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**Consumer's behaviour with respect to meat demand in the presence of animal disease concerns:
the special case of consumers who eat bison, elk, and venison**

Aye C. Myae¹, Dr. Ellen Goddard²

¹ PhD student, Department of Rural Economy, University of Alberta, Edmonton, Alberta, Canada. Email: myae@ualberta.ca

²Professor, Department of Rural Economy, University of Alberta, Edmonton, Alberta, Canada. Email: ellen.goddard@ualberta.ca

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Consumer's behaviour with respect to meat consumption in the presence of animal disease concerns: the special case of consumers who eat bison, elk, and venison



Aye C. Myae, Dr. Ellen Goddard

Department of Rural Economy, University of Alberta, Edmonton, Alberta



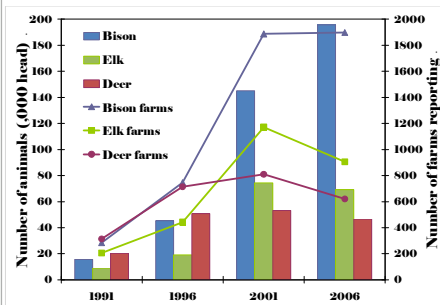
Introduction



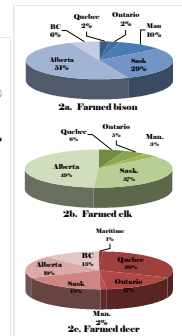
Prion diseases may have raised concerns in consumer's minds about food safety associated with meat world-wide. *Bovine Spongiform Encephalopathy* (BSE) and *Chronic Wasting Disease* (CWD) both exist in Canada and markets for beef, bison, elk and deer have been affected by the diseases, partially through trade bans in export markets. While to date no bison have been found with BSE, many of the trade bans put in place at the time of BSE have affected the bison market and consumers may associate bison with BSE through media coverage of the disease and trade barriers.

Background

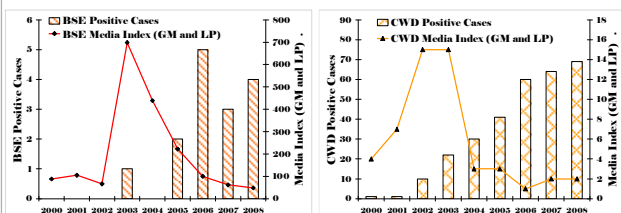
Since the 1980s, diversification of livestock enterprises has been explored as a mean of stabilizing farm incomes, utilizing marginal agricultural land, and conserving specialized livestock. During the 1990s, the growth in the exotic meats sector, especially bison, elk and deer, which are healthy meats with novel quality traits, was driven by consumers with higher health consciousness and increasing disposable incomes (Statistics Canada). However, industry development has slowed after domestic BSE and CWD cases (figure 1). Figure 2 shows the relative concentration of farmed bison, elk and deer by province in Canada. BSE, CWD positive cases and respective media coverage collected from "The Globe and Mail Canada" (GM) and "La Presse" (LP) has potentially had an influence on consumers' meat purchasing behaviour (figure 3).



Source: Statistics Canada "Census Data"
Figure 1. Production information



Source: Statistics Canada "2006 Census Data"
Figure 2. Relative concentration by province



Source: Canadian Food Inspection Agency; Canadian Statistics; Government of Alberta - Agriculture and Rural Development; Government of Alberta - Sustainable Resource Development; Government of British Columbia - Ministry of Environment; Government of Saskatchewan - Environment; Ontario - Ministry of Agriculture, Food and Rural Affairs.
Figure 3. The relationship between BSE, CWD positive cases and media coverage

Objective

The research aims to examine the behavior of selected households that include bison, elk and venison meat as part of their total meat consumption with respect to: (i) their responses to relative prices; (ii) the revealed impact of BSE and CWD incidents via media coverage on these household's meat purchasing behavior and (iii) different behavioural responses according to demographic characteristics of these households.

Data: An unbalanced panel dataset (N = 4761) has been constructed using annually aggregated Homescan™ household data (ACNielsen) from 2002 to 2008. Only 7.4 percent consumed these exotic meats among total households surveyed by ACNielsen in 2006. This sample of consumer is overrepresented by people from Quebec, Manitoba and Saskatchewan, is overrepresented by French speaking people, and is overrepresented by households with no children than the Canadian Census suggests for the general population in 2006. The data show an upward trend in expenditure shares with relatively unstable prices for bison, elk and venison (figures 4, 5).

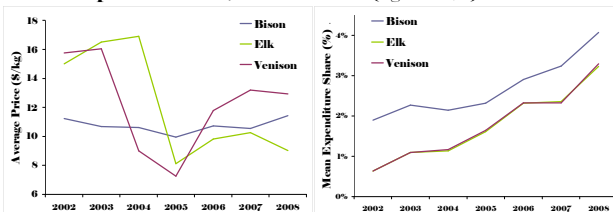


Figure 4. Mean price comparison

Figure 5. Mean expenditure comparison

Model: LA-AIDS model

$$w_i = \alpha_i^* + \sum_{j=1}^N \delta_{ij} DF_j + \sum_j \gamma_{ij} \ln p_j + \beta_i [\ln Y - \sum_j w_j \ln p_j]$$

where w_i is the budget share of i th good, α_i^* is the intercept net of demographic and food safety effects, DF_j is demographic and food safety media indices, p_j is real price, $\ln Y$ is total expenditure, and $\ln P$ is the stone price index.

Restrictions: homogeneity ($\sum_i \gamma_{ij} = 0$), symmetry ($\gamma_{ij} = \gamma_{ji}$), adding up ($\sum_i \alpha_i^* = 1$, $\sum_i \gamma_{ij} = 0$, $\sum_i \beta_i = 0$)

Elasticities: Own-price, Cross price, Expenditure, Demographic (media indices, HH income)

$$\varepsilon_{ii} = \frac{\gamma_{ii}}{w_i} + \beta_i - 1 \quad \varepsilon_{ij} = \frac{\gamma_{ij} - \beta_i w_j}{w_i} \quad \varepsilon_{iY} = \frac{\beta_i}{w_i} + 1 \quad \varepsilon_{iP} = \delta_{ij} + \frac{DF_j}{w_i}$$

Method: Full Information Maximum Likelihood (FIML) Estimation Procedure

Results

Table 1. Estimated coefficients on demographic variables

Demographic variables	Bison	Elk	Venison	Beef	Pork	Chicken	Turkey	Seafood
Language (English=1)	-0.002	0.0009	0.001	-0.006	0.03***	-0.02	0.01*	-0.01
Regions (relative to Ontario):								
Quebec	-0.003	0.001	-0.001	0.01	0.02	-0.03	-0.003	0.004
Man/Sask	0.012*	-0.003	-0.005*	-0.09***	0.02	0.01	0.02*	0.04*
Alberta	0.004	-0.001	-0.003	-0.05**	0.004	0.008	0.01	0.03
BC	-0.0004	-0.005	-0.007	-0.05*	0.02	-0.004	0.01	0.05*
Urban/Rural (Urban=1)	0.002	-0.0005	-0.0004	-0.005	0.01***	0.001	-0.002	-0.01**
Household size (>=3)	0.002	0.007***	0.007***	-0.01	-0.01	0.008	0.004	-0.01
Presence of children (<18)	-0.001	-0.001	-0.0005	-0.03***	0.008	0.04***	-0.006	-0.002
Education of household head (>=college/university)	-0.001	-0.002***	-0.002***	0.003	-0.03***	0.03***	-0.002	0.01***

Notes:***=significant at 1%, **=significant at 5%, and *=significant at 10%.

Results (cont.)

Table 2. Elasticities of price, expenditure, hh-income and media coverage

Elasticities	Bison	Elk	Venison	Beef	Pork	Chicken	Turkey	Seafood
Own price elasticity:	-1.64*	-0.41***	-0.48***	-0.86***	-0.79***	-0.99***	-0.6	-1.28***
Expenditure elasticity:	0.51***	0.24***	0.25***	1.09***	1.05***	1.07***	0.81***	0.85***
Household income elasticity:	0.12	1.19***	0.23***	-0.04*	-0.03	-0.02	0.22***	0.08
Media index elasticity:								
BSE (-2)	-0.11*	0.21***	0.19***	-0.02*	-0.01	-0.004	0.07*	0.04
CWD	0.13*	-0.13**	-0.133***	0.02*	-0.002	-0.005	-0.02	-0.05

Notes:***=significant at 1%, **=significant at 5%, and *=significant at 10%.

Conclusions

Demographically: (i) pork and turkey are preferred by more English speaking people than French speaking people; (ii) relative to Ontario consumers, bison is more preferred and venison is less preferred by Man/Sask consumers; (iii) urban people prefer more pork and less seafood; (iv) the larger the household size, the more elk and venison are consumed; (v) households with children under 18 years of age consume less beef and more chicken; (vi) higher educated household heads choose more chicken, seafood and less elk, venison and pork.

Economically: (i) relatively bison has a highly elastic own price response but is not responsive to household income; (ii) relatively, elk and venison are own price inelastic but elastic in response to household income; (iii) meat expenditure elasticities of bison, elk, and venison are relatively low as compared to other meats.

Food safety concerns: These consumers are highly concerned about animal diseases, food safety issues and responded promptly to media reports by switching consumption from beef/bison to elk/venison/turkey at the time of BSE reports and vice versa for CWD reports.

Policy Implication

Since there is a relatively low response to meat expenditure and household income for bison and venison consumption and inelastic responses to own price and expenditure for elk and venison consumption, growth in the market for these meats among households who do eat them seems limited. The exact match between the animal disease outbreaks (BSE, CWD) and changes in consumption implies that these consumers have high knowledge and concerns about food safety, and are significantly influenced by disease outbreaks. Given the higher knowledge about these meats in this sample of households, it is likely that the animal diseases will have heightened risk perceptions associated with these exotic meats in the general population as well.

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Contact Info: myac@ualberta.ca, or via Department of Rural Economy, GSB 315, University of Alberta, Edmonton, Alberta, T6G 2H1.