

Pulse Crop Development and Research in Western Canada

Albert Vandenberg

NSERC Industrial Research Chair in Lentil Genetic Improvement

*Department of Plant Sciences / Crop Development Centre
University of Saskatchewan*

Slow Food Movement

SLOW EDUCATION MOVEMENT

Worked in family business at age 3 - 14 yrs

Primary and secondary education 11.5 yrs

Secondary education B,M,P (16 years)

Legumes = N + 3E

- ***N***utritional importance
- ***E***cological importance
- ***E***nvironmental importance
- ***E***conomic importance

Mammals (millions)

<i>Animal</i>	<i>1974</i>	<i>2014</i>	<i>% increase</i>
Asses	48	50	5
Buffaloes	131	219	67
Camels	17	28	63
Camelids	6	9	40
Cattle	1224	1600	31
Goats	458	1195	161
Sheep	1122	1412	26
Pigs	950	1467	54
<i>Total Domesticated Animals</i>	3956	5979	51
Humans	4013	7141	78

Source: FAOSTAT

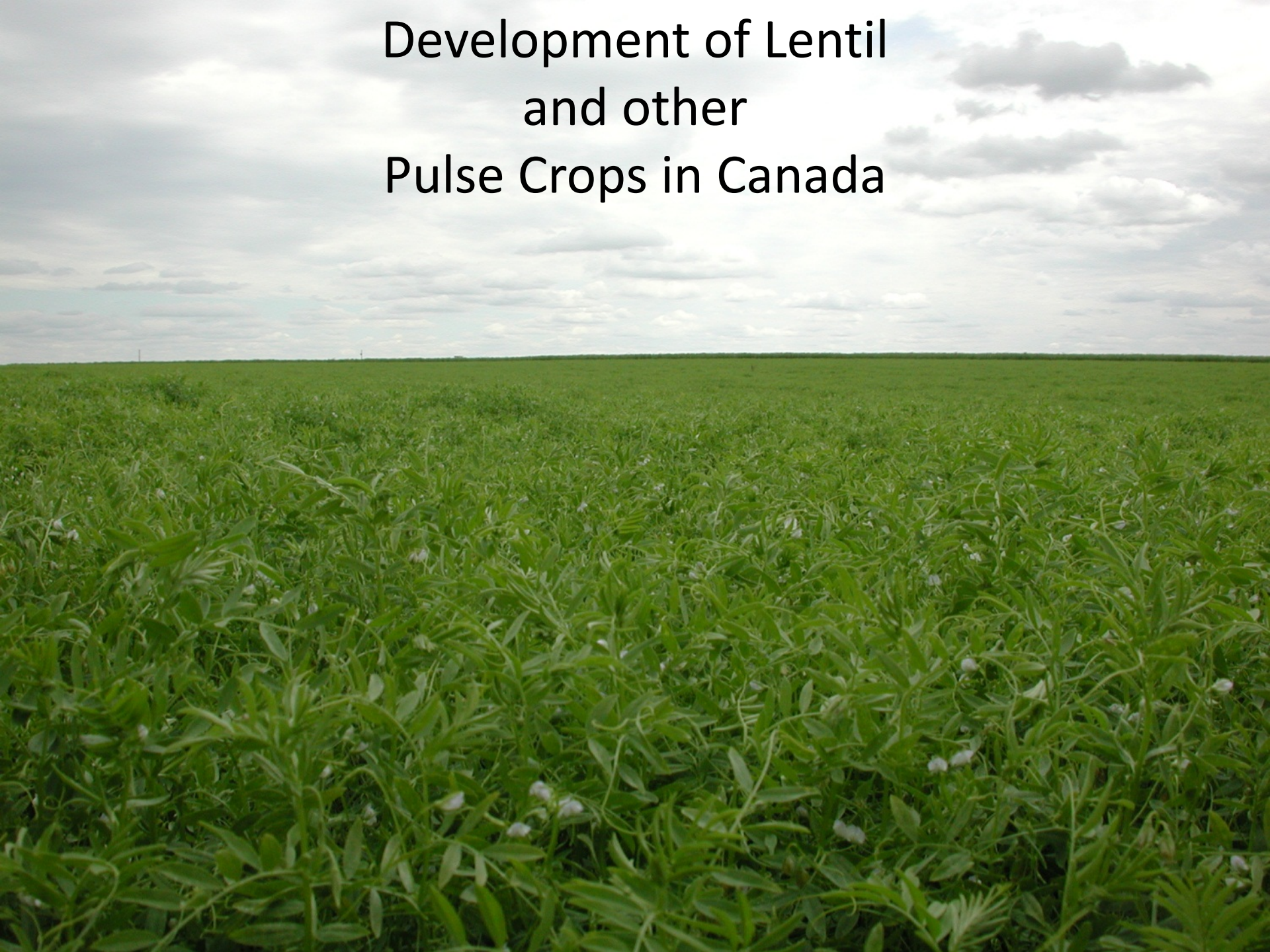
	<i>MMt of Annual Production</i>		
Crop	1970-74	2010-14	% increase
Barley	136	135	0
Maize	303	931	208
Palm oil	2	51	2105
Potato	288	367	27
Rice	322	727	126
Sorghum	59	59	-1
Soybean	50	271	445
Sugar Cane	602	1825	203
Tomato	40	127	220
Wheat	346	691	100
Total	2147	5184	141

	<i>Mt of Annual Production</i>		
Crop	2010-14	% growth 1974-2014	Main Food/ Diet Group
Barley	135	0	Beer
Maize	931	208	Carbs
Palm oil	51	2105	Fat
Potato	367	27	Chips
Rice	727	126	Carbs
Sorghum	59	-1	Carbs
Soybean	271	445	Fat/Protein
Sugar Cane	1825	203	Alcohol/Sugar
Tomato	127	220	Ketchup
Wheat	691	100	Carbs
Total	5184	141	

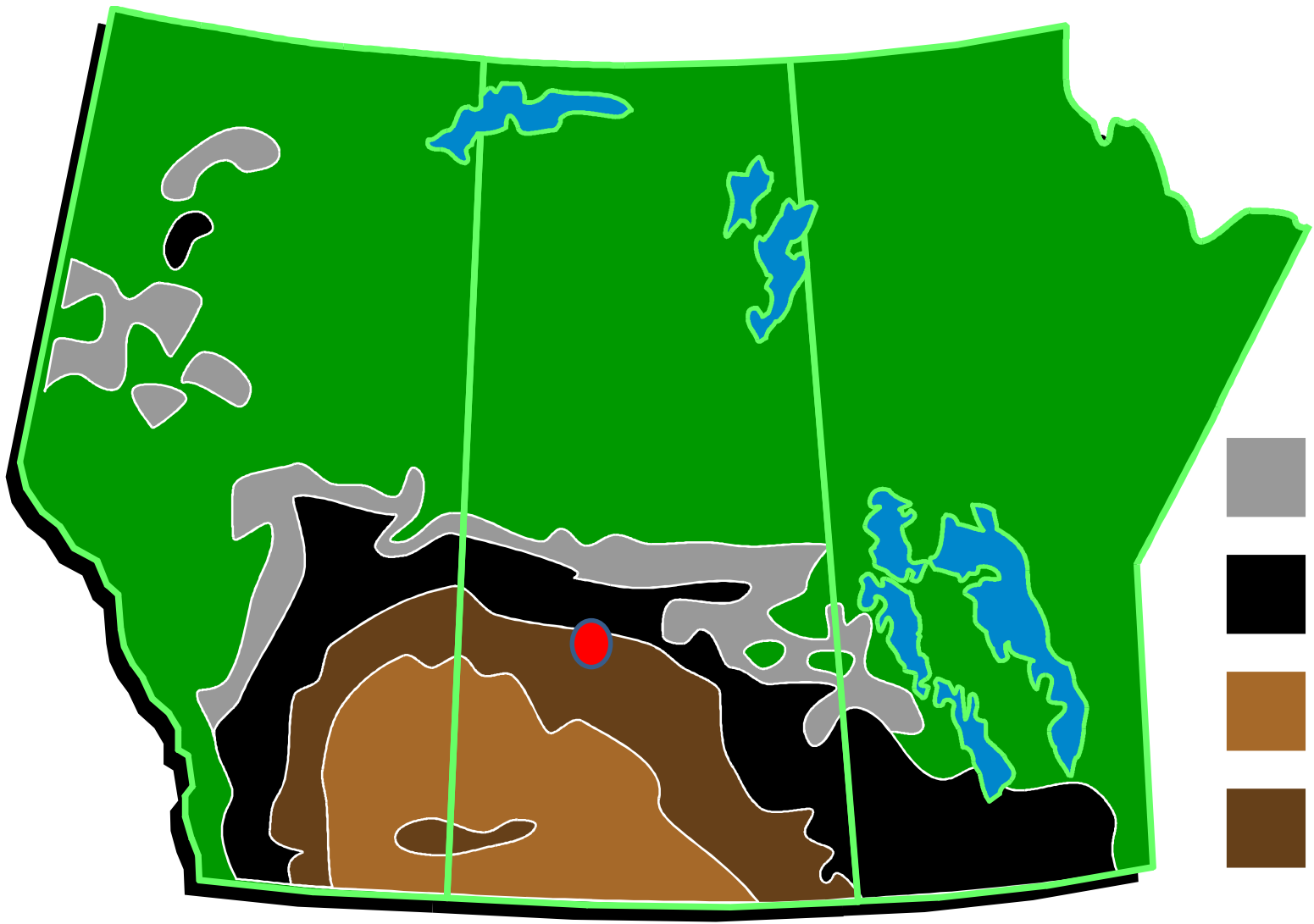
Millions of Tonnes Annually

	1970-1974	2010-14	% growth	% protein
Common bean	12.7	23.9	89	23
Faba	4.4	4.3	-2	30
Chickpea	6.5	12.4	90	23
Cow Pea	1.2	6.7	444	23
Lentil	1.1	4.8	340	25
Pea	9.2	10.9	19	23
Pigeon Pea	2.0	4.3	121	22
All Pulses	37.1	67.4	82	
Soybean	49.7	270.9	445	43
Groundnut	17.9	41.6	133	26
Humans			80	

Development of Lentil and other Pulse Crops in Canada







The IMPOSSIBLE Dream

The 20% Solution in Western Canada

- ❖ *20% of the land base in annual legumes*
- ❖ *Profitable and sustainable crop rotations*
- ❖ *2 possible pulse crop options on every farm*
- ❖ *2 market class options on every farm*

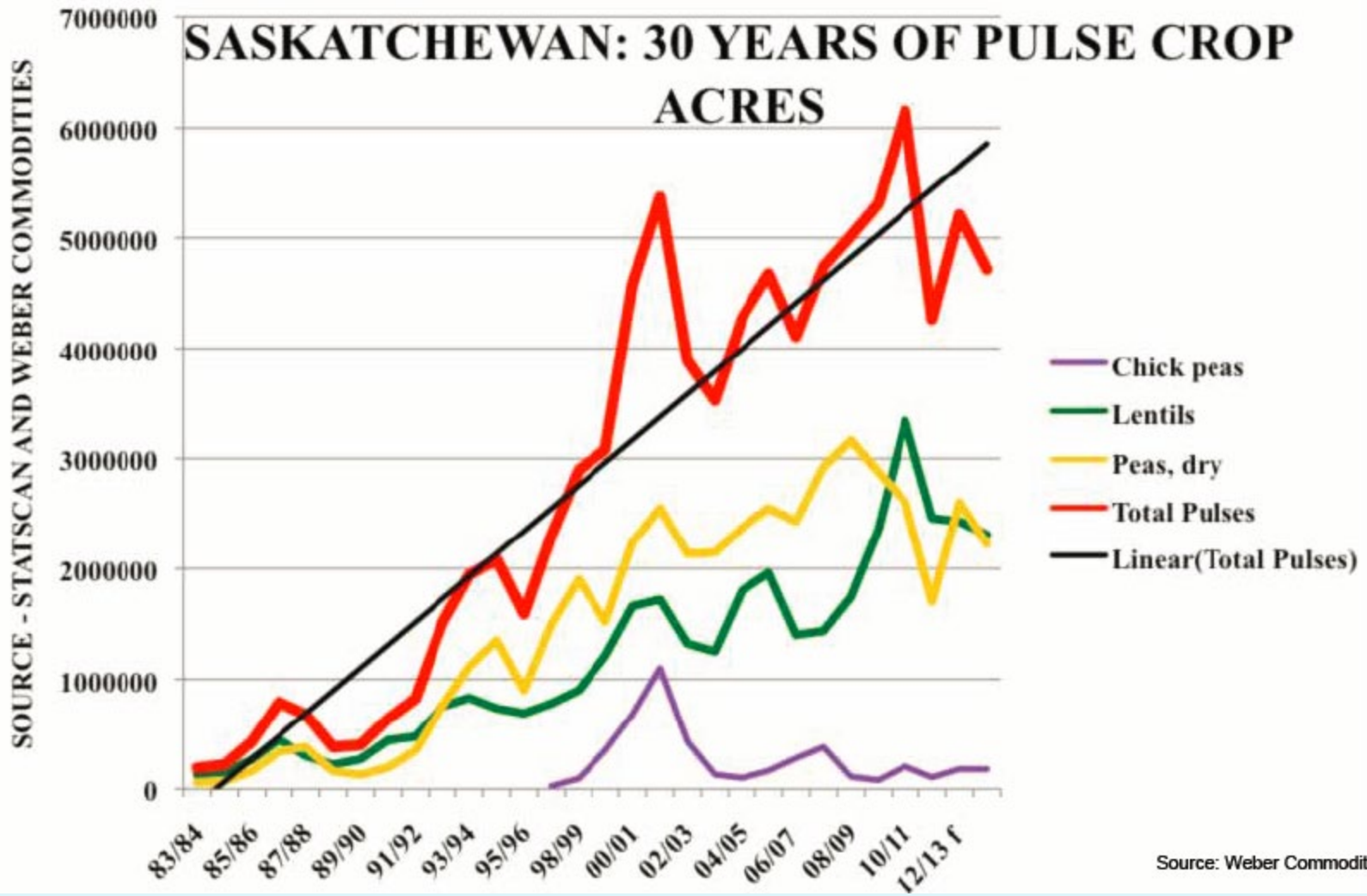
Plant Protein Production

The IMPOSSIBLE Dream

The 20% Solution in Western Canada

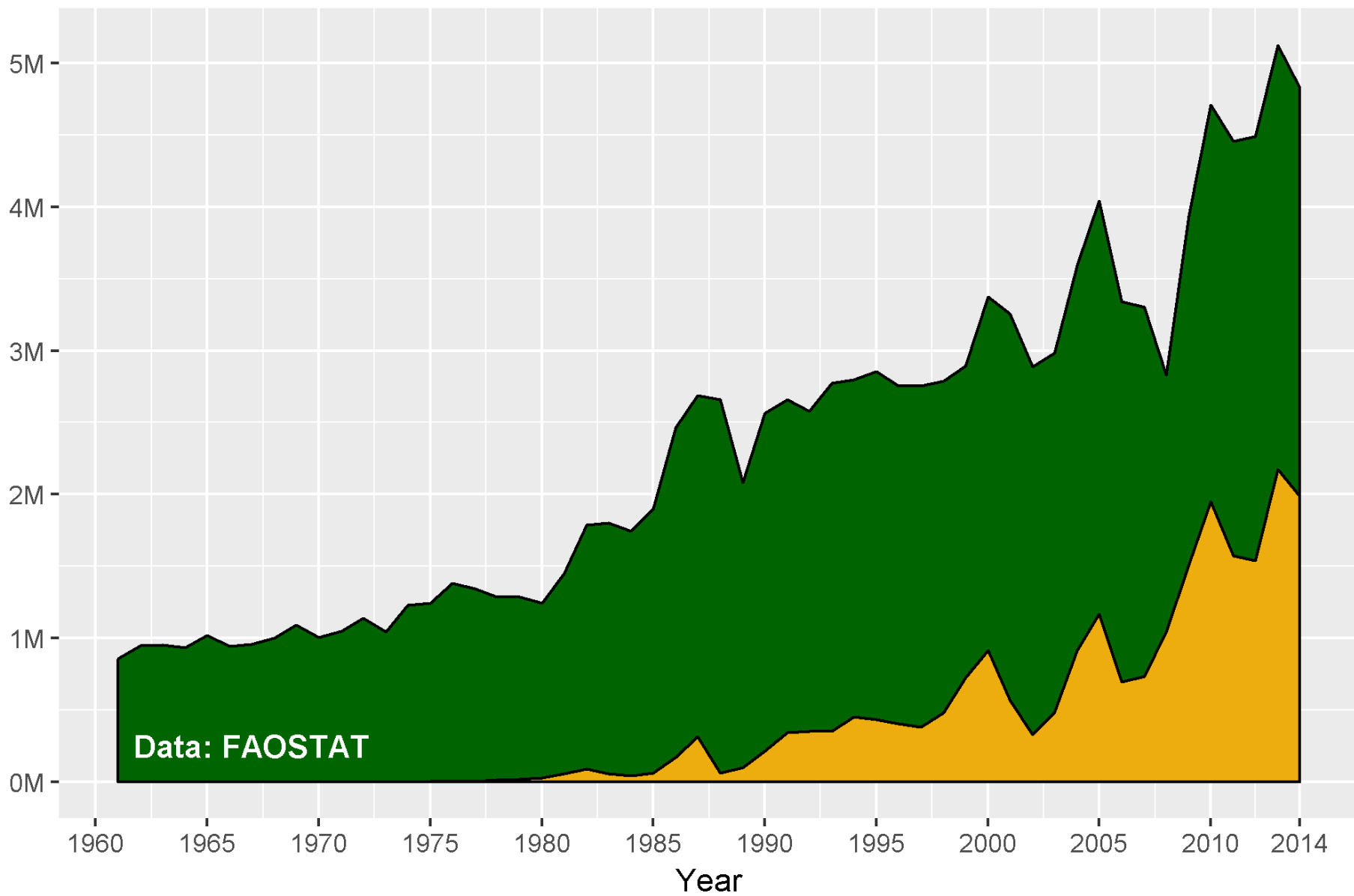
- ❖ *20% of the land base in annual legumes*
- ❖ *Profitable and sustainable crop rotations*
- ❖ Disease cycles, soil health, nitrogen cost, economic diversity, biological diversity

Plant Protein Production



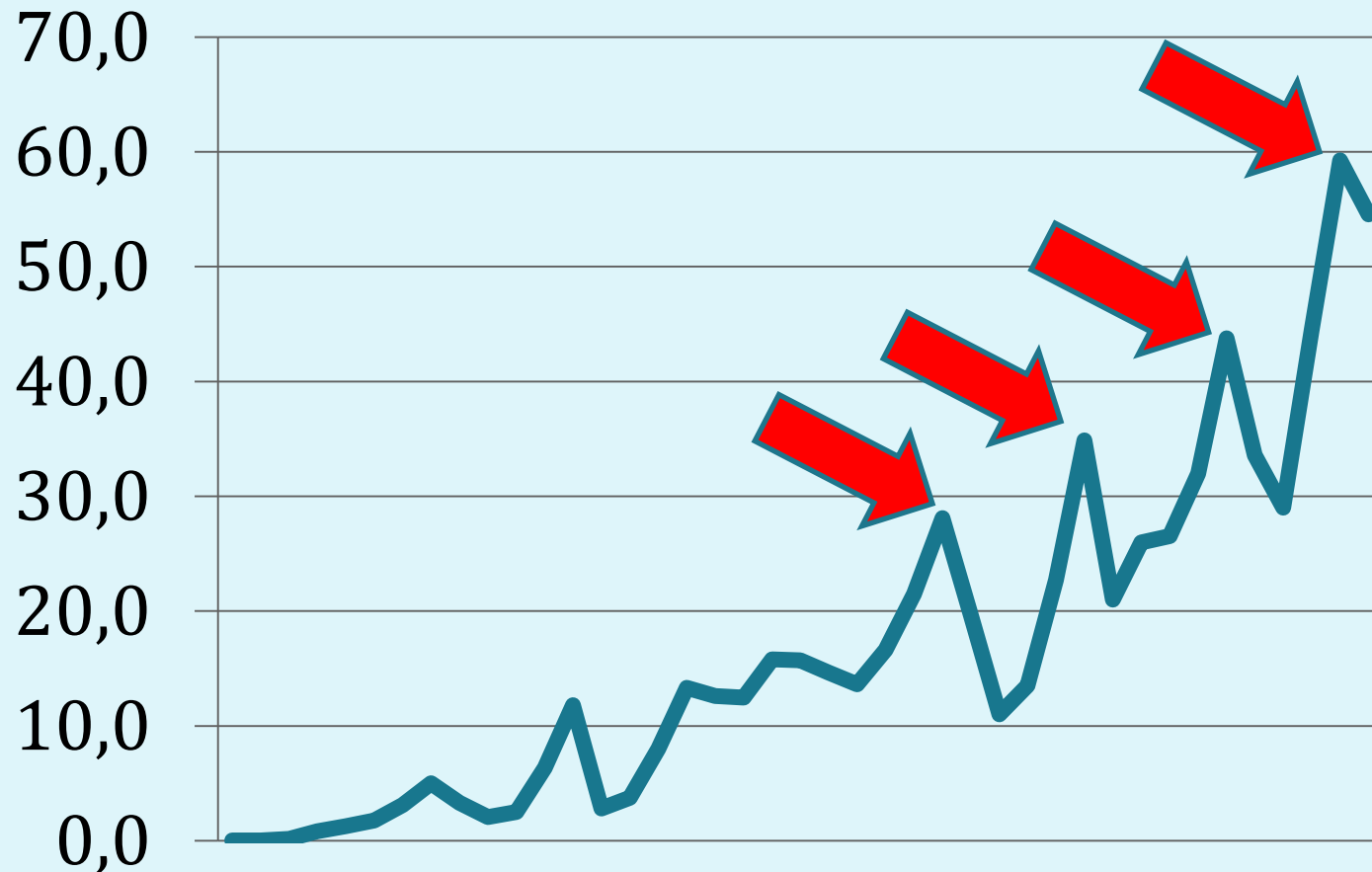
Area ■ Rest of World ■ Canada

Lentil Production (tonnes)



Data: FAOSTAT

Canada Lentil Production % of World Production 1974-2016



Lentils – Whole Food Products



Main Drivers of Successful Pulse Crop Development in Saskatchewan (So Far...)

- *Participation by producers, exporters, researchers*
- Extension of knowledge
- Appropriate germplasm development system
- Research and development funding system
- Good relations with a patient provincial government
- Long term vision of basic farming principles
- Collapse of cereal-based subsidy system
- Focused research priorities with *s, m, l* term goals
- Over-delivery strategy for research outputs
- Freedom to operate (university system)

Lentil Crop Development – A Short History of Progress

1970s – plant introduction phase

1980s – crop development phase

1990s – crop expansion phase – breeding begins

2000s – breeding scope enhancement & investment

2010s – genomics era integration with breeding

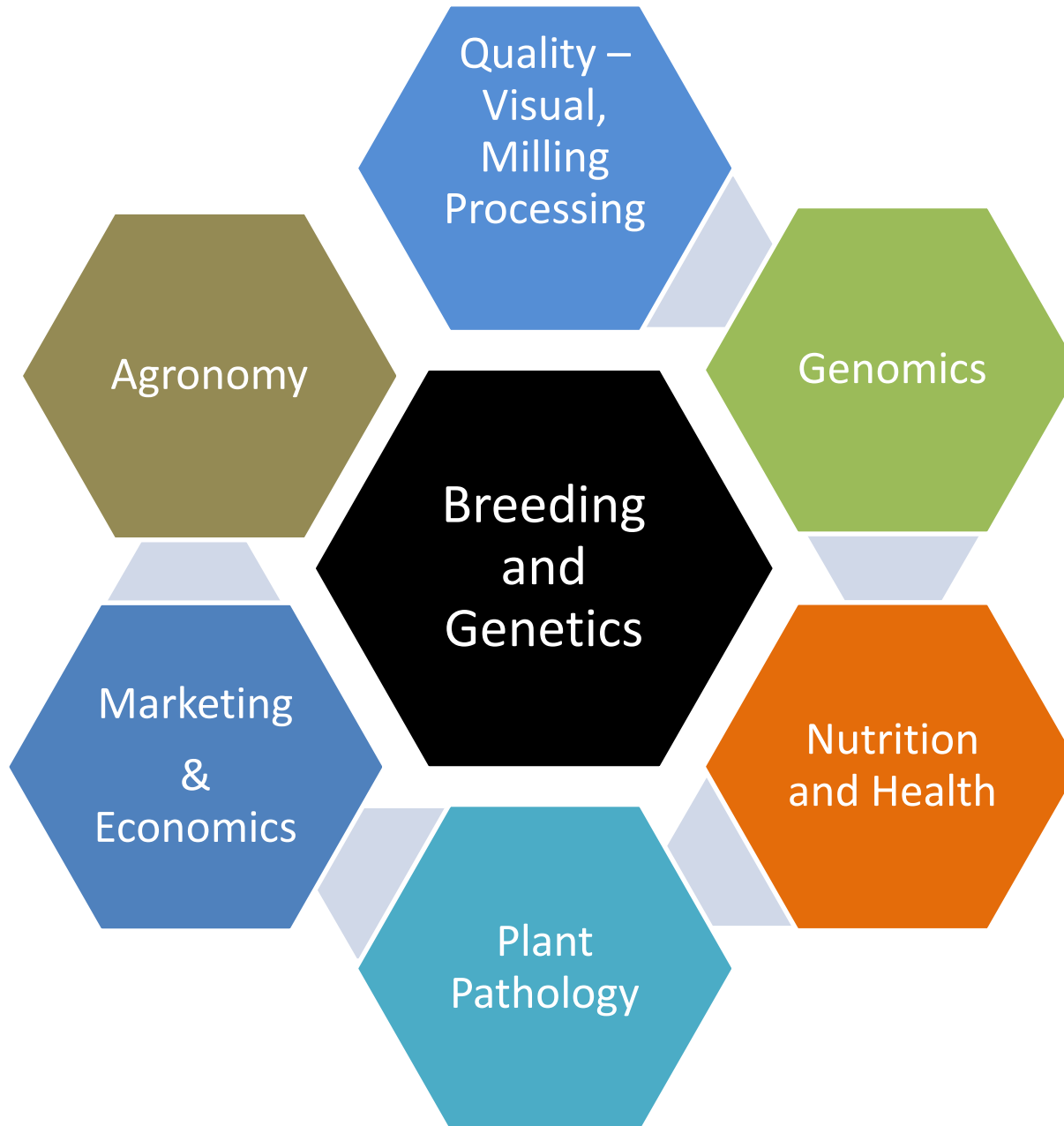
❖ Introduction, breeding, basic agronomy, weed control, seeding, harvesting, storage

- ❖ Production agronomy – zero tillage, airseeding, herbicides, inoculation
- ❖ Investments - cleaning, processing, exporting, dehulling

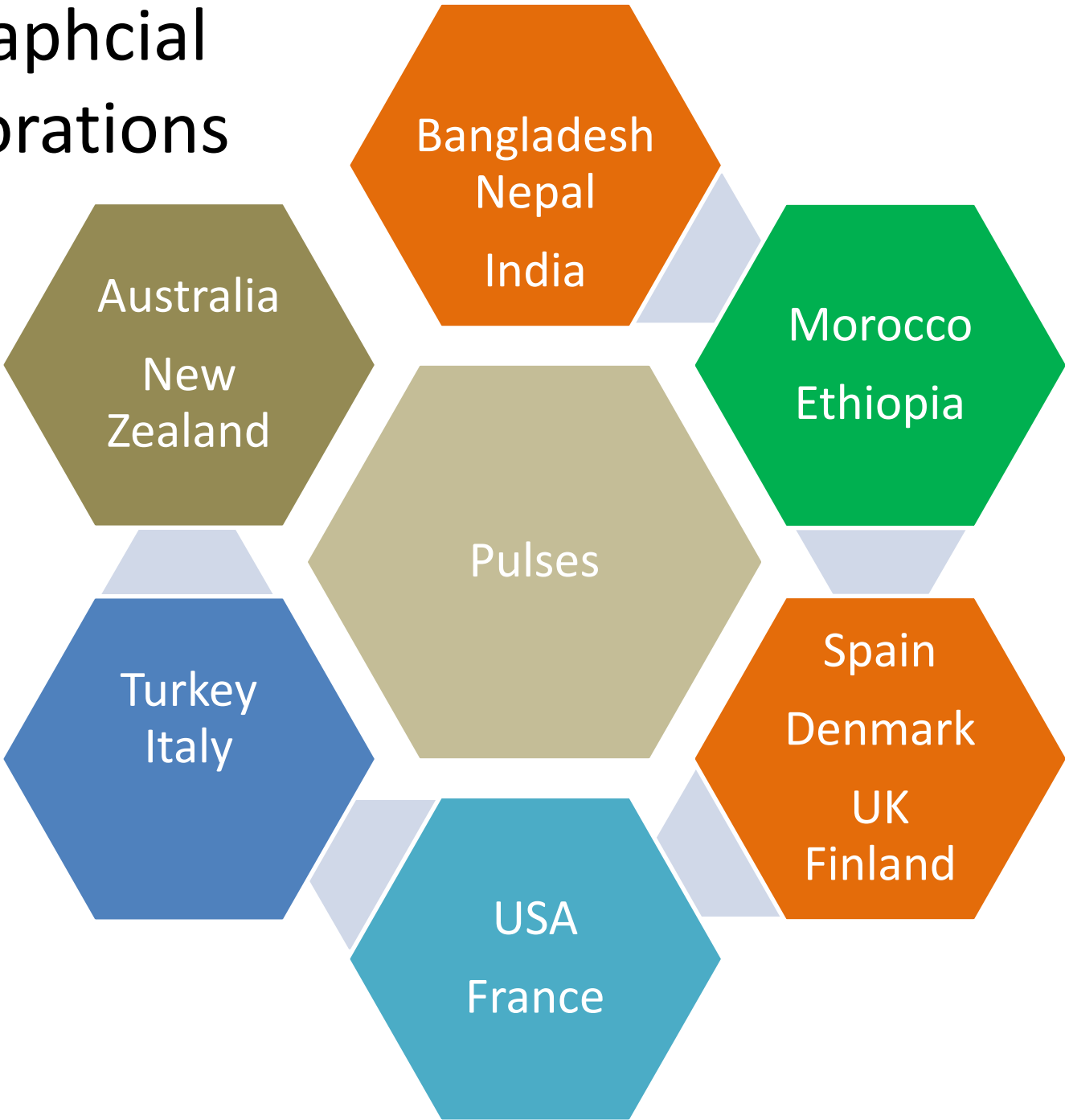
- ❖ Yield, quality, disease resistance, lodging, herbicide tolerance,
- ❖ Market diversification

- ❖ Genetic and genomic resources
- ❖ Market diversification
- ❖ Product diversification

Required Interdisciplinary Collaborations



Geographical Collaborations



Systems of Survival
Jane Jacobs

**Guardian
System**

Agriculture

**Commercial
System**





Attencion Leguministas!!

Get Ready for Faba Bean Protein!!