



Demand for farm animal welfare and producer implications: Results from a field experiment in Michigan

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ABSTRACT

This study utilizes a Becker-DeGroot-Marschak (BDM) mechanism to assess Michigan consumer demand for animal welfare practices. Results are examined in the context of changing farm production costs and producer marketing margins. We find that while consumers are willing to pay significant premiums for animal welfare standards, failing to account for the costs associated with producing the entire animal under the new system could lead to suboptimal policy that negatively affects producer welfare. Our results suggest that consumer premiums for animal welfare are product specific and that WTP estimates should not be generalized to the entire animal. We discuss policy implications of our findings and highlight the importance of considering producer costs when evaluating consumer demand for farm animal welfare practices.

1. Introduction

Animal agriculture producers are facing a changing marketplace for food and agricultural products. A great deal of attention in recent years has been focused on assessing consumer demand for food production practices and cost implications of altering those practices. High profile legally mandated changes to animal production systems, such as California's Proposition 2 (ballot initiative) and Florida's Amendment 10 (legislation), limiting practices that confine farm animals have increased attention to on-farm practices and affected the food marketplace. But legal avenues are not the only means for change as retailers, grocers and restaurants are also interested in demonstrating social awareness by sourcing products from producers who are certified to follow some set of welfare-related practices. Evidenced by the multitude of labels displayed on products found on supermarkets shelves, as well as in restaurants and in advertisements, marketers are increasingly appealing to consumers by selling production process attributes. Livestock and poultry products, in particular, evoke consumer sentiments regarding the treatment and welfare of the animals in the production processes (Frewer et al., 2005).

With respect to farm animal welfare, production changes have tended to focus on animal confinement practices. Both the legal and market methods for change in recent years have largely been about allowing farm animals to "stand up, lie down, fully extending limbs, and turn around freely." The result is that practices such as battery cages for laying hens and gestation stalls for sows are being or have been phased out in many locations. Additionally, laws, such as one

passed recently in California, require any incoming eggs or meat to achieve the same standard affecting producers across the country.

Michigan passed legislation that required the phasing out of battery cages for laying hens and gestation stalls for sows in October 2009. The Michigan legislation effectively means that beginning in 2019 battery cages and gestation stalls will no longer be allowed. Instead, producers will be required to use a system that provides for more room and natural behaviors for laying hens and gestating (pregnant) sows. This change in system design and production method has caused concerns amongst producers with the deadline for compliance fast approaching.

Economists have been following farm animal welfare related changes with an interest in understanding market, management and policy implications. Egg and pork producers must understand the demand and potential social aspects to adjust practices appropriately. Given that these production changes often require large, long-term investments, it is critical that producers understand the demands and potential premiums or deductions. Understanding consumer willingness-to-pay (WTP) for farm animal welfare related production attributes is key to marketing and management aspects, and is the primary focus of this research.

There are multiple methods available to examine consumer willingness-to-pay, each with strengths and weaknesses. These methods include the study of revealed preference via scanner data as well as stated preferences through the use of hypothetical choice experiments and incentive compatible experimental methods. Scanner data records purchases and reveals actual willingness-to-pay but its use is restricted to products currently available for purchase. Thus, scanner or purchase

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data are not available for products not currently on the market which often includes those produced under potential welfare-related practice restrictions. Choice experiments allow examining virtually any set of attributes or product characteristics that can be effectively communicated. Some drawbacks of choice experiments include issues surrounding hypothetical bias, social desirability bias, lack of market realism, as well as their reliability on distributional assumptions of parameter estimates and WTP. Incentive compatible experimental methods, such as experimental auctions, can overcome many of these limitations by directly eliciting consumer WTP values and allowing researchers to conduct studies *in situ* such as in a supermarket or other retail locations (Lusk and Shogren, 2007).

The primary objective of this study is to conduct an economic assessment of Michigan consumer preferences and willingness to pay for on-farm production practices in livestock and egg products. In order to accomplish this objective we utilized a Becker-DeGroot-Marschak (BDM) mechanism to elicit Michigan consumer demand for animal welfare practices, and examine the results in the context of changing farm production costs and marketing margins. The remainder of the paper is organized as follows. The next section examines the farm animal welfare situation in the US. The following section reviews the experimental methods including potential drawbacks and limitations of the BDM mechanism. Respondent characteristics and willingness-to-pay results are presented in context of past studies for eggs, and pork products. We conclude by deriving marketing and food policy implications of our findings.

2. Farm animal welfare background

Conventional farm practices in recent decades have included housing gestating sows and laying hens in individual enclosures that allow limited movement of animals often leaving them unable to turn around or extend their limbs. The majority of hogs sold in the U.S. come from operations that utilize individual crates or stalls while the sows are gestating (National Hog Farmer, 2012). Similarly, the majority of eggs sold come from operations that use cages for laying hens (Tactacan et al., 2009). Several states have passed legislation or ballot initiatives that mandate changes specifically to pig and chicken housing to allow more freedom of movement and natural behaviors. The watershed event in this evolving policy was California's Proposition 2 in 2008. Given the magnitude of the California market, industry and other states have been adjusting in the intervening period.

In Michigan, Public Act No. 117 signed into law on October 12, 2009, applies to egg-laying hens and gestating sows.¹ The legislation, which is to go into effect 10 years after enactment for hens and pigs, states that farmers shall not confine an animal “for all or that majority of any day, in a manner that prevents such animal from doing any of the following:

- (a) Lying down, standing up, or fully extending its limbs.
- (b) Turning around freely.” (Michigan, 2009).

It is no coincidence that this language is almost identical to Proposition 2 passed by California voters in November 2008. Language of this type has been used in several states in both formal legislation and ballot initiatives (Springsteen, 2009).

As is the case with most legislation, the impact depends very much on how the regulations are interpreted and implemented. The implementation of the Michigan law is still a work in progress. However, it is clear that conventional battery cages for laying hens and gestation crates or stalls for pigs will not be permitted when the law is fully implemented. The pork and egg industries, while aware of the

uncertainty surrounding the implementation of the law, are operating under the assumption that animal housing will need to be changed to allow for more room and natural behaviors.

Gestation stalls are metal enclosures that house female breeding stock in individually confined areas during an animal's four-month pregnancy (Schulz and Tonsor, 2015). Pork producer organizations maintain that the use of gestation stalls facilitates efficient pork production resulting in lower consumer prices. In the confinement system, sows will spend at least two thirds of their lives in gestation stalls (Seibert and Norwood, 2011). This stall is too small for the sow turn around and it is difficult for the animal to even lie down comfortably (Seibert and Norwood, 2011). Thus, the transition from gestation stalls to group housing is the most common adjustment required to be in compliance with the laws and regulations requiring more space and freedom of movement. Without gestation stalls, sow group housing can range from small pens (six or fewer animals) to large pens (50 or more sows in a pen) (Buhr, 2010). Edwards (2008) suggested that the extent to which acceptable economic performance can be realized in alternative sow housing systems depends on the level of performance which can be achieved – but also on the premium that can be extracted. Hog producers are reluctant to make this change unless the premium exceeds the cost of group housing (Seibert and Norwood, 2011).

In the case of egg-laying hens, the Michigan legislation states that this means “fully spreading wings without touching the side of an enclosure or other egg-laying hens and having access to at least 1.0 square feet of usable floor space per hen.” Thus, while battery cages are definitely prohibited, what have come to be known as “conventional” cages with 6 birds in an 80-square inch cage (Matthews and Sumner, 2015) would also likely not meet the requirement (depending on interpretations such as how many birds must be able to spread their wings at the same time which is still undetermined). In addition to size requirements, conventional cages also lack amenities to provide for natural bird behaviors including perching, nesting and scratching. To comply with the legislation, egg operations will be required to move to either enriched colony or cage-free aviaries. An enriched colony has cages that contain 60 hens each with 116.75 square inches of total physical space (Matthews and Sumner, 2015). Each colony cage provides several amenities that allow natural behaviors including perch space, nest space, and scratch pad space (Matthews and Sumner, 2015). Cage-free aviaries have the hens divided into colony rows with each row further divided by wire mesh screens into pens along the building length. Hens in cage-free aviaries have access to perch space, and nest space (Matthews and Sumner, 2015).

Despite the legal and media attention which these laws have received, it is unclear what consumer preferences towards these changes are or whether they are willing to pay a premium for products produced under these alternative practices. Previous studies on consumer WTP for farm animal welfare practices usually rely on hypothetical data and may not accurately reflect market premiums. Moreover, when drawing implications for producers and industry, the majority of studies use premiums for one type of product as representative of the entire animal. Are consumer premiums for farm animal welfare invariant to the type of product that is being purchased? Given that producers are being forced to produce the *entire* animal, and not just a portion (e.g. pork chop), under these new practices, knowing how premiums differ across products from the same animal is important.

3. Methods

To answer our research questions, we utilized a BDM mechanism to elicit consumer demand for farm animal welfare practices in different types of pork and poultry products (Becker et al., 1964). The BDM mechanism is a theoretically incentive-compatible single response procedure used in experimental economics to measure willingness to pay. In a BDM, a subject formulates a bid and the bid is compared to a “market” price which is drawn from a pre-specified distribution. If the

¹ The law also applies to veal calves but this is a very small industry in Michigan. For veal calves, the rules went into effect in 2012.

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