



# NC-213 “Management of Grain Quality & Security in World Markets”

Omaha, Nebraska  
26-27 February 2008





# Compliance & Cost-Benefit Analysis Methodologies for Grain Traceability and Identity Preserved Handling

Gregory S. Bennet, Ph.D., Candidate

Dr. Charles R. Hurburgh, Jr.

Iowa State University

Agricultural & Biosystems Engineering Dept.

NC-213 Annual Meeting/Technical Sessions

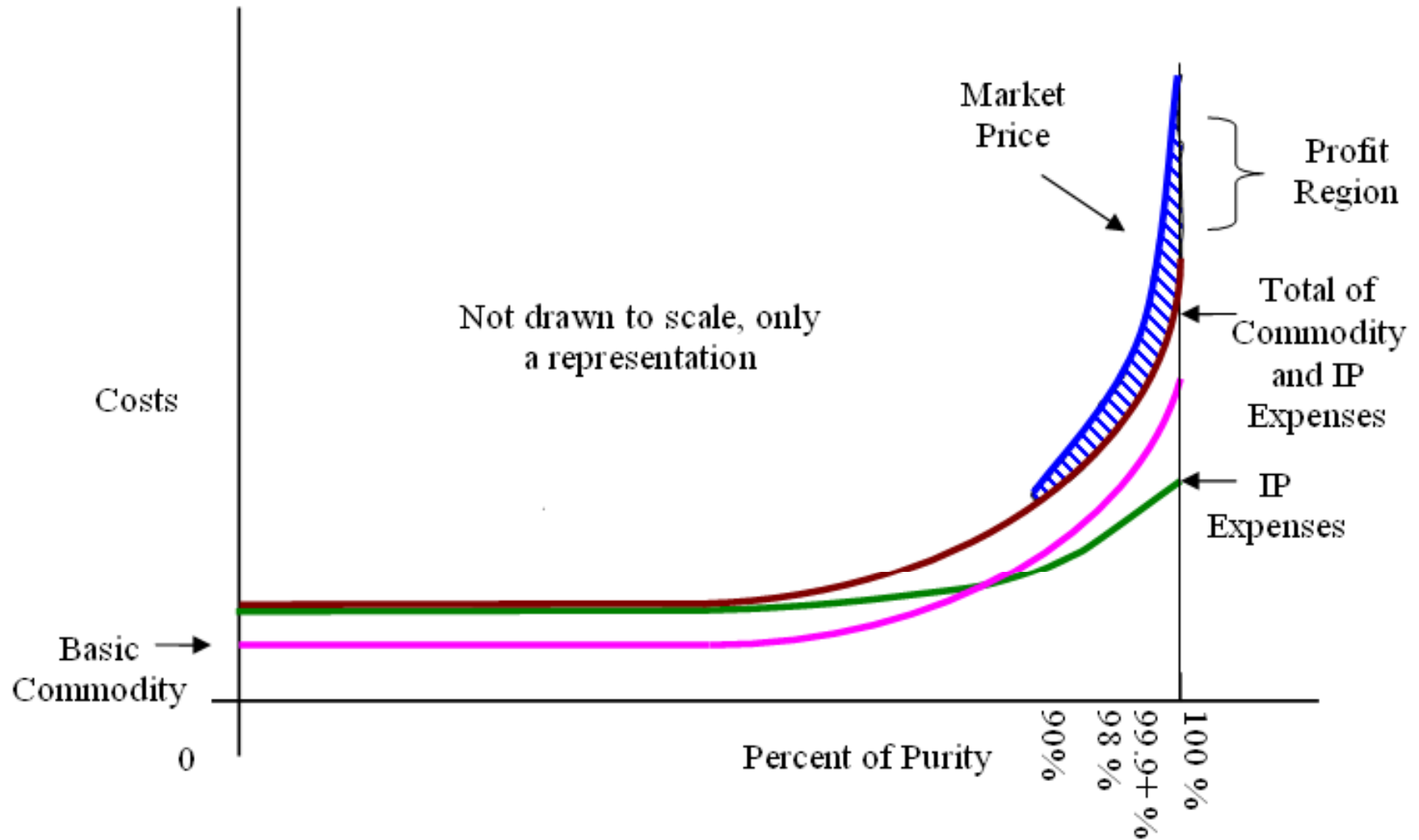
Omaha, Nebraska, 26-27 February 2008






- 
- **Introduction—Goals & Situation**
  - **Research—Scorecard Matrix & Cost-Benefit Spreadsheet**
  - **Results**

# The Financial Picture





# **Methods to address IPT compliance and cost-benefit challenges - at the grower level**

- 1) Scorecard Matrix—Compliance**
- 2) Cost-Benefit Spreadsheet**



Farm &  
Grain Buyer  
Raw Material  
Supplier



Upstream  
Supplier



Processor



Warehouse



Carrier  
Logistics

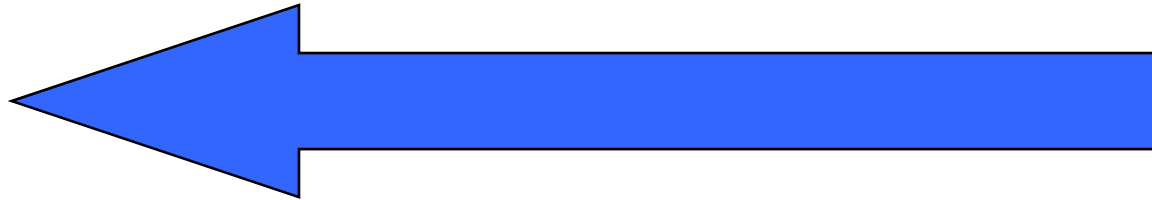


Distribution  
Platform



Customer  
Point-of-sales

Traceability—Logistics & Recall



Identity Preserved—Value Added



Which Soybean is 1% low Linolenic,  
Non-GMO, Roundup Ready?



#1



#2



#3



#4

Which Soybean can be traced  
or identity preserved?



# **Scorecard Matrix**

## **Categories**

- 1. Controlling Standard (contract/regulations)**
- 2. Performance Measurement (by entity & parameters)**
- 3. Communications (producer/buyer)**

## **Criteria Measured**

- A) Breadth (amount of data)**
- B) Depth (the distance forward/backward data is recorded)**
- C) Accuracy (as measured by labs, field tests)**



# Categories

- 1. Controlling Standard (contract/regulations)**
- 2. Performance Measurement (by entity & parameters)**
- 3. Communications (producer/buyer)**

# Criteria Measured

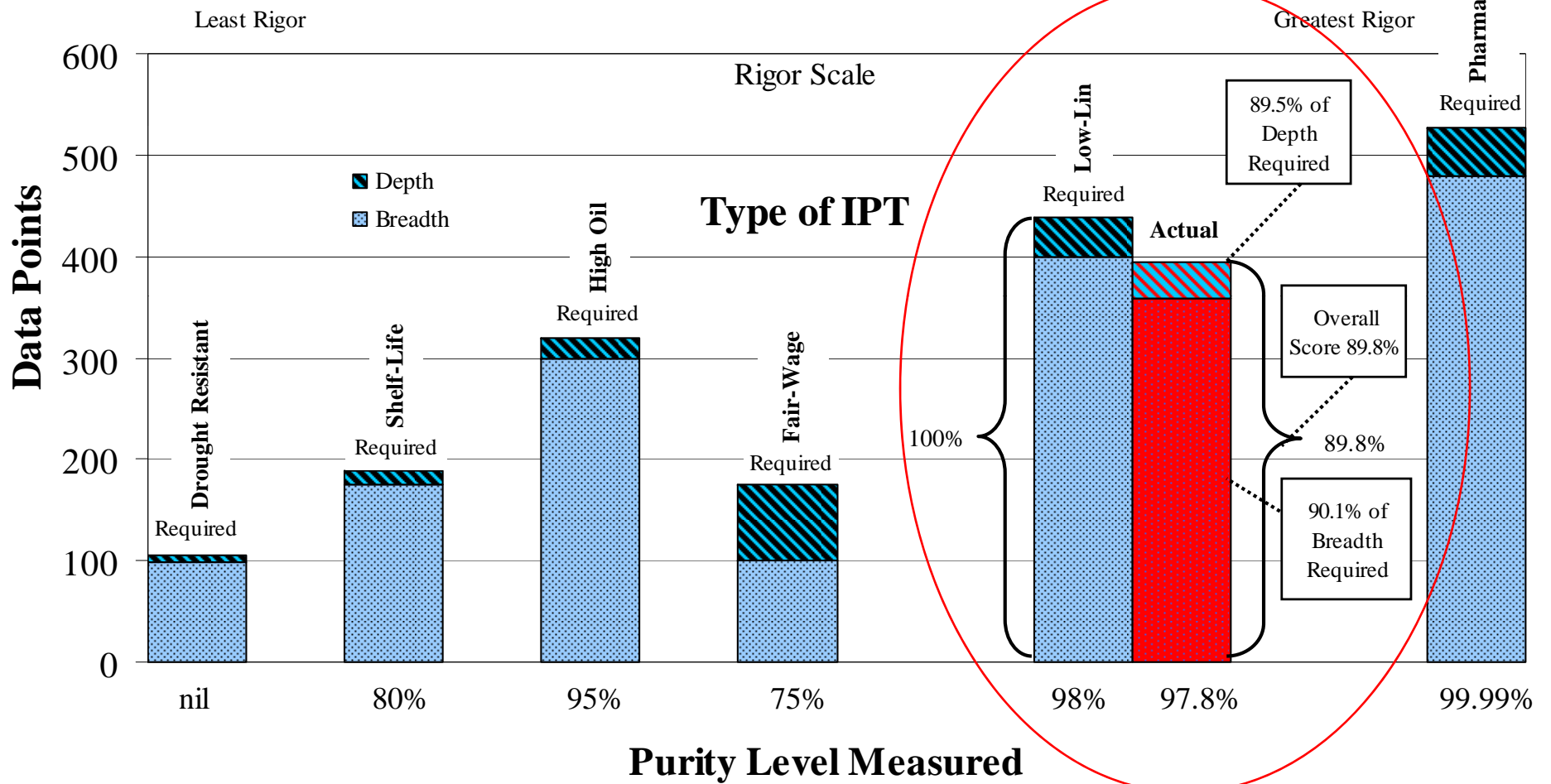
- A) Breadth: describes the amount of information or data the system records.**
- B) Depth: describes how far back or forward the system tracks recorded data.**
- C) Accuracy: as measured by labs, field tests; the degree of conformity of an actual (true value) measured to the standard (required).**



Scorecard Matrix Continued			Breadth Depth Accuracy			Breadth Depth Accuracy			Breadth Depth Accuracy		
			Std (required)			Measured (actual)			Difference		
A = Accuracy (degree of conformity and/or measurement parameters; determined by tests, audits, etc.)		(c) Inspection, records	1	3	0.98	1.0	3.0	0.9700	1.00	1.00	0.9898
		(v) Certification (pts.)									
		(a) Organic									
			(b) ISO								
		B) Buyer inspections									
		(i) Operational (pts.)	8	4		4.8	3.2		0.60	0.80	
		(ii) Administrative (pts.)	7	3		5.2	2.1		0.74	0.70	
		(iii) Tests (A)									
		C) Third-Party inspections									
		(i) Operational (pts.)	20	4		14.9	3.7		0.75	0.93	
		(ii) Administrative (pts.)	15	3		13.0	2.0		0.87	0.67	
		(iii) Tests (A)			0.98			0.9780			0.9980
	D) Grader (pts.)	5	2		4.5	2.0		0.90	1.00		
	* Σ	3) Communications (Producer/Buyer)									
		A) Production Nomenclature (pts.)	25	3		22.0	2.4		0.88	0.80	
		(i) Unit size									
		(ii) Product									
		(iii) Other inputs/Byproducts									
		B) Trait(s)/Attribute(s) (pts.)	50	3		46.5	2.1		0.93	0.70	
		(i) Data/process(s) of interest									
		(ii) Measurements									
		(iii) Test Methodology									
		Weighted Average Score									
		Accuracy Range (Min, Max)				0.960	0.980		0.901	0.895	



# IPT Measurement Score



# Scorecard Matrix Results

1. Using this matrix can enhance the ability to evaluate Controlling Std, Performance Measurements, & Communications compliance regarding measured criteria.
2. It also points to areas of strength and weakness within an IPT program.
3. This format can be expanded, especially if it becomes evident that particular areas lend themselves to weakness or shortcomings.

# Cost-Benefit Spreadsheet

## Categories

1. Revenue
2. Costs
  - a) Pest Mgmt/Fertilizer Data/Costs
  - b) Capital Fixed Costs
  - c) Working Variable Financial Costs
  - d) Post Harvest Data/Costs
  - e) Etc.

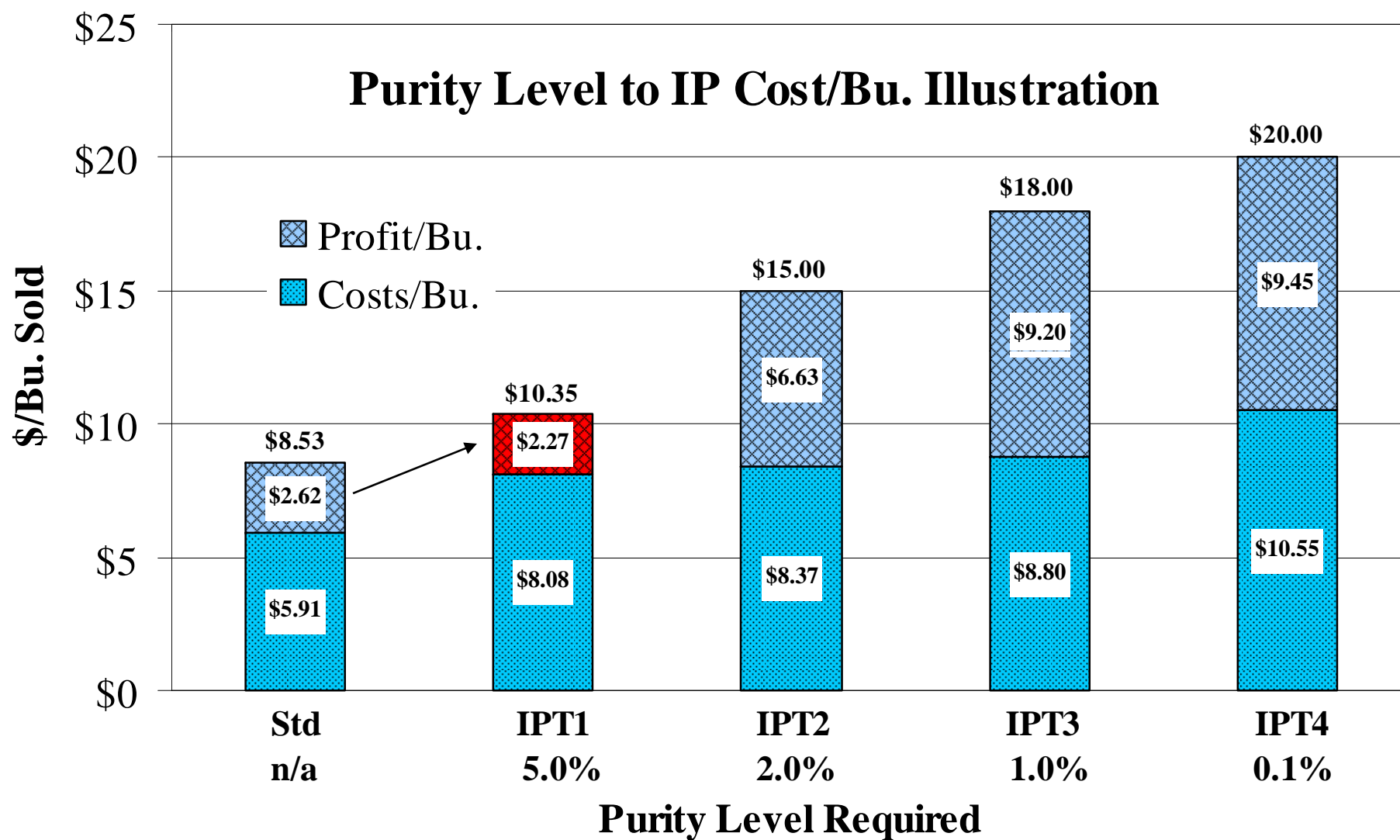
## Criteria—Purity Level

Std	n/a
IPT 1	5.0%
IPT 2	2.0%
IPT 3	1.0%
IPT 4	0.1%

## Back Ground Information

Item	Measu		Std.	IPT 1	IPT 2	IPT 3	IPT 4
<b>Personal Information</b>							
ID Number			1	2	3	4	5
Name			Bill Smith				
Address			Ames IA 50014				
Phone #			515.123.4567				
Email			<a href="mailto:isu@iastate.edu">isu@iastate.edu</a>				
<b>General Information</b>							
Crop Planted			Soybeans	UL Soybeans	UL Soybeans	UL Soybeans	UL Soybeans
Crop Variety Planted				DKB 2752			
<b>Purity Level (Required)</b>	<b>%</b>		<b>n/a</b>	<b>5.0%</b>	<b>2.0%</b>	<b>1.0%</b>	<b>0.1%</b>
Crop Acres	acres		200	200	200	200	200
Grain Yield	bu/acre		55	55	55	55	55
Previously Planted Crop in Field			Corn	Corn	Corn	Corn	Corn
Type of IP System			None	Non-GMO	Non-GMO	Non-GMO	Non-GMO
Trait(s) and/or Attribute(s) of Interest			None	Ultra Low Linolenic	Ultra Low Linolenic	Ultra Low Linolenic	Ultra Low Linolenic
<b>Hourly Wage Information</b>							
Management	\$/hr		\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Labor	\$/hr		\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Meeting, Off Season	\$/hr		\$40.00	\$40.00	\$40.00	\$40.00	\$40.00
Contract or Hired Professional	\$/hr		\$50.00	\$50.00	\$50.00	\$50.00	\$50.00
<b>Operating Assumptions</b>							
Grain Hauling, Semi	\$/mile		\$0.250	\$0.250	\$0.250	\$0.250	\$0.250
Interest, Carry-on Operating Money	%/yr		8.00	8.00	8.00	8.00	8.00
Capital Interest	%/yr		6.00	6.00	6.00	6.00	6.00
Personal travel mileage	\$/mile		\$0.500	\$0.500	\$0.500	\$0.500	\$0.500
Personal travel meal expense	\$/day		\$50.00	\$50.00	\$50.00	\$50.00	\$50.00
Personal travel overnight expense	\$/day		\$100.00	\$100.00	\$100.00	\$100.00	\$100.00





# Cost-Benefit Results

1. This format enhances the ability to evaluate various production purity levels (and associated costs) to their particular market price.
2. This method reveals particular areas of strength & weakness, throughout a variety of IPT purity levels.
3. The spreadsheet can be used as a forecast tool to evaluate trends in order to determine what purity level of production would be most appropriate.

# Methodology Evaluations

## Scorecard Matrix

- The Scorecard can be an efficient, easy to use tool, to evaluate Traceability compliance
- Reveals possible lapses, where software, auditing, and laboratory testing lack an holistic view of production.

# Methodology Evaluations Cont.

## Cost-Benefit Spreadsheet

- This Cost-Benefit Spreadsheet, can provide a more concise comparison of financial data, for the purposes of evaluating Identity Preserved crops.
- Provides a quantitative tool to measure production purity comparisons
- Improve system's cost control analysis



# Thank you. Questions?

Gregory S. Bennet - [gsbennet@iastate.edu](mailto:gsbennet@iastate.edu)

