

# Effects of Biofuels Policy on Global Trade Flows

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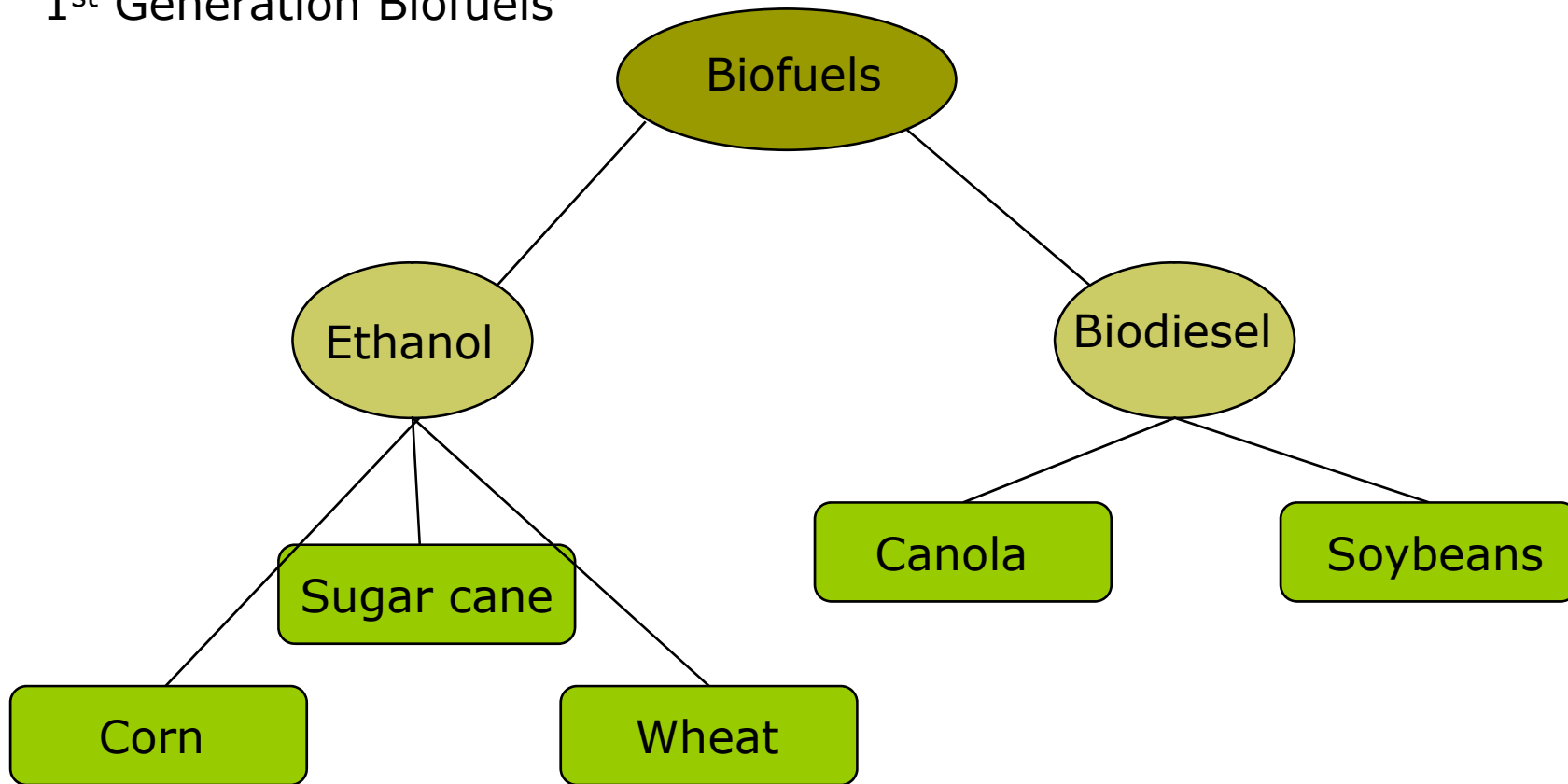
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# Biofuels Background

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## 1<sup>st</sup> Generation Biofuels



# Biofuels Background

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Initially there were...

- High oil prices
- Relatively low commodity prices
- Strong agriculture lobby
- Strong government involvement
  - Blending/consumption mandates
  - Production quotas
  - Import tariffs
  - Excise tax exemptions
  - Repayable loans for capital costs/construction
  - Purchase of surplus stocks for biofuels

# Research Problem

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- ❑ What are the price impacts of global biofuels policies, and to what extent do they affect trade flows?
- ❑ How are biofuels linked to the principles of the World Trade Organization, and what issues are raised by increased biofuel trade?

# United States

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- Corn-based ethanol
  - 2007 production: 5.8 billion gallons/year
- Soybean-based biodiesel
  - 2007 production: ~ 172 million gallons/year
- Goals:
  - Under RFS, 7.4 B gallons by 2012
- Motivations: energy security, agricultural support, environmental benefits

# European Union

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- Rapeseed-based biodiesel
  - Production (2006): 1.6 B gallons/year
- Goals:
  - 2% of total transportation fuel use from biofuels by 2005
  - 5.75% by 2010
- Motivations: environment, energy security, agricultural support

# Canada

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- Wheat/corn-based ethanol
  - 725 million litres/year
- Canola-based biodiesel
  - 100 million litres/year
- Goals:
  - 5% renewable content in gasoline by 2010
  - 2% in diesel and heating oil by 2012
- Motivations:
  - environment, agricultural support, rural development

# AGLINK

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- Dynamic partial equilibrium model
- Multi-region, multi-commodity
  - Crude oil, sugar exogenous
- Exogenous shocks
- Issues:
  - Value of the by-products
  - Emergence of second-generation biofuels



# United States Ethanol Production

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- Coarse grains consumption

$$QC_{CG}^{US} = CG_{FE}^{US} + CG_{FO}^{US} + CG_{OU}^{US}$$

- Apply the exogenous shock to  $CG_{OU}^{US}$

- Account for by-products

$$\begin{aligned} \text{LN}(CG_{FE}^{US}) = & \alpha + \beta_1 * \text{LN}(\text{PRICE}_{CG}^{US} / \text{PRICE}_{WT}^{US}) + \beta_2 * \text{LN}(\text{PRICE}_{OM}^{US} / \\ & \text{PRICE}_{WT}^{US}) + \beta_3 * \text{LN}(QP_{NR}^{US}) + (1 - \beta_3) * \text{LN}(QP_{RU}^{US}) + \beta_4 * \text{LN}(\text{TRND}) + \\ & \text{LN}(R. CG_{FE}^{US}) \end{aligned}$$

as per Westcott (2007):

CORN:  $0.75 * ((0.8 * \text{BF @ 100\%}) + (0.1 * \text{DAIRY @ 45\%}) + (0.05 * \text{PK @ 85\%}) + (0.05 * \text{PLTRY @ 55\%}))$

SOY:  $0.75 * ((0.1 * \text{DAIRY @ 55\%}) + (0.05 * \text{PK @ 15\%}) + (0.05 * \text{PLTRY @ 45\%}))$

# Canadian Biodiesel Production

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## □ Demand for oilseeds

$$QC_{OS}^{CAN} = OS_{CR}^{CAN} + OS_{FE}^{CAN}$$

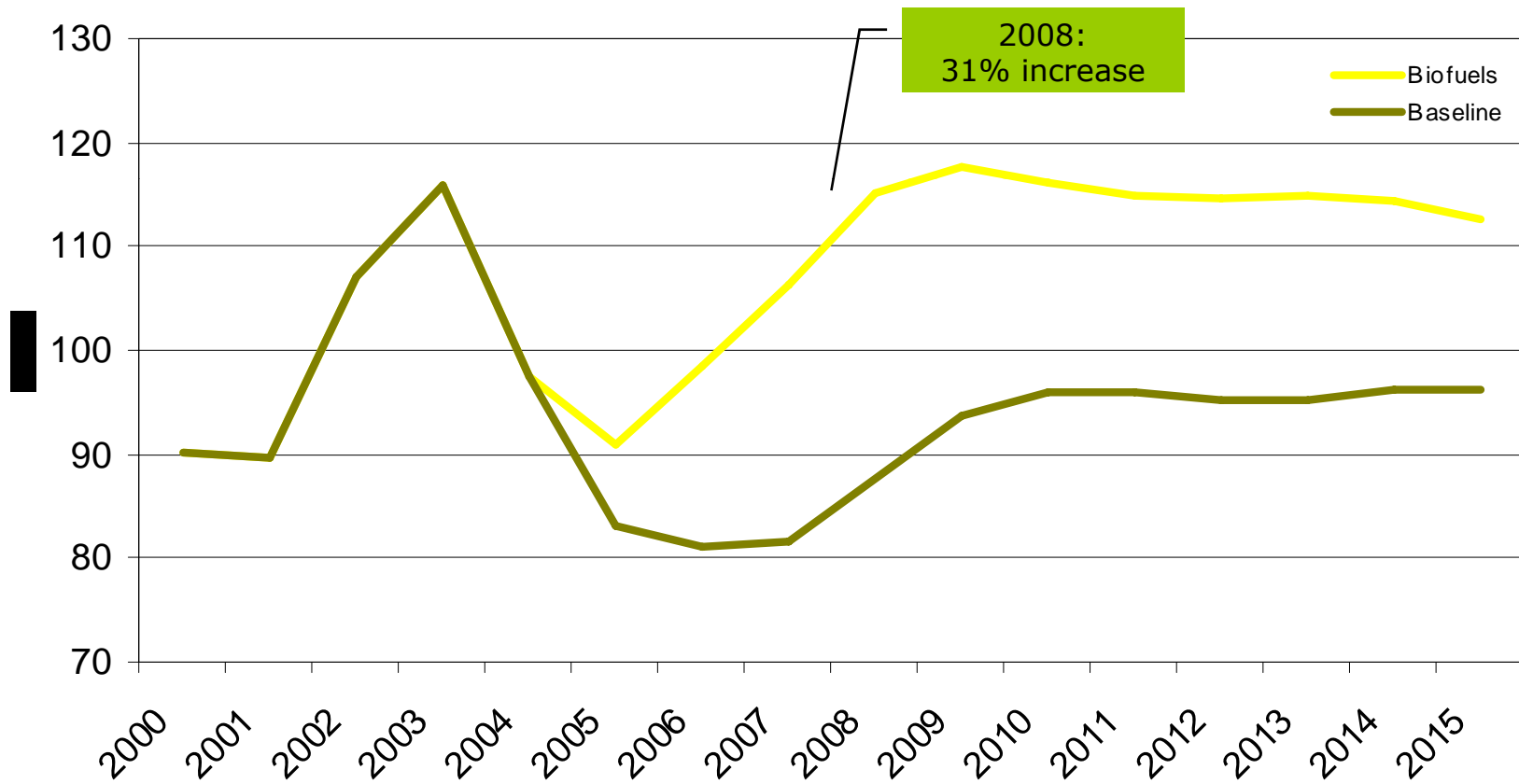
## □ Oilseed crush demand

$$\begin{aligned} \ln(OS_{CR}^{CAN}) = & \alpha + \beta_1 * \ln((PRICE_{OM}^{CAN} * YLD_{OM}^{CAN} + \\ & PRICE_{OL}^{CAN} * YLD_{OL}^{CAN}) / GDP^{CAN}) - 0.9 * \beta_2 * \ln(PRICE_{OS}^{CAN} / GDP^{CAN}) \\ & + \beta_3 * \ln(OS_{CR(-1)}^{CAN}) + \ln(R * OS_{CR}^{CAN}) \end{aligned}$$

## □ Bumping the crush automatically adjusts the oil meal markets

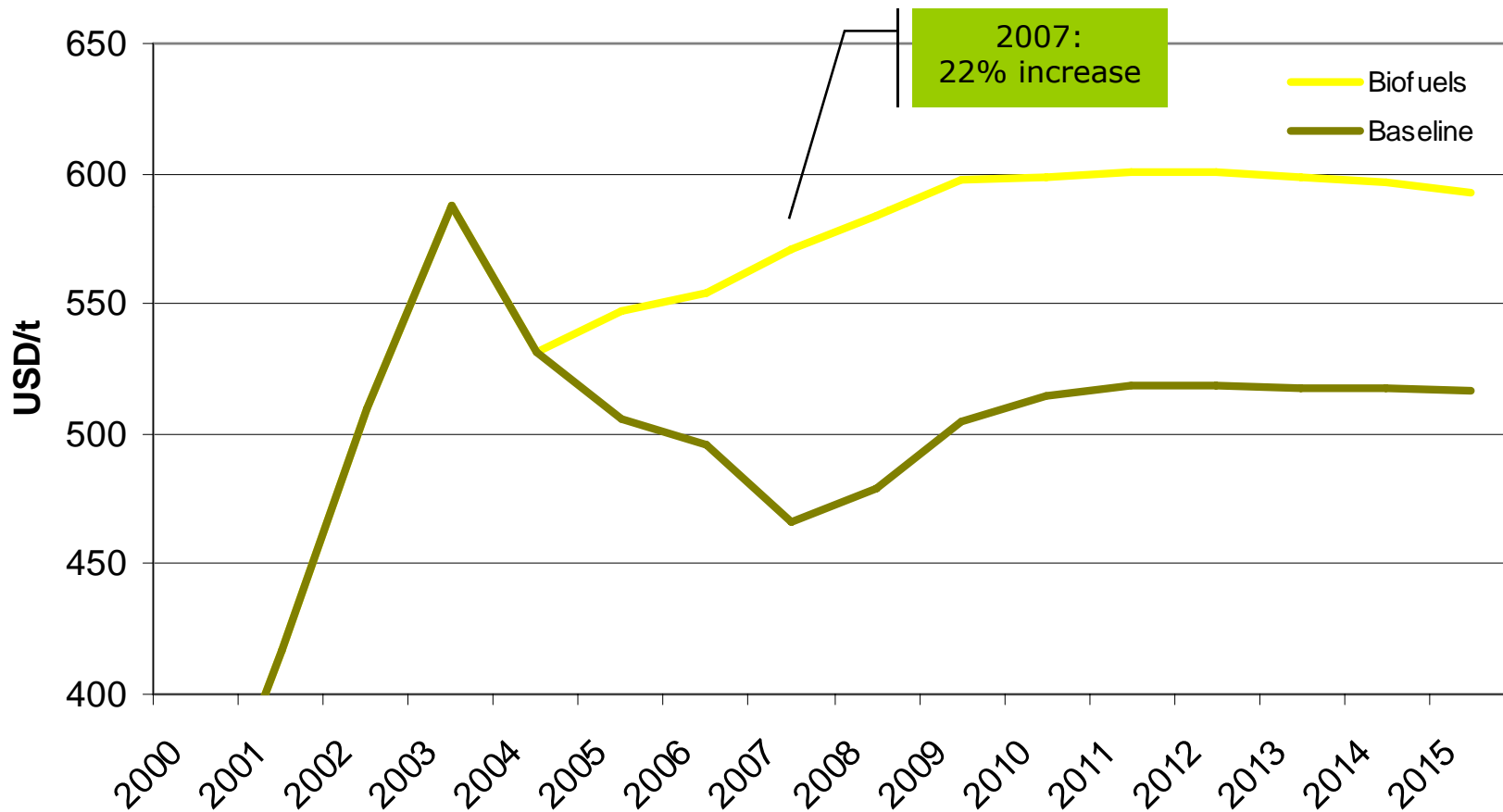
## Price Impacts

# World Corn Market



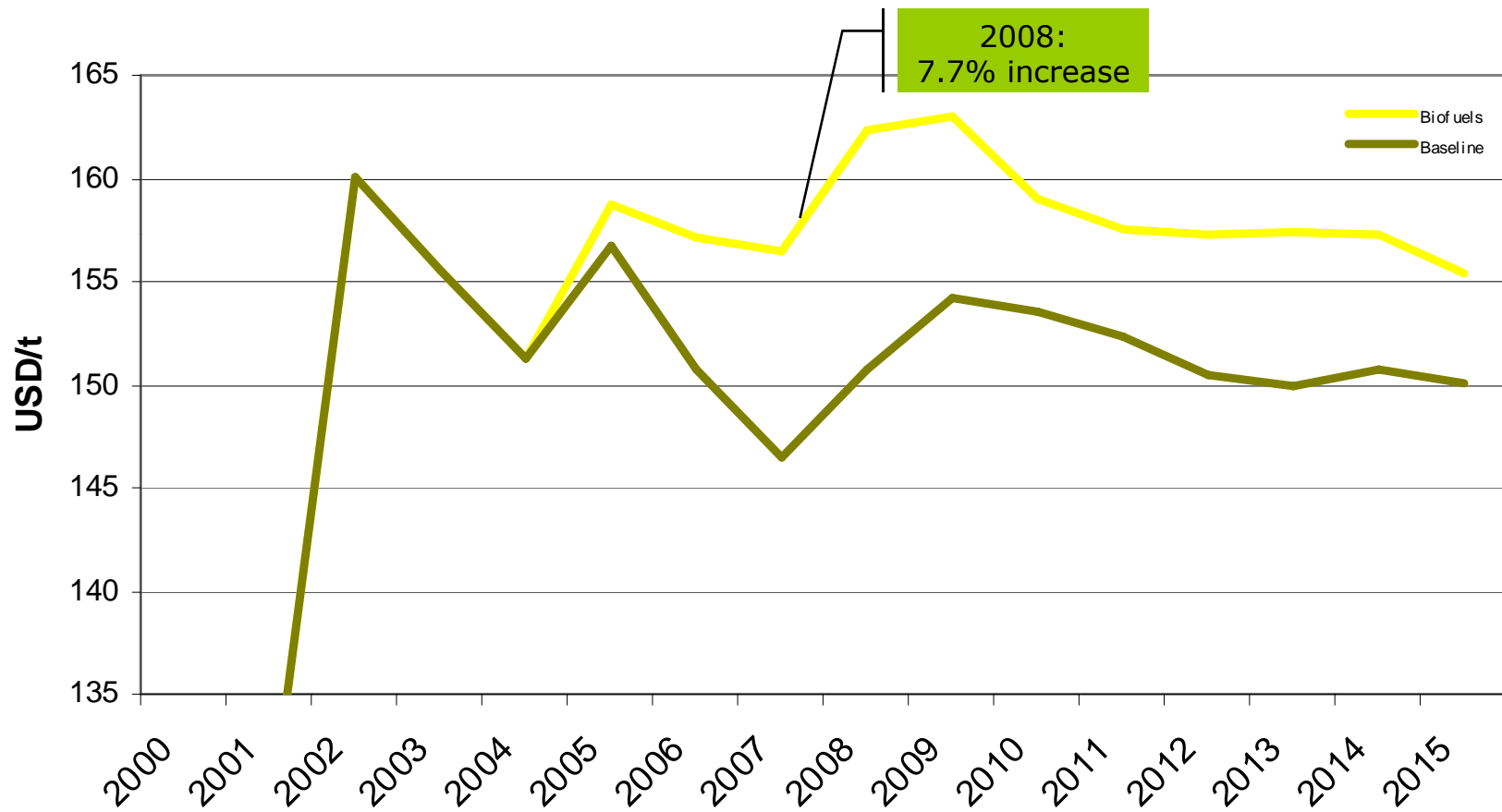
## Price Impacts

# World Vegetable Oil Market



## Price Impacts

# World Wheat Market



## European Union 25

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- ❑ Coarse grain exports fall by 5%
- ❑ Beef exports drop by roughly 9%
- ❑ Oilseed imports remain fairly constant
- ❑ Vegetable oil net trade declines by over 50%

## Trade Impacts

# United States

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- ❑ Coarse grain exports decline nearly 50%
- ❑ Beef and veal exports of live animals and meat decrease by roughly 3%
- ❑ Oilseed exports fall by approximately 3%, with another 62% decrease in vegetable oil net trade
- ❑ Wheat exports drop by 14%

# Canada

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- ❑ Oilseed net trade decreases by 2.5%
- ❑ Wheat net trade falls by 11%
- ❑ Pork meat exports fall by roughly 5%
- ❑ Beef and veal net trade averages a decline of 1%, with increasing losses
  - Feed expenditures increase by an average of 15% over the projection period



# Trade Issues

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- ❑ How should biofuels be classified under WTO definitions?
- ❑ Blending requirements: national treatment?
- ❑ Cross-subsidization?
- ❑ Effects of reducing current trade barriers?
- ❑ Increased regional trade agreements?



CATPRN

Canadian Agricultural Trade Policy Research Network

Westin Harbour Castle Hotel

Toronto, Ontario

February 8-9, 2008