

# **Food Safety Risk Perception Gap Between Consumers and Processors of Specialty Meat**

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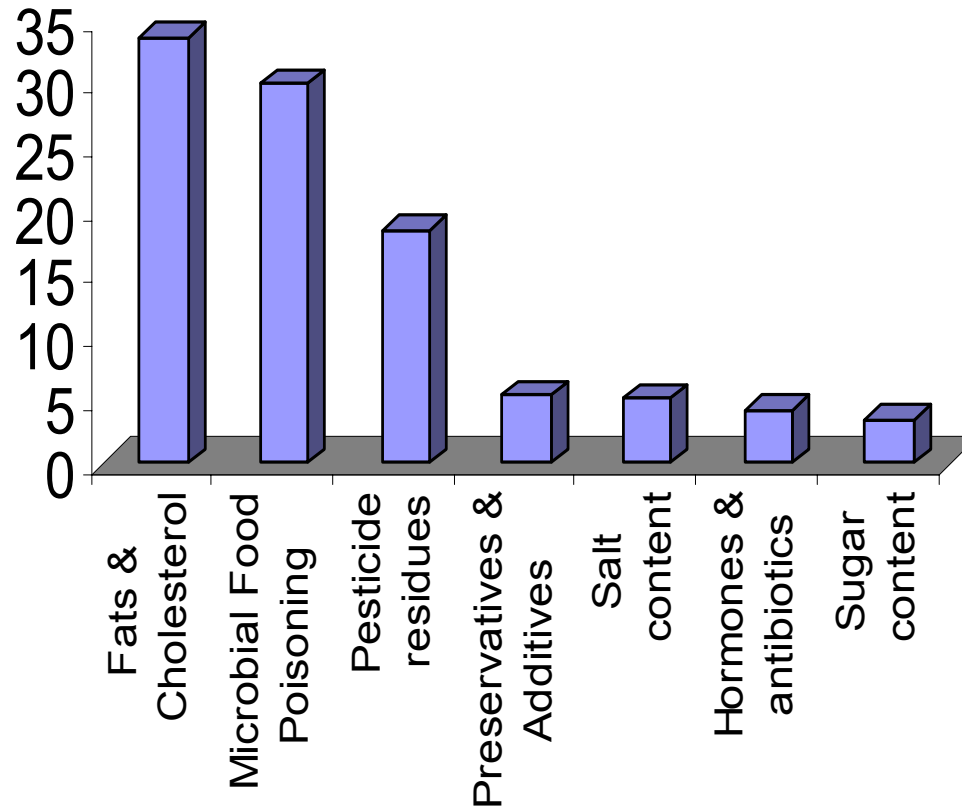
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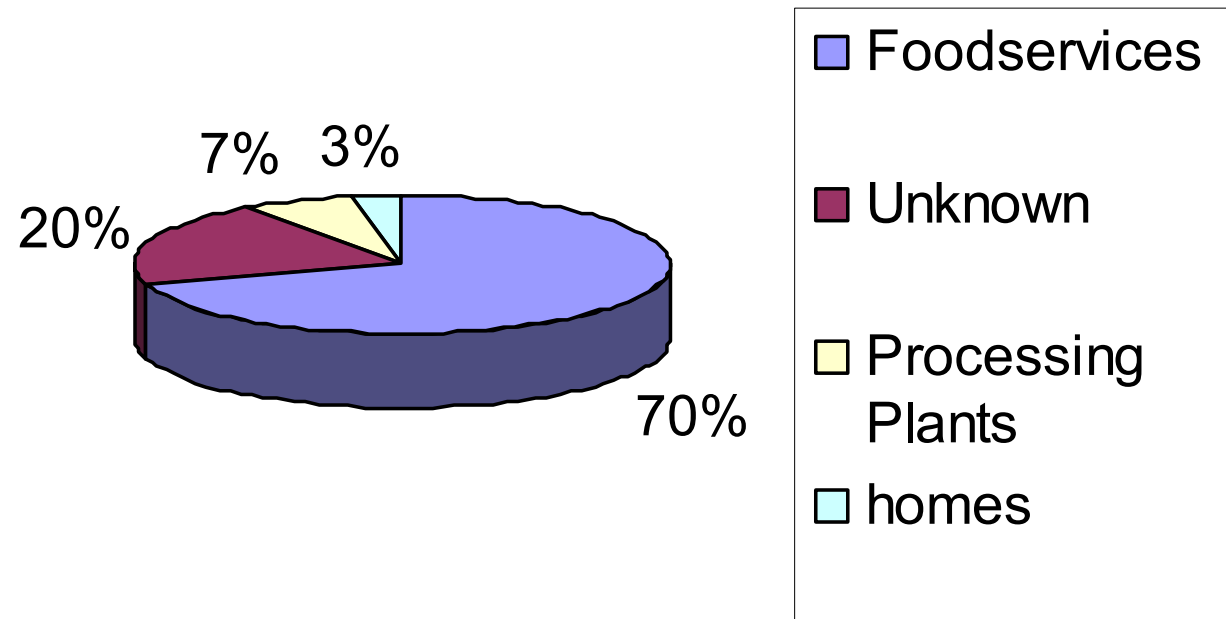
# Outline

- Food Safety Issues, Problem Statement, and Objectives
- Review of Relevant Literature
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  - Survey Procedure and Data
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  - Survey Results and Risk Perception Gaps
  - Risk Perception Determinants and Impact of Consumption of Bison
- Conclusions and Discussion

# Consumers' Top Food Safety Concerns



# Source of Foodborne Illness Outbreaks (adapted from Julie Garden-Robinson)



# Food Safety Microbial Issues

## ■ General Issues

- Emerging pathogens are posing new food safety challenges.
  - ❖ CDC estimates there are about 250 foodborne pathogens (e.g. *E. coli* 0157:H7, *listeria*, etc)
- Major foodborne outbreaks
  - ❖ Each year known pathogens cause: 13.8 million illnesses, 60,854 hospitalizations, and 1,809 deaths.
  - ❖ Each year unknown foodborne pathogens cause: 62 million illnesses, 263,000 hospitalizations, and 2,400 deaths.

## ■ Specific Issues with Specialty Meats

- Unknown Pathogens and Specialty Meats
  - ❖ Limited documentation of pathogen species that may be associated with specialty meats (Li et al., 2002).
- Demand for specialty meats is limited to niche markets
  - ❖ Food safety perception issues (Adu-Nyako and Thompson; Wessells, Kline and Anderson; Schupp, Gillespie and Reed)
  - ❖ Risk perception gap between consumers and food

# Foodborne Illnesses, Hospitalization and deaths caused by known and unknown pathogens

<b>Viral</b>	<b>Illnesses</b>	<b>Hospitalization</b>	<b>Deaths</b>
<i>Rotavirus</i>	39,000	500	0
<i>Norwalk like virus</i>	9,200,000	20,000	0
<i>Stovirus</i>	39,000	125	0
<i>Heptitis</i>	4,170	90	4
<b>Viral Subtotal</b>	<b>9,282,170</b>	<b>21,167</b>	<b>128</b>
<b>Known Pathogens</b>	<b>13,814,93</b>	<b>60,854</b>	<b>1809</b>
<b>Unknown Pathogens</b>	<b>62,000,000</b>	<b>263,000</b>	<b>3,400</b>
<b>Grand Total</b>	<b>76,000,00</b>	<b>323,000</b>	<b>5,200</b>

# Problem Statement

- Studies show that consumers continue to resist specialty meats, and perceive them as somewhat unsafe while processors perceive them to be safe.
  - The need to identify determinants of risk perception gap that limit demand for specialty meats to niche markets.

# Objective

- This study uses a discrete choice experiments to elicit consumer and processor food safety risk perceptions of bison meat and analyze how risk perception gaps affect consumption away from the home and at home.



# **Review of Relevant Literature**

- **The Theories of food safety risk perception (Adu-Nyako and Thompson,1999).**
  - **Sociocultural and economic characteristics (income, age, gender, location, education)**
  - **Personal health influences (friend or family member suffered from microbial food poisoning)**
  - **Perceived locus of control (perception on ease to become ill)**
- **Outrage or Unknown (Sandman, 2000)**
  - **(TV, magazines, labels, etc..)**

# Survey Procedure and Data

- **Developed a questionnaire (survey instrument) to gather data on social cultural characteristics, personal health influence, perceived loci of control, and outrage.**
- **Two questionnaires were developed**
  - Processors
  - Consumers
- **Administer survey instrument to consumers and processors in the northern Plains States of ND, MN, SD, and MT.**

**Table 1. Summaries the distribution and properties of the data**

Factors	Variables	Description	Mean	Standard Deviation
<b>Consumers' Responses (n=400)</b>				
<b>Social and Cultural Characteristics</b>	City	1= North Dakota 2= South Dakota 3= Montana 4= Minnesota	1.3647	0.7812
	Gender	1= Male 2= Female	1.4727	0.4998
	Age	1= 18-25 Years 2= 26-40 3= 41 +	23.198	8.764
	Income	1= less than \$20,000 2=\$21,000- \$40,000 3=\$40,000+	1.630	0.765
<b>Personal Health Influence</b>	Anybody ill from food related illness	1= Yes 2= No	1.6138	0.49253
	Anybody ill from specialty meat	1= Yes 2= No	1.7871	0.4217
	Safety of bison meat	1= Safe 2= Somewhat safe 3= Somewhat unsafe	1.4611	0.2110
<b>Perceived Locus of Control</b>	Ease of falling sick from consuming bison prepared at home	1= Very common 2= Somewhat common 3= Not very common	2.52	0.234
	Ease of falling sick from consuming burgers prepared away from home	1= Very common 2= Somewhat common 3= Not very common	2.59	0.221
<b>Outrage/Awareness</b>	Awareness of food safety risk	1= Very aware 2= Somewhat aware 3= Not aware	2.76	0.567
	Awareness of safe Handling	1= Very aware 2= Somewhat aware 3= Not aware	1.76	0.78
	TV as a source of information	1= Yes 2= otherwise	1.84	0.15
	Magazines	1= Yes 2= otherwise	1.64	0.29
	Labels	1= Yes 2= otherwise	1.21	0.11
<b>Consumption Levels</b>	Consumption of bison	1= Yes 2= No	1.079	0.013
	Eat bison	1= Away from home 2= At home 3= Both	1.901	0.302

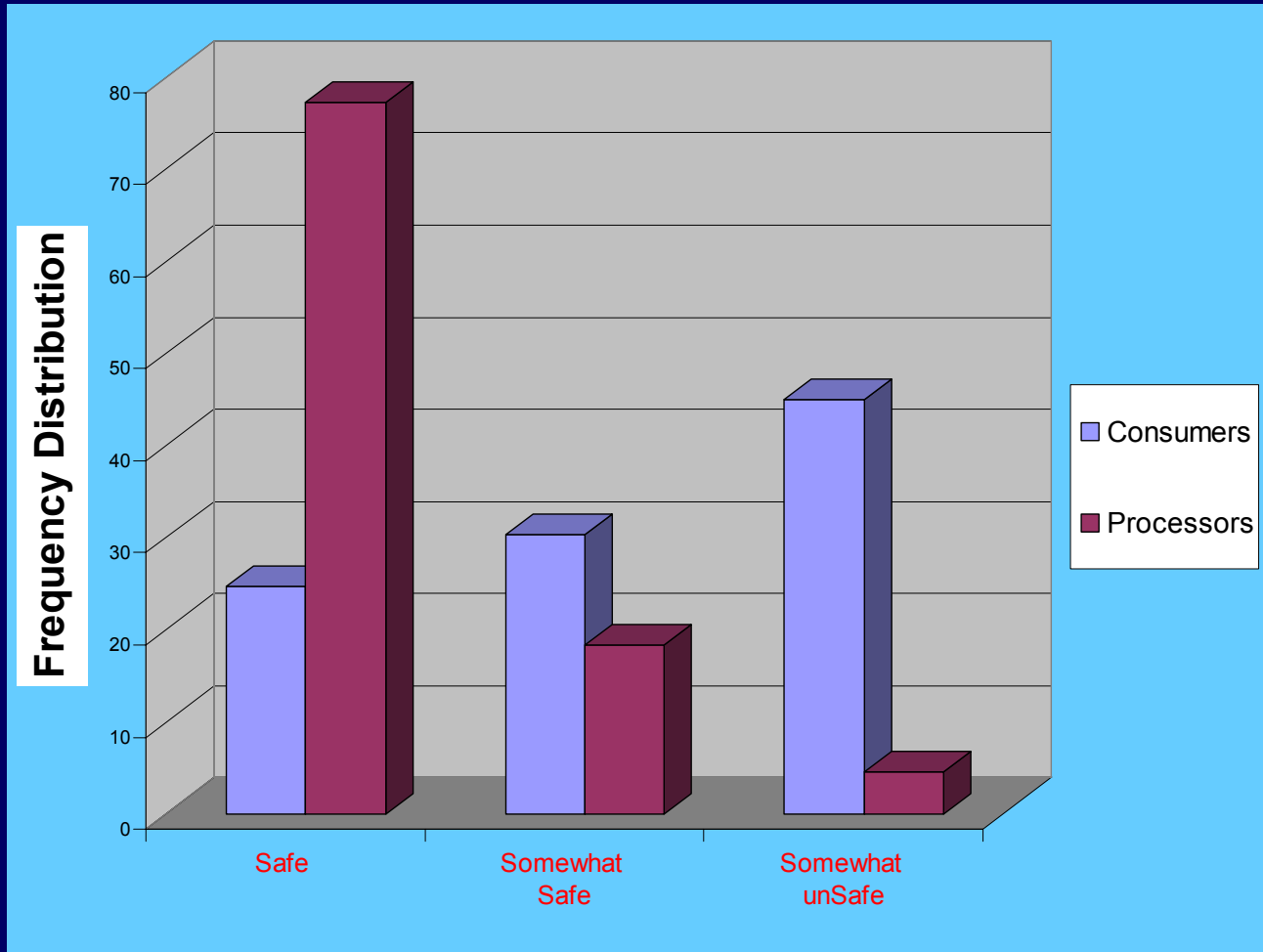
<b>Table 1 Cont.. Packers and Processors' Responses (n=22)</b>				
	Years in business	1=less than 4years 2=5-9 years 3=10-20 4= 20 +	3.14	2.03
	Number of employees	1=1-2 2=3-10 3=11+	2.11	0.76
	City	1= North Dakota 2= South Dakota 3= Montana 4= Minnesota	2.5	1.37
	Sales Volume	1= less than \$500,000 2= \$500,000 - \$2.5 M 3= \$2.5 - \$10.0 M 4= \$10M plus	2.03	0.97
	Price	Weighted Price per Pound of bison Burger	\$1.43	\$0.51
	Safety	1 = Safe 2= Somewhat safe 3 = Somewhat unsafe	2.671	0.30
	USDA Inspected/Microbial testing	1=Yes 2=No	1.32	0.33
	Use food label	1=Yes 2=No	1.5	0.15
	Had Recall	1=Yes 2= No	1.86	0.02
	Awareness of microbial hazards	1=Yes 2= No	1.16	0.12

Survey Responses

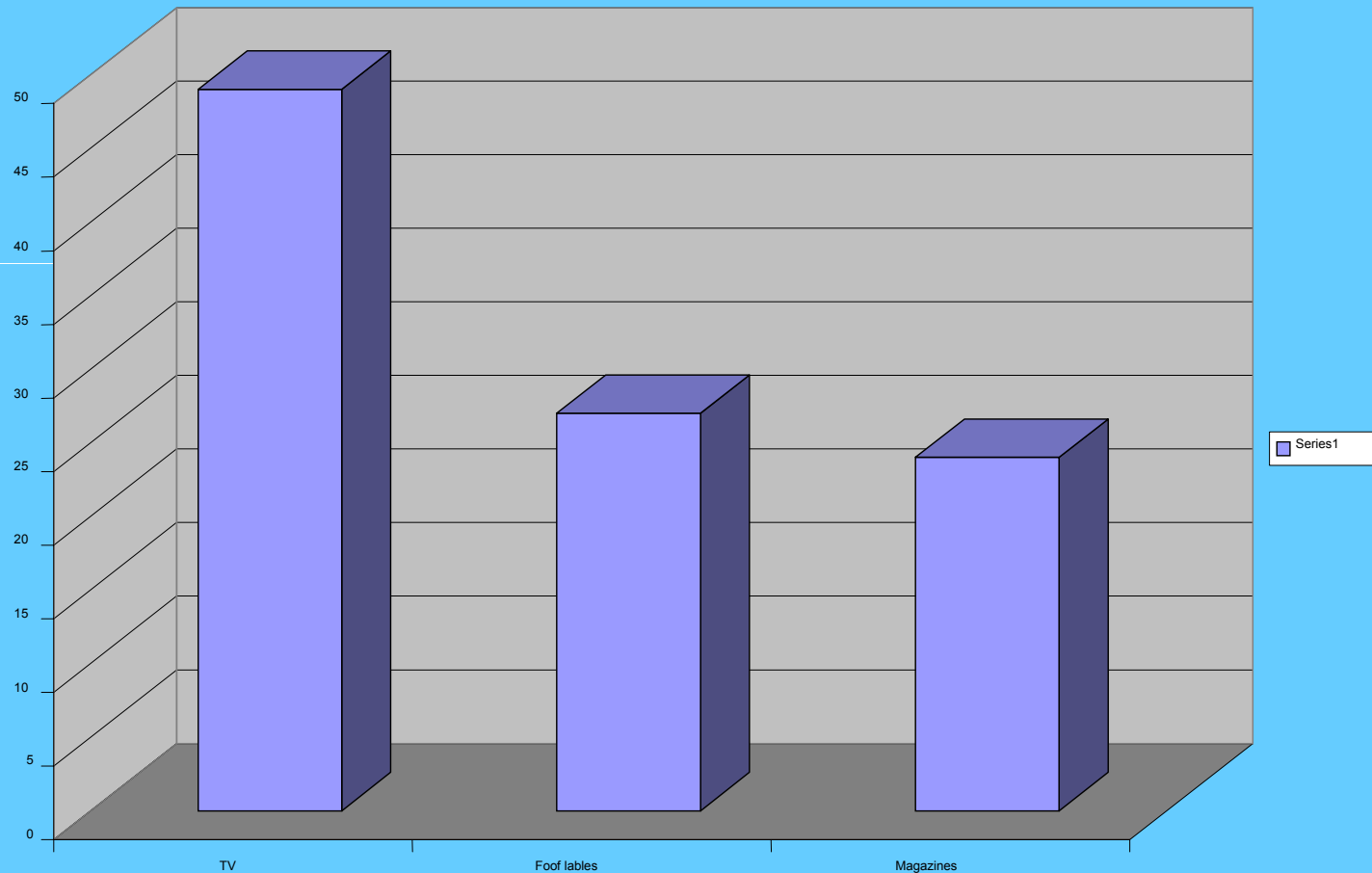
# Survey Results

- **Personal Health Influence**
- **Perceived Locus of Control**
- **Outrage and Awareness**

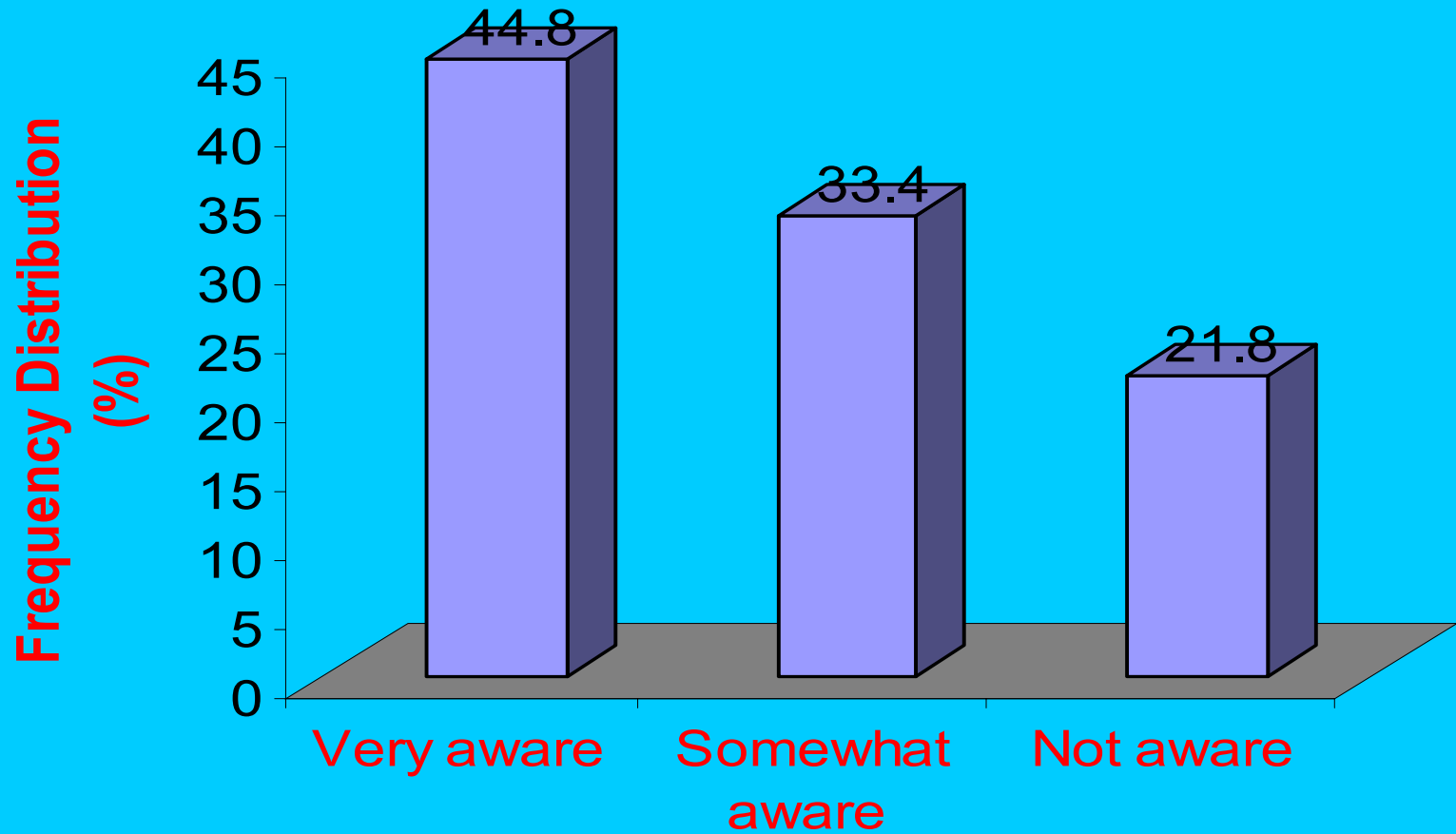
# Figure 4. Food Safety Perception Gap Between Consumers and processors



# Figure 5. Primary Source of food Safety Information



# Handling and Precautionary Practices





# Multinomial Logit Results

## ■ Consumers

- Socialcultural/ Economic Characteristics and Perceived Risk
- Personal Health Influence Characteristics and Perceived Risk
- Perceived Locus of Control Characteristics and Perceived Risk
- Outrage and Perceived Risk

## ■ Processors

## ■ Risk Perception and Consumption of Bison Meat

**Table 2. Estimated Coefficients and Marginal Effects of Factors Affecting Consumer's Risk Perception**

	Variables	Coefficient (n=400)	Standard Error (n=400)	Cell Probability
	<b><i>Somewhat UnSafe</i></b>			
Social and Cultural Characteristics	Income	-1.822	1.057	0.040
	Age	0.114	0.055	0.001
	Education	2.177	1.711	
	City (location)	0.628	0.331	0.003
	Gender	0.827	1.159	
Personal Health Influence	Anybody ill	8.828	1.442	0.095
	Family member ill	0.855	0.05	0.005
Perceived Locus of Control	Ease illness homeprep	-1.581	0.667	0.018
	Ease illness Awayprep	-0.417	0.726	
Outrage/Awareness	Info TV	18.094	2.271	0.000
	Info Magazines	-2.58	1.843	
	Radio	2.076	4.283	
	Food labels	-4.21	3.075	
	Trend in safety bison meat	-0.852	0.691	
	Awareness of handling	-1.957	0.87	0.002
	<b><i>Somewhat safe</i></b>			
Social and Cultural Characteristics	Income	0.131	0.158	
	Age	1.616	0.016	
	Education	2.175	0.429	0.001
	City (location)	-0.228	0.159	
	Gender	-0.508	0.248	0.004
Personal Health Influence	Anybody ill	0.119	0.305	
	Family member ill	0.513	0.349	0.006
Perceived Locus of Control	Ease illness homeprep	-0.136	0.236	
	Ease illness Awayprep	-0.609	0.288	0.034
Outrage/Awareness	TV	-0.948	0.557	0.009
	Magazines	0.496	0.452	
	Radio	0.129	0.903	
	Food labels	0.903	0.681	
	Trend in safety bison meat	-0.37	0.177	0.037
	Awareness of handling	5.924	0.163	0.097
	Ln L at Convergence		473.508	
	Cox and Snell R^2		0.635	
	Nayelkerke R^2		0.714	
	Model significance		0.000	

**Table 4. Estimated Coefficients and Marginal Effects of Factors Affecting Processor's Risk Perception**

	Variables	Coefficient (n=22)	Standard Error (n=22)	Probability
<i>Somewhat Safe</i>				
Socio-cultural & Economic Characteristics	Years in business	3.112	1.001	0.060
	Sales Volume	8.121	6.225	
	City (location)	0.988	0.751	
Perceived Locus of Control	Recall	-4.128	1.042	0.091
	USDA Inspected/Microbial testing	3.252	0.785	0.020
	Awareness of Microbial hazards	3.551	1.677	0.011
	Food labels	-0.457	0.526	
<i>Somewhat Unsafe</i>				
Socio-cultural & Economic Characteristics	Years in business	-2.031	0.188	0.019
	Sales Volume	1.066	2.011	
	City (location)	-3.218	2.959	
Perceived Locus of Control	Recall	1.177	0.505	0.001
	USDA Inspected/Microbial testing	-1.511	0.441	0.016
	Awareness of Microbial hazards	-0.336	0.255	
	Food labels	-0.619	0.438	
	Ln L at Convergence		414.001	
	Cox and Snell R <sup>2</sup>		0.432	
	Nayelkerke R <sup>2</sup>		0.522	
	Model significance		0.001	

**Table 3. Estimated Coefficients and Marginal Effects of Factors Affecting Consumption Away from Home and at Home**

	Variables	Coefficient (n=400)	Standard Error (n=400)	Cell Probability
<b>Consumption of Bison at Home</b>				
Social and Cultural Characteristics	Income	0.593	0.195	0.002
	Age	0.027	0.018	
	Education	0.038	0.195	
	City (location)	-0.109	0.169	
	Gender	0.979	0.303	0.003
	Price	-0.244	0.118	0.001
Personal Health Influence	Anybody ill	-0.163	0.037	0.015
	Family member ill	-0.223	0.424	
Perceived Locus of Control	Ease illness homeprep	-0.459	0.297	
	Ease illness Awayprep	-0.327	0.352	
Outrage/Awareness	Info TV	-0.089	0.0112	0.000
	Awareness of handling	4.112	1.023	0.027
Food Safety Risks Perception	Trend in food safety risk	-0.241	0.244	
	Bison meat safety	-1.640	0.478	0.062
<b>Away Consumption</b>				
Social and Cultural Characteristics	Income	1.165	0.431	0.001
	Age	0.051	0.076	
	Education	0.375	0.429	
	City (location)	-0.302	0.184	
	Gender	0.102	0.310	
	Price	-0.189	0.0121	0.012
Personal Health Influence	Anybody ill	-0.236	0.038	0.001
	Family member ill	-0.426	0.044	0.014
Perceived Locus of Control	Ease illness homeprep	-0.191	0.308	
	Ease illness Awayprep	-0.029	0.004	0.002
Outrage/Awareness	TV	-0.329	0.007	0.008
	Awareness of handling	2.998	0.336	0.071
Food Safety Risk Perception	Trend in food safety risk	-0.100	0.249	
	Bison meat safety	-1.282	0.486	0.102
	Ln L at Convergence		477.74	
	Cox and Snell R <sup>2</sup>		0.795	
	Nayelkerke R <sup>2</sup>		0.848	
	Model significance		0.000	

# Conclusions and Discussion

- Results indicate that a significant risk perception gap exist between consumers and processors
  - Outrage among other factors account for this gap.
- Results further show that perceived risk affects bison consumption away from home and at home.
- Producers and processors of specialty meats will have to overcome risk perception issues to move their products beyond niche markets.

## Limitations and Areas for Further Research

- Extending the study to other regions and increasing the sampling size.
- Extending the study to restaurants and other end users of specialty meats.
- More explicit modeling out outrage.
- Extending the methodology to jointly model food safety risk perception and consumer choice of specialty meats.