

Economic Reasons for What was Observed in Fed Cattle and Beef Markets During the Spring of 2020

Stephen R. Koontz – Stephen.Koontz@ColoState.Edu

Department of Agricultural & Resource Economics – Colorado State University

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Events in cattle and beef markets that unfolded from February to the current date were unique and unprecedented, but all also could and maybe should have been anticipated. That is the purpose of this document. There have been many social media statements and some popular press communications maintaining that cattle and beef markets are “broken”, and that legislative intervention is required. Before that, what is in the best interest of the cattle and beef industry is an outline of the events and a discussion of what would be the anticipated market reactions in proper-functioning markets. I will offer that is what has happened. The market events were economically painful for participants especially producers of cattle and sellers of beef. But the direction and magnitude of the market adjustments were due to what was happening to cattle numbers, beef supplies, and disruptions to the supply chain. What began in the U.S. as novel coronavirus (COVID-19) demand disruptions, turned into the worst-case scenario by the emergence of huge supply chain constraints. These market disruptions were experienced by the wholesale sector and particularly by firms that slaughter animals and fabricate meat cuts. Market outcomes can elicit emotional responses – especially when one sees oneself as on the receiving end. But this is the society that we have chosen to construct for ourselves and in which we live. Market economies offer phenomenal opportunities. But come with the substantial risks. There are few guarantees associated with outcomes in a market economy. It is appropriate to ask questions about the proper functioning of markets. But there is a need to assess that functioning and not necessarily whether we prefer the outcome.

Across November, December, and January of last winter the live cattle futures contract prices stopped their moves higher. Contracts expiring in the spring and summer of 2020 pressed life of contract highs across these three months. These futures markets provide a participant-based forecast – or an anticipatory price – for the underlying fed cattle commodity when those contracts expire. The futures market was optimistic but lacked specific news or actual events to move higher. More traditional forecasts and outlook offered by market watchers at the beginning of 2020 warned of increasing protein supplies. Supplies of beef, pork, poultry, and dairy products would increase from 2019 and be large into 2020. Market outlook discussions warned that the anticipated volumes would require proper supply chain management, that domestic demand would need to remain strong, and that substantial exports and export growth would be necessary to avoid potentially significant price declines. Some price declines were reasonably expected. However, the prospects that had captured the attention of market participants and forecasters alike was the opportunity for dramatic increases in exports to China. That was the market discussion offered and can be, for example, found in the USDA Outlook Forum Commodity Outlooks from the meeting February 20-21, 2020.

The main news discussed at the beginning of 2020 by agricultural market watchers were the new, emerging, and anticipated trade agreements and the protein-deficit that was in China created by the outbreak of African Swine Fever. There had been substantial depopulation of the hog herd in China. At the beginning of 2020 there was significant optimism. The U.S. economy was strong, and sectors of the world economy were also reasonably stable. The Chinese economy had suffered the most due to global

trade wars and the general shift away from globalization. However, that economy also had the greatest protein supply needs.

As the first quarter of 2020 progressed, weekly U.S. beef production was larger than a year ago and more than forecasted. Both slaughter levels and dressed weights were bolstered by excellent cattle feeding conditions. These year-over-year increases dampened fed cattle price levels. Then came the news that we all observed in March. Market watchers were not entirely surprised by the news as many asset markets had been in selloffs and some since in January. The oil market turned the corner on January 8. It fell through February and then became a collapse in March. At one point, the futures price for oil during the delivery month was negative – as in less than zero. That was more than 100% decline in price. This was a unique and singular event, but the economics are clear – it was worth it for someone to pay someone else to take oil – oil was so abundant as to be worth less than zero. The stock market indices made a soft rally through February after watching the happenings in the oil market. The 30% selloffs there began in late February. The cattle futures complex took notice of the what was going on in the energy complex on January 23. Cattle – and for that matter most commodity – market watchers follow both oil and stocks as indicators of both domestic and global demand. Hard selling in cattle futures markets began at that point in time. Price declines were close to 40% -- more than stocks but less than hogs and oil. A reasonable market watcher could conclude that numerous market participants – as in most producers – were optimistic to start the year and that because of that perception many risk management positions were lightly implemented. The focus was on the strength of the economy and the upside potential. Risk positioning was likely modest to minimal. The emerging human health crisis and its impact would move to the forefront and change the outlook.

The COVID-19 health crisis in China had been ongoing but appeared to be managed. However, the amount of travel with reasonable world economic activity was something different between this event and the prior deadly SARS influenza virus event. There quickly became an escalating health crisis in Europe, and around New York City and in Washington state in the U.S. With no vaccine, health experts communicated few alternatives with known effectiveness. The health response in the U.S. was initially indecisive – in part because of the few palatable options – and the only choices for policy makers were closing or limiting population movements, along with implementing social distancing in public settings. These health-based actions have resulted in dramatic impacts on the predominant service-based U.S. economy. Unemployment increased dramatically and substantially in a matter of weeks.

The limited population movement has had a dramatic negative impact on energy, travel, hotel, restaurant, and other commonly consumed goods and services by our time-constrained population. Something unique, though, is the abundance of online retailing. Grocery stores and other retail consumer good outlets had depleted shelf-space. Initially, they looked like all the stores that I have experienced before blizzards or hurricanes. But consumption in the economy is not zeroed-out by the limited ability to travel to retail outlets. Online retailers have shown substantial increases in sales, traditional box stores have elevated their online presence, and delivery services have shown strong usage. And while travel, hospitality, and restaurant trade have taken big hits, have laid off workers, and are a key contribution to the economic slowdown. A significant portion of people in the economy are retired. Salaried professional employees can often – and often have already – work from home offices. There also has been a transition to working remotely through this event that so that, certainly more than before, we reasonably continue to conduct work activities. The timing and speed of the return to the-new-normal of economic activity are not known. Still, the uncertainty associated with this

slowdown is rather different than that, for example, of the Great Recession. The uncertainty is not with the stability of lenders or the availability of credit as it was then, but rather the timing and extent of return to an open consumer economy.

Because of the disruption to the economy then the events in cattle and beef markets, and in fact all main protein markets, have been supply chain disruptions. Packing plants have not been able to process animals. Some facilities were closed, for a few days to a few weeks, and others are open but running at reduced capacities. This has been happening across the entire protein processing segment. Estimates associated with the extent and timing of closures and reduced capacity are observable for some individual facilities but difficult to find for the entire beef or pork industries (see the Meating Place Magazine map). So, in part we can rely on Federally Inspected slaughter reporting (see USDA NASS Quick Stats). But these numbers do not communicate regional variations which may be more severe. Federally Inspected (FI) fed steer and heifer slaughter declined through all of April and remains low the second week reported for May. On May 2, 2020, the FI fed steer and heifer slaughter number was 114,800 head and on March 28 the same category was 209,800 head. The number for May 9 is 127,400 head and this is the most recent reported. FI slaughter for these fed animals that comprise almost all fresh beef availability fell between April 4 and April 11 from 200,300 to 156,200 head. This is a 22% decline in a single week. These are not because the packing industry is choosing not to run, and it is not because there is little economic incentive to operate. Instead, it is the inability to run plants due to the human health event and the need to implement mitigations, such as shielding and distancing, within plants. The availability of beef was something like 25% less than the prior year for the nation. Regionally, the reductions will be more variable with some larger.

The slaughter and fabrication volumes that I have observed for individual plants within some packing companies reveal the extent and severity of the operations problem. Plant operations, that I was able to study, showed persistent and dramatic declines beginning in late-March or early-April and are only now showing modest improvements. Some plants fell to operating at below 30% of potential capacity. Volume reductions such as these are just never observed. Some plants operated not at all on some days. There were multiple weeks of operating at approximately 60% of potential – and Pre-COVID-19 – volumes. Currently, the best-case operations for some companies is about 80%. Operations are improving in terms of daily and weekly volumes of animals slaughtered and fabricated. But it is not clear if plant operations will return to prior volumes or capacities.

Similar experiences occurred for pork slaughter and fabrication. There have been double-digit percentage decreases in the number of Federally Inspected market hogs slaughtered weekly. Also, there has been some impact on poultry processing but generally to a lesser extent than for beef and pork. Poultry plants are smaller – not in head number but any single plant processes a smaller portion of the total industry capacity – and slaughter of birds and fabrication of poultry cuts are more automated than either beef or pork slaughter and fabrication.

Downstream meat supply chains were also substantially disrupted. Much meat is eaten away-from-home. For example, half of the beef consumed in the U.S. is consumed away from home. Further, products that are consumed away from home are different than products consumed at home. For beef, it is the end meats that are consumed at home and these are generally the chuck and round primal cuts. Whereas, middle meats which are high-cost high-quality steaks are eaten away-from-home. Hamburger – or ground beef – is the main product people eat both at home and away from home. In watching the

market, we see adjustments impacting prices for the primal cuts when the U.S. population began to be faced with limited-movement orders. Chuck and round prices increased substantially while ribs and tenderloins initially decreased. These were the impacts as restaurant product movement slowed and then stopped, and grocery store retail movement ramped up. However, once packing plants began to see closures and/or reduced operations, and all beef supplies were reduced something close to 25%, then all cut prices increased markedly.

Beef tenderloin prices almost halved between early March and early April. I have never seen this happen. These prices have rebounded since but are currently only about 25% above last year and an average of the prior five years. Beef ribeye also fell 20% in a two-week period in early April before rebounding 40% above the previous year and prior to that five years. Beef loin prices were steady through early April and are now also 40% above last year and five-year averages. On the other hand, beef chuck prices have more than doubled (>200%) while round prices have tripled (>300%) above the prior year and prior to that five years. Given the reduction in beef supplies, middle meat prices are much weaker than end meat cut prices. That is because of the changes in where consumers are eating. The ground beef market is also interesting. Ground beef that is 90% lean – beef from cows and bulls and other nonfed animals – is less than a third higher. While ground beef that is 50% lean – fat and meat trimmings from fed animal carcasses – is now about double the base price but during the initial stages of the plant closures it had increased 500%. (Both products are blended to make hamburger.) Beef cut prices clearly reveal expected market adjustments from the combination of initial plant closures and then reductions in processing speeds after reopening, compounded by the adjustments to shift supplies to retail grocery businesses instead of restaurant and food away-from-home institutions.

The product type and mix that marketed to food service and other institutions is different from what is sold through grocery stores. For example, the typical food service package of bacon weighs 40 pounds. These packages are just not found in retail stores. Similarly, beef brisket cuts sold to institutions might each weigh 20-25 pounds. Routine consumer product weights of brisket purchased at grocery stores are about 8-10 pounds. Neither of these food service products will be found in a consumer shopping cart, and a single institutional sale is multiples of multiple consumer retail sales. Substantial changes to processing and packaging are needed to convert products commonly sold to restaurants and other institutions to products that consumers will buy and buy not without significant price discounts. These are not alterations to products or packages that can be made quickly and without cost. Supply chain disruptions come with losses to efficiency of distribution. Pre-COVID-19, supply chains had predictable patterns and typical flows. Even unique and special sales had predictable timings: holidays especially. These were substantially and significantly changed. Again, about half of beef consumption was away from home. And this volume had reduced to a small portion of that from pre-COVID-19. Food for at-home use needed to elevate, and the throughput in the grocery store system could not easily handle the needed product movement with well-established resupply and restocking patterns.

The U.S. population is also large enough and diverse enough in term of preferences that we do not have a simple national food supply system. Food distribution systems are regional and are often relationship-based. There are national chains, but most of the largest grocers and distributors are regionally managed. As an example of this issue, if restaurants in a given region are closed for four weeks, then all of those fresh meat and vegetable products – that are not storable – must be sold to a different buyer, perhaps in a new form, and transported to new markets. If they are not then we would expect to see, and did see, videos of farmers destroying fields of vegetables that are ripe and without a market.

Similarly, retail grocery stores will see substantial demand – for initially different products than the food away-from-home outlets make use of. And the food-away-from-home products will be at the same time abundant. For example, with respect to beef products, the highest quality grade with the highest marbling and fat content are typically not sold as fresh product direct to consumers. This product will be sold to and used by restaurants and food service and will be marketed to beef consumers after preparation. The highest quality beef cuts are marketed through restaurants and when not, are predominately sold into the north central and north east populations centers of the U.S. Most high-quality carcasses and cuts are rarely marketed as fresh beef to southern and west coast regions. Again, the exception is through restaurants. Disruptions to meat supply chains due to closures and limited population movements were substantial and should not be ignored. These disruptions had and are having continued impacts on traditional trading relationships, flows, and patterns. These disruptions are not small, it's half of the beef trade and consumption, and not without cost. And are also not limited to the meats.

Much has been made about packer margins: the difference between composite wholesale beef prices including the by-product value and those values relative to fed cattle prices. Margins are record large. This is to be expected, is not evidence of the marketplace being broken, and is, in fact, the marketplace providing proper signals. The signal is clearly for the packing sector to operate at as high of capacity as possible. Packer operations are limited by labor availability. And initially, some constraints placed by health agencies. And then by factors internal to the facilities. Social distancing is relatively impossible in some facilities. Incorporating distancing and shielding between workers often required changing the plant layout and slowing the line speed. Further, some workers have been fearful of working and rationally choose to limit work to potentially avoid illness.

To expect historical relationships between meat price and livestock prices to persist when major facilities in the packing sector are at times closed and in others operating at reduced capacity has no economic foundation. Reduced capacities substantially increase packing costs as the largest portion of these costs are fixed – costs incurred whether a plant runs or not – and are related to the cost of the physical assets such as the buildings and equipment.

Speaking more about plant costs, a typical commercial slaughter and fabrication beef facility can run at a cost that is reasonably and approximately \$180-\$225 per head. That is if the plant runs multiple shifts per day and the entire week. Importantly, if the plant is operating at an efficient rate with high and steady throughput then the plant can obtain its potential operating capacity. Commercial plants operate two shifts per day, for six days a week, and typically process at least 300 head of fed cattle per hour. These plants will process 25,000 to 35,000 head per week. Reducing the operating rate relative to potential capacity increases the cost per animal incurred during operations. The majority of a packer's expenses are for the physical facility, equipment, management, portions of the meat sales force and company management. Labor, energy, and materials costs are also important, but these variable costs are less than fixed costs. The fixed costs do not decline, in the short run, if a plant or a variety of plants owned by the firm do not operate at potential capacity. Reducing operations by 20% then increases costs per animal by 7%-10% relative to the lowest potential costs. Reducing operations by 40% then increases costs per animal by 15%-20% again relative to the lowest potential costs. This assessment is based on research in the public-domain (see USDA RTI LMMS). Reducing the operating rate of packing plants increases the costs of operating and increases costs at an ever-increasing rate. The most expensive-to-operate commercial plants when operated at reduced capacity incur costs of about \$300-

\$350 per head. And this compares to very small packing operations that serve the freezer beef market with best-case costs of \$600-\$700 per animal.

For a given facility, costs are lowest when running the plant at closest to potential capacity. And across the spectrum of possible plants, the larger plants have far lower costs per unit processed. These are simple plant-economics truths. It is possible that plants can be so large as to be bigger than the regional supplies of animals and that transportation costs may make the facility uneconomical. But this is not common, nor much discussed by packing industry participants.

It is difficult to estimate costs for the plants whose operations numbers that I have seen during this spring. (And operations numbers are one thing, but account costs are something else in terms of sensitivity.) In all the meat packing plant operations data that I have seen, I have never seen plant volumes decline so steadily to such low levels. In any other situation, plants would cease operations. The managing firms would have temporarily closed the plants rather than operate at such low levels. But this situation is unlike any other. Economics is not driving meat packing plant operations. It is the pandemic. The following estimate is based on economic logic and not accounting data. If a plant is slaughtering and fabricating 30,000 head per week at an average total cost of \$200 per head, then that same plant operating at 8,000 head per week would have a cost of \$750 per head. Cost increases associated with COVID-19 mitigation within the plant, for example shielding, would increase that estimate further. Similarly, if that plant returns to 60% of capacity then costs are \$334 per head – and again there will be additional costs due to mitigation efforts. The slowing of plants that as has been observed has substantially increased costs.

Returning to margins, record high meat prices are not a surprise. The grocery store supply chain was emptied during the closures of local economies and then had difficulty catching up. Further, prices associated with specific cuts that consumers typically prepare at home were the highest. Prices of cuts sold at restaurants initially dropped to record lows and then rallied as consumers made substitutions and began purchasing cuts they did not buy typically. However, all rallied as total beef supplies diminished with closures and partial operations.

Record low livestock prices are also not a surprise. If packers cannot run or cannot run at typical throughput levels – especially if animal supplies are abundant – then the marginal value of that last group of animals that is not-sold is close to zero. And the last pen or truckload or group of animals is a perfect substitute for the first. It is the marginal value of the last product that sets the market. This point is critical. In fact, that is what is communicated by economists when supply and demand curves are drawn on that well-known figure. The equilibrium quantity and price are what is traded at the lowest marginal value to buyers and the highest marginal value to sellers.

Again, the marginal value of refilling the meat case by the retailer is high. They want the meat case, maybe not full, but undoubtedly not empty. Similarly, the marginal value to the packer of all the available animals is low when those packers cannot run for lack of some portion of their labor or for the need to implement spacing and shielding within plants. Critics of what is happening are assuming an efficiently run packing sector. Or a packing sector with no constraints on operations. This assumption is ignoring all that is happening in the country, and the world, or is a narrow focus on self-interests. And clearly not a recognition of the problems occurring in the packing sector and in the transition from the consumer eating half their meals away from home to almost none.

Turning to the fed cattle and feeder cattle markets, the economic incentives communicated by the various cash and futures markets are reasonably obvious. Currently, there are far more fed cattle than can be processed. The critical constrained stage is animal slaughter and meat fabrication. Therefore, the economic signals communicated by the pricing system are to slow cattle growth, slow the rate of throughput or turnover, and stretch out cattle supplies. Past incentives were largely the reverse: a rapid growth process that, results in higher beef product quality, required less capital. The signals communicated now are to extend inventories as long as possible. The end of the current human health event is not known or at least the return to some normalcy is not clearly seen by the market. It would likely be revealed in oil and other consumer energy markets or in the stock market asset indices.

Similar to how this discussion was started, prices for futures contracts communicate when the marketplace as a community thinks events will pass for the fed cattle and feeder cattle markets. Live cattle futures – the financial product derived on fed cattle prices – are weak through August, begin to rally in October, and seasonally peak next April at slightly better than \$109 per hundredweight. There is then seasonal weakness into the fall of 2021 with prices trading slightly above \$100 per hundredweight. These are only somewhat pessimistic prices – they are about \$10 per hundredweight below pre-COVID-19 forecasts – and are not unreasonable if the economy remains weak. Feeder cattle futures prices communicate a similar market recovery, and this is not a surprise. Feeder cattle prices remain weak into September and then rally into next year. Current prices of the deferred contracts are close to \$130 per hundredweight. This is below the \$150 peaks of last winter but are consistent – or are a bit too strong – given a \$100 to \$110 fed cattle market. Feeder cattle are \$15-\$20 below pre-COVID-19 forecasts. The futures market communicates economic issues, or a willingness to sell any rally opportunity, through the remainder of 2020. But the market returning to more normal price and margin relationships by 2021. And more normal is in the context of weaker domestic and international economies. Overall prices are lower, but margins appear more typical.

A parallel exercise is possible for hogs and milk. Lean hog futures communicate a more normal market only after going well into 2021. Seasonally, hog prices are at their lowest in December of any year – supplies are most abundant, and feed is cheapest. December 2020 futures are trading just above \$50 per hundredweight. That is a historically weak price. And the market is forecast to rally into the summer of 2021. Contracts that expire in June, July, and August of 2021 are priced above \$73 per hundredweight. This is a reasonably high price, but of course the market assessment could be that hog producers will just substantially reduce production. This appears to be happening, but we have also seeing strong pork exports – especially to China. Class III milk futures contract prices show the manufacturing milk market price returning to the \$16-\$17 per hundredweight – from current lows of \$12 – by June and July of 2020. This is a quick rebound that is not entirely supply driven.

Let's think about risk management for the moment. I am familiar with two general portfolios of dairy producers. The first is a top producer group – for any number of reasons. Their financial situation at the end of 2019 was healthy and they looked at 2020 as an opportunity to accept the risk and potentially reap substantial gains. The second group was in financial difficulty – again for many potential causes with no judgement. Lenders required the second group to be aggressive risk managers to protect the capital that they had. The same ledgers had no such requirements on the first group. Five months into 2020, the financial conditions of the two groups had reversed. The second group that managed risk had protected their capital. The first group that had assumed risk had lost much capital as milk price collapsed – distribution systems for dairy product manufacturers were also disrupted. This experience is

not unique to dairy producers. There has been a similar experience with cattle feeding businesses, calf growing enterprises, and hog operations. Cautious risk managers have weathered 2020 in much stronger financial condition than those that looked at 2020 as an opportunity to take what looked like reasonable risks with considerable upside potential.

The meat packing industry, while part of the food system and in that capacity is essential, is entirely privately owned, or in a few situations cooperatively owned. The economic losses are borne solely by the investors and owners in that sector. Losses are not shared with the public and the packing industry receives no public support. In fact, compliance with public mandates are often leveled on the packing industry. For example, food inspection is required for some of the most common forms of trade and packers pay for this inspection. Clearly, this cost is passed on to consumers of the product but there is not public investment in the packing industry. In this type of industry there will be few capacity cushions and there are few backups for low-probability emergencies. Excess capacity must have some likelihood of probable use and profitability. Or such capacity might be in isolated regions or where there are niche opportunities. The industry simply does not invest in plants that might run.

An exacerbating factor are the economies of size. Packing firms and plants show strong economies of size. This is an overwhelming conclusion from existing research. Thus, once very large investments are made in facilities then those assets are made use of to the extent possible. Closure or limited use of a given facility, therefore, has a significant impact on market-level supplies of cattle and beef. But most of the time – so far anytime outside of a worldwide human health pandemic – these low-cost facilities are economically beneficial to the consumer and producer, and therefore to the economy as a whole. Efficient manufacturing – any manufacturing – is beneficial in the long-run but not necessarily at every moment and during disruptions.

I am unaware of a policy debate existing in any public forum where the question was should public funds be invested to provide meat processing capacity, that is not used because when it is not needed, but the investments made just-in-case. This has never happened. One reason is that just-in-case events are so low-probability. The events we are experiencing we have not experienced in our modern economy. And second, these investments are so costly. The investments would likely need to be entirely written off by the investing public. Finally, it is likely at any public stake will eventually get sold to the packing industry – provided the facility is functional and similar to a like investment. In the end, these investments by the public would eventually be purchased by the packing industry at a discount.

Some Resources

Meating Place Magazine resource: meat plant COVID-19 cases map:

https://www.google.com/maps/d/u/0/viewer?hl=en&ll=40.06862612431667%2C-99.78282480024967&z=7&mid=1vpbLCKW_gW0DiUVg_n7lZ-gLeBUWqqiD

USDA Agricultural Outlook Forum Commodity Talks:

<https://www.usda.gov/oce/forum/2020/Outlooks.htm>

USDA RTI Livestock and Meat Marketing Study:

https://www.gipsa.usda.gov/psp/publication/live_meat_market.aspx

USDA NASS Quick Stats: <https://quickstats.nass.usda.gov/>