Public Attitudes in the Northeast Region Toward Recombinant Porcine Somatotropin[1] [2]

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Abstract

This study explored the attitudes of consumer regarding the use of recombinant porcine somatotropin (PST) in the production of pork, and the association between the attitudes and individual socioeconomic characteristics. The data were collected from surveys of households located in the New York and Philadelphia metropolitan area. The results show that both gender and education may play a role in the level of concern regarding the use of PST. Education programs which address the safety of pork produced with PST need to target the lower-educated and female consumers. Moreover, the education programs should be developed by organizations which are trusted by the public, such as universities and public agencies.

Introduction

Consumer preferences for leaner meat products could be the most important challenge facing the swine industry. According to the National Research Council (1988), nutrition and health concerns have an increasingly significant influence on food choices. Consumers are demanding meat products that are leaner and lower in cholesterol (Cross et al., 1986). Historically, swine producers have relied on selective breeding programs to produce leaner animals; however, these methods take years to accomplish. Research has shown (Boyd et al., 1986) that when hogs are administered porcine somatotropin (PST), a naturally occurring protein hormone, the pork produced is 30 to 40 percent leaner. Commercial production of PST is now possible using recombinant-DNA technology (Cogburn, 1985) and offers swine

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producers a rapid way to complement existing breeding programs.

The thrust of scientific developments has not always been matched by public acceptance. Although the advantages of PST to swine producers have been proven, public disapproval of the use of genetically engineered products to produce food could complicate successful commercialization of the product. To date, genetically engineered products have not had much success obtaining Food and Drug Administration approval. One livestock vaccine was removed from the market for a time due to pressure from consumers (Flemming, 1987).

Thus far, very few studies have been conducted on the public acceptance of using a genetically engineered product like PST, to produce the leaner meat consumers demand. Lemieux and Wohlgenant (1988) analyzed the willingness of consumers to pay for leaner pork products. Their results indicated that consumers would be willing to pay a premium for leaner pork. However, their study did not introduce the issue of using a genetically engineered compound, such as PST, to produce the leaner pork. As such, the use of PST could have a strong influence on consumer acceptance and the successful commercialization of the product.

Objectives

The purpose of this study was to explore the attitudes and perceptions of a random sample of urban Northeasterners (New York and Philadelphia) toward pork produced with PST. The objectives were:

1. To examine the attitudes of consumers regarding the use of PST in pork production.
2. To identify factors that affect those attitudes.
3. To examine the association between the attitudes and individual socioeconomic and personal characteristics.

Procedure

The data used in this study were collected from surveys of households located in the New York and Philadelphia metropolitan area. A random sample stratified by income was provided by R. R. Donnelley & Sons Company. Approximately 3,750 survey questionnaires were mailed in June, 1988, and 400 responses were received by the end of September 1988, a response rate of about 11 percent.

Respondents were asked a total of 14 questions regarding their buying habits, meat consumption patterns, attitudes toward using PST in pork production, and willingness to pay for leaner pork produced with PST. The respondents were asked their marital status, race, level of education, gender, and age. All these variables were hypothesized to influence their responses.

For the first and second objectives, the identification of public attitudes regarding the use of PST in pork production and the factors that affect those attitudes, the data were analyzed with descriptive analysis. For objective three, measures of both dependency and direction were used to determine the association between attitudes and individual socioeconomic and personal characteristics. The Chi-square statistic was used to test the dependence/independence of the bivariate relationship between a given response and characteristic. The null hypothesis for this test is that the characteristic and response are independent. Spearman's rank correlation was estimated to measure the direction and degree of association.

Respondent Characteristics

Table 1 defines the categories and shows the percentage of respondents in each group. Age was divided into three groups: 18 to 34, 35 to 54, and 55 and over. Respondents falling into these groups were quite evenly distributed with 30, 40, and 30 percent respectively.

Forty-three percent of the respondents had incomes of more than $35,000. The middle income group, $15,000 to $35,000, contained 36 percent of the respondents, and 21 percent of the respondents had an income less than $15,000.

Level of education was classified into two groups. Respondents having a college education or more made up 37 percent of the respondents, while 63 percent indicated they were high school graduates or below. Gender was equally represented with the percentage of male and female respondents being 48 and 52, respectively. Fifty-eight percent of the respondents were from Philadelphia and 42 percent were from New York.

The respondents were also questioned about the size of their household and their meat purchasing patterns. The majority (73%) of the

respondents came from 1-2 person households. Twenty-three percent of the respondents came from 3-4 person households, while the remaining 4 percent came from 5-6 person households. Almost 90 percent of the respondents said they were the primary food shopper for the household.

Table 1

Characteristics of Respondents Surveyed, New York, Philadelphia, 1988

Characteristics	Percent
Age	
18-34	30
35-54	40
55+	30
Income	
< $15,000	21
$15 - 35,000	36
> $35,000	43
Education	
High school graduate & below	37
College graduate & above	63
Gender	
Male	48
Female	52
City	
Philadelphia	58
New York	42
Household size	
1 - 2	73
3 - 4	23
5 - 6	4
Pork consumption (times/week)	
> 7	1
< 6	72
0	27
Primary food shopper	
yes	87
no	13

When asked how many times per week they ate pork, about 70 percent of the respondents indicated they ate pork less than 7 times a week. Twenty-seven percent said they never ate pork.

Results

Analysis of the data revealed factors which affect public attitudes toward using a genetically engineered product in food production. In general, respondents were asked about: 1) their level of concern with genetically engineered products, 2) whether various names for PST affect their opinions about the product, and 3) what sources of safety information they trust. Specifically, respondents were asked about their level of concern with: a) the use of recombinant DNA technology to produce human food, b) changing bacteria so it is not in its natural form, and c) growth promotants used in livestock and poultry production. Table 2 shows that most of the respondents expressed some level of concern. For each of these questions, at least 49 percent were very concerned and 33 were somewhat concerned. Only seven to 16 percent of the respondents answered they were not concerned with the use of genetically engineered products.

Respondents were also provided with a list of commonly used names for PST and asked whether the names had an effect on their opinion about the safety of using PST in pork production. For each of the four names: growth promotant, somatotropin, growth hormone, and repartitioning agent, more than 40 percent of the respondents said it had a negative effect (Table 3), and at least 14 percent said they had no opinion about the different names. "Growth promotant" had the least negative effect with 43 percent, while "growth hormone" and "repartitioning agent" had the most negative effect with 57 and 49 percent respectively. These results indicate that the names commonly used for PST generally convey a negative message to the public.

Successful commercialization of a genetically engineered product depends heavily on informing the public that the product is safe. Therefore, it is vital to know what sources of information the public will trust regarding the safety of PST. Table 4 shows the respondents' tendency to believe different sources of safety information. Eighty-seven percent of those surveyed expressed that they were inclined to believe safety statements made by university scientists. This result is similar to a 1987 Office of Technology Assessment (OTA) study which asked a similar question. In the OTA survey, 86 percent of the respondents said that they were inclined to believe statements made by university scientists. Respondents indicated that federal agencies also have a high level of credibility, with 75 percent of those surveyed inclined to

Table 2. Public Concern Regarding the Use of Genetically Engineered Products

Question	Very Concerned	Somewhat Concerned	Not Concerned
		(percent)	
How concerned are you with ...			
a) the use of recombinant DNA to produce human food.	49	36	15
b) changing bacteria so it is not in its natural form.	51	33	16
c) growth promotants used in livestock and poultry production?	56	36	7

Table 3. Public Attitudes Towards Various Names for PST

Question	Positive Effect	No Effect	Negative Effect	Don't Know
		(percent)		
How does each of the names affect your ideas about the safety and use of PST in hogs?				
a) growth promotant	22	20	43	14
b) growth hormone	10	14	57	19
c) repartitioning agent	4	18	49	28
d) somatotropin	6	18	44	32

Table 4. Public Trust in Sources of Information on Safety of PST

Source	Inclined to Believe	Inclined Not to Believe
	(percent)	
a) Federal Agencies	75	25
b) University Scientists	87	13
c) News Media	43	57
d) Company making PST	14	86

Table 5. Attitudes and Perceptions Regarding the Use of PST in Pork Production; Consumption and Willingness to Pay

Statement	Response (percent)		
1. I am in favor of using PST because...	Agree	Agree Somewhat	Disagree
a) it increases rate of growth in hogs.	25	31	45
b) it lowers the cost of producing pork.	38	34	27
c) it will result in leaner pork.	60	25	15
2. If pork is produced with PST I will...	Most Likely	No Change	Less Likely
a) eat more because it will be leaner.	32	46	22
b) eat more because it will be cheaper.	19	57	24
c) eat less because of PST use.	23	55	22
d) eat pork not treated with PST.	24	49	27
3. Are you willing to pay more for leaner pork produced with PST?	Yes 48	No 52	

believe them. News media and the companies producing PST were rated credible by only 43 and 14 percent of the respondents, respectively.

Several questions in the survey were designed to determine the attitudes of the respondents regarding the use of PST in swine production. A summary of answers to these questions is given in Table 5. The results indicate that even though there is a high degree of concern regarding the use of genetically engineered products in food production, respondents were willing to accept them under certain circumstances. At least half of the respondents indicated that they were in favor of PST use if it increased the rate of growth of hogs and lowered the cost of producing pork. Eighty-five percent of the respondents favored PST adoption if it resulted in the production of leaner pork.

Table 5 also presents changes in the consumption pattern of pork produced with PST. Thirty-two percent of the respondents indicated they would eat more pork if it is leaner, with 46 percent indicating no change. Only 19 percent of the respondents answered they would eat more if it was cheaper, with 57 percent saying they would not change their current consumption pattern. About 23 percent of the respondents answered they would eat less because of PST use and 24 percent will eat pork not produced with PST. In general, about half of the respondents indicated they would not change their consumption patterns following commercial use of PST.

Respondents were asked whether they would be willing to pay a premium for leaner pork produced with PST. Forty-eight percent of the respondents said they would be willing to pay a premium, while 52 percent said they would not. In summary, Table 5 shows that about half of the respondents will neither change their consumption pattern, nor pay a premium for leaner pork produced with PST.

For objective three, questions dealing with the concern and acceptance of genetically engineered products were cross-tabulated with the socioeconomic variables. This was done to measure the direction and degree of association between respondents' attitudes towards questions asked and respondents' characteristics. The hypothesis was that public acceptance and concern was dependent on income, race, marital status, education, gender, and age.

Tables 6-10 show the statistically significant bivariate relationships between the respondents' characteristics and answers to selected questions. Table 6 summarizes the results of the contingency analysis dealing with the question, "How concerned are you with the use of recombinant-DNA technology to produce a product for human food?" Education and gender showed a statistically significant Chi-square with a positive correlation (from Spearman's rank correlation estimate) indicating that the better-educated and male respondents were less concerned with the use of recombinant-DNA technology to produce food than were the lower-educated and female.

Table 7 presents the results of the contingency analysis based on the question, "How concerned are you with changing a bacteria so that it is not in its natural form?" Education and gender again showed statistically significant Chi-squares and a positive correlation, indicating that the better-educated and male respondents showed less concern with the manipulations of genes in a bacteria.

Table 8 shows the cross-tabulation results with the question, "How concerned are you with growth promotant used in livestock and poultry production?" Both gender and age showed a significant Chi-square. Gender was positively correlated, indicating that male respondents were less concerned with growth promotants than female respondents. For age, the Spearman correlation estimate was quite small relative to its estimated standard error. This implies that the basis for the high Chi-squared value is not a continuous function across the stratification. This can be seen by looking at Table 8. The middle age group expressed significantly more concern (66% very concerned) than either the younger (50%) or older (51%) group.

In Tables 9 and 10, cross-tabulation results from the questions, "Do you think that if pork is produced with PST, you will: a) eat more because it will be leaner, b) eat more because it will be cheaper, c) eat less because of the use of PST, or d) eat pork produced without the use of PST?" are presented. In all of the above questions only the gender variable showed statistically significant Chi-squares. The correlation for the first and second questions was negative, and positive for the third and fourth. The results indicate that male individuals would be less likely to reduce their pork consumption if pork was leaner and cheaper due to PST, and they would be less likely to eat pork produced without the use of PST.

Table 6. Respondents Concerned with the use of Recombinant DNA Technology to Produce a Product for Human Food?

	EDUCATION	
RESPONSE (percent)	HS Grad and Below	College and Above
Very concerned	61	43
Somewhat concerned	33	38
Not concerned	6	19
	Chi^2 = 13.39	Spearman = .193
	Prob = .001	ASE = .051

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Very concerned	60	36
Somewhat concerned	31	43
Not concerned	9	21
	Chi^2 = 20.70	Spearman = .251
	Prob = .001	ASE = .053

Chi^2 - Chi-squared value for the null hypothesis that the rows and columns are independent.
Prob - Prob-value for the Chi-squared test.
Spearman - Non-parametric correlation coefficient
ASE - Asymptotic standard error.

Table 7. Respondents Concerned with Changing a Bacteria so that it is not in its Natural Form

	EDUCATION	
RESPONSE (percent)	HS Grad and Below	College and Above
Very concerned	57	49
Somewhat concerned	34	32
Not concerned	9	19
	Chi^2 = 5.82	Spearman = .103
	Prob = .055	ASE = .053

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Very concerned	64	39
Somewhat concerned	27	39
Not concerned	9	22
	Chi^2 = 22.87	Spearman = .264
	Prob = .001	ASE = .052

Chi^2 - Chi-squared value for the null hypothesis that the rows and columns are independent.
Prob - Prob-value for the Chi-squared test.
Spearman - Non-parametric correlation coefficient
ASE - Asymptotic standard error.

Table 8. Respondents Concerned with Growth Promotants used in Livestock and Poultry Production

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Very concerned	66	46
Somewhat concerned	30	43
Not concerned	4	11
	Chi^2 = 16.87	Spearman = .213
	Prob = .001	ASE = .051

	AGE		
RESPONSE (percent)	18-34	35-54	55+
Very concerned	50	66	51
Somewhat concerned	41	28	41
Not concerned	9	5	7
	Chi^2 = 9.15	Spearman = -.021	
	Prob = .058	ASE = .054	

Chi^2 - Chi-squared value for the null hypothesis that the rows and columns are independent.
Prob - Prob-value for the Chi-squared test.
Spearman - Non-parametric correlation coefficient
ASE - Asymptotic standard error.

Table 9. Likelihood of Respondents to Increase Consumption of Pork Due to PST

a) I will eat more because it will be leaner.

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Most likely	29	35
No change	42	50
Less likely	29	15
	Chi^2 = 9.41	Spearman = -.135
	Prob = .009	ASE = .056

b) I will eat more because it will be cheaper.

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Most likely	17	22
No change	52	63
Less likely	32	15
	Chi^2 = 12.09	Spearman = -.170
	Prob = .002	ASE = .056

Chi^2 - Chi-squared value for the null hypothesis that the rows and columns are independent.
Prob - Prob-value for the Chi-squared test.
Spearman - Non-parametric correlation coefficient
ASE - Asymptotic standard error.

Table 10. Likelihood of Respondents to Decrease Consumption of Pork Due to PST

a) I will eat less because of the use of PST.

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Most likely	32	14
No change	48	62
Less likely	20	23
	Chi^2 = 12.15	Spearman = .159
	Prob = .002	ASE = .060

b) I will eat pork produced without the use of PST.

	GENDER	
RESPONSE (percent)	FEMALE	MALE
Most likely	33	16
No change	46	51
Less likely	21	33
	Chi^2 = 12.74	Spearman =.206
	Prob = .002	ASE = .058

Chi^2 - Chi-squared value for the null hypothesis that the rows and columns are independent.
Prob - Prob-value for the Chi-squared test.
Spearman - Non-parametric correlation coefficient
ASE - Asymptotic standard error.

Conclusions

Results from this study provided insights into the respondent characteristics that influence attitudes and perceptions regarding the use of PST in pork production. In most cases, gender and education, and to a lesser degree age, influenced the level of concern and attitudes toward genetically engineered products and pork produced with PST. It is equally important to note that income and age (except for one case) showed weak and insignificant relationships to the questions asked. One can then surmise that public perception of genetically engineered products and acceptance of pork produced with PST, is generally not sensitive to the levels of income and age.

The results indicated that female and less educated respondents were more concerned with the use of a genetically engineered product in the production of food than were the males and better educated respondents. Although there is a high degree of concern regarding the use of genetically engineered products, PST use could be accepted under certain conditions. The public is inclined to favor using PST to reduce production costs and to produce higher quality, leaner pork products. The results also indicated that over half of the consumers were not willing to pay more for pork produced with PST. Close to half of the respondents indicated they would not change their consumption of pork due to the use of PST.

Implications

This study contributes to the understanding of, and the basis for, public attitudes on an aspect of genetic engineering. According to a 1987 survey conducted by the Office of Technology Assessment (OTA), only about one in six Americans rates his or her basic understanding of science and technology as very good. The same survey showed that the public will not accept the use of a genetically engineered product if the safety level of the product is not known. The results of this study indicate that education may play a role in the level of concern regarding the use of a genetically engineered product in the production of food. This is in agreement with Offutt and Kuchler (1988), who state that in order to change the public's view toward genetically engineered products, the level of understanding about these products must be increased.

Education programs which address the safety of pork produced with PST need to target the lower-educated and female consumers. These programs should be developed and implemented by groups such as universities and public agencies, which enjoy a high level of trust by consumers. The manufacturers of products like PST need to work closely with university scientists and public officials in order to improve their public image and enhance the successful commercialization of genetically engineered products.

References

Boyd, R. D., D. E. Bauman, D. H. Beermann, A. F. DeNeergard, L. Souza, and H. T. Kuntz, "Porcine Somatotropin: Dose Titration for Maximum Growth Rate, Feed Efficiency, and Lean Deposition in Swine," *Proceedings, Cornell Nutrition Conference*, 1986, pp. 24-28.

Cogburn, L. A., "Metabolic Responses of Animals to Endogenous and Exogenous Growth Regulators," paper presented at the 1985 Minnesota Nutrition Conference, Bloomington, MN, 1985.

Cross, H. R., J. W. Savell, R. E. Branson, D. S. Hale, J. J. Francis, J. W. Wise, and D. L. Wilkes, *National Consumer Retail Beef Study*, Final report to the Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C., 1986.

Flemming, B., "Wonder Drug Promises Super-Lean Hogs: Dream or Reality?" *National Hog Farmer*, August, 1987.

Lemieux, C. M. and M. K. Wohlgenant, "Consumer Acceptance and Demand for Lean Pork," paper presented at the annual AAEA meeting in Knoxville, TN, August, 1988.

National Research Council, *Designing Foods*. Washington, D.C.: National Academy Press, 1988.

Office of Technology Assessment, Congress of the United States, 1987. *New Developments in Biotechnology: Background Paper on Public Perceptions of Biotechnology*. Washington, D.C., May, 1987.

Offutt, S. E., and F. Kuchler, "Biotechnology on the Farm: Is Safety all that Matters?" *Choices*, 1988.