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Dutch Consumers' Willingness to Pay for Broiler Welfare

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ABSTRACT

This article analyzes Dutch consumers' willingness to pay (WTP) for the welfare of broiler chickens and the consequences for nonhuman animal welfare policies. Using data from a discrete-choice experiment and a random parameter logit model, this study showed that consumers particularly value opportunities for outdoor access and the method used for anesthesia before slaughter. The WTP was also positively related to the number of consumers buying the same product, indicating that they experience the public-good dilemma. Moreover, the WTP was higher if consumers knew that animal welfare practices were subject to public or collective supervision. Women, people with more education, those with higher income, and nonreligious people had relatively high WTP values. For 87.5% of the respondents, the WTP exceeded the price difference between a broiler with a higher level of animal welfare and a regular chicken. The findings suggest that the Dutch market for broiler chickens can be improved by raising consumer confidence in the labeling system.

KEYWORDS

Broiler welfare; choice experiment; willingness to pay; The Netherlands

The welfare of nonhuman animals on farms is a heavily debated topic in both society and academic literature. Nonhuman animal welfare groups frequently campaign against some practices in the production and transport of farm animals, while governments have implemented various forms of regulation regarding farm animal welfare (FAW). From a theoretical economic perspective, the decision by farmers regarding the level of FAW depends on the tradeoff between their costs and benefits related to a change in the level of FAW (Simpson & Rollin, 1984). Note that these benefits for the farmer may also include nonuse values besides the direct monetary values of selling the products. Improving the animal welfare level by, for instance, increasing the space available per animal raises farm-level costs but may create benefits for the farmer as well when consumers are willing to pay for such an increase.

Saitone, Sexton, and Sumner (2015) found the overall economic benefits of implementing restrictions on the pork industry resulting in higher production costs strongly depend on the valuation and demand response by consumers. The optimal level of implementing restrictions on FAW management is the level where the marginal private costs equal the marginal private benefits, resulting in the maximum profit for the farmer. This level may deviate, however, from the optimal social level in case of market failures.

These market failures refer to the public-good character of FAW and the existence of information asymmetry (Carlsson, Frykblom, & Lagerkvist, 2007a; Verbeke, 2005). Animal welfare can be considered a public good because it is nonrival and nonexcludable (Lusk & Norwood, 2011). This public-good character implies that everyone would be better off if they bought products that are produced with a higher level of animal welfare, while individuals may have the incentive to free-ride on such consumption by others. After all, if other consumers buy meat that is produced with a

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higher level of animal welfare, everyone benefits from the improved conditions for the animals involved. Moreover, animal welfare is a credence good because consumers making their buying decision in the supermarket cannot see or taste whether a product is produced with a higher level of animal welfare (Lusk & Norwood, 2011). Consequently, the market for animal products may suffer from information asymmetry, resulting in adverse selection (Kawata, 2013; Verbeke, 2005). Hence, the actual behavior of consumers may be driven by private concerns only, resulting in market outcomes that do not necessarily satisfy public concerns (Carlsson, Frykblom, & Lagerkvist, 2007a).

To mitigate the problems associated with these market failures, regulations have been implemented in many countries. The European Union (EU), for instance, has set minimum standards for farm-animal husbandry (European Commission, 2007). These minimum standards refer to husbandry characteristics such as stocking density, lighting, litter, feeding, and ventilation. Likewise, the labeling of animal products is a way to mitigate the information asymmetry that consumers experience concerning the animal welfare level of products. A necessary condition for the labels to function effectively is that consumers trust these labels, including the way the supervision is implemented (Hobbs, 2003; Nocella, Hubbard, & Scarpa, 2010). Meeting this condition appears to be problematic, because consumers still appear to face difficulties interpreting the labels and picturing the situation in terms of FAW (Baltzer, 2004). Hence, the actual buying behavior of consumers may not reflect their actual willingness to pay (WTP) for animal welfare.

Several studies have been conducted to assess the WTP for FAW. In the past, many used the contingent valuation method (CVM), where respondents are explicitly asked to mention the monetary value they attach to certain goods. Using CVM, several studies revealed a positive mean WTP for a ban of battery cages in egg production (e.g., Bennett & Blaney, 2003; Bennett & Larson, 1996). Taylor and Signal (2009) found that the largest group of respondents in Australia showed a WTP of 5% to 10% of the regular price for animal-based products that ensure certain basic needs for the animals.

For a number of years, the choice-experiment (CE) method has been increasingly used to identify the WTP for FAW production attributes. In this method, respondents choose from a number of options. Lagerkvist, Carlsson, and Viske (2006) and Liljenstople (2008) found positive WTP estimates for pork meat that is produced with a higher level of animal welfare in Sweden. Carlsson, Frykblom, and Lagerkvist (2007b) found a mean marginal WTP of Swedish consumers of around 70% of the average market price of regular eggs for six free-range eggs if battery cages are legally forbidden. Tonsor, Olynk, and Wolf (2009), applying the CE method to determine the WTP for pork products, found a significant degree of consumer heterogeneity among consumers in Michigan.

This article assesses the WTP for a number of key animal welfare attributes of broiler products. As the focus of our study was to determine the WTP for animal welfare, we ignored other attributes of broiler products that may affect consumer decisions. The WTP is determined by assessing the tradeoff between animal welfare attributes and the price of products. This analysis differs from previous studies, as it explicitly included attributes to estimate the impact of potential market failures on the WTP for animal welfare. After all, based on Hamilton, Sunding, and Zilberman (2003), it follows that the WTP for a private good may deviate from the WTP for public regulation of the quality of that good.

While a labeling system reducing information asymmetry may solve private concerns about animal welfare, additional intervention is needed for internalizing the negative externality of others consuming non-FAW-friendly products (Lagerkvist & Hess, 2011). When this market failure is adequately dealt with, consumers know that others are making a similar decision. To assess this public concern, this study included an attribute that refers to the market share of the broiler products. If the negative externality related to public concerns exists, the (assumed) number of people buying a product that is produced with a higher level of animal welfare positively influences the WTP of an individual consumer. Another attribute refers to the way the supervision of the FAW is organized to deal with the information asymmetry. Here, this article distinguishes three types of supervision of FAW: through a market, through collective agreements, or through legislation. This

attribute regarding supervision is related to the strength of public intervention in husbandry practices where a ban on specific practices (i.e., legislation) can be seen as the most stringent (Carlsson et al., 2007a).

Another novelty of our analysis is that it focused on the Dutch market for broiler chickens. As far as we know, a CE for estimating the WTP of Dutch consumers for broiler production attributes has not been conducted before. The broiler industry is, however, strongly represented in The Netherlands, while animal welfare practices are heavily debated.

We sent the questionnaires to about 2,500 members of an online panel of households, which resulted in 1,603 respondents. Significant WTP values were found for all attributes. Although consumers showed different WTP values, overall, relatively high values were found for outdoor access and the method used for anesthesia before slaughter. We also found a positive WTP for the number of consumers buying a specific product. This finding may suggest that the Dutch consumers indeed experience the public-good dilemma. Moreover, the WTP for government intervention was also positive, which means that consumers value independent supervision of FAW. Our results suggest that the Dutch market for broiler chickens could be improved when the confidence of consumers in broiler welfare during production is raised.

Animal welfare in the Dutch broiler industry

The broiler industry is strongly developed in The Netherlands and has resulted in a relatively high share of 8% in the European production of poultry meat (EU, 2013). The domestic production is mainly used for export (more than 60%)—in particular to Germany and the United Kingdom, but also to countries outside the EU. About 20% of all EU exports to nonmember states come from the Netherlands (EU, 2013). The number of specialized broiler firms is about 500, with an average firm size of about 90,000 broilers (Van Horne, 2013).

The production of broilers in The Netherlands is subject to a number of legal obligations regarding FAW, including, among other things, housing, feeding, treatment in case of illness, and slaughtering. The conventional husbandry system in The Netherlands is directed at these minimum standards, which may suggest that the optimal level perceived by the producers may be lower than the minimum standard; otherwise, the introduction of such standards would not make much sense. A small number of these firms try to meet the highest levels of animal welfare, while a somewhat larger group aims at a level of broiler welfare between the highest level and the level realized by regular farmers. The group of regular farmers still consists of more than 90% of all farmers. In line with this, the share of consumer spending on meat that is produced with a higher level of animal welfare is less than 10% in the Dutch market (Ministerie van Economische Zaken [EZ], 2014).

Recently, animal welfare groups started a campaign against current practices in broiler production, because of the perceived low level of animal welfare of broilers in regular husbandry systems (Wakker Dier, 2014). Although there is regulation concerning FAW, these groups are still critical toward the current practices of broiler production in The Netherlands. Approximately two thirds of the broilers of conventional rearing systems in The Netherlands appear to have mild to severe injuries to the heel, foot pad, or breast (contact dermatitis; de Jong et al., 2011). Additionally, more than 50% of the broilers have severe to very severe leg disorders; in other words, they are lame (de Jong et al., 2011; Knowles et al., 2008).

These problems are mainly caused by the high growth rate of the broiler breed used, the high housing density, a disrupted day-and-night rhythm (lighting scheme), and the lack of environmental enrichment use. These problems result in pain experienced by the broilers and less positive observable behavioral expression (Bokkers, De Boer, & Koene, 2011; European Food Safety Authority [EFSA], 2010). In alternative rearing systems that, among other things, use slower-growing breeds and lower-stocking densities than standard rearing systems, these broiler welfare issues occur less often (de Jong et al., 2011). Furthermore, 78% of the broilers are stunned using the electrically charged water-bath system (Food Chain Evaluation Consortium [FCEF], 2012). In commercial slaughterhouses, two methods are used for stunning of broilers: water-bath stunning

and controlled atmosphere stunning (CAS; FCEF, 2012). Instead of live shackling when using water baths, the broilers are unconscious when shackled in CAS systems. Furthermore, the broilers are always sufficiently stunned in CAS systems as opposed to water-bath systems. Such a system is associated with live shackling of broilers while the broilers are not always stunned prior to slaughter (EFSA, 2004).

To inform consumers about the level of FAW, the Dutch animal welfare group named *Dierenbescherming* ("Animal Protection") labels animal products, such as meat and eggs (Dierenbescherming, 2014). This labeling system consists of a certification scheme in which the amount of stars (with a maximum of three stars) indicates a particular product's level of animal welfare. Products with this label are widely available in Dutch supermarkets. Consumer expenditures on these products amount to €350 million ($447 USD), which is about 10% of total consumer expenditures on meat products in The Netherlands (EZ, 2014). The market share of these labels is gradually increasing. Although a significant number of consumers seem to value animal welfare, it does not directly result from their actual buying behavior, as more factors are at stake, such as the (limited) knowledge among consumers about husbandry conditions and marketing strategies focusing on prices (De Jonge & Van Trijp, 2013). This study assessed how much consumers value the products with these labels by estimating the WTP for "one-star Better Life chicken."

Only a few studies have analyzed the WTP of Dutch consumers for FAW. Meuwissen, Van der Lans, and Huirne (2007) found positive WTP values for pork meat if all public concerns were met. They also found significant preference heterogeneity among Dutch consumers regarding FAW. Therefore, this study investigated the influence of individual characteristics on WTP. These authors confirmed that Dutch farmers have little knowledge about the basic facts of animal production and animal welfare issues, and they also have difficulties dealing with different types of labels. Based on these results, the researchers controlled for the lack of information of the respondents by explicitly informing them about the relationship between the characteristics of husbandry and FAW.

Materials and methods

CVM and choice experiment

The WTP of consumers for a good can be determined using the concept of the Hicksian compensating variation. This concept refers to the part of income an individual is prepared to give up to stay at the same utility level after a change in another good occurs. This monetary measure of welfare changes can be applied to both private and public goods, including FAW (Hanemann, 1991). Note that consumers may have different reasons for valuing FAW, including ethical considerations. The most commonly used methods to derive this value are the CVM and the CE (Lagerkvist & Hess, 2011). In the CVM, a respondent is asked the maximum amount he or she is willing to pay for a certain scenario (product) that is described in detail. In a CE, the respondent is asked to make a choice between two or more options for a product that differ in product attribute levels. Hence, CVM provides estimates for the total value of a product, while CE gives estimates of the marginal value of one attribute over another (generally the price).

A CE provides a good approximation for the decision-making process of consumers regarding what product to buy in the supermarket by comparing products and their corresponding attributes. From a psychological perspective, it is argued that valuing products may differ from making choices. Because a CE emphasizes the tradeoff between product attributes, it can be used to estimate the value for a specific attribute of a good in terms of another (i.e., the price; Adamowicz, Boxall, Williams, & Louviere, 1998; Adamowicz, Louviere, & Williams, 1994). In CVM, it is practically not possible due to the very detailed description of the scenario. Another advantage of the CE is that it is consistent with the "random utility theory." Choice-based methods are also argued to show a lower hypothetical bias (Carlsson, Frykblom, & Lagerkvist, 2005; Murphy, Allen, Stevens, & Weatherhead, 2005). This is related to the fact that choices may encourage respondents to elicit their preferences and

tradeoffs in a more detailed way. In this study, therefore, our main approach was using the CE. In addition, we conducted a CVM as a kind of sensitivity analysis. Both techniques were applied in a fully independent way, albeit among the same group of respondents.

Survey design

A key aspect in any design for WTP research refers to the information respondents are given. Regarding animal welfare, it appears that many people do not know much about the production process and usually paint a rosy picture of it (Lusk & Norwood, 2011; Meuwissen et al., 2007). This information asymmetry may be one of the reasons that products that are produced with a higher level of animal welfare are not bought frequently. Hence, it is important to reduce information asymmetry to derive an estimate for the WTP that is not affected by a lack of information. Respondents need, therefore, to be informed about the factors that influence animal welfare.

Although the concept of animal welfare is well defined, it is complicated to measure it in a straightforward manner, as many aspects are relevant, such as the physical state, the emotional state, and the naturalness of living conditions (Fraser, Weary, Pajor, & Milligan, 1997). Animal scientists commonly use a variety of indicators of animal welfare including animal health, production, physiology, and ethology (Moynagh, 2000). Specifically for the welfare of broilers, the most common factors are (a) the genotype, which determines the growth rates; (b) the rearing system, including stocking density, outdoor access, and use of environmental enrichment; and (c) management by farmers, such as lighting schemes, feed, litter, temperature, and ventilation management (see, e.g., Bokkers et al., 2011; de Jong, Berg, Butterworth, & Estevéz, 2012; de Jong, Van Harn, Gunnink, Hindle, & Lourens, 2012; EFSA, 2010; Shepherd & Fairchild, 2010). However, it must be noted that these different factors interact with one another and generally do not have an unambiguous individual effect on animal welfare. Therefore, the conjunction of all factors determines the level of animal welfare.

To deal with this complexity, at the beginning of the questionnaire, text was included giving information about the factors influencing FAW (see Appendix A). Because individual factors do not have an unambiguous effect on FAW and all factors together determine the level of animal welfare, a table consisting of a more detailed description on the rearing and management systems of different products and the resulting level of broiler welfare was offered to the respondents. To control for the hypothetical bias resulting in overestimating the WTP (Carlsson et al., 2005; Lusk, 2003; Tonsor & Shupp, 2011), a cheap talk script was provided to the respondents informing them of the fact that expenditures for chickens have consequences for their own budget. After being informed, the respondents were asked their WTP for different levels of broiler welfare using the CVM method (see Appendix B). The quality of the information on FAW and the cheap talk script was tested through another group of individuals before including the (revised) text in the survey.

After the CVM questions, the CE was conducted. In each choice set, the respondent needed to choose between two different chickens (Chicken A and Chicken B) or to choose no chicken (opt-out alternative). Carlsson, Frykblom, and Lagerkvist (2007b) found that preference heterogeneity depends on whether an opt-out alternative is available: In the survey version that included an opt-out alternative, greater unobserved heterogeneity was found compared with the version that did not include this option, although the mean WTP did not differ significantly. The two chickens were described with seven attributes in total. These attributes can take on different levels (see Table 1).

Regarding the first four attributes and the seventh attribute, the levels are based on the characteristics of the regular chicken and the most common alternatives in the market that are produced with a higher level of animal welfare. These attributes refer to the main characteristics of meat that play a role in the public debate on animal welfare (Wakker Dier, 2014). Although the WTP level is conditional on the attributes explicitly included (see Tonsor et al., 2009), the number of labels to be included is restricted to make the experiment not too complicated for the respondents. Note that

Table 1. Attributes and levels in choice experiment.

Attributes	Levels
1. Lifetime in days (growth rate)	40/60/80
2. Outdoor access available	No/yes
3. Living space available measured in the number of mature chickens per square meter	10, 15, or 20 chickens per square meter
4. Anesthesia method[a]	There is a chance that the chicken is not sufficiently anesthetized/always sufficiently anesthetized
5. Number of Dutch consumers who purchase this type of chicken	Small/large
6. The way broiler welfare is taken care of	Free market Collective agreements between market participants Legislation
7. Price of 500 g of chicken meat (in euros)	4/5/6/8/12 (€)

[a]If the electrically charged water-bath method is used, there is a chance that not all chickens are sufficiently anesthetized. If, on the other hand, the controlled atmosphere stunning method is used, all chickens are always sufficiently anesthetized.

such restrictions are also relevant in practice, as marketers cannot add too much information on their products so as not to confuse consumers.

As the importance of attributes has several dimensions (Van Ittersum, Pennings, Wansink, & Trijp, 2007), we focused here on the importance of attributes for determining judgment and choices by consumers. Attributes 5 and 6 were included to estimate the impact of market failures on the WTP. By including the attribute "number of Dutch consumers who purchase this type of chicken," we tested whether consumers are influenced by the buying behavior of all other consumers in the market. If broiler welfare is viewed to suffer from its public-good character, this attribute would have a positive effect on the WTP. By including the attribute "the way broiler welfare is taken care of," we tested to what extent consumers trust market parties, which is a measure for the importance of information asymmetry.

Based on these attributes and levels, 90 choice sets were created in total. These choice sets were divided over six versions of questionnaires, leading to 15 choice sets per questionnaire. The levels of the attributes used varied between the options of the choice sets. Eventually, each level was used equally many times in the overall survey design. For an example of a choice set, see Table 2.

Data

The questionnaire was sent to the CentER panel, which is an online panel of households that is representative for the Dutch population (CentERdata, 2014). A total of 1,603 of more than 2,500 panel members completed the questionnaire. People who never buy and eat chicken meat were excluded from the survey.

Table 2. Example of choice set.

Attributes	Chicken A	Chicken B	No chicken
Lifetime of the chicken	40 days	60 days	—
Outdoor access	No	Yes	
Living space available measured in the number of mature chickens per square meter	20 chickens	10 chickens	
Anesthesia method	Chance of not sufficiently anesthetized	Always sufficiently anesthetized	
Number of Dutch consumers who purchase this type of chicken	Small number	Large number	
Way broiler welfare is taken care of	Legislation	Free market	
Price of the chicken (per 500 g)	€6	€10	
When shopping for groceries, I would choose the following alternative:	○	○	○

The ages of the 846 men and 757 women ranged from 16 to 92 years. The average age of the respondents was 55 years, while the average age of all Dutch people was 41 years (CBS, 2014). A total of 75% of the respondents reported (sometimes) purchasing chicken meat, and 25% of these respondents reported never buying chicken meat that is produced with a higher level of animal welfare while 11% reported always buying such chicken meat. Note that these percentages are very close to the share of this type of meat in aggregate consumer spending (EZ, 2014). Table 3 gives the descriptive statistics of the respondents.

Econometric model

The analysis of the CE was based on the random utility theory (McFadden, 1974). The underlying assumption is that choices are driven by utility maximization where the utility (U) consists of a systematic component (V) and a stochastic or random component (ε). The utility function of individual i for a particular alternative j can be written as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \tag{1}$$

When the utility is linear in the parameters, the systematic component of the utility function can be specified as follows:

$$V_{ij} = x_j'\beta_i \tag{2}$$

where x_j' is the transposed attribute vector of alternative j and β_i is the corresponding coefficient's vector assigned by individual i to the attributes. The attribute vector included all attributes as shown in Table 1. The probability that individual i chooses alternative j over all other alternatives given a choice set K is:

$$\begin{aligned} P_{ij} &= Prob\left(U_{ij} > U_{ik}\right) \ \forall \ K \neq j \\ P_{ij} &= Prob(V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik}) \ \forall \ K \neq j \\ P_{ij} &= Prob(\varepsilon_{ik} - \varepsilon_{ij} < V_{ij} - V_{ik}) \ \forall \ K \neq j \end{aligned} \tag{3}$$

Different assumptions about the distribution of the unobserved component of the utility (ε_i) lead to different models (Train, 2009). This study estimated a random parameter logit model (RPL), which was based on the assumption that the unobserved component of the utility consisted of two parts: a part that contains all the correlation and heteroscedasticity and an independent and identically distributed (IID) extreme-value part (Train, 2009). The first part could follow any distribution and allowed the coefficients in the model to vary across individuals. Then the probability (P) that individual i chooses alternative j from a given choice set K was given by the following equation:

Table 3. Descriptive statistics of respondents.

Variable	Definition	Mean	Standard deviation
Buying experience	1 = (sometimes) purchases chicken meat; 0 = never purchases chicken meat	0.75	0.43
Gender	1 = female; 0 = male	0.47	0.50
Age	In years	54.75	16.15
Members	Number of persons in household	2.38	1.18
Children	Number of children in household	0.58	0.99
Education	1 = primary school to 6 = university (academic degree)	3.85	1.54
Urbanicity*	Measured on a Likert scale ranging from 1 = highly urban to 5 = nonurban	2.97	1.33
Income	Household income net of taxes (€) per month	2,795	1,416
Religion	1 = religious; 0 = not religious	0.56	0.50
Social pressure sensitivity	1 = the respondent is sensitive to what other people buy when choosing a food product; 0 = other people's buying behavior is unimportant to him/her	0.08	0.27

*The urbanicity is measured as the amount of addresses per square kilometer in the environment. Highly urban (valued at 1) means a density of 2,500 or more addresses per square kilometer; nonurban (valued at 5) means a density of less than 500 (Source: CentERdata, 2014).

$$P_{ij} = \int \frac{\exp(x'_{ij}\beta)}{\sum_{k=1}^{K} \exp(x'_{ik}\beta)} f(\beta|\theta)d\beta \quad (5)$$

where $f(\beta|\theta)$ is the density function of β, which is described with parameters θ. Because the coefficients were allowed to vary, it allowed for preference heterogeneity between individuals. Because Equation (5) does not have a closed form solution, it was estimated using simulation. The model was estimated in preference space using STATA 13.0, and 500 Halton draws were used for the simulation. All independent variables, except for the price variable, are specified as random coefficients following a normal and independent distribution.

The WTP for an attribute i can now be calculated by the negative ratio of the estimated coefficient of attribute i (β_i) and the estimated coefficient for the price variable (β_{price}):

$$WTP_i = -\frac{\beta_i}{\beta_{price}} \quad (6)$$

This ratio represents the utility for attribute i divided by the utility an individual assigns to €1. Using Equation (6), the mean WTP values for the attributes were calculated (see Table 4).

After estimating the RPL model, individual-specific coefficients were retrieved for each respondent. With these individual coefficients, the WTP for the one-star Better Life chicken could be calculated per respondent.

Explaining individual WTPs

Using the individual WTP for FAW, this research analyzed the influence of the respondents' characteristics. Individual characteristics may affect the WTP for animal welfare through a number of mechanisms. Women seem to care more about animal welfare than men do because of the nurturing role women typically take on in a household, which might be extended toward animals (Kendall, Labao, & Sharp, 2006; María, 2006; Taylor & Signal, 2009; Vanhonacker, Verbeke, Van Poucke, & Tuyttens, 2007; Verhue & Verzijden, 2003).

Many studies have shown a negative relation between age and the WTP for FAW (Lagerkvist & Hess, 2011; María, 2006; Taylor & Signal, 2009). In addition, a negative relationship between household size and WTP may be due to the effect of someone with dependent children being more likely to invest in them rather than in animals (Vanhonacker et al., 2007). Several authors (Bennett, 1998; Verhue & Verzijden, 2003) have found a positive relationship between WTP and education. Moreover, Taylor & Signal, (2009) indicated that people living in rural areas are most likely affected by animal welfare policy, either directly as a farmer or indirectly as a stakeholder. Kendall et al. (2006) also indicated that people living in rural areas have historically used animals as economic resources and are therefore expected to be less concerned with animal well being than are urban people. The latter group of people is more socially and spatially distant from animals compared with rural people.

The income of households can be expected to positively influence the WTP for FAW (Cowen, 2006; Lagerkvist & Hess, 2011; Taylor & Signal, 2009). Deemer and Lobao (2011) found that religious people attending church services express fewer concerns regarding FAW compared with

Table 4. Mean willingness to pay (WTP; in euro per unit) of attributes using the model.

Attribute	Mean	95% Confidence Interval
Lifetime (per day)	0.039	[0.030, 0.048]
Outdoor access (available or not)	2.145	[1.995, 2.296]
Living space (per one or more chicken per square meter)	−0.110	[−0.131, −0.089]
Anesthesia method (always sufficiently anesthetized or not)	3.095	[2.908, 3.282]
Number of Dutch consumers (large or small number)	0.685	[0.555, 0.816]
Collective agreements (yes/no)	0.650	[0.500, 0.800]
Legislation (yes/no)	0.505	[0.349, 0.661]

others. Finally, a perceived level of public consensus can have a great impact on an individual's decision making as was found by Bennett and Blaney (2002). Based on these findings in literature, the researchers tested the influence of individual characteristics on the WTP with the following regression model:

$$WTP_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Members_i + \beta_4 Education_i + \beta_5 Urbanity_i + \beta_6 Income_i + \beta_7 Religion_i + \beta_7 SPS_i + \varepsilon_i \quad (7)$$

where the dependent variable is the WTP for the one-star Better Life chicken of respondent i and SPS stands for social-pressure sensitivity. See Table 3 for the definitions and measurements of the regressors. The model was estimated using robust standard errors to correct for possible heteroscedasticity.

Results

All estimated coefficients are significant at the 1% level and have the expected sign (Table 5). The coefficient "living space" has a negative sign, which means that if the number of chickens per square meter increases, the FAW decreases and hence the WTP increases as well. Furthermore, the price coefficient is negative, which means that spending an additional euro had a negative impact on the utility of an individual. This finding makes sense because spending an additional euro limits an individual's ability to buy other or more products. The opt-out alternative constant is negative, which implies that not buying a chicken gives negative utility to an individual as compared with buying a chicken.

We found high WTP values for the attributes "outdoor access" and "anesthesia method." These findings are probably related to the way consumers view broiler welfare. Consumers generally define animal welfare as natural lives and "gentle deaths" (Harper & Henson, 2001). This research also showed high coefficients for the attributes "number of Dutch consumers," "collective agreements," and "legislation." Regarding the latter two attributes, consumers appeared to be fairly homogeneous in their preferences. Although the estimated coefficient for "collective agreements" was a bit higher than the coefficient for "legislation," the equality of the coefficients cannot be rejected at a 5% level. This finding indicates that consumers do not have a preference for legislation or collective agreements between market participants, though they derive more utility from these options than from a free market with respect to FAW.

The positive valuation for the attributes "number of Dutch consumers," "collective agreements," and legislation suggests that consumers experience market failures, in particular the public-good character of FAW and information asymmetry. The finding regarding the impact of the number of Dutch consumers buying the same products appears not to be affected by a perceived social pressure.

Table 5. Results of the estimated random parameter logit model.

	Mean		*SD*	
Variables	Coefficient	*SE*	Coefficient	*SE*
Lifetime	0.0169***	(.0022)	–0.0334***	(.0020)
Outdoor access	0.9327***	(.0341)	0.8787***	(.0390)
Living space	–0.0478***	(.0047)	0.0999***	(.0045)
Anesthesia method	1.3456***	(.0427)	1.2898***	(.0424)
Number of Dutch consumers	0.2979***	(.0287)	0.6283***	(.0394)
Collective agreements	0.2827***	(.0332)	0.0390	(.0691)
Legislation	0.2195***	(.0346)	0.0556	(.0743)
Opt-out constant	–4.3137***	(.2140)	4.2531***	(.1663)
Price	–0.4348***	(.0076)		
Number of individuals	1,603			

*** $p < .01$.

In addition, more than 80% of respondents stated that their buying behavior was not influenced by choices made by other people in their neighborhood (see Table 6).

Furthermore, the estimated standard deviations were all significant at the 1% level, except for the attributes "collective agreements" and "legislation." This result implies a preference heterogeneity with respect to all attributes, except with respect to the attributes "collective agreements" and "legislation." Apparently, Dutch consumers have shared views on the importance of these institutional arrangements.

With the WTP values for individual attributes, the authors computed the overall mean WTP value for the one-star Better Life chicken. Compared with the regular chicken, the one-star Better Life chicken lives 16 days longer, has outdoor access, lives with nine fewer chickens per square meter, is anesthetized using the CO_2-gas method, and is bought less frequently by Dutch consumers. The mean WTP value for this chicken equals €6.17 ($7.88 USD) per 500 g.

After estimating the model, the individual betas (per respondent) were retrieved. With these individual betas, the WTP for the one star Better Life chicken was calculated. Figure 1 shows the distribution of the individual-level WTP values. In this figure, a reference line is included that indicates the additional actual price for such a chicken compared with a regular chicken, which is around €2 ($2.55 USD) per 500 g. It appears that for 87.5% of the respondents, the marginal WTP exceeds the additional price for a one-star Better Life chicken.

All estimated coefficients were significant at the 1% level, except "members" and "income," which were significant at the 5% level (see Table 7). As a check for multicollinearity, each independent variable in Equation (7) was regressed on all other independent variables. The highest adjusted *R*-squared found for these regressions was .2766. Furthermore, the highest variance inflation factor and lowest tolerance value were, respectively, 1.39 and 0.7206. Hence, the authors concluded that the model does not suffer from multicollinearity. See Appendix C for the correlation matrix of the regressors.

Furthermore, all the coefficients have the expected sign. That is, they are in line with findings of previous studies (Lagerkvist & Hess, 2011; María, 2006; Taylor & Signal, 2009). Women are, on average, willing to pay €1.10 ($1.40 USD) more for the one-star Better Life chicken than are men. People with more education had a higher WTP than less educated people. In addition, a positive relationship was found between income and WTP for FAW. If the net income increases with €1,000 ($1,277 USD), people are willing to pay an additional €0.20 ($0.26 USD). Furthermore, the number of household members and urbanity influence the WTP as expected (Kendall et al., 2006; Taylor & Signal, 2009; Vanhonacker et al., 2007): The WTP of one-person households was higher than the WTP of

Table 6. Evaluation of statements by the respondents (in % of number of respondents).

	Statement	(1) Totally disagree	(2) Disagree	(3) Do not agree nor disagree	(4) Agree	(5) Totally agree	(6) I don't know
1.	The price plays a decisive role when I am buying food.	3.2	15.3	21.6	40.1	19.8	n/a
2.	Animal welfare is unimportant to me.	25.9	44.3	20.8	6.6	2.4	n/a
3.	Besides the price, I also think animal welfare is very important when buying food.	1.8	7.2	29.9	48.6	12.5	n/a
4.	When I buy food, animal welfare is very important to me.	5.4	19.2	38.2	28.8	8.4	n/a
5.	I often ask for advice from other people when I am choosing food products.	37.5	46.4	13.9	2.1	0.1	n/a
6.	To make sure that I buy the right food product, I often look at what other people buy.	46.2	45.7	7.5	0.6	0.1	n/a
7.	When choosing a food product, I think it is unimportant what other people buy.	3.9	4.4	11.9	46.8	33.0	n/a
8.	Freedom to choose between different food is very important to me.	1.1	2.6	17.5	57.3	21.4	n/a
9.	I think organic meat tastes better than regular meat.	6.9	13.4	33.4	21.1	9.8	15.4
10.	I would describe myself as an animal lover.	1.4	6.9	28.8	44.0	17.9	1.0
11.	I pay much attention to my health.	1.8	9.3	39.8	39.5	9.3	0.4

n/a (not applicable) = The respondent could not choose this option.

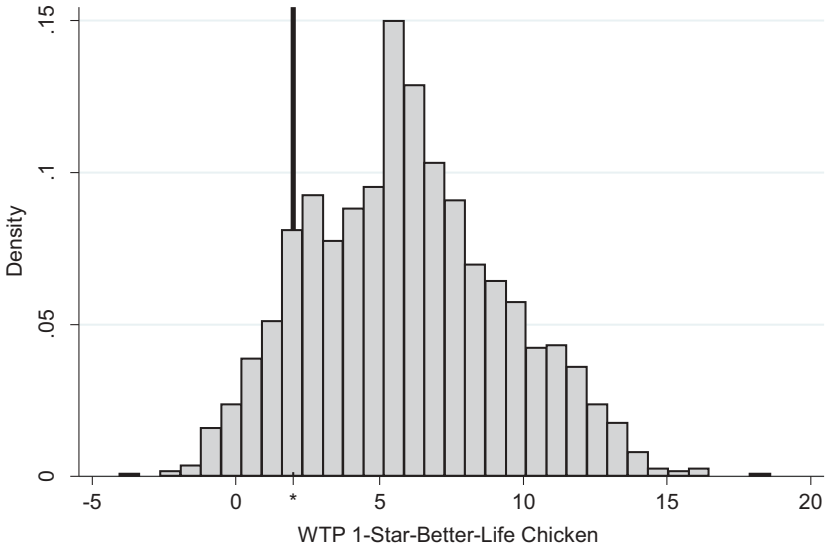

Figure 1. Individual-level willingness-to-pay (WTP) values (in euros) for the one-star Better Life chicken. The reference line * indicates the additional cost to consumers for a one-star Better Life chicken.

Table 7. Estimated regression model.

Willingness to pay for one-star Better Life chicken	Coefficient	Robust *SE*
Gender	1.0995***	(.1691)
Age	0.0256***	(.0059)
Members	−0.2045**	(.0802)
Education	0.1721***	(.0589)
Urbanicity	−0.1764***	(.0651)
Income	0.0002**	(.0001)
Religion	−0.5347***	(.1716)
Social pressure sensitivity	−0.2701	(.3146)
Constant	4.2812***	(.5646)
Observations	1,586	
R-squared	.0630	

Note. See Table 3 for the definitions and measurements of the regressors.
Significance: *** $p < .01$. ** $p < .05$.

multiperson households, and persons who lived in a nonurban area showed a lower WTP than people living in a highly urban area.

With respect to religion, Taylor and Signal (2009) found a negative, though insignificant, coefficient for the strength of religious belief on the WTP. This study also showed a negative, though significant, coefficient for religion, indicating that nonreligious people on average are willing to pay €0.54 ($0.69 USD) more than religious people. Only with respect to age do these results differ from those of other studies. Instead of a negative relationship, here a positive relationship was found between age and the WTP for FAW. The WTP increased by €0.03 ($0.04 USD) when a respondent was 1 year older, ceteris paribus. Finally, we found that sensitivity to social pressure did not influence the WTP, which means that the WTP estimate for the public-good character of FAW is not distorted by a social-pressure sensitivity.

These characteristics of the respondents only explain around 6% of the variation in WTP between respondents. Even though a pattern was found here, which is in line with existing literature, these results indicate that much of the variation in WTP is due to unobserved (individual) factors.

Finally, as a robustness check, the authors compared the results of CE with those of CVM. CE may result in values that are too high because respondents may become too focused on nonprice variables. However, the literature has shown that CVM generally produces relatively low values. Our

findings were: €0.80 ($1.02 USD) when using the CVM, against €6.17 ($7.88 USD) when using the CE (see Appendix B). It is a common finding in the literature that the WTP from a CE or closed-ended methods is higher than the WTP derived from open-ended methods (Carson, Flores, & Meade, 2001). Typically, an open-ended question results in many zeros, few very small WTPs, and a small fraction of very large WTPs, which was also observed here. Although the WTP values differed substantially, a positive correlation of .216 was observed between the WTP from CE and the CVM. The relatively large spread between the CE and CVM estimates indicates the uncertainty about the true value of the WTP. The CE estimate of WTP may be seen as an upper bound of this true value.

Conclusion

Although the Netherlands has a relatively large broiler industry while the animal welfare practices are heavily debated, the preferences of Dutch consumers for broiler welfare are hardly analyzed. Based on a CE, the authors found that Dutch consumers show on average a marginal WTP of around €6 ($7.66 USD) per 500 g of chicken meat for a production technique with a higher level of animal welfare. This amount is substantial because it is around 150% of the price of a regular chicken.

There was a significant heterogeneity in preferences across consumers. Women, those with more education, people with higher incomes, and nonreligious people had relatively high WTP values. On average, consumers especially showed a high WTP for the production attributes "outdoor access" and "anesthesia method" used, but there were significant differences in valuation across respondents. The value attached to these attributes is probably related to how people define animal welfare: naturalness of life and deaths using "humane" methods. However, this high WTP is not observed in the market. The market share of chicken meat that is produced with a higher level of animal welfare was about 10% in 2013 (EZ, 2014), while the average WTP for the one-star Better Life chicken was much higher than the actual price difference of this type of chicken compared with regular chicken in the supermarket. In addition, 87.5% of the respondents had a WTP that exceeded the market price of the one-star Better Life chicken.

Several explanations can be given for the difference between the estimated WTP and the actual buying behavior. First of all, consumers often have a rosy picture of actual production practices in terms of FAW (Lusk & Norwood, 2011). In the WTP analysis, the respondents were carefully informed about current welfare issues and the influence of production attributes on FAW, thereby reducing the information asymmetry that consumers may experience. Secondly, it is conceivable that consumers do not fully trust the labeling system, as was discussed by Jahn, Schramm, and Spiller (2005) who stated that a lack of trust in labels is one of the most important barriers for the success of organic farming. Some of the respondents indeed indicated that they do not trust or have little faith in the labels and therefore make purchase decisions solely based on the price of meat.

An indication for the lack of trust in such labels is the finding that most consumers have a preference for collective arrangements or legislation to take care of animal welfare. Furthermore, it is possible that consumers have difficulty picturing the improvement in broiler welfare that corresponds to a label and do not trust this improvement to be substantial. Moreover, the positive valuations for both the (expected) number of Dutch consumers buying the same chicken and the existence of legislation may indicate that consumers face the prisoner's dilemma. This indication implies a need for collective coordination such as stricter legislation with respect to FAW.

It seems that the market share of meat produced with a higher level of animal welfare and consumer welfare can be increased if these market failures are properly solved—for instance, by improving consumer confidence in the labeling system. From Carlsson et al. (2007a), it follows that consumers may be indifferent between a system where they can trust the value of labels and a system where the government has implemented fierce regulation such as a ban on specific husbandry practices. The potential of labeling systems to solve information asymmetry may, however, be easily overestimated because of the risk for overloading consumers with information resulting in more confusion and reduced interest (Verbeke, 2005).

The authors put in our best effort to avoid a hypothetical bias in the response by, among other methods, explicitly reminding the respondents of their own budget for groceries when choosing between the alternatives in a choice task as well as by addressing the consequences for their monthly expenses when they would choose to pay more for a chicken who is produced with a higher level of animal welfare. However, CE remains a stated-preference method. In other words, the authors do not rule out that the respondents may have chosen differently in this CE than what they would have chosen in real life while facing the same choice options. In addition, it is possible that our estimate of the average WTP overestimates the real value because of a relatively high average age of the respondents. Hence, more research is needed regarding the value consumers really attach to FAW of broiler chickens. Moreover, to further analyze the impact of information asymmetry on consumer valuation, one could apply a split sample approach in which the CE is conducted in two scenarios that differ in the degree to which the respondents receive information on animal welfare (Tonsor & Shupp, 2011). The outcome of this research can help to improve the Dutch market for meat so that the decisions of the industry result in socially optimal levels of FAW.

References

Adamowicz, W., Boxall, P., Williams, M., & Louviere, J. (1998). Stated preference approaches for measuring passive use values: Choice experiments and contingent valuation. American Journal of Agricultural Economics, 80, 64–75.

Adamowicz, W., Louviere, J., & Williams, M. (1994). Combining revealed and stated preference methods for valuing environmental amenities. Journal of Environmental Economics and Management, 26, 271–292.

Baltzer, K. (2004). Consumers' willingness to pay for food quality—The case of eggs. Acta Agriculturae Scandinavica: Section C. Food Economics, 1, 78–90.

Bennett, R. M. (1998). Measuring public support for animal welfare legislation: A case study of cage egg production. Animal Welfare, 7, 1–10.

Bennett, R., & Blaney, R. (2002). Social consensus, moral intensity and willingness to pay to address a farm animal welfare issue. Journal of Economic Psychology, 23, 501–520.

Bennett, R. M., & Blaney, R. J. (2003). Estimating the benefits of farm animal welfare legislation using the contingent valuation method. Agricultural Economics, 29, 85–98.

Bennett, R. M., & Larson, D. (1996). Contingent valuation of the perceived benefits of farm animal welfare legislation: An exploratory survey. Journal of Agricultural Economics, 47, 224–235.

Bokkers, E. A., De Boer, I. J., & Koene, P. (2011). Space needs of broilers. Animal Welfare, 20, 623–632.

Carlsson F., Frykblom P., & Lagerkvist, C. J. (2005). Using cheap-talk as a test of validity in choice experiments. Economics Letters, 89, 147–152.

Carlsson, F., Frykblom, P., & Lagerkvist, C. J. (2007a). Consumer benefits of labels and bans on GM Foods—Choice experiments with Swedish consumers. American Journal of Agricultural Economics, 89, 152–161.

Carlsson, F., Frykblom, P., & Lagerkvist, C. J. (2007b). Farm animal welfare—Testing for market failure. Journal of Agricultural and Applied Economics, 39, 61–73.

Carson, R. T., Flores, N. E., & Meade, N. F. (2001). Contingent valuation: Controversies and evidence. Environmental and Resource Economics, 19, 173–210.

Centraal Bureau voor de Statistiek (CBS). (2014). Bevolking; kerncijfers [Statistics Netherlands]. CBS Statline.

CentERdata. (2014). Representativiteit van het panel [Statistical representativeness of the panel]. Retrieved from http://www.website.centerpanel.nl/veelgestelde_vraag/33

Cowen, T. (2006). Market failure for the treatment of animals. Society, 43(2), 39–44.

Deemer, D. R., & Lobao, L. M. (2011). Public concern with farm-animal welfare: Religion, politics, and human disadvantage in the food sector. Rural Sociology, 76, 167–196.

de Jong, I. C., Berg, C., Butterworth, A., & Estevéz, I. (2012). Scientific report updating the EFSA opinions on the welfare of broilers and broiler breeders. EFSA Supporting Publications, 9, EN–295.

de Jong, I. C., Perez Moya, T., Gunnink, H., Van Den Heuvel, H., Hindle, V. A., Mul, M., & Van Reenen, K. (2011). Simplifying the welfare quality assessment protocol for broilers (Report 533). Lelystad, The Netherlands: Wageningen UR Livestock Research.

De Jong, I. C., Van Harn, J., Gunnink, H., Hindle, V. A., & Lourens, A. (2012). Footpad dermatitis in Dutch broiler flocks: Prevalence and factors of influence. Poultry Science, 91, 1569–1574.

De Jonge, J., & Van Trijp, H. (2013). The impact of broiler production system practices on consumer perceptions of animal welfare. Poultry Science, 92, 3080–3095.

Dierenbescherming. (2014). Beter Leven kenmerk [Animal Protection]. Retrieved from https://beterleven.dierenbescherming.nl/het-keurmerk
European Commission (EC). (2007, June 28). Council Directive 2007/43/EC: Laying down minimum rules for the protection of chickens kept for meat production (OJ L182/19). Brussels.
European Food Safety Authority (EFSA). (2004). Welfare aspects of the main systems of stunning and killing the main commercial species of animals. EFSA Journal, 45, 1–29.
European Food Safety Authority (EFSA). (2010). Scientific opinion on the influence of genetic parameters on the welfare and the resistance to stress of commercial broilers. EFSA Journal, 8, 1666.
Ellen, H., Leenstra, F., Van Emous, R., Groenestein, K., Van Harn, J., Van Horne, P. L. M.,… Wagenaar, J. A. (2012). Vleeskuikenproductiesystemen in Nederland (Rapport 619) [Broiler Production Systems in The Netherlands]. Lelystad, The Netherlands: Wageningen UR Livestock Research.
European Union. (2013). EU Agriculture: Statistical and economic information. Retrieved from http://ec.europa.eu/agriculture/statistics/agricultural/2013/index_en.htm
Food Chain Evaluation Consortium. (2012). Study on various methods of stunning for poultry. Berlin, Germany: European Commission Directorate General for Health and Consumers.
Fraser, D., Weary, D. M., Pajor, E. A., & Milligan, B. N. (1997). A scientific conception of animal welfare that reflects ethical concerns. Animal Welfare, 6, 187–205.
Hamilton, S. F., Sunding, D. L., & Zilberman, D. (2003). Public goods and the value of product quality regulations: The case of food safety. Journal of Public Economics, 87, 799–817.
Hanemann, W. M. (1991). Willingness to pay and willingness to accept: How much can they differ? American Economic Review, 81, 635–647.
Harper, G., & Henson, S. (2001). Consumer concerns about animal welfare and the impact on food choice (EU FAIR CT98-3678). Reading, United Kingdom: Centre for Food Economics Research.
Hobbs, J. E. (2003). Consumer demand for traceability (Working Paper 03–1). Saskatoon, Canada: International Agricultural Trade Research Consortium.
Jahn, G., Schramm, M., & Spiller, A. (2005). The reliability of certification: Quality labels as a consumer policy tool. Journal of Consumer Policy, 28, 53–73.
Kawata, Y. (2013). Adverse selection revisited in the context of food safety. International Business Research, 6, 160–167.
Kendall, H. A., Lobao, L. M., & Sharp, J. S. (2006). Public concern with animal well-being: Place, social structural location, and individual experience. Rural Sociology, 71, 399–428.
Knowles, T. G., Kestin, S. C., Haslam, S. M., Brown, S. N., Green, L. E., Butterworth, A.,… Nicol, C. J. (2008). Leg disorders in broiler chickens: Prevalence, risk factors and prevention. PLoS One, 3, e1545.
Lagerkvist, C. J., Carlsson, F., & Viske, D. (2006). Swedish consumer preferences for animal welfare and biotech: A choice experiment. AgBioForum, 9, 51–58.
Lagerkvist, C. J., & Hess, S. (2011). A meta-analysis of consumer willingness to pay for farm animal welfare. European Review of Agricultural Economics, 38, 55–78.
Liljenstople, C. (2008). Evaluating animal welfare with choice experiments: An application to Swedish pig production. Agribusiness, 24, 67–84.
Lusk, J. L. (2003). Effects of cheap talk on consumer willingness-to-pay for golden rice. American Journal of Agricultural Economics, 85, 840–856.
Lusk, J. L., & Norwood, F. B. (2011). Animal welfare economics. Applied Economic Perspectives and Policy, 33, 463–483.
María, G. A. (2006). Public perception of farm animal welfare in Spain. Livestock Science, 103, 250–256.
McFadden, D. (1974). Conditional logit analysis of qualitative choice behaviour. In P. Zarembka (Ed.), Frontiers in econometrics (pp. 105–142). New York, NY: Academic Press.
Meuwissen, M. P. M., Van der Lans, I. A., & Huirne, R. B. M. (2007). Consumer preferences for pork supply chain attributes. Wageningen Journal of Life Sciences (NJAS), 54, 293–312.
Ministerie van Economische Zaken [Ministry of Economic Affairs]. (2014, June). Monitor Duurzaam Voedsel 2013; Consumentenbestedingen aan duurzaam gelabelde producten [Monitor Sustainable Food 2013; Consumer spending on sustainable labeled food]. The Hague, The Netherlands.
Moynagh, J. (2000). EU regulation and consumer demand for animal welfare. AgBioForum, 3, 107–114.
Murphy, J. J., Allen, P. G., Stevens, T. H., & Weatherhead, D. (2005). A meta-analysis of hypothetical bias in stated preference valuation. Environmental and Resource Economics, 30, 313–325.
Nocella, G., Hubbard, L., & Scarpa, R. (2010). Farm animal welfare, consumer willingness to pay, and trust: Results of a cross-national survey. Applied Economic Perspectives and Policy, 32, 275–297.
Saitone, T. L., Sexton, R. J., & Sumner, D. A. (2015). What happens when food marketers require restrictive farming practices? American Journal of Agricultural Economics, 97, 1021–1043.
Shepherd, E. M., & Fairchild, B. D. (2010). Footpad dermatitis in poultry. Poultry Science, 89, 2043–2051.
Simpson, J. R., & Rollin, B. E. (1984). Economic consequences of animal rights programs. Journal of Business Ethics, 3, 215–225.
Taylor, N., & Signal, T. D. (2009). Willingness to pay: Australian consumers and 'on the farm' welfare. Journal of Applied Animal Welfare Science, 12, 345–359.

Tonsor, G. T., Olynk, N., & Wolf, C. (2009). Consumer preferences for animal welfare attributes: The case of gestation crates. Journal of Agricultural and Applied Economics, 41, 713–730.
Tonsor, G. T., & Shupp, R. S. (2011). Cheap talk scripts and online choice experiments: 'Looking beyond the mean.' American Journal of Agricultural Economics, 85, 840–856.
Train, K. E. (2009). Discrete choice methods with simulation (2nd ed.). Cambridge, UK: Cambridge University Press.
Vanhonacker, F., Verbeke, W., Van Poucke, E., & Tuyttens, F. (2007). Segmentation based on consumers' perceived importance and attitude toward farm animal welfare. International Journal of Sociology of Food and Agriculture, 15(3), 84–100.
Van Horne, P. L. M. (2013). Concurrentiekracht van de Nederlandse pluimveehouderij (LEI-Rapport 2013–037) [Competitiveness of the Dutch Broiler Industry]. The Hague, The Netherlands: LEI Wageningen UR.
Van Ittersum, K., Pennings, J. M. E., Wansink, B., & Van Trijp, H. C. (2007). The validity of attribute-importance measurement: A review. Journal of Business Research, 60, 1177–1190.
Verbeke, W. (2005). Agriculture and the food industry in the information age. European Review of Agricultural Economics, 32, 347–368.
Verhue, D., & Verzijden, D. (2003). Burgeroordelen over de veehouderij: Uitkomsten publieksonderzoek [Citizens' judgment on livestock farming: Results of a public survey]. Amsterdam, The Netherlands: Veldkamp.
Wakker Dier. (2014). Stop de plofkip [Stop the blow-up chicken!]! Retrieved from https://www.wakkerdier.nl/plofkip

Appendix A: Information provided to the respondents

1. *General text on animal welfare*

"As a consumer, you increasingly have to deal with information on farm animal welfare (FAW), because supermarkets and butchers offer various types of chicken meat products that differ in terms of FAW. These products are differentiated through labels (e.g., regular chicken meat, organic chicken meat), as well as the labels certified by the Animal Welfare Group called 'Dierenbescherming' ('Animal Protection'). These labels communicate the level of animal welfare of the chicken. The biggest welfare issues of the regular chicken are leg disorders and injuries to foot, heel, or chest.

The welfare of chickens is partly determined by the husbandry system and management by the farmer. For example, the growth rate of the chicken is very important. A fast-growing chicken suffers more often from leg disorders. These leg disorders are associated with pain and hinder the natural behavior of the chickens. When chickens grow more slowly, they often are more active and therefore need more living space. Other factors that influence the welfare of chickens are the availability of enrichments such as grain and straw bales, light schedules, duration of transport to slaughter, and anesthesia method used before slaughter.

In Table A.1, three types of chickens of different rearing systems are displayed: 'regular chicken,' 'one-star Better Life chicken,' and 'organic chicken.' As you can see, the chickens differ on several characteristics. All characteristics together determine the level of animal welfare. Please have a careful look at Table A.1."

2. *Text for the contingent valuation method*

"The price of the regular chicken in the supermarket is €4 ($5.11 USD) per 500 g. How much are you willing to pay for the other types of chicken ('one-star Better Life chicken' and 'organic chicken')? Please fill in the amount you would be willing to pay at maximum for the other types of chicken in case you are shopping for groceries.

Please be reminded of your own budget. Paying more for meat has consequences for your monthly living expenses depending on how much meat you normally buy."

3. *Text for the choice experiment*

"On the following pages, you are asked to make a choice between two different chicken products that differ in a number of characteristics. In total, there are four characteristics that have a major influence on the level of animal welfare of the chicken. In addition, three other variables are also

Table A.1. Characteristics of chickens from different rearing systems.

Different types of chicken			
Characteristics	Regular chicken	One-star Better Life chicken	Organic chicken
Welfare issues	More than 50% have moderate-to-severe leg disorders. About a third have injuries to the foot sole, heel, or chest.	About 15% suffer from moderate leg disorders and approximately 5% suffer from injuries to their foot sole, heel, or chest. This chicken is more active and more relaxed than the regular chicken.	About 15% suffer from moderate leg disorders. This chicken has fewer injuries to the foot sole, heel, or chest than the regular chicken when the outdoor area is well maintained (otherwise, there would be a deterioration). This chicken is significantly more active and more relaxed than the regular chicken.
Growth rate	Fast	Slower	Slower
Average lifetime	40 days	56 days	70 days
Number of mature chickens per square meter (living space)	21 chickens	12 chickens	10 chickens
Availability of enrichments	None	Grain and straw bales	Grain and straw bales
Lighting scheme	6 hr dark per 24 hr, of which 4 are consecutive	During the evening or night, it is dark 8 hr consecutively	During the night, it is dark 8 hr consecutively
Daylight in the stable	No	Yes	Yes
Outdoor access	No	Covered outdoor range available	Outdoor range available
Time limit to duration of transport to slaughter	No	3 hr at maximum	3 hr at maximum
Anesthesia method before slaughter	Several slaughterhouses use an electrically charged water bath whereby possibly not all chickens are sufficiently anesthetized. Other slaughterhouses make use of CO_2 gas in which case all chickens are sufficiently anesthetized.	All slaughterhouses make use of CO_2 gas in which case all chickens are sufficiently anesthetized.	All slaughterhouses make use of CO_2 gas in which case all chickens are sufficiently anesthetized.

Note. The information in this table is derived from multiple sources (Dierenbescherming, 2014; Ellen et al., 2012).

included: how many Dutch consumers buy the chicken, how animal welfare is taken care of, and the price at which the chicken can be bought in the supermarket. These attributes will now be explained to you.

1. *Lifetime of the chicken*

The characteristic 'lifetime of the chicken' indicates how long the chicken lives before it is slaughtered. In the choice questions, the lifetime varies from 40 days to 60 days to 80 days.

2. *Outdoor access*

The characteristic 'outdoor access' indicates whether or not the chicken can walk outside freely.

3. *Living space of the chicken*

The characteristic 'living space of the chicken' indicates how large the living space of the chicken was during her/his life in the stable. This variable is expressed as the number of mature chickens per square meter (that is, an area of a meter long and a meter wide). In this questionnaire, a distinction is made between 20, 15, and 10 chickens per square meter.

4. *Anesthesia method before slaughter*

The characteristic 'anesthesia method before slaughter' indicates whether the chicken is 'fully anesthetized' or whether there is a chance that the chicken is not fully anesthetized (in case the method of an electrically charged water bath is applied).

5. *Number of Dutch consumers who purchase this type of chicken*

This characteristic indicates how many Dutch consumers purchase this type of chicken. In this questionnaire, a distinction is made between a 'small number of Dutch consumers' and a 'large number of Dutch consumers.'

6. *How is animal welfare taken care of?*

This characteristic describes how FAW is taken care of. In this questionnaire, a distinction is made between three different ways: 'free market,' 'collective agreements between market participants,' and 'legislation.'

- 'Free market' means that there are no specific agreements or rules regarding the welfare of the chicken: Every producer determines it himself or herself. The level of welfare of animal products is communicated through labels.
- A second way to regard animal welfare is through "collective agreements." This means that there are marketwide agreements between the joint supermarkets and farmers as to how the chicken meat must be produced.
- The third way, 'legislation,' means that the government imposes legislation, in which minimum standards for the rearing system regarding animal welfare are set. Noncompliance is prohibited by law.

7. *Price of the chicken*

The last characteristic is the price of the chicken in the grocery store. The prices for chicken in the grocery stores vary greatly. The average price of the cheapest chicken in the stores is around €4 ($5.11 USD) per 500 g. The most expensive chicken can easily cost more than €12 ($15.33 USD) per 500 g.

Imagine yourself shopping for groceries and you want to buy chicken meat. Please be reminded of your own budget for groceries. Be aware that paying one additional euro for a kilo meat will have an impact on your monthly living expenses depending on how much meat you usually buy.

You will now see a total of 15 choice sets in which you need to choose between two types of chicken (Chicken A or Chicken B) or no chicken. The intent is that you indicate which type of chicken you would buy in your situation."

Appendix B: Results of contingent valuation method

After being presented with Table A.1, the respondents were asked how much they were willing to pay at maximum for the two types of chicken: the "one-star Better Life chicken" and the "organic chicken." The price of the regular chicken was said to be equal to €4 ($5.11 USD) per 500 g. The mean WTP for the one-star Better Life chicken and the organic chicken were, respectively, €4.80 ($6.13 USD) and €5.54 ($7.08 USD). The distributions of these two values among the respondents are shown in Figure B.1.

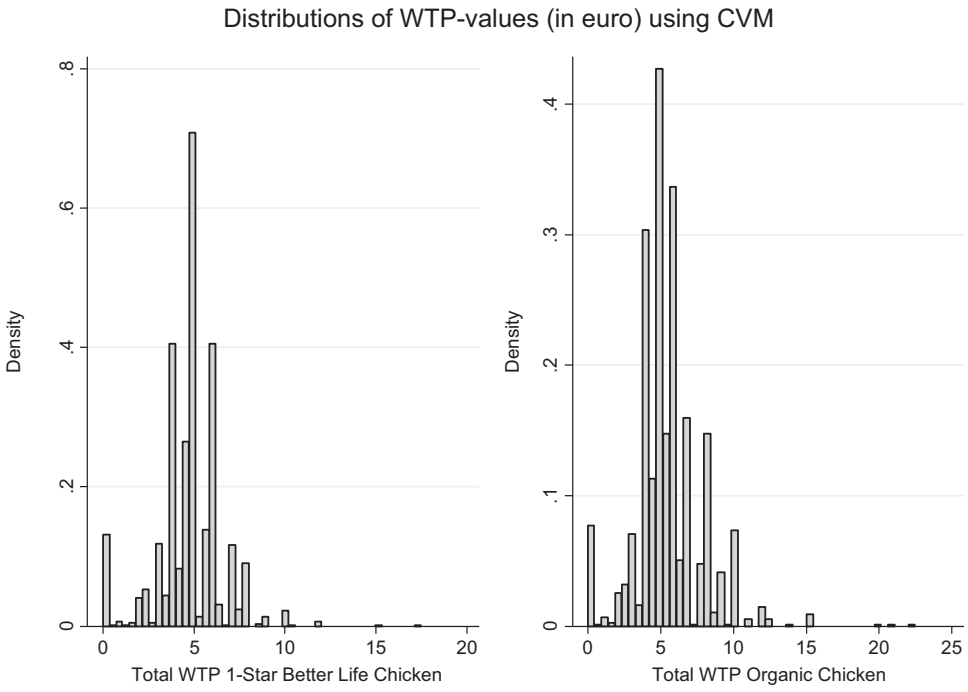

Figure B.1. Histogram of the willingness to pay (WTP) for the one-star Better Life chicken and the organic chicken using the contingent valuation method (CVM).

Appendix C: Correlation matrix of explanatory variables

Table C.1 presents the correlation matrix of the regressors of Equation (7). It appears that all coefficients are relatively low. Based on the test on multicollinearity, it was concluded that the regressors are independent from each other.

Table C.1. Correlation matrix of the regressors of Equation (7).

	Gender	Age	Members	Education	Urbanicity	Income	Religion	Social pressure sensitivity
Gender	1.000							
Age	−.155	1.000						
Members	−.008	−.389	1.000					
Education	−.070	.215	.021	1.000				
Urbanicity	.001	.032	.207	−.125	1.000			
Income	−.069	−.117	.298	.271	.003	1.000		
Religion	−.008	.142	−.005	−.092	.122	−.091	1.000	
Social pressure sensitivity	.011	.024	−.057	−.029	−.034	−.062	.033	1.000