IOWA STATE UNIVERSITY
Extension and Outreach

Ag Decision Maker

VOL. 29 NO. 4 / FEBRUARY 2025 A BUSINESS NEWSLETTER FOR AGRICULTURE

INSIDE . . .

UPDATES

The following Information Files have been updated on extension.iastate.edu/agdm:

A1-44 Supplemental Coverage Option (SCO) and Enhanced Coverage Option (ECO)

B2-41 Lean Hog Basis

B2-42 Live Cattle Basis

B2-43 Feeder Cattle Basis

C3-20 Your Balance Sheet

The following Videos and Decision Tools have been updated on extension.iastate.edu/agdm:

A1-10 Chad Hart's Latest Ag Outlook Video

A1-33 2025 Farm Bill Decisions with USDA FSA (video)

A1-33 ARC-CO & PLC Per Acre Payment Estimator for Iowa, 25-26

A1-44 SCO and ECO County Yields for Iowa

A3-25 Days Suitable for Fieldwork in Iowa

C3-19 Balance Sheet (short form)

The following Profitability Tools have been updated on extension.iastate.edu/agdm/outlook.html:

A1-85 Corn Profitability

A1-86 Soybean Profitability

A2-11 Iowa Cash Corn and Soybean Prices

A2-15 Season Average Price Calculator

D1-10 Ethanol Profitability

D1-15 Biodiesel Profitability

Inflation and the role of monetary policy, banking, and productivity

Jason Henderson, Ph.D., Vice President, Iowa State University Extension and Outreach, jhender5@iastate.edu

The financial health of agriculture is shaped by inflation. Rising inflation is often good for farm profits as agricultural commodity prices soar. However, over time, rising costs trim farm profits. In addition, if a fight against inflation begins and the Federal Reserve (the Fed) tightens monetary policy with higher interest rates and farmland values fall.

Inflation is often defined as "too much money chasing too few goods." "Too much money" is driven by the Fed's monetary policy and the supply of money. "Chasing" depends on bank lending and whether banks keep money in reserve or lend it into the economy. "Too few goods" is underpinned by the productivity of labor and their ability to produce goods and services. Inflation soars when too much money chases too few goods. These three measures hold insights into future inflation and the financial health of US agriculture.

The rise and fall of inflation

Over the past five years, farm profitability has risen and fallen with inflation. The great inflation of the 1970s coincided with a US farm boom. The more recent surge in inflation coincided with surging commodity prices and record high farm incomes. After a decade of record low inflation following the Great Recession in 2009, inflation surged in 2022, reaching 9.0% above the previous year's levels, its strongest increase since the 1970s (Figure 1). The Fed

Figure 1. United States Consumer Price Index. Source: Bureau of Labor Statistics.

responded, tightening monetary policy, raising interest rates that coincided with a decline in farm profits and weaker land values. In short, the future of inflation will impact the financial health of agriculture.

Understanding the forces shaping money, chasing, and the production of goods and services will help the US agricultural sector navigate future trends. This article will explore three key indicators–Fed assets, bank reserves, and labor force productivity–that could provide signs to the future health of agriculture.

Monetary policy: too much money?

Understanding inflation starts with the Fed, monetary policy, and the supply of money. Traditionally, the primary tool of the Fed in monetary policy is interest rates, raising them when they want to reduce the supply of money in the economy to slow inflation and lowering them to spur the economy, which boosts inflation. During the Great Recession of 2009, interest rates fell to zero and the Fed began to use its balance sheet to influence the money supply to spur the economy. Through a process called quantitative easing, the Fed expanded its balance sheet by purchasing financial assets from commercial banks, primarily mortgage-backed securities and treasury bills. With these purchases, the Fed sent money into the US economy setting the stage for higher inflation. During the Great Recession, the Fed increased its balance sheet from $800 billion to more than $2 trillion. Since then, the Fed Balance sheet continued to soar, reaching $9 trillion by 2023, after the COVID Recession, before declining to $7 trillion in 2024 (Figure 2).

Figure 2. Federal Reserve balance sheet–total assets.
Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis.

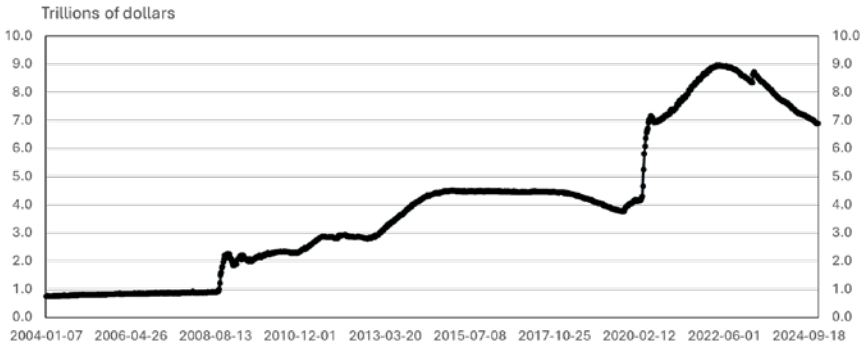


Figure 3. Deposits held at the Federal Reserve by depository institutions.
Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis.

Bank activity: chasing?

Although a bigger Fed balance sheet sets the stage for inflation, increased banking activity is needed to trigger "chasing", the second part of inflation. After the Fed purchases assets from commercial banks and expands the supply of money in the system, commercial banks have a choice on how to use the money. Commercial banks can hold the money in as deposits in Fed accounts or they can lend the money to businesses, families, farmers, etc. in the economy. If money is lent into the economy, commercial banks spur stronger demand for goods and services, which leads to higher inflation. Alternatively, if commercial banks keep the money in Fed accounts, the money does not spur demand and inflation is muted.

Similar to the Fed balance sheet, commercial bank deposits have fluctuated. Immediately after the Great Recession of 2009, deposits held at the Fed increased, peaking in 2015. Then deposits steadily declined through 2020 as banks increased lending activity and the economy strengthened. During the COVID Recession of 2021, deposits spiked and continued to rise until 2022 when they started to decline as banks increased their lending and inflation spiked (Figure 3).

Yet, Federal Reserve assets and bank deposits do not tell the story of inflation in isolation, but impact inflation jointly through financial markets. In a simple regression, larger Fed assets were associated with high inflation rates and bigger bank reserves held in deposit were correlated with slower inflation. Even when the Fed expanded its balance sheet and boosted the money supply, if banks held the money in reserve, inflation was muted. This happened between 2013 and 2015, when bank deposits rose faster than the growth in Fed assets and concerns about deflation dominated the US economy (Figure 4). In contrast, if the Fed boosted its assets and banks decreased their deposits at the Fed, inflation would soar as money was chasing economic activity through lending. This happened in 2022 when the Fed boosted its balance sheet in response to the COVID Recession and banks shrank their deposits held at the Fed, inflation soared. In addition, even when the Fed began shrinking its balance sheet heading into 2023 by letting its assets mature and not reinvesting the proceeds or selling assets before maturity, the pace was not fast enough to reduce the gap between assets and deposits. The result is too much money chasing.

Labor productivity: too few goods?

In addition to monetary policy and banking activity, the third part of inflation, too few goods, impacts inflation. Inflation is shaped by an economy's potential to produce goods and services and satisfy emerging demand. If an economy produces too few goods, inflation could rise as customers bid up prices to buy scarce products. An economy's ability to produce goods and services is based on two fundamental components – how many people are working and how productive they are when they work.

As demographic shifts are often long-term trends that impact labor force growth, the short-term productivity of workers fluctuates more frequently influencing shifts in inflation. For example, in 2022 when inflation soared, labor productivity contracted, suggesting that workers were producing too few goods (Figure 5). Yet, by 2023, labor productivity rebounded strongly as workers produced more goods and services, which contributed to slower inflation rates.

Figure 4. Federal Reserve assets and bank deposits held at the Federal Reserve.
Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis.

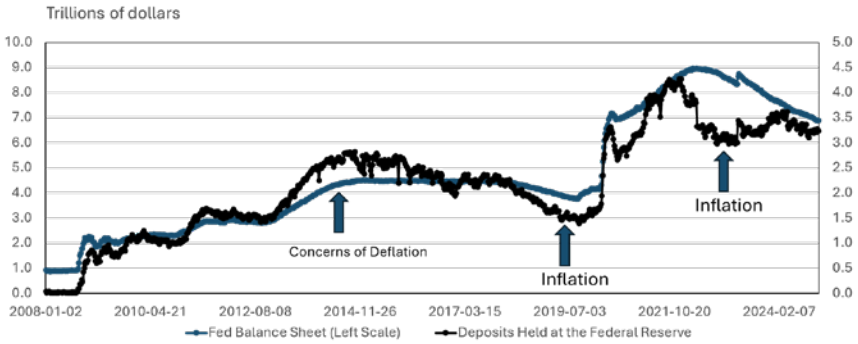
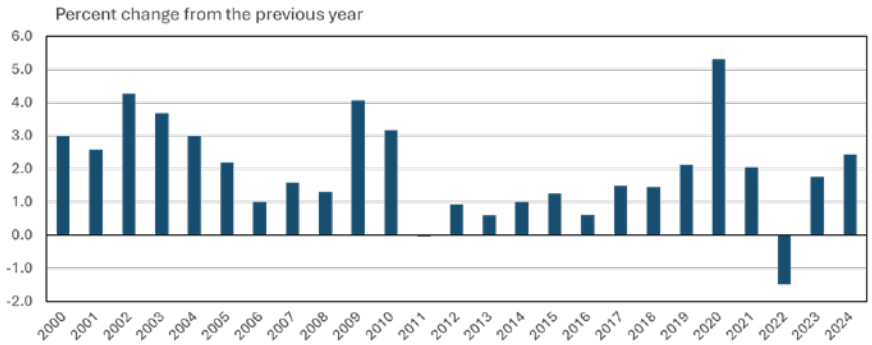


Figure 5. US labor productivity.
Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis.



Conclusion and implications

Inflation provides a multi-faceted impact on US agriculture. Rising inflation often coincides with stronger farm profits as agricultural commodity prices rise. Yet, over time farm profits decline as input costs increase, trimming profits. If the Fed raises interest rates to slow inflation, farm operations financed with debt face higher debt service payments that trim farm profits and struggle with lower collateral levels as higher interest rates weigh on

farmland values. As a result, the US agricultural sector must be in tune to the forces shaping inflation as they navigate future economic conditions.

Currently, consumer price inflation is roughly 2.5% above year ago levels, slightly higher than the Federal Reserve's 2.0% target for inflation. To better understand inflation in the future, US agriculture should pay attention to three key indicators.

1. Fed balance sheet: by engaging in quantitative easing, the Federal Reserve is using its balance sheet to influence money supply. After expanding its balance sheet from $800 billion to $9 trillion, the Fed is now shrinking its balance sheet and placing downward pressure on inflation but reducing money supplied to the economy. A shrinking balance sheet would trim inflation.
2. Bank reserves held in deposit at the Federal Reserve: monetary policy works through the banking system. Bank decisions on whether to lend money into the economy or hold money in reserves drive inflationary trends. If the recent trend of banks is keeping more money in reserve, inflationary pressures will continue to wane.
3. Labor productivity: the ability of labor to produce more goods and services shapes inflation. The wildcard is the continued strength of labor force productivity. Although labor productivity strengthened in 2024, it started to slow at the end of the year. If labor productivity slows, inflation could remain stubbornly higher than Federal Reserve targets.

The next year could present a turning point for US agriculture. Has farm profitability reached its bottom? Is the fight against inflation, which resulted in higher interest rates and softer farmland values amid lower commodity prices and farm profits, about to end? Data on the Fed balance sheet and bank deposits is available at the **Federal Reserve Bank of Cleveland**, www.clevelandfed.org/indicators-and-data/credit-easing. Only time will tell, but Federal Reserve assets, bank reserves, and labor productivity can shed some insight into the future of inflation and farm profitability.

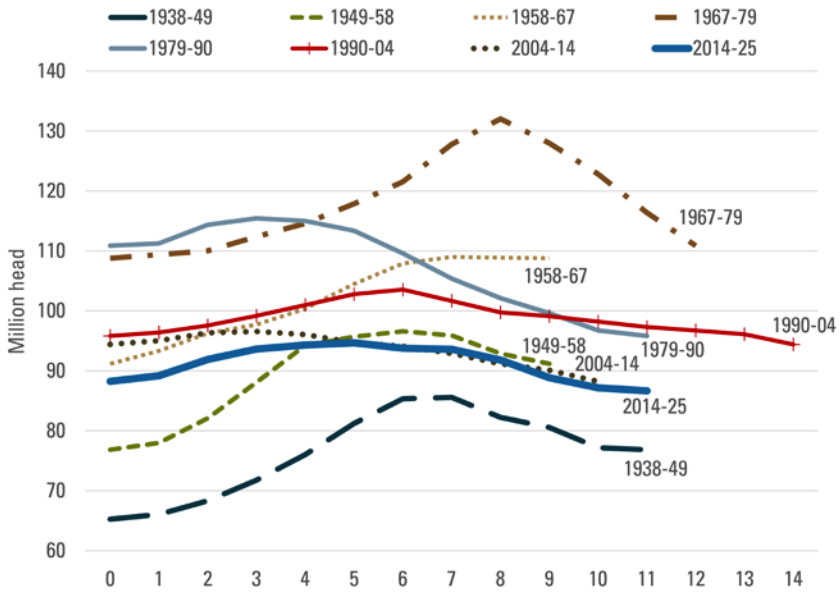
Repeating patterns help understand cattle cycle phases

Lee Schulz, Chief Economist, Ever.Ag Livestock Division; ISU extension livestock economist (on leave) | lschulz@iastate.edu

Patterns underpin every aspect of the universe, including agriculture, economics and markets. The cattle cycle is a pattern. Recognizing patterns, understanding relationships, and quantifying uncertainties, provide valuable insights and help guide predictions about the future.

The US cattle industry is beginning the twelfth year of the current cattle inventory cycle that began in 2014 (Figure 1). Periods are measured from beginning of the year to

Figure 1. Total United States cattle inventory by cycle, January 1.
Data source: USDA National Agricultural Statistics Service.



beginning of the year. The last inventory cycle lasted ten years from its Jan. 1, 2004 trough to another inventory bottom on Jan. 1, 2014. The one before that lasted fourteen years or from 1990 to 2004.

According to the Livestock Marketing information Center, cow-calf producers captured record returns over cash costs in 2024. Even stronger returns are expected to persist at least through 2026. Solid profits will eventually trigger cyclical expansion. But they are not doing so yet.

Based on survey responses of producers, USDA's National Agricultural Statistics Service in the latest **Cattle report**, downloads.usda.library.cornell.edu/usda-esmis/files/h702q636h/sf26b275x/h989sz55j/catl0125.pdf, estimated the Jan. 1, 2025 beef cow inventory on U.S. farms at 27,863,500 head (Table 1). This was down 0.5% from the 28,013,000 head on Jan. 1, 2024.

Early-release tables from the **USDA Agricultural Projections to 2034 report**, www.usda.gov/about-usda/general-information/staff-offices/office-chief-economist/commodity-markets/baseline-projections, do not forecast a year-over-year increase in the national beef cow herd until Jan. 1, 2027. Ample uncertainties exist to keep this prediction in play.

Cyclical cattle herd expansion has to come from retaining aging cows for additional calving plus an influx of heifers entering the beef cow herd.

The number of heifers kept for beef cow replacement as of Jan. 1, 2025 totaled 4,672,400 head, down 1.0% from Jan. 1, 2024. The last expansionary phase of the cattle inventory cycle saw beef replacement heifer numbers rise for six consecutive years. This occurred from 2012 to 2017. This led to total cattle inventory expansion from 2015 to 2019.

Beginning with the January 2001 Cattle report, USDA began publishing data for beef replacement heifers expected

Table 1. Cattle inventory by class and calf crop. Data source: USDA National Agricultural Statistics Service.

	United States			Iowa		
January 1 inventory *	2024	2025	2025 as % of 2024	2024	2025	2025 as % of 2024
Cattle and calves	87,157.4	86,662.2	99.4	3,450	3,500	101.4
Cows and heifers that calved	37,359.8	37,212.8	99.6	1,050	1,070	101.9
Beef cows	28,013.0	27,863.5	99.5	810	825	101.9
Milk cows	9,346.8	9,349.3	100.0	240	245	102.1
Heifers 500 pounds and over	18,320.0	18,179.0	99.2	690	720	104.3
For beef cow replacement	4,718.3	4,672.4	99.0	100	110	110.0
Expected to calve	2,971.5	2,921.8	98.3			
For milk cow replacement	3,951.2	3,914.3	99.1	120	110	91.7
Expected to calve	2,508.9	2,499.8	99.6			
Other heifers	9,650.5	9,593.2	99.4	470	500	106.4
Steers 500 pounds and over	15,959.2	15,802.4	99.0	1,180	1,180	100.0
Bulls 500 pounds and over	2,030.7	2,009.0	98.9	60	60	100.0
Calves under 500 pounds	13,487.7	13,458.1	99.8	470	470	100.0
Feeder cattle outside feedlots	24,671.1	24,586.0	99.7	940.0	940.0	100.0
Cattle on feed	14,426.3	14,267.7	98.9	1,180	1,210	102.5
Calf crop **	33,563.0	33,529.5	99.9	1,000	1,020	102.0

* 1,000 head, **2023 and 2024.
Full report: https://downloads.usda.library.cornell.edu/usda-esmis/files/h702q636h/sf26b275x/h989sz55j/catl0125.pdf.

to calve in the coming year. This facilitates breaking the total replacement heifer number into bred heifers, which is the number expected to calve in the coming year, and heifer calves being retained for breeding.

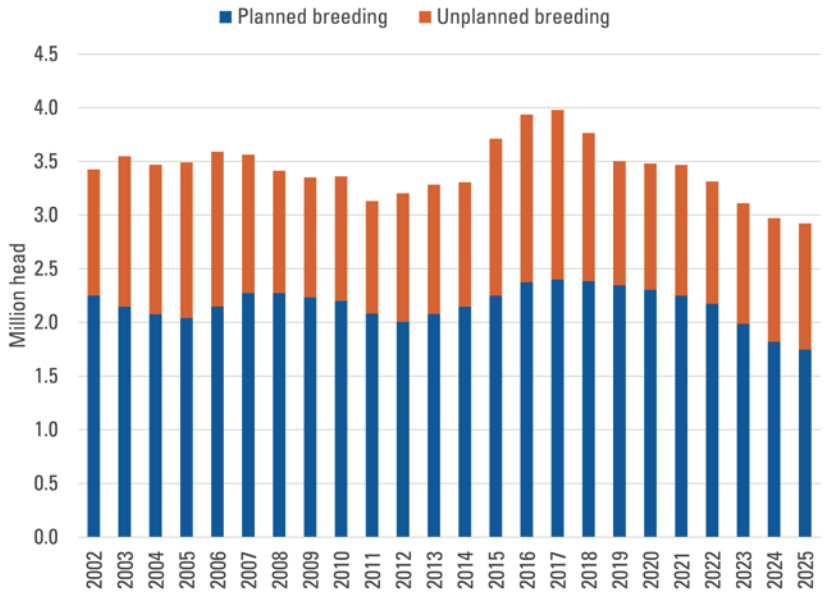
Knowing how many heifers are expected to calve, and when, is a more valuable clue for predicting when cattle supplies will rise than knowing a total number of heifers expected to calve sometime.

This breakdown acknowledges that the beef replacement heifer total consists of heifers from two consecutive calf crops. The forthcoming two-year-old bred heifers from the 2023 calf crop will calve this year. The forthcoming yearling heifers from the 2024 calf crop are in development and will be bred this year and calve in 2026. They are not included in the "expected to calve this year" head count.

Opportune breeding is a swing variable

Yearling heifers retained for breeding this year become bred heifers expected to calve next year. Over the last 24 years, the average calculated yearling heifer total ran 63.2% of the bred heifer total the following year. As such, the remaining 36.8% of bred heifers were not previously identified as replacement heifers, but producers decided to breed them. Call this opportune breeding. These additional heifers that are bred are presumed to be sourced from the other heifer inventory as

Figure 2. United States beef replacement heifers on January 1 expected to calve in the coming year.
Data source: USDA National Agricultural Statistics Service.



defined by USDA. Other heifers are heifers that will not be bred as replacements for the beef herd, but are instead destined for feedlots.

Opportune heifer breeding is more variable, and harder to predict, than planned heifer breeding. Heifer calves can be sold at feeder cattle auctions by one producer and bought by another producer to use as replacements. Producers may sometimes pull heifers out of feedlots for breeding. Think of these as two-way heifers–they are available for finishing or breeding.

The Jan. 1, 2025 inventory of heifers for beef cow replacement expected to calve this year was down 1.7% year-over-year and consisted of yearling heifers bred in 2024 and expected to calve in 2025, which were down 4.0% year-over-year and a 2.0% increase in extra heifers bred (Figure 2). In other words, the rise in opportune breeding of heifers in 2024 is offsetting some of the slide in planned heifer breeding. This pattern occurred in 2023, too, with an 8.4% drop in planned heifer breeding and 2.5% hike in unplanned breeding.

So, what do the recent increases in unplanned, opportune heifer breeding mean? Its confirmation that profits are incentivizing expansion and some individual producers are in the early stages of expansion. This also means the clock is ticking. Early movers will benefit most by expanding before all profits get bid away. Waiting too long to expand may result in missing the boat. How rapidly some producers can expand may hinge on their financial situations.

Changes in calving season may also provide clues

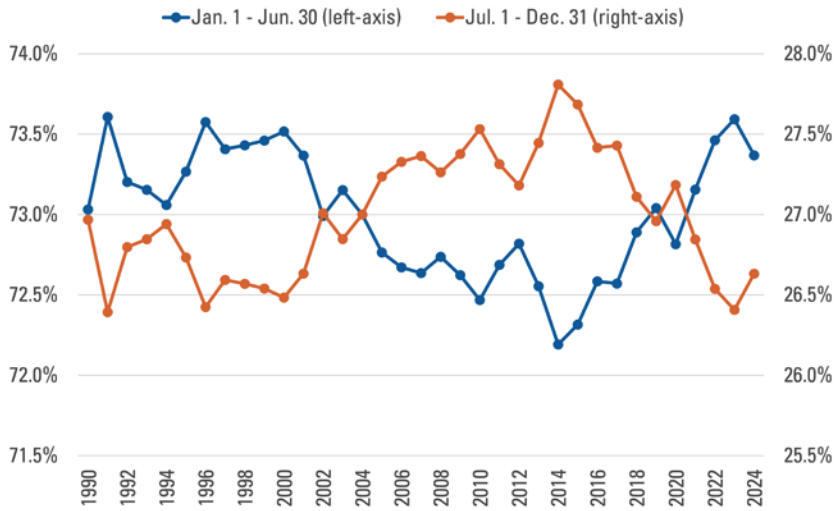
In 2024, 73.4% of the U.S. calf crop was born between Jan. 1 and Jun. 30 while 26.6% was born between Jul. 1 and Dec. 31. The calf crop includes both beef and dairy calves. Assuming dairy calf births are evenly distributed throughout the year, adjustments in the beef cattle herd drive changes in spring versus fall calving percentages.

An **Iowa Beef Center Cow-Calf Producer Survey**, store.extension.iastate.edu/product/Iowa-Beef-Center-2014-Cow-Calf-Producer-Survey, asked producers what are the primary reasons their operation calves when it does? Percentages include multiple answers from some producers:

- Weather 64.0%
- Labor availability 42.2%
- Tradition 25.3%
- Market timing 25.3%
- Feed availability 12.0%
- Other 3.6%

At least one more likely driver exists. It could be what some producers responded as "other." That is the industry's current position in the cattle inventory cycle. The accompanying prices and expected profits spur producers to get calves on the ground sooner rather than later.

Figure 3. United States calf crop by six month period.
Data source: USDA National Agricultural Statistics Service.



Solid profit expectations may tempt producers to give cows that didn't conceive during an operation's normal breeding season one more chance. But extending the breeding season will shift a portion of the herd from spring or summer calving to fall calving.

As a percentage of the total annual calf crop, second half of the year calving peaked in 2014 at 27.8% (Figure 3). While the second half calving percentage may not reach that high to begin the next cattle inventory cycle, it will likely be higher than the 26.6% in 2024. Second half calving was at or above 27.0% at the beginning of the expansion phases of the last three cattle inventory cycles. The relatively low 26.6% in 2024 suggests the beginning of herd expansion is likely a year or two off.

No exact timetable exists for when producers will begin retaining more replacement heifers. In fact, the available information would suggest no substantial heifer retention will occur until 2026. Similarly, no way exists to predict how quickly producers will rebuild the beef cow herd and how large they will grow it. Those uncertainties make attempting to forecast price trends and prices even more challenging.

The pattern of profits and losses driving expansion phases and contraction phases of the cattle inventory cycle will undoubtedly persist.

Gains outside the traditional numbers

By Chad Hart, extension crop market economist, 515-294-9911 | chart@iastate.edu

The February USDA update showed no changes for the US corn and soybean supply and use tables, with the exception of prices. But there were a few numbers moving within the report that will feedback to impact those tables. For the prices, USDA moved their 2024-25 season-average price estimates up 10 cents for corn and down 10 cents for soybeans. In both cases, these movements are just following what has been happening with prices over the past few months, with corn prices still bouncing back from pre-harvest lows and soybean prices struggling to find traction to increase. However, the global supply and use situation for both crops continues to shift, with the US crops gaining in export sales and global supplies shrinking a bit, due to challenging weather conditions across the globe.

Currently, the market is focused on the weather conditions in South America and their impact on South American production. For the 2023-24 growing season, South American crops faced similar problems to US crops, drought conditions to start the year, but the weather improved enough that crop production was stronger than the previous year. For 2024-25, drought conditions have shifted once again, currently impacted Argentina a bit more than Brazil. Tables 1 and 2 show the latest global estimates from USDA and the major adjustments were in South American crops. For corn, the general picture is for slightly smaller global production due to small adjustments for both Argentina and Brazil. The latest update shaved 1 million tons or roughly 39 million bushels off of Argentina's and Brazil's corn supply. However, even with this cut, South American corn production is projected to still be higher this year. Combined,

Table 1. World corn production. Source: USDA-WAOB.

Country or Region	2023-24 Estimate	2024-25 Forecast	Change from January 10	Change from 2023-2024
	Million tons			
World	1,230.1	1,212.5	-1.9	-17.6
United States	389.7	377.6	--	-12.0
Foreign	840.4	834.8	-1.9	-5.6
Argentina	50.0	50.0	-1.0	--
Brazil	122.0	126.0	-1.0	4.0
Mexico	23.5	23.7	--	0.2
Canada	15.4	15.3	--	-0.1
European Union	61.9	58.0	--	-3.9
Serbia	6.8	5.5	--	-1.3
FSU-12	55.3	46.0	0.1	-9.3
Ukraine	32.5	26.5	--	-6.0
Russia	16.6	13.3	--	-3.4
South Africa	13.4	17.0	--	3.6
China	288.8	294.9	--	6.1
India	37.7	38.0	--	0.3

Table 2. World soybean production. Source: USDA-WAOB.

Country or Region	2023-24 Estimate	2024-25 Forecast	Change from January 10	Change from 2023-2024
	Million tons			
World	395.0	420.8	-3.5	25.8
United States	113.3	118.8	--	5.6
Foreign	281.7	301.9	-3.5	20.2
Argentina	48.2	49.0	-3.0	0.8
Brazil	153.0	169.0	--	16.0
Paraguay	11.0	10.7	-0.5	-0.3
Canada	7.0	7.6	--	0.6
India	11.9	12.6	--	0.7
China	20.8	20.7	--	-0.2

Argentina and Brazil are forecast to produce just over 6.9 billion bushels of corn this year, 157 million more than last year.

The global soybean situation is an ongoing series of records. Global production continues to increase with most of that growth outside the US. However, the weather issues in Argentina forced USDA to downgrade soybean production potential there by 110 million bushels. Paraguay is also experiencing drought and that forced USDA to move the soybean supply projection there to shrink 18 million bushels. But global soybean production is still set to increase by nearly one billion bushels, with the vast majority of that growth coming from Brazil.

The reductions in global supply projections do show avenues for US export growth and that has been occurring over the past few months. US corn export sales have increased nearly thirty percent year-over-year, while US soybean export sales have risen by roughly 12%. The increased sales have come from a variety of countries. But there is one market where US crop sales continue to fall, China. For corn, China has fallen from our 4th largest market at this time last year to our 26th largest market. However, that drop in sales has been more than made up by increased purchases by many countries. In fact, US corn is currently on pace to have its 3rd largest export year, only trailing the 2020 and 2021 marketing years. Arguably, it's the strength of those export sales and the ability to replace Chinese purchases somewhat easily that has lifted corn prices. For soybeans, China is still the dominant market. And while overall sales are higher this year, sales to China continue to decline and soybean prices remain under pressure due to that. The threat of tariffs, both original and retaliatory, looms large over both markets for the next few months. However, with only a few of those tariffs actually implemented at this time, US crop export sales continue to grow.

Table 3. United States meat production and prices. Source: USDA-WAOB.

Item	2024 Forecast	2025 Forecast	Change from January 10	Change from 2024
Production		*Billion pounds*		
Beef	26.99	26.57	0.78	-0.42
Pork	27.79	28.53	0.02	0.74
Broilers	46.99	47.63	--	0.64
Turkey	5.12	4.97	-0.13	-0.15
Total Meat	107.62	108.43	0.65	0.81
Prices		*Dollars per cwt*		
Steers	187.12	200.75	5.25	13.64
Hogs	61.56	63.50	0.25	1.94
		Cents per pound		
Broilers	129.4	131.8	0.3	2.4
Turkey	93.7	96.5	-2.0	2.8

The global crop production shifts were not the only news in USDA's update. The change in the outlook for US beef production is also providing a little optimism for the crops. In January, USDA had projected a roughly 1.2-billion-pound reduction in US beef production for 2025. That would have sent total beef production below 26 billion pounds. Now, USDA projected a more modest 420-million-pound reduction in beef for 2025. This 780-million-pound shift in beef provides some hope to increase crop feed demand, as it indicates that many of the heifers USDA thought would be joining the breeding herd in the latter half of 2025 will instead continue to be headed to feedlots and processing plants. There will be a large beef production and feed usage adjustment in the near future, when that heifer retention occurs. But that looks to be a 2026 issue rather than this year. Feed usage is also being supported by projected increases in pork and broiler production.

For 2024-25 season-average prices, USDA is now at $4.35 per bushel for corn and $10.10 per bushel for soybeans. Currently, futures point to the 2024-25 season-average prices being in the $4.50 range for corn and the $10 range for soybeans. So, the markets are generally in line with USDA, but are slightly more optimistic for corn and slightly more pessimistic for soybeans.

Those slight differences are likely based on the export trajectories of the two crops. Looking out to the 2025-26 marketing year, futures are showing relatively small improvements for both crops, with prices estimates around $4.70 per bushel for corn and $10.10 per bushel for soybeans. Given ISU's production cost estimates for 2025, corn has a bit of profit potential, whereas soybeans are still below production costs. Thus, crop acreage is expected to shift away from soybeans and into corn. USDA's early estimates showed corn gaining 1.4 million acres and soybeans losing 2.1 million acres. They will update those estimates later this month at the Ag Outlook Forum. Stay tuned.

The latest **Market Outlook video**, https://youtu.be/_eGRWtWuHrE, is provided for further insight on outlook for this month.

Apply now for 2025 Landowner Education Program

By Catherine DeLong, water quality program manager, 515-294-5963 | crdelong@iastate.edu; Julia Baker, Natural Resources Extension Specialist, jaclymer@iastate.edu

Iowa landowners may apply to participate in the **2025 Landowner Education Program**, naturalresources.extension.iastate.edu/programs/landowner-education, offered by Iowa State University Extension and Outreach. The application window is open until April 4. Program events will take place in June and July.

The program is intended for landowners who are interested in learning about soil health and conservation, and whose land is dedicated primarily to row crops. The program consists of two online workshops and five in-person events in the Ames-Ankeny area of central Iowa. There is no cost to participate, thanks to program sponsorships, but space is limited.

The Landowner Education Program brings together Iowa State experts on conservation, agronomy, economics and law. There are many steps between interest in conservation practices and implementation. This can include discussing with family members or other land beneficiaries, speaking with a lawyer to adapt or create a written lease, discussing practices with a tenant including cost-share of any expenses, equipment needs, etc. Hearing from the experts can help landowners navigate the agronomic, legal, financial and relational aspects to managing their land for soil health.

The Landowner Education Program also includes a survey to understand what the participating landowners would like to learn about. We take that into account as we develop the program and create a curated educational plan that uses the landowners' time thoughtfully

The program also provides the opportunity for interactive learning and networking with fellow landowners. Carolyn Harryman was a member of the program's 2024 cohort.

"As I worked with other members of the group, I feel there are many landowners in Iowa that may not have been directly working with the family farming operation until more recently, as is my situation," Harryman said. "The array of topics covered was outstanding and greatly helped me improve my farming knowledge."

The online application for the 2025 program is available from the **Landowner Education Program webpage**, naturalresources.extension.iastate.edu/programs/landowner-education.

Artificial intelligence and cybersecurity: the future of grain farming

Alexis Stevens, former extension farm management field specialist

As artificial intelligence (AI) continues to reshape agriculture, grain farmers are seeing significant improvements in efficiency, profitability, and sustainability. AI-driven tools optimize planting, fertilization, and harvesting while also helping farmers navigate market fluctuations. However, with increased reliance on digital technology, cybersecurity threats pose a growing risk to modern farm operations. Implementing AI alongside strong cybersecurity practices ensures a resilient and productive future for grain farmers.

AI in grain production

Precision planting and soil management

AI-powered tools analyze soil health, moisture levels, and weather patterns to guide planting decisions. Smart sensors provide real-time data, helping farmers determine the best seed varieties and planting densities for maximum yield. By optimizing seed placement and soil inputs, AI reduces waste and enhances efficiency.

Fertilizer and irrigation optimization

Machine learning algorithms process field data to determine precise fertilizer and water requirements. AI-based irrigation systems adjust in real time, reducing water usage while ensuring crops receive adequate hydration. This precision management minimizes input costs and supports environmental sustainability.

AI in harvesting and yield prediction

AI integrates with harvesting machinery to assess crop maturity and optimize harvest timing. Computer vision technology helps identify areas of the field that require earlier or later harvests, reducing losses and maximizing grain quality. Additionally, AI models analyze historical yield data, weather trends, and soil health to predict future yields, allowing farmers to make informed financial and storage decisions.

Cybersecurity in agriculture

With AI-driven systems controlling critical farm operations, cybersecurity is no longer optional—it's essential. Digital threats such as ransomware attacks, phishing scams, and system breaches can disrupt farm management software, equipment automation, and financial transactions. Here's how farmers can protect their data and infrastructure:

1. Implement Multi-Factor Authentication (MFA)

MFA adds an extra layer of security by requiring multiple credentials for system access. Even if a password is compromised, an attacker cannot gain entry without the second authentication factor.

2. Secure farm data with backups

Regularly backing up farm data—both on-site and in secure cloud environments—ensures that critical records are not lost in the event of a cyberattack. Backups should be ransomware-hardened to prevent unauthorized access.

3. Segment farm networks

Separating farm operations into different network segments prevents a breach in one system from compromising the entire operation. Limiting remote access and requiring secure VPN connections further reduces risk.

4. Train employees on cyber threats

Human error is one of the leading causes of cybersecurity breaches. Educating farmworkers and agribusiness partners about phishing scams, social engineering tactics, and safe data handling practices strengthens overall farm security.

Integrating AI and cybersecurity for a resilient future

AI has the potential to revolutionize grain farming by enhancing efficiency, reducing costs, and improving yields. However, these advancements

also introduce cybersecurity risks that farmers must address. By implementing strong cybersecurity measures, grain producers can confidently embrace AI technologies while protecting their operations from digital threats.

For more information, visit Iowa State University's **Ag Decision Maker website**, www.extension.iastate.edu/agdm/info/cybersecurity.html. A recent Women Managing Farmland webinar shares additional insights on **marketing fundamentals**, https://vimeo.com/1056545659.

Ag Decision Maker is written by extension ag economists and compiled by Ann Johanns, extension program specialist, aholste@iastate.edu.