

# Assessing Impact of Packing Plant Utilization on Livestock Prices

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As the agricultural sector continues to adapt to the situation presented by COVID-19 (Novel Coronavirus), a multitude of questions have developed. One critical development is broader recognition of the importance of ongoing operation of packing plants. This importance reflects the need to sustain ongoing production of meat and meat products for end-user consumption. Moreover, the importance of ongoing operation to ensure business continuity of livestock markets is top-of-mind for producers. While the unprecedented response to the COVID-19 pandemic is evolving rapidly, the goal of this report is to provide big-picture guidance on how sensitive cattle and hog prices are to “regular” operation of packing plants. Some major potential concerns as both the beef and pork industries drift closer to maximum packing capacity are labor availability and temporary plant closures or reduction in shifts. There is a big difference between maximum physical, or rated, capacity and operational capacity with labor often being the driving factor.

## **Approach Overview**

Unfortunately, we are not aware of a robust estimate of packing industry capacity for either the cattle or hog sector. As a proxy for capacity, we have previously found using historical federal-inspected (FI) slaughter estimates useful. Here we consider the maximum FI slaughter over the past three years for a given month to reasonably approximate current capacity. Accordingly, a utilization-to-capacity ratio can be derived by taking current month FI slaughter volumes divided by the maximum FI slaughter which occurred over the past three years for the same month.<sup>1</sup> This approach reflects seasonality in operation and over-time broadly captures changes in overall entry, expansion or contraction, and exit of plants within the industry.

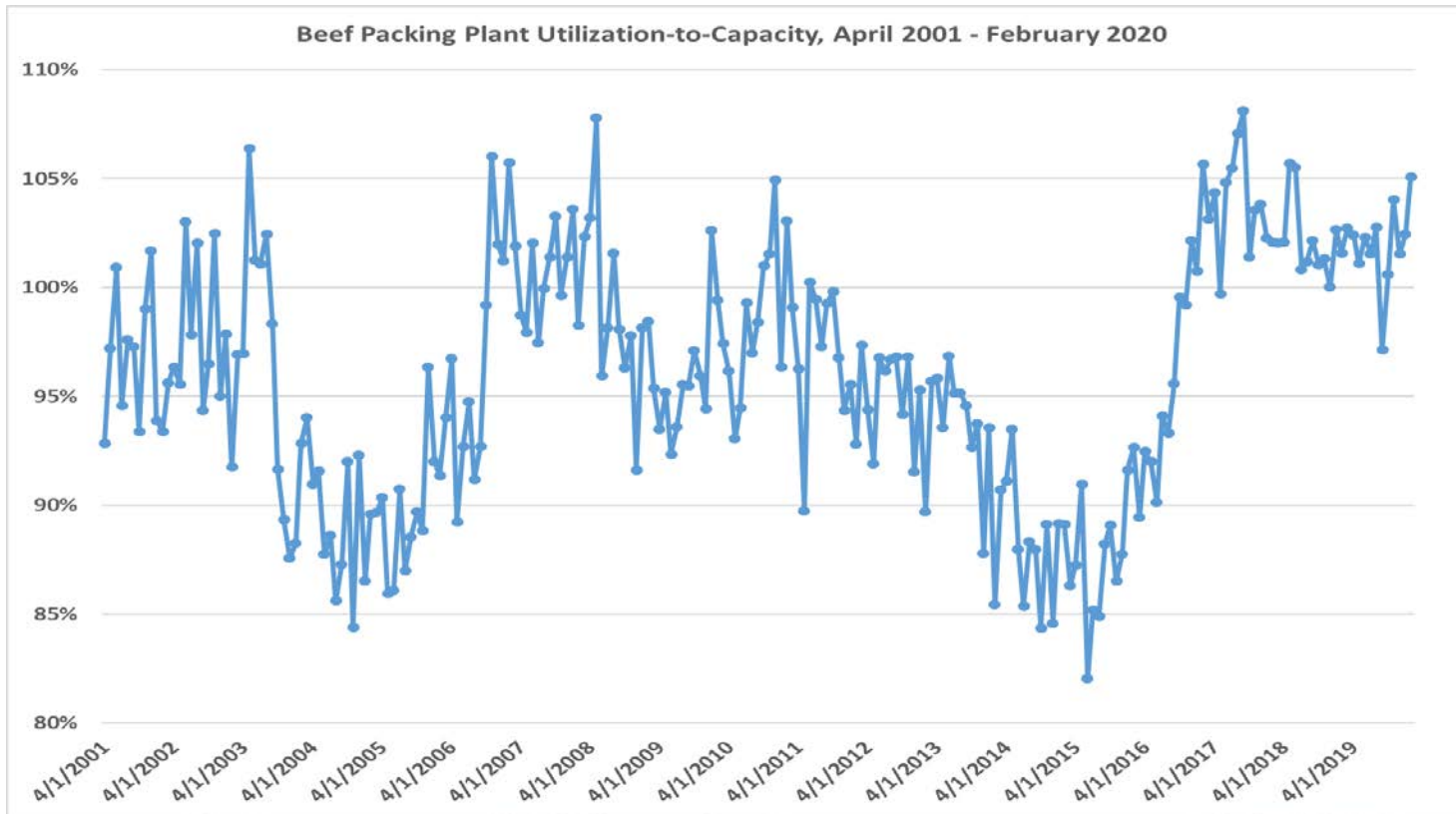
Given an estimate of packing plant utilization, we estimate simple models to see how changes in utilization impact fed cattle and market hog prices. Here we utilize data compiled by the Livestock Marketing Information Center (LMIC) that originates from USDA. The period of April 2001-February 2020 (for cattle) and August 2001-February 2020 (for hogs) is used given data availability following implementation of Livestock Mandatory Reporting (LMR).

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<sup>1</sup> We also utilize slaughter days per month to help account for holiday and related effects. Other approaches were examined and results were relatively robust with regards to the specific approach used.

**Fed Cattle**

The following figure presents how our estimated utilization ratio has varied in the fed cattle sector since April of 2001. Following the extended period of reduced utilization through 2015, utilization has increased notably positioning the industry to be operating at relatively high levels going into the COVID-19 situation. Furthermore, it should be noted that packer capacity is not an average annual concept, it’s how close the industry is to capacity at peak harvest times. Peak fed cattle slaughter typically occurs in the summer.



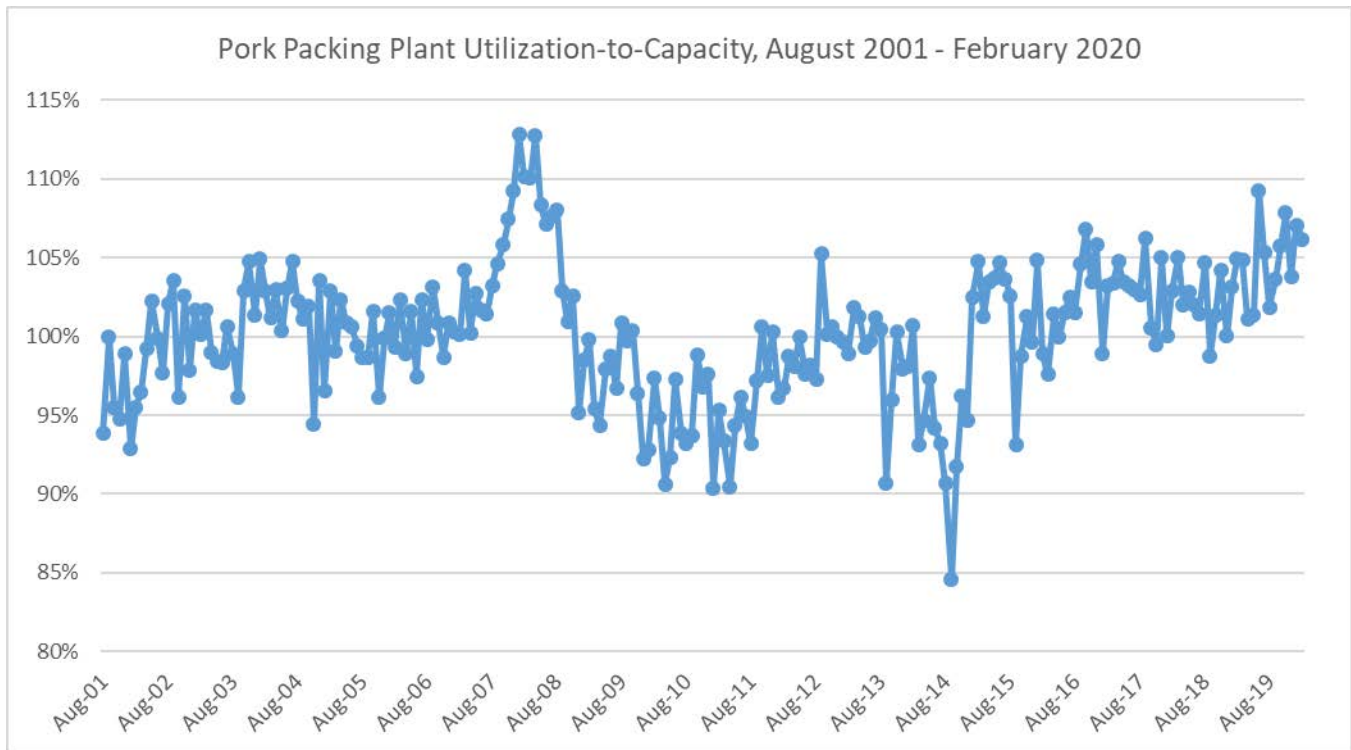
We examined the impact on USDA reported, 5-area weighted average fed cattle prices. Specifically a log-log model was estimated where the natural log of prices was regressed against the natural log of utilization while also including an annual time trend variable.<sup>2</sup> This model indicates that a 1% increase in national beef packing plant utilization corresponds with a 1.32% reduction in fed cattle prices. Accordingly, for demonstration purposes, if the industry operates at 20% lower capacity rates (increased capacity utilization), then we may anticipate fed cattle prices to decline by 26.49%. The extent to which these effects are “already priced” into the market are beyond the scope of

<sup>2</sup> The model’s adjusted R-Square of 0.79 indicates a strong fit while a positive annual time coefficient absorbs other trend effects for simplicity.

this report, but regardless this clearly demonstrates the economic importance of packing plant utilization on cattle prices.

**Market Hogs**

The figure below is used to show the historical level of monthly utilization-to-capacity from August 2001 to present. There was a severe packing capacity constraint during the fourth quarter of 2016 and utilization levels reached the highest levels since 2007 and 2008. High capacity utilization had negative impacts on hog prices. New pork processing plants, steady ramping up of additions, and a few tweaks in smaller plants helped this from occurring again until recently. In the spring of 2019, U.S. hog slaughter capacity was roughly 9.5% larger than it was in the fall of 2015. The industry is capable of running above total rated capacity for short periods. Such was the case, at times, during the fall of 2019. With more hogs forecasted for 2020 there has always been a concern if there would be adequate slaughter capacity late in the year, particularly the fourth quarter. In a normal operating environment, current capacity would be sufficient in the near-term, as the hog market is going into a period of time when slaughter levels seasonally decline. However, a significant threat exists to slaughter capacity if labor for pork packing, processing, and shipping are directly impacted by COVID-19. The industry does not have excess hog slaughter capacity, a cushion so to speak, that could absorb production if a packing plant(s) were to slow down operations or go idle for a period of time.



Using a similar approach for hogs, we examined the impact of utilization-to-capacity on USDA reported, national weighted average barrow and gilt prices. The specific price series referenced was the producer sold total weighted average net price of all purchase types (negotiated, other market formula, swine/pork market formula, and other purchase arrangement). The model indicates that a 1% increase in national pork packing plant utilization corresponds with a 1.82% reduction in hog prices. Using the hypothetical scenario of pork slaughter operating at 20% lower capacity (increased capacity utilization), based on our model, we may anticipate hog prices to decline by 36.35%. Again, the degree to which this may be already priced into the market is unknown.

### **Summary**

This fact sheet aims to provide a timely broad approximation for context as the industry proceeds forward. It is important to note this broad context considers aggregate effects at the national level and regional effects on markets more closely aligned with any specific plants altering operation would likely differ. The impact of a particular plant closure would likely have a lot to do with its location and its size. For example, in 2018, FI cattle slaughter plants with over 1,000,000 head per year capacity slaughtered over 56% of the FI cattle slaughter and FI hog slaughter plants with over 3,000,000 head per year capacity slaughtered over 62% of the FI hog slaughter. This reflects the leveraged, aggregate economic impact that would occur from decreases in capacity of larger plants.

It is beyond our ability to project the likelihood, duration, and extent of packing plants having to operate at reduced levels. Nonetheless, as the entire industry is operating in uncharted territory, we hope this and related resources help decision-makers better assess the complex and ever evolving situation they face. Each day more is learned about COVID-19 and its impact on the human condition and the economy. With the benefit of more knowledge, the livestock industries are becoming better equipped to address the impacts, while preparing for a return to a “normal” operating environment.

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