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The U.S. Gestation Stall Debate

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Abstract
One of the most contentious and emotional issues in livestock production is that of animal welfare. The welfare of livestock in commercial production systems has been, and continues to be, intensely debated by many groups, including, but not limited to, consumers, animal activists, scientists, legislators, and farmers. Perceptions or misconceptions of welfare issues can have a dramatic effect on livestock production if industries respond by changing certain production practices, if governments react by enacting laws dictating how livestock are produced, or if consumers respond by changing purchasing patterns. A major economic issue in this area spawns from the fact that existing markets may not be well suited for solving the animal welfare debate and imposition of regulatory requirements on production practices could result in significant costs to producers and, ultimately, consumers who pay higher prices for meat.

Keywords
Animal Welfare, Economics of Legislation, Gestation Stalls, Pork, Swine

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One of the most contentious and emotional issues in livestock production is that of animal welfare. The welfare of livestock in commercial production systems has been, and continues to be, intensely debated by many groups, including, but not limited to, consumers, animal activists, scientists, legislators, and farmers. Perceptions or misconceptions of welfare issues can have a dramatic effect on livestock production if industries respond by changing certain production practices, if governments react by enacting laws dictating how livestock are produced, or if consumers respond by changing purchasing patterns. A major economic issue in this area spawns from the fact that existing markets may not be well suited for solving the animal welfare debate and imposition of regulatory requirements on production practices could result in significant costs to producers and, ultimately, consumers who pay higher prices for meat.

The concern for animal welfare has particularly targeted the use of gestation stalls—also known as gestation crates—by swine producers. Gestation stalls are metal stalls that house female breeding stock in individually confined areas during an animal's four-month pregnancy. Pork producer organizations suggest that the use of gestation stalls may facilitate more efficient pork production resulting in lower prices for consumers. The use of the stalls is deemed as an animal welfare issue by some because the stalls limit animal mobility (Tonsor, Olynk, and Wolf, 2009). This perception has led to regulatory pressures and agri-food companies considering moving towards policies restricting the use of gestation stalls.

To understand the economic aspects of this ongoing debate, it is helpful to review the structural evolution of the U.S. swine industry, the legal framework underlying provisions of animal welfare in the United States, and adjustments in livestock and meat markets regarding animal welfare claims and protocols.

Changes in Swine Production

The number of swine produced in the United States during the last several decades has remained relatively constant. However, animal production practices have become increasingly concentrated with the major focus being on improved economic efficiency (Fraser, Mench, and Millman, 2001; and Mench, 2008). Once dominated by small operations that practiced crop and swine production, the industry has become increasingly concentrated among large operations. According to the U.S. Department of Agriculture's (USDA) 2012 Census of Agriculture, 63,246 farms, about 3% of the 2.1 million farms in the United States, had a swine inventory in 2012 (USDA National Agricultural Statistics Service (NASS), 2014). Most of these were large operations. Over 95% of farms had a swine inventory of more than 1,000 hogs, more than 90% had more than 2,000 hogs, and over 67% had more than 5,000 hogs (USDA, NASS, 2014).

As the industry has evolved, swine producers have had to adjust the size, organizational structure, and technological base of their operations, or cease production (Key and McBride, 2007). Gestation stalls were an experimental system in the 1950s and, as farms remodeled and were built, gestation stalls became more common amongst newer facilities in the 1970s (McGlone, 2013). In 2012, 75.8% of all gestating breeding stock (38.9% of sites) in the United

States was housed in individual stalls (USDA, Animal and Plant Health Inspection Service (APHIS), 2014).

These changes in housing—combined with changes in nutrition, health, and genetics as well as the widespread adoption of new technologies—have also led to significant changes in productivity. The efficiency of the U.S. swine breeding herd continues to increase with the average number of pigs per breeding animal continually on the rise. The average number of annual pigs per breeding herd animal (including sows, gilts, and boars) was 20.22 in 2012, up from 10.32 in 1963. This tremendous increase in the average number of pigs per breeding animal is due to the increase in the number of litters per sow per year and the increase in litter rates. Overall, producers have been able to increase pig crops while decreasing breeding herd as a percent of the total inventory.

The pressure for increased production efficiency is driven by many factors, among them the drive to acquire export markets; the availability of competing imports; the low margins paid to producers because of the increased cost of product packaging, distribution, and marketing; technological innovation; and the high cost of skilled farm labor (Appleby, 2005; Appleby, 2006; and Mench, 2008). To remain competitive, producers must continuously maintain or improve production performance. Swine producers are reluctant to change from well-established production practices unless they increase performance or at the very least do not decrease performance. Any production system that has a negative impact on performance will not be widely adopted voluntarily.

Legal Framework in Animal Welfare

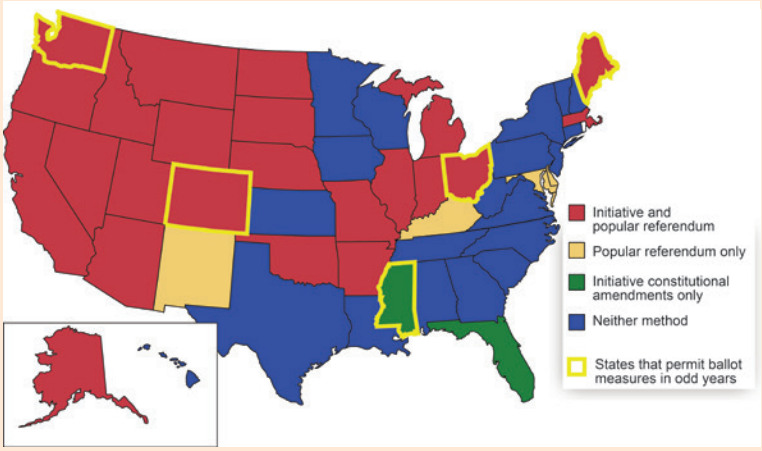
In the United States, there are two federal laws regulating the treatment of farm animals. The Twenty-Eight Hour Law, passed in 1873 (amended in 1994), requires that animals, while in the course of interstate transportation, may not be confined in a vehicle or vessel for more than 28 hours without unloading the animals for feeding, water, and rest (USDA, National Agriculture Library (NAL), 2014a). The Humane Methods of Slaughter Act, originally passed in 1958 (the law that is enforced today was passed as the Humane Slaughter Act of 1978), requires the proper treatment and humane handling of all food animals, excluding chickens and other birds, slaughtered in USDA-inspected slaughter plants (USDA, NAL, 2014b).

There has been almost no change in U.S. federal legislation related to farm animals in the last several decades, even though the treatment of animals in research, exhibition, transport, and by dealers has been extensively regulated since 1966 (amendments in 1970, 1976, 1985, 1990, 2002, 2007, and 2008) under the provisions of the Animal Welfare Act (USDA, NAL, 2014c). The lack of federal legislation governing the housing of farm animals has lead animal activist groups to pressure individual states to enact animal welfare legislation (Mosel, 2001; Uralde, 2001; and Mench, 2008).

Proponents of state legislation claim that stalls (for gestating sows, veal, and other farm animals) or cages (for laying hens) cause cruelty to animals, while the opponents argue that they are merely engaging in normal animal production practices (Rumley, 2009). The debate is intensified by the fact that, while all 50 states have enacted some form of legislation prohibiting cruelty to animals, about 30 states exempt "common," "normal," or "customary" farm animal production practices from coverage under the law (Wolfson and Sullivan, 2004).

In addition to the typical legislative process, there are ballot measures to enact new laws or constitutional amendments or repeal existing laws or constitutional amendments. An initiative is a proposal of a new law or constitutional amendment that is placed on the ballot by petition, that is, by collecting signatures of a certain number of citizens. A referendum is a

Figure 1. State-by-State Initiative and Referendum Provisions



Source: Initiative & Referendum Institute (2013).

Note: This figure shows only the general initiative and referendum provisions for a particular state, not those only specific to animal welfare regulations. Every state has some form of the legislative process which allows the government to place issues on the ballot and so, therefore, is not referenced in the map.

Table 1. States with Bans on the Use of Gestation Stalls and Corresponding Breeding Inven

			Breeding inventory		
State	Year passed	Type	Number	Rank in U.S.	Percent of U.S.
Florida	2002	Ballot Initiative	3,509	30th	0.06%
Arizona	2006	Ballot Initiative	Not Reported	Not Reported	Not Reported
Oregon	2007	Legislation	2,801	32nd	0.05%
Colorado	2008	Legislation	145,140	11th	2.54%
California	2008	Ballot Initiative	8,322	28th	0.15%
Maine	2009	Legislation	1,596	37th	0.03%
Michigan	2009	Legislation	111,983	13th	1.96%
Ohio	2010	Legislation	142,782	12th	2.50%
Rhode Island	2012	Legislation	578	44th	0.01%

Source: States with bans on the use of gestation stalls compiled from Rumley (2009), Natio HSUS (2014). Breeding operations and inventory are as of the end of December 2012; comp (USDA NASS 2014).

Note: Any tabulated item that could potentially identify an individual producer or operation Census of Agriculture data and, thus, not available to be reported here.

proposal to repeal a law that was previously enacted by the legislature, and that is placed on the ballot by citizen petition. Currently 24 states have the initiative process and 24 states permit a referendum (Initiative & Referendum Institute, 2013). Figure 1 shows which states have the initiative and referendum process, and what type. These states through the initiative or referendum process have enacted (or have the ability to enact) laws that regulate farm animal production practices. There is no provision for any sort of ballot proposition at the national level in the United States.

Several states have issued bans on sow gestation stalls, veal calf stalls, or conventional cage systems for laying hens. Oregon, Colorado, Maine, Michigan, Ohio, and Rhode Island have already passed legislation and Florida, Arizona, and California have already passed animal confinement laws through a ballot initiative (National Agricultural Law Center, 2014; and Humane Society of the United States (HSUS), 2014). The states slated for elimination of gestation stalls represent a relatively small percentage of the total U.S. breeding inventory (7.30%) and breeding operations (18.89%) (Table 1). However, future regulation in other states could significantly impact a greater percentage of the U.S. breeding inventory and breeding operations. For example, the top three states ranked by breeding inventory represent over 41% of the breeding inventory and over 13% of the breeding operations in the United States - Iowa 917,567 inventory (1,676 operations), North Carolina 896,231 inventory (838 operations), and Minnesota 572,545 inventory (1,133 operations) (USDA NASS, 2014). These states do not have initiative and referendum provisions and currently there is no farm animal confinement legislation being considered in these states.

Smithson et al. (2014) suggest a larger number of states may be favorable to initiatives similar to California's Proposition 2. Proposition 2 prohibits California livestock producers from the "confinement of farm animals in a manner that does not allow them to turn around freely, lie down, stand up, and fully extend their limbs" (California Secretary of State, 2008). The particular species and production segments discussed in Proposition 2 were calves raised for veal, laying hens, and gestating sows and gilts. Importantly, the authors identify a disconnect between these states and the distribution of livestock production highlighting tension that can arise from customer (retailers or other up-stream industry participants) requests not cleanly matching consumer signals for change in the form of observed food purchasing behavior.

Farm Level Costs of Transitioning from Gestation Stalls to Group Housing

The transition from gestation stall housing to group housing is the most common adjustment being made or discussed within the industry. For example, in 2007, Smithfield Foods, Inc., made a decision based on input from its customers to convert to group housing for pregnant sows on all company-owned U.S. farms. Smithfield remains on track to finish its conversion to group housing systems on all company-owned U.S. farms by 2017 and is asking contract sow growers to convert by 2022 with a sliding scale of incentives to accelerate that timetable (Smithfield, 2014).

Gestation stall housing is well defined in the United States because a prototypical system has been installed as the industry has modernized in the past 25 years. In contrast, no prototypical gestation group housing system has emerged, largely because of its limited application at the commercial level which has limited the evolution of systems to fit commercial scale. Group housing has been shown to include large pen systems (greater than 50 sows in a pen) and small pen systems (six or fewer sows in a pen) (Buhr, 2010). Edwards (2008) suggests that the extent to which acceptable economic performance can be realized in alternative housing systems for gestating swine depends on the level of performance which can be achieved in a given system relative to the cost requirement.

The first issue to consider relates to the fixed costs arising from the capital cost of system installation. Several studies have estimated the direct costs of switching from gestation

stalls to group pen housing (Lammers et al., 2007; Buhr, 2010; and Seibert and Norwood, 2011). While there is general agreement of increasing costs at the farm level, the magnitude of increase is highly debated. Buhr (2010) defines several factors that will determine transition costs. These include: "(1) the feasibility and cost of retrofitting existing stall facilities into group housed facilities compared to complete construction of new facilities, (2) the remaining useful life of the existing facilities and the useful life of renovating these facilities compared to constructing new facilities, (3) the amount of time available to make the transition if there is a time limitation, (4) any subsequent differences in operation and production net profits after the refurbishment, (5) space allocation requirements for pens versus stall facilities which will determine if new buildings must be constructed to accommodate existing production levels, and (6) the learning curve of management and labor in achieving production results in a new system."

The second issue relates to the level of reproductive performance which can be achieved in a given system relative to the variable cost requirement. A review of available scientific literature on swine breeding stock housing showed that well managed gestation stalls and group housing produced similar outcomes for gestating swine in terms of physiology, behavior, performance, and health (McGlone et al., 2004). Likewise, a similar scientific literature review concluded that neither stall nor group housing is clearly superior to the other and that each system has advantages and disadvantages (Rhodes et al., 2005). The literature suggests that the method of gestation housing plays an important but not exclusive role in breeding herd productivity. Many factors are shown to influence productivity such as genetics, health, environment, geographic location, worker skill, and management. In reality, swine producers are a heterogeneous demographic and a ban on gestation stalls could affect producers of different sizes, cost structures, and management styles in various ways.

Changes in the Market Place

Consumers are increasingly sensitive to food production processes. Livestock products in particular arouse consumer sentiment regarding livestock treatment and animal welfare (Frewer et al., 2005). The actions of companies that have committed to sourcing pork from producers who do not use gestation stalls or are phasing them out of their own facilities indicate that activism has led to strong market forces to discontinue gestation stall use in the United States (HSUS, 2014). Furthermore, the Food Marketing Institute (FMI) and the National Council of Chain Restaurants (NCCR) support enhanced pork industry guidelines regarding gestation housing systems (FMI and NCCR, 2002).

An argument is typically made that gestation-stall-free pork is demanded by consumers and they will compensate producers by paying higher prices. A number of recent studies have assessed consumer willingness to pay (WTP) for animal welfare attributes in meat products, including gestation-stall-free pork (Grannis and Thilmany, 2002; Tonsor, Olynk, and Wolf, 2009; Tonsor, Wolf, and Olynk, 2009; Olynk, Tonsor, and Wolf, 2010a; Olynk, Tonsor, and Wolf, 2010b; Tonsor and Wolf, 2010; Prickett, Norwood, and Lusk 2010; and Tonsor and Wolf, 2011). However, a general consensus has not been found regarding the magnitude of consumers WTP or if WTP would be large enough to offset a cost increase at the farm level. Buhr (2010) estimates that to fully compensate pork producers would require an additional 25% increase in consumer WTP for U.S. pork products from gestating swine raised in group housing.

Consumer demand for gestation-stall-free pork, or the elimination of gestation stalls, is difficult to identify. With the elimination, one cannot simply say that demand for pork will increase. Previous research has shown that consumers, when directly asked, on average prefer pork produced without gestation stalls. What is unclear is how providing information on gestation stall use would impact aggregate pork demand. For example, consumers may prefer that gestation stalls not be used but, after learning that gestation stalls were used in the first place, may begin to further question animal welfare or other issues in the production of pork which could reduce demand. On the other hand, the ban may appease those consumers concerned about animal welfare and pork demand may increase.

State of Change, Vote versus Buy Difference

It is important to note that gestation stalls continue to be voluntarily used on roughly three-fourths of the inventory (roughly two-fifths of operations). This suggests that actual WTP for stall-free pork products is likely lower when summed across all pork products than what is needed to cover adjustment costs. If this were not the case, one would expect more apparent and voluntary adjustment towards alternative production practices given favorable benefit-cost relationships. This is consistent with points made by McKendree et al. (2013) highlighting the need to evaluate the total premium of stall-free production across the full set of pork products as the cost of producing the entire carcass—not just typically examined pork chops—is impacted given the adjustment occurs during the live-animal segment of pork production.

The situation underpins the controversial setting of animal welfare discussions in the United States as producers are meeting the consumer

outside the usual marketplace: in the voting booth. The list of examples where voting residents send signals inconsistent with observed consumption behavior is growing and increasing political tension between producers and consumers. Perhaps the clearest demonstrative and high-profile example is that cage-free eggs hold less than 5% market share in the United States, yet the majority of residents who have voted on related ballots have supported restricting use of laying hen cages (Norwood and Lusk, 2011). Allender and Richards (2010) also note: "Somewhat paradoxically, a majority of California voters elected to regulate cage-free production, even though almost three-quarters of egg consumers are not willing to pay the price difference required" (p. 436). This example is shared as the existing literature is richer in terms of egg research applying scanner data but the same general point holds in the debate of gestation stalls.

Some recent research applied to animal welfare issues suggest several reasons citizens may be more likely to vote to ban practices than they are to regularly buy resulting products in the grocery store. Harvey and Hubbard (2013) outline six reasons including: 1) cheap talk of voting (the costs may be more salient in retail than ballot settings); 2) some people are willing to pay retail premiums only if they are assured of actual improvements in the underlying issue (highlighting the role of group vs. individual decision-making); 3) product labels are not sufficient or reliable to influence purchasing; 4) overall information available to consumers is inadequate or confusing, leading to reduced purchases; 5) the costs of checking information are too high; and 6) other things besides the issue of focus in a voting setting are more important in purchasing environments (for example, safety may trump animal welfare at the retail shelf but not be considered in a voting booth).

Regardless of why this behavior occurs, when voters require practices that shoppers will not fully fund, it has an adverse effect on agricultural producers which, of course, leads to the observed added contention regarding requested production changes that arrive from sources not fully paying premiums to cover adjustment costs.

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