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New Zealand Farmer and Grower Intentions to Use Gene Technology: Results from a Resurvey

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This study examines changes in the intentions, attitudes, and beliefs of farmers regarding their use of gene technology. Of 656 respondents to a postal survey in 2000, the views of 115 were assessed again in 2002. Relationships between intention to use gene technology, attitudes towards using gene technology, and beliefs about market acceptance, commercial viability, and environmental risk from using the technology were similarly supported in 2000 and 2002. Attitudes and beliefs about the consequences of using gene technology are discussed as key determining factors in farmer and grower decisions regarding use of gene technology.

Key words: attitudes, farmer, gene technology, GM food, intentions.

Introduction

A survey of New Zealanders conducted by the New Zealand Royal Commission on Genetic Modification (2001; $N = 1,153$) found disapproval for the use of gene technology in processed foods (73% disapproved), farm animals (70% disapproved), and crops (58% disapproved). However, this finding is not surprising, given that national surveys conducted in New Zealand had revealed more concern than approval over the use of gene technology in food production (Couchman & Fink-Jensen, 1990; Gamble, Muggleston, Hedderly, Parminter, & Richardson-Harman, 2000; Macer, 1994; 1998). More recently, there has been an indication that New Zealanders may have become less concerned. The sampling of the views of New Zealand farmers and growers over approximately two years found a minor positive shift in views (Fairweather, Maslin, Gossman, & Campbell, 2003).

The aim of the study presented in this paper was to investigate changes in the intentions of New Zealand farmers and growers regarding their use of gene technology in agricultural production. A survey, undertaken in 2000, had recorded the views of farmers and growers (Cook, Fairweather, & Campbell, 2000; $N = 656$). The second study reported in this paper involved a resurvey of a sample of these respondents and was conducted in 2002 ($N = 115$). This paper therefore reports on an investigation of change over time in farmer and grower attitudes and intentions to use gene technology.

In social psychology, the use of intention as a predictor of actual behavior and the explanation of intention has been the purview of the well-known Theory of Planned Behavior (TPB; Ajzen, 1991). Consequently, like other models of consumer intentions to purchase genetically modified (GM) food (e.g., Bredahl, 2001; Cook, Kerr, & Moore, 2002; Subrahmanyan & Cheng, 2000) and models of farmer intentions (e.g., Beedell & Rehman, 1999, 2000; Bennett, Meister, & Wilkinson, 1999), this work follows the axioms of the TPB. The TPB poses attitude towards performing a behavior as the main determinant of intention. In turn, this attitude is held to be formed from a set of referent beliefs. Subsequently, in our research on the views of farmers and growers, beliefs about market acceptance, commercial viability, and environmental risk are identified as key determining factors in the acceptance or rejection of gene technology.

To explain further to those less familiar with our approach and methods, from our 2000 survey we identified a number of reasons associated with the attitudes and intentions of farmers towards their using GM production methods on their farms. To investigate whether farmers and growers had changed their minds, after approximately two years, we went back, resurveyed some of the original respondents to our 2000 study, and asked them to answer a selection of the same questions that they had answered in 2000. We sought to ascertain whether attitudes, intentions, and salient reasons or beliefs about gene technology had changed over time. We assumed that salient reasons or beliefs about gene technology held by farmers give rise to a correspondent attitude, which then informs an intention to act or behave in a particular manner. These assumptions are integral to an established model, which we have used to assist in structuring our understanding of the decision processes of farmers; we have endeavored to apply this model according to the recommendations of its designers. This model is particularly useful, because a measure of intention has been shown empirically in many studies across a range of topic areas to be reasonably correspon-

dent with actual behavior (Armitage & Conner, 2001; Conner & Armitage, 1998; Randall & Wolff, 1994). This means that intentions can be used in projections of the actual rejection or acceptance of GM production technology. Nevertheless, our immediate concern here is with whether farmers and growers have changed their minds and similarly with whether the key reasons or beliefs and general attitudes regarding GM production technology have altered over time.

Method

The resurvey questionnaire was shorter than the 2000 questionnaire because it measured for a second time only key questions of relevance to farmer and grower intentions. The format and question style were unchanged. The questions used in 2000 and repeated in 2002 were developed from focus group work ($N = 26$) and a public survey conducted in 1999 (Cook, Kerr, & Moore, 2002; $N = 266$). The following is an explanation of the questions and measurement scales. The survey questions, as presented to respondents, are provided in the Appendix. A number-in-box design was used to facilitate data coding. Our research on question format suggests that number-in-box and tick-in-box designs do not differ in terms of response rates (see Fairweather & Gossman, in press).

Intention to use gene technology was measured by asking: "Which one of the following statements best represents your intention to either use or not use gene technology on your farm within the next ten years?" Respondents could answer by choosing one of a range of seven statements anchored by: *I have a very strong intention to use gene technology* and *I have a very strong intention not to use gene technology.* The midpoint of the scale was anchored by: *I have no intention either to use gene technology or not to use gene technology.* Intention to purchase GM food and intention to use organic methods were similarly measured using the respective referents of *purchase GM food* and *use organic methods*.

Three attitude measurements were taken by asking: "How favorable or unfavorable is your general attitude towards the following three items?" Attitude to *using gene technology*, *purchasing GM food* and *using organic methods* were then each measured on seven-point scales anchored by *extremely unfavorable* and *extremely favorable*.

The questionnaire included eight consequences of the production of GM food: (a) better quality food, (b) new risks to public health, (c) enhanced economic growth for New Zealand, (d) consumer acceptance of foods produced using gene technology, (e) adverse effects on future generations, (f) damage to ecological systems, (g) increased food production, and (h) personal risk. Each was measured using two questions; one question assessed desirability, and one question assessed the likelihood of its occurrence. Likelihood was measured on a seven-point scale anchored by *extremely unlikely* and *extremely likely*. Desirability was measured on a seven-point scale anchored by *extremely undesirable* and *extremely desirable.*

To explain how these questions are incorporated in farmers and grower's decisions, following Ajzen (1991), it is presumed that in forming an attitude, individuals summarize a number of important beliefs. This summation is modeled by first multiplying together the likelihood and desirability scores. The products are then summed. This produces a single measure, which is presumed to be a basis of an individual's attitude towards a behavior, which in this case is using gene technology.

Measurement was also taken of the level of agreement or disagreement with New Zealand becoming free of genetic engineering (GE). These measurements were taken by using seven-point scales anchored by *very strongly agree* and *very strongly disagree*. Additional demographic information and farm characteristics were gathered using various measures. These measures were derived from the 2000 survey.

With respect to response rate and distribution, the initial survey conducted between May and August 2000 distributed at random 1,950 questionnaires to New Zealand farmers and growers and resulted in 656 responses for an effective response rate of 35%. The resurvey was conducted in September and October 2002 (approximately two years after the 2000 survey). Two hundred questionnaires were posted to farmers and growers randomly selected from the 656 respondents to the 2000 study. The resurvey received an effective response rate of 63% ($N = 115$).

Results

Representativeness and Response Bias

In a test for response bias between the 200 farmers and growers that were posted the questionnaire and the 115 that replied there were no significant differences (chi-square, $p > 0.05$). To test whether the subsample was representative of the population of farmers and growers, comparison was made between demographic information (sex, income, qualification, and age) from the ques-

Table 1. Comparison of subsample, sample, and census data.

	Subsample (*N* = 115)		Sample (*N* = 656)		Census data
Item	**Freq.**	**%**	**Freq.**	**%**	**%**
Sex					
Male	91	79.1	506	78.4	69.0
Female	20	17.4	139	21.6	31.0
Income					
<$5,000	4	4.9	21	3.2	15.0
$5,001–$10,000	4	4.9	20	3.0	11.3
$10,001–$15,000	7	8.5	30	4.6	13.6
$15,001–$20,000	4	4.9	55	8.4	12.4
$20,001–$25,000	8	9.8	48	7.3	10.7
$25,001–$30,000	8	9.8	38	5.8	9.7
$30,001–$40,000	12	14.6	68	10.4	9.8
$40,001–$50,000	8	9.8	68	10.4	4.6
$50,001–$70,000	15	18.3	50	7.6	4.1
$70,001–$100,000	7	8.5	45	6.9	2.3
>$100,000	5	6.1	41	6.3	3.4
Qualifications					
No qualification	30	27.3	179	27.3	15.8
School certificate	14	12.7	97	14.8	16.6
Sixth form certificate or UE	14	12.7	89	13.6	10.6
Higher school qualification	7	6.4	22	3.4	3.9
Trade certificate or equivalent	32	29.1	156	23.8	23.6
Bachelors degree	7	6.1	59	9.0	3.4
Further qualifications	6	5.2	29	4.4	1.1
Age					
15–24	0	0.0	2	0.3	15.8
25–34	4	3.6	25	3.8	19.6
35–44	27	24.3	176	26.8	24.0
45–54	37	33.3	206	31.4	20.9
55–64	23	20.7	135	20.6	13.1
65+	20	18	82	12.5	6.5

tionnaire and census information about New Zealand farmers. As shown in Table 1, there were more males, more with higher income, and more farmers in the 35–55 age groups than those recorded in census data. Similarly, level of education failed to match levels recorded in census data. All of these differences were significant (chi-square, $p < 0.05$). However, because responses were elicited from a sample of farm owners, and census data is derived from self-reports of those who describe themselves as farmers, it is likely that each sampling frame is quite different. A further test comparing the subsample with the population from which it was drawn found no significant difference ($\chi^2 = 0.325$, $df = 4$, $p > 0.05$). These data, shown in Table 2, were based on a classification of farm type with the comparison made between the subsample and farms in New Zealand. Farm information was derived from Quotable Value, which was formerly the official government valuation service in New Zealand. Comparison between the original sample and these data also showed no significant difference ($\chi^2 = 1.68$, $df = 4$, $p > 0.05$).

Table 2. Comparison of subsample, sample, and population data.

	Subsample (*N* = 115)		Sample (*N* = 656)		Population
Farm type	**Freq.**	**%**	**Freq.**	**%**	**%**
Horticulture	11	9.6	89	13.6	10.8
Pastoral	64	55.7	342	52.1	56.3
Specialist livestock	5	4.3	30	4.6	4.0
Dairy	31	27.0	166	25.3	25.3
Arable	4	3.5	22	3.4	3.4

Descriptive Results

Descriptive results are shown in Table 3. In terms of differences between 2000 and 2002, except for level of agreement with New Zealand becoming GE free (paired sample *t* test, $p < 0.001$), there was no evidence of significant differences ($p > 0.05$). The results show that attitudes and intentions had become no more or no less favorable towards using gene technology and purchasing GM food. Minor changes in other measures were also nonsignificant. In contrast, it is evident there was less agreement in 2002 with the view that New Zealand should become GE free.

Both the 2000 and 2002 results show that intention to use gene technology and purchase GM food was generally negative, whereas intention to use organic methods was generally positive. Intention to purchase GM food was more negative than intention to use gene technology. Examination of the frequency of responses from 2002 shows that 41% had a negative intention towards using gene technology, 34% had no intention to either use or not use the technology, and 25% had a positive intention to use the technology. In terms of intentions to purchase GM food, 43% had a negative intention towards purchasing GM food, 40% had no intention to either purchase or not purchase, and 17% had a positive intention to purchase GM food. Positive intentions

Table 3. Intentions and attitudes, 2000 and 2002.

Item		2000	2002
Intention to use gene technology	**Mean**	-0.61	-0.56
	SD	1.43	1.63
	N	113	112
Intention to purchase GM food	**Mean**	-0.74	-0.67
	SD	1.43	1.53
	N	115	112
Intention to use organic methods	**Mean**	0.43	0.40
	SD	1.20	1.23
	N	115	112
Attitude towards using gene technology	**Mean**	-0.53	-0.31
	SD	1.93	1.85
	N	114	108
Attitude towards purchasing GM food	**Mean**	-1.00	-0.82
	SD	1.60	1.64
	N	112	107
Attitude towards using organic methods	**Mean**	0.62	0.59
	SD	1.57	1.64
	N	114	109
Try to achieve GE-free status	**Mean**	0.45	0.14*
	SD	1.94	1.89
	N	108	108

Note. Range = -3 to 3 for all items.
** Paired sample t-test found a significant difference ($p < 0.001$).*

(38%) were more predominant for the use of organic methods with 47% having no intention to either use or not use organic methods and 14% having a negative intention. Examination of the frequency of responses for agreement or disagreement that New Zealand should become GE free showed that 50% disagreed, 17% neither agreed nor disagreed, and 33% agreed. In 2000, the proportion was 39% disagreed, 13% neither agreed nor disagreed, and 48% agreed for the 115 respondents.

Table 4 shows the descriptive results for desirability and likelihood of beliefs. Similar mean scores to 2000 were found for 2002. In general, positive consequences were judged marginally more likely and more desirable in 2002, and similarly, negative consequences were judged either less likely or less undesirable. In 2002, desirable consequences, including better quality food, enhanced economic growth, and increased food production, and negative consequences were generally judged likely. However, only five of the changes in desirability and likelihood of consequences were significant (paired sample t test, $p < 0.05$). These changes were for desirability and likelihood of increased food production and likelihood of new risks to public health, enhanced economic growth, and damage to ecological systems. In 2002, consumer acceptance was judged unlikely and adverse consequences (except for personal risk) were judged likely. Adverse effects were logically rated very undesirable, whereas better quality food, economic growth, consumer acceptance, and increased food production judged in general as desirable. Increased food production was judged the most desirable outcome from using gene technology and of the eight consequences was generally considered the most likely consequence.

Table 4. Likelihood and desirability for eight consequences, 2000 and 2002.

		Desirability[a]		Likelihood[a]	
		2000	2002	2000	2002
Better quality food	**Mean**	0.57	0.77	0.09	0.11
	SD	1.71	1.65	1.9	1.65
	N	108	110	112	110
New risks to public health	**Mean**	-1.71	-1.78	0.51	-0.78*
	SD	1.45	1.35	1.77	1.35
	N	108	112	112	110
Enhanced economic growth	**Mean**	0.82	1.03	-0.02	0.46*
	SD	1.58	1.51	1.62	1.66
	N	108	109	111	114
Consumer acceptance	**Mean**	-0.04	0.12	-0.48	-0.26
	SD	1.73	1.64	1.46	1.4
	N	107	109	111	114
Adverse effects for future generations	**Mean**	-1.70	-1.97	0.38	0.09
	SD	1.52	1.23	1.71	1.77
	N	107	111	112	113
Damage to ecological systems	**Mean**	-1.79	-2.07	0.62	0.14*
	SD	1.42	1.18	1.69	1.83
	N	106	111	113	114
Increased food production	**Mean**	0.54	0.96*	1.16	1.22*
	SD	1.57	1.5	1.41	1.25
	N	107	111	112	114
Personal risk	**Mean**	-1.83	-2.00	0.11	-0.17
	SD	1.56	1.2	1.82	1.73
	N	107	111	112	114

[a] *Desirability and likelihood range = -3 to 3.*
** Paired sample t-tests found significant differences ($p < 0.05$).*

Relationships Between Items

Given the lack of change over time, it is interesting to investigate whether the belief-attitude-intention relations held under these conditions. In other words, the investigation is of whether farmers and growers who

changed their intentions also requisitely changed their attitudes and beliefs.

The summation of respondent beliefs about gene technology for 2002 (M = 12.3, range = -27–63, SD = 18.29, n = 108), like other measures, was slightly more positive than the belief summation for 2000 (M = 2.7, range = -46–72, SD = 20.46, n = 105). Differences between the summations were also significant (paired sample t test, $p < 0.001$). There was evidence of internal consistency for the eight beliefs in 2000 (Cronbach's alpha = 0.70) and 2002 (Cronbach's alpha = 0.76). Cronbach's alpha coefficient is a calculated value (ranging between 0 and 1) based on the average correlation of items. Values above 0.5 are considered acceptable as evidence of a relationship (Nunnally, 1967), whereas values above 0.7 are more definitive (Peterson, 1994).

To investigate change over time for the hypothesized model, multivariate testing for change between the two time periods is inappropriate for examining changes in individual beliefs, because in the TPB model each belief is assumed to have variance independent of another belief. However, the hypothesized belief-attitude-intention relationship can be tested so that change in the model as a whole can be assessed. The test (MANOVA) between belief-attitude-intention in 2000 with belief-attitude-intention in 2002 as multiple dependant variables found a nonsignificant multivariate effect for attitude 2000 (Pillai's trace, $p > 0.05$). There is therefore no evidence to suggest that a change had occurred in respondents' beliefs, attitudes, and intentions to use gene technology between 2000 and 2002. These results are consistent with the lack of change indicated by results of the paired sample t tests.

Having found no evidence of change between 2000 and 2002, further relationships to investigate are the hypothesized causal sequences (beliefs-attitude-intention) from both 2000 and 2002 relationships. To test the hypothesized causal sequence from responses to the 2000 study, evidence of relationships were found between the sum of beliefs and attitude (r = 0.56, $p < 0.001$, n = 103) and attitude and intention to use gene technology (r = 0.70, $p < 0.001$, n = 111). As would be expected from the MANOVA result, from the 2002 study, evidence of relationships similar to the 2000 results were found between: the sum of beliefs and attitude (r = 0.64, $p < 0.001$, n = 102), and attitude and intention to use gene technology (r = 0.70, $p < 0.001$, n = 106). In keeping with the axioms of the TPB, these strong positive relations support the interpretation that consequences of the use of gene technology are important factors in decisions to use or not use the technology. Therefore, farmer and grower decisions are likely to be strongly influenced by the economic, environmental, social, and production implications of gene technology tested in this study.

Further investigation of the 2002 data showed that intention to use gene technology was correspondent with intention to purchase GM food (r = 0.73, $p < 0.001$, n = 112) and inversely related to the imperative for New Zealand to become GE free (r = -0.57, $p < 0.001$, n = 106). In addition, inverse correspondence was found with intention to use organic methods (r = -0.42, $p < 0.001$, n = 106). In cross-tabulation, only one of the 115 respondents had a positive intention to use both organic methods and gene technology. This was fewer than in 2000, when 10 of the 115 respondents had a positive intention to do both activities. It appears that the activities are considered incompatible, which suggests that an increase in intentions to use gene technology is dependent upon a reduction in intentions to use organic methods.

Like the relationship between attitudes and intentions to use gene technology, attitude to purchasing GM food and intention to purchase GM food were strongly correlated (r = 0.75, $p < 0.001$, n = 105). In addition, attitudes towards using organic methods correlated with intentions to use organic methods (r = 0.45, $p < 0.001$, n = 105).

Discussion and Conclusion

First, an important necessary consideration is the qualification of the results in terms of the validity of claims that can be made about farmers and growers in general. Tests for representativeness found no evidence of significant response bias, and comparison between the resurvey sample and the population of farmers and growers found no evidence of significant differences. Nevertheless, because of the small number of respondents (N = 115), minor differences between this and other samples of the population can be expected.

To qualify the results further, although the relationships between items were strong, attitude measures may not necessarily characterize all elements in personal decisions. Eagly and Chiaken (1993) have recommended a measure of self-identity to capture value-oriented positions more effectively. Indeed, TPB studies of purchasing GM food have found that self-identity independently contributed to explaining intention while accounting for the effect of attitude on intention (Bredahl, 2001; Cook, Kerr, & Moore, 2002). A further possible unmeasured effect is the possibility that because

gene technology is unfamiliar, uncertainty may contribute to harmful consequences being judged more likely (Otway & Wynne, 1989). In addition, in characterizing decision-making using a particular model, personal decision-making is summarized, and the possibility that people can make decisions in different ways is not taken into account (Eagly & Chiaken, 1993, p. 173). Alternative models have sought to characterize spontaneous or less well thought out decisions (e.g., Fazio, 1986; Triandis, 1980). Indeed, farmers and growers who favor organic methods appear to simply reject gene technology, because they consider it incompatible with organic farming. Against these qualifiers, key factors in farmer and grower decisions have been identified, and although some farmers may decide in different ways, and other factors may well be of influence, the support given to the model affords the projection of the results onto farmers and growers in general.

In terms of the overall aim of examining changes in farmer and grower decisions, because of nonsignificant results, farmers and growers appear to be no more accepting or rejecting of gene technology than they were two years ago. However, significantly fewer farmers and growers than two years ago agreed that New Zealand should become GE free. The general lack of change was confirmed further by a multivariate test of model components (beliefs-attitudes-intentions). This absence of change between 2000 and 2002 suggests that farmers and growers have stable views about gene technology. An issue, then, is what factors may influence their attitudes and intentions; this question can be answered through the application of the TPB.

Following the directives of the TPB, strong relationships were found between the sum of beliefs, attitudes, and intentions. These relationships show that changes in attitude and intention are the result of changes in beliefs about the consequences of performing an intended action (Ajzen, 1991; Ajzen & Fishbein, 1980). In keeping with this interpretation, a positive or negative change in any of the consequences assessed by farmers and growers should effect a corresponding change in attitude and a corresponding change in intention. Less favorable attitudes would result from perceived increase in the likelihood of negative consequences. Reducing the perceived likelihood of favorable consequences would also produce a negative attitude. On the other hand, a more positive attitude will arise through farmers and growers determining that harmful consequences are less likely. Attitude would also improve with evidence that the perceived benefits of better quality food, economic growth, and increased food production would be realized. Farmers and growers deciding that risks to public health or personal health, damage to ecological systems, and adverse effects on future generations were unlikely, would also result in more favorable attitudes and intentions. Indeed, the beliefs of farmer and growers are readily encapsulated as conditional factors in terms of market acceptance, commercial viability, and environmental risk. In other words, the minority of farmers and growers who intend to use gene technology appear to be speculating that applications of the technology that are economically viable and marketable with regulatory approval will be available in the next ten years.

To consider the results in broader context, a number of conditional factors must be addressed for gene technology to be accepted. First, farmers and growers must be convinced that the risks are acceptable. Farmer and grower concerns about damage to ecological systems, adverse effects on future generations, personal risk, and risks to public health presently preclude acceptance. Second, the marketplace must be accepting of the use of the technology in agricultural production; at present, most farmers and growers do not believe consumers are accepting of the technology. Third, financial rewards from either efficiency in production or better returns for produce must be evident. As this study indicated, evidence of increased food production, better quality food, and enhanced economic growth for New Zealand would encourage acceptance. In addition to changes in these factors of concern to farmers and growers, current preferences for organic methods present a difficulty. Organic methods and gene technology appear to be perceived by farmers and growers as incompatible. This means that based on the results of this study, approximately 38% of farmers and growers believe they cannot seriously consider using gene technology.

Farmer and grower decisions are dynamic, and their beliefs and preferences represent key factors that will ultimately influence their actions. As yet, gene technology is not available to farmers and growers, and their acceptance of the technology is dependent upon whether their concerns about a variety of risks, market acceptance, and profitability are satisfactorily addressed. In this way, although farmers and growers may well readily accept any development that holds the prospect of improving their business, their intentions are, nevertheless, dependent upon the realization of relevant benefits and evidence of acceptable risk from the use of genetic engineering in agriculture.

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Appendix: Questions and Response Scales

1. Using the seven-point scale below, how favorable or unfavorable is your general attitude towards the following three items?
   _____ Using gene technology on your farm
   _____ Using organic methods on your farm
   _____ Purchasing GM food
   Scale: 1 = extremely unfavorable, 2 = very unfavorable, 3 = unfavorable, 4 = neither unfavorable nor favorable, 5 = favorable, 6 = very favorable, 7 = extremely favorable.

2. Please indicate your level of agreement of disagreement with the following statements:
   _____ New Zealand should try to achieve GE-free status

_____ New Zealand should *not* try to achieve GE-free status
Scale: 1 = very strongly disagree, 2 = strongly disagree, 3 = disagree, 4 = neither disagree nor agree, 5 = agree, 6 = strongly agree, 7 = very strongly agree.

3. Please indicate how *likely or unlikely* you think it is that each of the following consequences of gene technology will occur:
_____ Better quality food
_____ New risks to public health
_____ Enhanced economic growth for New Zealand
_____ Consumer acceptance of food produced using gene technology
_____ Adverse effects on future generations
_____ Damage to ecological systems
_____ Increased food production
_____ Placing your own health at risk
Scale: 1 = extremely unlikely, 2 = very unlikely, 3 = unlikely, 4 = neither likely nor unlikely, 5 = likely, 6 = very likely, 7 = extremely likely.

4. Please indicate how *desirable or undesirable* you think it will be for each of the following consequences of gene technology to occur:
_____ Better quality food
_____ New risks to public health
_____ Enhanced economic growth for New Zealand
_____ Consumer acceptance of foods produced using gene technology
_____ Adverse effects on future generations
_____ Damage to ecological systems
_____ Increased food production
_____ Placing your own health at risk
Scale: 1 = extremely undesirable, 2 = very undesirable, 3 = undesirable, 4 = neither undesirable nor desirable, 5 = desirable, 6 = very desirable, 7 = extremely desirable.

5. Which one of the following statements best represents your intention to either use or not use gene technology on your farm within the next ten years?
1 = I have a very strong intention to use gene technology
2 = I have a strong intention to use gene technology
3 = I intend to use gene technology
4 = I have no intention to either use gene technology or not to use gene technology
5 = I intend not to use gene technology
6 = I have a strong intention not to use gene technology
7 = I have a very strong intention not to use gene technology

6. Which one of the following statements best represents your intention to either use or not use organic methods on your farm within the next ten years?
1 = I have a very strong intention to use organic methods
2 = I have a strong intention to use organic methods
3 = I intend to use organic methods
4 = I have no intention to either use organic methods or not to use using organic methods
5 = I intend not to use organic methods
6 = I have a strong intention not to use organic methods
7 = I have a very strong intention not to use organic methods

7. Which one of the following statements best represents your intention to either purchase or not purchase GM food?
1 = I have a very strong intention to purchase GM food
2 = I have a strong intention to purchase GM food
3 = I intend to purchase GM food
4 = I have no intention to either purchase GM food or not to purchase GM food
5 = I intend not to purchase GM food
6 = I have a strong intention not to purchase GM food
7 = I have a very strong intention not to purchase GM food