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Attitudes Toward Genetically Modified Food in Colombia[1]

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Transgenic or genetically modified crops are widely grown, covering over 50 million hectares in 2001 (James 2002), and transgenic food is widely consumed, entering an estimated 60% of processed foods in the United States (Hopkins 2001). Some see genetically modified (GM) crops as critical to improving agricultural productivity and insuring food supplies especially for poor and malnourished in the developing countries (Evans 1998; Oxfam 1999). Others argue that this is a myth and that there are significant health and environmental risks from GM crops and food (Altieri 2001). In this context, consumer attitudes towards GM foods have become a factor both in the market demand for GM foods, and in their regulation. In some markets there is no doubt that consumer attitudes have slowed the utilization of GM crops (Charles 2001).

Because consumer attitudes have become such a key factor in the acceptance of GM food, and because these attitudes seem to vary so substantially among countries, increasing attention has been paid to understanding consumer attitudes towards GM food (Bredahl et al 1998; Sheehy et al 1998). Particular attention has been paid to understanding differences in consumer attitudes between in the United States and Europe (Nelson 2001; Wolf and Domegan 2002; Wolf et al 2001). In general, European consumers have a stronger sense of the potential risks of GM foods than do U.S. consumers. Little if any similar research has examined consumer attitudes towards GM food in low-income countries where hunger and malnutrition are most common and where, therefore, GM crops might have their greatest contribution to welfare of consumers.

This paper makes an initial examination of consumer attitudes in Colombia toward GM food. It follows on research previously conducted in the United States and Ireland. First, the methods of the study are briefly described and some characteristics of the sample population noted. Second, some general background attitudes of the Colombia consumer with respect to food safety, science and government regulation are reviewed. Third, levels and sources of consumer knowledge about GMO food are presented. [1]Fourth, attitudes towards GMO foods, including likelihood of purchase are analyzed. Finally, the major implications of the study are reviewed and some areas for further research are noted.

Methods and Data

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This study largely followed the approach and utilized a modified questionnaire that had been previously used in Ireland and the United States (Wolf et al 2001; Wolf and Domegan 2002). This both facilitates international comparisons and provides a research instrument that has been validated in previous studies. The questionnaire is largely comprised of questions scaled around different degrees of frequency or different degrees of agreement. A Spanish translation was developed and pre-tested to insure understanding. A few additional questions on attitudes were added.

This study was conducted in Cali, Colombia, an urban center with a metropolitan population of around 2.5 million. Cali can reasonably be considered as a typical South American city in a region where over 70% of the total population is urban. As in the Irish and US studies, the questionnaire was randomly applied to people approaching or departing from points of food purchase. These included supermarkets and open air markets in six different neighborhoods selected according to general indicators of economic status. A total of 150 questionnaires were conducted among food purchasers in March 2001 by a single experienced sociologist.

Females comprised 89.3% of respondents, and 51.7% were between 25-44 years old and 68% were married or lived with partners and 69% were members of dual income households. The respondents were almost evenly divided among those who work full time (34.7%), those employed part time (34.0%), and those not employed (31.3%). The sample was comparatively well educated with 33.5% having attended university. Some 71.8% of respondents have children under the age of 18 living at home.

Attitudes to Food Safety and Science

There is a high level of awareness among Cali consumers of possible food risks (Table 1). There is strong agreement among 63.3% that pesticides in food are dangerous and among 64% that food additives are dangerous. A majority of 52.7% strongly agrees that foods are adulterated with false ingredients. However, even though (or perhaps because) foot and mouth disease is endemic among cattle in some regions of Colombia, 65.3% of the sample disagrees or strongly disagrees that foot and mouth disease is a food risk for humans. Clearly the sample exercises discrimination among what it considers to be real food risks. It is sensitive to some potential food risks, like pesticide residues or food additives, but it is prepared to discount other factors, like foot and mouth disease, that could have been perceived as a food risk.

Overall, the Cali food purchasers have a positive view of science and technology. There is strong agreement among 68% of the sample that science improves the quality of life while 56% strongly agree that computers improve the quality of life. Thus the sample would not appear to have a prior predisposition to be skeptical of scientific innovations such as genetically modified food but rather might even be predisposed to associate new scientific discoveries with something positive.

There is also a fairly high level of confidence in the government assuring food safety. While 75.3%% agree or strongly agree that the government assures food safety, only 22.0% disagree or strongly disagree. Similarly, 74.0% agree or strongly agree that food producers assure food safety, but only 21.3 % disagree. There is less confidence in the

environmental safety of food production, with 32.2% disagreeing or strongly disagreeing that food production is environmentally safe.

One major distinguishing characteristic of this sample is that nearly two-fifths, 38.3%, disagree or strongly disagree that there is always enough food to eat in their family. Likewise, a majority, 55.3%, agree or strongly agree that price is the most important factor in purchasing food. These two attitudes would support the hypothesis that for many people in low-income countries, they are unable to afford the quantity of food that they desire. This being the case, Colombian consumers may be less sensitive to potential but as yet unidentified food risks than consumers in high-income countries like Europe where food is abundantly available and quality issues come to the fore. These data suggest that in contrast to high-income countries, inadequate availability of food may be the most pressing food related health issue for many people, thus decreasing the likelihood of resistance to transgenic food.

Knowledge of Genetically Modified Food

There is a very low level of familiarity with genetically modified food in Colombia. The vast majority of the sample, 77.6%, reports that they are not at all familiar with genetically modified food. Only 5.4 % indicate they are very familiar with transgenic food and 7.5% say they are somewhat familiar. These awareness levels are significantly lower than those found by Wolf et al in their examination of familiarity with genetically modified food in the United States and Ireland. Approximately half of the respondents in the United States and 40% of respondents in Ireland were at least somewhat familiar with genetically modified food.

Television news has been the main source of information in Colombia, reaching 10% of the sample, while 6% had discussed it with acquaintances, 5.3% had heard about it over the radio, 4.0% had read about it in magazines, and 1.4% had read about it in magazines. Given the very low levels of familiarity, obviously many of those with some familiarity had had access to information about transgenic foods from more than one source.

Given the low levels of familiarity and access to information about genetically modified food, it is probable that many of the attitudes towards GMO food reported in this paper may not be strongly held. The attitudes of the Colombian consumer could be subject to significant change in the light of additional exposure to information in the future.

Attitudes to GM Food

Attitudes towards genetically modified foods among Colombian consumers are mixed. There is widespread agreement that some GM foods may be unsafe, but nonetheless only a minority would be unwilling to buy GM food.

Nearly three-quarters of Colombian consumers strongly agree or agree that some foods produced by genetic engineering may be unsafe (Table 2). Less than one-quarter would disagree. On the other hand, Colombian consumers are split quite evenly into three

groups in terms of their willingness to purchase genetically modified food. Some 33.6% would definitely or probably buy GM food; 32.9 % might buy it; and 33.6% would probably or definitely not buy GM food. The Colombian probability of purchasing GM food is similar to that observed by Wolf et al in the United States. However, it is higher than that observed for Ireland where only 17.2% would definitely or probably buy GM food.

Thus, nearly three-quarters of consumers perceive potential risks with GM food, but two-thirds would be willing to purchase GM foods. There are some possible explanations for this apparent inconsistency. In the first place, the widespread belief that some GM foods may be unsafe, does not preclude the simultaneous belief that some GM foods may be safe. Given the previously reported high level of reported confidence in the food regulatory system, consumers may simply trust that some GM foods are safe, and those that are not, would be excluded from the food supply by the regulatory authorities. Another explanation could be that consumers might be willing to absorb the risk of GM food if it met other important criteria for them.

The characteristics of the GM food would have an influence on consumers' likelihood to purchase GM food. Using a five point scale of willingness to buy (definitely=5; probably=4; maybe=3; probably not=2; definitely not=1), it can be seen that consumers are more willing to buy GM food if it has characteristics that they appreciate (Table 3). For example, consumers indicated that pesticides are dangerous to their health. The use of genetic modification to reduce the use of pesticides generated the highest purchase interest. Further, willingness to buy is significantly higher for characteristics that would be desired by consumers like improved nutrition or taste than for a characteristic like resistance to weed killers that does not directly benefit consumers. Consistent with the finding reported above that Colombian consumers are aware of the risks of pesticide residue on food, this genetically modified pest resistance which would reduce the use of chemical pesticides also has a higher willingness to buy. Further research might attempt to elucidate whether a lower cost of GM food would similarly elicit a greater willingness to purchase.

Attitudes of Colombian consumers to labeling may also have some relevance to these questions. A majority of Colombian consumers read food ingredient labels very or somewhat often (Table 4). This could indicate that they rely on the content and even the mere presence of food labels as a warrant of food safety. Moreover, 68% of consumers report that they think that mandatory labeling of GM food is very important and 22.7% think it is somewhat important. It is possible that this implies that with a system of labeling most Colombians would be willing to purchase GM food even though they believe that some GM foods might be unsafe. Consequently, in order to be able to have the assurance that they can consume GM foods safely, Colombians think that mandatory labeling is very important.

This is not really contradicted by the fact that in practice far fewer consumers, 38%, often read food ingredient labels than think that mandatory labeling of GM foods is very important, 68%. To some extent, the mere presence of labels may be a sufficient indicator for many consumers that appropriate authorities are monitoring food safety. In addition, for items that are consumed regularly, people may not expect constant changes in ingredients and therefore do not need to read the labels of regularly purchased food on a frequent basis.

To understand better the attitudes of Colombian consumers to GM food, Table 5 shows mean willingness to buy scores for people holding different opinions. Thus, it is clear that among those who more strongly disagree that engineered foods are unsafe, that is among those who perceive less chance of risk from GM foods, willingness to buy is higher, 4.33, than it is among those who strongly agree that GM foods are not safe. Those strongly agreeing that GM foods are unsafe have a lower willingness to buy, 2.84. Perceptions of the risks of GM food thus have the expected relationship with willingness to buy. This relationship is consistent across the opinion categories and is statistically significant.

Furthermore, for those who strongly agree that low price is important in the food purchase decision, willingness to buy is higher, 3.41, than for those who strongly disagree that price is the main decision criteria for food purchase. Those who are less sensitive to price have a lower willingness to buy GM food, 2.40. This relationship of higher willingness to purchase GM food with higher sensitivity to food price is consistent across the categories of opinion with respect to price and is statistically significant. This would be consistent with the hypothesis that higher income people for whom the cost of food is less important, are more influenced by possible food quality characteristics and for this reason are less willing to purchase GM food. In contrast, for those consumers for whom food prices are a major criterion in food purchase, they may be more disposed to purchase GM food as long as it is cheaper. This suggests that poor consumers could benefit disproportionately from cheap GM food so long as it was indeed safe, but on the other hand if it really was not safe, then they could be more vulnerable to any risks associated from consuming GM food.

Similarly, among those who strongly disagree that the quality and variety of food in the family is good, that is, among those consumers in families where the quality and variety of food is less than desired, the willingness to buy GM food is high, 3.5. In contrast, among those families where they agree that the quality and variety of food is already good, willingness to buy GM food is low, 2.57. Although this relationship is not statistically significant for this sample, it does consistently suggest that the less adequate the quality of current food consumption, the more willing people are to buy GM food. The better the current quality of food, the less willing are people to buy GM food. This finding is again quite consistent with the previous result on the relationship between food price and willingness to purchase GM food.

There is, though, not a clear relationship between the adequacy of current diets in terms of quantity and willingness to buy GM food. It would have been hypothesized, that consumers without an adequate quantity of food would have been more willing to purchase GM food, but there is no evidence for this.

Summary and Suggestions for Further Research

Although transgenic crops are being widely grown worldwide, consumer attitudes towards them have been found to vary substantially between Europe and the United States. This study of a sample of 150 food purchasers in Cali, Colombia is believed to be one of the first studies to examine consumer attitudes towards GM food among consumers in tropical or low-income countries.

Consumers in Colombia are aware of possible food risks, with about two-thirds agreeing that residues of pesticides or food additives are dangerous. However, other factors that could have been perceived as a food risk, like foot and mouth disease, were not considered dangerous by nearly two-thirds of consumers, indicating that Colombian consumers do not simply accept as dangerous any hypothetical risk factor.

Well over half of consumers in Colombia appear to have positive views of science and technology and a surprisingly high level of three-quarters of consumers have confidence in government regulation of food safety. Holding these positive attitudes towards the benefits of science and the effectiveness of food safety regulations is likely more consistent with less concern about the risks of GM food.

Economic factors seem to affect the access to food of a significant number of Colombian consumers. Nearly two-fifths sometimes do not have enough food to eat in their family and for nearly one-half, a low price is the most important factor in buying food. For consumers such as these, for whom the absolute quantity of food is a pressing concern, quality factors such as potential but unidentified food risks from GM foods, may not play a major role in food purchase decisions.

About three-quarters of Colombian consumers agree that some GM foods may be unsafe. Nevertheless, some two-thirds of consumers would be willing to buy food with GM ingredients. This result is similar to that observed in the United States, but lower than the probability of purchase for consumers in Ireland. Concerns about safety do effect the willingness to buy GM food. There is a statistically significant relationship between perception of genetically engineered food as unsafe and the willingness to buy GM food: the stronger the safety concern, the lower the willingness to purchase.

Nevertheless, many consumers who perceive some safety risks in GM food, would still be willing to buy it. Economic factors may be important in this regard. Those for whom low price is the most important factor in the food purchase decision are significantly more willing to buy GM food. Likewise, those for whom the current quality and variety of food is less than desired, are also more willing to buy GM food. These findings suggest that for resource constrained food consumers, ill defined or uncertain risks would not necessarily be highly dissuasive of GM food consumption, especially if it were cheap. Thus, if GM food risks are indeed low or non-existent, then poor consumers would be most likely to reap the benefits of GM foods that reduce the price of food.

Finally, though highly suggestive, these results must still be taken as a very tentative picture of the attitudes of Colombian consumers to GM food. Familiarity with GM food is still very low and current attitudes could shift with increased familiarity.

Several further extensions to this initial research could be considered. It would be useful to more directly assess whether a lower cost of GM food would elicit a greater willingness to purchase. It could be useful to more purposively sample among consumers with a higher degree of familiarity with GM food to attempt to project what likely attitudes might be with increased familiarity in the future. The survey approach could be supplemented with a focus group approach to probe more into people's attitudes and to see how additional information might shape these attitudes. Further research is planned to contrast the results of this survey with those of surveys in high income countries to compare and contrast the differences.

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Table 1. Consumer Attitudes to Food, Safety, Science, Government and Food Producers, Cali, Colombia 2001.

N=150	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Sure
Pesticides Dangerous To Health	63.3	28.0	6.7	2.0	0.0
Foot & Mouth Disease A food Risk	24.0	10.7	53.3	12.0	0.0
Food Additives Dangerous to Health	64.0	29.3	6.0	0.7	0.0
False Ingredients Put in Food	52.7	37.3	3.3	2.0	4.7
Science Improves Quality of Life	68.0	26.0	3.3	2.0	0.7
Computers Improve Quality of Life	56.0	30.7	10.7	2.7	0.0
Government Assures Food Safety	38.0	37.3	15.3	6.7	2.7
Global producers Assure Food Safety	49.3	24.7	17.3	4.0	4.7
Global food producers Environmentally safe	30.9	27.5	30.2	2.0	9.4
Household Food Supply Adequate	24.8	36.9	37.6	0.7	0.0
Price Most Important In Choosing Food	31.3	24.0	41.3	3.3	0.0

Table 2. Attitudes to GMO Food, Cali, Colombia 2001.

N=150	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Not Sure**
GMO Food Unsafe	36.0	39.3	20.7	2.0	0.7
	Definitely	**Probably**	**Maybe**	**Probably Not**	**Definitely Not**
Willingness to Buy GMO Food	15.1	18.5	32.9	18.5	15.1

Table 3. Likelihood to Buy-Attribute Mean Rating

N=150	Attribute Means	Paired T
To reduce the use of pesticides?	3.43	
To improve nutrition?	3.39	.513**
For improved taste?	3.16	2.44**
To resist weed killers?	2.84	3.14**

Table 4. Practices and Attitudes towards Food Labeling, Cali, Colombia, 2001.

N=150	**Very Often**	**Somewhat Often**	**Not Very Often**	**Not at All**
Read Food Labels For Ingredients	38.1	26.5	22.4	12.9
	Very Important	**Somewhat Important**	**Not Very Important**	**Not at all Important**
Importance of Mandatory Labeling of GMO Food	68.0	22.7	4.7	4.7

Table 5. Mean Willingness to Buy Genetically Modified Food by Food Attitude Groups (5 = Definitely Willing; 1 = Definitely not willing) Cali, Colombia, 2001.

N=150	Strongly Disagree	Disagree	Agree	Strongly Agree	F Statistic
Genetic Engineered Foods Not Safe	4.33	3.35	2.88	2.84	2.491*
Low Price Important to Buy Food	2.40	2.90	2.75	3.41	2.606**
Family Food Supply Adequate	3.00	3.15	2.68	3.19	1.714
Family Food Quality Good	3.50	3.18	3.10	2.57	1.856