primarily for sale of animals
- ❖ ~ 20% own them primarily as a means of saving
- ❖ Very little evidence of milk sales

Key findings

(1) Impacts of goat ownership on perceived food security

	Goat owners	Non-owners
Secure	853 (41 %)	2,661 (33 %)
Insecure	1,249 (59 %)	5,471 (67 %)

Nominal impact: 8 percentage points

Did you worry over the last 7 days about food availability?

Key findings

(2) Impacts of goat ownership on average meals per day

	Goat owners	Non-owners
1	50 (2 %)	358 (4 %)
2	1,087 (52 %)	4,614 (57 %)
3	959 (46 %)	3,085 (38 %)
4	6 (< 1 %)	75 (< 1 %)

Nominal impact on the likelihood to have three meals or more: 7 percentage points

How many meals do you typically eat in this household?

Key findings

(3) Impacts of goat ownership on income growth

	Goat owners	Non-owners
Saving	445 (21 %)	1,312 (16 %)
Hand to mouth	694 (33 %)	2,781 (34 %)
Borrowing	963 (46 %)	4,039 (49 %)

Nominal impact on the likelihood to have income growth: 5 percentage points

Which of the following statements is true about your income?

Discussion

- ❖ Impacts appear consistent across different ranges of welfare measures — food security, income, human health, and perceived overall welfare
- ❖ Selection bias unlikely as a smaller panel dataset (2010-2013-2016) suggests similar results
- ❖ Subjective bias unlikely as the two groups perceive their neighbours in a very similar way (discrepancy < 2%)
- ❖ Overall, then, that goat ownership is likely to improve welfare of smallholding farmers under common methods of welfare measurements

Way forwards

- ❖ Verification of the mechanism that brings the welfare impact — with many other possibilities eliminated, this seems to be related to resource utilisation
- ❖ Resource utilisation (of, say, cattle farms and goat farms) is difficult to quantify from survey data, although attempts can be — e.g. stocking density, feed cost, replacement rate
- ❖ Spatial differentiation (mapping) of forecasted income effects of goats replacing cattle
- ❖ Evaluation of unintended consequences

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Skillset available

- ❖ Programme evaluation
- ❖ General equilibrium (macroeconomic) modelling
- ❖ Life cycle assessment
- ❖ Policy impact analysis — randomised, matched, unmatched
- ❖ Shadow pricing of limited resources— land, labour, nutrients and water

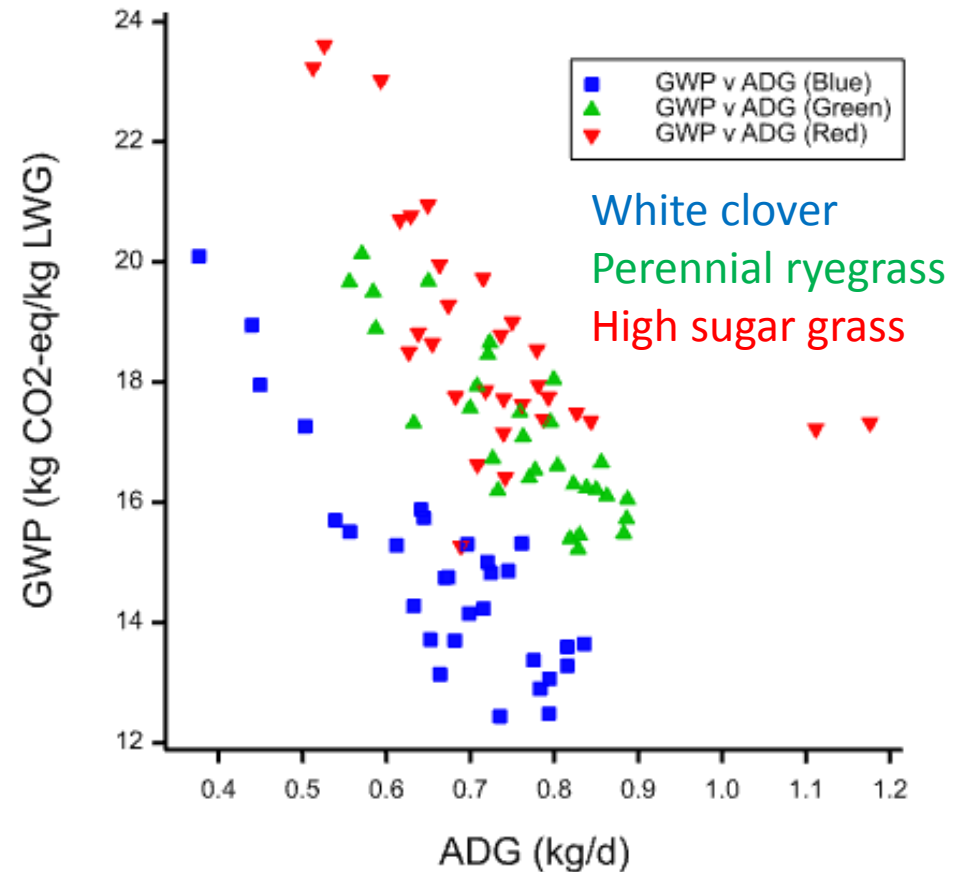
For both ex ante and ex post analysis (including pre-proposal)

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Life cycle assessment (trade-off analysis)

Relationship between average daily gain and global warming potential of cattle



North Wyke Farm Platform grazing trial

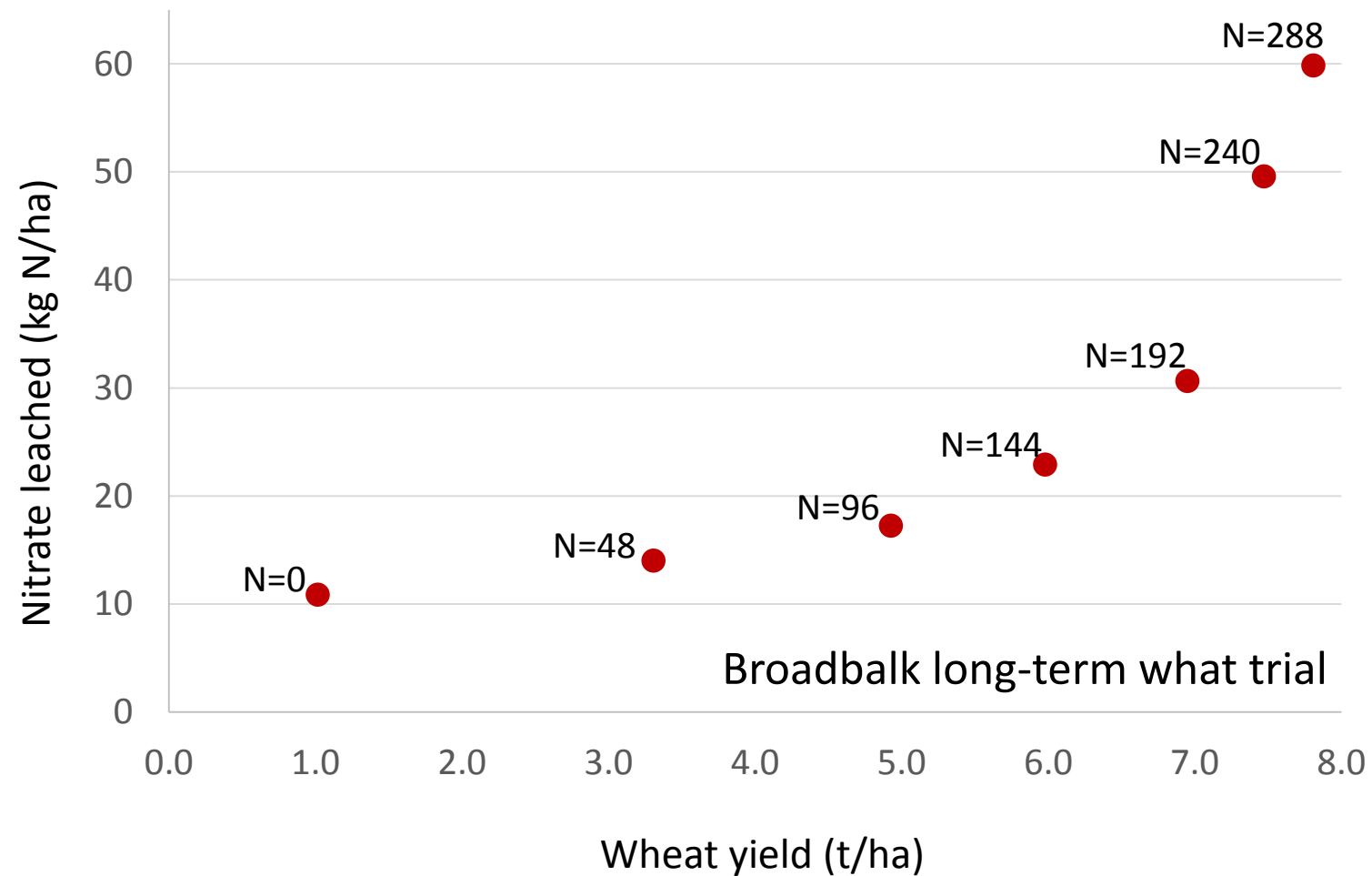
Policy impacts (matching)

Estimated impacts of Environmental Stewardship on ruminant reduction

Farm size	Lowland	Less-favoured area
Very small	- 0.43	- 0.86
Small	- 0.33	- 0.75
Medium	- 0.07	- 0.33
Large	0.28	0.09

Changes in cattle number per hectare (2013)

Estimated impacts of Environmental Stewardship on ruminant reduction



Nutrient budgeting (shadow pricing)

Consequences of applied nitrogen

	Today	Lost	Tomorrow
Inorganic 48kgN	80%	68%	– 48%
Inorganic 192kgN	40%	80%	– 20%
FY manure 192kgN	39%	60%	1%

Broadbalk long-term wheat trial

Nutrient budgeting (shadow pricing)

Consequences of applied nitrogen

	Today	Lost	Tomorrow	
Inorganic 48kgN	80%	68%	- 48%	Extracting stock
Inorganic 192kgN	40%	80%	- 20%	Polluting the world
FY manure 192kgN	39%	60%	1%	Only agronomically sustainable

Broadbalk long-term wheat trial