

Voter-Approved Proposition to Raise California Pork Prices

Hanbin Lee, Richard J. Sexton, and Daniel A. Sumner

California voters passed Proposition 12 in November 2018 to require more housing space for certain farm animals. We estimate that Prop 12 will cost California pork consumers about \$320 million annually due to higher pork prices.

More than 63% of California voters supported Proposition 12 to set specific housing space requirements for covered animals, including egg-laying hens, breeding pigs, and calves raised for veal. Prop 12 applies to all farms that produce these covered livestock in California and to farms in other states with covered livestock connected to products ultimately sold in California. Some Prop 12 requirements were implemented on January 1, 2020, with the full set of requirements for breeding pigs and egg-laying hens to be implemented on January 1, 2022.

This article explains some economic implications of Prop 12 for the integrated U.S. and Canadian hog and pork markets, including implications for producers and consumers, especially those in California. We do not study the benefits to people—whether pork consumers or not, and whether they are in California or not—who value knowing that some breeding pigs will be in more spacious housing.

Prop 12 has no housing requirements for the fed hogs whose cuts of meat are consumed in California. Rather, Prop 12 housing rules apply to the mothers of those hogs.

Prop 12 covers all of the few breeding sows that are housed in California. But, crucially, Prop 12 will also prohibit sales in California of uncooked cuts of pork derived from pigs born from sows that are allowed less than 24

square feet of space each—except for a brief period around farrowing—no matter where those pigs are born. Pork products other than uncooked cuts of pork purchased in California are not included under Prop 12, nor is any pork mixed with other ingredients. California regulations do not apply to pork products sold outside California nor to the hogs that produce this pork.

Nonetheless, all participants in the pork value chain will be affected, at least to some extent, by Proposition 12. This includes farrowing farms, hog feeding operations, primary pork processors, secondary processors and packaging operations, wholesalers, retailers, and pork consumers.

To understand the impending implications of Prop 12 for the pork value chain, we administered written surveys and conducted in-person and telephone interviews with key personnel operating at various stages of the pork supply chain. Then, based on this input, we constructed an economic model of the North American pork industry (Canada and the United States) to assess the economic impacts of Prop 12. The model includes hog production, processing and marketing, and selling to consumers through retail and food service.

We find that Prop 12 will likely increase prices of uncooked pork cuts in California by about 7.7% and that California consumers will likely purchase about 6.3% less uncooked pork cuts as a consequence. California pork consumers will lose \$320 million per year in economic benefits.

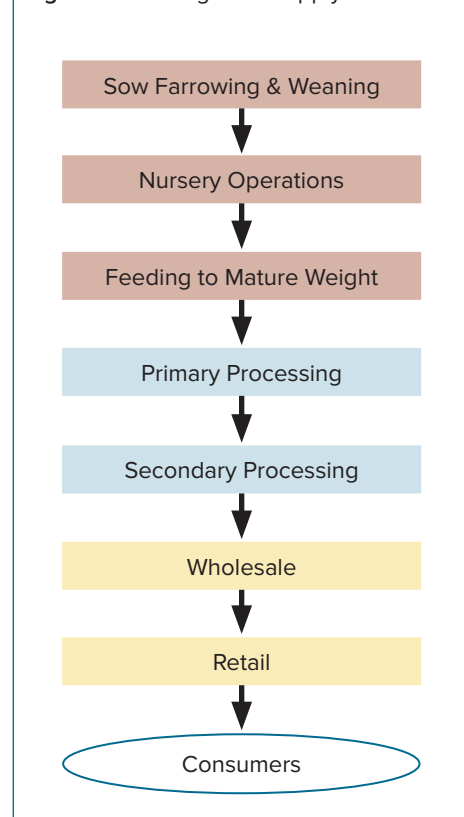
The North American Pork Value Chain

Figure 1 displays a schematic flow chart of the pork value chain. The first

stage of modern hog production is farrowing, where breeding sows produce piglets that stay with their mothers for about 21 days before they are weaned. Prop 12 applies specifically at the farrowing stage, with a requirement per sow of 24 square feet of space, except during a few days before birth and a three-week period when piglets remain with the sow after birth.

Some farrowing operations, specifically those that already house sows in group pens rather than individual stalls, will have a cost advantage in converting their operations to be compliant with Prop 12. However, very few sows are currently housed in ways that are fully compliant with Prop 12's space requirements, so any farrowing operation considering converting to Prop 12-compliant housing faces substantial one-time costs. They will also face higher ongoing variable costs

Figure 1. The Hog/Pork Supply Chain



due, for example, to increased sow mortality, smaller litters, reduced rates of farrowing, and possibly, reduced feeding efficiency.

Proposition 12 will have little direct effect on nursery and hog feeding operations except, of course, that the pigs from California-compliant farrowing operations will be more expensive. These hogs must have their identities preserved, so that they may be segregated before shipping for slaughter.

Primary processors acquire market hogs mainly from their contract growers. They then slaughter the hogs and produce cuts and pork products sold directly to wholesalers, retailers, and food-service operators. They also sell pork to a variety of secondary processing operations.

Pork processors generate a variety of pork products, some of which are uncooked cuts of pork (e.g., bacon) that must come from hogs identified as Prop 12 compliant. They also produce pork products that do not require Prop 12 compliance. These include products such as ground pork and sausage, pork destined for cooked products such as lunch meats and fully cooked hams, pork used as ingredients in prepared foods such as hotdogs or pizza, and pork used in uncooked mixed products such as soups and meat mixtures.

Operations that sell to retailers will have to create new stock-keeping units (SKUs) for Prop 12-compliant products, imposing another fixed cost. To supply a full line of uncooked cuts of pork in California, processors will need to approximately double their number of SKUs in this product category. However, some respondents to our surveys indicated that the fixed cost to introduce a new SKU for each Prop 12-compliant version of a product would likely lead to reduced consumer choice in California because marketers would drop niche products from their California offerings.

Costs of Compliance with Prop 12

Given the size of the California pork market, only about 8–9% of North American sow housing, enough for about 0.7 million sows, needs to meet Prop 12 standards. About 30% of sows (2.2 million) were in group housing in 2020. Because the adjustment would be less costly for them, the farrowing operations that convert to meet Prop 12 standards will be among those that already have group housing. The one-time cost of conversion we considered applies to operations that now have group housing that does not meet the California requirements. We also compared ongoing operating costs for group-housing operations that would become Prop 12 compliant with those that remained non-compliant.

The most tangible increase in capital recovery cost per sow due to Prop 12 is from fewer sows using a facility. Based on data from the industry, we expect facility costs per sow to rise by about 20% to achieve an increase in space per sow from 20 to 24 square feet. In addition, instituting new electronic feeding and other innovations likely adds another 5% to capital costs. Given capital recovery is about 16% of the total cost, the 25% increase results in about 4% higher total costs.

Sow feed costs account for about 50% of the total costs to produce weanling pigs. Other variable costs, including labor, veterinarian services, and medicine, account for the final 34%. The main factors affecting incremental feed costs are that sow mortality is likely to be higher by about 2% and weaned pigs per sow are expected to decline by about 12%—partly due to sow mortality and partly because breeding becomes less efficient in a group setting. Overall, sow feed cost per marketed weanling pig is expected to rise by about 12% due to decreased sow fecundity, contributing a 6% increase in total cost per weanling pig.

Finally, we project that other variable costs will rise by roughly 15% because of spreading them across fewer weanling pigs and because of the need for more labor and health care per sow. These other variable costs add about 5% (0.34×0.15) to total costs. Combining the three categories yields a 15% increase (4% + 6% + 5%) in costs per weanling pig for California-compliant operations.

Using an average cost of about \$33 per weanling pig gives a cost increase at the farrowing operation of $0.15 \times \$33$, or approximately \$5 per weanling pig. The cost of \$5 per weanling pig implies a \$5 increase per retail weight of 160.8 pounds of pork per pig, or about \$0.03 per pound of carcass meat available for retail sales.

Additional Costs of Processing and Marketing Prop 12-Compliant Pork

The weanling pigs that leave farrowing operations move through the feeding stages to reach slaughter weights in about five months. Prop 12 requires that hogs destined for California are clearly identified so that the uncooked cuts of pork from these hogs can be segregated, labeled, and traced. Besides keeping identity preservation, there is no difference in how these hogs are housed or fed. Thus, any added costs during the feeding stages are small on a per-hog basis. However, they will likely incur higher transport costs to get their hogs to a processing plant that plans to supply Prop 12-compliant pork.

Given that California comprises only 8–9% of the market for North American pork, we expect that many primary processing operations (slaughter plants) will choose not to acquire the costly Prop 12-compliant hogs. These plants will avoid the added costs of identifying, segregating, tracing, and labeling the compliant pork separately from the rest of their production.

Those primary processing operations that do acquire and process the more expensive compliant hogs will incur additional costs to assure that they can sell this compliant pork into the California market. Pork that is destined for Prop 12-compliant cuts must be identified, segregated, and traced. The compliant hogs will be processed at different days and times from other hogs to assure that no non-compliant pork is comingled with uncooked pork cuts that are destined for the California market.

Even the most efficient scheduling plan will involve added transport, storage, and scheduling costs associated with processing California-compliant hogs. Such costs include having separate holding pens, more complicated and less flexible scheduling, interruption in plant operation between processing the compliant and non-compliant hogs, additional storage capacity so that the up-to-double SKUs of fresh pork can be kept in distinct lots, a more complicated labeling process, and more complex shipping of labeled products. The most costly among these factors is likely to be the interruption of plant operations and reduced throughput during the change-over from compliant to non-complaint hogs and pork. Our best estimate is that the additional cost is about \$15 per compliant hog slaughtered.

We estimate, based on pending California Department of Food and Agriculture regulations, that about 58% of the retail meat from a compliant hog (93 pounds) will be subject to Prop 12 requirements. The added cost associated with processing is thus $\$15/93 = \0.16 per pound of Prop 12-compliant pork.

In addition to the higher costs incurred at the primary processing plant, other costs will be incurred for handling compliant pork throughout the downstream marketing chain. We estimate these costs to be about \$0.05 per pound

of Prop 12-compliant uncooked cuts of pork. Overall, we estimate the segregation, identity preservation, traceability, and other compliance costs, such as audits and registration, to be about \$0.21 per pound of Prop 12-compliant pork products.

Wholesaling and retailing operations may also incur higher costs associated with Prop 12 compliance, mainly in the form of achieving segregation of compliant products in trucks and warehouses that serve outlets in multiple states and also for ensuring traceability of products and Prop 12 compliance of suppliers. California regulations include requirements for record keeping and reporting that have some compliance costs and risks of liability for potential errors.

We were able to obtain little direct information on the likely magnitude of these costs, so they consequently played no part in our analysis. Omission of these costs from our modeling means, however, that our estimates of impacts are likely conservative.

Economic Model of the North American Hog/Pork Market

The increase in market prices for hogs and pork products that are compliant with Prop 12 must be sufficient to reimburse participants in the various stages of the value chain for the initial costs they will incur to become compliant with Prop 12 and the higher ongoing costs they will incur to maintain compliance with it.

To understand how these higher costs to produce and market Prop 12-compliant pork would affect pork prices and sales in California and elsewhere, we constructed an economic model of the hog/pork market for North America. Our model includes specifications for consumer demand, farm supply, and conversion of live hogs to consumer products. We adapted key parameters from the scientific literature to specify the

model and then calibrated it to actual 2018 values for the market. The model details are omitted from this brief article.

Key features incorporated in the model are: 1) only the farms and plants with lowest costs of supplying Prop 12-compliant pork will enter that market, 2) the full cost of compliance must be borne by the subset of products to which Prop 12 rules apply, 3) the costs of segregation and traceability throughout the supply chain add to the cost of compliance, and 4) competition within the supply chain will work to efficiently supply California, as well as markets outside California.

Estimated Impacts of Prop 12 on Pork Prices and Consumer Welfare

Our base case simulation involves the specific parameter values we consider to be most reasonable. Results are presented in Table 1 (on page 8). The model predicts that the average farm price equivalent of Prop 12-compliant pork will rise by 3.7%, or about \$3.00 per hundredweight (cwt). However, it predicts almost no change in the price of noncompliant hogs or pork. Further, it predicts that the average price of uncooked cuts of pork in California (the regulated products) will rise by 7.7%, or about \$0.25 per pound. Finally, our model predicts almost no change in the retail price of pork outside California or in the price of pork products not covered under Prop 12.

Our model suggests that the total quantity of live hogs will not significantly change because of Prop 12. However, the share of live hogs whose pork products are destined for California will decline from 8.8% to 8.3% of North American hogs. California consumers will eat 6.3% less of the regulated, uncooked pork cuts as a consequence of Prop 12. Quantity impacts for uncooked pork cuts for

Table 1. Impacts of Proposition 12 on Hog and Pork Prices and Outputs

Variable	Unit	Base	Prop 12	Percent Change
Prices				
Average price, all slaughter hogs	\$/cwt	79.2	79.4	0.26
Price, hogs for California pork	\$/cwt	79.2	82.2	3.74
Price, hogs for non-California pork	\$/cwt	79.2	79.2	-0.04
Average retail price, uncooked pork cuts	\$/lb	3.30	3.32	0.7
Retail price, California uncooked cuts	\$/lb	3.30	3.55	7.7
Retail price, Non-California uncooked cuts	\$/lb	3.30	3.30	-0.1
Retail price, non-covered pork	\$/lb	3.79	3.80	0.1
Hog and Pork Quantity				
Number of hogs slaughtered	millions	145.0	145.1	0.1
Pork quantity (includes net exports)	million cwt	233.1	233.2	0.1
Quantity of uncooked pork cuts	million cwt	147.1	146.4	-0.5
Quantity of non-covered pork	million cwt	86.0	86.8	0.9
Share of hogs for the California market	%	8.84	8.33	-5.8
Retail Pork in North America				
Retail uncooked pork cuts	billion lb	11.95	11.88	-0.6
California retail uncooked pork cuts	billion lb	1.30	1.22	-6.3
Non-California retail uncooked pork cuts	billion lb	10.65	10.66	0.1
Retail non-covered pork	billion lb	8.55	8.55	0.1

Source: Authors' analysis based on survey and interview information and economic model results.
 Note: cwt= hundredweight.

the rest of North America and for all other pork products, for which Prop 12 compliance is not required, will be negligible.

California pork consumers lose because they will pay about \$40 million more, but that will buy much less pork. For the base model parameters, we project that the economic benefits for California consumers from buying uncooked pork cuts will decline by about \$320 million annually, or about 7.4% of the initial expenditure on uncooked pork cuts.

The impact of Prop 12 on pork consumers in the rest of the United States and Canada will be very small because Prop 12 will cause only tiny changes to prices and outputs. We should note that our estimate of consumer loss does not account for the possibility that fewer pork products

will be sold in California after the implementation of Prop 12 because it will not be worth the cost to introduce new SKUs for niche products.

Finally, we note that our model and simulation results do not incorporate impacts of temporary undersupplies or oversupplies of Prop 12-compliant pork caused by uncertainties about the needed adjustments to and resolutions of legal challenges. There is likely to be a transition period after January 1, 2022, during which markets will not yet have settled on the equilibrium price and quantity impacts. Christine McCracken, Executive Director, Animal Protein at Rabobank, cautioned us in the summer of 2021 that there is some concern in the industry that important and needed market adjustments are delayed, and that pork market disequilibrium and disruption may persist well into 2022.

Conclusion

In passing Proposition 2 in 2008 (<https://bit.ly/37nI0Zl>) and Proposition 12 in 2018, California voters have shown their willingness to impose changes in housing for selected farm animals. What is likely to have been the last of the legal challenges to Proposition 12 was rejected at the end of July 2021 at the same time the state of California was finalizing details of regulations to implement Prop 12.

Advertisements in favor of Prop 12 depicted hogs, chickens, and calves confined in small enclosures. However, those farrowing operations that comply with Prop 12 will almost certainly come from farms that were already implementing group housing. Hence, Prop 12 will result in only slightly fewer sows in stalls and a bit more space for sows already in group housing. Thus, impacts on sow housing will be much more modest than claimed.

We estimate the cost of Prop 12 to California consumers is \$320 million annually, through paying about 8% more for uncooked pork cuts and consuming about 6% less of that pork.

Suggested Citation:

Lee, Hanbin, Richard J. Sexton, and Daniel A. Sumner. 2021. "Voter-Approved Proposition to Raise California Pork Prices." *ARE Update* 24(6): 5–8. University of California Giannini Foundation of Agricultural Economics.

Authors' Bios

Hanbin Lee is a Ph.D. Candidate and Richard J. Sexton and Daniel A. Sumner are Distinguished Professors, all in the Department of Agricultural and Resource Economics at UC Davis. They can be reached at hanbin@primal.ucdavis.edu, rich@primal.ucdavis.edu, and dasumner@ucdavis.edu, respectively.