

**ASSESSING THE MARKET FOR
ANIMAL WELFARE ATTRIBUTES IN DAIRY PRODUCTION
FY 2009**

Agriculture accounts for 21 percent of Idaho's gross state product and the dairy industry, which ranks third in the U.S. in milk production, is Idaho's leading agricultural sector. Although there are many large dairies, the average size of Idaho's approximately 900 dairies is about 320 cows. Small dairy producers are constantly looking for innovative marketing approaches to supplement the profitability of their operations. One such possibility may be a niche market for dairy products with "animal welfare" attributes. This project evaluated consumer perceptions about and willingness to pay for animal welfare attributes in milk production.

FINAL REPORT

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**WILLINGNESS TO PAY FOR HUMANE ANIMAL CARE LABELED DAIRY
PRODUCTS**

Final Report for Federal State Marketing Improvement Program (USDA)

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WILLINGNESS TO PAY FOR HUMANE ANIMAL CARE LABELED DAIRY PRODUCTS

Abstract

Consumer concerns pertaining to animal welfare provisions may present an opportunity to market animal products which are produced in accordance with consumer perceptions about bioethical animal production. The two objectives of the research are to a) examine consumer perceptions pertaining to animal welfare aspects of production in dairy industry, and b) evaluate consumers' willingness to pay a premium price for dairy products produced using "animal friendly" production practices (like heat stress relief via shading and sprinkler systems, pasture grazing, comfortable bedding with wood chips or other materials, etc.). Using experimental methodology, we study consumers' willingness to pay for cheese and ice cream produced using practices which incorporate animal welfare considerations. Income, education attainment, demographics, and other variables are explicitly incorporated to identify consumer groups who may be a part of the niche market.

1. Background and Justification

Industrialized agricultural systems have contributed greatly to the abundant and readily available food supply that most Americans enjoy today. However, the advanced production technologies that are employed to increase agricultural production levels and lessen human labor have also brought forth ethical questions about these production and corresponding marketing practices. Whatever the bioethical concern are, the issue of economic efficiency is at the core of incorporating bioethical concerns into production systems. For example, Rollin (2003) calls for research on the economic feasibility of incorporating pasturing into modern dairy systems. It is important to address such issues not only from supply but also from consumer demand perspective. Consumer willingness to pay for less intensively produced and potentially more costly animal products is an important factor of interest to livestock industry and policy makers.

Idaho's agriculture accounts for 21 percent of Idaho's gross state product and the dairy industry, which ranks third in the US in milk production (IDA, 2008), is Idaho's leading agricultural sector. Although there are numerous thousand-cow-plus dairies, the average size of Idaho's 900 or so dairies is about 320 cows. Small dairy producers are constantly looking for innovative marketing approaches to supplement the profitability of their operations. One such possibility may be a niche market for dairy products with "animal welfare" attributes. Many farmers already incorporate many "welfare attributes" into their production (UDI, 2008) so taking advantage of potential demand for "animal welfare" milk will be relatively easy for those producers. For example, many dairies have free-stall barns where the cows are "free" to move about to eat, drink or rest whenever and wherever they like. These barns also provide shaded comfortable bedding for the cows in the form of sand or wood chips. The bedding is replaced and refreshed with clean straw several times a day, so cows always climb into freshly made beds.

Some farmers use a system of spray misters and large fans to keep cows cool (UDI, 2008). To date however, Idaho dairy farmers do not have information about the market for and profitability of producing dairy products with animal welfare attributes.

Ethical concerns have been raised about farm animal welfare and the role of science in advising food animal policies. A tremendous amount of information is being published pertaining to farm animals and ethical concerns about their welfare during production and processing. A Land Grant University Multi-State Research Committee on agricultural bioethics (WERA-1902) has been created to address bioethical concerns in animal agriculture. Animal welfare has been the topic of an increasing number of popular media articles (examples include Copeland (2008), Holguin (2003), Munday (2004), Weise (2003), and many others). Concerns pertaining to animal welfare have started to be incorporated into strategic business plans of large food producers like KFC, McDonalds, Jack in the Box, Wendy's (and perhaps others) whose websites include information on their respective animal welfare programs.

Several characteristics of dairy production processes have been discussed as relevant in the animal welfare debate. The use of artificial growth hormone (rBST, rBGH), which has been banned in EU for health as well as animal welfare related reasons, has received much of the attention (Brinckman, 2000; DuPuis, 2000; Collier 2000; Lusk, Roosen and Fox 2003). Rollin (2003) discusses other dimensions of animal welfare in dairy production. These include early separation of calf and mother, heat stress (some farmers provide shade and cooling with sprinklers), waste removal, flooring that reduces slippage, and grazing on pasture.

The animal welfare issue has become a point of debate in the general public as well as in political circles (Norwood and Lusk 2009). On the one hand, proponents of animal welfare argue for improved mandatory standards for animal handling in agricultural production. On the

other hand, agricultural producers and opponents of mandatory animal handling standards question the validity of assumptions behind and arguments for “improved” animal welfare. A major complication is the public good nature of the animal welfare issue, which reduces the economic efficiency of market based solutions (Norwood and Lusk 2009). Nevertheless, provision of information pertaining to ethical dimensions of production, including animal welfare, can have a major impact on demand for products with “desirable” but costly to observe attributes (Frank 2006). For example, Kiesel, et al. (2005) conclude that provision of additional positive information can increase consumption of the commodity that has a “desirable” but costly to observe characteristic. In this study we find that provision of such positive information about humane animal care principles without provision of corresponding information about benchmark characteristics of conventional production practices is likely to be ineffective for increasing competitiveness dairy products labeled as “humane animal care certified”.

2. Previous Literature on Demand Animal Welfare

Frank (2008) argues that information on process elements related to the ethical dimensions of production is a relevant dimension of goods that can have a major impact on the demand function. Lockie et al. (2005) found that some of the most important factors which influence consumer disposition towards biotechnology were the extent to which they were motivated by convenience, consumers’ level of motivation to find natural foods, whether they did the shopping for their household on a regular basis, and gender.

Several economic studies have been devoted to the issue of animal welfare. Liljenstolpe (2008) finds that WTP for animal welfare attributes in the case of the Swedish pig industry may be negative or positive and information asymmetries may be responsible for small share of animal welfare products. Managi et al. (2008) find that the image of environmental friendliness

in the production process, and the image of the health and comfort of the cows are important factors that influence consumers' demand for organic milk in Japan. Kiesel, Buschena, and Smith (2005), although not in the context of animal welfare, found that voluntary labeling increases the demand for bovine growth hormone free milk. They concluded that provision of additional positive information will increase consumption of the commodity that has a "desirable" but costly to observe characteristic. Olesen et al. (2009) used non-hypothetical choice experiments to show that Norwegian consumers are likely to be willing to pay premium price for welfare labeled salmon as opposed to conventional salmon. Tonsor, Olynk, and Wolf (2009) find that voluntary producer participation in gestation crate-free pork production with corresponding labeling can benefit consumers and allow some producers to seize market opportunities. Olynk, Tonsor and Wolf (2010) also find some willingness to pay for verified pasture grazing in milk production.

2.1 Animal Welfare in Dairy Production

A few studies have also examined WTP for animal welfare in dairy production. Napolitano et al. (2008) use second price Vickrey auction to find that consumers are willing to pay extra for yogurts labeled with high animal welfare standards. Similarly, Carlucci et al. (2009) also use second price Vickrey auction to study the effects of information about animal welfare on WTP for yogurt. Napolitano et al. (2010) find that provision of information about benefits of organic farming on environment, animal welfare, and food safety has a positive effect on WTP for organic cheese. Managi et al. (2008) use choice modeling (CM) and find that the image of environmental friendliness in the production process, and the image of the health and comfort of the cows are important factors that influence consumers' demand for organic milk in Japan. Kiesel, Buschena and Smith (2005), although not in the context of animal welfare, find that

voluntary labeling increases the demand for bovine growth hormone free milk. They conclude that provision of additional positive information will increase consumption of the commodity that has a “desirable” but costly to observe characteristic.

3. Goals and Objectives

Regardless of the quality characteristics, such as nutritional value, safety, and taste of the products, consumers may be willing to pay for just the comfort of knowing that the product comes from “animal friendly” production processes. Such information may provide opportunity for dairy producers in Idaho, and perhaps elsewhere, to take advantage of potential demand for “animal welfare” dairy products. The purpose of this research project is to evaluate consumer perceptions towards and willingness to pay for animal welfare attributes in milk production. Therefore our objectives are two-fold. **First objective** is to investigate consumers’ perceptions about humane animal care in agricultural production. This includes an assessment of their familiarity with the issue, familiarity with related production practices, trusted sources of information on animal welfare, and trusted certification organizations. **Second objective** is to estimate consumer willingness to pay for animal welfare attributes in dairy products. If in fact it turns out that the consumers may be willing to pay a premium price for dairy products with animal welfare attributes, then the results will provide a profile of consumers who would be willing to pay for animal welfare attributes.

4. Materials

Four products, cheese and ice cream labeled as “Humane animal care certified”, and conventional cheese and ice cream, were used in this study. Conventional and animal welfare products were identical except for the labels identifying them as conventional or humane animal

care certified. Each cheese was a 21g semisoft cheese ball covered in wax. Ice cream was auctioned in the increments of a standard scoop served in a plastic cup. Up to five units of cheese and up to five units of ice cream were offered to subjects.

Given that consumer demand is affected by the availability of substitutes or complements, we provided reference prices for the conventional products (i.e. identical products to the animal friendly products except for the “humane animal care” certification label) to the participants at the beginning of each session. Reference prices, equal to the prices at a nearest grocery store, were 50 cents for 21 gram semi soft cheese covered in wax, and 25 cents for scoop of vanilla flavored ice cream. This provision is necessary not only to take into account the effects of substitute availability (Rousu, Beach, and Corrigan, 2008) and the role of field prices (Drichoutis, Lazaridis, and Nayga, 2008), but also in the calculation of our consumer surplus estimates. A similar approach was used by Corrigan et al. (2009) who provided the reference price for conventional product from a local super market. We informed subjects that they can bid zero for the animal welfare products if they do not want these products. Also, since some subjects may prefer to purchase the conventional product, we informed them that they could obtain the conventional products from the attendant after the session at reference prices. We believe that providing this option to subjects gives them more incentive to truthfully reveal their valuation for the animal welfare counterparts. It also mimics what really happens in real field settings (i.e., retail stores) where consumers would have the option to buy either or both, conventional and animal welfare products depending on their preferences and WTP. All exchanges of money and products, including conventional and animal friendly, in our study took place directly after each session.

5. Methodology, Experimental Design, and Valuation

Consumer willingness to pay for animal products has been studied using surveys and consumer sensory evaluation (Umberger, et al., 2002; Schupp and Gillespie 2001; Loureiro, and Umberger 2003; Loureiro, and Umberger 2005). However, willingness to pay results obtained by traditional surveys have been questioned by several studies because consumers' responses may differ from their actual behavior (Cummings et al, 1995; List and Shogren, 1998). Alternatively, Dickinson and Bailey (2002) have used experimental auctions to estimate consumer willingness to pay for traceability, transparency, and assurance (TTA) characteristics of meat products. Alfnes and Rickertson (2003) have also used experimental auction methodology to compare European consumers' willingness to pay for Irish, Norwegian, US hormone-free, and US hormone treated beef rib eye steak. Using Vickrey second price sealed bid auctions, they found that most participants preferred domestic to imported beef and that hormone treated beef was least preferred.

In this study, non-hypothetical experimental methods are used to elicit consumers' willingness to pay, following Dickinson and Bailey (2002), Alfnes and Rickertson (2003), and many others. Experimental methods are becoming more common than a hypothetical survey setting because the use of real products, real money and real incentive environments provide the participants a motivation to reveal their true value for a product (e.g., Cummings et al., 1995; Fox et al.1998; List and Shogren 1998, Hobbs et al 2005). Auction experiments and choice experiments are used to elicit purchasing preferences for cheese and ice cream produced in accordance with bioethical considerations.

Three valuation mechanisms are used in this study to check for robustness of the results: second and random Nth price Vickrey auctions (List and Shogren 1999; Shogren et al. 2001;

Rousu et al. 2004) and Open Ended Choice Experiment (OECE) (Corrigan et al. 2009). Each session included three practice rounds, followed by five real rounds.

Participants in second and random Nth price auctions submitted bids for 1, 2, 3, 4, and 5 units of animal welfare cheese and animal welfare ice cream in each of the five rounds. In the incremental second price auctions, the number of animal welfare cheese and ice cream products auctioned was incrementally increased from 1 to 5 across rounds. The binding animal welfare product and the binding quantity were randomly selected (after each round in the case of 2nd price and random Nth price auctions, and at the end of five rounds in the case of incremental auction). IDs and bids of the winner(s) were displayed in front of the room following each round. The participants were told that only the winners would be expected to purchase the binding quantity of the binding product at the binding price. Participants were also informed that conventional cheese and ice cream were available for purchase at the end of the session from the experimenter at prices equal to those at the nearest grocery store (\$0.5 for a unit of cheese and \$0.25 for a scoop of ice cream).

In the OECE sessions, the participants indicated the number of animal welfare products that they would be willing to purchase at different price scenarios. Prices of conventional products were fixed at the same levels as in the auctions. The binding animal welfare product and the binding price scenario were randomly selected after each round. Quantities of the binding product indicated by each participant under the binding price scenario were displayed at the front of the room following each round. After five rounds the binding round was randomly selected. Participants were aware that each of them would be expected to purchase the number of binding products that they indicated for the binding price scenario in the binding round.

5.1 Information treatment

In this study, we estimate the WTP for humane animal care labeled dairy products using non-hypothetical uniform price auctions and non-hypothetical choice experiments. Our objective is to examine how consumers respond to provision of information about what types of practices constitute humane animal care in dairy production. The information provided is neutral in the sense that the information treatment was not designed to affect participant attitudes towards humane animal care in agricultural production.

Each of the four valuation mechanisms included sessions where participants were informed about principles of humane animal care practices in dairy production, and sessions where the participants were not given any information about dairy production practices. For the informed treatment sessions a one page information sheet¹ was compiled summarizing the guidelines from the FAO (2008) and standards made public by Humane Farm Animal Care (2004). After the practice rounds, the experimenter read the information out loud and the participants were asked to read along. The information page stated that the humane animal care principles in dairy production include: Access to clean water; Clean feeding equipment; Ability to engage in natural behaviors; No weaning before five weeks of age; Appropriate milking parlor hygiene; Bedded stalls to the minimum depth of 3 inches; Rapid diagnosis and treatment of sick animals; Access to shaded area during hot summer conditions; Appropriate thermal environment and adequate ventilation; Access to exercise areas for at least 4-5 hours per day; Nutritious diet without antibiotics (except for the purpose of disease treatment), hormones, or mammalian-derived protein sources (with the exception of milk products); No excessive mud causing cattle difficulty walking to and from feeding and watering areas; Ample loafing space 40-50 sq.ft./adult cow in

¹ See appendix

semi arid conditions and 20-40 sq.ft./head of roofed area in cooler climates; Ample space in stalls to allow lying down without risk of being stepped on or kicked by other cows; No continuous confinement, except for the purposes of marking, washing, weighing, cleaning, milking, loading, or unless directed by the veterinarian; Benign handling aids that don't cause pain (no electric prods except when animal or human safety is in jeopardy); and Knowledge and understanding of humane animal care guidelines by all stockpersons and managers.

6. Data

The participants for the experiments were recruited from two cities (Pullman WA, and Moscow ID). The participants were provided \$30 each as compensation for participation. The subjects were free to use none, some or all of this money to bid and pay for the items during the experiment.

Table 1 provides summary statistics for the data. A total of 293 participants were recruited for this project. Of these participants, 215 are used for statistical analysis in this report. Data from the remaining participants, corresponding to treatments groups with unconventional bid posting, are not used in this report. A report using these observations will be available in a separate publication. The rest of the discussion and estimation methods in this report will focus on the data from 215 participants. However, discussion and figures pertaining to perceptions of the participants regarding animal welfare in agricultural production, in section 7.1, includes all 293 participants.

Approximately 56% of participants (of 215 individuals that participated in OECE and repeated Vickrey Auctions) are college undergraduate students. The high proportion of undergraduate students in the sample may raise questions about extrapolation to the general

Table 1. Summary statistics

Variables		2 nd Price	Nth Price	OECE	Incremental 2 nd
		Participants	Participants	Participants	Participants
		53	55	56	51
Trust Score	<i>Mean</i>	4.07	3.83	3.64	4.06
	<i>Median</i>	4	4	4	4
	<i>Std. dev.</i>	0.88	0.84	1.05	0.79
Age	<i>Mean</i>	27.92	29.33	27.3	31.27
	<i>Median</i>	23	23	23	23
	<i>Std. dev.</i>	12.19	13.12	11.78	15.35
Individual Income¹	<i>Mean</i>	1.84	1.73	1.59	2.19
	<i>Median</i>	1	1	1.5	2
	<i>Std. dev.</i>	1.87	2.05	1.593	2.14
Family Income²	<i>Mean</i>	4.09	3.84	3.61	4
	<i>Median</i>	2	2	2.5	3
	<i>Std. dev.</i>	4.23	3.75	3.13	3.24
Category		Percentage			
Farming background					
	Yes	33.96%	29.09%	30.35%	17.64%
	No	66.04%	70.91%	69.65%	82.36%
Gender					
	Male	45.28%	45.45%	41.07%	45.10%
	Female	54.72%	54.55%	58.93%	54.90%
Formal education					
	Up to high School	3.77%	1.82%	0.00%	1.96%
	Associate / some college	77.36%	69.09%	69.64%	60.78%
	Post graduate	18.87%	29.09%	30.36%	37.25%
Awareness about animal welfare					
	No	22.64%	16.36%	16.07%	80.39%
	Yes	77.36%	83.64%	83.93%	19.61%
Belief on super quality of animal welfare products					
	Yes	35.85%	52.73%	42.86%	62.75%
	No	64.15%	44.27%	57.14%	37.75%

¹ Individual monthly income was reported and coded in intervals: 1 - (less than \$499), 2 - (\$500-\$999), 3 - (\$1,000 - \$1,999), 4 - (\$2,000-\$2,999), etc.

² Family monthly income was reported and coded in intervals: 1 -(less than \$999), 2 - (\$1,000-\$1,999), 3 - (\$2,000-\$2,999), 4 – (\$3,000 – \$3,999), etc.

Source: Elbakidze and Nayga (2011)

population. However, Depositario et al. (2009) found no significant difference in valuation estimates for food products between college students and the general population. Average age in our sample is 28 years, with standard deviation of 12, a minimum of 18 and a maximum of 68. Approximately 28% of the participants self identified themselves as coming from a farming background.

7. Results

The results section is organized according to the two tasks of this project. Task one is to explore the perceptions of the consumers regarding bioethics in agricultural production. Under this task we examine consumers' perceptions regarding animal wellbeing in agricultural production. Under task two, we empirically evaluate willingness to pay for animal welfare attributes when buying milk.

7.1 Task I – Consumer perceptions on animal welfare

Figure 1 reports summary of responses to the following question: Regarding bioethics of animal wellbeing in production agriculture, how informed do you consider yourself (choose one)? The multiple choice answers for this questions were:

0. Extremely well-informed
1. Well-informed
2. Somewhat informed
3. Not very informed
4. Not informed at all
5. I do not know.

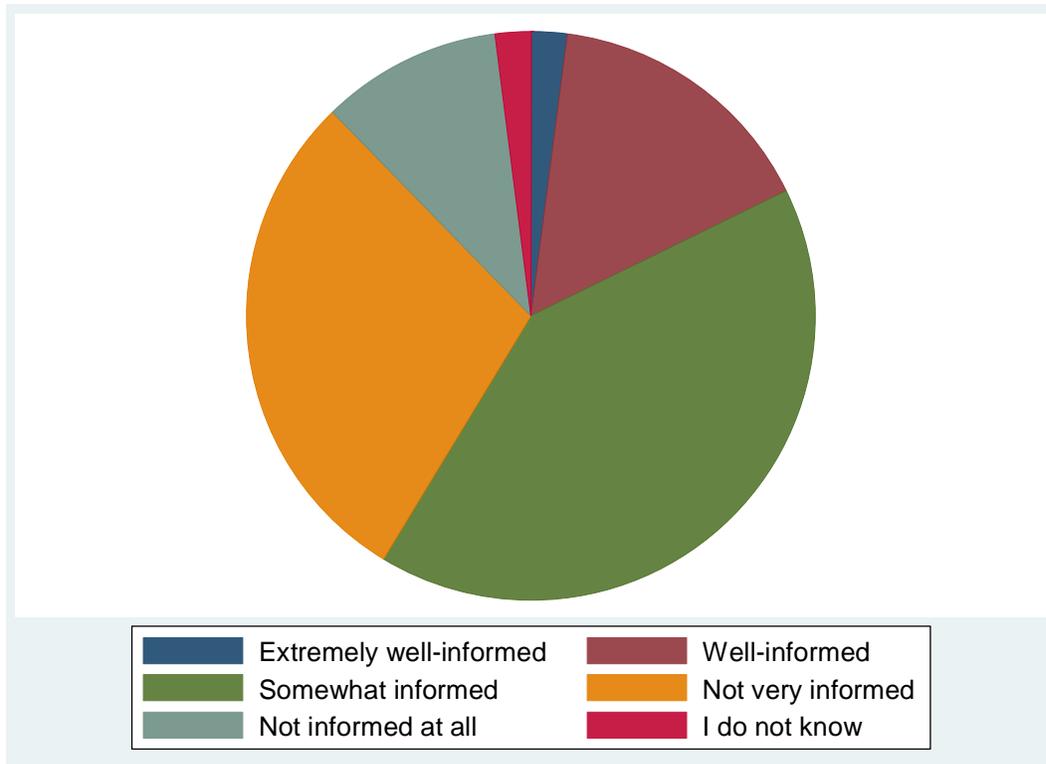


Figure 1: Self assessed awareness of animal well-being in agricultural production

The mean response for this question was 2.36 with a standard deviation of 1.00 indicating that the participants are generally not very well informed about animal welfare issues in agricultural production. Breaking down the responses into two categories of participants who self identified themselves into those that come from a farming background and those that don't produced the results in figure 2. As expected, individuals coming from a farming background report greater awareness of animal wellbeing issues in agricultural production than individuals who are not coming from a farming background. However, there are still individuals who are not informed about these issues. This is probably due to the location of the experiment, where agricultural production in the region primarily revolves around crop production rather than livestock.

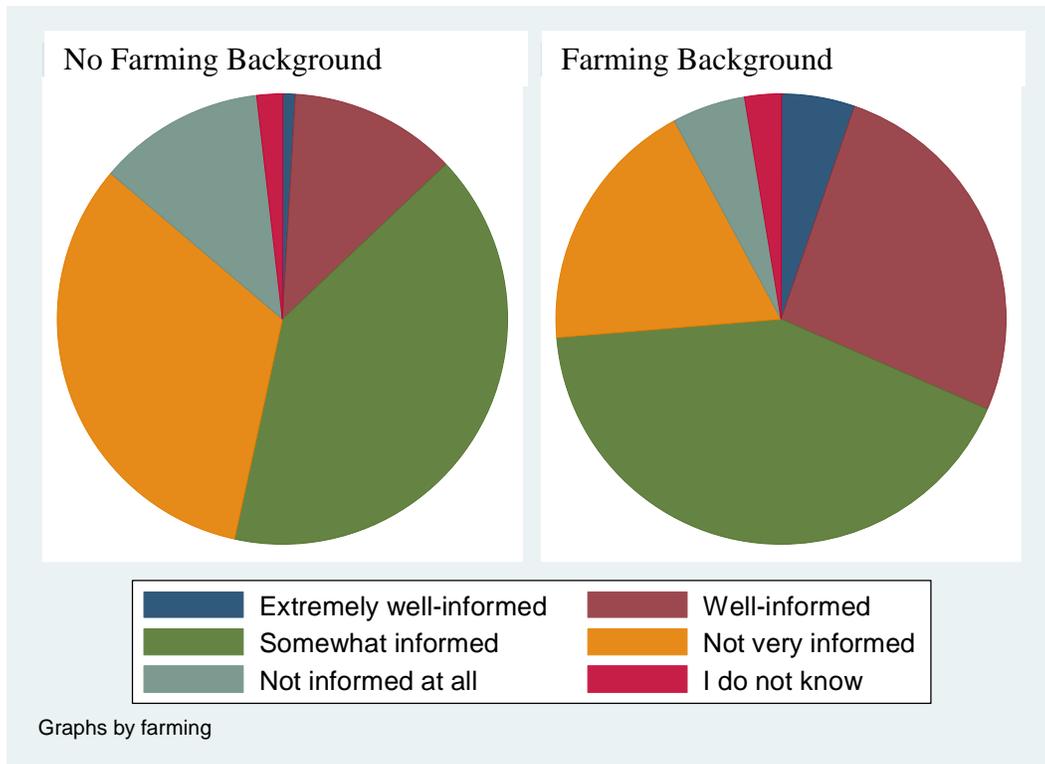


Figure 2. Self assessed awareness of animal well-being in agricultural production by farming background.

Figure 3 shows summary of responses to the following question: Current dairy production practices are in no conflict with animal wellbeing (choose one). With the following provided multiple choice answers:

- 0 Strongly Agree
1. Somewhat Agree
2. Somewhat Disagree
3. Strongly Disagree
4. Don't know

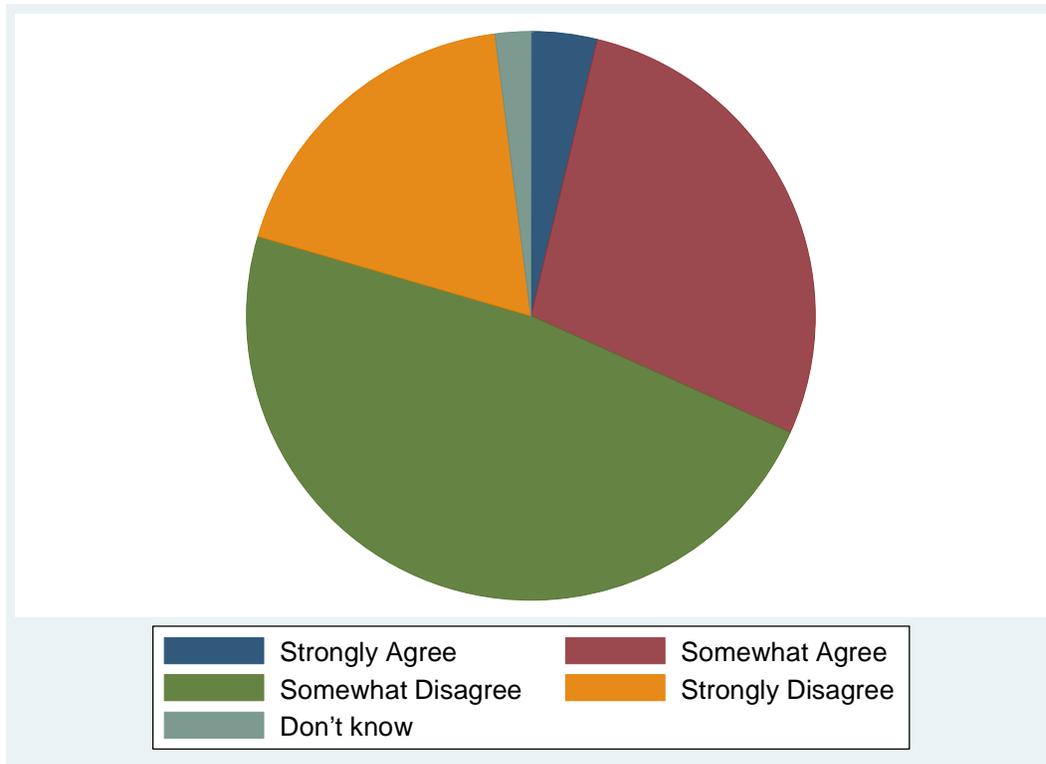


Figure 3: No conflict between animal wellbeing and dairy production practices

The mean response is 1.87 with a standard deviation of 0.83. Figure 3 shows that most of the participants either strongly disagree or somewhat disagree with a statement that there is no conflict between animal wellbeing and current dairy production practices. Most of the participants believe that “Current production practices can be adjusted to accommodate animal wellbeing considerations” (figure 4). The majority of the participants either strongly agree or somewhat agree with the above statement. The mean response for this question (coded similar to the question in figure 3) is 1.15 with a standard error of 1.09. However, most of the participants either somewhat disagree or strongly disagree with the following statement “Producing dairy products according to “Humane Animal Treatment” imposes no additional costs on the producers” (figure 5). So, the consumers do realize that additional restrictions, or voluntary improvements, pertaining to animal wellbeing in dairy production will imply increased costs of

production. At the same time most participants agree with the statement “Small-scale farmers could be positively impacted by voluntary third party “Humane Animal Treatment” certification programs” (Figure 6).

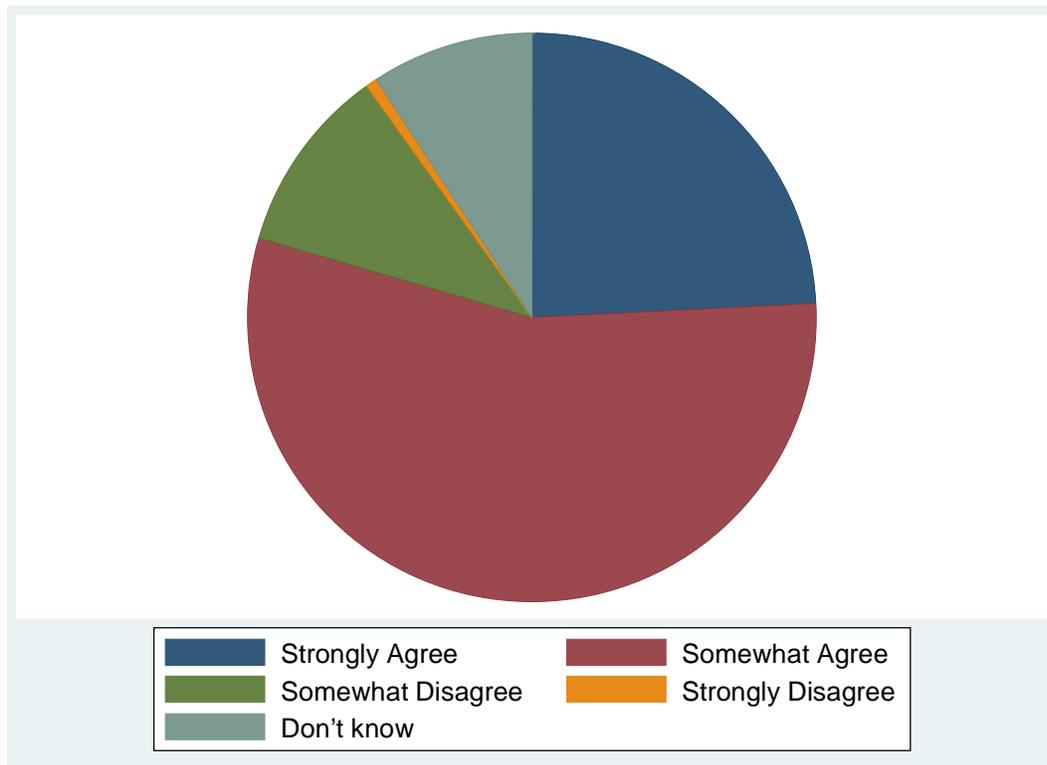


Figure 4. Current production practices can be adjusted to accommodate animal wellbeing considerations

With regards to the information pertaining to animal wellbeing, figure 7 shows the distribution of most trusted sources of information. Research institutions were revealed to be most trustable by the participants, followed by academia in general, and farmer groups. At the same time, third party nonprofit organization would be viewed as the most trustworthy to provide accurate certification and labeling pertaining to Humane Animal Care, followed by agricultural industry and a government agency (Figure 8).

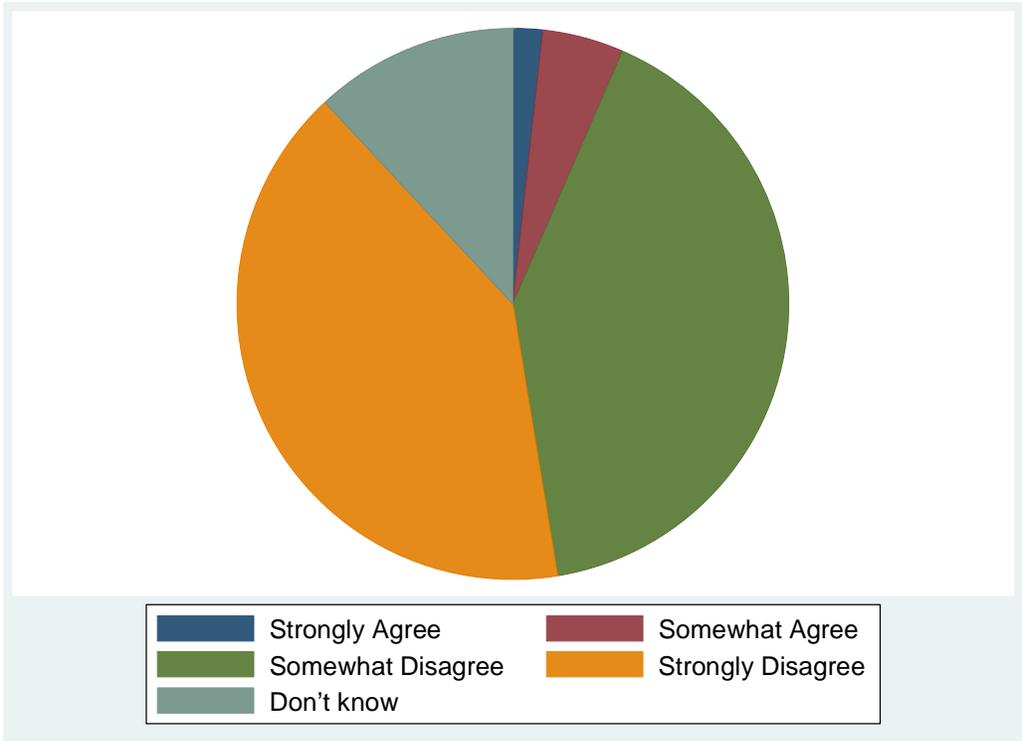


Figure 5. Producing dairy products according to “Humane Animal Treatment” imposes no additional costs on the producers

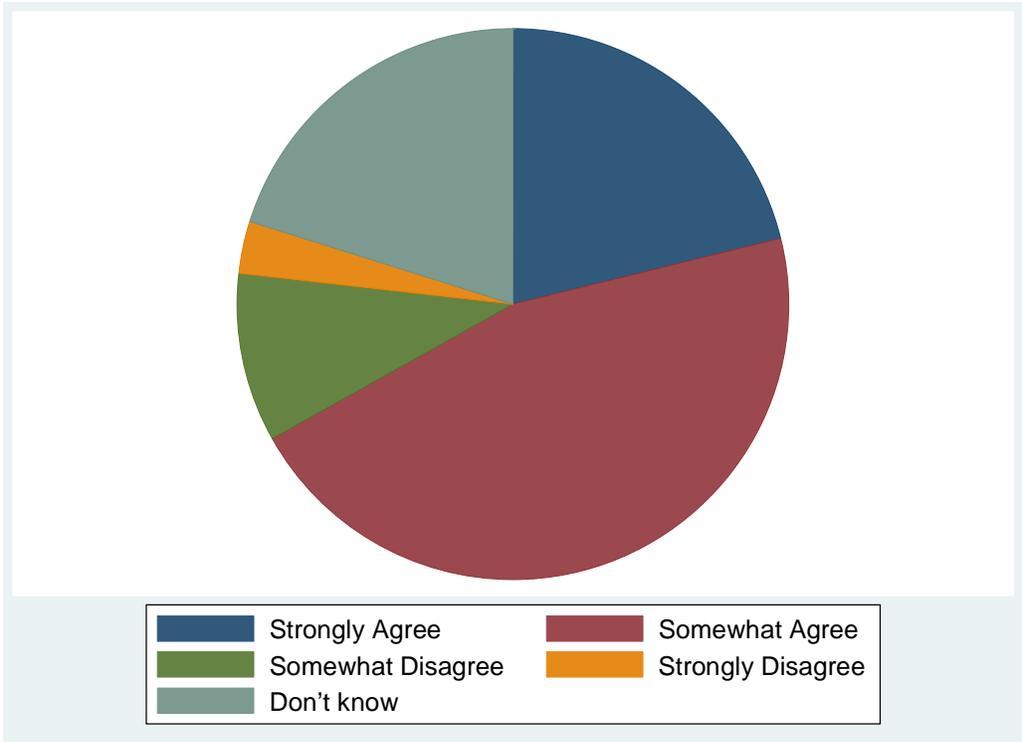


Figure 6. Positive impact of voluntary third party “Humane Animal Treatment” certification on small scale farmers

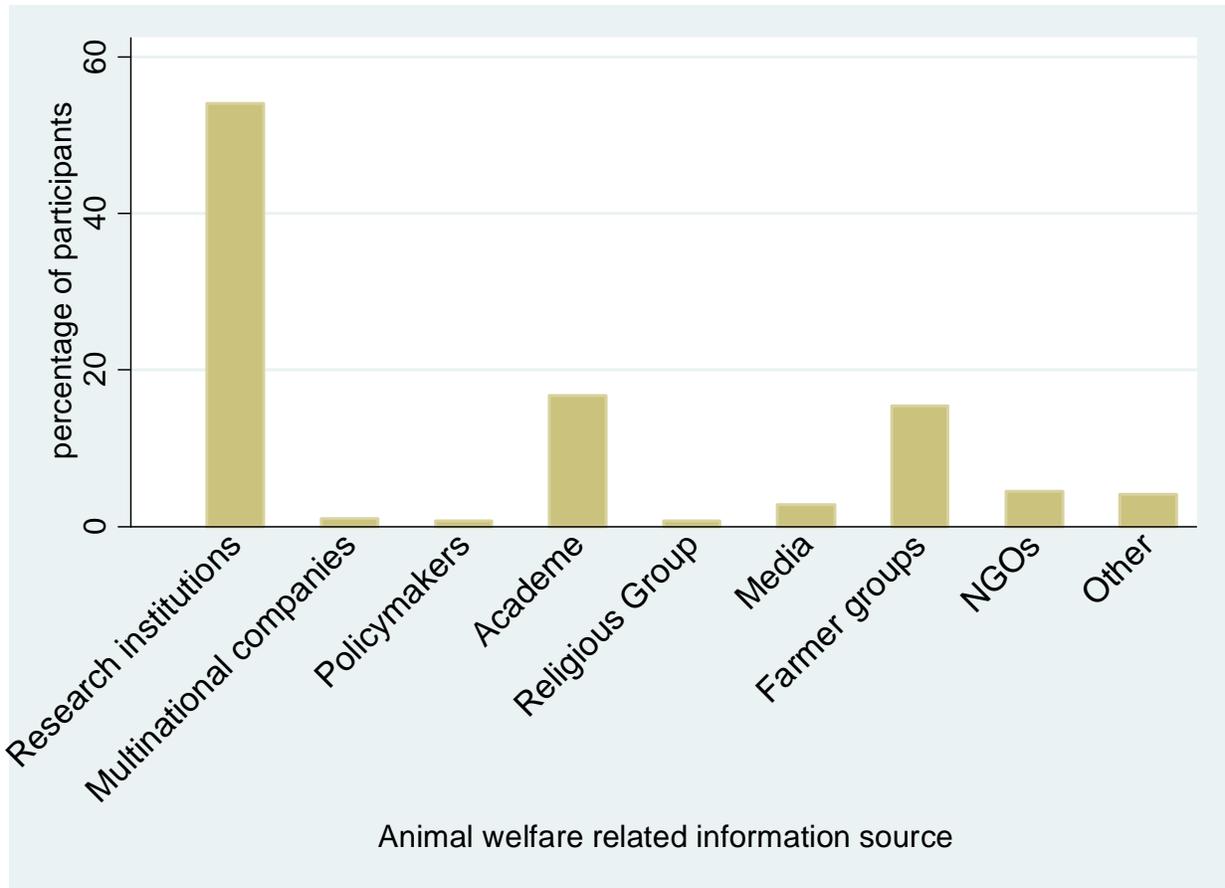


Figure 7. Trusted sources of information about animal welfare in dairy production

Participants were also asked about their opinion about the perceived quality of “animal friendly” products relative to conventional products. Figure 9 shows that the majority of participants did not disagree that the statement that “dairy products produced according to “Humane animal treatment” are of superior quality than conventional dairy products”. Significant proportion of the participants chose “don’t know” as the answer. However, slightly more participants agreed than disagreed with the statement above.

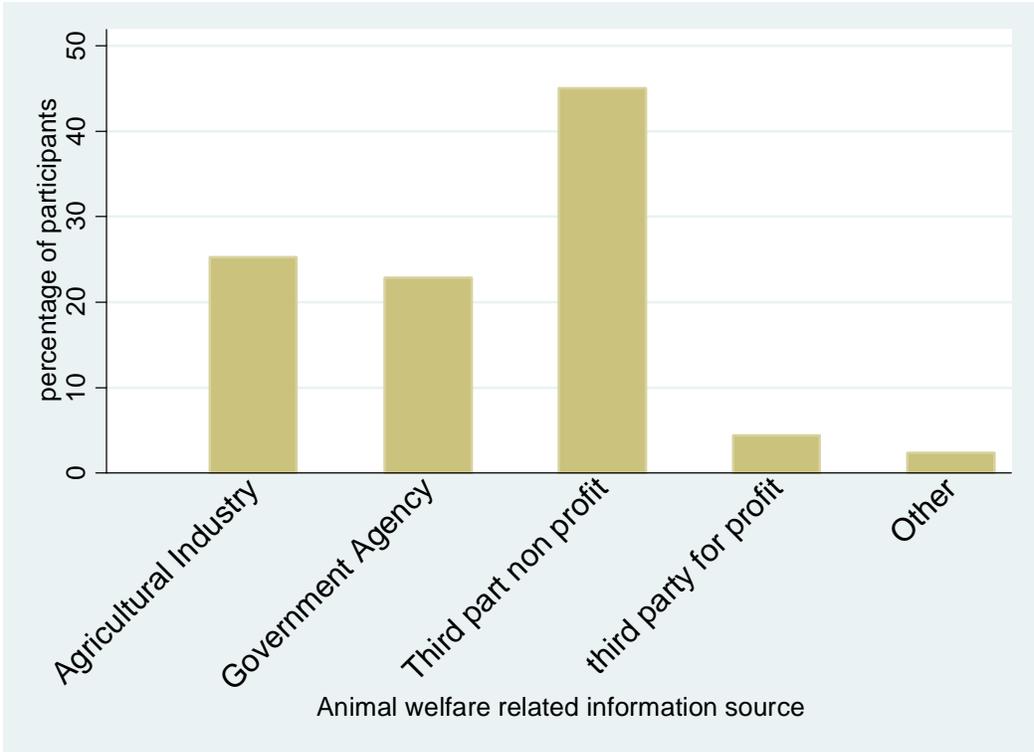


Figure 8. Trusted providers of certification and labeling.

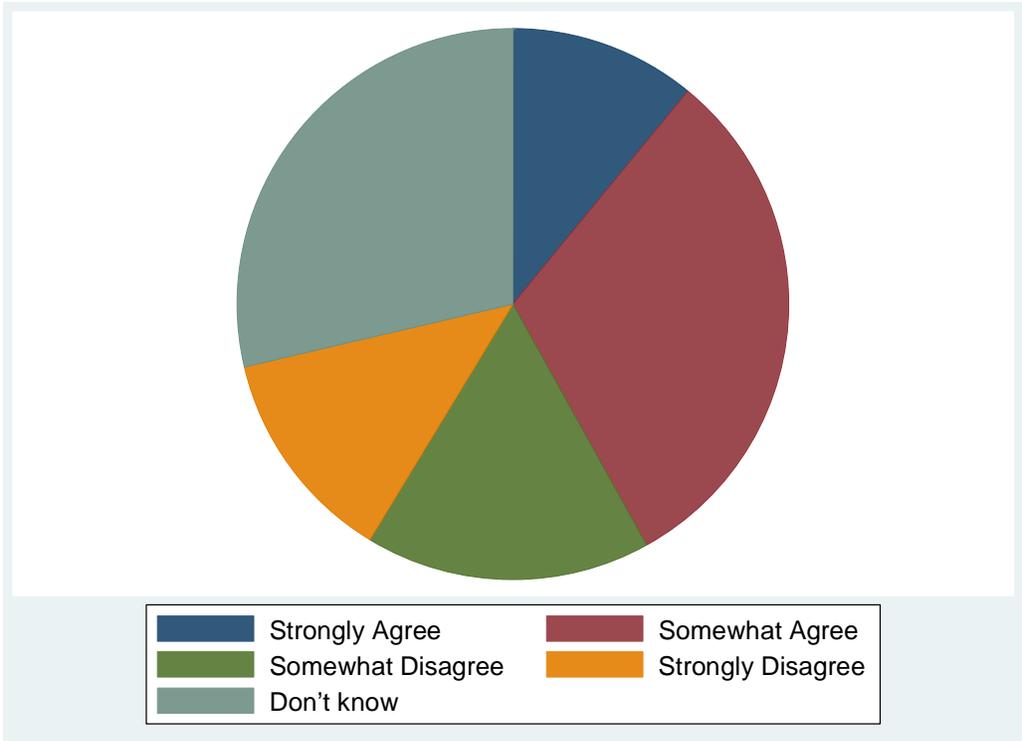


Figure 9. Dairy products produced according to “Humane animal treatment” are of superior quality than conventional dairy products

7.2 Task II – Labeling and consumer willingness to pay

Table 2 shows the WTP estimates for one unit of product across informed and uninformed treatment groups in each valuation mechanism across five rounds. WTP estimated in auction mechanisms correspond to the bids submitted by the participants. However, because in OECE the participants indicated the number of units that they would be willing to purchase at various price levels, WTP in OECE is calculated as the highest price at which the subject indicated a positive quantity, as was done in Corrigan et al. (2009).

The results show that on average the participants were willing to pay a premium price for one scoop of ice cream labeled as humane animal care certified. In case of more than one scoop of ice cream the participants were not willing to pay more per scoop of animal welfare ice cream than the reference price of conventional ice cream. Also, average premium WTP for one scoop of humane animal care labeled ice cream is more pronounced in OECE than in auction mechanisms. Interestingly, in case of cheese the participants on average were not willing to pay a greater price for even one unit of animal welfare cheese than the price of conventional cheese.

Table 2 also shows that in all mechanisms, except for the random Nth price and incremental second price auctions for cheese, mean WTP for uninformed groups is higher than corresponding mean WTP from informed groups. A possible explanation for this is the one sided nature of the information treatment. Subjects were only exposed to the information about what types of practices are consistent with humane animal care in dairy production. No information was provided about what types of practices constitute conventional dairy production or how the two differ. If participants in the information treatment group were not familiar with conventional dairy production practices, then they may have gotten an impression that animal friendly dairy production practices described in the information treatment page may not be very different from

Table 2. WTP from auctions and OECE for one unit

Round	2 nd Price		Random N th Price		OECE		Incremental 2nd ¹	
	Inform.	No inform.	Inform.	No inform.	Inform.	No inform.	Inform.	No inform.
Ice cream								
1	0.265 [.241]	0.275 [.282]	0.279 [.228]	0.235 [.168]	0.5 [.46]	0.828 [.738]	0.315 [.339]	0.338 [.264]
2	0.289 [.268]	0.310 [.352]	0.322 [.332]	0.262 [.262]	0.574 [.489]	0.888 [.823]		
3	0.224 [.215]	0.322 [.414]	0.307 [.297]	0.345 [.757]	0.583 [.509]	0.853 [.795]		
4	0.252 [.264]	0.323 [.417]	0.312 [.291]	0.202 [.153]	0.657 [.564]	0.802 [.797]		
5	0.246 [.271]	0.269 [.275]	0.326 [.418]	0.243 [.205]	0.741 [.645]	0.897 [.86]		
Cheese								
1	0.293 [.254]	0.352 [.335]	0.291 [.221]	0.284 [.237]	0.315 [.325]	0.631 [.589]	0.417 [.545]	0.37 [.329]
2	0.301 [.395]	0.337 [.345]	0.228 [.184]	0.289 [.257]	0.419 [.452]	0.709 [.725]		
3	0.302 [.266]	0.4 [.3]	0.199 [.172]	0.264 [.267]	0.4 [.409]	0.676 [.659]		
4	0.34 [.292]	0.339 [.349]	0.228 [.236]	0.214 [.2]	0.413 [.44]	0.66 [.67]		
5	0.412 [.39]	0.497 [.627]	0.208 [.219]	0.293 [.227]	0.478 [.477]	0.714 [.693]		

Note: Standard errors are in brackets.

¹ Since in the incremental second price auction, the round order also corresponded to the amount of products being auctioned, we only report the results from the first round.

Source: Elbakidze and Nayga (2011)

conventional dairy production practices. In such a case, the subjects may not be willing to pay a premium price for animal welfare labeled products if they do not believe that the animal welfare production practices and conventional production practices differ sufficiently to justify a premium price. In fact, some “informed” participants might even be willing to pay less for animal welfare products as a demonstration of protest against potentially misleading labeling/advertising/marketing if they believe that the conventional and animal welfare

production practices do not differ enough in terms of animal welfare in production to justify labeling differentiation.

Another way to analyze our WTP data is to only examine the bids of individuals who are willing to pay at least the price of the conventional product for the corresponding conventional and/or animal welfare products. Using OECE data from round one, 43 out of 56 individuals are willing to pay at least \$0.25 (i.e., price of the conventional ice cream) for either the animal welfare or conventional ice cream. Similarly, 49 out of 56 individuals are willing to pay at least \$0.50 (i.e., price of the conventional cheese) for either the animal welfare or conventional cheese product. 47 percent of those who are willing to pay \$0.25 per scoop of ice cream are also willing to pay more than \$0.25 for animal welfare ice cream and only 35 percent of those who are willing to pay \$0.50 per unit of cheese are also willing to pay more than \$0.50 for animal welfare cheese. Figures 9a and 9b provide histograms of WTP in OECE for those individuals who are “in the market” – those who are willing to pay at least the reference price for either conventional or animal welfare products. As exhibited in figure 1a, out of the participants who are willing to spend \$0.25 per scoop of ice cream, approximately 11 percent are willing to pay up to \$0.20 per scoop of animal welfare ice cream. Similarly, approximately 10 percent of participants are willing to pay between \$0.50 and \$0.75 per scoop and 5 percent are willing pay between \$0.75 and \$1.00. As exhibited in figure 1b, approximately 15% of those who are willing to pay \$0.50 per unit of either conventional or animal welfare cheese are also willing to pay between \$0.50 and \$0.75 per unit of animal welfare cheese. Notice that we cannot perform a similar analysis using our auction data since our auctions involved bidding for only the animal welfare products (while providing reference prices for conventional products). What we can say, however, is that of all the participants (including those who may not be willing to pay conventional prices for

either conventional or animal welfare products), approximately 41% are willing to pay more than \$0.25 per scoop of animal welfare ice cream and approximately 17% are willing to pay more than \$0.50 per unit of animal welfare cheese.

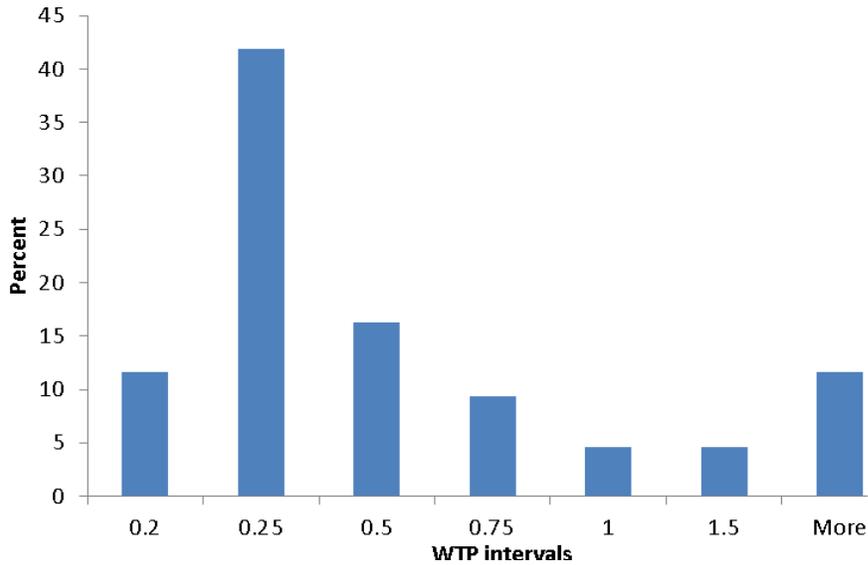


Figure 9a: Histogram of WTP for animal welfare ice cream from OECE round one

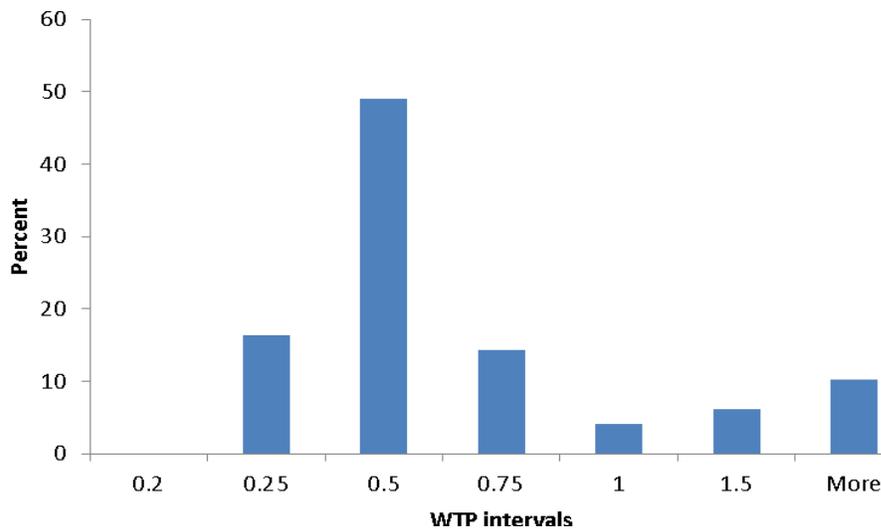


Figure 9b: Histogram of WTP for animal welfare cheese from OECE round one

Note: the figures exclude individuals who are not willing to pay the conventional price for either animal welfare or conventional products.

Source: Elbakidze et al. (2011)

Table 3 shows results for humane animal care cheese from uniform price auctions and OECEs. Results are presented for tobit and ZINB regressions using just the data from round 1, and tobit and Negative Binomial random effects panel regressions using data from all rounds. The independent variables used include the demographic and experimental design control variables, level of trust in the experiment, product quality perception, time since last meal, consumption frequency and inventory variables, and an indicator variable depicting whether animal welfare information was provided or not. Across all models WTP for animal welfare cheese tends to increase with the level of education. Also, participants who believed that humane animal care products were qualitatively superior to conventional products generally were willing to pay more for humane animal care cheese. Interestingly, the effect of cheese consumption frequency reverses sign across OECEs and uniform price auctions. However, inventory seems to have mostly negative effect suggesting that participants who had cheese at home at the time of the experiment were willing to purchase less cheese during the experiment. The statistical significance of consumption frequency and inventory variables reflect the importance of controlling for these factors when conducting WTP studies.

Table 4 shows the corresponding regression results for animal welfare ice cream. Except for panel estimation of OECE data, trust score seems to have a positive correlation with WTP. In other words, the greater the participant's reported confidence in the authenticity of the experiment, the higher their WTP for humane animal care labeled ice cream. This result is consistent with the results from auctions for cheese (Table 3). Also, similar to cheese results, WTP for animal welfare ice cream increases with the belief in the superior quality of animal welfare ice cream over conventional ice cream. For the case of immediate consumption good like ice cream, the frequency of consumption has a positive effect on WTP. Similar to the case

of cheese, higher quantities in uniform price auctions corresponded to lower per unit WTP. Also, higher prices in OECE corresponded to lower quantities demanded.

8. Conclusions

Higher WTP in OECE than in auction mechanisms is detected in case of cheese as well as ice cream. This is not surprising since the lowest price scenarios in OECE were \$0.10 for ice cream and \$0.25 for cheese. On the other hand, the Vickrey auctions have no preset minimums on disclosed WTP values. This may imply that the OECE can suffer from starting point bias similar to that which can occur in contingent valuation studies that use a payment card elicitation mechanism. If so, then WTP estimates obtained from choice experiments can differ from those obtained from auction mechanisms as in this study.

Inconsistency in WTP for humane animal care in cheese versus in ice cream may be caused by two factors. One is functional difference between cheese (a relatively storable product) and ice cream (an immediate consumption good). It may be that the participants did not want to deal with carrying cheese with them until returning home at the end of the day (the experiments were conducted around lunch time) and were not interested in consuming cheese by itself immediately. On the other hand, ice cream has to be consumed or refrigerated immediately after purchase. Given that the participants might have been more willing to consume ice cream on the spot more so than cheese, and that they may have been not inclined to consume both immediately and not willing to carry cheese home, they may have submitted lower bids for cheese than if the experiment was conducted just using cheese. The second reason for the inconsistency may be bid anchoring. The participants may have anchored their bids on the lower of the two reference prices for conventional products. In this case ice cream.

Table 3. Regression Estimates for Animal Welfare Cheese

VARIABLES	Auctions		OECE	
	Round 1 (N=540)	All Rounds (N=2160)	Round 1 (N=504)	All Rounds (N=2016)
Trust Scores (From 1 to 5)	0.036*** (0.013)	0.036*** (0.014)	-0.0003 (0.089)	0.145 (0.116)
Gender (Male=0; Female=1)	0.042** (0.019)	0.003 (0.020)	0.178 (0.176)	0.371* (0.201)
Age	-0.0006 (0.001)	-0.001 (0.001)	0.014 (0.011)	0.007 (0.014)
Education Level (From 1 to 9)	0.026*** (0.008)	0.024*** (0.009)	0.141** (0.060)	0.314*** (0.071)
Personal monthly Income (Dollars)	0.017** (0.008)	0.011 (0.008)	-0.186** (0.086)	-0.262** (0.106)
Family monthly Income (Dollars)	-0.015*** (0.003)	-0.012*** (0.003)	-0.010 (0.027)	0.031 (0.035)
Quality superiority (yes=1; no=0)	0.07*** (0.020)	0.064*** (0.021)	0.443*** (0.165)	0.377* (0.211)
Time since Last Meal (minutes)	-0.003 (0.003)	-0.015*** (0.004)	0.065*** (0.023)	0.032 (0.029)
Provided Animal welfare information (yes=1, no=0)	-0.006 (0.021)	-0.027 (0.022)	-0.914*** (0.167)	-1.072*** (0.211)
Quantity	-0.027*** (0.006)	-0.027*** (0.007)		
Random N or 2nd price (Random N=1, 2nd price=0)	-0.032* (0.019)	-0.1*** (0.020)		
Consumption Frequency (1 to 4)	0.082*** (0.011)	0.07*** (0.011)	-0.688*** (0.115)	-0.374** (0.153)
Inventory (yes =0, no=1)	0.064** (0.028)	-0.031 (0.029)	-1.792*** (0.328)	-1.961*** (0.325)
Round3		0.012 (0.009)		0.105 (0.088)
Round4		0.007 (0.009)		0.167** (0.077)
Round5		0.038*** (0.010)		0.260*** (0.085)
Cheese Feedback from previous round (yes=1, no=0)		-0.003 (0.007)		0.045 (0.071)
Price of Cheese			-1.7*** (0.143)	-1.529*** (0.124)
Constant	-0.235** (0.094)	-0.067 (0.100)	2.408*** (0.660)	16.150 (167.100)

Note: Standard errors in parentheses;

*** p<0.01, ** p<0.05, * p<0.1

Source: Elbakidze et al. (2011)

Table 4. Regression Estimates for Animal Welfare Ice cream

VARIABLES	Auctions		OECE	
	Round 1 (N=540)	All Rounds (N=2160)	Round 1 (N=504)	All Rounds (N=2016)
Trust Scores (From 1 to 5)	0.053*** (0.013)	0.068*** (0.015)	0.261*** (0.067)	0.013 (0.086)
Gender (Male=0; Female=1)	0.011 (0.020)	-0.033 (0.023)	-0.311** (0.129)	0.389** (0.174)
Age	0.0004 (0.001)	0.001 (0.001)	-0.013 (0.009)	0.008 (0.011)
Education Level (From 1 to 9)	0.017* (0.009)	0.019* (0.010)	-0.043 (0.051)	0.054 (0.065)
Personal monthly Income (Dollars)	0.022** (0.008)	0.015 (0.010)	-0.095 (0.059)	-0.078 (0.080)
Family monthly Income (Dollars)	-0.006** (0.003)	-0.007** (0.003)	-0.034 (0.021)	-0.015 (0.026)
Quality superiority (yes=1; no=0)	0.048** (0.021)	0.045* (0.024)	0.601*** (0.128)	0.546*** (0.160)
Time since Last Meal (minutes)	-0.001 (0.003)	-0.007* (0.004)	0.049*** (0.017)	0.081*** (0.022)
Provided Animal welfare information (yes=1, no=0)	0.036 (0.022)	-0.027 (0.025)	-0.811*** (0.128)	-0.807*** (0.160)
Quantity	-0.025*** (0.007)	-0.034*** (0.008)		
Random N or 2nd price (Random N=1, 2nd price=0)	0.010 (0.020)	0.056** (0.024)		
Consumption Frequency (1 to 4)	0.064*** (0.012)	0.049*** (0.014)	0.011 (0.109)	0.387*** (0.125)
Inventory (yes =0, no=1)	-0.035* (0.020)	-0.021 (0.023)	-0.397*** (0.149)	-0.013 (0.197)
Round3		-0.010 (0.009)		-0.006 (0.082)
Round4		-0.015 (0.009)		0.007 (0.072)
Round5		-0.011 (0.010)		0.208*** (0.079)
Ice cream Feedback from previous round (yes=1, no=0)		-0.001 (0.007)		-0.075 (0.068)
Price of Ice cream			-1.914*** (0.148)	-1.749*** (0.130)
Constant	-0.225** (0.094)	-0.192* (0.109)	0.887 (0.554)	16.420 (227.100)

Note: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Elbakidze et al. (2011)

Similar to results in Napolitano et al. (2008) our results indicate that the consumers may be willing to pay a premium price for animal wellbeing certification in dairy production. Although the estimated magnitude of WTP across the experimental mechanisms used in this study varies, all mechanisms indicated that the consumers are on average willing to pay a higher price for a scoop of humane animal care labeled ice cream than the price of conventional ice cream. However, this is not the case for animal welfare cheese. Moreover, for more than 1 unit of animal welfare products the average WTP per unit decreases below the reference prices for conventional products. This is not surprising due to decreasing marginal benefits from consuming additional units of food products.

Unlike Napolitano et al. (2008) our results generally suggest that providing information about humane animal care practices in dairy production, at least the way it was provided in this study, does not significantly increase WTP for such dairy products. Our results show that provision of only the information about humane animal care principles without provision of corresponding information about conventional production practices does not have a positive effect on WTP in most cases. In fact, in some cases it can have a negative effect. This effect may be due to the inability of only partially informed subjects to directly contrast the described unobservable attributes of the humane animal care products with the unobservable and not described attributes of conventional products. This can potentially create an impression that the two products are not sufficiently different in terms of humane animal care practices to justify a premium price. Humane animal care production principles may appear to be normal and not very different from conventional production practices to consumers who are not familiar with standard production practices. This implies that informing consumers about humane animal care practices alone, as a tool to differentiate products and increase competitiveness (Napolitano et al.

2008), will probably not result in increased WTP unless corresponding information is provided about conventional practices. It is possible that WTP values in our study could differ if this reference information about conventional dairy production was provided. This topic would be interesting to examine further in future studies.

Overall gender and age did not have a statistically significant effect on WTP for either cheese or ice cream. Education level had a statistically significant and positive effect on WTP for cheese but not for ice cream. Quality superiority had a robust and statistically significant effect on WTP for cheese as well as ice cream. This implies that consumers who believe that humane animal care in some way leads to improved product quality are willing to pay extra for dairy products produced according to humane animal care principles. One may speculate that given the results of this study, successful marketing of humane animal care labeled dairy products may require educating consumers about potential differences between conventional and animal friendly production practices in dairy industry. If such differences are sufficiently significant and consumers are aware of these differences, WTP for humane animal care labeled dairy products might be more pronounced than what was found in this study if subjects are informed not only about animal care principles associated with humane animal care labeled products but also with conventional production practices. This topic would be interesting to examine further in future studies.

A couple of limitations need to be mentioned. The composition of the sample used in this study presents a limitation for the purposes of generalizing the results to the whole population. Unlike Depositario et al. (2009) we found that undergraduate students' WTP estimates for humane animal care labeled ice cream and cheese obtained via experimental auctions and choice experiments differs statistically from WTP of non-undergraduates.

Furthermore, since the non-undergraduate category in our sample includes graduate students, faculty, university staff, as well as non-university affiliated city residents, it is not possible to make a meaningful comparison between our non-undergraduate group and general population. This is a typical limitation of WTP studies conducted on university campus sites, which should be taken into account when attempting to extrapolate the results to the whole population. The results of this study should be interpreted as a preliminary analysis of WTP for humane animal care labeled dairy product rather than estimates of population wide WTP. Another potential limitation of this study is the possible bid anchoring by the participants which may have contributed to low estimates of WTP for humane animal care labeled cheese, the more expensive of the two products considered in this study. While inclusion of multiple products in studies of WTP for such unobservable attributes as animal welfare in agricultural production is a valuable ingredient for verifying robustness of findings, we suggest that the use of multiple products in experimental auctions be revisited in future studies to examine in more detail the effects of potential bid anchoring.

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10. APPENDIX

Animal Wellbeing Certification

“The ethical obligations associated with dairy production include a strong emphasis on animal well-being. As science and practical experience enhance our understanding of dairy animal wellbeing, producers continue to employ appropriate animal care and management practices. The National Dairy Animal Well-Being Initiative has developed broad principles and guidelines that dairy animal well-being programs should include to meet our ethical obligations.” (FAO, 2008) Dairy products labeled as “Humane Certified” and verified by a third party satisfy humane animal treatment guidelines and principles (for example Humane Animal Care Program Standards <http://www.certifiedhumane.org>).

The principles include but, are not limited to, the following humane animal care guidelines:

- Access to clean water
- Clean feeding equipment
- Ability to engage in natural behaviors
- No weaning before five weeks of age
- Appropriate milking parlor hygiene
- Bedded stalls to the minimum depth of 3 inches
- Rapid diagnosis and treatment of sick animals
- Access to shaded area during hot summer conditions
- Appropriate thermal environment and adequate ventilation
- Access to exercise areas for at least 4-5 hours per day
- Nutritious diet without antibiotics (except for the purpose of disease treatment), hormones, or mammalian-derived protein sources (with the exception of milk products)
- No excessive mud causing cattle difficulty walking to and from feeding and watering areas. Mud over ankle depth must not be allowed to persist.
- Ample loafing space 40-50 sq.ft./adult cow in semi arid conditions. In cooler climates, 20-40 sq.ft./head of roofed area.
- Ample space in stalls to allow lying in down without risk of being stepped on or kicked by other cows.
- No continuous confinement, except for the purposes of marking, washing, weighing, cleaning, milking, loading, or unless directed by the veterinarian
- Benign handling aids that don't cause pain (no electric pods except when animal or human safety is in jeopardy)
- Knowledge and understanding of humane animal care guidelines by all stockpersons and managers

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