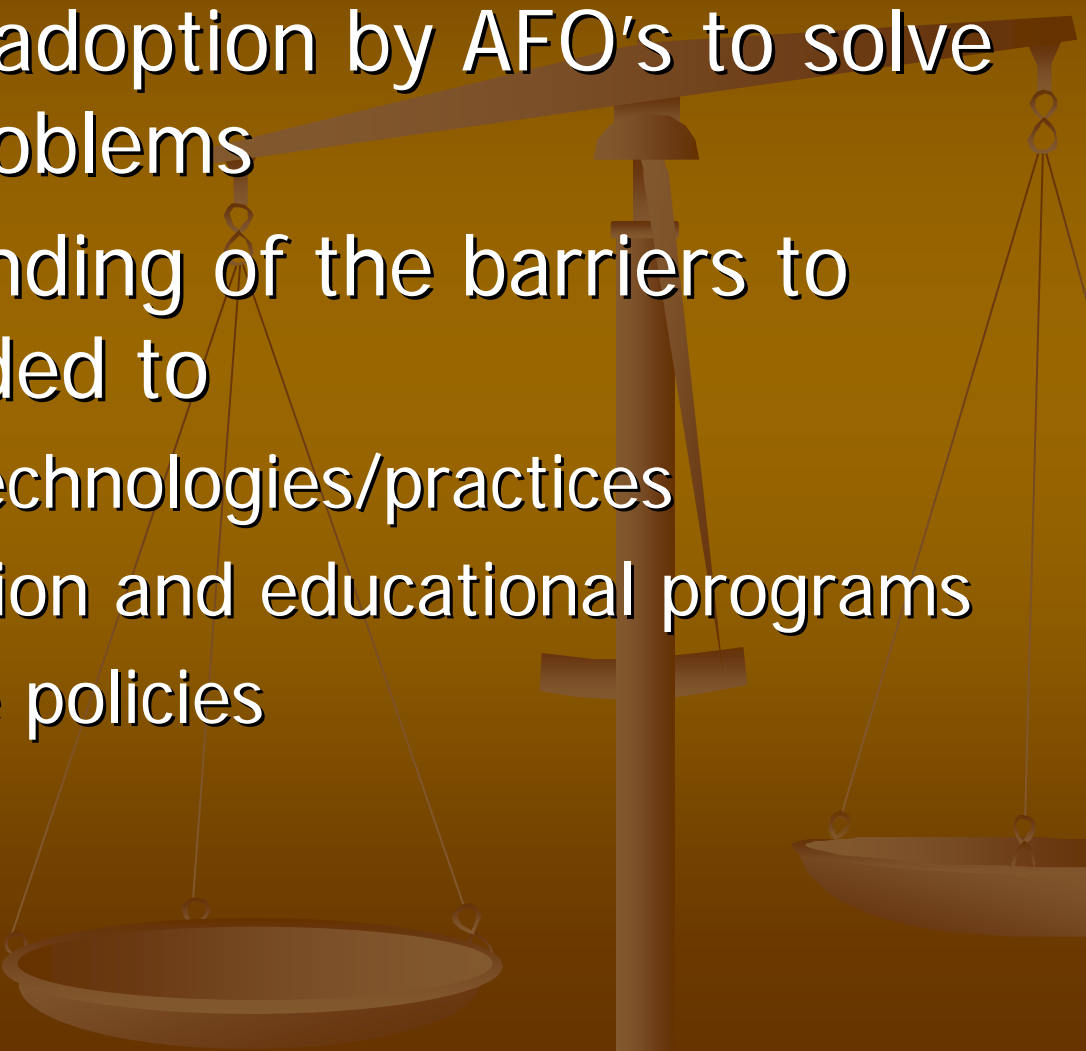




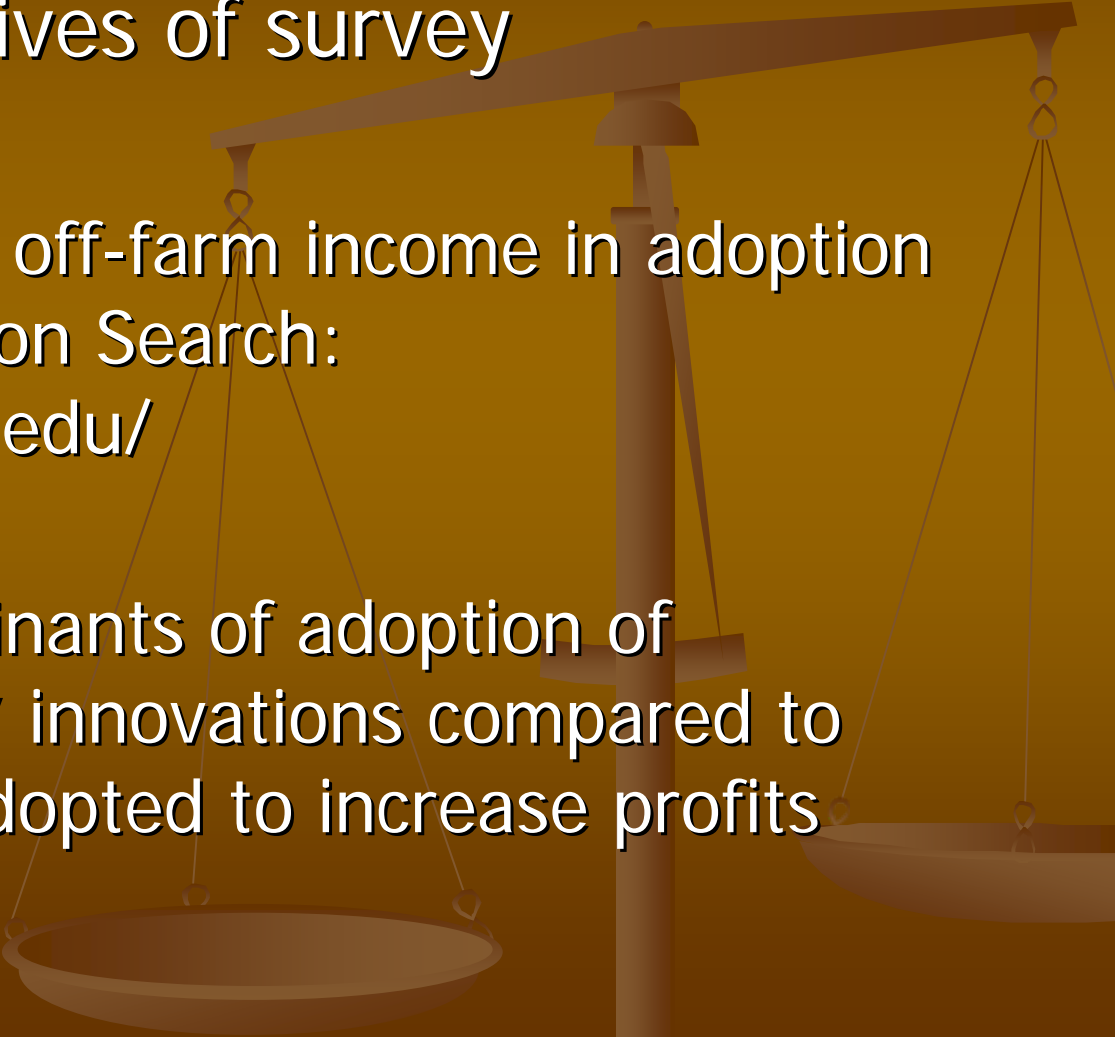
Adoption of Environment-Oriented versus Profit-Oriented Manure Management Technologies

Haluk Gedikoglu, Laura McCann, Bob
Broz, John Lory and Ray Massey,
University of Missouri

Why?

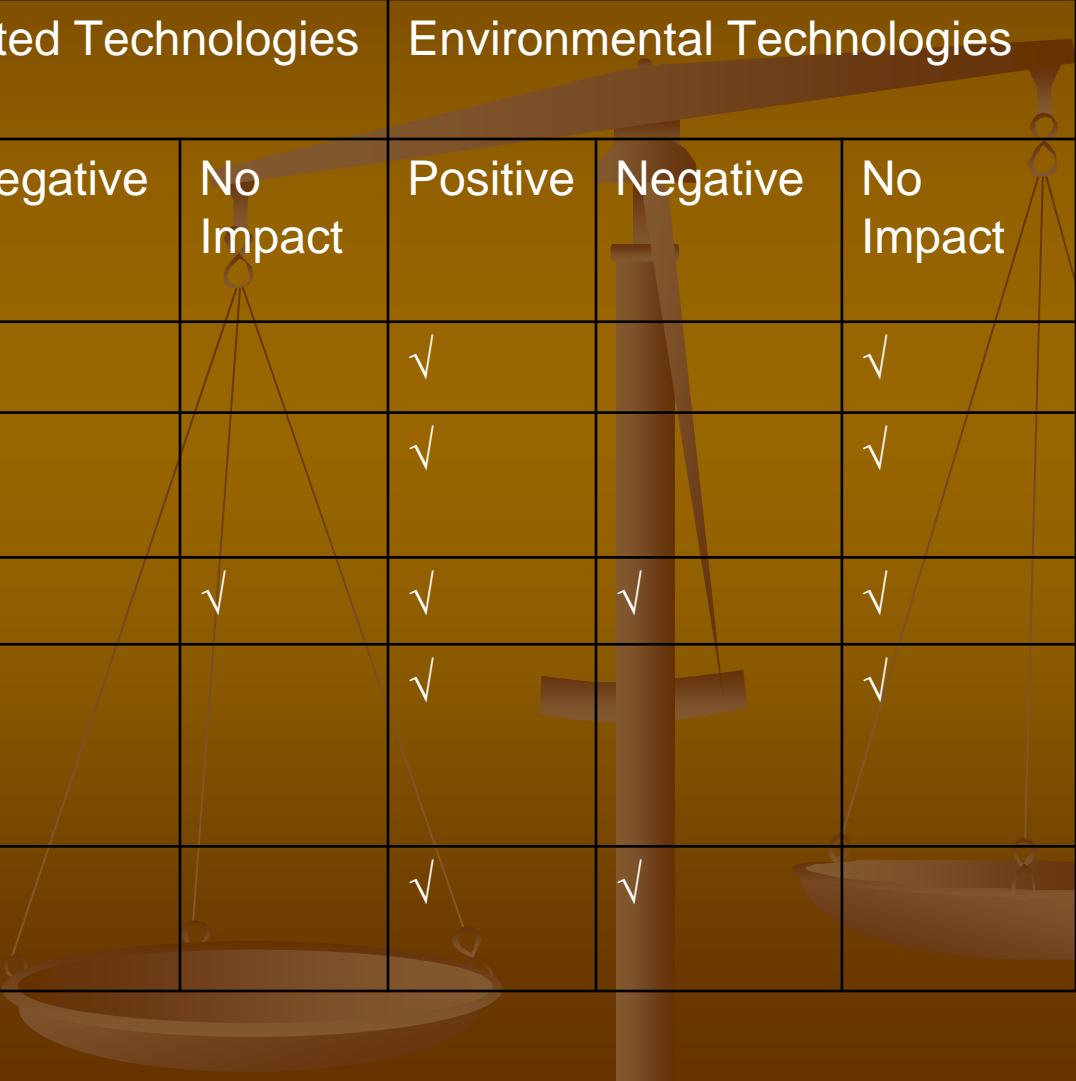
- Need voluntary adoption by AFO's to solve water quality problems
 - Better understanding of the barriers to adoption is needed to
 - Design better technologies/practices
 - Improve extension and educational programs
 - Design effective policies
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Current CSREES Project

- Research objectives of survey
 - Examine role of off-farm income in adoption
Check out AgEcon Search:
agecon.lib.umn.edu/
 - Identify determinants of adoption of “environmental” innovations compared to ones that are adopted to increase profits
- 

Literature Review

Expected Impact by Economic Theory	Profit Oriented Technologies Empirical Results			Environmental Technologies Empirical Results		
	Positive	Negative	No Impact	Positive	Negative	No Impact
Profitability ↑	✓		✓	✓		✓
Farm Size ↑	✓			✓	✓	✓
Credit Constraint ↓		✓				
Soil Quality ↑	✓			✓		
Risk Aversion ↓		✓			✓	



Expected Impact by Economic Theory	Profit Oriented Technologies			Environmental Technologies		
	Positive	Negative	No Impact	Positive	Negative	No Impact
Education ↑	✓			✓		✓
Information (Extension) ↑	✓			✓		✓
Age ↑↓		✓	✓	✓	✓	✓
Environmental Perceptions and Attitudes ↑				✓		✓
Off-Farm Income ↑↓	✓	✓		✓	✓	

Methods



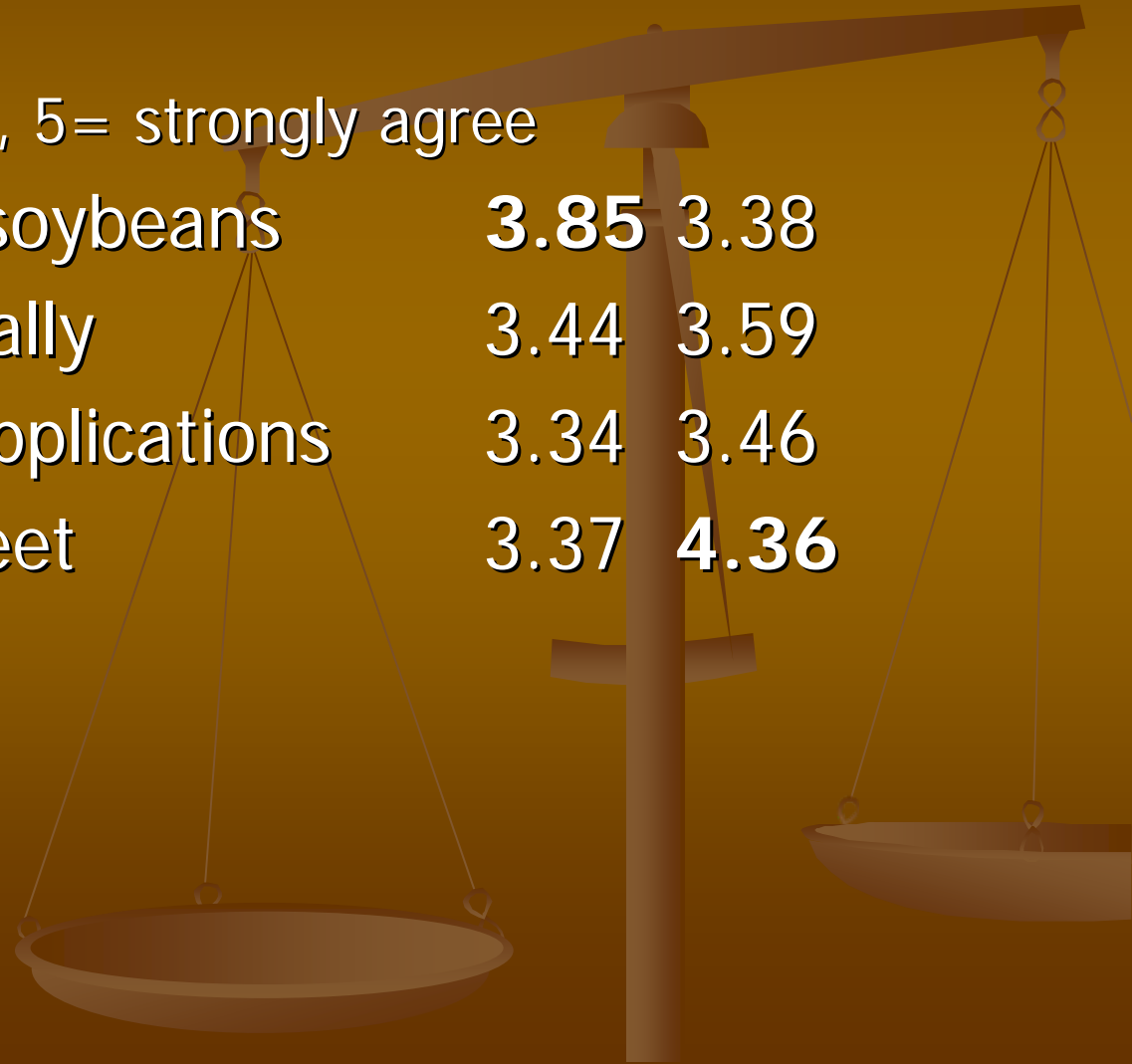
- Survey was designed and implemented using Dillman 2000.
- Final survey was conducted in March 2006
- Recipients chosen at random after stratification by size and livestock type
- Farms with sales less than \$10,000 were not surveyed
- Effective response rate was 37%
- Data entry finished in summer 2006
- Analysis using univariate probit

Profitability/ Improves WQ Perceptions

- Likert scale

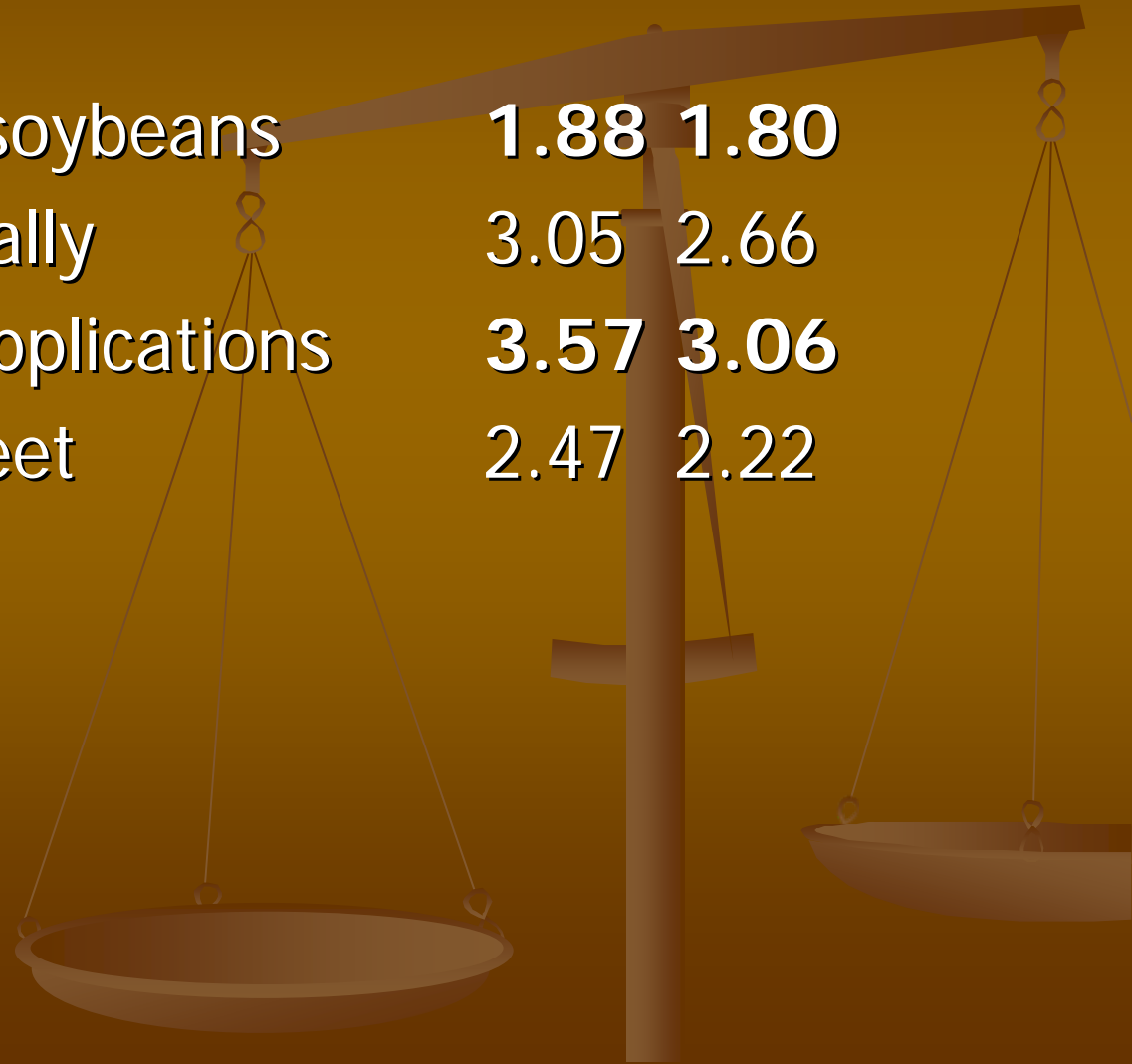
1=strongly disagree, 5= strongly agree

■ Round-up Ready soybeans	3.85	3.38
■ Manure test annually	3.44	3.59
■ Keep records of applications	3.34	3.46
■ Setbacks of 100 feet	3.37	4.36



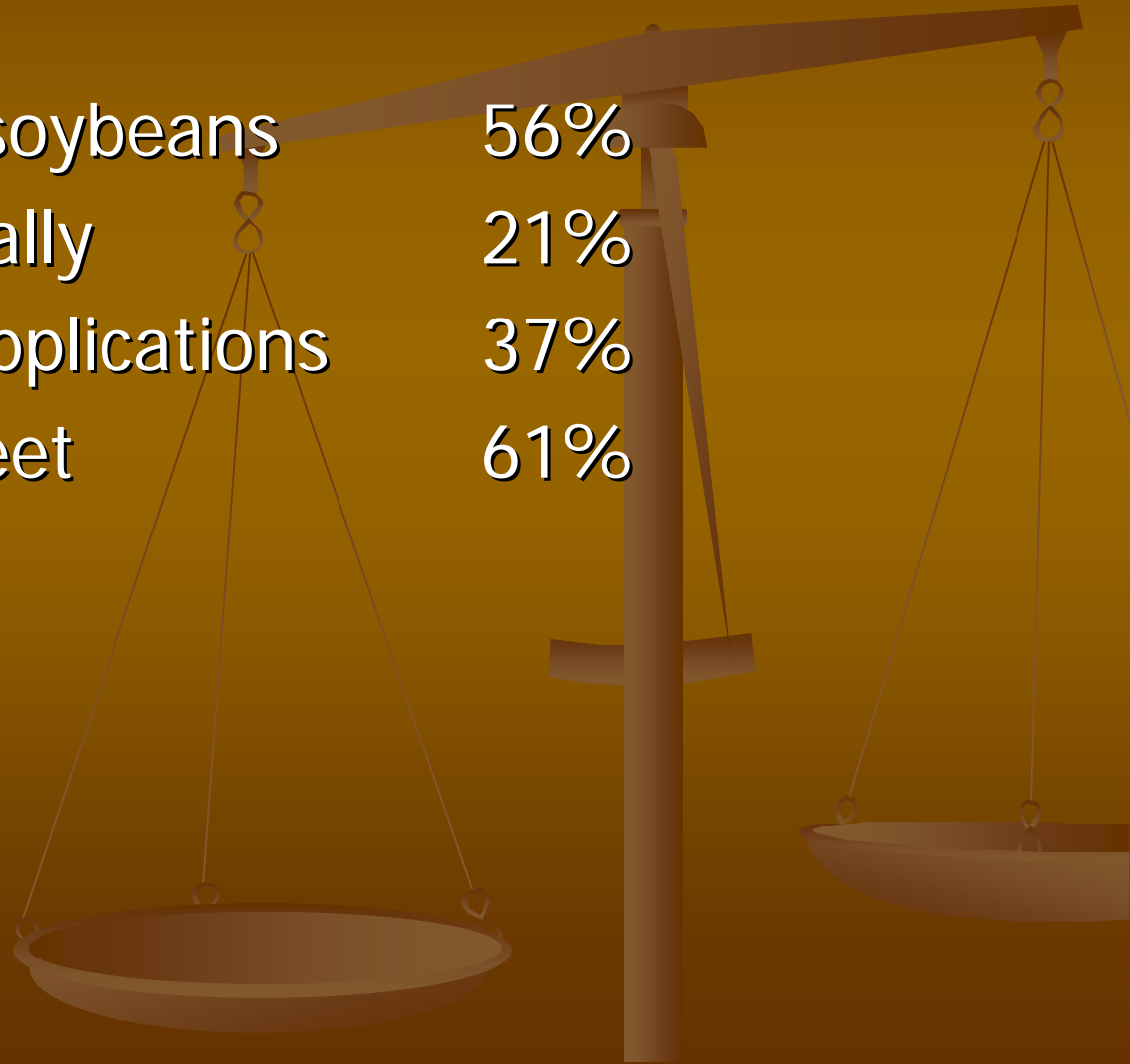
Time Consuming/Complicated

- Round-up Ready soybeans **1.88 1.80**
- Manure test annually **3.05 2.66**
- Keep records of applications **3.57 3.06**
- Setbacks of 100 feet **2.47 2.22**



Crude Adoption Rates

- Round-up Ready soybeans 56%
- Manure test annually 21%
- Keep records of applications 37%
- Setbacks of 100 feet 61%




Regression Results (Non-CAFOs)



	Round-up-Ready	Manure Testing	Record Keeping	Setbacks
Pseudo R ²	0.51	0.59	0.41	0.22
Age	-0.29**	-0.12	0.11	0.09
Age ²	0.00**	0.00	0.00	0.00
IA	0.62	0.06	0.21	-0.30
Education (Base = HS)				
Less than High School	-2.53***	0.85	1.61***	-0.13
Some College or Vocational School	0.07	0.38	0.13	-0.30
Bachelor Degree	-0.30	0.51	0.03	-0.37
Graduate Degree	-1.76*			-0.93

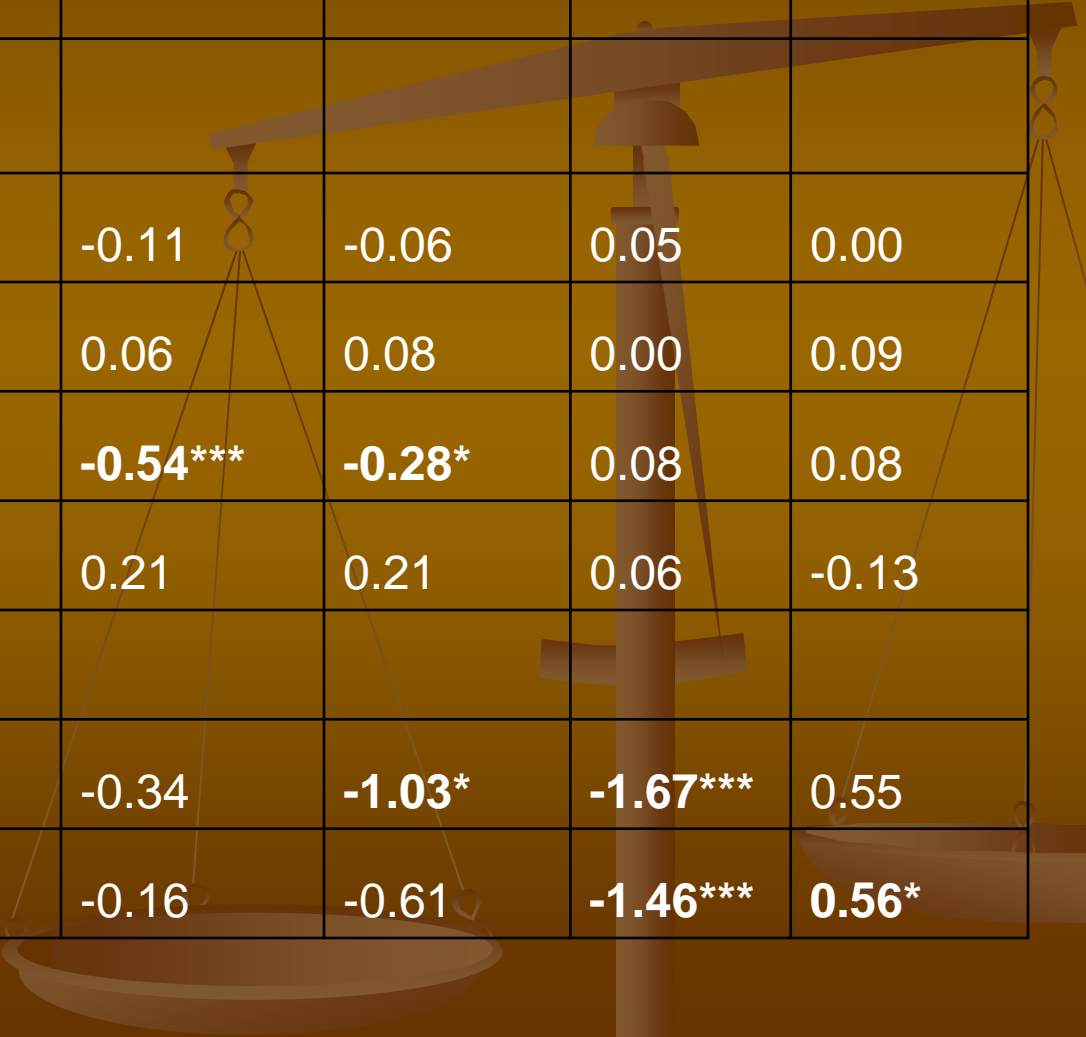


	Round-up-Ready	Manure Testing	Records	Setbacks
Off-farm Income (base is \$10,000-24,999)				
No off-farm income	0.29	-0.40	0.04	0.00
\$0 - \$9,999	1.42**	-0.29	0.18	0.26
\$25,000 - \$49,999	-0.19	-0.29	-0.21	0.21
\$50,000 - \$99,999	-0.29	0.42	-0.42	0.75*
> \$100,000	0.10	-1.52*	-1.16*	0.74
Farm Sales (base is 100,000-249,999)				
Farm Sale \$10,000 - \$99,999	-0.66*	-0.15	0.34	-0.40
Farm Sale \$250,000 - \$499,999	0.73*	0.16	0.18	0.37
Farm Sale \$500,000 +	0.91**	0.69	0.26	0.38



	RRS	MT	RK	SB
Environmental Perceptions				
Smell of Manure Bothers Me or Fam.	0.08	-0.62***	-0.24*	-0.18
Smell of Manure Bothers My Neighbors	0.37**	0.11	0.21*	0.09
Not Sure How Crops Respond to Manure	-0.35**	0.02	-0.12	-0.05
Concerned about Water Quality in County	-0.04	0.05	0.28**	-0.07
Managing Manure Improves Water Quality	-0.14	0.01	-0.07	0.18
Regulations about Water Quality will be Stricter	-0.34**	0.14	0.18	-0.03
Transportation Cost affects where apply	0.27***	-0.13	-0.17**	0.14**

	RRS	MT	RK	SB
Perceptions about the Practice (1-5)				
Profitable	0.80***	1.11***	0.45***	0.20**
Improve Water Quality	0.19	-0.23	-0.06	0.25**
Time Consuming	0.24	0.20	-0.35***	0.05
Complicated	-0.15	-0.67***	-0.07	-0.14
Continue Farming in Next 5 Years YES	-0.08	-0.43	0.34	-0.01
Continue Farming in Next 5 Years NOT SURE (Base = NO)	-1.15*	-1.70**	0.38	-0.54
Expand Livestock Numbers in Next 5 Years YES	-0.09	-0.44	-0.07	-0.25
Expand Livestock Numbers in Next 5 Years NOT SURE (Base = NO)	-0.33	-0.04	0.41	-0.43*

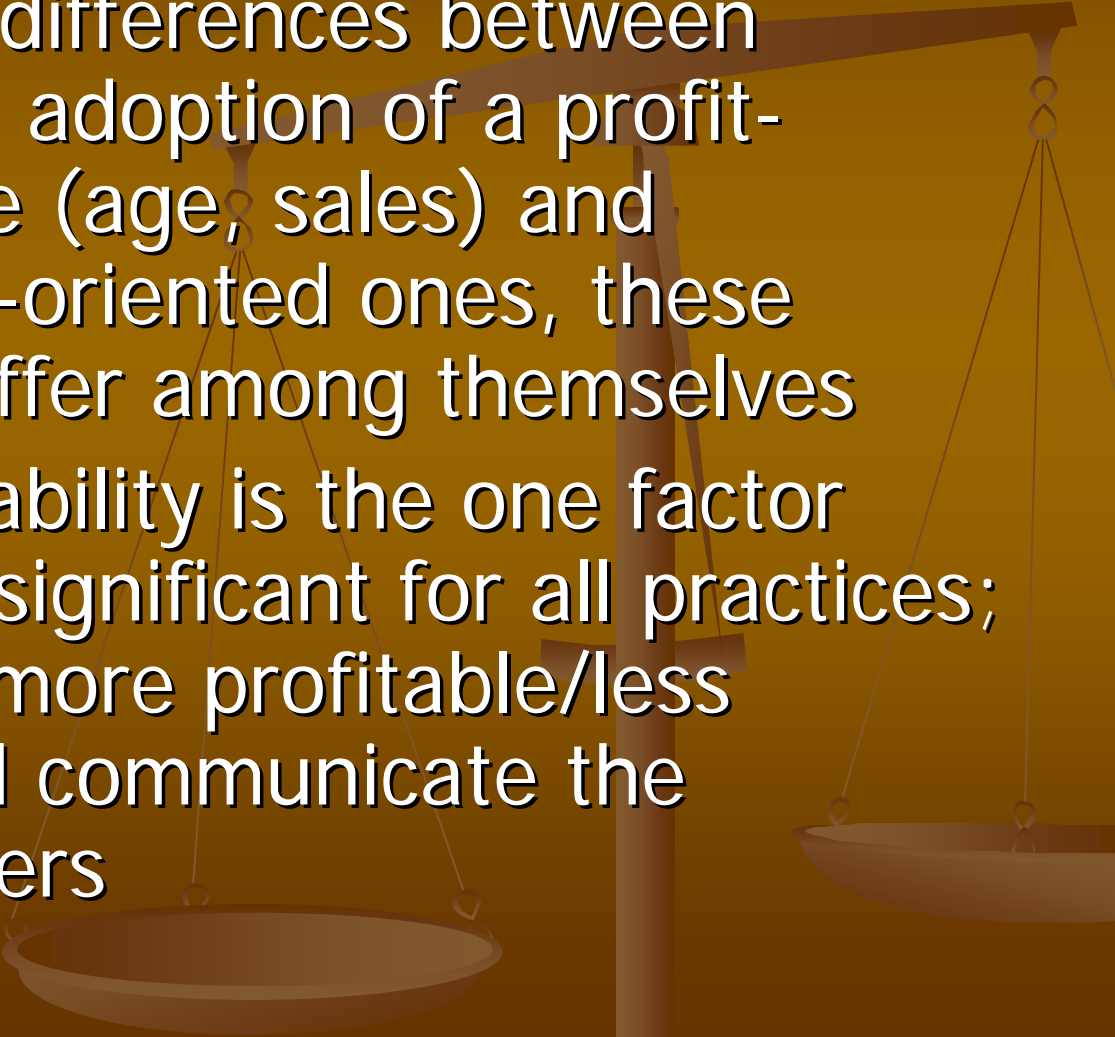


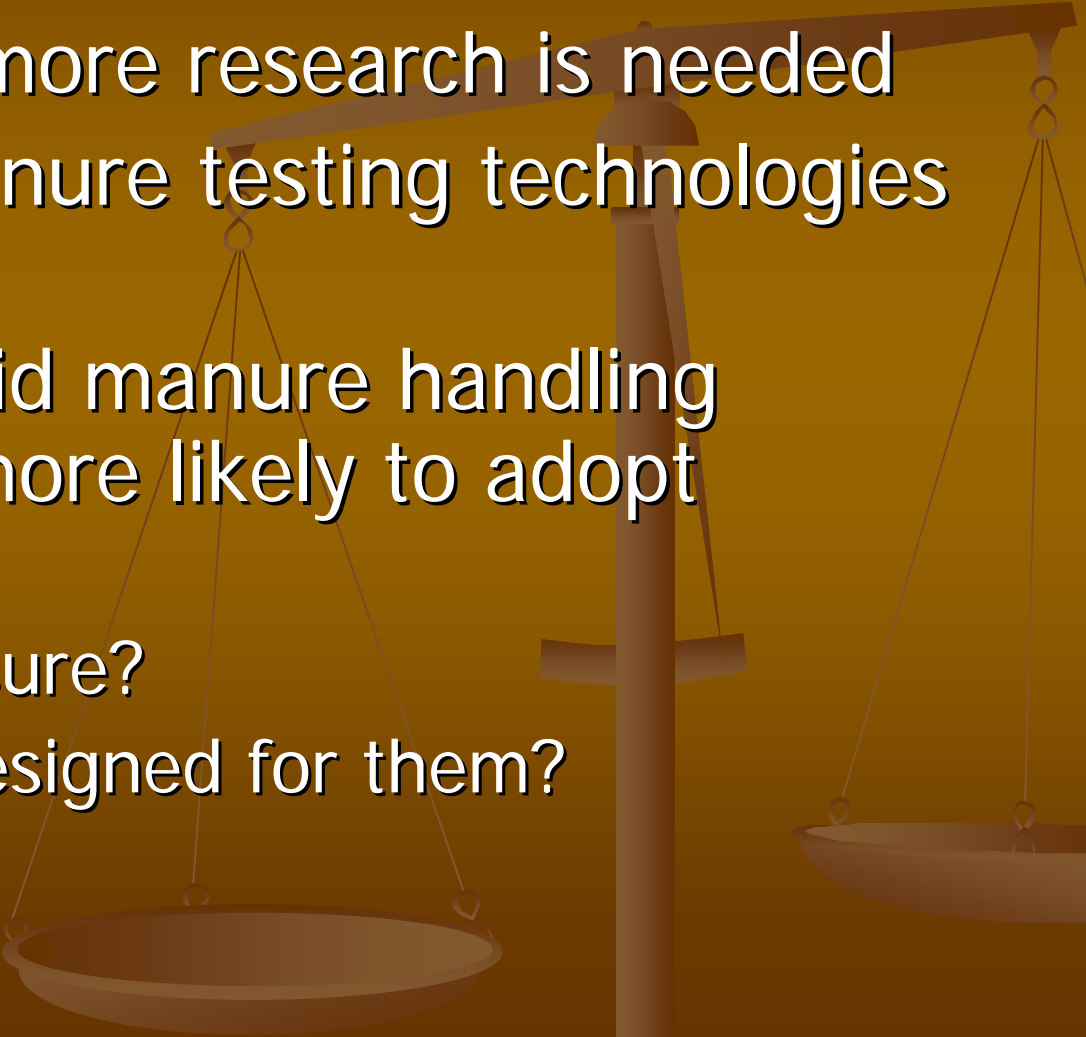
	RRS	MT	RK	SB
Influence on Agricultural Production Decisions (1-5)				
Bank	-0.11	-0.06	0.05	0.00
Contractor	0.06	0.08	0.00	0.09
University (not Extension)	-0.54***	-0.28*	0.08	0.08
NRCS	0.21	0.21	0.06	-0.13
Manure Handling (vs liquid)				
Solid Handling	-0.34	-1.03*	-1.67***	0.55
Solid and Liquid Handling	-0.16	-0.61	-1.46***	0.56*



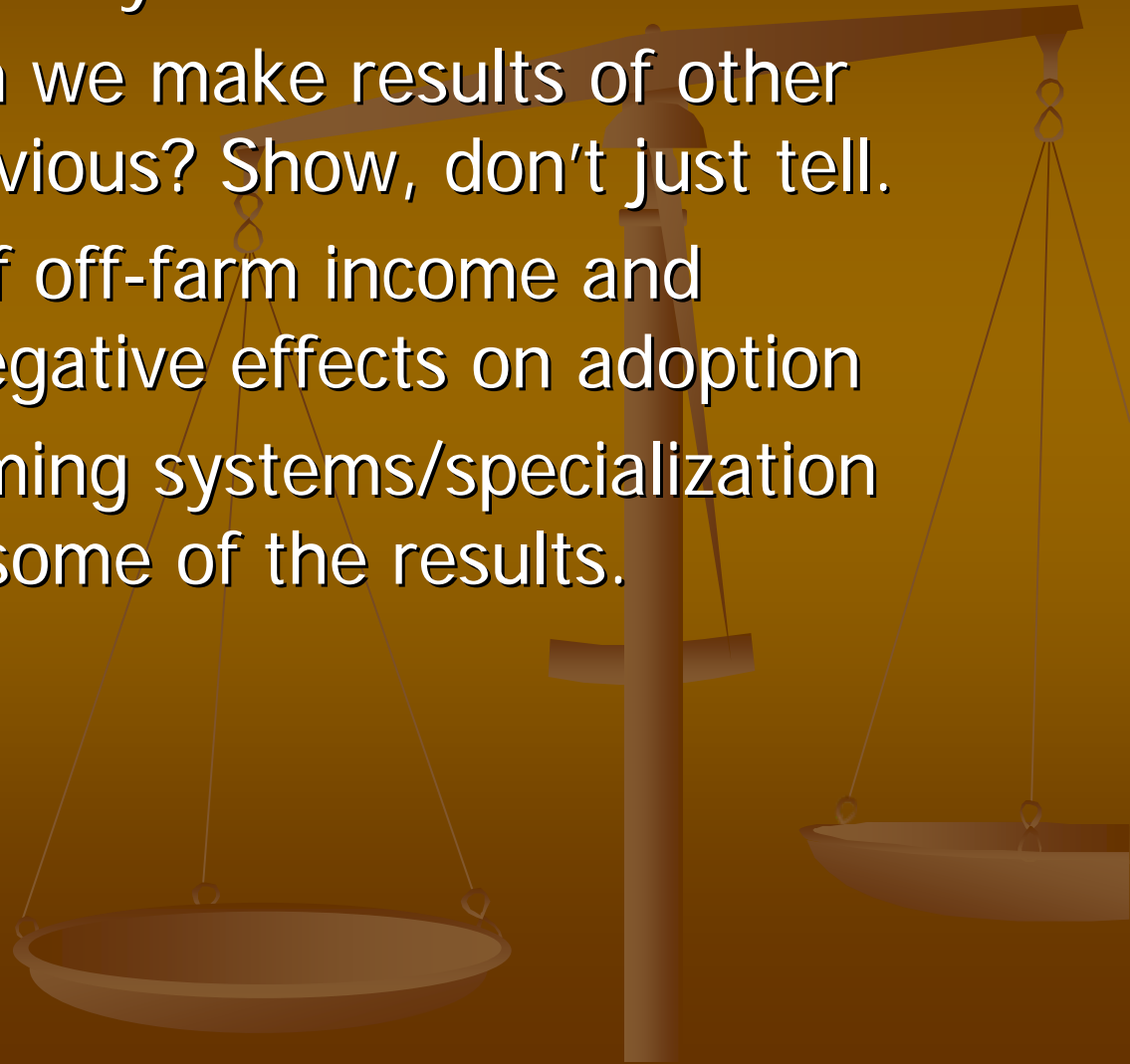
	RRS	MT	RK	SB
Total AU	0.00*	0.00***	0.00**	0.00
Species Dummy (vs swine)				
Dairy	-0.32	0.97**	-0.09	-0.62**
Beef Cow	0.75	-0.17	-0.60*	-0.22
Beef Cattle	-0.19	0.72	-0.58	0.03
Poultry	-2.27***	-0.75	-0.54	0.23
Turkey	-2.16***	0.93	0.29	0.22
Lake or Stream (base = No)	0.21	-0.17	0.09	0.48**
% HEL	0.00*	0.00	0.00	0.00

Conclusions/Recommendations

- While there are differences between factors affecting adoption of a profit-oriented practice (age, sales) and environmentally-oriented ones, these practices also differ among themselves
 - Perceived profitability is the one factor that was highly significant for all practices; make practices more profitable/less unprofitable and communicate the benefits to farmers
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- Environmental perceptions can make a difference but this effect is not consistent
 - Smell matters; more research is needed
 - Research on manure testing technologies is needed
 - People with liquid manure handling systems seem more likely to adopt practices; why?
 - Feel more pressure?
 - Technologies designed for them?

- Setbacks are recognized as improving water quality; is observability an issue?
- As a corollary, can we make results of other practices more obvious? Show, don't just tell.
- Very high levels of off-farm income and education have negative effects on adoption
- Differences in farming systems/specialization seem to underlie some of the results.



- This project is partially funded by a USDA-CSREES Integrated Research, Extension and Education 406 Project

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