

Organic- and Animal Welfare-Labeled Eggs: Competing for the Same Consumers?

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Abstract

To understand the market for sustainable foods, it is important to allow for heterogeneous preferences. However, most studies of consumer preferences for sustainable foods only investigate average consumer preferences. They do not take into account that some consumer segments attempt to purchase as much sustainable food as possible, others are indifferent to the notion of sustainable food, and still others consider sustainable food a complete hoax. The aim of this study is to explore the preferences for various types of premium eggs across these three consumer segments. We conduct a choice experiment including nine hundred Norwegian consumers and perform a behavioral segmentation based on the frequency of organic food purchase. We find that the segment purchasing the most organic food is willing to pay a significant premium for organic eggs over eggs displaying only enhanced animal welfare. However, most consumers who occasionally purchase organic products are unwilling to pay more for organic eggs than for enhanced animal welfare eggs, suggesting diminishing marginal utility for additional attributes. We find the third consumer segment attempts to avoid organic eggs, even when they cost the same as other eggs. Our findings suggest that organic products will be unsuccessful in acquiring larger market shares as long as most consumers are unwilling to pay a premium for organic products with all their cost increasing sustainable attributes over products that have only a single sustainable attribute, in our case enhanced animal welfare.

Keywords: *animal welfare; choice experiments; egg attributes; mixed logit; organic food; segmentation; willingness to pay.*

JEL classifications: *D12, D83, Q18.*

1. Introduction

Food products are increasingly differentiated using credence attributes such as organic and animal welfare, and a segment of consumers is generally willing to pay high price premiums for products with these attributes. One such product where organic and animal welfare labels are available in many stores is eggs. Comparing production standards, organic eggs involve the same or better levels of animal welfare than eggs labeled free range or other animal welfare labels (European Commission, 1999, 2007, 2008; DANÆG, 2015; The British Egg Industry Council, 2015). In addition, organic eggs have a set of other cost-increasing standards also intended to improve the sustainability of the product, such as organic fodder. In this paper, we focus on the market potential for organic- and animal welfare-labeled eggs in different consumer segments. Our results show that most consumers display positive attitudes toward organic eggs, but are generally unwilling to pay a premium for organic eggs over animal welfare-labeled eggs.

When it comes to improving production standards, policymakers can choose between regulations or labeling. On January 1, 2012, the European Union (EU) Directive 1999/74/EC (European Commission, 1999) became effective. This directive prohibits conventional small battery cages for hens and allows for larger “enriched cages”. The new cages must allow at least 750 cm² per hen, with each cage furnished with a roost, bedding, and a claw-shortening device. This lifts the lower limit for animal welfare in egg production, but there remains room for even better production conditions. However, despite support from both governments and numerous organizations over many years, food produced under organic or enhanced animal welfare standards has reached only a limited niche market (European Commission, 2013). This paper aims to provide governments, organizations, and producers interested in organic- and animal welfare-labeled eggs with better insights into consumer preferences, consumer segment sizes, and consumer segment characteristics.

Many consumer studies concerning the choice of sustainable food have found that their respondents assign positive values to animal wellbeing and organic production (see, e.g., Liljenstolpe, 2005; Carlsson *et al.*, 2007; Kjærnes and Lavik, 2008; Olesen *et al.*, 2010; Dentoni *et al.*, 2011; Gracia *et al.*, 2011; Lagerkvist and Hess, 2011; Norwood and Lusk, 2011a, 2011b; Toma *et al.*, 2011; Kehlbacher *et al.*, 2012; Vecchio and Annunziata, 2012; Grimsrud *et al.*, 2013). While organic food is mainly purchased for health and safety reasons (Padel and Foster, 2005; Lusk and Briggeman, 2009; Napolitano *et al.*, 2010), ethical concerns are most important

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3 for food produced with enhanced animal welfare standards (Harper and Makatouni, 2002).
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5 Moreover, because of the credence features of animal welfare goods, access to information and
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7 personal responsibility are the main cue identifying the propensity to consume these products
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9 (Harper and Henson, 2001; Meehan *et al.*, 2002; Toma *et al.*, 2012).

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11 In general, the motivations for purchasing products with enhanced animal welfare attributes
12 closely relate to consumer sociodemographic characteristics, knowledge of animal welfare
13 issues, and trust in information about rearing systems and attitudes (Toma *et al.*, 2012). For
14 example, existing findings show that pro-animal welfare behavior positively relates to education,
15 occupation and income (Gracia *et al.*, 2009; Lagerkvist and Hess, 2011; Toma *et al.*, 2011).
16 However, sociodemographic characteristics do not always reveal consumer behavior
17 (Vanhonacker *et al.*, 2009). Recent animal welfare reviews underline that lifestyles, beliefs,
18 awareness and values towards animal and animal wellbeing can more accurately explain the pro-
19 welfare behavior of consumers than their sociodemographic attributes (Vanhonacker *et al.*, 2009;
20 Toma *et al.*, 2012; Vanhonacker and Verbeke, 2014).

21
22 It is common to use consumer segmentation to identify the behavior, motivations, and
23 attitudes of certain consumer groups (Nie and Zepeda, 2011). In their literature review of
24 consumer studies on animal welfare, Vanhonacker and Verbeke (2014) argue that analysis
25 carried out only on a full sample may obscure the existence of a consumer segment highly
26 sensitive to sustainable food products. Furthermore, they call for additional studies concerning
27 the segmentation of consumer behavior and willingness to pay (WTP) for such products. Some
28 of these existing segmentation studies include Vanhonacker and Verbeke (2009), who
29 investigated purchase frequencies for animal-friendly poultry products and Vanhonacker *et al.*
30 (2007), who examined the importance consumers assign to animal welfare issues. They also
31 include Gracia and Zeballos (2011), who investigated the consumer concerns and attitudes
32 toward meat with higher welfare standards and Van Loo *et al.* (2014), who examined consumer
33 tastes and WTP for welfare labels for chicken breast meat.

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35 In this paper, we investigate the preferences of Norwegian consumers for eggs from organic,
36 Friland, free-range, and battery systems. We perform segmentation based upon organic food
37 purchase frequency to examine how preferences differ among consumer groups according to
38 sustainable food choice. We collected the requisite data in an online survey of a representative
39 sample of Norwegian consumers.
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The remainder of the paper proceeds as follows. In Section 2, we provide a brief review of the recent literature on consumer preferences for eggs. In Section 3, we describe the choice experiment (CE). In Section 4, we present and discuss the results. Finally, in Section 5 we provide some concluding remarks.

2. Background

2.1. Egg terminology

Eggs are especially suitable for the study of consumer attitudes and behavior relating to animal welfare because consumers can select eggs based upon different levels of animal wellbeing; see the meta-analysis in Lagerkvist and Hess (2011). The Norwegian animal welfare-ranked hierarchy for eggs is as follows: (1) the battery system (hens living in cages), (2) the free-range system (hens can move freely indoors, either in aviaries or on the floor), (3) the Friland system (hens can move freely both indoors and outdoors), and (4) organic systems (the same animal welfare standard as Friland, but with organic fodder) (Freedom Food, 2014).

In Norway, “free-range eggs” is the commonly used term for eggs laid by indoor free-range hens, corresponding to the “barn system” in the EU regulations (European Commission, 2003). In contrast, in the EU, the term “free-range eggs” applies when hens have continuous daytime access to open-air runs. In this paper, we use the four terms detailed earlier. However, the reader should note that the common term for barn eggs in Norway is free-range eggs, which may provide more positive animal welfare associations than the conventional EU term. For organic eggs, Norway follows EU regulations (European Commission, 2008), that is, organic hens must have access to outdoor areas. Each hen should have at least 6 m² of area indoors and 4 m² outdoors in which to move freely. All fodder must be organic.

2.2. Consumer studies on eggs

Several studies have investigated consumer preferences for egg attributes. Freshness, visual characteristics, origin, and price are commonly among the most important information purchasers seek when buying eggs; animal welfare issues are generally less relevant (Fearne and Lavelle, 1996; Kjærnes and Lavik, 2008; Kvakkestad *et al.*, 2011; Mesías *et al.*, 2011; Vecchio and Annunziata, 2012). In contrast, consumer concern for animal welfare in egg production is evident from a 2005 survey, where EU citizens considered laying hens as having the most need

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3 for improved living conditions among all farmed animals, with most respondents willing to pay
4 extra for eggs from animal welfare production systems (European Commission, 2005).
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7 Two studies have segmented the UK egg market. In the first, Gerhardy and Ness (1995)
8 grouped participants into five segments, based on the value they ascribed to egg attributes such
9 as freshness, method of production, origin and price. In order to carry out a simulation analysis,
10 they defined three kinds of eggs: low-priced imported battery eggs (Type 1), intermediate-priced
11 UK-produced barn eggs (Type 2), and high-priced local free-range eggs (Type 3). Consumers
12 belonging to “production and freshness”, “production system”, and “origin” orientated segments
13 obtained the highest utility with the purchase of Type 3 eggs and the lowest with Type 1 eggs. In
14 contrast, a “price sensitive” respondent group most preferred Type 1 eggs and least favored Type
15 3 eggs, while a “neither favored” participants exhibited the highest utility with Type 2 eggs and
16 the lowest with Type 1 eggs. Overall, the findings indicated that the most important attributes in
17 consumer choice for eggs was the method of production, followed by origin, price, and lastly,
18 freshness.
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21 In the second UK study, Fearn and Lavelle (1996) segmented UK egg consumers into four
22 groups based on price sensitivity and animal welfare concerns. The largest segment identified
23 was lower-income participants, who tended to be price sensitive and purchased battery eggs.
24 Consumers with middle levels of income typified a second segment. These consumers also cared
25 about prices and were interested in animal wellbeing issues, but were too preoccupied to consider
26 the broad range of eggs available. Those in higher socioeconomic classes identified the third
27 group, being quite interested in prices and rather concerned about the method of production.
28 Finally, consumers belonging to the highest income class and unconcerned about price were
29 identified in the fourth and smallest segment. This group was very interested in animal welfare
30 concerns and only bought eggs produced using free-range systems.
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33 Outside the UK, and by focusing on the WTP for egg attributes, Gracia *et al.* (2014) found
34 that Spanish consumers were willing to pay a premium for animal welfare-friendly systems and
35 the proximity of farms. Moreover, they identified that local and organic characteristics were
36 complements for consumers preferring origin attributes. In a Danish study, Baltzer (2004) found
37 that egg purchasers were willing to pay most for eggs from organic farms, followed by barn,
38 free-range and cage systems, with Danes seemingly regarding barn-rearing systems to be more
39 animal welfare friendly than free-range systems. This was perhaps because of the lack of
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3 information about the production systems themselves. Andersen (2011) also found that the WTP
4 for free-range eggs was lower than that for barn eggs, meaning that purchasers confused the two
5 egg typologies and thus preferred the cheaper barn eggs.
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9 Using a calibrated auction-conjoint valuation method, Norwood and Lusk (2011b) found that
10 US consumers considered animal welfare conditions as an important attribute for eggs.
11 Accordingly, the mean WTP was \$2.23 for 12 organic eggs and \$1.87 for the same number of
12 eggs from an aviary with free-range system. For eggs sourced from aviary, barn and cage
13 systems, consumers were willing to pay \$1.41, \$1.53, and \$0.92, respectively. In another US
14 study, Heng *et al.* (2013) confirmed that purchasers were willing to pay extra for eggs from
15 organic farms, those where the hens had outdoor access, and cage-free housing. Moreover,
16 consumers paid more attention to animal living conditions than to environmental concerns in the
17 choice of eggs. Performing a meta-analysis of nine earlier studies, Lagerkvist and Hess (2011)
18 assessed that the WTP for laying hen wellbeing attributes increased with consumer income and
19 decreased with consumer age. Further, French and German consumers were willing to pay most
20 for hen welfare, Danish purchasers the lowest.
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24 Regarding label understanding and knowledge, most EU consumers (51%) could not easily
25 identity eggs from animal welfare systems when making their purchases (European Commission,
26 2005). In an Italian study, Vecchio and Annunziata (2012) found that 67% of their subjects were
27 very unfamiliar with the alphanumeric code displayed on eggshells or the egg carton, while only
28 11% understand this information relating to the rearing system. Consistent with these findings,
29 other studies on animal welfare have suggested that stakeholders should invest in both
30 information campaigns and labeling systems concerning animal living conditions in order to
31 justify the price premium for producers and to help consumers make informed choices
32 (Napolitano *et al.*, 2010; Olesen *et al.*, 2010; Toma *et al.*, 2012; Vecchio and Annunziata, 2012).
33 Moreover, education programs, with the aim of enhancing consumer awareness, can help to
34 reach new consumer segments (Vanhonacker and Verbeke, 2014).
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51 **3. Data and Estimation**

52 *3.1. Sample*

53 We conducted a choice experiment as part of a Norwegian web survey in June and July 2013.
54 The sample consists of 948 Norwegian consumers, recruited from TNS Gallup's Norwegian
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online survey panel in July 2013. The summer send out resulted in a response rate of about 40 percent, which is on the low side for this kind of online panel in Norway. All the participants stated that they were the main purchasers of food in the household.

The sample is quite representative when it comes to age and gender. However, there are too few respondents from northern Norway, an area of relatively lower levels of education and income. For education and income, this is standard for web surveys because people in these two groups are not often willing to be part of survey panels. We segmented the participants into three groups based on how often they purchased organic products. Section 4 provides details about the socioeconomic characteristics of the full sample and the different consumer segments.

3.2. Description of the choice experiment

In the experiment, we used four attributes to describe the eggs: production method, the number of eggs per carton, the price per egg in Norwegian kroner (NOK), and the size of the eggs. In the CE, the price was per carton because that is how consumers commonly relate to egg prices. The price per carton is simply the number of eggs in each carton multiplied by the price per egg, so the carton price is not in itself an attribute. Table 1 presents the attribute levels.

Table 1

Attributes and levels in the choice experiment

Production method	Eggs per carton	Price per egg in NOK	Size of egg
Battery	6	1.5	Medium
Free-range	12	2.0	Large
Friland		2.5	
Organic		3.0	
		3.5	
		4.0	
		4.5	
		5.0	

Before respondents made any choices in the CE, we provided information about the four different production systems used for the hens laying the eggs. Table 2 presents this information.

Table 2

Information given to the respondents before the CE. Translated from the Norwegian.





Organic and Friland production of eggs have slightly different animal welfare rules than the regular production of eggs. For example, there may be up to 9 hens per square meter in regular production, while it may be only six hens per square meter in organic and Friland production. In addition, in organic and Friland systems, hens can move in outdoor spaces with a density of only four hens per square meter, when the weather is fine.

On the following screens, we ask you to choose among four types of egg cartons. The egg cartons vary with price, size and system of production (regular, free-range, organic or Friland production).

- *Regular production means that hens living in cages produce the eggs. From January 2012, these cages have become larger (but unchanged in surface area per hen), and cages must be furnished (roost, bedding, and a claw-shortening device) to improve conditions for the hens.*
- *Eggs from free-range systems are produced by hens that move freely indoors.*
- *Organic eggs come from hens that move freely indoors, have a little more space than free-range hens, have outdoor access, and in addition, the fodder is organic.*
- *Eggs from Friland hens are produced under the same animal welfare rules as organic eggs, but the hens are not fed with organic fodder.*

Figure 1 presents the CE. Each respondent's task was to perform a full rank of the four egg cartons. Each respondent undertook six such rankings.

Rank the four egg cartons, A, B, C and D, from the most preferred carton to the least preferred carton. A ranking of 1 denotes your most preferred egg carton and 4 is the least preferred egg carton. Check one circle on each line.

A		B		C		D	
							
1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>
2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>









3		3		3		3	
4		4		4		4	

Figure 1. CE ranking of four different egg cartons. Translated from the Norwegian.

3.3. Design

The design has $4 \times 2 \times 8 \times 2 = 128$ possible combinations of attributes and levels from which we created 24 choice sets using the SAS %ChoiceEff macro (Kuhfeld, 2010). During the web survey, we randomly drew four of these choice sets for each respondent, giving each respondent a unique combination of choice sets.

For each choice set, the respondents conducted a full ranking of the four alternatives in each choice set (Hensher *et al.*, 2007). Following earlier ranking CEs, including Mueller *et al.* (2010) and Eckert *et al.* (2012), we constructed the CE without an opt out alternative. However, whereas these studies include a follow up question asking whether the respondent would actually purchase the preferred alternative, we do not. This means that the data are limited to estimation of the price premiums for the product attributes, and so do not yield a total WTP estimate for a specific type of egg.

3.4. Estimation method

We estimated the ranking data using the following random utility function:

$$U_{ijt} = \beta_{1i}Battery_{ijt} + \beta_{2i}Friland_{ijt} + \beta_{3i}Organic_{ijt} + \beta_{4i}Twelve_{ijt} + \beta_{5i}Large_{ijt} + \beta_{6i}Price_{ijt} + \varepsilon_{ijt}$$

where U_{ijt} is the utility per egg for individual i when choosing egg carton j in choice situation t . *Free-range*, *Friland* and *Organic* refer to the free-range, Friland and organic production methods, respectively. The variable *Twelve* refers to a carton of 12 eggs, while *Large* refers to large-sized eggs. The price is per egg and measured in NOK.

We estimate the utility function with NLOGIT 5.0 using a mixed logit model with 1,000 Halton draws, a panel structure and freely correlated random parameters. All non-price

parameters are random, following the standard normal distribution (Train, 2009). The base alternative is an egg in a carton of six medium-sized free-range eggs.

3.5. Importance of attributes and segmentation

Following the choice experiment, we asked the participants to state how important a series of attributes are in their choice of food, using a 6-point scale from 1 = ‘not important’ to 6 = ‘very important’. Furthermore, we asked how often they chose the organic alternative if available (‘Always/Often’, ‘Sometimes’, ‘Never’, and ‘Don’t know’). We used this organic purchase frequency question to group the respondents into three behavioral segments, which we then included in the analysis below. This allowed us to investigate the preferences and WTP for organic- and animal welfare-labeled eggs in three different segments showing different purchasing behavior. ‘Don’t know’ answers were excluded.

4. Results and Discussion

Table 3 provides an overview of the descriptive statistics for the sample and the three segments, based on organic food purchase frequency. While most participants responded that they sometimes purchase organic food (63.6%), only 17.84% are a typical organic buyer and 16.68% state that they never purchases organic food. The ‘Always/Often’ and ‘Never’ segments display statistically significant differences for age, gender, and education (the p -values from t -tests with a 95% confidence interval are 0.03, <0.01, and 0.03, respectively). These suggest that consumers who typically buy organic food are younger, female and possess a higher education level than non-organic food buyers.

Table 3
Sociodemographic characteristics of the full sample and consumer segments

Sociodemographic characteristics		Norwegian population ^a (%)	Full sample (%)	Always/Often (%)	Sometimes (%)	Never (%)
Age	20–36 years	23	20	25	20	15
	37–53 years	24	30	30	31	31
	54–70 years	19	50	45	49	54
Gender	Female	50	52	65	53	38

Education level	High school or lower	70	70	64	71	73
	More than high school	30	30	36	29	27
Household income	<NOK 399,999	44	12	15	11	14
	NOK 400,000–999,999	49	60	52	63	58
	≥NOK 1,000,000	7	16	18	15	19
	No response	–	11	14	10	8
N		5,109,056	948	170	603	159

Source: ^aStatistics Norway (2013, 2014a, 2014b).

Table 4 provides the estimation results from the mixed logit model of the ‘Full sample’ and the ‘Always/Often’, ‘Sometimes’ and ‘Never’ organic segments. All coefficient estimates are relative to the base alternative, namely, an egg in a carton of six medium-sized free-range eggs. In the ‘Full sample’ model, all of the estimated coefficients are statistically significant.

Table 4
Estimated coefficients for the mixed logit model with free-range eggs as the base alternative

Variable	Full sample	Always/Often	Sometimes	Never
	Coefficient (Standard error)			
<i>Means of parameters in utility function</i>				
ORGANIC	–0.12*** (0.02)	4.86*** (0.58)	–0.47*** (0.14)	–2.77*** (0.55)
FRILAND	–0.21*** (0.02)	1.44*** (0.39)	–0.46*** (0.12)	–0.81*** (0.47)
BATTERY	–4.44*** (0.18)	–8.50*** (1.09)	–4.54*** (0.24)	–2.72*** (0.92)
TWELVE	0.11*** (0.17)	0.31 (0.23)	0.09 (0.07)	0.25*** (0.05)
LARGE	0.06*** (0.17)	0.01 (0.17)	0.04 (0.05)	0.26*** (0.05)
PRICE	–0.67*** (0.01)	–0.55*** (0.07)	–0.73*** (0.02)	–0.71*** (0.02)

Standard deviations of random parameters

ORGANIC	3.57*** (0.02)	5.60*** (0.61)	2.72*** (0.12)	3.09*** (0.06)
FRILAND	2.37*** (0.02)	4.42*** (0.50)	2.17*** (0.11)	1.78*** (0.52)
BATTERY	3.97*** (0.13)	5.52*** (0.85)	3.95*** (0.23)	4.55*** (0.09)
TWELVE	1.17*** (0.01)	1.12*** (0.25)	1.25*** (0.07)	1.18*** (0.03)
LARGE	0.38*** (0.13)	0.57** (0.26)	0.35*** (0.99)	0.64*** (0.01)
Number of participants	948	170	603	159
Number of observations	3792	680	2412	636

Notes: ** and *** denote significance at the 5% and 1% level, respectively.

The negative values of the estimates for *ORGANIC*, *FRILAND* and *BATTERY* in the full sample indicate that the utility of organic, Friland and battery eggs are lower than eggs from free-range rearing systems, the base alternative in the estimation. However, the statistically significant standard deviations indicate heterogeneous preferences within the ‘Full sample’. *BATTERY* eggs are the least preferred in the full sample, while *ORGANIC* eggs are the second-most preferred after free-range eggs. The number of eggs per carton (*TWELVE*) and egg size (*LARGE*) also increase utility in the full sample. The larger the egg, the more grams of egg per egg, so it is reasonable to prefer larger eggs. For the number of eggs per carton, the positive parameter estimate for the larger cartons means that consumers prefer cartons with 12 eggs compared to cartons with six eggs when the price per egg is the same. In stores, the per egg price of 12-egg cartons is usually lower than six-egg cartons, and consumers may be accustomed to thinking of the larger cartons as a better bargain than the smaller cartons. Furthermore, the habit of buying 12-egg cartons may affect the choices of some participants.

Focusing on the three segments, we can see that the preferences differ quite substantially. While the ‘Always/Often’ organic segment displays the highest utility for *ORGANIC* eggs, the ‘Never’ group rates organic eggs as the least preferred. The lowest utility for the ‘Always/Often’ and ‘Sometimes’ segments is associated with *BATTERY* eggs. On the whole, ‘Sometimes’ and

‘Never’ groups exhibit negative utility for *ORGANIC*, *FRILAND* and *BATTERY* systems when compared with the free-range systems. The *TWELVE* and *LARGE* attributes are positive and statistically significant for the utility function of the ‘Never’ segment. The negative and statistically significant estimate for *PRICE* implies that an increase in the price per egg reduces consumer utility across all three segments.

Table 5 and Figure 2 present the average marginal WTP for *ORGANIC*, *FRILAND* and *BATTERY* eggs relative to free-range eggs. We calculate the WTP by dividing the mean estimated coefficient for *ORGANIC*, *FRILAND* and *BATTERY* in the utility function by the (negative) *PRICE* parameter.

Table 5
Marginal WTP estimates with free-range eggs as the base alternative (NOK per egg)

Variable	Full sample	Always/Often	Sometimes	Never
	Coefficient (Standard error)			
ORGANIC	-0.17*** (0.03)	8.77*** (1.20)	-0.63*** (0.18)	-3.91*** (0.16)
FRILAND	-0.31*** (0.03)	2.60*** (0.74)	-0.63*** (0.15)	-1.14*** (0.08)
BATTERY	-6.58*** (0.25)	-15.31*** (2.33)	-6.18*** (0.30)	-3.84*** (0.17)
TWELVE	0.17*** (0.03)	0.56 (0.42)	0.13 (0.1)	0.36*** (0.07)
LARGE	0.95*** (0.25)	0.1 (0.30)	0.05 (0.07)	0.37*** (0.67)

Note: *** denotes significance at the 1% level.

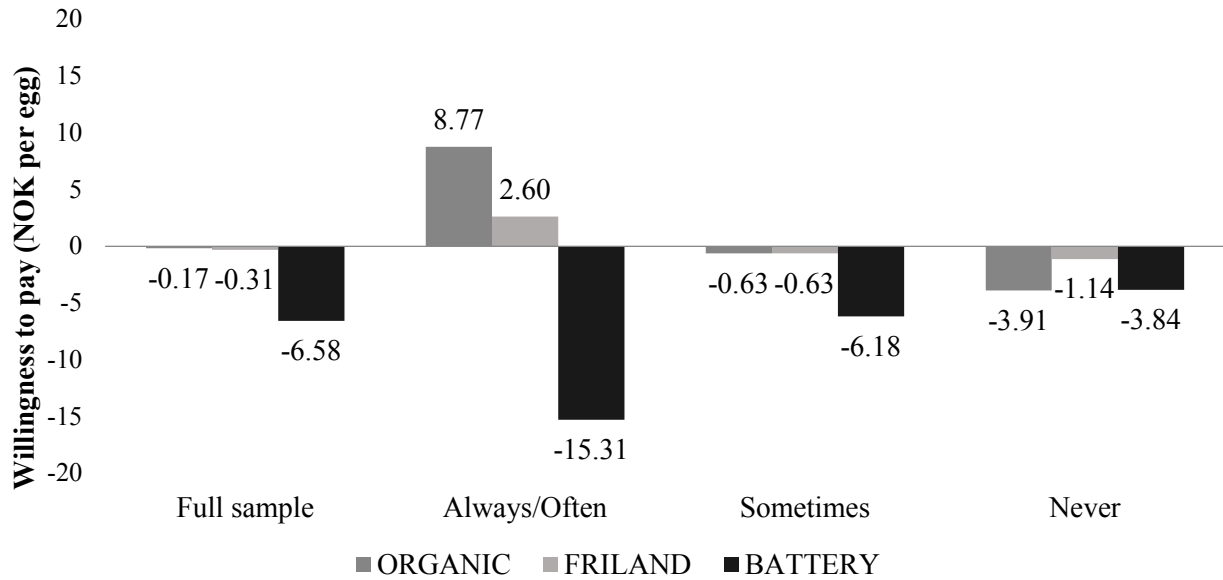


Figure 2. Marginal WTP estimates, with free-range eggs as the base alternative (NOK per egg)

In general, the survey participants display low sensitivity to price differences giving high WTP values. This is typical for stated preference studies on normative attributes, possibly strengthened by our focus on credence attributes in the presentation of egg types in the information accompanying the choice experiment (see Table 2). As a result, we mainly draw conclusions based on the qualitative differences between the WTP for the different egg types in the three segments, and do not suggest that this represents the price premiums possible in the market. With this warning, we now discuss the WTP results.

By calculating the marginal WTP, we obtain results from the different samples that are on the same scale. The relative ranking of the alternatives within each sample is unchanged. On average, consumers prefer free-range eggs most and rank battery eggs lowest. We can see that the 'Always/Often' segment prefers organic eggs whereas the 'Never' segment attempts to avoid them. Worth noting from the WTP results are the large differences between the 'Always/Often' segment and the remaining segments with respect to how important the production method is relative to the price. The difference in WTP for the 'Always/Often' segment between the best and worst alternative is almost four times larger than that for the 'Sometimes' segment, and more than six times larger than the same differences for the 'Never' segment. The 'Always/Often' segment is therefore clearly willing to put money behind their preferences for what they consider

the best production practices, while this is a more questionable commitment for the other consumer segments.

The average ordering of the egg types with free-range on top differ from other studies on consumer preferences for egg attributes. Norwood and Lusk (2011b) found that US consumers are willing to pay the highest price for organic eggs, followed in order by aviary free-range (Friland in Norway), barn (free-range in Norway) and cage (battery) eggs. Baltzer (2004) concluded that Danish consumers are willing to pay extra for eggs from organic (+58%), barn (+43%), and free-range (+15%) systems, compared with eggs from cage systems. Our results, showing that most purchasers are unwilling to pay a premium for organic eggs, are most consistent with the findings of Vittersø and Tangeland (2014), who observed that from 2000 to 2013, trust in and perceptions of organic food by Norwegian consumers became more unfavorable.

To understand better the attitudes and beliefs of the survey respondents, we had requested that the participants evaluate the importance of 15 attributes during food choice. The possible responses ranged on a six-point scale from 1 = 'Not important' to 6 = 'Very important'. Table 6 provides the mean and rank values.

Table 6

When you buy food on a normal day, how important are the following attributes for your choice of food?

1 = 'Not important', 6 = 'Very important'

Attributes	Full sample		Always/Often		Sometimes		Never	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Taste**	5.55	1	5.65	1	5.56	1	5.44	1
Freshness	5.34	2	5.41	3	5.35	2	5.26	2
Former experience with the product	5.08	3	4.90	8	5.18	3	4.94	5
Smell	5.05	4	5.07	7	5.04	4	5.10	3
Pesticides/medicine residues***	5.00	5	5.58	2	4.99	5	4.46	8
Shelf Life ***	4.85	6	4.64	11	4.86	6	4.99	4
Healthiness***	4.81	7	5.22	6	4.82	7	4.35	9
Looks*	4.76	8	4.65	10	4.77	8	4.87	6
Price***	4.55	9	4.16	15	4.62	9	4.55	7
Animal welfare***	4.34	10	5.40	4	4.22	10	3.60	12

Conditions for workers***	4.24	11	4.79	9	4.21	11	3.76	10
Environmentally friendly***	4.20	12	5.30	5	4.14	12	3.25	15
Vitamin content***	4.14	13	4.58	12	4.13	13	3.68	11
Short travel distance***	3.99	14	4.54	13	3.99	14	3.39	14
Country of origin***	3.94	15	4.32	14	3.93	15	3.59	13
Number of participants	948		170		603		159	

Notes: Excluding ‘Do not know’ responses. T-test ($H_0: \mu(\text{Always/Often}) = \mu(\text{Never})$). *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

As shown, taste is the most important characteristic driving food choice in our sample. In addition, freshness, former experience with the product, smell and pesticide residues are other relevant key factors of food choice. In contrast, qualities such as country of origin, short travel distance, vitamin content, and environmental friendliness are the least important. Ranked ninth, price is not among the main characteristics Norwegians consider when choosing food.

Examining the segment preferences, we denote significant differences between the ‘Always/Often’ and ‘Never’ segments (results for *t*-test of significance shown in Table 6). While ethical and safe attributes such as environmentally friendly production, animal welfare, and pesticides residues are very important for typical organic buyers, consumers who never buy organic food instead rank these same characteristics as not relevant. The ‘Always/Often’ segment considers price the least important signal for the choice of food. These results are largely consistent with other studies concerning the attitudes of organic food buyers (Padel and Foster, 2005; Nie and Zepeda, 2011; Paul and Rana, 2012). The most favored qualities for the ‘Never’ segment are attributes which denote a consumer profile caring of sensory and storability details, while consumers in the ‘Sometimes’ segment, which contains most of the participants (63.6%), reflect the attitudes of the ‘Full sample’.

From our results, we consider that consumers who typically buy organic food are the most interested in problems relating to the environment and animal welfare. They also trust the organic and Friland logos because they are willing to pay the highest prices for eggs produced using these two methods. The average consumer, namely, the ‘Sometimes’ segment, who is generally caring of sensory and experience factors, prefers eggs from free-range systems. However, they are willing to pay the same price for organic and Friland eggs (NOK 0.63 less than a free-range egg).

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Norwegian consumers who never purchase organic food do not seem to be interested at all in buying organic food. In fact, they are willing to pay less for organic eggs than for all other types of eggs. They also declare that they are not very price sensitive, as we can see from the ranking of this attribute (ranked 7 of 15 total attributes). However, they are the consumers with the lowest price premium indicated for free-range over battery eggs, indicating that they care less about ethic credence attributes such as animal welfare. Perhaps, they believe that the benefits of organic products have been oversold, giving them a distaste for organic products. It would appear that Norwegians who do not ordinarily purchase organic food have not generally accepted its positive claims, and hence, rank organic eggs last in the choice experiment.

Our findings are similar to the results of studies focusing on animal welfare and organic attributes in poultry meat products. Gracia *et al.* (2014) and Van Loo *et al.* (2014) found that consumers assign higher values to “free-range” claims than organic claims. We note that we conducted our research in Norway, where hens that can only move freely indoors produce “free-range” eggs. This means that consumers associate the term “free-range” with the best standards available for hen rearing systems.

5. Conclusions

Organic production and animal welfare are ethical credence attributes which characterize food products. Understanding consumer preferences for these attributes is useful for stakeholders promoting the consumption of sustainable food. However, while preferences for sustainable food have been widely examined for average consumers, few studies focus on these for consumer segments.

Using a CE and behavioral segmentation based on the stated consumption of organic products, we investigated egg production preferences across three consumer segments. Our results show significant differences between the segments. The largest segment that sometimes buys organic products, prefers eggs that carry some kind of claim over battery eggs, but the differences between the premium eggs are not substantial in economic terms (even though they are statistically significant). Any production method that can fulfill this segment’s desire for an animal-friendly egg, or at least one better than a battery-produced egg at the lowest possible cost, is likely to capture a major share of this segment. As it stands, this seems to be free-range eggs.

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3 As price is likely to be more important in real stores than in a survey, battery eggs will be the
4 natural choice of the most price-sensitive consumers in this segment.
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7 The segment that declares that they always or often purchase organic products indicate that
8 they are not very price sensitive and will choose those eggs which they consider involve the best
9 production method. Organic eggs, costing more to produce because of their strict regulations on
10 factors such as fodder, will likely find most of their customers in this segment. These consumers
11 strictly prefer organic eggs to other types of eggs, and are willing to pay for the privilege.
12 However, this segment comprises just one-sixth of the market, thereby limiting organic eggs to a
13 niche market. Instead, the more price-sensitive consumers in this segment are likely to buy
14 Friland or free-range eggs, as these yield some of the same benefits as organic eggs but at a
15 lower price. It is also worth noting that a market share of 17% is more than double that which
16 organic eggs in Norway enjoy today.
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19 The third consumer segment we studied is those that say they never purchase organic food. In
20 fact, our results indicate that they display negative attitudes to organic eggs, strictly preferring
21 free-range and Friland eggs. This segment is also that which cares least about production method
22 and most about factors such as the size of the eggs and the cartons. Hence, low-priced battery
23 eggs are likely to account for the largest share of this market segment, while costly organic eggs
24 are unlikely to find any customers here.
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27 The overall impression of our results is that there is a segment of consumers willing to pay a
28 substantial premium for organic eggs, but this segment is limited in size. Most consumers do not
29 seem to appreciate the value added of organic eggs, such as the use of organic fodder.
30 Alternatively, the results suggest that most consumers have diminishing marginal utility for
31 added attributes. This would mean that they prefer a labeled product, but it is not important
32 which label it is as long as they are not purchasing an inferior alternative. In both cases, the egg
33 type providing consumers with the feeling of purchasing a premium product at the lowest price is
34 likely to control most of the market, together with the existing price leader, namely, battery eggs.
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