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INSIDE . . .

UPDATES

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

A1-53 Margin Protection Crop Insurance

C2-09 Iowa Farmland Rental Rates (USDA)

C3-55 Financial Performance Measures for Iowa Farms

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

A1-10 Chad Hart's Latest Ag Outlook

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

A1-85 CornProfitability

A1-86 Soybean Profitability

A2-11 Iowa Cash Corn and Soybean Prices

A2-15 Season Average Price Calculator

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D1-15 Biodiesel Profitability

Strong beef demand boosts cull bull market

By Lee Schulz, extension livestock economist
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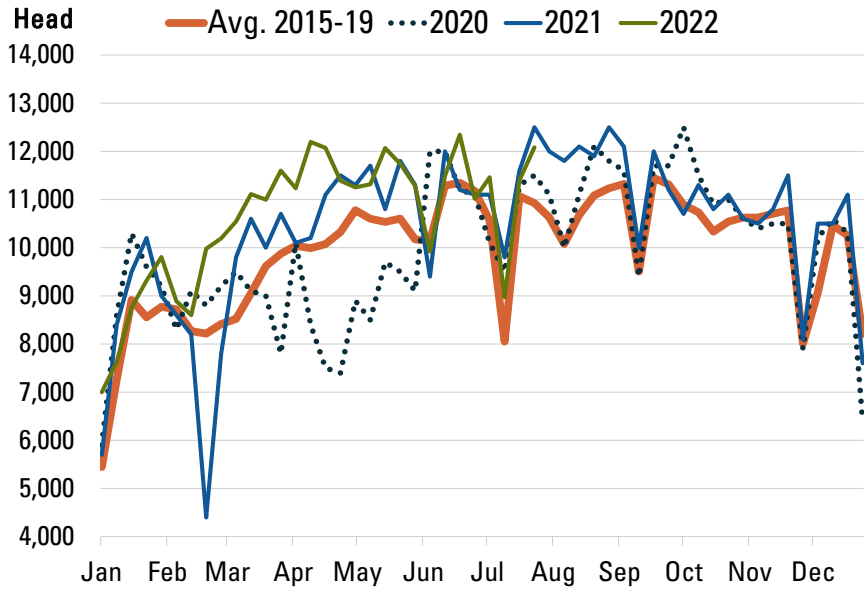
Dry weather, drought, high input costs, and strong cull breeding stock prices are bringing a surge of cull beef cows and bulls to slaughter. Stepped up culling adds to the current supply of beef on the market.

Looking ahead, packers will keep competing to buy cattle from shrinking cattle inventories. Although few in number, bulls play an important role in supplying beef. Cow and bull processors tend to be much smaller than fed cattle processors. Still these non-fed beef packers strive to run plants at capacity to capture efficiencies. Doing so may lift packers' ability to bid for bulls.

Through the first almost seven months of 2022, bull slaughter is 5.1% or 14,955 head above year ago levels (Figure 1). Producers have also sent 14.3% or 277,367 more beef cows to slaughter than in the same period in 2021. Producers have culled 7.5% of the national beef cow herd, which is the highest ever for this time of the year. The data goes back to 1986. Stepped up culling trimmed the July 1, 2022 US beef cow herd by 2.4% to 30.35 million head

Figure 1. US Federally Inspected Bull Slaughter, Weekly. Source: USDA-AMS.



according to surveys by USDA for the National Agricultural Statistics Service (NASS) mid-year Cattle report (Table 1).

Herd will keep shrinking

Years of crunching numbers show that the July 1 inventory of beef cows and heifers for beef cow replacement is a good predictor of the beef cow inventory six months later. Including bulls makes the model an even better predictor. Regression analysis allows researchers to predict or explain the variation of one variable based on another variable or set of variables. Using this, it possible to set up a predictive model that explains 98.62% of the variation in January 1 beef cow numbers.

July 1, 2022 inventories of beef cows, beef replacement heifers, and bulls and a linear time trend predict the January 1, 2023 beef cow herd at 29.202 million head. This would be down 3.1% from January 1, 2022. Any decline would make 2023 the fourth consecutive year with a smaller January 1 beef cow inventory. A 3.1% decline would make the January 1 beef cow herd the smallest since 2014 which was the last bottom in the cattle inventory cycle.

Weekday federally inspected (FI) cattle slaughter is running about 124,000 head. The run roughly consists of 60,000 steers, 37,000 heifers, 15,000 beef cows (what USDA labels as other cows), 10,000 dairy cows, and 2,000 bulls. On average, bulls make up about 1.6% of the total FI cattle slaughter. Bulls tally 7.4% of the combined total FI cow and bull slaughter.

Table 1. US Cattle Inventory by Class and Calf Crop. Source: USDA-NASS.

July 1 inventory *	2021	2022	2022 as % of 2021
Cattle and calves	100,800.0	98,800.0	98.0
Cows and heifers that calved	40,600.0	39,800.0	98.0
Beef cows	31,100.0	30,350.0	97.6
Milk cows	9,500.0	9,450.0	99.5
Heifers 500 pounds and over	15,900.0	15,600.0	98.1
For beef cow replacement	4,300.0	4,150.0	96.5
For milk cow replacement	3,800.0	3,750.0	98.7
Other heifers	7,800.0	7,700.0	98.7
Steers 500 pounds and over	14,600.0	14,400.0	98.6
Bulls 500 pounds and over	2,000.0	2,000.0	100.0
Calves under 500 pounds	27,700.0	27,000.0	97.5
Feeder cattle outside feedlots	36,700.0	35,700.0	97.3
Cattle on feed	13,400.0	13,400.0	100.0
Calf crop **	35,085.4	34,600.0	98.6

* 1,000 head, ** First half of 2022 estimate plus second half of 2022 expectations.
Full report: https://release.nass.usda.gov/reports/catl0722.pdf

Weekly bull slaughter shows a notable rise in some regions. Bull slaughter in region 3 (DE-MD, PA, WV, VA), which accounts for about 10% of the national total, averaged 21.4% above year ago levels through late-July. Region 4 (AL, FL, GA, KY, MS, NC, SC) and region 6 (AR, LA, NM, OK, TX) each have about a fifth of the nation's bull slaughter and are up 8.9% and 4.9%, respectively. Region 7 (IA, KS, MO, NE) has about 17% of the total and is up 5.0%. Imports of Canadian slaughter bulls are up 13%, or 2,441 head, so far in 2022 compared to the same period in 2021.

Because of confidentiality constraints, USDA has discontinued reporting bull slaughter in a number of regions. Beginning in January 2013, and then after being reported in 2014 and 2015, USDA no longer provides weekly bull slaughter data for region 5, which includes IL, IN, MI, MN, OH, and WI. This is an important region to monitor as it accounted for over 20% of all U.S. bull slaughter in 2012, 2014, and 2015. Beginning in 2022, USDA also does not publish bull slaughter for region 8, which includes CO, MT, ND, SD, UT, and WY. In 2021, this region had less 4% of the total bull slaughter but it is a region that has been dealing with persistent drought.

Two bull categories

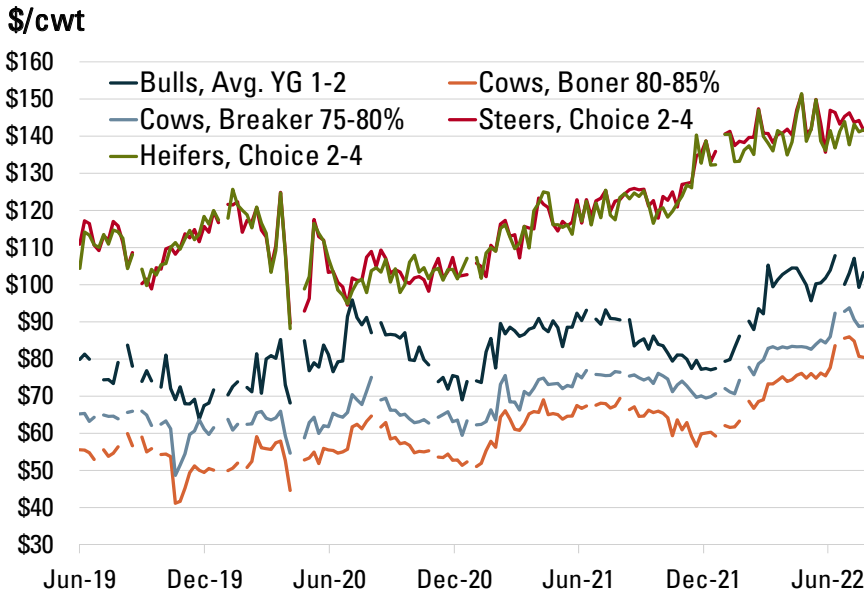
USDA's Agricultural Marketing Service (AMS) defines a bull as a mature, approximately 24 months of age or older, uncastrated, male bovine. However, for the purpose of grading standards, any mature, castrated, male bovine, which has developed or begun to develop the secondary physical characteristics of an uncastrated male is also considered a bull. Think masculine head, neck crest, and coarse muscling.

Bull slaughter is made up of both beef and dairy animals. Traditionally this has been a two-segment market. One is driven by culling activity and consists of typically older and/or lower, or non-performing bulls. The other segment consists of bullocks or young, under approximately 24 months of age, male bovine, castrated or uncastrated, that have developed or begun to develop the secondary physical characteristics of a bull. Quality grade standards exist for bullocks, which are essentially the same as those for steers of comparable maturity. Yield grades are the only grades applicable to animals in the bull class.

Bull price range

Under the voluntary price reporting authority of USDA-AMS, sales of feeder and slaughter cattle at local auctions are collected, summarized, and published. For Iowa, this is in the Iowa Weekly Cattle Auction Summary. A total of 1,097 slaughter bulls have shown up on this report so far in 2022.

Figure 2. Iowa Slaughter Cattle Prices at Auction, Weekly.
Sources: Data source: USDA-AMS & Iowa Dept of Ag Market News.



AMS reports slaughter bull prices by dressing designation and yield grade. Most of the volume is in average dressing and yield grade 1-2. Figure 2 shows these bull prices against representative slaughter cow and finished steer and heifer prices.

Bull prices range from $14 to $23 per hundredweight (cwt) more than slaughter cow prices, depending on the conditioning of the cows. Bull prices average about $35 per cwt less than finished steer and heifer prices. None of the bulls in the report were listed as bullocks. But on occasion, market reporters denote lighter weight sale lots as "return to feed" possibly suggesting these are younger bulls with the potential to be fed to choice or select quality grade.

The *National Weekly Direct Slaughter Cattle – Premiums and Discounts* report lists an average discount for bullocks of $35 per cwt with a range of $15 to $55 per cwt based on individual packer's buying programs.

Bulls, 500 pounds and over, on July 1, 2022 totaled 2.00 million head, unchanged from July 1, 2021 according to the USDA NASS mid-year Cattle report. Most of these are beef breed bulls. Besides the cattle on feed inventory, bulls were the only class of cattle that were at par with July 1, 2021 levels. All other categories of cattle were below July 1, 2021 inventories.

AI less common in beef herds

According to USDA's National Animal Health Monitoring System (NAHMS) Beef Cow-Calf 2017 study, 95.5% of beef operations had cows that were exposed only to bulls. For operations that had beef replacement heifers, 89.1% exposed these heifers only to bulls. Most heifers (76.8%) and nearly all cows (92.9%) were exposed only to bulls.

About 15.5% of heifers and 5.5% of cows were artificially inseminated (AI) and exposed to bulls as a follow-up. Given that 90.7% of all beef females were exposed only to bulls, use of AI is not that prevalent and is not trimming cull beef bull supply much.

On the other hand, rising use of AI in dairy herds is reducing the need for as many dairy bulls. The dairy industry has used AI since the 1930s. In 2014, 89.3% of dairy operations used AI for breeding (AI only or AI and natural service) according to the USDA NAHMS Dairy 2014 study. AI was used exclusively on 43.7% of operations. Many dairy producers are now using sexed semen to obtain more heifer calves. Dairies are also using beef bull semen on dairy cows and heifers whose offspring they do not intend to use as replacements. Doing so boosts the value of dairy calves not intended for replacements.

Bull management strategies

All 500 pounds and over bulls in inventory are intended for slaughter, eventually. But some are intended for breeding first. Some will be castrated, some won't. In commercial operations, bull calves are often castrated before they leave the operation. In seedstock herds, bull calves are often sold for breeding purposes, so castration is not routinely practiced.

According to the USDA NAHMS Beef Cow-Calf 2017 study, 62.0% of commercial operations castrated bull calves before sale. A higher percentage of operations in the Central region (86.2%) of the United States castrated bull calves before sale compared with operations in the West (57.0%) and East (48.9%). Of bull calves born on commercial operations, 79.0% of bull calves were castrated before sale. A higher percentage of bull calves were castrated before sale on operations in the Central region (92.0%) than on operations in the West (76.4%) and East (63.4%).

The percentage of operations that castrated bull calves and the percentage of bull calves castrated on these operations increased as herd size increased. A higher percentage of large operations (90.9%) castrated calves before sale compared with medium (80.5%) and small (55.1%) operations. On large operations (200 or more beef cows) 91.7% of bull calves were castrated before sale compared with 83.6% on medium operations (50-199 beef cows), and 60.1% on small operations (1-49 beef cows).

The decision to cull many bulls happens in the spring after failing a breeding soundness exam. Some producers cull bulls in the fall if the bull, or their offspring, have any undesirable characteristics that would make them unsuitable for the next breeding season. Culling open cows in the fall is common. Cows can also be evaluated during the spring as well. Culling in the fall and adding weight and targeting a seasonally higher market in the spring can often add value. Some producers factor income tax strategies into breeding herd culling decisions.

Mixed messages

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

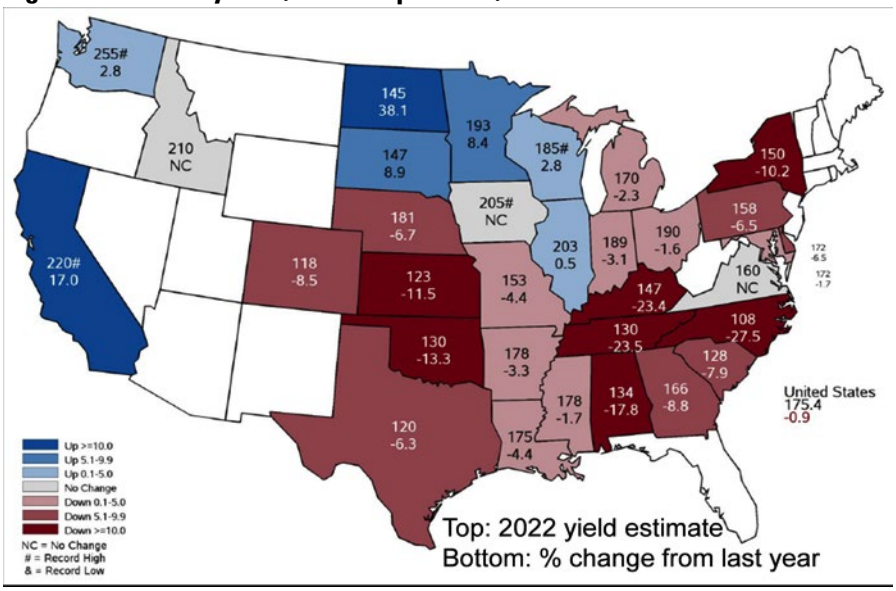
Each month during the growing season, the US Department of Agriculture provides market watchers an update on their projections for the coming marketing year. The August update is important as it is the first monthly update where farmers weigh in on potential production, via a national survey. This year, the August update was also special as it included a re-survey of crop plantings in the states most delayed this spring (Minnesota, North Dakota, and South Dakota).

For corn, USDA's update showed that both corn supply and usage are shrinking, but supply was moving a bit faster than usage. The planting re-survey found a few of the acres intended for corn were not planting this spring. Thus, corn harvested area was adjusted down slightly to 81.8 million acres, which is 3.6 million less than last year. The results of the farmer survey also revealed yield prospects are lower as well. The national yield was estimated at 175.4 bushels per acre, 1.6 bushels below the July estimate and last year's crop yield. Farmers indicated better yield potential in the NW Corn Belt, but much weaker potential in the Southern Plains (drought) and Southeast (flooding). Iowa's projected corn yield is 205 bushels per acre, the same as last year.

National corn production was lowered by 146 million bushels, setting total production at 14.36 billion bushels. That would be 756 million fewer bushels than last year, so corn supplies are significantly less. However, corn usage is also retreating. While ethanol production has rebounded from the COVID cut, corn use for ethanol is not quite as strong as USDA previously estimated, which forced USDA to cut 25 million bushels from the ethanol estimate for the 2021 crop. Meanwhile, looking forward, USDA expects the liquidation of cattle in the West due to the drought will lower corn feed use this fall and winter, falling by 275 million bushels. Export quantities for corn are also expected to decline, by 75 million bushels, as higher prices, inflationary concerns, and general economic woes are not just a US problem, but a global one. The one corn usage area seeing an increase is corn sweeteners, up 5 million bushels for both the 2021 and 2022 crop years. In the end, the 2021-22 corn ending stocks estimate increased to 1.53 billion bushels, while the 2022-23 ending stocks projection declined to 1.388 billion bushels.

Figure 1 displays the state corn yield estimates. While drought and flooding are having major impacts, there are still four states showing potential for record yields (including Iowa, tying last year). This map also shows how the drought has shifted. Drought conditions have dominated the western US for

Figure 1. US corn yields, bushels per acre, Source: USDA-NASS.



the past couple of years. In 2020 and here in 2022, more of the impact on corn production was seen in the Central and Southern Plains. In 2021, that impact was centered in the Northern Plains. Thus, the map shows sizable gains in corn yields in the Northern Plains and losses in the South. The Southeast had nearly ideal corn growing conditions last year, which is not the case this year.

Switching to soybeans, traders had anticipated slightly higher acreage and slightly lower yields with the August USDA update. Instead, we got the opposite. Soybean plantings were lowered by 300,000 acres and the national yield was raised 0.4 bushels. Farmers indicated stripes of alternating yield prospects, with the Northern Plains looking better than last year, Nebraska, Iowa, Wisconsin, and Michigan looking worse, and so on. Overall, the record projected yields in Illinois, Indiana, Ohio, Arkansas, Mississippi, and Virginia carried the day, as the national yield estimate is set at a record 51.9 bushels per acre. Given the combination of more soybean acres than last year and a higher projected yield, national soybean production is estimated at 4.53 billion bushels, 96 million bushels better than last year, so the market has more soybeans to work with. As USDA examined soybean usage, the major adjustment they made was a partial transfer of exports from the 2021 crop to the 2022 crop, with a 10 million

Figure 2. US soybean yields, bushels per acre, Source: USDA-NASS.

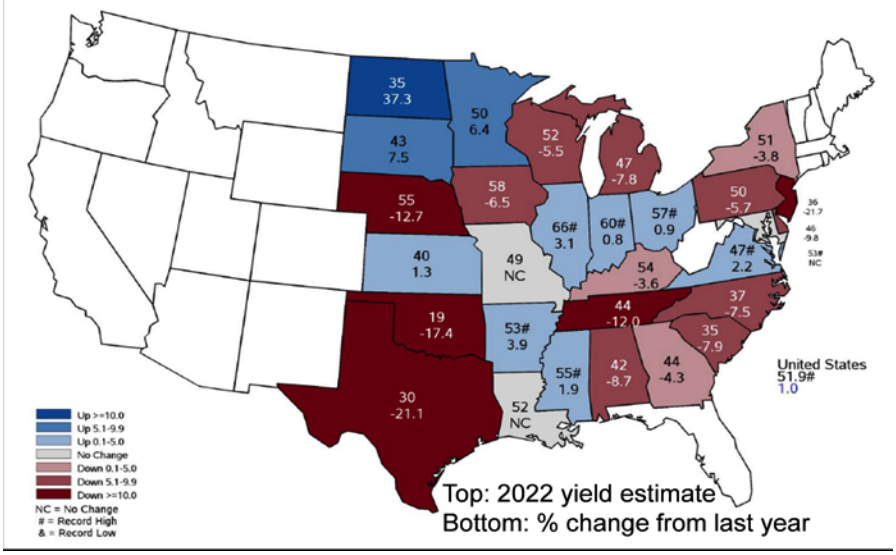
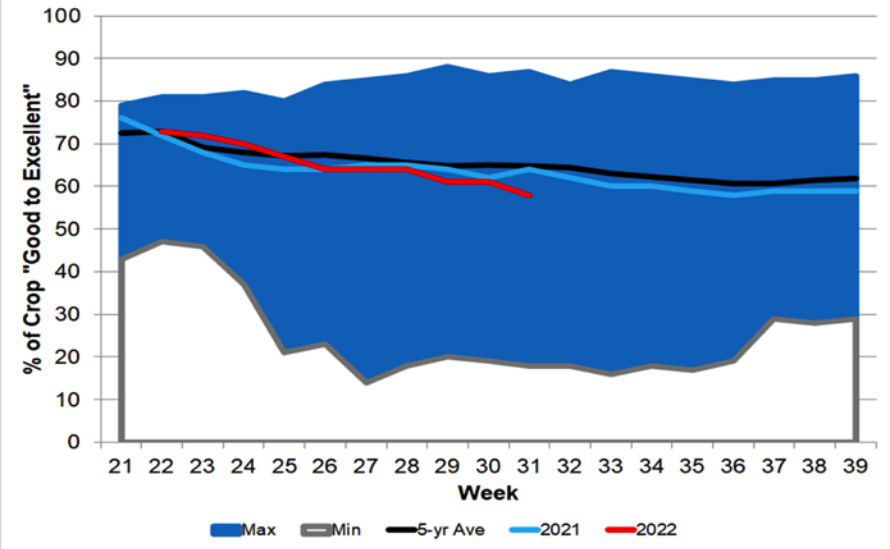


Figure 3. US corn crop ratings. Source: USDA-NASS.



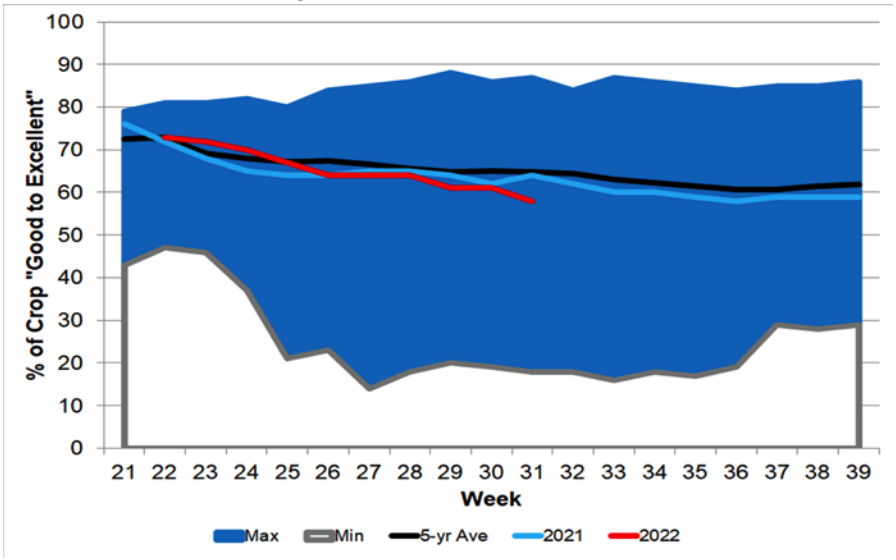
bushel drop in 2021 exports and a 20 million bushel increase in 2022 exports. Overall, soybean usage is projected to increase, but not as fast as production. Thus, the adjustments increased ending stocks estimates for old and new crop soybeans.

Looking forward, USDA will continue to update their weekly crop ratings and in September, they will begin the objective yield surveys, where they actually go out into fields, counting plants, ears, and pods. These pieces of information will provide a much richer picture of potential production. On the corn crop ratings, this year's crop has now fallen below both the average and last year. Typically, between now and harvest, the percentage of the crop rated Good to Excellent will dwindle by an additional 3%. That would provide additional support for USDA to adjust corn yields again.

The national soybean ratings have followed much closer to the 5-year average, but this year's rating has moved slightly below last year. While the August farmer survey revealed the potential for higher yields, the crop ratings suggest lower yields, in the 50 bushel per acre range. Between now and harvest, the Good to Excellent percentage typically falls another 2%.

Given all of the changes in the USDA projections, they maintained their corn season-average prices where they were, $5.95 for the 2021 crop and $6.65 for the 2022 crop. For soybeans, USDA lowered its season-average price estimates by 5 cents for each year, down to $13.30 for the 2021 crop and $14.35 for the 2022 crop. Futures market-based projections of those same prices reveal that the markets are more

Figure 4. US soybean crop ratings. Source: USDA-NASS.



pessimistic than USDA, with estimated prices in the $6.25 range for corn and $14.25 range for soybeans. The slightly lower market prices are mainly based on concerns about exports and the general economy. However, the markets are also rebuilding some of the weather premium in crop prices as the drought continues. Despite all of the price variation so far this year, 2022 should be another profitable year for farmers. Throughout all of the swings up and down this year, market prices have remained well above production cost estimates. And drought concerns should keep prices higher over the next couple of months.

For more ag market outlook, **see this month's video**, https://youtu.be/TOonudwFl5U.

Scientific agreement on climate change

By Don Hofstrand, retired agricultural business specialist
Reviewed by Eugene Takle, retired professor emeritus, Iowa State University

This article is part of our series focused on the causes and consequences of a warming planet.

People in the US are divided over whether human activity is causing global warming. Some believe it is part of a natural climate cycle that will reverse course in the near future. Others believe that human activity is causing a permanent change in the world's climate. This article looks at evidence of what climate scientists say, the results of scientific research, position statements of scientific organizations, the results of computer models and more.

Surveys of climate scientists

Several surveys of climate scientists have been conducted over recent decades. These surveys have shown a strong consensus by climate scientists that the planet is warming and the warming is caused primarily by human activity. Examples of organizations conducting these surveys include George Mason University and the American Meteorological Society. The latter survey focused on members of the American Meteorological Society, the American Geophysical Union and the American Association for the Advancement of Science, along with other scientists working in the field.

Survey of climate research

Moving from scientists to the actual scientific research, a 2004 survey of all peer-reviewed research studies on global warming published between 1993 and 2003 (928 studies) showed that when looking just at the studies taking a position on the topic (75% of the studies), the studies all confirmed that human activity causes global warming. The remaining 25% of the studies made no comment either way as they focused on other issues like assessing research methods or historic analysis.

A more recent survey conducted in 2013 of all peer-reviewed global warming research published between 1991 and 2011 (12,000 studies) found that, when looking just at the studies taking a position on the topic (4,000 studies), over 97% agreed that human activity is causing global warming.

Survey of climate organizations

Next consider the position of scientific organizations, most scientific organizations have "position statements" on the topic. An example is the American Meteorological Society; "It is clear from extensive scientific evidence that the dominant cause of the rapid change in climate of the past half century is human-induced increases in the amount of atmospheric greenhouse gases, including carbon dioxide, methane, nitrous oxide and chlorofluorocarbons."

Almost 200 scientific organizations around the world have position statements stating that global warming is primarily attributed to human activity. No national scientific organization position statements were found stating that global warming is not caused by human activity.

Climate computer models

Scientists create computerized models to predict the future of the Earth's temperature and climate. A climate computer model is a mathematical representation of the physical processes that heat and cool our planet, move heat around, melt ice, create clouds, etc. Numerous climate models have been created by scientists in recent years.

These models are also used to identify the causes of the rapid rise in global temperature that has occurred in recent decades.

When all of the naturally occurring factors are included in the models, they fall far short of predicting the current rise in temperature. Only when man-made factors are included in the models do they predict the rapid rise in Earth's temperature.

This result should not come as a surprise. Increases and decreases of greenhouse gas concentrations have caused changes in global temperature many times over millions of years, including mass extinctions and ice ages. This linkage is so strong that any attempt to attribute the current warming to other causes must also explain why the current warming is not caused by the greenhouse effect.

The clincher

The near-Earth atmosphere (troposphere) is warming while the upper atmosphere (stratosphere) is cooling. So, scientists know that the Earth's warming must be something that traps heat next to the surface of the planet and does not let the heat move higher in the atmosphere. This phenomenon eliminates many of the potential natural causes of warming. Only the greenhouse effect traps heat in the lower atmosphere.

And the greenhouse effect is being driven by carbon dioxide and other gases that we are releasing into the atmosphere.

See the **Ag Decision Maker website**, www.extension.iastate.edu/agdm/energy.html#climate, for more from this series.

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