Economics of Native Seed Production for Reclamation of Disturbed Lands in Wyoming

University of Wyoming

Betsy Mock
Kristiana Hansen
Roger Coupal

INTRODUCTION

- Motivation/Background
- Interviews
- Enterprise budgets
- Laboratory Experiment
- Conclusion and Recommendations

Why is the Native Seed Industry Important?

- Native seed supply is a vital component in the reclamation process in the West.
- Types of Reclamation in Wyoming
  - Over 70,000 working oil and gas wells
  - 21 coal mines
  - 231 highway improvement projects
  - 73,865 acres burned (7-year) average
- Federal Lands make up 48% of Wyoming's total acreage

http://www.drillingahead.com/photo/ensign-rig-86-5242007?xg_source=activity

The Problem

- Reclamation Practitioners want more grass, forb, and shrub seed, but seed producers/collectors are not delivering either the right species or quantities, at the required time.
- Some species are in excess supply and some species are in excess demand

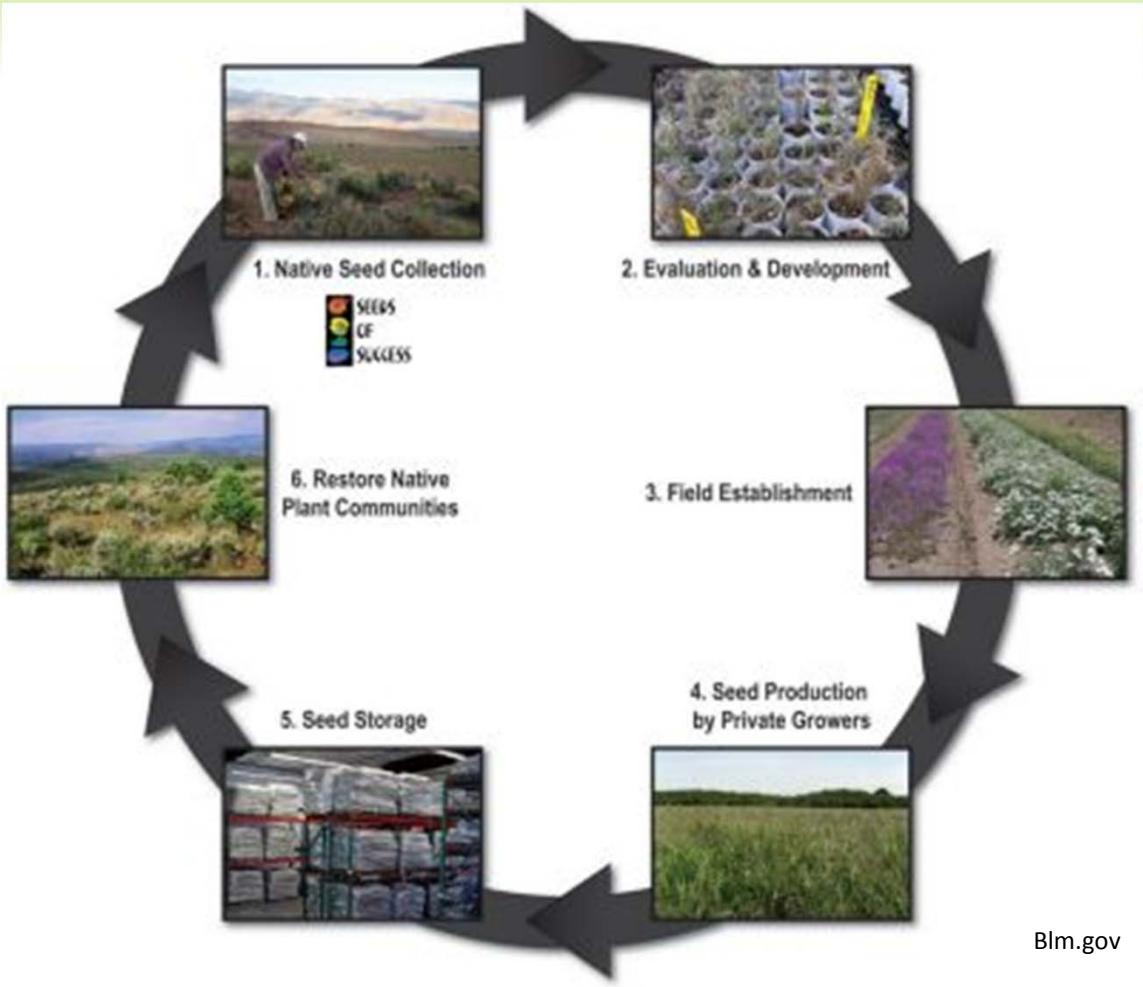
www.windriverseed.com

BACKGROUND

- The biological theory is that native plants may be the best at restoring particular ecosystem functions with the least amount of unintended side effects.
- Native plants are not like commodity crops
  - Survival and dormancy mechanisms
  - Potential symbiotic requirements
- Wyoming is unique among the 11 Western States
  - BLM policy in Wyoming obligates the use of native plant material with few exceptions
  - Wyoming does not have major fire cycles like many other Western states
    - At least partially attributed to lower amounts of cheatgrass and other early-maturing invasive grasses

https://attra.ncat.org/attra-pub/grassland.html

Background: Lifecycle of Native Seed



Blm.gov

OBJECTIVES

- What needs to be done now?
  - Forming a general picture of the native seed market landscape
  - Understanding Production and Demand Requirements
    - Biology/Ecology
    - Cultural Practices
  - What can be done to facilitate this market?
    - How do different market structures affect the profits of native seed producers?
    - What market structure is the best for the native seed market?

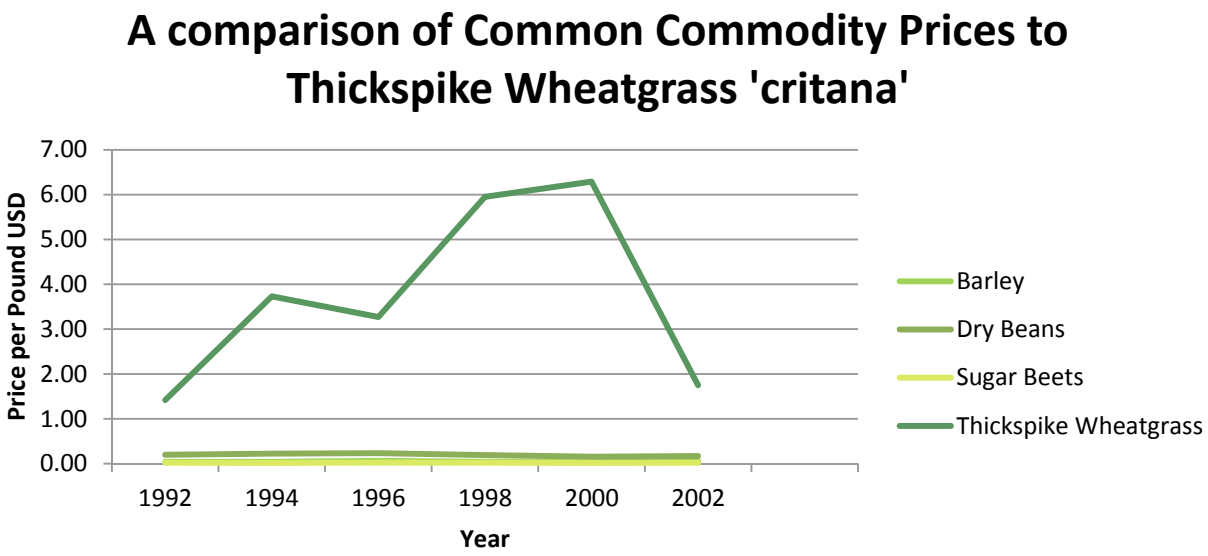
Interviews: Market Players

- Supply
  - Producers
  - Intermediaries
  - Federal research centers
- Demand
  - Buyers aka Responsible Party
  - Subcontractors
- Regulators
  - Regulators are also buyers (BLM, etc.)

http://www.santafebotanicalgarden.org/HERB%20PAGES/H%20IndianRiceGrass.html

Interviews: Market Overview

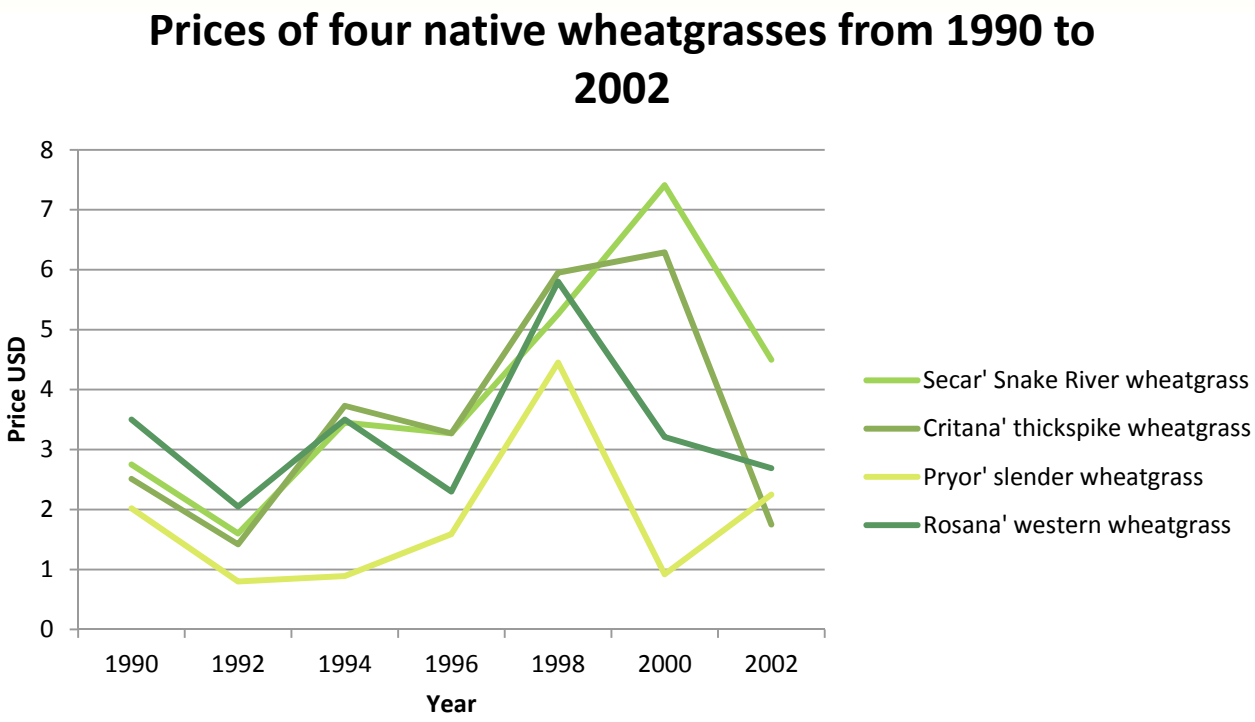
- The native seed market is relatively young and much more volatile than other common Wyoming commodities.
  - There are extreme fluctuations in the native seed industry's prices and quantities demanded.
  - Peaks and troughs vary in both breadth and depth.



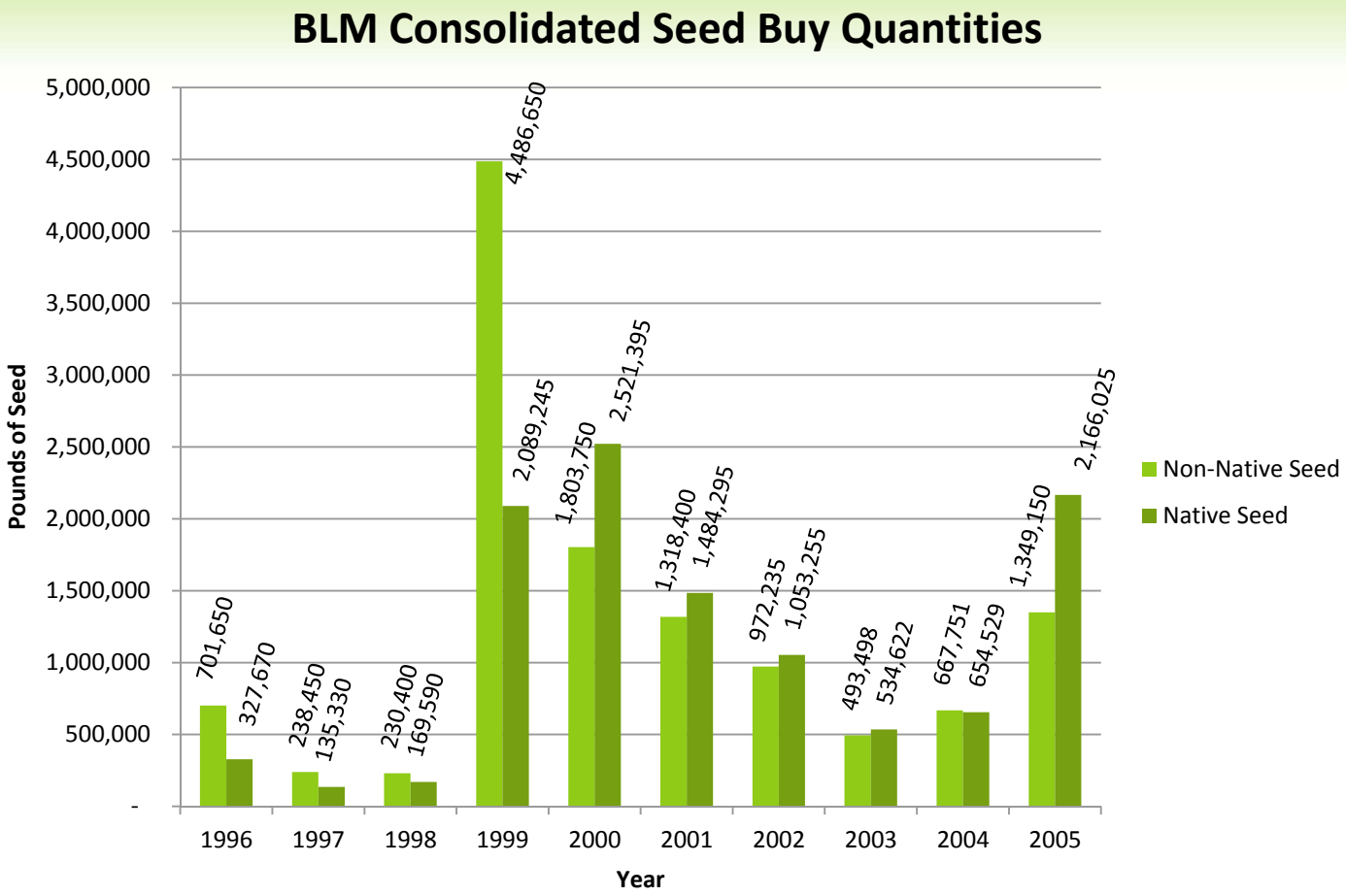
Interviews: Market Uncertainty

Type of Uncertainty	Supply uncertainty is caused by:	Demand uncertainty is caused by:
Market	Species and quantity demanded can be impulsive and unpredictable, 2-yr commitment	Species and quantity availability can be sporadic
Financial	Producer liquidity and operating capital; Loan flexibility	Emergency Funds vs. Yearly budget funds
Meteorological	Precipitation and climatic variability	Precipitation and climatic variability, Fire, Multiple reclamation attempts at same site.
Biological/Ecological	Plant survival methods, Genotypes, and Ecosystem interactions are not fully understood.	Plant survival methods, Genotypes, and Ecosystem interactions are not fully understood.
Philosophical/Situational	Local vs. broad genotype usage	Local vs. broad genotype usage
Regulatory	Regulations governing native seed change rapidly and without adequate warning time .	Regulations governing native seed change rapidly and without adequate warning time. The degree to which substitution of species is allowed.

Interviews: Example of Price Volatility



Interviews: Example of Quantity Volatility



Interviews: Summary

- Production knowledge is crucial for producers, regulators, and reclamation agents.
- More research into the biology and ecology of species is needed.
- Both Supply and demand players acknowledge dysfunction.
- The BLM is the big buyer, making up 70%-80% of all demand if we include individual district office buys and seed bought through the BLM by private industry.
- The way in which federal funds are allotted to the BLM accounts for much of the variability in demand.
- Market uncertainty comes from multiple sources, which makes meeting demand a gamble for producers. So diversity in production and producer liquidity are essential for producer survival.

Partial Enterprise Budgets

- Enterprise budgets
  - An overview of production economics
    - Forbs and Shrub Issues
    - Thickspike Wheatgrass ‘critana’
    - Indian Ricegrass
  - Capital costs are not included as capital structures can vary widely among different farms.

http://www.wy.blm.gov/jio-papo/papo/reclamation.htm

Partial Enterprise Budgets: Thick Spike Wheatgrass Summarized

		$/Per Acre	$/Per Field (30 acres)			Average Yield Lbs/Acres
	Field Prep and planting	$ 514.00	$ 15,420.00		Year 0	-
	Yearly Crop Maintenance	$ 918.00	$ 27,540.00		Year 1	1,200.00
	Harvest*	$ 438.00	$ 13,140.00		Year 2	900.00
	Field & Seed Fees	$ 486.50	$ 486.50		Year 3	600.00
	Total Cost	**$ 2,356.50**	**$ 56,586.50**		Year 4+	200-300
	Market Price	Income Per Acre	Total Income (30 acres)	Net Income (30 acres)		
Break Even Price	***$ 1.57***	***$ 1,887.90***	***$ 56,637.00***	***$ 50.50***		
Current Price	***$ 2.50***	***$ 4,393.50***	***$ 131,805.00***	***$ 75,218.50***		
1990	$ 2.51	$ 4,420.50	$ 132,615.00	$ 76,028.50		
1992	$ 1.42	$ 1,477.50	$ 44,325.00	**$ (12,261.50)**		
1994	$ 3.73	$ 7,714.50	$ 231,435.00	$ 174,848.50		
1996	$ 3.27	$ 6,472.50	$ 194,175.00	$ 137,588.50		
1998	$ 5.95	$ 13,708.50	$ 411,255.00	$ 354,668.50		
2000	$ 6.29	$ 14,626.50	$ 438,795.00	**$ 382,208.50**		
2002	$ 1.75	$ 2,368.50	$ 71,055.00	$ 14,468.50		
*Does not include storage costs						

Partial Enterprise Budgets: Indian Rice Grass Summarized

		$/Per Acre	$/Per Field (30 acres)			Average Yield Lbs/Acres
	Field Prep and planting	$ 521.00	$ 15,630.00		Year 0	-
	Yearly Crop Maintenance	$ 933.00	$ 27,990.00		Year 1	800.00
	Harvest*	$ 368.00	$ 11,040.00		Year 2	600.00
	Field & Seed Fees	$ 555.50	$ 555.50		Year 3	600.00
	Total	**$ 2,377.50**	**$ 55,215.50**		Year 4	500.00
					Year 5	500.00
	Market Price	Income Per Acre	Total Income (30 acres)	Net Income (30 acres)		
Break Even Price	**$ 1.81**	**$ 1,846.50**	**$ 55,395.00**	**$ 179.50**		
	$ 2.00	$ 2,416.50	$ 72,495.00	$ 17,279.50		
	$ 3.00	$ 5,416.50	$ 162,495.00	$ 107,279.50		
Current Price	**$ 3.50**	**$ 6,916.50**	**$ 207,495.00**	**$ 152,279.50**		
	$ 4.00	$ 8,416.50	$ 252,495.00	$ 197,279.50		
	$ 5.00	$ 11,416.50	$ 342,495.00	$ 287,279.50		
*Does not include storage costs						

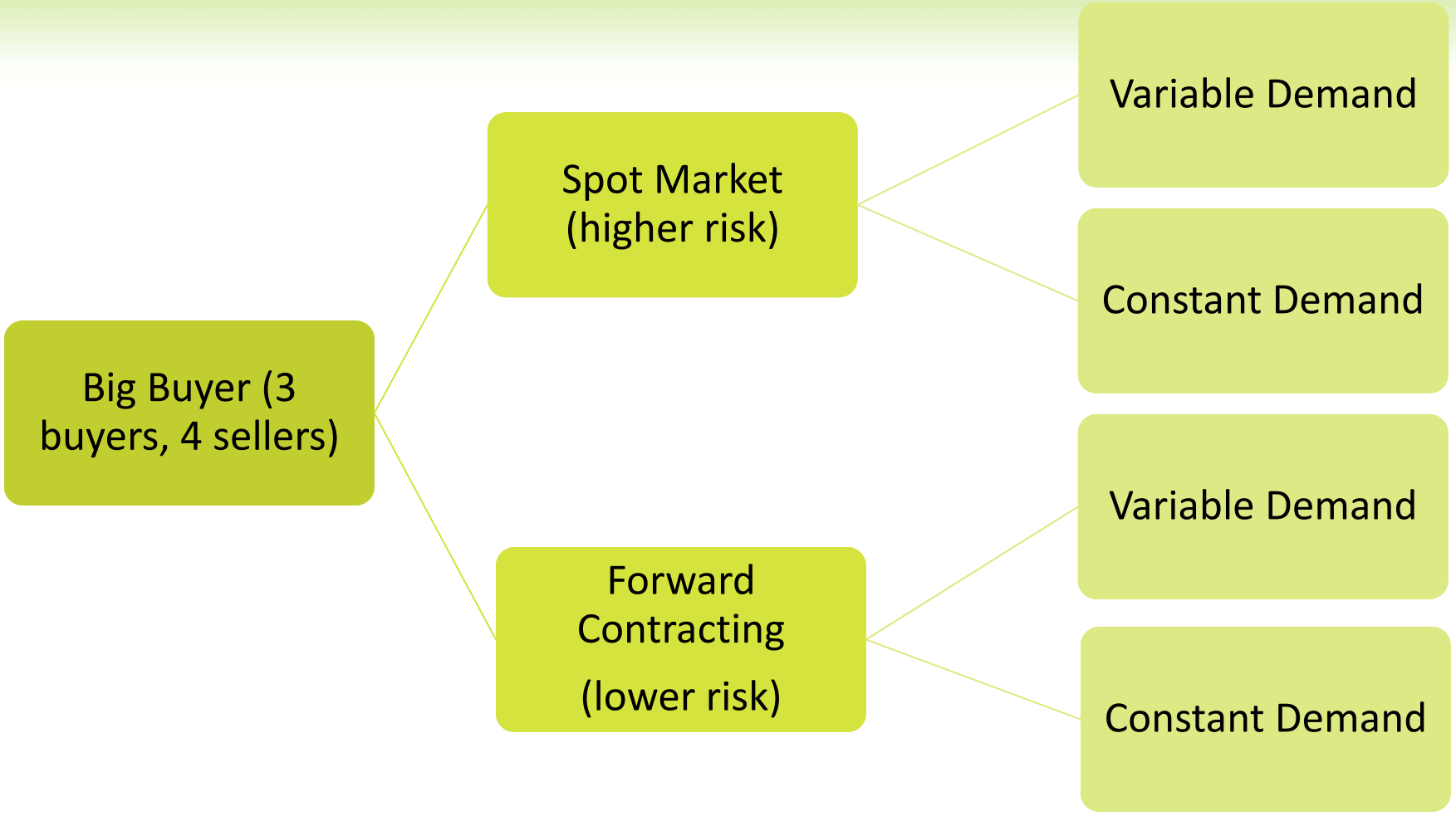
Enterprise Budgets: Summary

- Input costs and time commitment are significant.
  - Opportunity costs are even more significant, especially since most native grasses grown in Wyoming take a minimum of 2 growing seasons
  - Prices can fluctuate greatly between successive seasons, so the highs need to be able to make up for the lows.
- Significant biological differences between species equals significant production and returns differences

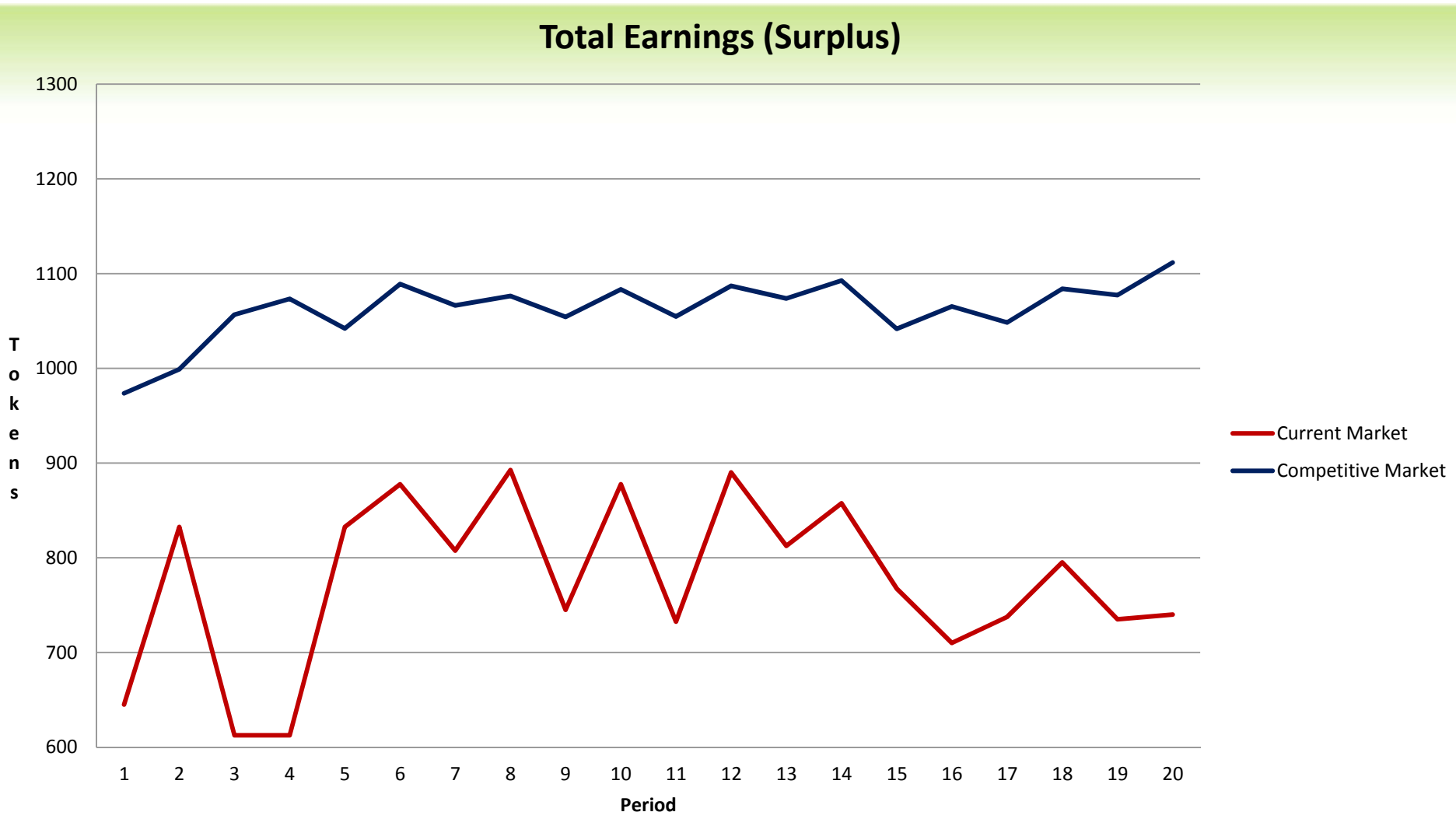
Lab Experiment

- We conducted market experiments to simulate the native seed market using economic principles.
  - Lack of real world data
  - Controls for outside influences on market behavior
    - Test the direct relationship between market behavior and differences in market structures.
  - Lab experiments are reasonably predictive
  - Better understand the relationship between supply and demand under a big buyer scenario
  - Rounds out the rest of the research on the native seed industry

Lab Experiment: Big Buyer Treatments



Lab Experiment: Results



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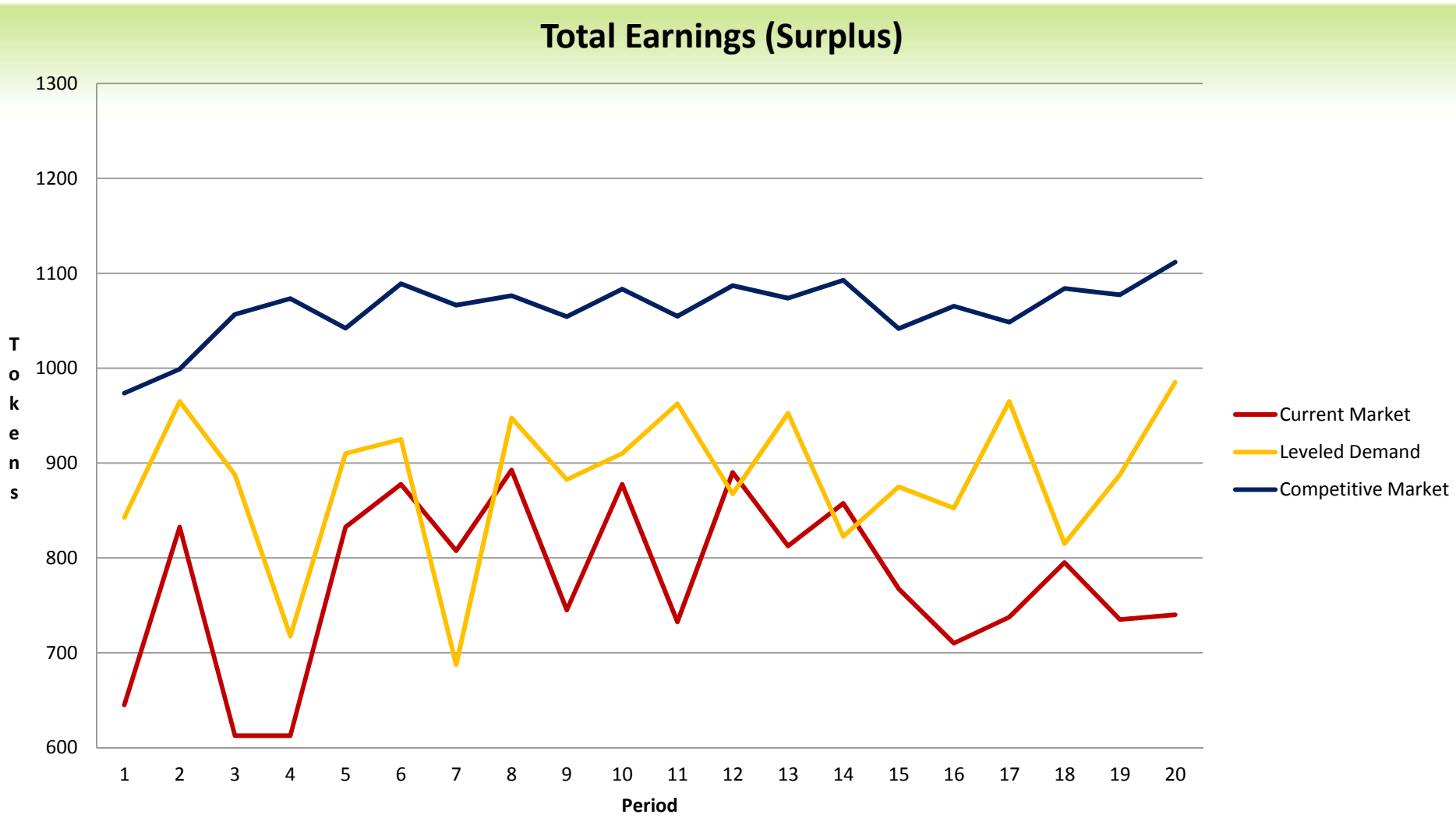

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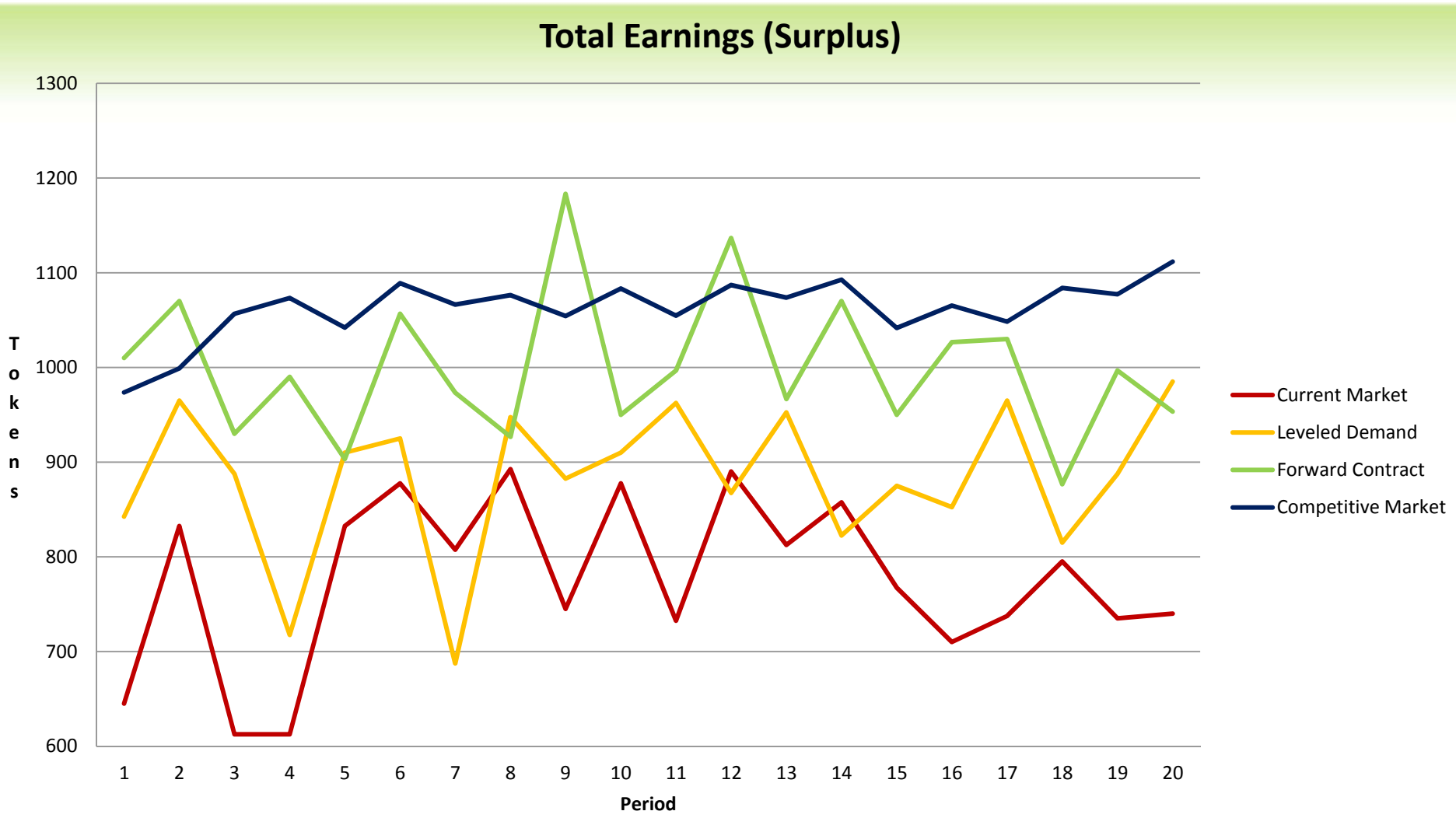

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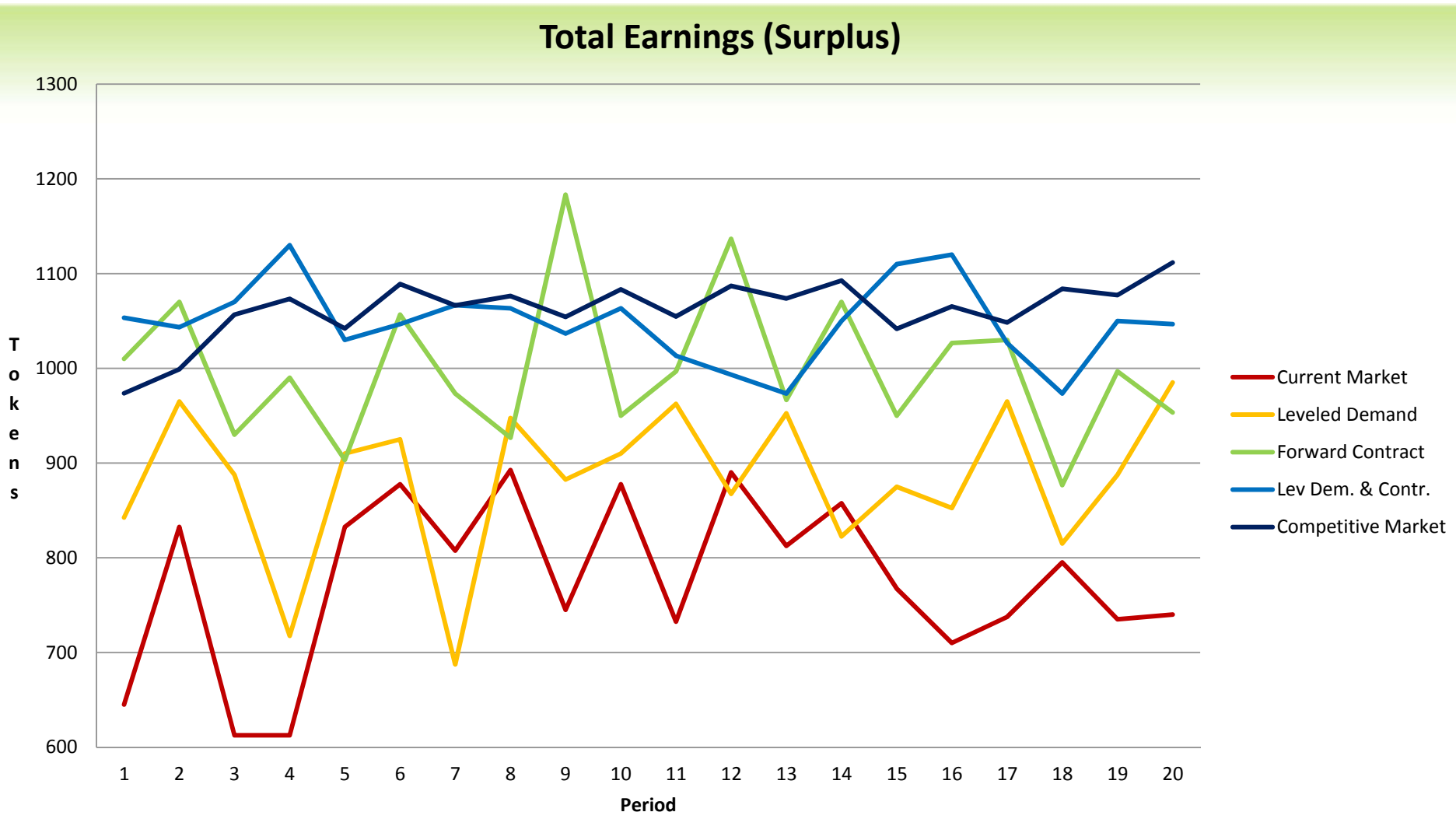
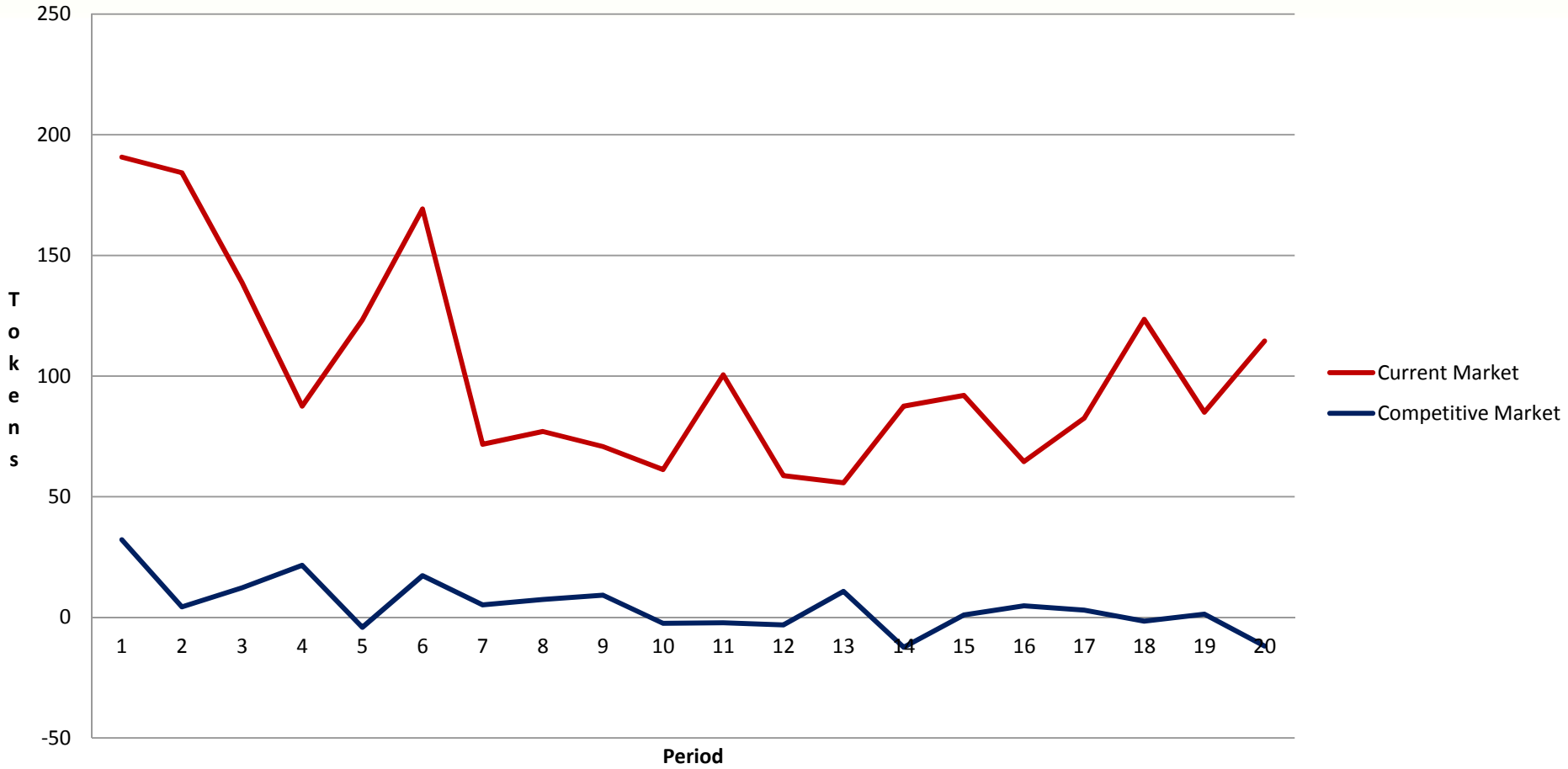


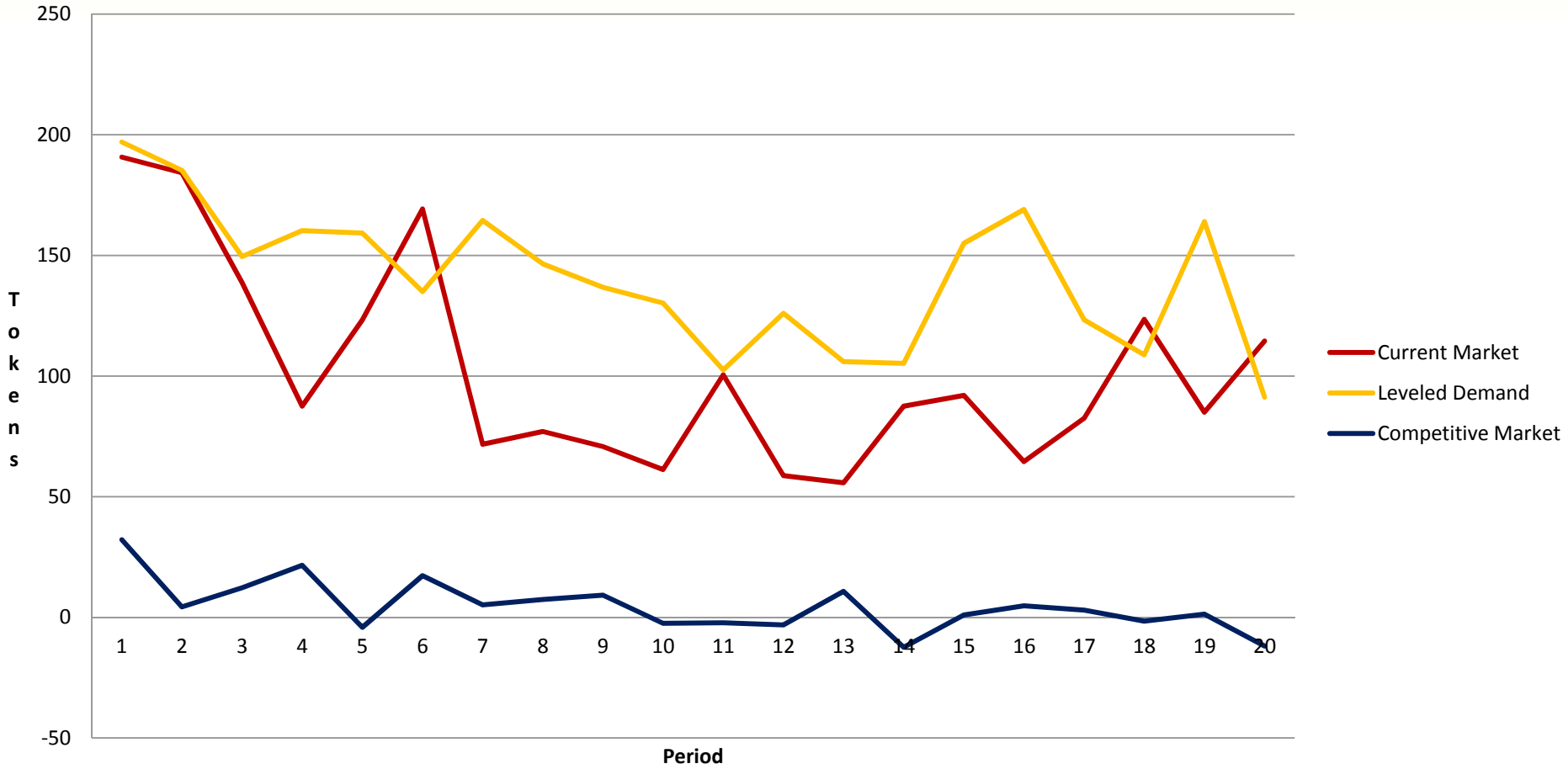
Lab Experiment: Results

- Current general market structure is spot-market with variable demand and a big buyer.
  - The current market structure earns the least amount of total profit.
  - Leveling demand increases total market earnings
  - Forward contracting increases total market earnings more than leveling demand
  - Forward contracting and leveling demand together show the greatest increase in total market earnings
  - Total market earnings do not show the relationship between sellers and buyers

Lab Experiment: Results



Lab Experiment: Results



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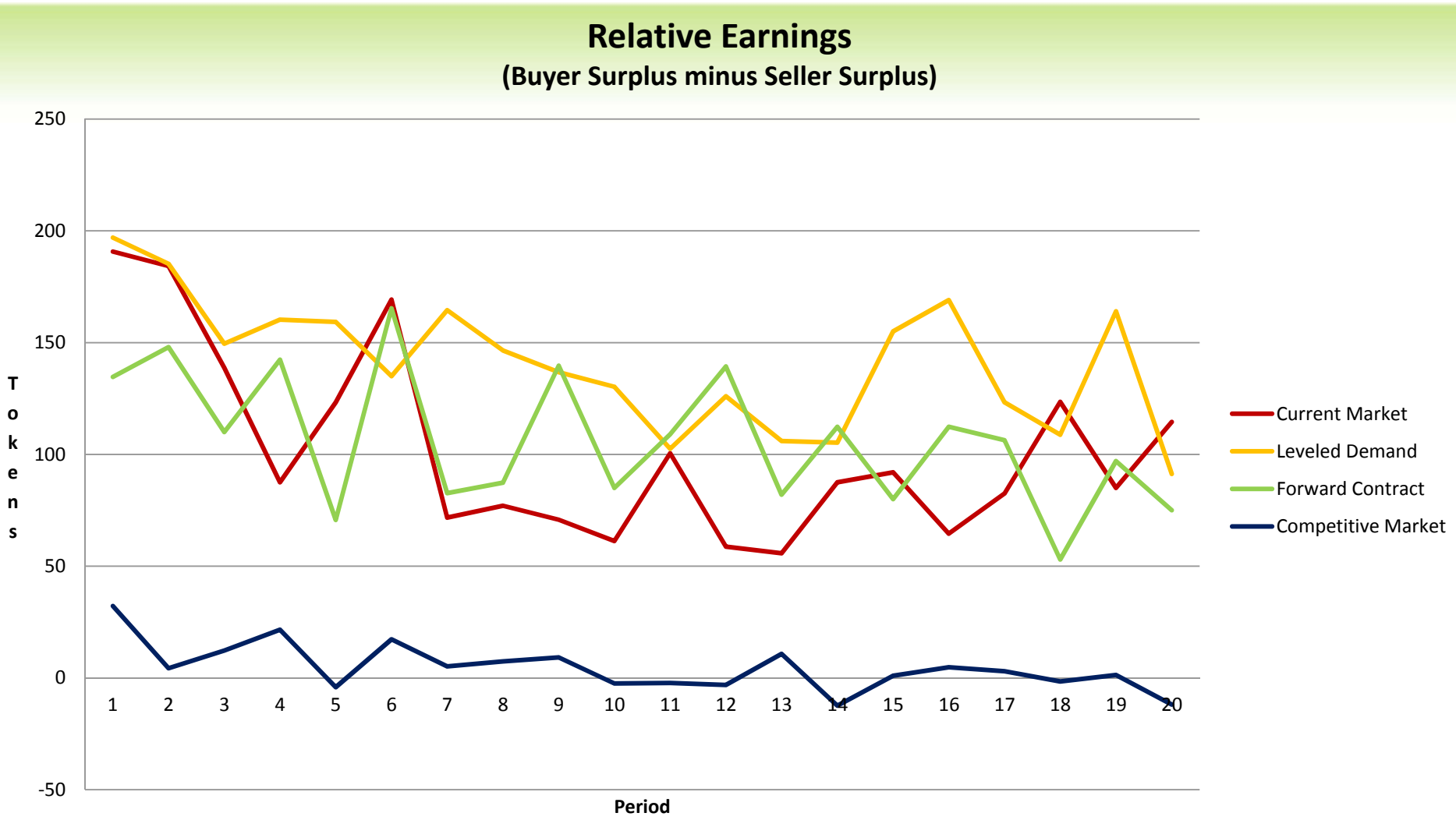
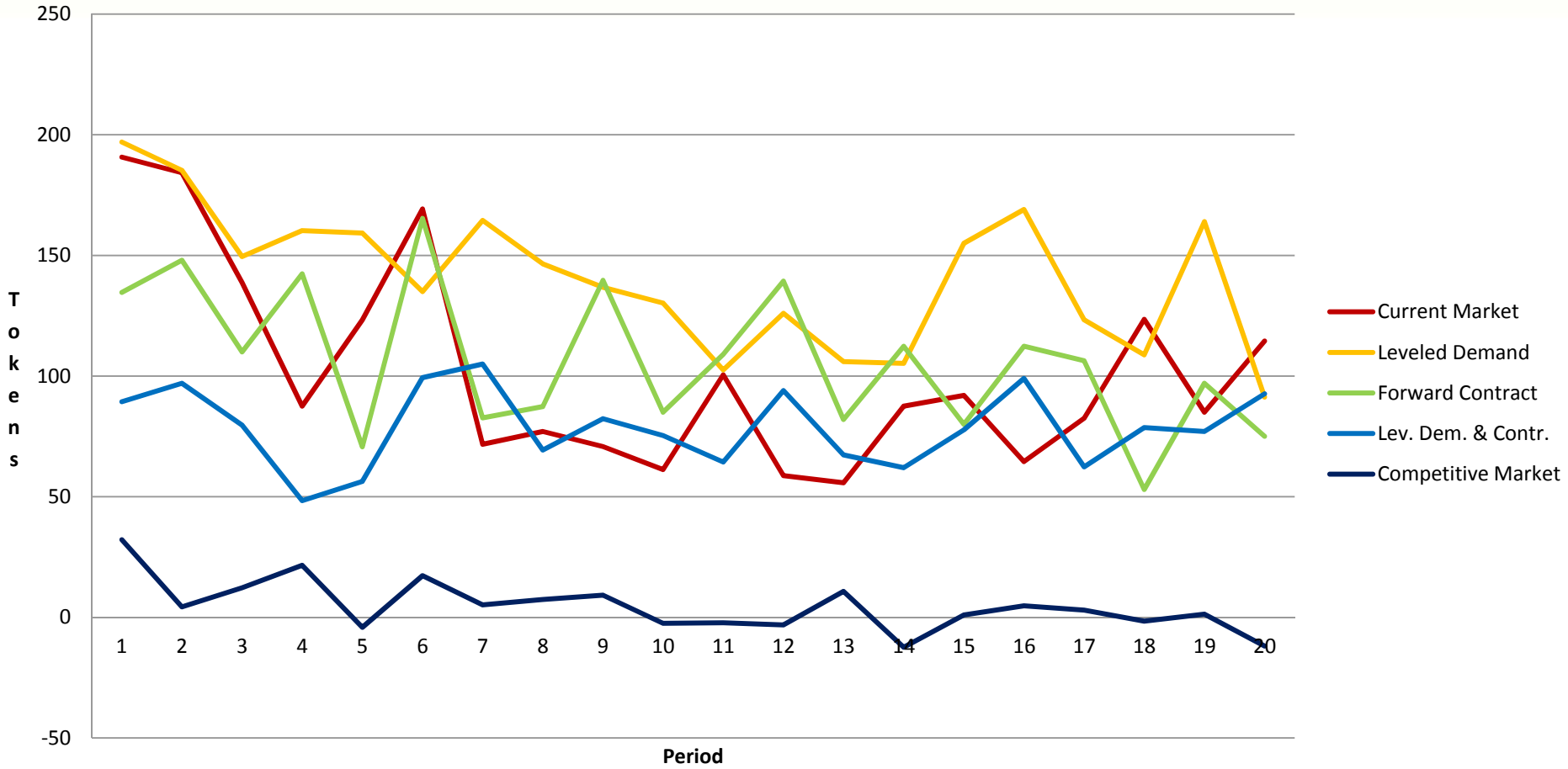
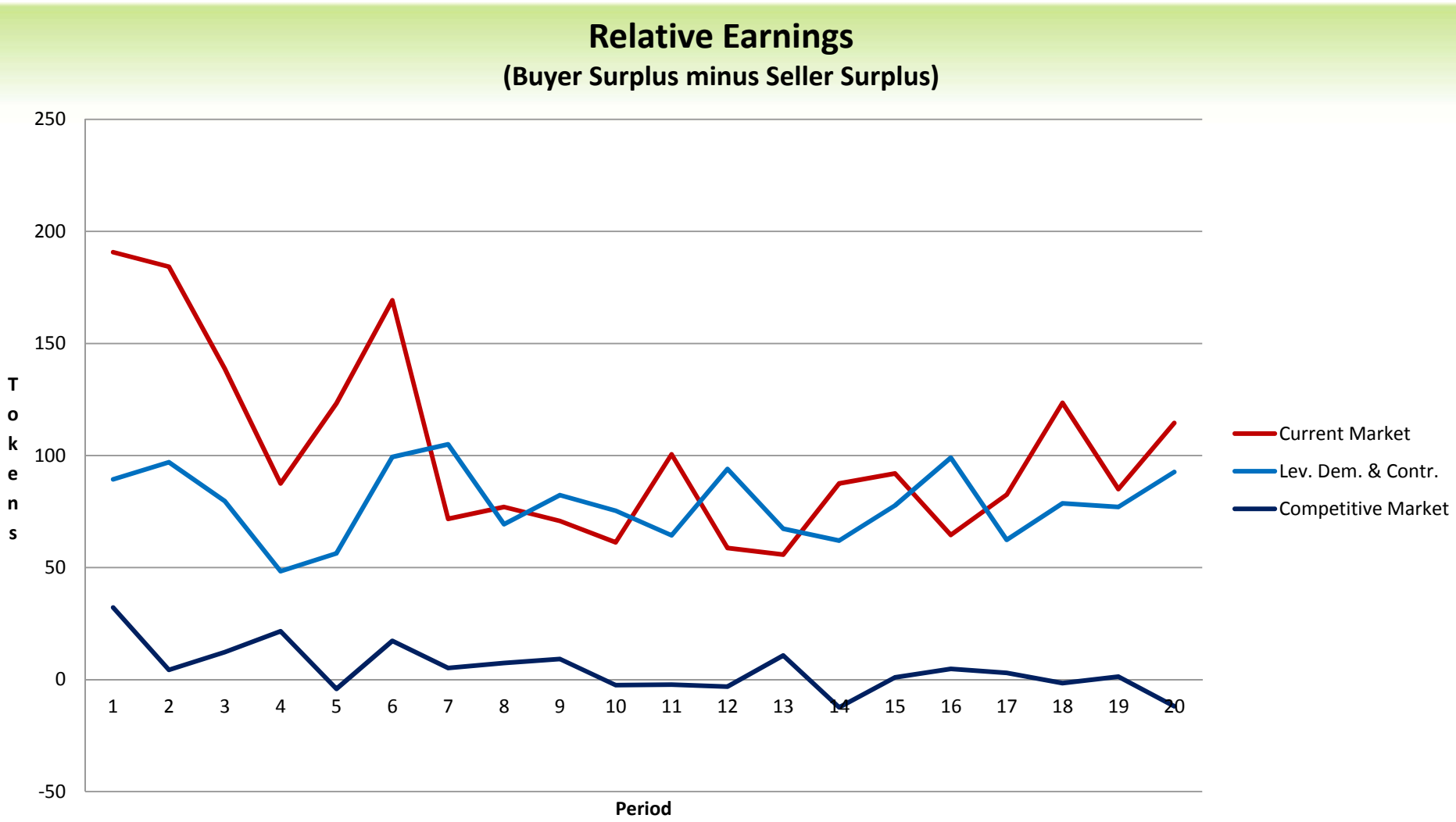


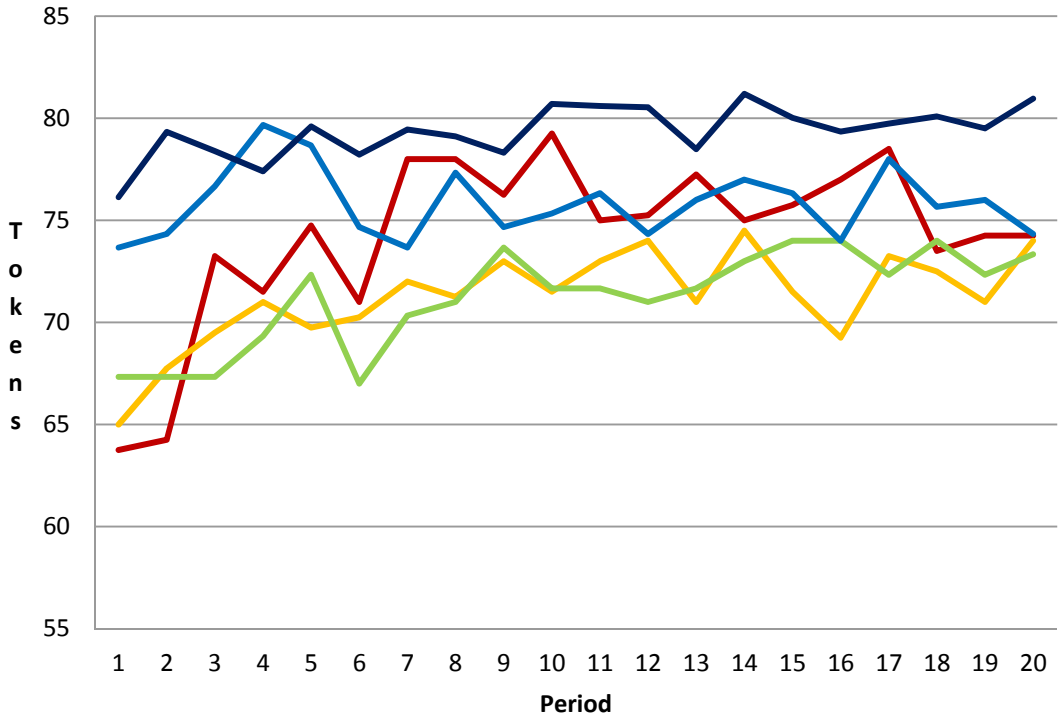
Lab Experiment: Results



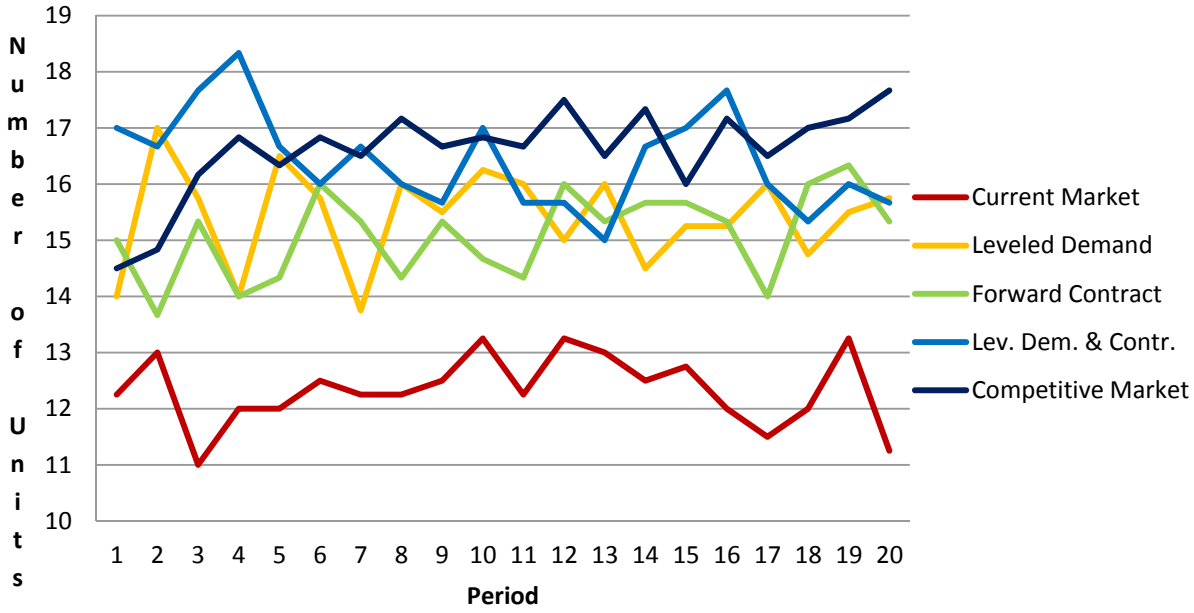
Lab Experiment: Results



Average Unit Price



Units Traded



Lab Experiment: Results

http://www.desertseedstore.com/category/Desert-Native-Shrubs-50/rec/20

- Relative earnings shows the gap between buyer and seller earnings
  - The current market structure shows a large gap between buyer and seller earnings, with **seller earnings being much less than buyer earnings**.
  - Leveling demand and contracting together would help **decrease** the buyer/seller gap.
- High price is maintained when both forward contracting and leveling demand are implemented
- All moves towards a more competitive market will increase the number of units sold
- Implementing **either** leveled demand **or** forward contracting will benefit buyers more than sellers

Lab Experiment: Results

- Any movement towards a more competitive structure would increase both buyer and producer earnings.
  - If only one structural change could be implemented, forward contracting would increase earnings the most for both producers and buyers.
  - Enlarges the pie
- Implementing forward contracting **and** leveling out demand would increase the proportion of total market profits going to producers.
  - By maintaining high price and increasing units traded
    - Enlarges the producers' slice of that larger pie

http://www.endangeredspecieslawandpolicy.com/2010/03/

Conclusion and Recommendations

- Leveled demand and forward contracting may allow for easier market entry
  - This would create a larger market
    - A larger market might reduce the Western US' reliance on non-native seed.
- Buyers would see increased profits by leveling demand for different species and quantities. However, these benefits would be most likely short-term without forward contracting.
  - Maintaining the producers' desire to stay in the market may help secure steady supplies.
    - Potential gains must be worth the market risk

Conclusion and Recommendations Cont'd

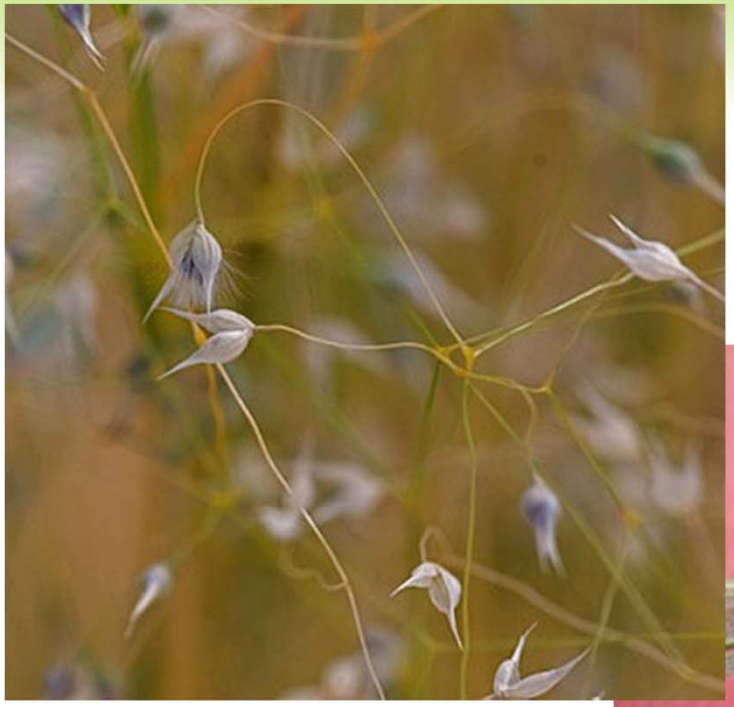
- Mismatch between Supply and Demand may be smoothed out by:
  - 1. Federal Emergency funds should be replaced with a more flexible and consistent federal funding system.
  - 2. Federal regulations governing replanting timeframes should be more flexible.
    - This may also include time for planting interim species.

http://www.fws.gov/rockymountainarsenal/habitat/native/wildflowers/scarglobe.htm

Conclusion and Recommendations Cont'd

- Mismatch between Supply and Demand may be smoothed out by:
  - 3. There should be more efficient information sharing among producers, buyers, and regulators.
    - This may include a higher reliance on intermediate agencies such as extension services to translate research, regulations, and realities to stakeholders.
    - This may include forward contracting with an elastic supply clause (the risk is transferred to/shared with the buyer).
    - **There should be adequate forewarning to producers of upcoming demand changes** (species, variety, quantity)
  - 4. There should be better access to or understanding of biological aspects in the regulatory administrations.

Questions and Comments?



http://www.santafebotanicalgarden.org/HERB%20PAGES/H%20IndianRiceGrass.html ;
http://www.flickr.com/photos/plant_diversity/4049544945/