The Impact of Hormone Use Perception on Consumer Meat Preference

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Abstract

Consumers see retail beef products labeled as produced with no added hormones (NAH), but also see similar labels on pork and chicken products on market shelves despite the fact that added hormones are not used in production. This may mislead consumers to think hormones are used in meat production as a whole. This research examines the impact of hormone use perception on consumer preference for meat products. Specifically, we assess consumer perception of hormone use in different livestock species as compared to actual use in production. We then assess whether hormone use perception affects consumer choice for unlabeled meat products. Finally, we identify whether consumer perception of hormone use affects willingness to pay (WTP) premiums for meat products labeled as produced with NAH. Choice experiment data was collected using Oklahoma State University monthly Food Demand Survey. Results indicate that consumers underestimate the rate of hormone use in cattle production, but overestimate the rate of hormone use in pork and chicken production. Results from a conditional logit model suggest that consumer perception of hormone use can affect food preferences for unlabeled meat products. Using a Tobit model, we also found WTP premiums for the NAH label are affected by consumer perception of hormone use and by demographic characteristics.

Impact of Hormone Use Perception on Consumer Meat Preference

Introduction

Hormone use in meat production has received much recent attention from media, consumer groups and other sources. Hormones act as growth promotants in animals for improved weight gain and feed efficiency before slaughter in meat industries. It is estimated that more than 90 percent of all U.S. feedlot cattle are injected with hormones to improve growth rates (USDA, 2013). Six different kinds of steroid hormones are currently approved by Food and Drug Administration (FDA) for use in beef production: estradiol, progesterone, testosterone, zeranol, trenbolone acetate, and melengestrol acetate (FDA 2015). Currently, federal regulations do not allow these or other hormones to be used in poultry (chickens, turkeys, ducks) or hog production (USDA, 2015). FDA does allow the use of recombinant bovine growth hormone (rbGH) to increase milk production in dairy cattle, but it is not used in beef cattle (FDA 2015). Though hormone use is prohibited by federal regulations in poultry and swine production, other growth promotants are used in production. In swine production, beta-agonists (e.g. Ractopamine) are widely used to enhance lean muscle gain and feed conversion by stimulating receptors on cell surfaces and promoting proteins synthesis in muscle tissue. Beta-agonists work at a cellular level without affecting the hormone levels of the animal (American Meat Science Association, 2015). Beta-agonists, such as Ractopamine and Zilpaterol, are also used in 60% to 80% of feedlot cattle in the U.S. (Penn State Extension, 2016). Controversy has been raised on the impact of beta-agonists on animal welfare and export issues (Agweb, 2013).

Consumers, however, may think differently about the prevalence of hormone use in livestock production. Given the prevalence of news and information about hormone use, consumers may perceive that prevalence of hormone use in the meat industry as a whole is very high. Research indicates that hormone use in cattle does not pose a risk to human beings or the environment and its use is approved by FDA (Capper and Hayes, 2015; Cattle network, 2012; FDA, 2015). Still, consumer concerns exist regarding hormone use, including potential health risks (Organic Consumers Association, 2007; Health, 2016).

Consumer concern about the safety of hormone use in livestock production is relatively high. A study conducted by the Food Marketing Institute (1995) found that 50% of consumers said hormones were a serious hazard. Lusk, Fox, and McIlvain (1999) found that consumer concern about animal growth enhancers, including hormones, was higher than concern for additives, preservatives, and antibiotic use, but lower than concern for bacteria, spoilage, and chemicals. Moreover, research shows that consumers do not always equally believe the information on probabilities presented in advertisements, experiments or surveys (Hayes et al., 1995). Teisl and Roe (2010) show that people's perceptions of the likelihood of getting sick from food-borne illness can differ from the probabilities of food contamination in reality. Similarly, consumer perception of hormone use for different livestock species may differ from reality. Introduction of food labels can also create uncertainty and influence beliefs about the quality of unlabeled products (Dannenberg, Scatasta and Strum, 2011). Consumers see beef products labeled as produced with no added hormones (NAH), but also see similar labels on pork and poultry products on market shelves despite the fact that added hormones are not used in production. This may mislead consumers to think hormones are used in pork and poultry production. What are consumer perceptions of hormone use in production of beef, pork and poultry? Does consumer perception of hormone use affect demand for beef, pork or chicken? Are consumers willing to pay more for meat products labeled as produced with NAH over those without the label?

Knowledge of consumer perception of hormone use across different livestock species increases our understanding of purchase decisions for various meat products. Consumer beliefs affect choice, thus measuring consumer beliefs in studies of consumer choice is needed (Lusk, Schroeder and Tonsor, 2014). Lusk, Schroeder and Tonsor (2014) suggest willingness to pay (WTP) can be estimated more precisely by distinguishing beliefs from preferences in food choice. WTP estimates for meat products may be improved by considering consumer perception of hormone use for different livestock species. In addition, econometric approaches that do not account for differences in beliefs across people may yield misleading estimates of welfare changes (Marette, Roe and Teisl, 2012). The inclusion of consumer perceptions of hormone use in livestock production could improve measures of the welfare implications of meat product labeling.

Economists have conducted many studies about the impact of hormone use on beef demand. For example, Lusk, Roosen and Fox (2003) compared consumer valuations of beef ribeye steaks from cattle produced with and without growth hormones or genetically modified corn in France, Germany, the United Kingdom, and the United States. They found that French consumers place a higher value on beef from cattle that have not been administered added growth hormones than U.S. consumers. Platter, et al. (2003) reported that consumer ratings of beef palatability are affected by the use of hormonal implants on cattle. They found that steaks from non-implanted steers were rated as more desirable for overall eating quality than steaks from implanted steers. Capper and Hayes (2015) quantified the environmental and economic impact of withdrawing growth-enhancing technologies (GET), including hormone implants, from the U.S. beef production system. They concluded that withdrawing GET from U.S. beef production would reduce both the economic and environmental sustainability of the industry.

However, there is no study examining the accuracy of consumer perceptions regarding the prevalence of hormone use in cattle, hogs and chicken production. In addition, studies regarding consumer preference for NAH products have been limited to beef, since hormones are not used in pork or chicken production. However, if consumer perception of hormone use differs from reality, WTP for pork or chicken products labeled as produced with NAH may be impacted.

Many studies elicit consumer WTP for various beef products and for health and environmental outcomes (Adamowicz, 2004; Dannenberg, 2009; Grunert et al., 2009; Lagerkvist and Hess, 2011). However, this large body of applied work often does not explicitly separate WTP estimates into consumer beliefs and preferences for product attributes. Most WTP studies are constructed such that attributes are assumed to be known with certainty and beliefs across people are the same. However, Lusk, Schroeder and Tonsor (2014) showed that controlling for subjective beliefs can substantively alter the interpretation of WTP and the ultimate implications derived.

Economists often estimate WTP for certain attributes. WTP may be closely related to consumer beliefs about the attributes and their own demographic and socio-economic characteristics. Lusk (2011) estimated the linear effects of demographics and consumer food values on relative preferences for organic food using choice experiment data. His result indicated that the model including relative price changes, consumer food values and demographic variables is the most preferred specification as compared to models without demographics by likelihood ratio tests and comparisons of the AIC values.

The purpose of this paper is to identify the impact of hormone use perception on consumer preference for meat products. Specifically, we assess consumer perception of hormone use in different livestock species, as compared to actual use in production. We then assess whether consumer perception of hormone use affects choices for unlabeled meat products. Finally, we identify whether consumer perception of hormone use affects WTP premiums for meat products labeled as produced with NAH.

Theory

Consumer preferences for different food products are estimated using random-utility, discrete choice models that describe how the probability of purchasing food products varies with price and perception of the prevalence of hormone use. Random utility theory posits that individual *i*'s utility from choice j can be specified as a function of a systematic component describing the attributes of the choice and a stochastic error term representing individual idiosyncrasies unobservable to the analyst. Utility for food product *j* is

(1) $$U_{ij} = V_{ij} + \varepsilon_{ij}$$

where U_{ij} *i*s individual i 's utility of food product *j*, V_{ij} is the systematic portion of the utility function determined by attributes of the alternative *j* and potentially individual-specific characteristics, ε_{ij} is stochastic error term.

It is assumed that the consumer chooses the option they most prefer: the one generating the most utility. In particular, food *j* is chosen if $U_{ij} \geq U_{ik}$ $(k \neq j)$. The probability that food *j* is chosen is

(2) $$Prob\ \{V_{ij} + \varepsilon_{ij} \geq V_{ik} + \varepsilon_{ik}; for\ all\ k \neq j\}$$

Assuming ε_{ij} is logistically distributed, the probability that individual *i* chooses food product *j* on a particular choice set J is

(3) $$Prob\ \{\ j = 1\} = \frac{e^{V_{ij}}}{\sum_{k=1}^{J} e^{V_{ik}}}$$

where *j*=1means j is chosen; *j*=0 means j is not chosen. The log-likelihood function is

(4) $$\text{LogL} = \sum_{i=1}^{N}\sum_{j=1}^{J} d_{ij}\log(Prob\,\{j = 1\})$$

where d_{ij} is a dummy variable that takes the value of 1 for the particular alternative that was chosen, and 0 otherwise. Equation (3) also represents the market share of product *j*.

Expected utility theory (EUT) is the standard model employed to determine how consumers assess the desirability of a choice. Under EUT, individual *i* evaluates prospect *j* as follows:

(5) $$EU_{ij} = \sum_{k=1}^{K} p_{ijk} U(x_k)$$

where p_{ijk} is the probability of individual *i* receiving attribute x_k from option *j*, and $U(x_k)$is a utility function that describes the desirability of attaining attributes. Attribute x_k can be interpreted as a dollar amount, a variable indicating the presence/absence of a discrete attribute (e.g. organic, hormone free, etc.) or a continuous quantity of some attribute (e.g. fat content, sodium content, etc.). Although most WTP studies are constructed such that attributes are assumed to be known with certainty, i.e. $p_{ijk} = 1$, uncertainty is prevalent in the real world. In most real-world applications, the probabilities, p_{ijk}, are typically subjective and individual specific.

In this subjective expected utility (SEU) framework, the utility that a consumer expects to derive from a product has two components: the desire to obtain the attributes provided by the product, given by $U(x_k)$ in Equation (5), and their subjective beliefs that the product will actually deliver the attributes, given by p_{ijk} in Equation (5). In choice data analyses, a choice of option A over option B reveals that $SEU_{iA} > SEU_{iB}$.

Data

A survey was conducted by appending survey questions to Oklahoma State University monthly Food Demand Survey in May 2016 (Lusk, 2016). A total of 1023 consumers responded.

Subjects were asked about their perception of the prevalence of hormone use in production of different livestock species including beef cattle, pigs, and broiler chickens. They were also asked to make 9 discrete choices. In each choice, subjects chose between 8 types of food products including hamburger, steak, pork chop, ham, chicken breast, chicken wings, bean, pasta and a “no purchase” option. Prices of each food products varied across the 9 choices. Willingness-to-pay premiums were solicited for meat products labeled as produced with NAH. Demographic information was collected, including farm experience, age, household income, education level, regions and presence of children in the household.

Methods and Procedures

Standard t-tests are used to examine consumer perception of hormone use rates in meat production across cattle, hogs and chicken as compared to actual use in production. Ordinary least squares (OLS) is used to assess whether consumer perception of hormone use rates differ across education levels, ages, income levels and regions. Random expected utility models are used to identify relative preferences for hormone added meat products over NAH meat products.

The conventional model estimated in choice experiment studies includes belief variables:

(6) $$EU_j = \gamma_j - \alpha Price_j$$

where EU_j is expected utility of product *j*, $Price_j$ is the price of product *j*, γ_j is the fixed effect of product *j* and incorporates beliefs about hormone use in food product *j*.

We estimate a random expected utility model:

(7) $$EU_{ij} = \gamma_j + P_{ij}U(H) - \alpha Price_j$$

where P_{ij} is subject *i*’s belief that product *j* is hormone added, *U*(*H*) is relative preference for hormone added product over NAH product. The preference for NAH, *U*(*NH*), has implicitly been normalized to zero for identification such that *U*(*H*) is the difference in utilities of hormone added and NAH: $U(H) - U(NH)$. This allows isolation of the relative contributions of hormone added from the overall preference for product j.

An additional consideration is that consumers' relative preference for NAH meat can vary across different species. The random expected utility model becomes

(8) $$EU_{ij} = \gamma_j + P_{ij}U(H)_j - \alpha Price_j$$

where $U(H)_j$ is relative preference for NAH product j over hormone added product j. We allow relative preferences for NAH meat products to differ from each other. The -2 Log L and AIC model selection criteria are used to test whether random expected utility models (Equation (7) and Equation (8)) fit the data better than the conventional model (Equation (6)).

Meat product demand is analyzed for 1) consumer perceived hormone use rates, 2) actual hormone use rates, and 3) NAH (only for cattle). The demand for meat product j on a particular choice set J is

(9) $$D_{ij} = \frac{e^{EU_{ij}}}{\sum_{k=1}^{J} e^{EU_{ik}}}$$

Since consumer perceptions may vary across demographic groups, a Tobit model is used to identify whether WTP premiums for product labeled as produced with NAH are affected by consumer perception of hormone use and demographic factors. The Tobit model is chosen because maximum WTP premiums were censored. Demographic factors include farm experience, age, household income, education level, regions, and presence of children in the household.

Results

Consumer perception of hormone use prevalence ranged from 0 to 100% for each specie (Figure1). Perception patterns are similar across species with peaks of consumers near 50% and near 100% for each species. The average perceived hormone use rate is approximately 62% for cattle, 55% for hogs, and 57% for chicken. Compared to actual hormone use rates, consumer perceived hormone use rates are significantly different at the 99% level. Interestingly, on average, consumers underestimate hormone use in beef and overestimate hormone use in pork and poultry.

Table 1 reports results of three model specifications, including the conventional model (Equation (6)), random expected utility model incorporating beliefs and identification of preferences for hormone added (Equation (7)), and the modified random expected utility model allowing different preference for hormone added ($U(H)$) across meat products (Equation (8)). Magnitude and significance of shared parameters are similar across models. The -2 Log L and AIC model selection criteria clearly favor the expected utility models incorporating beliefs over the conventional model.

In general, consumers derive the highest utility from steak and the least utility from ham among meat products represented in all three models (Table 1). The marginal utility of hormone use rate ($U(H)$-$U(NH)$ (mean)) is negative in the random expected utility model indicating if a consumer believes a meat product is hormone added, he is less likely to choose the meat. The marginal utilities of hormone use rate for individual meat products are also negative in the modified random expected utility model. The marginal utility of hormone use rate for steak (0.554) is the highest and for ham (0.125) is the lowest. The fact that the marginal utilities of hormone use rate are different across meat products implying that the marginal utility of hormone use rate for high value meat is higher than for low value meat.

Demand for the meat products in this study is affected by perceived hormone use rate in different livestock species (Figure 2). Figure 2 simulates demand graphs reflecting market share among the 9 options in our choice experiment across perceived, actual, and –in the case of beef-no hormones, at various prices according to Equation 9. Predicted market share for steak with perceived hormone use (62%) at any price is larger than with actual hormone use (90%). Predicted market share for hormone free steak is the largest among perceived, actual and none. The impact of hormone use perception on demand for burger is similar to steak. If consumers perceived NAH in pork or chicken production, the market share for chops, ham, chicken breasts and wings would be larger.

Generally, consumers are willing to pay more for meat products labeled as produced with NAH. WTP premiums for NAH steak are the highest across the 6 meat products while WTP premiums for NAH chicken wings are the lowest (Table 2). Table 3 reports three model specifications associated with WTP premiums for meat products labeled as produced with NAH. Model 1 shows that WTP premiums for meat products labeled as produced with NAH are indeed sensitive to consumer perception of hormone use rate in different livestock species. Model 2 and Model 3 incorporate demographic characteristics. Model 2 focuses only on the linear effects of demographics on WTP premiums. Model 3 includes interaction effects between consumer perception of hormone use and demographics. AIC and Log Likelihood values indicate that Model 3 is the preferred specification. Results indicate that consumer perception of hormone use is significantly related to WTP premiums for meat products labeled as produced with NAH.

Coefficients from Model 3 suggest that demographic factors including farm experience, age, household income, education level, regions, and presence of children in the household affect WTP premiums for NAH labeled meat products. For example, WTP premiums for consumers who have farm experience are higher than for people without farm experience. In general, WTP premiums increase in response to increased perceived hormone use rate across different demographic characteristics. For example, WTP premiums for consumers with incomes more than $160K (0) are higher than for those with income of $140k-$159k (-0.922), but WTP premiums increase more slowly in response to an increase in perceived hormone use rate for consumers with incomes more than $160K (0.381) than for those with income of $140k-$159k (2.351).

Conclusions

Though consumers are concerned about hormone use in meat animals, our results suggest that most are not well-informed regarding actual use of hormones in production. While the average perceived hormone use rate by consumers in this study is 62% for cattle, 55% for hogs, and 57% for chicken, actual hormone use in cattle is more than 90% and there is no hormone use in swine or chicken production. The wide range of consumer perception of hormone use within species also implies that most consumers have little knowledge about actual hormone use rate in meat production, and that consumer perception of meat production differs from actual production practices.

Consumer perceptions of hormone use prevalence in different meat animal species are shown here to be an important factor in meat demand. This research examines how those perceptions affect consumer choices for various meat products. Results reveal that relative preference for hormone added meat products over NAH meat products from cattle, hogs and chickens are negatively related to consumers' utility. Meat demand is also affected by consumers' misbeliefs about hormone use in different livestock species.

Consumers are willing to pay more for meat products labeled as produced with NAH, relative to unlabeled products. A consumer's perceived hormone use rate for cattle has a strong impact on WTP premiums for steak labeled as produced with NAH, relative to lower value meat cuts. The implication is that for high value meat products, consumers may care more whether hormones are added in production.

NAH labels increased consumer WTP for the 6 meat products in this study, including pork and poultry products. This labeling claim may lead consumers to believe that the product is different or healthier than similar products without that label, while in reality, all poultry and pork products are NAH. Since hormones are not allowed in pork or poultry production, the claim "no added hormones" cannot be used on the labels of pork or poultry unless it is followed by a statement that says "Federal regulations prohibit the use of hormones." (USDA, 2015). However, manufacturers may shrink, minimize, or obscure this statement of clarification. It is a challenge to deliver correct information to consumers by labeling claims.

Consumer misbeliefs about hormone use in the meat industry affects food choices. Given that most consumers have little direct involvement in food production, many food choices are likely made with inaccurate beliefs regarding production claims.

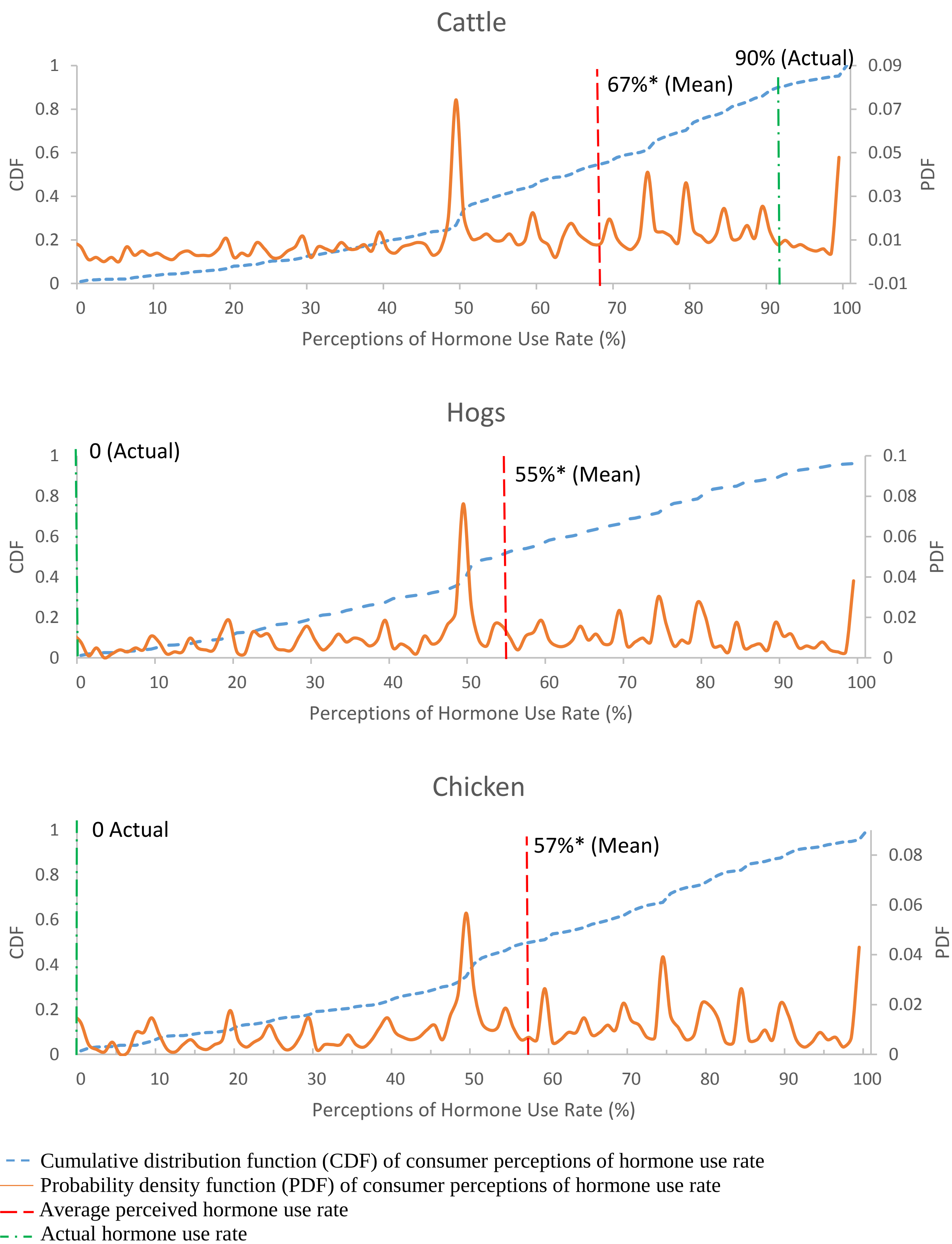

Figure1. Distribution of consumer perceptions of hormone use rate in cattle, hogs and chicken.
Note: *significant at 99%.

Table 1. Results from Different Utility Models Fit to the Choice Experiment Data

Parameters (Utilities)	Conventional Model (Equation 6)	Random Expected Utility Model (Equation 7)	Modified Random Expected Utility Model (Equation 8)
-1 * Price (mean)	0.483*	0.483*	0.483*
	(0.011)	(0.011)	(0.011)
Burger vs. None (mean)	2.302*	2.579*	2.595*
	(0.058)	(0.076)	(0.099)
Steak vs. None (mean)	3.429*	3.706*	3.774*
	(0.081)	(0.095)	(0.120)
Chop vs. None (mean)	1.979*	2.226*	2.296*
	(0.062)	(0.076)	(0.101)
Ham vs. None (mean)	1.089*	1.335*	1.160*
	(0.060)	(0.074)	(0.113)
Breast vs. None (mean)	2.846*	3.102*	3.107*
	(0.054)	(0.071)	(0.080)
Wing vs. None (mean)	1.173*	1.429*	1.397*
	(0.054)	(0.071)	(0.097)
Bean vs. None (mean)	1.038*	1.039*	1.039*
	(0.055)	(0.055)	(0.055)
Pasta vs. None (mean)	1.567*	1.568*	1.568*
	(0.069)	(0.069)	(0.069)
U(*H*)-*U*(*NH*) (mean)		-0.443*	
		(0.078)	
U(*H*) (burger)-*U*(*NH*) (burger) (mean)			-0.470*
			(0.130)
U(*H*)) (steak) -*U*(*NH*) (steak) (mean)			-0.554*
			(0.145)
U(*H*) (chop) -*U*(*NH*) (chop) (mean)			-0.572*
			(0.147)
U(*H*) (ham) -*U*(*NH*) (ham) (mean)			-0.125
			(0.170)
U(*H*) (breast)-*U*(*NH*) (breast) (mean)			-0.452*
			(0.101)
U(*H*) (wing)-*U*(*NH*) (wing) (mean)			-0.386*
			(0.141)
-2 Log L	35820.633	35788.002	35781.998
AIC	35838.633	35808.002	35811.998

Note: * significant at 99%; Parentheses are standard errors.
U(*H*)-*U*(*NH*) is relative preference for hormone added product over NAH product.

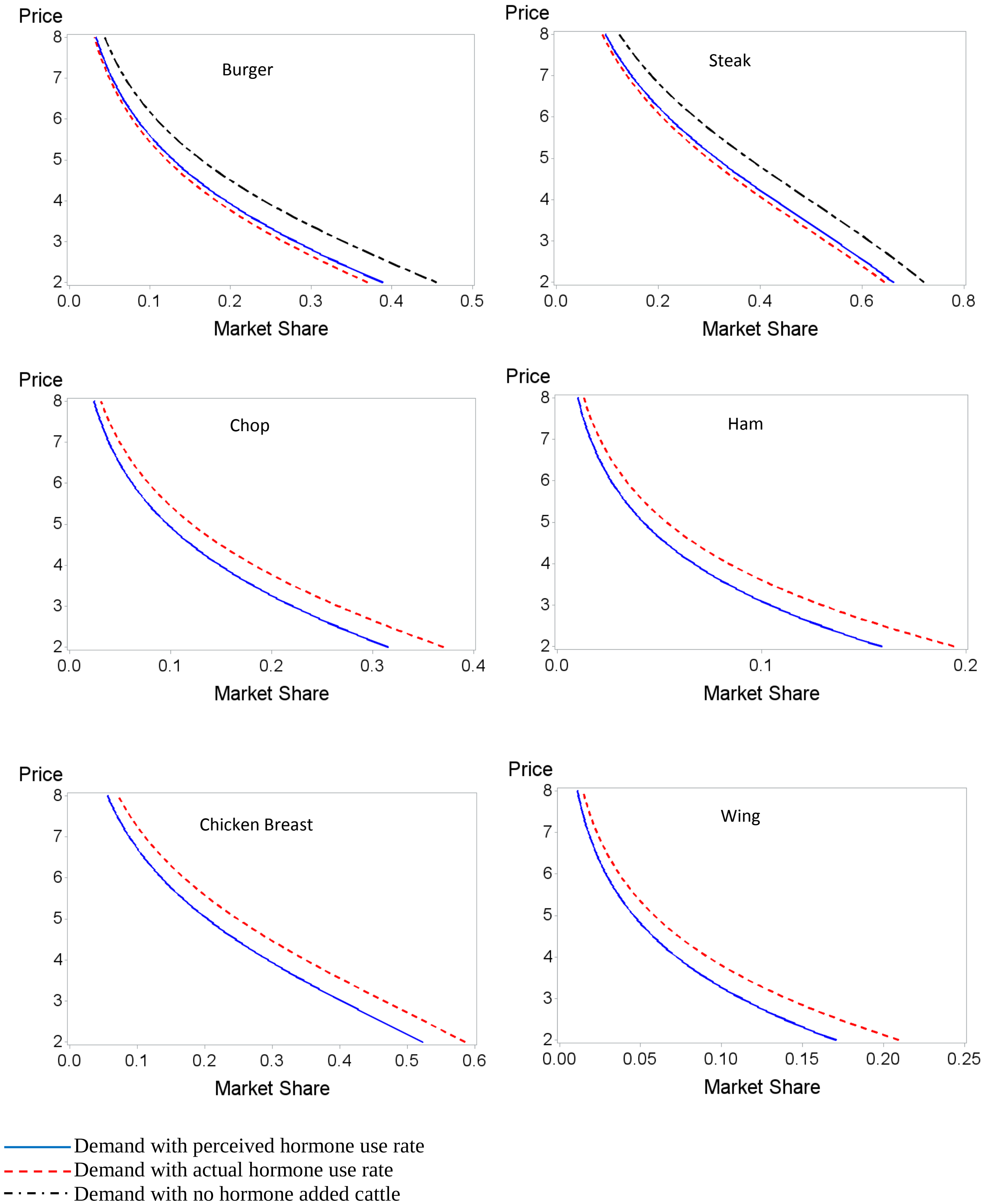

Figure 2. Meat product demand under different hormone use scenarios

Table 2. WTP Premiums for Meat Products Labeled as Produced with NAH

Meat Product	WTP Premiums ($/lb.)
Steak	2.151
Hamburger	1.719
Pork Chop	1.680
Ham	1.362
Chicken breast	1.759
Chicken wing	1.294

Table 3. Analysis of WTP Premiums for Meat Products Labeled as Produced with NAH by Tobit Method

Variable	Model 1	Model 2	Model 3
Intercept	1.113***	0.975***	1.185***
	(0.063)	(0.155)	(0.357)
Hormone use rate	0.333***	0.319***	0
	(0.074)	(0.072)	
Meat types			
Chicken breast	0.475***	0.475***	0.474***
	(0.066)	(0.063)	(0.062)
Ham	0.081	0.080	0.085
	(0.066)	(0.063)	(0.062)
Hamburger	0.418***	0.418***	0.426***
	(0.066)	(0.063)	(0.062)
Pork chop	0.402***	0.401***	0.407***
	(0.066)	(0.063)	(0.062)
Steak	0.908***	0.904***	0.912***
	(0.066)	(0.063)	(0.063)
Chicken wing	0	0	0
Demographics			
Female		0.176***	0.042
		(0.039)	(0.095)
Male		0	0
Farm experience		0.218***	-0.354
		(0.057)	(0.146)
No farm experience		0	0
Children presence		0.337***	0.713***
		(0.047)	(0.122)
No children presence		0	0
Age			
18-24 years		0.215*	0.566**
		(0.115)	(0.268)
25-34 years		0.408***	0.694***
		(0.111)	(0.257)
35-44 years		0.061	0.392
		(0.114)	(0.264)
45-54 years		-0.204*	0.363
		(0.109)	(0.249)
55-64 years		-0.368***	0.236
		(0.110)	(0.257)
65-74 years		-0.409***	0.173
		(0.111)	(0.256)
75 years or older		0	0

Education		
Up to high school	0.109*	0.002
	(0.062)	(0.149)
Some college	-0.116*	-0.139
	(0.060)	(0.148)
4-year college degree	0.107**	0.238*
	(0.054)	(0.143)
Master or professional degree	0	0
Income		
Less than $20k	-0.296***	-0.349*
	(0.082)	(0.209)
$20k-$39k	-0.173**	-0.564***
	(0.083)	(0.212)
$40k-$59k	-0.212**	-0.817***
	(0.086)	(0.227)
$60k-$79k	-0.197**	-0.799***
	(0.079)	(0.208)
$80k-$99k	-0.189**	-0.356
	(0.079)	(0.220)
$100k-$119k	-0.171**	-0.359
	(0.085)	(0.234)
$120k-$139k	-0.332***	-0.392
	(0.094)	(0.267)
$140k-$159k	0.192**	-0.922***
	(0.093)	(0.228)
More than $160k	0	0
Regions		
Far west	0.055	-0.480**
	(0.091)	(0.231)
Great Lakes	0.136	-0.254
	(0.093)	(0.234)
Mideast	0.058	-0.037
	(0.088)	(0.222)
New England	-0.190*	-0.062
	(0.111)	(0.288)
Rocky Mountain	-0.004	0.210
	(0.134)	(0.342)
Southeast	0.232***	-0.201
	(0.086)	(0.219)
Southwest	0.063	-0.023
	(0.101)	(0.256)
Plains	0	0
Interaction: hormone use rate*demographics		
Female		0
Male		-0.218
		(0.152)
Farm experience		0.973***
		(0.227)
No farm experience		0
Children presence		-0.628***
		(0.191)
No children presence		0
18-24 years		0.023
		(0.292)
25-34 years		0.140
		(0.240)
35-44 years		0

45-54 years			-0.360
			(0.251)
55-64 years			-0.451
			(0.285)
65-74 years			-0.366
			(0.283)
75 years or older			0.612
			(0.402)
Up to high school			0.183
			(0.236)
Some college			0.051
			(0.234)
4-year college degree			-0.236
			(0.220)
Master or professional degree			0
Less than $20k			0.413
			(0.354)
$20k-$39k			1.010***
			(0.371)
$40k-$59k			1.396***
			(0.387)
$60k-$79k			1.366***
			(0.348)
$80k-$99k			0.640*
			(0.373)
$100k-$119k			0.638
			(0.407)
$120k-$139k			0.496
			(0.423)
$140k-$159k			2.351***
			(0.360)
More than $160k			0.381
			(0.381)
Far west			0.123
			(0.231)
Great Lakes			-0.076
			(0.240)
Mideast			-0.662***
			(0.205)
New England			-0.937***
			(0.331)
Rocky Mountain			-1.202**
			(0.470)
Southeast			0
Southwest			-0.613**
			(0.279)
Plains			-0.832**
			(0.357)
Log Likelihood	-11061	-10780	-10708
AIC	22137	21630	21541

Note: *, **, *** significant at 90%, 95%, 99%; Parentheses are standard errors.

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