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Trust, Fairness and Consumer Acceptance of the Use of Genomics for Feed Efficiency in Cattle

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INTRODUCTION

Feed is one of the biggest costs in cattle production. In addition, methane emissions are related to the amount of feed eaten. Therefore, improving feed efficiency can lead to both economic and environmental sustainability in cattle production. Genomics, which is the study of genes and genetic characteristics of organisms, can be used as the basis of selective breeding for increased feed efficiency in livestock. However, the acceptance of the technology by consumers or the public in general could influence its adoption. Trust and/ or perceptions of fairness have been shown to be important factors that drive acceptance of food technologies (e.g. Siegrist et al., 2012; McComas et al., 2014). Perceptions of fairness also influence customer loyalty (Martin et al., 2009). However, there is still limited information on the effects of trust and fairness on acceptance of the use of genomic selection in livestock production. The knowledge of the factors that influence public acceptance of the technology might help in understanding consumer behavior, in predicting the success of the technology and in the development of information programs, policies and possibly regulations of the use of the technology in agricultural production.

OBJECTIVES

- To assess the effects of trust and perceptions of fairness on consumers' acceptance of the use of genomic selection for feed efficiency in cattle.

METHODS

Data

- Online survey in 2016 in December Canada -1822 respondents

Analytical methods

- Hierarchical cluster analysis and multinomial logit regression models

Classification of respondents

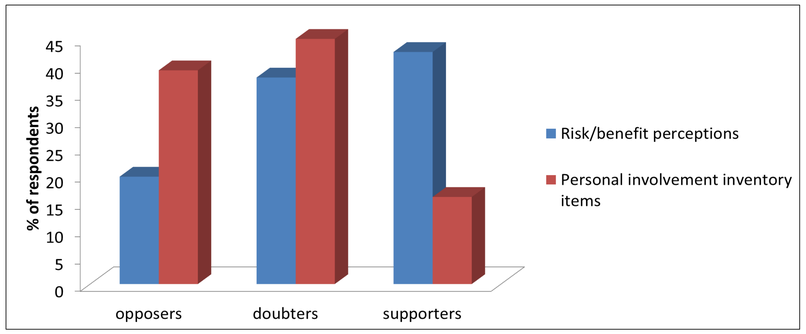
- For the dependent variables, respondents are classified into supporters, doubters and opposers of the technology using their risk/benefit perceptions (Vandermoere et al., 2011) and personal involvement inventory items (e.g. Batra and Ahtola, 1990).
- For risk/benefit perceptions, respondents were asked the following:

✓ How risky do you consider the use of genomic information, to undertake selective breeding for increased feed efficiency of dairy cattle, to be for your health?' 1. not at all risky … 5. very risky.

✓ How beneficial do you consider the use of genomic information, to undertake selective breeding for increased feed efficiency of dairy cattle, to be for your health? 1. not beneficial at all … 5. very beneficial.

- For personal inventory items, respondents rate the degree to which the use of genomic information to undertake selective breeding to increase feed efficiency in cattle is useful, valuable, beneficial, wise, nice, agreeable and pleasant on a seven point scale.

RESULTS



✓ For the risk and benefit questions, for supporters (risk < benefit), for doubters (risk = benefit) and for opposers (risk > benefit).

✓ For the personal involvement inventory items, hierarchical cluster analysis is used to classify respondents into three groups as well.

Fig. 1 Classification of respondents using responses from risk/benefit perception questions and personal involvement inventory items

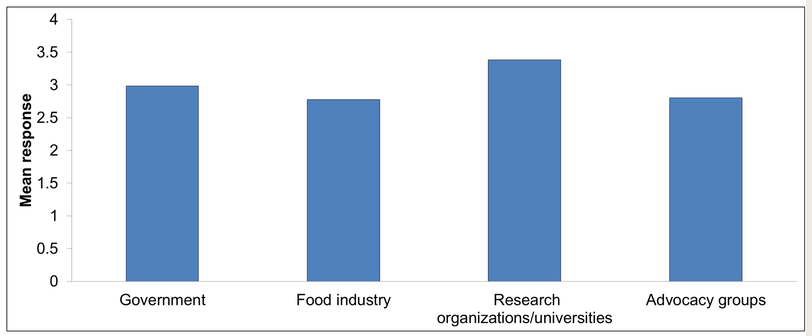


Fig. 2 How much trust do you have in the following groups or institutions regarding their responsibility for food production in Canada (1. strongly disagree….5. strongly agree)

Table 1 Questions about fairness and regulation of technologies

	Description (Responses are on a 5 point scale: 1. strongly disagree … 5. strongly agree)	**Mean (SD)**
Fairness of prices paid by consumers for food	Sum of responses to three statements adopted from Martin et al. (2009)	7.79 (2.71)
Fairness of prices paid to farmers for food	Sum of responses to three statements adopted from Martin et al. (2009)	7.95 (2.50)
Distribution of benefits from new technologies	Sum of responses to two statements adopted from McComas et al (2014)	6.07 (1.15)
It's fair spending my tax dollars on developing these new technologies	Adopted from McComas et al. (2014)	2.90 (0.97)

Note: We also include questions found to be important in previous studies. The other variables included are animal attitude scale (Herzog et al., 2015), generalized trust in people, natural product and health interest, pleasure from consuming food (Roininen et al., 2001) and questions relating to knowledge of and attitudes towards science and technology (or genomics), knowledge of environmental problems and myths of nature (Steg and Sievers, 2000).

RESULTS CONT'D

Table 2 Coefficients from multinomial regression results (Base is opposers)

	Risk/Benefit perceptions		**Personal involvement inventory items**	
	Doubters	*Supporters*	*Doubters*	*Supporters*
Constant	2.98***	-1.19	-3.06***	-9.96***
Male	-0.05	-0.04	0.27**	0.15
Age	-0.0002	0.01***	0.01**	0.03***
Child	-0.24	-0.10	0.08	-0.15
Education	-0.03	-0.04	-0.05	-0.07
Household income	0.002	0.02	0.05***	0.01
Live in a city	-0.23	-0.32*	-0.17	0.0003
Live in Quebec	-0.10	0.36*	0.19	0.11
Familiarity with genomics	0.06	0.29***	0.41***	0.73***
Self-rated knowledge of science and technology	-0.001	-0.08**	-0.03	-0.07
The world is better off due to science and technology	0.11***	0.28***	0.17***	0.35***
Support for biotechnology	0.12	0.40***	0.26***	0.52***
Self rated knowledge of environmental problems	-0.10**	-0.01	0.02	0.05
Animal Attitude Scale	-0.04	-0.07***	-0.06***	-0.05*
Generalized trust in people	0.10	-0.14	0.18	0.02
Trust in the government	-0.10	-0.10	-0.10	-0.13
Trust in the food industry	0.24	0.19	-0.002	0.31*
Trust in research organizations/universities	-0.07	0.18*	0.16*	0.26**
Trust in advocacy groups	0.09	0.05	0.05	0.11
Fairness of prices paid by consumers for food	0.07**	0.08***	0.05*	0.06*
Fairness of prices paid to farmers for food	-0.02	-0.06*	-0.05**	-0.01
Distribution of benefits from new technologies	-0.08	-0.01	0.00003	-0.05
It's fair spending my tax dollars on developing these new technologies	0.25***	0.40***	0.16**	0.23**
Natural product interest	-0.03	-0.06***	-0.01	-0.04**
Health interest	-0.04**	-0.01	0.01	0.05**
Pleasure from consuming food	-0.04	0.001	0.002	0.07**
Environmental problems can only be controlled by enforcing radical changes in human behaviour in society as a whole	-0.31	0.02	0.30	0.26
Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed	-0.03	0.12	0.35*	-0.03
We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions	-0.79	-0.21	0.31	-0.88
Eat dairy	0.33	0.22	0.26	0.04
Log likelihood	-1550.0		-1480.4	
McFadden Pseudo R^2	0.12		0.13	
Sample size	1668		1668	

***, ** and * significant at 1%, 5% and 10% levels respectively

CONCLUSIONS

The results are generally consistent between the two regressions, models of two different measures of support. Marginal effects show that people who trust the food industry and research organizations/universities have a high probability of supporting the use of genomics for feed efficiency in cattle. Respondents who agree that it is fair spending their tax dollars on developing new technologies are more likely to support the use of genomic selection for in cattle. Those respondents who state that food prices paid by consumers are fair are more likely to support the use of genomic selection for feed efficiency in cattle. People who state that prices paid to farmers for food are fair are less likely to support the use of genomic selection in cattle. Opposite results between fairness of food prices paid to farmers/by consumers might be because respondents are concerned that the technology will result in increased farmers' costs which might mean less fair prices received. In conclusion, higher trust, justifiable consumer food prices and support for taxes for the development of new technologies are important predictors of the acceptance of the use of genomic selection in cattle.

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