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Impacts of changes of consumption and production patterns in China and India on New Zealand trade and the environment

Meike Guenther, Caroline Saunders & Peter Tait

Contributed paper prepared for presentation at the 59th AARES Annual Conference, Rotorua, New Zealand, February 10-13, 2015

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AERU
Agribusiness and Economics Research Unit
A Lincoln University Research Centre.
New Zealand's specialist land-based university.

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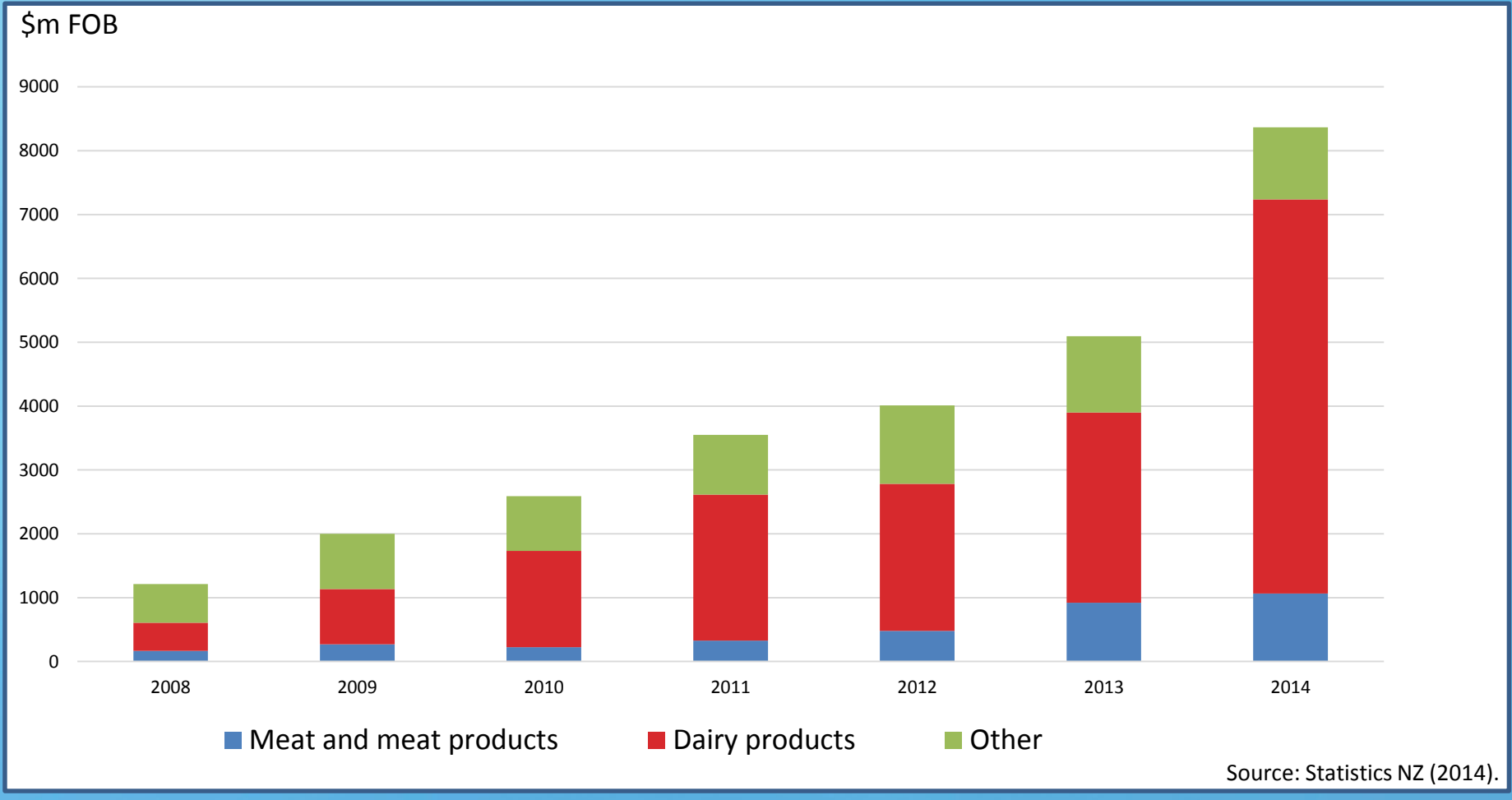
Lincoln University
Te Whare Wānaka o Aoraki
CHRISTCHURCH•NEW ZEALAND

Increasing food consumption, changes in dietary patterns & GHG emissions

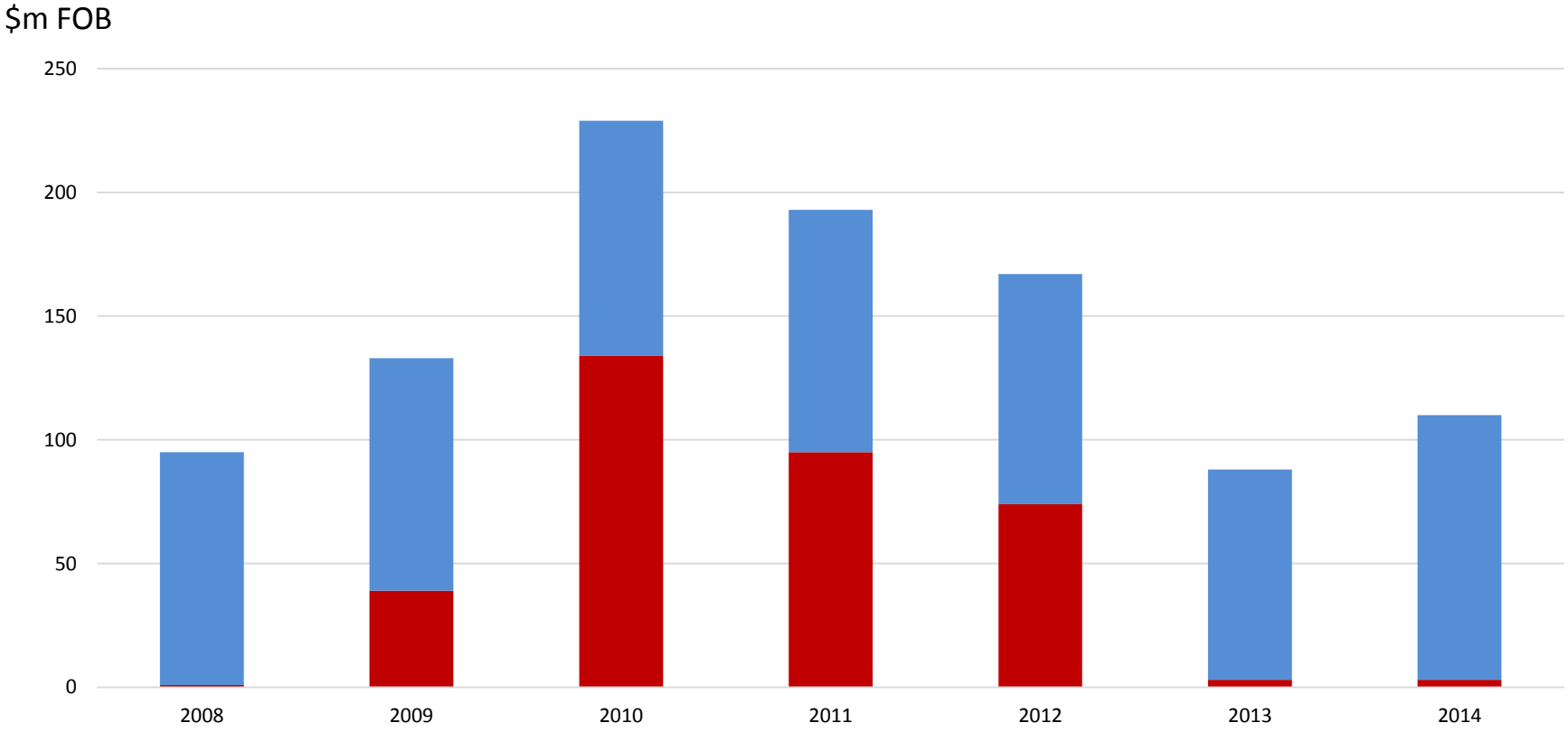
- Global increase in food consumption
- Changes in dietary patterns away from staples towards more livestock products, especially in China & India
- Livestock sector generates 18% of global GHG emissions (mainly ruminants)

NZ agricultural exports to China



Source: Statistics NZ (2014).

NZ agricultural exports to India



Source: Statistics NZ (2014).

Agricultural trade policy in China & India

- China's WTO accession in 2001
- NZ – China Free Trade Agreement (FTA) (2008)
- Tariffs on meat and dairy commodities will be completely eliminated in 2016 and 2019.

- India founding member of GATT (1947).
- In 2010, India started negotiations towards a FTA with New Zealand
- Strategy to become core trade partner for NZ by 2015.

Literature review – Methods

- ***Econometric analysis of supply and demand*** (Rae, 1998; Rae et al., 2006, Wang et al., 2005; Dong & Fuller, 2007).
- ***Total Factor Productivity*** growth in agricultural production (Nin et al., 2003; Ludena et al., 2007; Rae et al., 2005; Rae & Hertel, 2000).
- ***Trade modelling*** – Partial Equilibrium (PE) & General Equilibrium (GE) framework (Wang et al., 2008; Anderson & Strutt, 2012).
- ***Trade and Environment modelling*** using extended trade models (Schmitz et al, 2012; Saunders & Saunders, 2011; Verburg et al., 2009; Wreford, 2006; Catagay & Saunders, 2003).

Literature Review – Projections results

- Increase in meat and dairy consumption in China and India will continue to 2040 (Anderson & Strutt, 2012; Delgado et al., 1999).
- Increase in dairy consumption in China and India was greater than projected increase in dairy production (OECD FAO, 2013).
- Under trade liberalisation GHG emissions were projected to increase, esp. in Asia (Schmitz et al., 2012).
- Saunders et al. (2006) projected an increase of GHG emissions in NZ from freer trade of dairy products.

Lincoln Trade and Environment Model

- Non-spatial, partial equilibrium international trade model
- Focus on the agricultural sector and incorporates an environmental sub-module on GHG emissions
- Data from FAO, OECD, WTO and IPCC
- Base year 2008, projections to 2020
- Model includes:
  - 21 countries or regions (incl. ROW)
  - 22 commodities
- Results show prices, quantities, net trade and GHG emissions

Scenarios

Scenario	Type
BL	Baseline
1.	Increase of meat and dairy consumption and production in India and China (Rosegrant et al., 2001)
2.	Change of meat and dairy consumption and production in India and China (OECD FAO Agricultural Outlook 2013)
3.	Partial adoption of US dietary patterns in China and India

Results

- China, India and New Zealand
- Percentage changes from baseline to scenario in 2020
    1. Producer returns for two meat and four dairy commodities
    2. GHG emissions (in CO_2-equivalents) for dairy, sheep and beef

China – Effects on producer returns % changes to baseline in 2020

Scenario		Beef	Sheep meat	Butter	Cheese	Whole Milk powder	Skim Milk Powder
1	High growth rates (Rosegrant)	82	20	70	89	69	107
2	Mixed growth rates (OECD FAO)	-1	-2	7	46	48	40
3	Partial US diet adoption	40	-3	32	-	9	90

China – Effects on GHG emissions % changes to baseline in 2020

Scenario		Dairy	Beef	Sheep
1	High growth rates (Rosegrant)	21	79	12
2	Mixed growth rates (OECD FAO)	13	-1	-6
3	Partial US diet adoption	27	15	-3

India - Effects on producer returns
% changes to baseline in 2020

Scenario		Beef	Sheep meat	Butter	Cheese	Whole Milk powder	Skim Milk Powder
1	High growth rates (Rosegrant)	32	50	55	70	54	86
2	Mixed growth rates (OECD FAO)	51	30	82	45	47	141
3	Partial US diet adoption	34	-1	4	-	-13	53

India - Effects on GHG emissions
% changes to baseline in 2020

Scenario		Dairy	Beef	Sheep
1	High growth rates (Rosegrant)	23	30	40
2	Mixed growth rates (OECD FAO)	23	50	25
3	Partial US diet adoption	-1	11	-1

NZ - Effects on producer returns %changes to baseline in 2020

Scenario		Beef	Sheep meat	Butter	Cheese	Whole Milk powder	Skim Milk Powder
1	High growth rates (Rosegrant)	1	15	-9	-2	-9	1
2	Mixed growth rates (OECD FAO)	1	9	-11	1	6	10
3	Partial US diet adoption	38	-3	7	-	-5	31

NZ - Effects on GHG emissions
% changes to baseline in 2020

Scenario		Dairy	Beef	Sheep
1	High growth rates (Rosegrant)	-3	0	8
2	Mixed growth rates (OECD FAO)	1	0	4
3	Partial US diet adoption	3	14	-2

Conclusions

- Changing dietary patterns in India and China could lead to higher NZ producer returns from meat and dairy.
- NZ producer returns from dairy could decrease if India and China significantly increase dairy consumption and production.
- Although only small, increases in NZ GHG emissions from livestock could still be important if NZ sets agricultural GHG emission targets.

Future research

- Update base year to 2012 (projections to 2024)
- Removal of EU milk quota early 2015
- Changes in Ireland (doubling milk supply)
- Full thesis available on http://hdl.handle.net/10182/6376

THANK YOU

Hamburg port, June 2014