Agriculture By the Numbers

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Does it Pay to Purchase, Develop and Market Bred Heifers and/or Pairs?

Jon T. Biermacher, Professor of Practice and Livestock Development Specialist and Gavin Eeg (Eeg Cattle Company, Greenbush, Minnesota)

The beef cattle herd contraction due to prolonged drought over the past four years has resulted in record-high cattle prices and increased questions about when ranchers will initiate expansion. In anticipation of an impending expansion, some producers have expressed interest in understanding the potential profitability of purchasing backgrounded (wintered) heifers, breeding them and selling bred heifers or calving them out and selling pairs. To address this question, we developed a benefit-cost model that accounts for production costs, sources of revenue and net return to land, labor, management and overhead for a heifer development and marketing enterprise.

The base-case model discussed here was set up to account for the costs of purchasing one hundred 750-pound backgrounded heifers between late April and early May of 2025 for a price of $2.75/pound ($2,063/head). Cattle prices (purchase and sale prices) were obtained from the NDSU publication, "Plotting a Course - Planning Prices," which reports short-term and long-term cattle prices for the 2025 production year and adjusted them to reflect the beginning and ending months of the enterprise. The publication can be found at ndsu.ag/plottingacourse.

At the time of purchase, heifers are transported from a local sale barn and turned out on pasture for about 180 days and then moved to drylot, where they will receive feed, minerals and hay during the winter for 185 days. We assumed a cost of pasture equal to a rental rate of $30/acre and a stocking rate of eight acres per head. Clean-up bulls were assumed to need 10 acres of pasture/head for two months. A price of $75/ton was assumed for good quality grass hay, and a price of $150/ton was used for feed supplementation. We also accounted for the costs of a 90-horsepower tractor valued at $40,000 used for two hours per day to supply feed and hay during the winter period. Depreciation and interest were calculated, assuming a seven-year life of the tractor, a $15,000 salvage value and an annual interest rate of 7.5%. Fuel was assumed to be $3.50/gallon, and lube and repairs were calculated at 2% of the annual value of the tractor.

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Does it Pay to Purchase, Develop and Market Bred Heifers and/or Pairs? — continued from page 1

Veterinary/health regimens for heifers and clean-up bulls were included in the analysis following standard beef quality assurance (BQA) protocols. All cattle received vaccinations for IVRV-BVDV-BRSV-VIB-Lep5, blackleg, pinkeye and foot rot, and all were treated for parasites. In addition, we account for the costs of breeding heifers using an artificial insemination program, including the cost of a certified AI technician. The AI program requires a seven-day synchronization protocol plus the use of clean-up bulls with a ratio of one breeding bull per 33 heifers. More details about the synchronization program can be found at www.ag.ndsu.edu/news/newsreleases/2025/april/estrous-synchronization-with-natural-service-offers-many-benefits-to-the-cowherd. We assume that clean-up bulls have an initial value of $5,000/head with a life expectancy of five years and receive a breeding soundness exam prior to turnout.

The costs for transporting cattle were also included in the analysis. For the base-case model, we assumed that cattle would be transported a round-trip distance of 60 miles from a local sale barn at a price equal to $3.50/mile. Because sizes of trucks and trailers vary, we assumed all cattle are transported using a standard cattle truck with a pot belly trailer that has a maximum weight limit of 50,000 pounds. Based on the beginning and ending total weights of the 100-head enterprise, it was determined that two pot belly cattle trucks would be required for each of the two trips to and from the salebarn, which costs $840 total, or $8.40/head.

We also accounted for the cost associated with borrowed capital for operating expenses (i.e., feed, hay, fuel, lube, repairs, breeding, vet/health and transportation) and operating capital used to purchase and own backgrounded heifers during the year. These costs were calculated using an annual interest rate of 7.5%.

Marketing costs included a sales commission of 3% on the weighted final average value of the animal sold (i.e., bred heifers, pairs and opens) on a $/head basis, a $2/head salebarn fee for insurance and yardage, a $2/head fee for the beef checkoff program and $0.85/head for brand inspection. Operating capital was not used to cover the marketing expenses, as they were paid at the time of the sale of cattle at the end of the production system.

Sources of revenue are derived from the sale of bred heifers, pairs and opens. Bred heifers and opens were calculated as the product of their final weight and their projected price ($/pound), and pairs were calculated as the projected price per pair. We assumed that 10% of the heifers would not breed up successfully and would be sold as open at the prevailing projected price. Between mid-April and mid-May of 2026, open heifers would weigh 900 pounds/head and receive the projected price of $2.75/pound ($2,475/head), bred heifers would weigh 1,000 pounds/head and receive the projected price of $3.25/pound ($3,250/head) and cow/calf pairs would weigh a combined 1,000 pounds/head and receive a projected price of $3,750/pair ($3.75/pound). Net return was calculated as the difference between gross revenue and total production costs for three different marketing scenarios, including (1) selling 10 opens, 45 bred heifers and 45 pairs, (2) selling 10 opens, 0 bred heifers and 90 pairs and (3) selling 10 opens, 90 bred heifers and 0 pairs.

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Sources of revenue, production costs, net returns to land, management and farm overhead for the base-case enterprise are reported in Table 1. Net returns for the base-case model (scenario 1) were $195.68/heifer ($19,568/operation), which was $500/head less than the model scenario (scenario 2) where producers calved out all 90 of their bred heifers and sold them as pairs along with their 10 opens. Scenario 2 generated the greatest net return of $702/heifer, or $70,184 for the 100-head operation. The difference in net returns between these two scenarios is driven by the difference in the price of pairs and the price of bred heifers. Comparatively, the model suggests that, for each bred heifer sold, farmers would forgo $500/head ($3,750/pair minus $3,250/bred heifer) that would have been generated if they allowed bred heifers to calve and marketed them with their calves as pairs.

The benefit-cost model used for 2025/2026 development and marketing period discussed above is being developed into an interactive calculator that will allow cattle producers to adjust prices and other key parameters to better reflect their specific availability of land, labor and financial resources for their farms. This flexibility will allow producers to set the model up for their farms and use it each year. The calculator will be finished and uploaded onto our NDSU Extension website for anyone to use before July 1 of this year.

Please feel free to reach out with any questions you might have at jon.biermacher@ndsu.edu.

Table 1. Expected Revenues, Production Costs and Net Return to Land, Labor, Management and Overhead for the Heifer Development and Marketing Enterprise

Base-case sources of revenue	$/head	$/operation
Bred heifers: 45	3,250	146,250
Pairs: 45	3,750	168,750
Open heifers: 10	2,475	24,750
Total gross revenue	**3,398**	**339,750**
Production costs	**$/head**	**$/operation**
Heifer purchase	2,062.50	206,250
Pasture rent	240.75	24,075
Feed, hay and mineral	485.63	48,563
Tractor depreciation, interest, fuel, lube and repairs	14.98	1,498
Breeding (AI plus clean-up bulls)	73.26	7,326
Veterinary and health treatments	10.53	1,053
Transportation	8.40	840
Interest for operating expenses	44.31	4,431
Interest for owning the heifers	154.69	15,469
Marketing (commission, checkoff, insurance, etc.)	106.78	10,678
Total cost of production	**3,201.82**	**320,182**
Net return SC1: market 10 opens, 45 bred heifers, 45 pairs	195.68	19,568
Net return SC2: market 10 opens, 0 bred heifers, 90 pairs	701.84	70,184
Net return SC3: market 10 opens, 90 bred heifers, 0 pairs	-22.57	-2,257
Breakeven purchase price for wintered heifers ($/head)	3,620	—
Breakeven sale price of pairs ($/head)	2,946	—

Rates of Returns on Farm Assets and Equity Continue to Decline

Bryon Parman, Agricultural Finance Specialist

When conducting ratio analysis for farming, the profitability measures evaluate the value of goods produced versus the cost of resources to produce them. These measures include the rate of return on assets, the rate of return on equity, operating profit margin and asset turnover ratio. These four ratios for profitability have been established by the Farm Financial Standards Council and are part of 17 other farm financial ratios that make up the farm financial scorecard. Furthermore, the Farm Financial Standards Council has established benchmarks for each ratio. For the rate of return on assets, a ratio of over 4% is considered stable, while a ratio over 8% is considered strong. The rate of return on equity has a slightly lower benchmark for "stable" at 3% but a slightly higher benchmark for "strong" at 10%. Both of these ratios are important in that they establish the interest rates being earned on all assets (rate of return of assets) as well as the interest rates being earned by the business owner's investment in the business (rate of return on equity).

Using the North Dakota Farm Business Management Education Program data over the last decade and further, we can look at net farm incomes versus rates of returns on assets (RORA) and rates of returns on equity (RORE). Figures 1 and 2 show net farm incomes from the Red River Valley and RORE and RORA for the same region. While it is obvious that low net farm incomes from 2013-2019 resulted in low rates of returns on assets and equity, it is also noteworthy that nearly the same net incomes in 2020 and 2024 yielded different rates of returns on assets and equity. In 2020, the rate of return on assets was nearly 5.5%, and the rate of return on equity was just over 7% in the Red River Valley, with a net farm income of just below $197,000. In 2024, net farm income in the Red River Valley was just over $200,000, and the rate of returns on assets and equity were 4.1% and 3.6%, respectively.

The same relationship has occurred for farms in North Dakota outside the Red River Valley Region. Figures 3 and 4 show net farm incomes and rates of returns on assets and equity for those North Dakota farms outside of the Red River Valley. While net farm incomes in 2020 for non-Red River Valley farms were a bit higher than 2024, rates of returns on assets and equity were significantly higher in 2020 vs. 2024. The difference for non-Red River Valley farms from 2023 versus 2024 is even noticeable — net farm incomes in 2024 were higher than 2023, yet the rates of returns on assets and equity in 2023 were noticeably higher.

The main reason for the diminishing rates of returns is rising land prices and equipment costs. Estimates suggest that 83% of farm equity is wrapped up in

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Figure 1: Red River Valley Net Farm Income 2011 - 2024

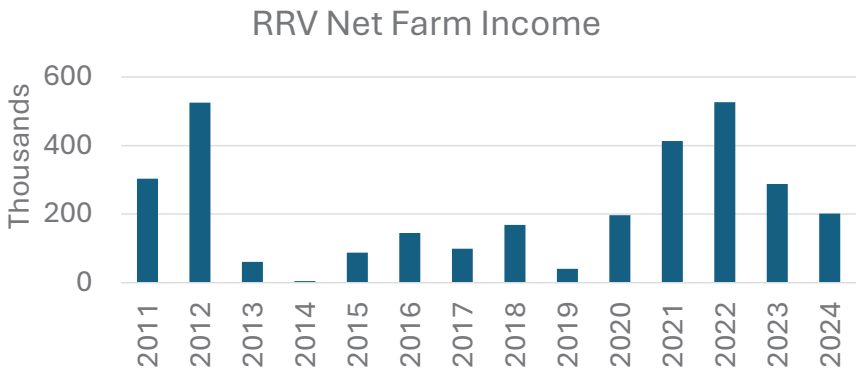
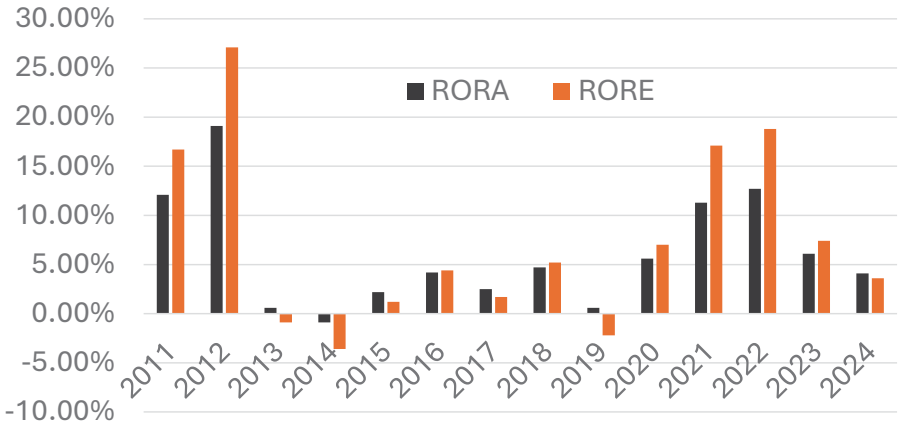


Figure 2: Red River Valley Rates of Returns on Assets and Equity



Rates of Returns on Farm Assets and Equity Continue to Decline — continued from page 4

land, while another 7-9% is contained in equipment values. Those two asset classes have seen dramatic appreciation from 2021-2024 growing much faster than the overall rate of inflation, which impacts all other production costs as well as incomes. Essentially, the capital cost of raising a crop has increased while income generation potential from yield trend increases, production efficiency via economies of scale and economies of scope and commodity prices have not. Basically, even accounting for inflation, farmers are spending more today on the assets required for production but not getting an equivalent in return. This situation is exacerbated by the fact that interest rates and rates of returns on other potential investments have increased over that same period of time.

It is difficult to imagine that this trend is sustainable moving forward. Theory would suggest that at some point, major farm assets such as land and equipment should be supported by the income generation potential that they create and not hinge mainly on capital gains. This would require a period of time where incomes start growing faster than asset values, or a decline in major assets — including land and equipment — especially if interest rates and other investment options continue to be substantially higher than the typical rates of return.

Figure 3: Non-Red River Valley Net Farm Incomes 2011-2024

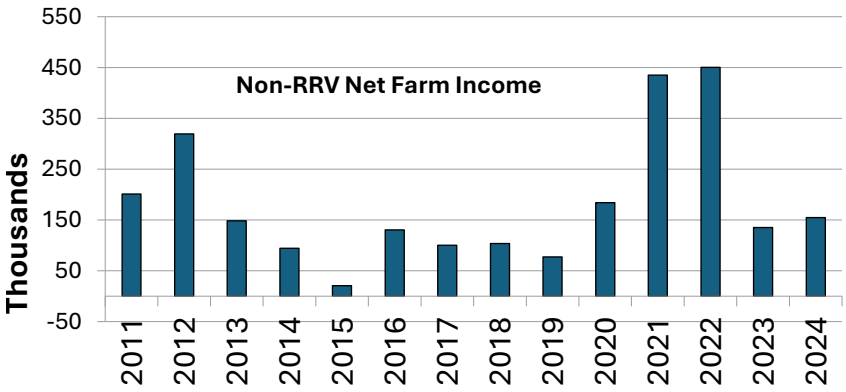
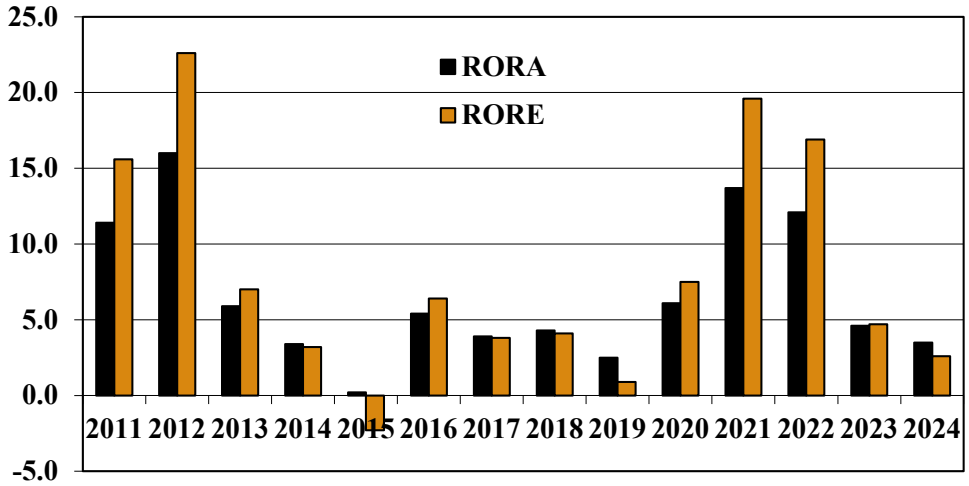


Figure 4: Non-Red River Valley Rates of Returns on Assets and Equity



Supply and Demand Factors to Watch for Fall Calf Prices

Tim Petry, Extension Livestock Marketing Specialist

As the 2024 beef calf crop marketing season winds down, the focus now turns to factors affecting prices for the 2025 calf crop.

All market classes of beef cattle were record high throughout 2024. That trend has continued in 2025, supported by short cattle supplies resulting from six straight years (2019-2024) of beef cow liquidation and good beef demand.

Many supply and demand fundamentals affect cattle prices.

The three most important factors to watch for fall calf prices are potential calf supplies, corn prices and fed cattle prices, especially the distant live cattle futures prices for contract months when the calves will ultimately reach slaughter weight.

The 2024 U.S. calf crop (including beef and dairy calves) at 33.53 million head declined for six years and was the lowest since the 33.5 million head in 2014. The 2025 calf crop will be lower again, because the Jan. 1 beef cow herd was down 0.5%, and beef heifers expected to calve were down 1.7%.

The first USDA National Agricultural Statistics Service (NASS) 2025 calf crop estimate will be made in the July "Cattle" inventory report to be released on July 25 at https://usda.library.cornell.edu/concern/publications/h702q636h.

Potential Fall calf supplies may be affected by the outbreak of New World Screwworm in Southern Mexico. On May 11, U.S. Secretary of Agriculture Brooke Rollins suspended live cattle, horse and bison imports through U.S. ports of entry along the Mexican border. During the fall calf marketing season, Mexican calf imports average about 25,000 head per week to graze winter wheat in the Southern Plains. In November 2024, Mexican cattle imports were suspended due to New World Screwworm, but were reinstated in February 2025.

Fed and feeder cattle prices, along with futures market prices, continue to set record highs.

Demand for high-quality beef has remained strong despite record-high beef prices. The choice boxed beef cutout value also continues to set weekly highs, buoyed by strong, seasonal demand.

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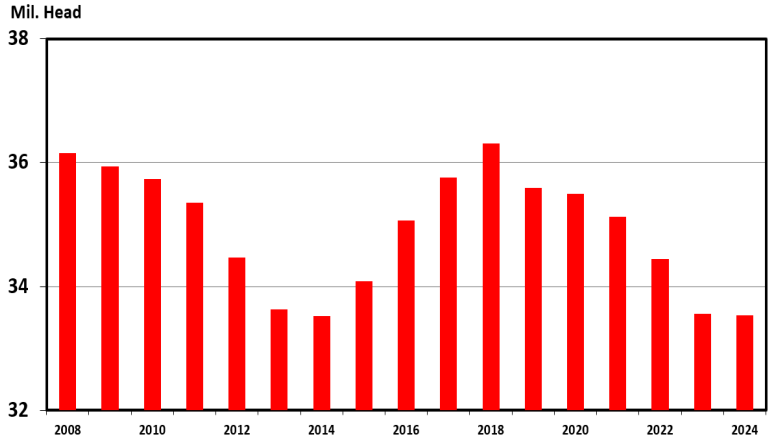
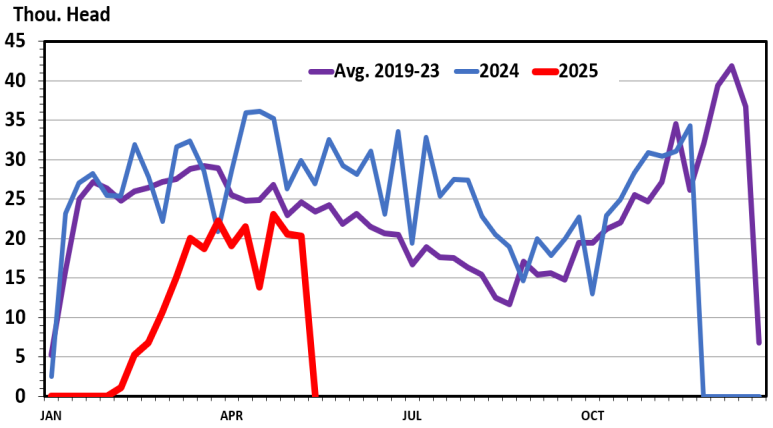
Calf Crop — U.S., Annual



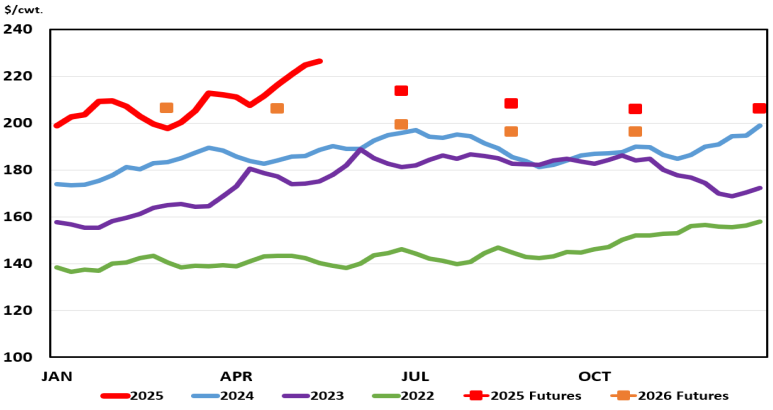
Source: USDA NASS

Feeder Cattle Imports From Mexico — Weekly



Source: USDA AMS and APHIS

Fed Steer Prices — 5 Market Weighted Average, Weekly



Source: USDA AMS

Supply and Demand Factors to Watch for Fall Calf Prices – continued from page 6

Another indication of strong demand is that beef production in the first quarter was nearly the same as last year, with higher carcass weights.

USDA predicts fed steers to average $214/hundredweight (cwt.) in 2025 and $223/cwt. in 2026.

The 2024 national average corn price received by farmers declined from $4.55 per bushel (bu.) in 2023 to $4.35/bu. in 2024.

A 10 cent/bu. change in corn prices usually results in a $1/cwt. change in fall calf prices in the opposite direction. So, declining corn prices were supportive to record record-high calf prices.

Looking ahead to the potential 2025 corn crop, NASS released the "Prospective Plantings" report on March 31.

The report indicated that U.S. corn producers intend to plant 95.3 million corn acres in 2025, up 4.7 million acres from last year.

The May 12 USDA World Agricultural Supply and Demand Estimates report, USDA's first estimate of 2025 corn production and expected price, estimated the 2025 corn price at $4.20/bu., down 15 cents from 2024 (www.usda.gov/oce/commodity/wasde). A potential record corn crop with lower corn prices would be supportive to fall calf prices.

The Western Corn Belt is experiencing dry conditions, particularly in South Dakota and Nebraska.

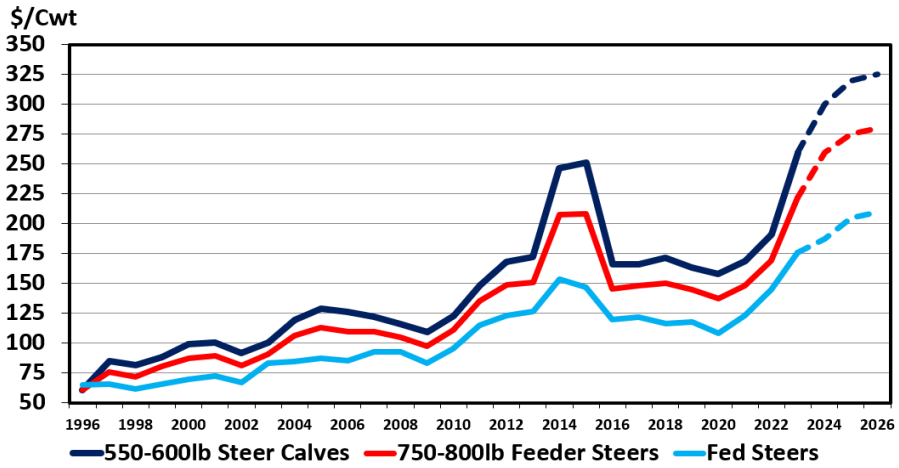
Corn planting progress, final planted acres, crop development and expected yield information, along with a dynamic corn export market, may cause significant corn price volatility this spring and summer.

The declining beef cow herd and calf crops will mean fewer cattle marketed and potentially declining beef production in 2025. That will be supportive to fall calf prices.

However, price volatility and risk will likely continue. Drought conditions linger in some areas, the potential size of the 2025 corn crop is unknown, domestic and export beef demand face challenges and the impact of geopolitical, tariff and trade issues are dynamic and uncertain.

Marketing plans with price risk management strategies that set a floor price but leave the top side open should be considered.

Average Annual Cattle Prices — North Dakota



Source: USDA AMS

Continued U.S. Soybean Exports to China are Important for Market Prices

Frayne Olson, Crop Economist/Marketing Specialist

As of June 2, 2025, the U.S. and China were engaged in closed-door trade negotiations. U.S. and Chinese officials are attempting to create an agreement that would prevent another extended trade war between the two countries. Public information about these negotiations is limited, but indications are that the talks are going slowly.

The May 2025, edition of Agriculture By the Numbers discussed the strong seasonal pattern for U.S. soybean export sales. Export sales and deliveries are strong between October and February, then slow dramatically when Brazil and Argentina begin their soybean harvest and export season.

This seasonal pattern is providing a narrow window for U.S. and Chinese trade negotiators to develop an agreement that could avoid future grain trade disruptions. However, some crop market analysts and traders are debating what might happen if an agreement is not reached before harvest and U.S. soybean exports to China are restricted.

The first response is that U.S. soybean prices would likely drop because Chinese purchases of U.S. soybeans would be lower. In addition, Brazilian soybean prices would likely rise because China would need additional supplies from other countries. Profit margins for Chinese soybean crushers would fall, and processing volumes would likely drop, tightening Chinese domestic supplies of soy oil and meal.

The next question is how far U.S. prices would drop. Unfortunately, there are too many unknowns to try to forecast specific market price levels.

A related question is if U.S. prices do fall, are there other countries that could buy more U.S. soybeans to compensate for lower Chinese purchases? Once again, the answer depends on how far prices fall.

The most recent USDA Export Sales and World Agricultural Supply and Demand Estimates (WASDE) information suggest that about 20% of all U.S. soybeans will be exported to China during the current 2024/25 marketing year. Even though the total export volume to China has dropped in the past several years, China remains the largest U.S. soybean buyer.

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Continued U.S. Soybean Exports to China are Important for Market Prices – continued from page 8

Figure 1 shows the historic import levels for the seven largest global soybean importers by marketing year. China is by far the largest buyer of whole soybeans in the world. The European Union is a distant second, and Argentina is the third-largest buyer. Argentina imports soybeans from Brazil, Paraguay and Uruguay to supplement their domestic crushing industry.

One of the big challenges to finding alternative export markets of U.S. soybeans is the need to sell to countries with existing soybean crushing capacity. Unlike corn, soybeans must be processed, or crushed, into soy oil and meal before it can be used for livestock feed, cooking oil or biofuels.

Figure 2 shows the historic domestic crush levels for the seven largest global soybean crushers by marketing year. Once again, China is the largest global soybean crusher. The U.S. is second, Brazil is third and Argentina is fourth. The European Union is a distant fifth, followed by India and Mexico.

It is unlikely that Brazil and Argentina are viable export markets for U.S. soybeans. This leaves the European Union, India and Mexico as potential alternative buyers. Mexico is already the second-largest buyer of U.S. soybeans, behind China, and may be able to purchase more U.S. soybeans. If Brazilian soybean prices increase due to more sales to China, then the European Union, India, Egypt, Thailand

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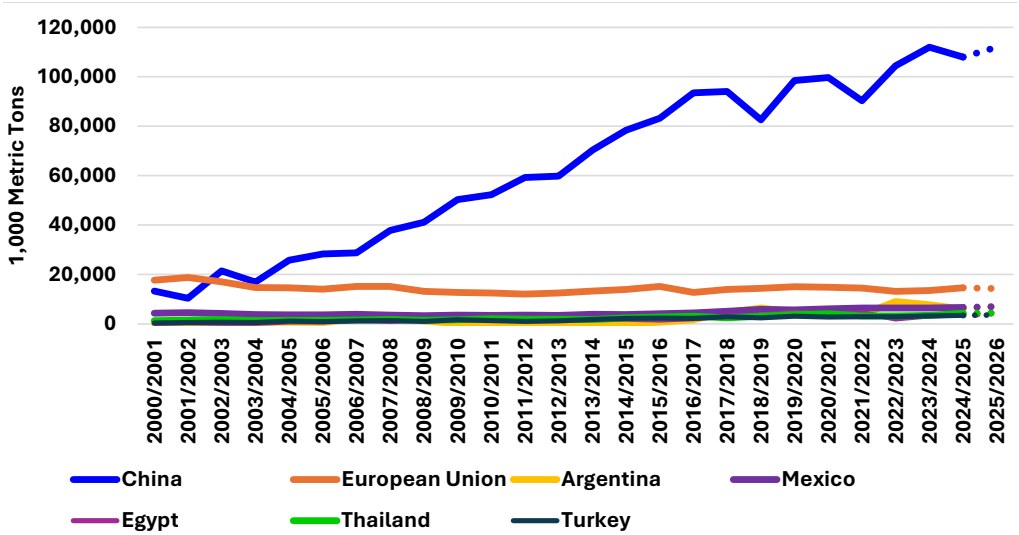
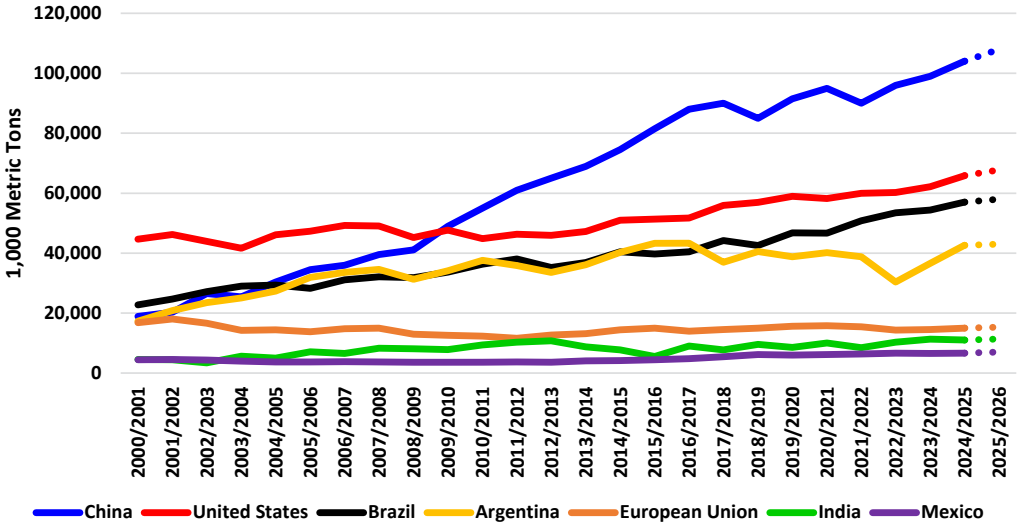
Figure 1 – Historic Import Levels for the Seven Largest Global Soybean Importers, by Marketing Year



USDA Foreign Agricultural Service – Production, Supply and Distribution Custom Query.

Figure 2 – Historic Domestic Crush Levels for the Seven Largest Global Soybean Crushers, by Marketing Year



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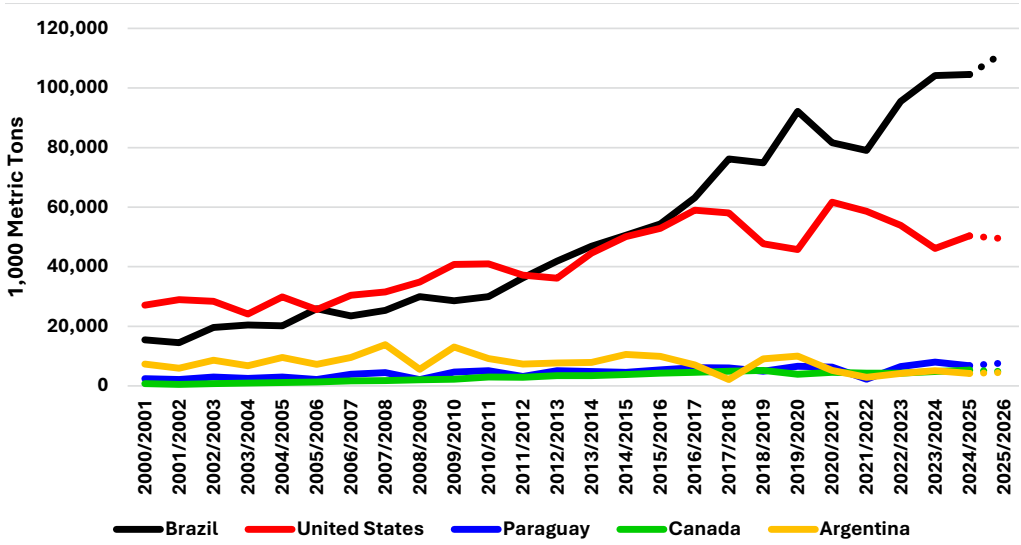
Continued U.S. Soybean Exports to China are Important for Market Prices – continued from page 9

and Turkey may purchase more U.S. soybeans. But it is unclear whether these sales volumes will be enough to offset a reduction in Chinese purchases.

A final question often asked is whether China must buy soybeans from the U.S. The simple answer is no.

Figure 3 shows the historic export levels for the five largest global soybean exporters, by marketing year. The USDA's forecast for Chinese soybean imports during the new crop 2025/26 marketing year is 112 million metric tons. Their forecast for Brazilian soybean exports during the 2025/26 marketing year is also 112 million metric tons.

Figure 3 – Historic Export Levels for the Five Largest Global Soybean Exporters, by Marketing Year



USDA Foreign Agricultural Service – Production, Supply and Distribution Custom Query.

It is unlikely that Brazil will sell all of its exportable soybean supplies to China. But Paraguay, Canada and Argentina could export more of their soybeans to China due to higher bid prices. As noted above, higher soybean import prices will put downward pressure on profit margins for Chinese crushers and reduce soy oil and meal supplies.

Higher soy meal prices will pressure Chinese livestock producers to adjust feed rations. Pork and poultry are China's primary meat sources. Both pork and poultry have monogastric digestive systems, so changing or shifting feed rations is relatively easy.

Chinese soybean import prices would increase, their crushing and livestock sectors would have lower profit margins and Chinese consumers would have higher meat prices, but China does not have to buy U.S. soybeans.

The best outcome is that U.S. and Chinese trade negotiators are able to develop an agreement in time to prevent a re-escalation of a trade war that would impact soybean trade flows. However, if another trade war develops and crop import-export values are impacted, U.S. soybean prices could be severely impacted. Alternative soybean supply chains will take time to develop and become efficient. This will make it difficult for U.S. farm managers to adjust their marketing plans and maintain profit margins.