Consumer Preferences for Welfare Friendly Production Methods: The Case of Chicken Production in Western Australia.

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ABSTRACT

The aim of this study is to investigate consumer preferences and willingness to pay (WTP) for welfare friendly meat chicken products in Western Australia. Data from an internet-based choice experiment on skinless chicken breast is analysed to determine whether consumers care about humane production practices. Majority of respondents are concerned about the welfare of meat chickens. In general, consumers are most concerned about stocking density, hot metal blade beak trimming and poor litter quality. Consumers are WTP substantial premiums for welfare friendly broiler products.

INTRODUCTION

Poor animal welfare in intensive livestock production systems in western countries is increasingly becoming an area of concern for consumers, producers, and policy makers alike (Bennett, 1997, 1998; Bennett & Blaney, 2003; de Jonge & van Trip, 2014; Frewer et al., 2005; Gao & Schreder, 2009; Harper & Henson, 2001; Hobbs et al., 2002; Kehlbacher et al., 2012; Mayfield et al., 2007; Napolitano et al., 2010; Phillips et al., 2009; Pouta et al., 2010; Vanhonacker et al., 2007). Intensive factory farming is largely perceived to be responsible for the declining welfare of animals (Napolitano et al., 2010), sparking increased interest in awareness of animal protection (Harper & Henson, 2001).

A number of studies have investigated consumers' willingness to pay for animal welfare friendly produce in Europe and North America (Bennett, 1996; Lagerkvist & Hess, 2011; Liljenstolpe, 2008; Makdisi & Marggraf, 2011; McEachern et al., 2007; Moran & McVittie, 2008; Napolitano et al., 2010; Vander Naald & Cameron, 2011). These studies have focused on a myriad of different welfare attributes affecting consumers' WTP. A few studies have been conducted on caged egg production by layer hens, which find that consumers are WTP price premiums to avoid caged eggs (Appleby, 2003; Bennett, 1997, 1998; Burgess et al., 2001; Croney & Millman, 2007; Fearne & Lavelle, 1996; Lagerkvist & Hess, 2011; Lusk & Norwood, 2011; McEachern et al., 2007; Rolfe, 1999; Wilkins, 2004). There are also some

studies that specifically consider poultry welfare (Pouta et al. (2010); Vander Naald and Cameron (2011)

The broiler production system in Western Australia covers approximately 368,841m^2 of sheds split between 35 growers with each grower averaging 10,538 m^2 of shed space with 20 birds per square meter (Brajkovich, 2010). Common welfare issues associated with high intensity farming for broiler chickens include foot-pad dermatitis, poor litter and air quality, stress, sudden death syndrome, lameness, cannibalism, feather pecking and disease susceptibility (Appleby, 2005; Martrencher et al., 2002; Moran & McVittie, 2008). Raising broiler welfare involves limiting stocking density, improving barn conditions that provide allowance for broiler physical activity and outdoor access, frequent inspection by independent auditors, record keeping, surgical interventions, and transport time limits (Moran & McVittie, 2008).

Growing consumer preference for welfare friendly animal products has given rise to a change in the broiler production practises for one of the major grocery chains in Australia, Coles. Coles, in conjunction with the Royal Society for the Prevention of Cruelty to Animals (RSPCA), introduced the 'Coles RSPCA Approved Chicken' in 2010. This food labelling scheme identifies and guarantees chicken meat that has been produced in accordance with the RSPCA Approved Farming Standards. It was designed to assist Australian consumers identity welfare friendly chicken meat through labelling (RSPCA, 2011). Coles branded chicken is now all RSPCA approved.

The aim of this study is to gain insight into consumer attitudes and WTP for welfare friendly broiler chicken products in Western Australia (WA). The objectives are to: 1) determine if WA consumers care about broiler welfare; 2) identify production attributes that are of most concern to consumers and, 3) determine whether and by how much consumers are WTP price premiums for chicken meat with improved welfare attributes. This study contributes to the academic literature in farm animal welfare by providing useful insight into consumers' preference for broiler production system and values that they place on production attributes.

MATERIALS AND METHODS

Choice experiments involve an analysis of trade-offs among alternatives by imitating real purchase situations and allowing an examination of multiple attributes (Lusk et al., 2003). Discrete choice experiments are based on two theories, the Lancasterian consumer theory as

described by Lancaster (1966) and the Random Utility Theory. The Lancasterian consumer theory holds that the utility of a good can be separated into utilities of different attributes of the product and proposes that purchase decisions are based on preferential attributes of the good (Lancaster, 1966). Thus, choices are made based on a combinations of attributes and involve making trade-offs between different attributes and different attribute levels (Van Loo et al., 2011). The WTP for a product attribute is calculated as the negative ratio between estimated marginal utility for product attribute and the estimated marginal utility for the price attribute (James et al. (2009).

Attributes considered

The attributes included in this study were chosen based on the standards set by the RSPCA, the guidelines set out in the 'Code of Practice for Poultry in Western Australia' and prior literature. These are: stocking density, ventilation, litter quality, beak trimming and price. Other factors important to chicken welfare such as transportation conditions, slaughter methods, lighting and diet were not considered due to time limitations and increased complexity. The definition of the attributes, their levels and variable names used in estimation, are reported in Table 1. Price levels were set to depend upon a self-reported 'normal' price that each individual respondent indicated they usually pay for their chicken, with increments of $0, $2, $4 or $6.

Survey design

The survey design included a combination of multi-choice questions, Likert scales and written responses to assess attitudes and perceptions of broiler welfare. Pictures depicting the attributes of stocking density and beak trimming were shown to respondents who were asked to give a rating from 0 to 10 of how concerned the images made them feel (Figure 1). Following the images was an example of a choice experiment and then five questions asking how influential each of the four chosen attributes and the price were when making their actual chicken meat purchases.

Figure 1 here

These questions were followed by a cheap talk script to reduce hypothetical bias, which is one of the main issues when using choice modelling to estimate WTP (Bennett, 1998; Carlsson et al., 2007; Carrigan & Attalla, 2001; Glass et al., 2005; Harper & Henson, 2001; Liljenstolpe, 2008; Mayfield et al., 2007; McEachern et al., 2007; Taylor & Signal, 2009).

The full choice set design involved 24 choice questions, constructed using Ngene, using an S-efficient design, based on prior parameters drawn from previous studies (Downsborough, 2012; Scarpa & Rose, 2008), and blocked into 3 blocks of eight. Each respondent answered one block of eight questions. An example of a choice question is given in Figure 2.

Finally, questions related to socio-demographic variables (age, education etc) were asked.

Table 1 here

Figure 2 here

Sampling

The survey was administered online for respondents in Western Australia (WA). It was promoted to the general public via social media, social networks and postcard drops to suburban houses. Three hundred and sixty eight surveys were completed with 234 of these included for the analysis.[2]

RESULTS

Sample characteristics

All the analysis was done using Stata 13 (StataCorp, 2013). The socio-demographic characteristics of survey respondents are summarised in Table 2, which highlights a skewed sample of the population demographics in Western Australia, due to the sampling methodology, but the study did not have the resources needed to commission a market research company to recruit the sample.

Table 2 here

Model Estimation

A conditional logit model (McFadden, 1974) was estimated, and reported in Table 3. Definitions of variable used in the models are reported in Table 4.

[2] Results of respondents with the following characteristics were removed from the survey: were under 18, rarely purchased food for the household, did not eat chicken meat, did not live in Western Australia, reported that their household income was below $10 000 (potentially many of the students read this as 'personal income') or were buying chicken for less than $5/ kg which we believe is unlikely. This was done to ensure results were reliable.

Table 3 here

The model includes a range of socio-demographic characteristics as interaction terms as well as considering whether the concern levels from the stocking density and beak trimming images (Figure 1) translate into stated behaviour. By incorporating the interaction variables we can see that those who were concerned by the beak trimming image suffered high disutility from both *Bt. Hot* and *Bt. Las*. This is not the same effect for the stocking density image. High stocking densities caused less concern for those respondents who knew a farmer while older people were significantly more concerned. Older people were less concerned by both natural and improved ventilation. Graduating from university also significantly affected the response to beak trimming.

Table 4 here

Part-worth values

Willingness to pay for individual attributes is reported in Table 5. The mean values for each attribute suggest the amount that the average respondent is willing to pay to improve the attribute. The attributes that respondents were most willing to pay to improve were poor litter quality ($3.23/ kg), stocking density ($0.38/ kg x 8= $3.04) and hot metal blade beak trimming ($3.00/ kg). Natural ventilation, also one of the 1 star welfare (*) attributes only reached $1.38/ kg WTP, which is noticeably less than the other 1 star welfare attributes. As expected, consumers are less concerned and thus WTP lower price premiums to improve welfare from 2 star (**) to 3 star (***).

Table 5 shows that age, gender, having a university degree and not knowing any farmer's influences respondents' WTP. Age has a small effect on WTP for ventilation, with older people WTP much less, but the opposite is true for age's effect on stocking density. Not knowing any farmers means that respondents were less WTP for stocking density, although WTP significantly more to avoid laser beak trimming. University graduates were found to care less about hot metal blade beak trimming compared to those without a university degree and females were significantly more concerned about 1 star beak trimming than males. Both hot metal blade and laser beak trimming are found to be of significantly higher concern for those who were very concerned by the beak trimming image. Incorporating these concern variables does significantly impact some variables, while most remain relatively constant.

Overall, the sampled respondents were WTP a price premia of $5.75 to $9/kg for chicken meat with a high welfare standard (Figure 3). This is a substantial premium on top of what they currently pay (ranges from $5.00/kg to 25.00/kg, with a mean of $12.41/kg and standard deviation of $4.12/kg). All respondents were WTP a premium greater than $5.50/kg and less than 50% of respondents were WTP a premium of between $7.00/kg to 8.00/kg; 18% of respondents were WTP over $8.50/kg. These suggest that consumers are WTP substantial premiums to avoid poor broiler production practises.

Table 5 here

Figure 3 here

DISCUSSION

The objective of this study was to investigate consumer concerns, preferences and WTP for welfare friendly compromise meat chicken products in Western Australia. Just fewer than 80% of the sample claimed to care about broiler welfare.

The attribute levels that were of most concern to consumers were poor litter quality, hot metal blade beak trimming and stocking density. However, what consumers perceive to be best for the welfare of animals is often not. Dawkins et al. (2004); Martrencher et al. (2002) and Almeida et al. (2010) suggest that ventilation and litter quality have more impact on bird welfare than how densely packed are birds in sheds. Additionally, beak trimming, which is thought to be detrimental to broilers by consumers, is an effective method to prevent bullying and cannibalisation, which are arguably much worse for chicken welfare (RSPCA, 2011). This raises interesting issues for communication to consumers about the true welfare impacts of practices.

The main factors found to influence WTP are whether they were or knew a farmer, and whether they had graduated from university. Concern for beak trimming and stocking density are also important, with consumers who are indifferent not prepared to pay to improve welfare but those who are even slightly concerned will. Laser beak trimming appears to be far less of a concern than using a hot metal blade.

Women are found to be consistently more concerned by poor animal welfare than men; they are also WTP pay more for chicken meat with no beak trimming. Concern for beak trimming accounted for much of the WTP, although a portion of it can be attributed to being a female. Literature provides support for the observation of higher female concern for animal welfare. However, it is non-conclusive regarding the effect of gender on WTP (Herzog, 2007; Lagerkvist & Hess, 2011; Vander Naald & Cameron, 2011; Vanhonacker et al., 2007).

Whether the respondent was a farmer, knew a farmer or did not know a farmer did affect their WTP. Not knowing a farmer meant respondents had a significantly higher WTP to avoid laser beak trimming, but they were slightly less willing to pay to decrease stocking density (Table 5). Similarly, Taylor and Signal (2009) considered the effect of rurality for Australia and found that while rural people claimed greater knowledge of farm practises, this did not translate into increased WTP. This may also line up with those who had first-hand knowledge of a chicken farm being less concerned about welfare. Having a university degree meant that consumers were willing to pay significantly less to avoid hot metal beak trimming than the average consumer. This contradicts some literature which suggests that educational attainment directly affects WTP price premiums for welfare friendly products (Bennett, 1998; Vander Naald & Cameron, 2011).

Older people were more concerned about stocking density than ventilation, which is contrary to what the literature suggests is detrimental to broiler welfare (Dawkins et al., 2004; Jorge de Moura et al., 2010). Age affects WTP for lower stocking densities, with people above 65 years old willing to pay \$4.24/kg to improve stocking density from 38kg/m^2 to 30kg/m^2 (Table 5), people aged 18 to 24 in this study were willing to pay \$2.80/kg. McVittie et al. (2008) found that consumers in Europe were willing to pay a premium of £3.89/kg of chicken meat to reduce bird-stocking density from 38 to 30kg/m^2. They were also willing to pay £2.68/kg to improve ventilation from low to poor quality. Both WTP for natural and improved ventilation were significantly decreased with increasing age. This is supported by the literature with a negative relationship between age and WTP (Bennett, 1998; Lagerkvist & Hess, 2011; Taylor & Signal, 2009).

CONCLUSIONS, LIMITATIONS AND IMPLICATIONS

Consumers are willing to pay for welfare friendly chicken meat, this is clear from the results. As welfare is a credence attribute, labels should be more explicit about welfare treatment of

broilers, with previous research showing that including information regarding ethical attributes on product labels can result in more favourable product evaluations. A lack of information is acknowledged to be a determinant of the gap between stated WTP and actually paying in the market, which suggest that giving improved levels of information on welfare attributes may increase consumer knowledge, and thus WTP. However, while this detailed information may assist broiler consumers who are knowledgeable about broiler welfare, it may be an unwelcome eye opener to consumers who are currently ignorant of broiler practices and may upset them.

This research is useful to producers, policy makers and processors of RSPCA Approved Chicken. It highlights consumer concerns and WTP estimates that can help to identify what attributes of production to change. The feasibility of improving production practises identified can be weighed up using WTP estimates and comparing these to the anticipated increased production costs. This survey confirms that consumers are concerned about chicken welfare. This suggest that other retail outlets may be losing out by not stocking an RSPCA Approved Chicken option, assuming consumer concern matches up with behaviour, which as the literature attests to, attitudes and behaviours are often not in sync.

Many broiler production practises were not considered in this study, such as transportation conditions, slaughter method, lighting in sheds and chicken growth rates. Therefore further research should involve a comprehensive study on all aspects of the broiler production system. Lastly, the socio-demographic and economic variables of respondents in this data sample does not accurately represent Western Australian consumers and thus further research is needed to collate WTP values that are more representative.

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Figure 1. The two images included in the survey, from left: a high stocking density and chick beak trimming

Please choose the option you most prefer

	Option 1	Option 2	Option 3
Stocking density (kg/ m2)	30 ***	30 ***	I do not want either of these options so will purchase different meat.
Ventilation	Improved ventilation **	Improved ventilation **	
Litter quality	*Poor* *	Average **	
Beak trimming	No beak trimming ***	Trimmed with hot metal blade *	
Price ($ /kg)	$ 15	$ 19	

Option 1 Option 2 Option 3

Figure 2. An example of a choice set for skinless chicken breast meat presented to respondents in the choice experiment

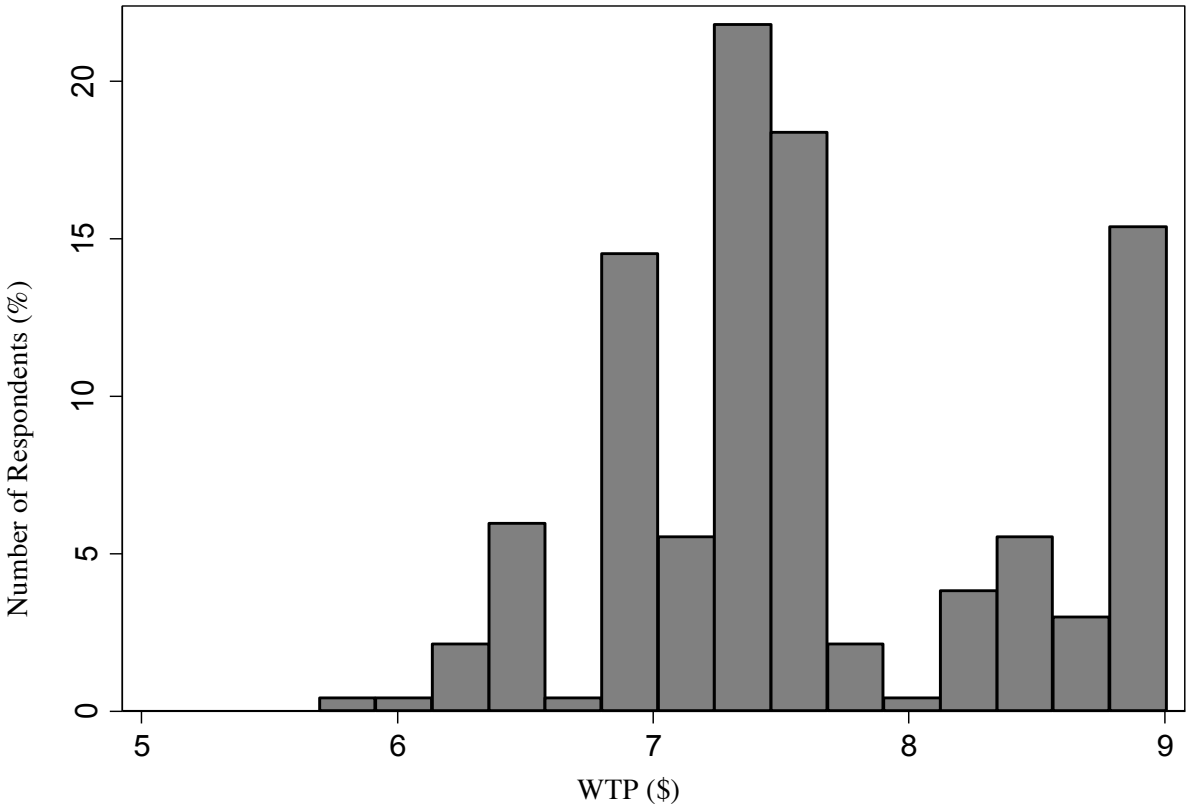

Figure 3. Frequency distribution of sample respondents willingness to pay to improve in aggregate, ventilation, litter quality, stocking density and beak trimming from * to * welfare levels for the conditional logit model reported in Table 3**

Table 1. Chicken meat attributes levels and the levels included in the survey

Attribute	Chicken meat	Star level	Variable name
Price (variation from respondents "normal" value)	$ 0, 2, 4, 6		Price
Stocking density	• 38 kg/m^2 (18 adult birds/m^2) • 34 kg/m^2 (15.5 adult birds/m^2) • 30 kg/m^2 (13 adult birds/m^2)	* ** ***	Stock.Den
Litter quality	• Poor quality - wet and caked litter • Average quality - shallow and moist litter • Good quality - dry and on average 2cm deep litter	* ** ***	Poor LQ Ave.LQ *base*
Ventilation	• Natural ventilation - sides of shed can be opened to let air in and out • Improved ventilation - as well as natural ventilation, shed also has fans to assist in air circulation and water misting systems to regulate temperature • Tunnel ventilated - sheds have fans at one end of the shed, which draws air into the shed then over the chickens and out the other end of the shed at high speed. Sheds have sensors to assess air conditions and adjust tunnel ventilation accordingly	* ** ***	Nat.Vent Imp.Vent *base*
Beak trimming	• Beak trimmed by hot metal blade • Beak trimmed by infrared laser • No beak trimming	* ** ***	Bt.Hot Bt.Las *base*

Table 2. Demographic characteristics of the representative sample

Gender (%)		**Education distribution (%)**	
Male	22.22%	*Yr 10*	1.71%
Female	77.77%	*Yr 12*	21.79%
		TAFE/ trade/ technical qualification	8.12%
Age (%)		*University*	67.95%
Under 18	0%	*Would rather not say*	0.43%
18-24	46.15%		
25-34	32.05%	**Income Distribution (%)**	
35-44	5.56%	*$10,001-$25,000*	12.82%
45-54	9.40%	*$25,001-$40,000*	7.26%
55-64	4.27%	*$40,001-$55,000*	13.25%
Over 65	2.56%	*$55,001-$70,000*	13.68%
		$70,001-$85,000	10.68%
Situation		*$85,001-$100,000*	13.25%
I have lived/do live on a farm	32.48%	*More than $100,000*	29.06%
I know someone who lives/works on a farm	55.13%		
I don't know any farmers personally	12.39%		

Table 3. Conditional logit model utility function estimates for chicken breast, with interaction variables, including concern upon seeing the two images

Variables	Coefficient	Standard Error	P>z
Opt-out	-7.945	0.721	0.000
Price	-0.361	0.042	0.000
Stock.Den	-0.101	0.020	0.000
Nat.Vent	-1.130	0.246	0.000
Imp. Vent	-0.799	0.268	0.003
Poor. LQ	-1.167	0.141	0.000
Ave. LQ	-0.423	0.140	0.003
Bt. Hot	-0.162	0.271	0.549
Bt. Las	0.339	0.237	0.154
Interaction terms			
Stock. Den x Stock. Den image	-0.001	0.001	0.094
Bt. Hot x Bt image	-0.173	0.027	0.000
Bt. Las x Bt image	-0.080	0.030	0.008
Bt. Hot x University	0.483	0.164	0.003
Stock. Den x age	-0.013	0.002	0.000
Nat.Vent x age	0.209	0.064	0.001
Imp. Vent x age	0.172	0.079	0.030
Bt. Las x farm	-0.627	0.275	0.022
Stock. Den x farm	0.019	0.006	0.002
LL= -1572.475			
Number of obs=5616			
Pseudo R2= 0.2354			

Table 4. Definitions of variables used in the estimated models

Variable Name	Definition
Opt-out	Dummy variable identifying the "opt out" alternative (=1 if opt out, 0 otherwise)
Inf. Price	Influence of price on meat chicken purchases
Inf. Stock.Den	Influence of stocking density on meat chicken purchases
Inf. Vent	Influence of ventilation on meat chicken purchases
Inf. LQ	Influence of litter quality on chicken meat purchases
Inf. Bt	Influence of beak trimming on chicken meat purchases
University	=1 if completed a university degree, 0 = if highest education is year 10 or 12, TAFE or technical qualification/ trade or would rather not say
Farm	=1 if indicated do not know any farmers; = 0 if have lived/do live on a farm, or know someone who lives/works on a farm

Table 5. Consumer willingness to pay values for a unit improvement in the production attributes of chicken breast meat ($/ kg)

Attribute and interactions	WTP $/ kg	Attribute and interactions	WTP $/ kg
Stock. Den: mean attribute levels	0.38***	**Bt. Hot: mean attribute levels**	3.00***
		Have a university degree	2.16***
Age=18-24	0.35***	No university degree	3.50***
Age=65+	0.53***		
		Female	3.12***
Know a farmer/ are a farmer	0.39***	Male	2.59***
Don't know any farmers	0.34***		
		No concern for Bt image	-0.46
		Very high concern for Bt image	4.32***
Nat. Vent: mean attribute levels	1.38**		
		Bt. Las: mean attribute levels	0.69
Age=18-24	1.97**		
Age=65+	-0.93	Know a farmer/ are a farmer	0.47
		Don't know any farmers	2.21**
Imp. Vent: mean attribute levels	0.78**		
		No concern for Bt image	-0.72
		Very high concern for Bt image	1.49***
Age=18-24	1.26**		
Age=65+	-1.12	**Poor. LQ: mean attribute levels**	3.23***
		Ave. LQ: mean attribute levels	1.17**

***, **, * Indicate p>|z| at 10, 5,1%. Individual characteristics at sample mean levels unless otherwise stated. Values are reported in $AUD.