

*Feeding a Hungry World*  
WE HAVE A PLAN ... WHAT'S YOURS?



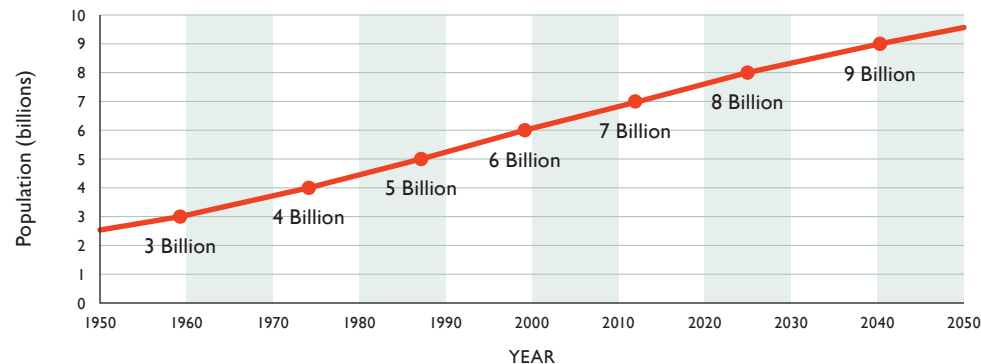
# The Challenge

A growing population is placing significant demands on agricultural production.

## A HUNGRY WORLD

- World population in 2010 was 6.5 billion; 1 billion do not have secure access to food.
- World population in 2050 predicted to be 9.3 billion; all the growth is expected to be in poor and developing countries.

### World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base, December 2008 Update

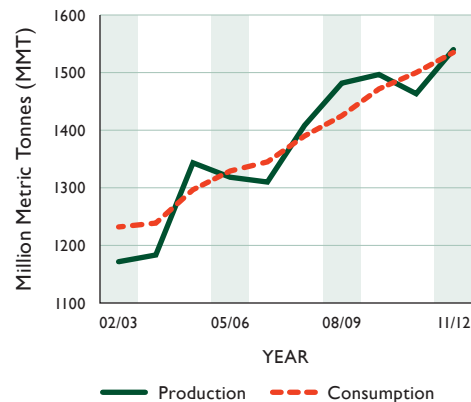


# Can Production Keep Up?

In the next 50 years, the world's farmers will have to produce as much food as has been consumed since the beginning of humanity.

## PRODUCTION AND CONSUMPTION

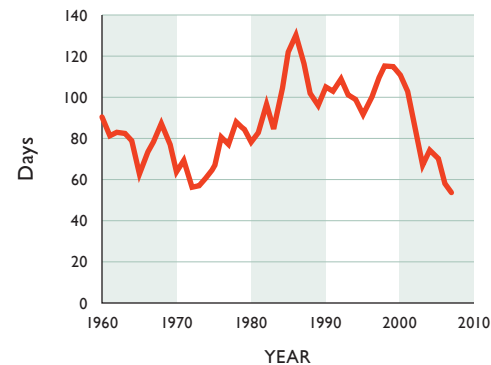
Global Corn and Wheat Production and Consumption in Balance



Source: USDA Foreign Agriculture Service

## RESERVES ARE SHRINKING

World Grain Carryover Stocks as Days of Consumption, 1960-2007

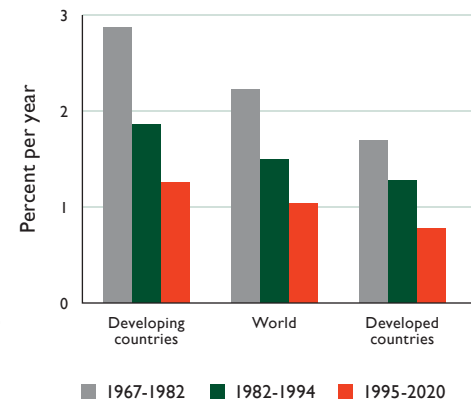


*In the 1980s, world grain supplies would support six months of consumption. Currently, supplies are only about 40 days of consumption.*

Source: USDA

## GROWTH IN YIELDS IS SLOWING

Annual Growth in Cereal Yields



*Cereal yields grew more than 2% per year between 1967 and 1982. However, annual growth is expected to decline to less than 1% by 2020.*

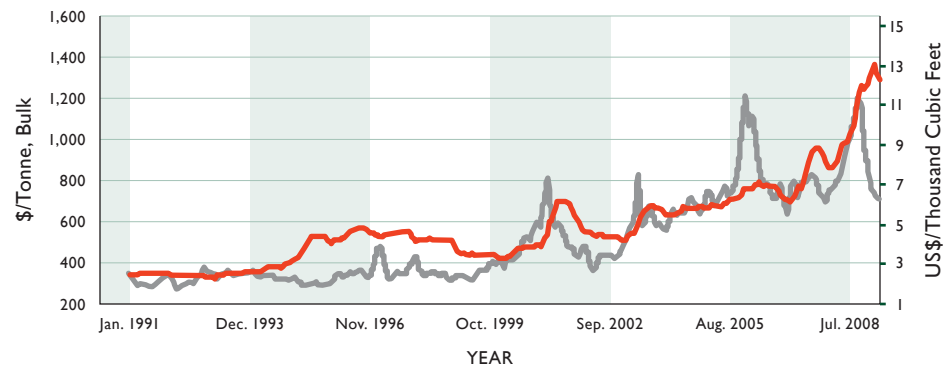
Source: P. Pinstrup-Anderson, R. Pandya-Lorch, and M.W. Rosegrars. World Food Prospects: Critical Issues for the Early Twenty-First Century (Washington, D.C.: IFPRI, 1999)

# Responding to Environmental Challenges

Climate change and limited natural resources are also posing serious threats to food production.

## AGRICULTURE NEARLY "MAXED OUT" ON CURRENT INPUTS

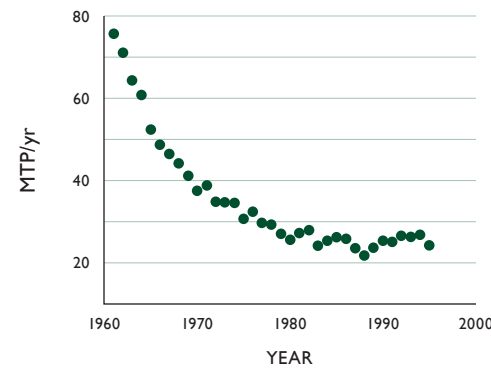
### Anhydrous Ammonia & Natural Gas Prices



— Alberta Anhydrous Ammonia, 82-0-0 — US Natural Gas Wellhead Prices (US\$/thousand cubic feet)

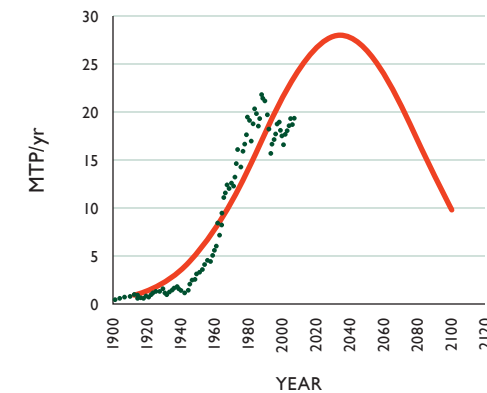
Nitrogen costs increase along with energy costs.

### Relation of Cereal Yield to Added Fertilizer



Added nitrogen is having less of an impact on yield.

### Phosphorus Production



● Actual — Modelled

Phosphorus extraction is expected to peak mid century.



Drought



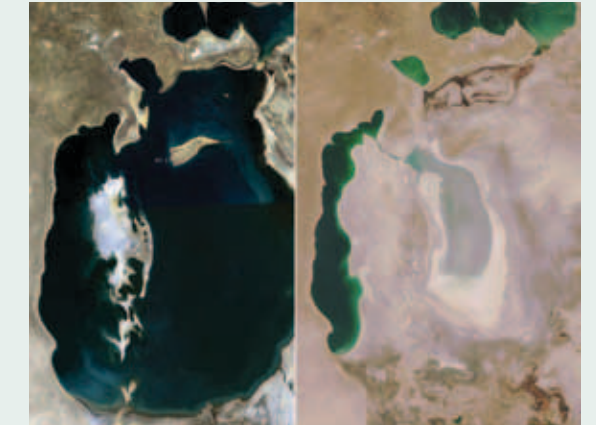
Excessive moisture



Salinization

- Increased urban competition for water and loss of aquifers will limit irrigation.
- Climate change – it will be hotter, drier and pests will move to different regions.

### Aral Sea Uzbekistan



July-September, 1989

October 5, 2008

# We Have a Plan

We believe we have a solution to help feed a hungry world.

## OUR PLAN

The development and commercialization of new plant varieties to deliver:

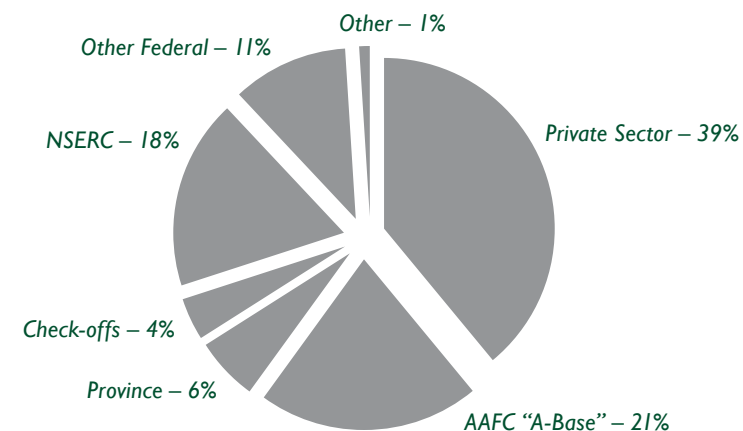
- Increased productivity and yield to produce more food per acre
- More efficient use of natural resources such as water and soil
- More efficient use of plant nutrients
- Solutions to enhance the environment
- Plant based health and wellness solutions

## IMPLEMENTING OUR PLAN

### Investment and Innovation

- Public and private sector research and development is required.

### Investment in Plant Breeding and Research 2007



Source: CSTA Survey, Provincial and Federal Government financial estimates

## PRIVATE SECTOR INVESTMENT

### Private Sector R&D Investment (actual and forecast)

	1987		2001		2007		2012	
	\$M	%	\$M	%	\$M	%	\$M	%
Canola	7.1	50	30.5	67.3	41.9	74.7	80	75.2
Corn	2.8	19.7	7.9	17.4	4.8	8.6	9	8.5
Cereals	1.5	10.5	2.3	5.1	3.3	5.9	2.7	2.5
Soybeans	0.7	4.9	2.6	5.7	3.9	6.9	12.7	11.9
Other	1.6	11.3	0.8	1.8	1.6	2.8	1.4	1.3
Garden Seed	0.1	0.7	0.0	0	0.0	0.0	0.0	0.0
Special Crops	0.1	0.7	0.4	0.9	0.12	0.2	0.1	0.1
Forages	0.3	2.1	0.8	1.8	0.49	0.9	0.5	0.5
<b>TOTAL</b>	<b>14.2</b>		<b>45.3</b>		<b>56.1</b>		<b>106.4</b>	

Private sector investment is growing.

Source: CSTA Survey 2007

Crop	% of Seed Used that is Certified	% of Total Private Sector Investment (Projected 2012)
Canola	92%	74%
Corn	98%	12%
Soybeans	87%	10%
Cereals	18%	2%

} 96%

Private sector invests 26% of total operating budget in R&D – primarily in three crop types where funds can be generated for investment.

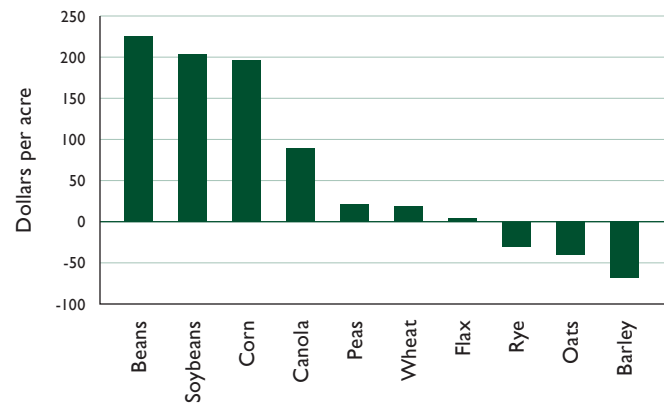
Source: CSTA Surveys, Statistics Canada, Blacksheep Strategy

# Investment in Seed Innovation Drives Success

Research shows that it pays to invest in seed innovation.

## PRIVATE SECTOR INVESTMENT PAYS OFF

### Net Cash Returns per Acre



Crops that receive the most investment top the chart.

### Yield Increases over 15 years:



Ontario Winter Wheat **62%**  
 Corn **59%**  
 Soybeans **50%**  
 Canola **27%**

### Productivity Improvements:

- Disease and insect resistance
- Improved nitrogen efficiency
- Drought tolerance
- Salinity tolerance

### Case Studies – Wheat and Barley (2007)

Variety	Average Yield Increase	Additional Farm Revenue (2007)
5602 HRSW (Hard Red Spring Wheat)	3.4 bu/acre	\$4.4 million
25R47 SRW (Soft Red Winter Wheat)	10 bu/acre	\$9.0 million
Xena Feed Barley	5.6 bu/acre	\$35.6 million

New high yielding wheat and barley varieties can make a large impact on production and farm revenues.

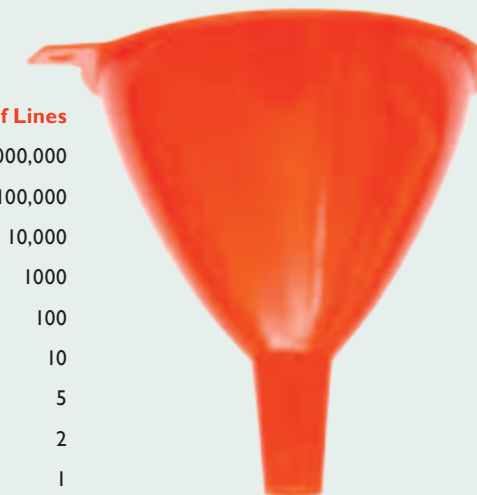
# Continued and Increased Investment is Critical

Greater investment is needed in seed innovations that will help meet the world's food demands.

## BRINGING A NEW VARIETY TO MARKET – TAKES UP TO 13 YEARS

**Year 1:** Plant breeders make crosses of male and female parents to achieve desired traits

Year	# of Lines
2	Plants 1,000,000
3	Short rows 100,000
4	Long rows 10,000
5	Single rep plot 1000
6	Replicated plot 100
7	1st Year Coop 10
8	2nd Year Coop 5
9	3rd Year Coop 2
10	Registration 1
11-13	Seed Multiplication and Commercial release



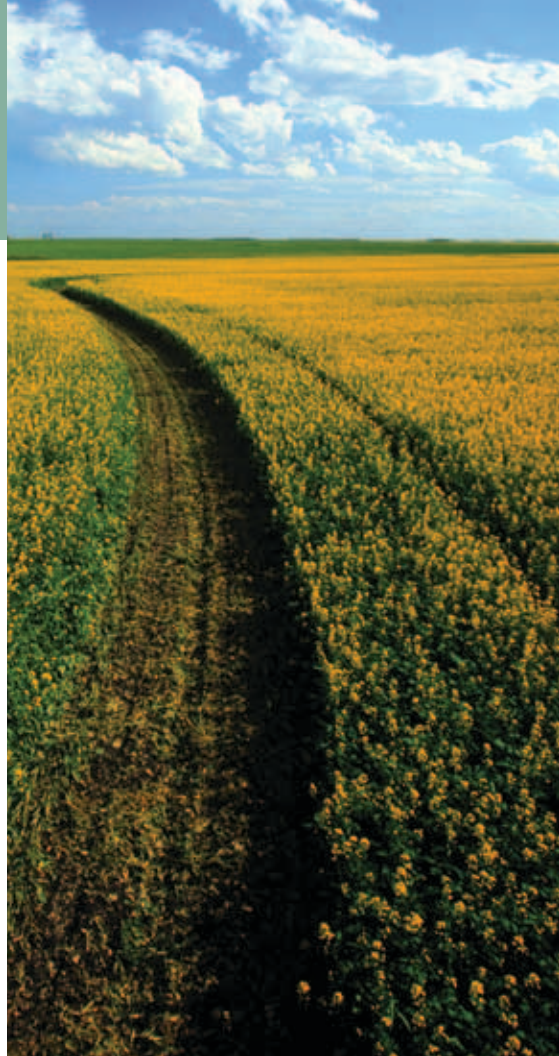
## BRINGING A NEW VARIETY TO MARKET – THE FINANCIAL INVESTMENT

### One Canola Breeding Program Example

Canola Breeding Program Cost                   \$20,500,000

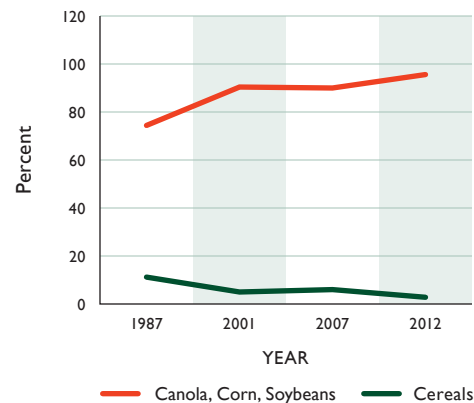
2 canola hybrids per year (cost per hybrid)   \$10,250,000

If each hybrid reaches 2 million acres in its lifetime, research costs \$6 per acre.



## REDUCED INVESTMENT HAS A NEGATIVE IMPACT – THE CASE OF WHEAT

### % of Private Sector Investment

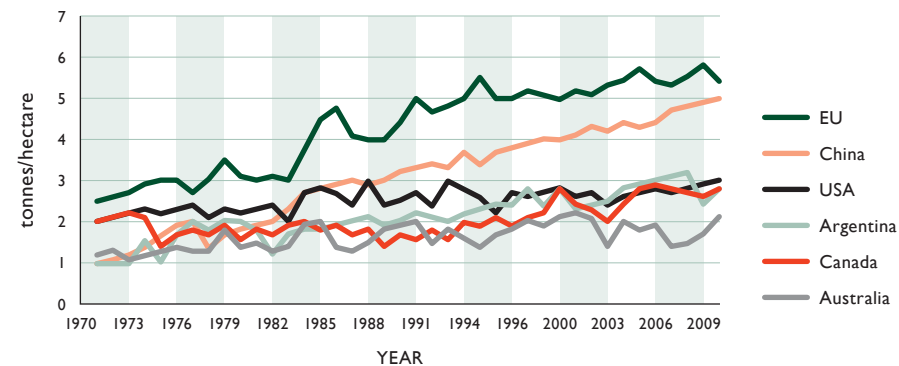


*The private sector will invest just over 2% in cereal R&D by 2012.*

Source: CSTA Survey, Government of Canada Main Estimates

## THE RELATIONSHIP BETWEEN INVESTMENT AND PRODUCTIVITY

### Wheat Yields



*The effect of this lack of investment is clearly evident when Canada's wheat yield improvements are compared to those of our competitors: the EU, China, the United States and Argentina.*

Source: USDA

# Make Our Plan Your Plan

## Create –

Flexible and efficient regulatory and intellectual property environments that attract domestic and international investment

## Stand up –

For science as the foundation for regulatory and trade decisions and rules

## Innovate –

Create innovative programs and incentives to encourage investment

## Invest –

In regulatory capacity to foster innovation and in public plant breeding and research to complement private sector investment

## Expand –

Domestic and international markets by breaking down barriers and promoting Canadian innovation

**FOR MORE INFORMATION,  
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*Headquartered in the nation's capital, the Canadian Seed Trade Association (CSTA) represents the interests of 132 corporate members engaged in all aspects of seed research, production and marketing, both domestically and internationally.*