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Ag Decision Maker

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INSIDE . . .

UPDATES

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

A1-12 Historical Corn Yields by County in Iowa, USDA NASS

A1-13 Historical Soybean Yields by County in Iowa, USDA NASS

A1-14 Iowa Corn and Soybean County Yields, USDA NASS

A3-10 2024 Iowa Farm Custom Rate Survey

B1-21 Livestock Enterprise Budgets for Iowa–2024

B1-31 Monthly Swine Feeding Returns in Iowa

B1-36 Monthly Cattle Feeding Returns in Iowa

C2-05 Leasing and Land Ownership Terms

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

A1-10 Chad Hart's Latest Ag Outlook

B1-21 Livestock Enterprise Budgets for Iowa–2024 (11 Decision Tools)

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

New Census of Agriculture reveals more farms, more farmers in Iowa

By William Edwards, retired extension economist, agdm@iastate.edu

Every five years the United States Department of Agriculture carries out an extensive survey of farms and farmers across the nation. The information that is collected and published serves a wide variety of purposes. One of the more important ones is to provide a snapshot of what farms and farmers at the national, state, and county level look like and how they are changing over time.

Highlights

- The number of farm units increased by 0.9%.
- The number of farmer producers increased by 7.1%.
- The average farm size decreased from 355 acres to 345 acres.
- The number of small and medium acreage farms increased while the number of large acreage farms decreased.
- The total acres of farmland decreased by 1.9%.
- Crop sales accounted for 51% of total gross farm income, Livestock sales accounted for 44% and direct government payments accounted for 2%.

Number of farms

The long-term trend in Iowa as well as in most other states has been for the number of farms to decrease over time. However, the 2022 Census of Agriculture showed 86,911 farms in Iowa, an increase of 807 from 2017, or almost 1%. This is the first increase in Iowa farm numbers since the 2007 Census.

Keep in mind that the Census of Agriculture defines any agricultural operation that sold or could have sold at least $1,000 in production in the past year as a "farm." Many small, part-time operations that do not fit the traditional "family farm" image are included, as well as some very large livestock and crop producers. Tracts of land owned by multiple landowners that are all being rented by the same operator count as one farm.

Most of the increase in farm numbers came from smaller farms, as shown in Table 1. Farms under 100 acres accounted for 44% of farms in Iowa, while units from 100 to 999 acres accounted for 48%. Large farms of 1,000 acres or more accounted for only 8 % of the total. Small and medium-size farms both showed a slight increase in numbers from 2017, while the number of large farms decreased by 13%, a reversal of trends in recent history.

Land in farms

The total area of land in farms in Iowa dropped by 585,712 acres over the same five-year period, or nearly 2%. The number of acres in harvested crops decreased even more, by 827,168 acres, and pasture decreased by 99,680 acres. However, the acres in idled acres (Conservation Reserve and other programs), woodlands and farmsteads all increased. The average number of acres in each farm unit decreased slightly, from 355 to 345.

Smaller farms were less likely to have harvested land. Less than half of the land operated by farms under 100 acres was harvested, indicating that many of them concentrated on livestock production. On the other hand, over 80% of the land farmed in units of 500 acres or more was harvested.

Details about changes in land use are shown in Table 2. The Census does not collect data about what types of nonfarm uses farmland may have been converted to.

Sources of farm income

Iowa's agriculture has always been diversified between crop and livestock production. As shown in Figure 1, sales of crops accounted for 51% of Iowa's gross farm income in 2022.

Table 1. Number of farms by total acres, Iowa, 2022. Source: USDA Census of Agriculture.

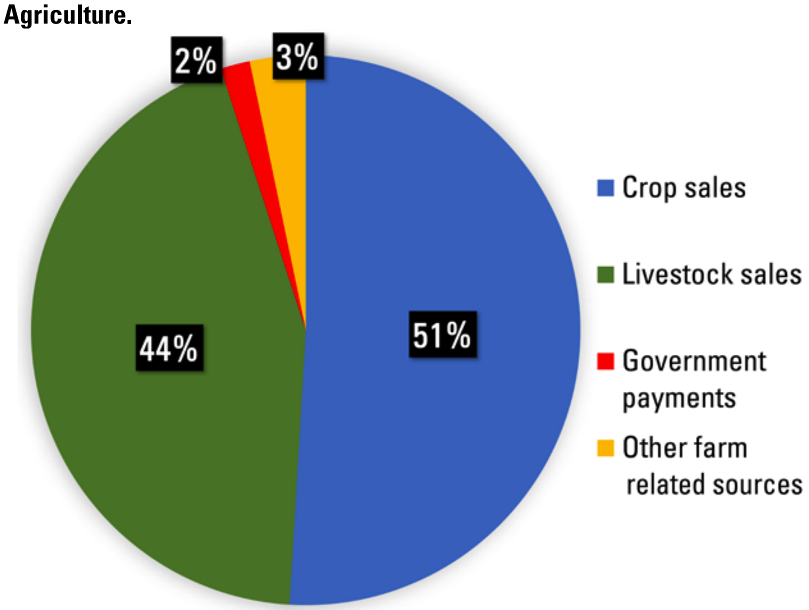
Farm size in total acres	Number of farms	Percent of all farms	Change from 2017	Percent change
Under 100 acres	38,045	44%	1,014	+2.7%
100 to 999 acres	41,515	48%	859	+2.1%
1,000 acres or more	7,351	8%	-1,066	-12.7%
Total	**86,911**	**100%**	**807**	**+0.9%**

Table 2. Land use, total acres, Iowa, 2022. Source: USDA Census of Agriculture.

Land use	Acres	Percent of all acres	Change from 2017	Percent change
Harvested cropland	23,520,694	78.5%	-827,168	-3.4%
Idled cropland	2,105,838	7.0%	169,494	8.8%
All pasture*	1,942,723	6.5%	-99,680	-4.9%
Woodland	1,224,543	4.1%	120,893	11.0%
Farmsteads, etc.	1,184,367	4.0%	50,748	4.5%
Total	**29,978,165**	**100.0%**	**-585,713**	**-1.9%**

*Includes 255,065 acres in pasture that could have been cropped.

Figure 1. Sources of farm income, Iowa, 2022. Source: USDA Census of Agriculture.



Livestock sales produced 44%, while other farm activities such as rental income and custom hiring produced 3%. Direct federal and state government payments accounted for only 2% of gross income.

Number of farmers

Sometimes there is confusion between the number of farms and the number of farmers. These are not the same. The number of farms represents the number of business units operated, but the number of people involved is greater. The Census of Agriculture uses the term "producer" for anyone who takes an active decision-making role on a farm. Many family farms count both spouses as producers. Family partnerships or corporations count as one farm, but often include multiple producers, who may be related to each other. Twenty-four percent of Iowa farms shared net income among more than one household.

In 2022, the Census of Agriculture identified a total of 153,680 farm producers in Iowa, an average of 1.8 per farm. This was an increase of 10,233 from 2017, or 7.1%. Females accounted for 33% of all the farm producers in the state.

What type of farmers are responsible for the increase in farm producers since 2017? The data in Table 3 show that 79% of the added number of producers said that farming was not their principal occupation. Moreover, 83% of the added number said they also worked off the farm, and over 50% worked at least 200 days off the farm. The increase in the number of producers living away from the farm that they operated actually exceeded the increase in total producers. Finally, the age profile of Iowa producers changed, with the numbers under 45 and over 65 increasing, while the number between 45 and 64 years of age decreased.

Thus, two different profiles may emerge to explain the increase in farm producers. One is younger farmers who have a nonfarm occupation but are involved in a farming operation in a management role, even though they may not live on the farm. The second is older farmers who may have partially retired and moved off the farm but are still involved in management. They may have acquired a part-time, off-farm job to supplement retirement income. Either group may manage a smaller than average operation.

Farm employees

Besides farm producers, many people work on farms as hired employees. They perform farm work for a living, so can be considered "farmers" as well. The 2022 Census of Agriculture showed that there were 71,748 paid farm workers in Iowa. Adding the number of employees and producers together shows that 225,428 people were employed on farms in Iowa in 2022, or 2.64 persons per farm.

Off-farm employment

The average farm size of 345 acres would generally not be large enough to support an individual or family, unless intensive crop or livestock production were being carried out. Not surprisingly, many farm producers work off the farm, as well. Census data reveal that just 40% of Iowa producers worked exclusively on the farm in 2022, while 19% reported part-time, non-farm employment

Table 3. Characteristics of farm producers in 2022 and 2017. Source: USDA Census of Agriculture.

Primary occupation	2022	2017	Change	Percent of total change
Farming	67,629	65,463	2,146	21%
Other	86,051	77,984	8,067	79%
Total	**153,680**	**143,467**	**10,213**	**100%**
Work off the farm	**2022**	**2017**	**Change**	**Percent of total change**
None	61,216	59,425	1,791	17%
Some	92,464	84,022	8,442	83%
Total	**153,680**	**143,447**	**10,233**	**100%**
Place of residence	**2022**	**2017**	**Change**	**Percent of total change**
On the farm	94,153	96,717	-2,564	-25%
Off the farm	59,527	46,730	12,797	125%
Total	**153,680**	**143,447**	**10,233**	**100%**
Age range	**2022**	**2017**	**Change**	**Percent of total change**
Under 45 years	36,980	29,934	7,046	24%
45 to 64 years	58,420	65,948	-7,528	-11%
65 or older	58,280	47,565	10,715	22%
Total	**153,680**	**143,447**	**10,233**	**100%**

and 41% worked 200 days or more off the farm, essentially a full-time job. Not surprisingly, producers on larger farms were less likely to have off-farm employment.

Other characteristics

Table 4 shows that the average age of all producers was 57.6 years, a slight increase from 2017. Sixty-one percent of producers lived on the farm they operated, and 44% considered farming to be their primary occupation. The average producer had been on the same farm for 24 years.

Table 4. Selected characteristics of Iowa farm producers in 2022. Source: USDA Census of Agriculture.

Average age	58 years
Percent female	33%
Percent with farming as primary occupation	44%
Percent with some off-farm employment	60%
Percent living on farm operated	61%
Years on present farm, average	24 years

Table 5. Farm producers and employees, Iowa, 2022. Source: USDA Census of Agriculture.

	Number, 2022	Number, 2017	Change from 2017	Percent change
Farm producers	153,680	143,447	10,233	7.1%
Farm employees	71,748	73,257	-1,509	-2.1%
Total	225,428	216,704	8,724	4.0%

The full Census report can be accessed online, 2022 Census of Agriculture, www.nass.usda.gov/AgCensus/index.php. Data are available for all states, and for each county within a state.

2024 96th Annual ISU Soil Management Land Valuation Conference

SAVE THE DATE! This year's ISU Soil Management Land Valuation Conference will be held in person at Scheman Building in Ames, May 15, 2024 from 8:15 am – 4:30 pm. The registration fee is $150.

Sponsored by the ISU College of Agriculture and Life Sciences and ISU Extension, the Soil Management and Land Valuation Conference is intended for farm managers, rural appraisers, real estate brokers, and others interested in the land market in Iowa. This is the longest-running conference at Iowa State in research and extension, and 2024 will mark the 96th annual meeting in this series. It is designed for anyone interested in agricultural land, land management, and land valuation. The program is planned each year by the ISU Extension Economics team in the Department of Economics at Iowa State University.

The final agenda and conference registration website will be made available soon. For questions regarding the conference content, please contact Rabail Chandio, 515-294-6181 | rchandio@iastate.edu.

Profitability of winter cereal rye in integrated crop-livestock systems*

By Alejandro Plastina, extension economist, 515-294-6160 | plastina@iastate.edu

Despite the numerous environmental benefits associated with cover crop use, such as reducing erosion, improving infiltration, mitigating nutrient loading in surface waters, and improving soil health, many farmers in the Midwestern United States are still reluctant to include cover crops in their production practices. The Iowa Farm and Rural Life Poll (Arbuckle 2016) reported potential economic impacts had moderate-to-very strong influence on changes in 74% of producers' management practices, and 57% of them agreed with the statement "pressure to make profit margins makes it difficult to invest in conservation practices." The peer-reviewed literature based on survey methods (Plastina et al. 2018a,b,c), field experiments (Thompson et al. 2020), and simulations from physical models (Marcillo et al. 2019), concluded net returns to cover crops in the US Midwest were predominantly negative, even after accounting for cost-share payments.

In integrated crop-livestock systems, cover crop biomass in early spring can reduce their dependence on stored feed, and thus reduce feed costs (Lundy et al. 2018; Phillips et al. 2019). Cost savings from grazing cereal rye are highly dependent on the type of livestock, herd size, proximity of the feedlot to the field, and total available biomass. In Iowa, farms selling between 20 and 99 cattle and calves in 2017 sold an average of 47 head per farm and accounted for 40% of all farms with sales of cattle and calves in the state (USDA 2019). Malone et al. (2022) suggested harvesting cereal rye for forage between mid-May and early June before planting soybeans in the north-central US could be economically viable, particularly if producers did not observe soybean yield losses from the double-cropping alternative (Gesch et al. 2014; Nafziger et al. 2016).

Using experimental agronomic data from six location-years in Iowa (Marcos et al. 2023) and a partial budget framework, Plastina et al. (2023) evaluated the annual private net returns to cereal rye as a winter cover crop in the no-till corn phase of an integrated corn-soybean and cow-calf system in Iowa. This article summarizes the findings by Plastina et al. (2023).

Methods

The evaluation was conducted in two stages. First, the net returns to cereal rye in the crop system were calculated using experimental agronomic data from Marcos et al. (2023) and local average prices in a partial budget framework. Partial budgets captured the differences between total profits from no-till corn production in fields planted to cereal rye in the fall, and total profits from no-till corn production in fields left fallow over the winter.

Second, using data on cereal rye biomass collected from the experimental plots and local average prices, the hypothetical net cost savings from grazing cows in the cover-cropped field for a typical cow-calf enterprise were simulated. The hypothetical cow-calf enterprise consisted of 48 cows feeding on dry hay in a feedlot during winter and early spring. The cereal rye area was assumed at 160 acres, arranged in the shape of a square adjacent to the feedlot, where a removable electrified fence along the perimeter and a pre-owned and fully depreciated waterer were installed in the early spring and removed the day before rye termination. The temporary fence was assumed to consist of two lines of barbed wire held in place by removable T-shaped posts placed 20 feet apart, and electrified with a solar electric fence charger.

Annual net returns to cereal rye in an integrated crop-livestock operation were calculated as the direct sum of the net returns in the crop system and the net cost savings in the cow-calf enterprise. Only short-term "direct" effects of cereal rye were included in the analysis, since "indirect" benefits from cover crop use, such as reduced soil erosion or nitrate loading from subsurface drainage (Roth et al. 2018; Bergtold et al. 2017; Snapp et al. 2005), do not affect the private net returns to farming in the short-run.

Treatment factors for the agronomic experiment included planting date-method, seeding rate, and target termination date. The study utilized a split-split-plot design with six replications. The main plot treatment was the cereal rye planting method: broadcast or drill. Following ISU recommendations (Conservation Learning Group 2020), the subplot treatment was cereal rye target termination date: early and late termination dates targeted, respectively, 14 and 3 days before planting (DBP) corn. The sub-subplot treatment was seeding rate: high, medium, low, and zero. The seeding rates were 0.33, 0.67, and 1.0 million pure live seed (PLS) for drilled cereal rye; and, 0.67, 1.0, and 1.33 million PLS for broadcast cereal rye.

Cereal rye was established in mid-September in standing soybean (R7 growth stage; Pedersen & Licht 2014) for broadcast plots using a high clearance boom applicator. Soon after soybean harvest in mid- to late-October, drill plots were seeded in both 2019 and 2020 using a John Deere 750 10-ft., no-till grain drill. Since the different seeding dates have a confounding effect with the alternative planting methods, only two main treatments are evaluated: "early-broadcast" versus "late-drill." Early planting and late termination of cover crops has been associated with better establishment and biomass production (Ruis et al. 2019) and higher ecosystem services (Hively et al. 2009).

At all locations, May 1 was targeted as the ideal planting date for corn, but actual planting dates were affected by weather conditions. Consequently, cereal rye termination targeting 14 DBP actually occurred 19 to 39 DBP in 2019, and 10 to 13 DBP in 2020; while the 3 DBP target actually resulted in termination 13 DBP in 2019 and 2 DBP in 2020. Corn nitrogen management consisted of 150 lbs. N per acre applied mostly at the time of V4 to V6 corn stage (Abendroth et al. 2011). All locations utilized ISU recommendations for phosphorous and potassium fertilizer (Sawyer et al. 2006, Mallarino et al. 2013) as well as for weed management (Hodgson et al. 2020). The collected agronomic data included pounds of cereal rye biomass in November and on the date of termination; as well as corn planting date, harvesting date, and yield. The full agronomic experiment is described in detail in Marcos et al. (2023).

Results

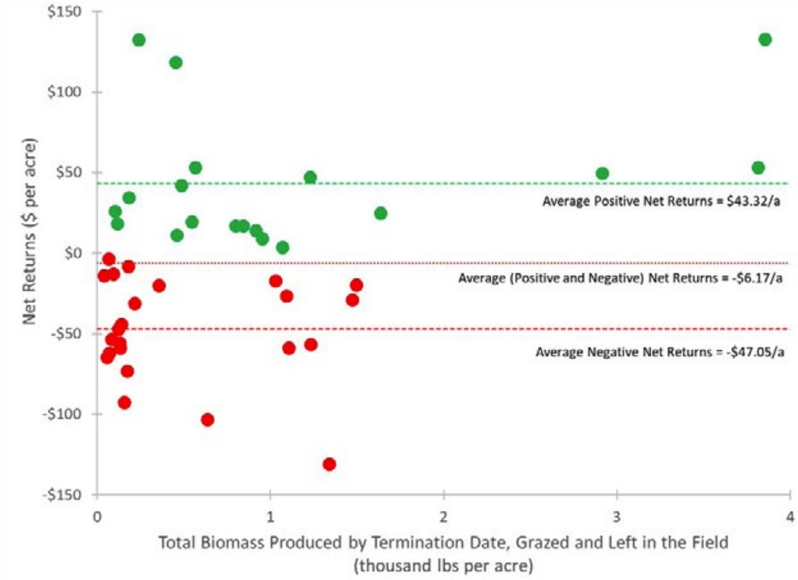
The average corn yields were 193 bushels per acre in the check plots (left fallow in the previous fall), and 188 bushels per acre in the plots planted to cereal rye in the previous fall. Table 1 shows the corn yield differences between cover cropped plots and non-cover cropped plots. While the average yield penalty was 4.7 bushels per acre across all plots, the average yield penalty among early-broadcast plots was 12 bushels per acre and late-drilled plots obtained a yield bump of 1.8 bushels per acre with respect to the check plots. Higher seeding rates and a later termination date were associated with larger yield penalties.

Net returns to cereal rye in the absence of grazing (and therefore no revenue stream from the rye) averaged -$50.08 per acre and were negative for 82.2% of the treatments (Table 2). However, given the higher yield penalty for early-broadcast cereal rye, the net returns associated with such treatment are $67.16 per acre lower than those of late-drilled rye. Also, higher seeding rates and a later termination date were associated with more negative net returns.

The total biomass produced by cereal rye until its termination averaged 776 pounds per acre across all plots, and ranged between 38 and 3,855 lbs. per acre (Table 3). The potential feed savings in the cow-calf enterprise offset most of the losses related to yield penalties and extra costs to implement cereal rye, reducing the average losses from -$50.08 per acre (Table 2) in the absence of grazing to -$6.17 per acre when the rye was grazed.

On average, early-broadcast cereal rye produced an additional 976 lbs. of biomass per acre than late-drilled cereal rye: 1,264 vs. 288 lbs. per acre (Table 3). Consequently, early-broadcast cereal rye generated larger net cost savings in the livestock enterprise and resulted in lower net losses than late-drilled rye: -$3.22 vs. -$9.22 (Table 4). The substantial variability in net returns around their mean values (Table 4) was driven by the differences in biomass production and corn yields.

Figure 1. Net returns to grazed cover crops versus total biomass produced by termination date (grazed and left in the field).



Implications for farm management

The findings have multiple implications for farm management:

First, the statistical relationship between higher cereal rye biomass in the spring and lower subsequent corn yields showcases the trade-off faced by farmers between producing higher environmental services and incurring economic losses. Private net returns to cereal rye in the no-grazing scenario were negative for 82.2% of the treatments and averaged -$50.08 per acre for those treatments. In the absence of large financial incentives (subsidies, cost-share payments, or payments for ecosystem services) their findings suggest cover crops will not be adopted at large scale in Iowa.

Second, average net returns were significantly less negative in late-drilled plots than in early-broadcast plots in the no-grazing scenario, as higher rye biomass negatively affected corn yields relatively more in the latter than in the former plots. This suggests Iowa farmers would be more likely to break-even if the planting date-method combination could be adjusted to achieve their environmental goals while minimizing corn yield losses. Late-broadcasting cereal rye (which was not explored in the study), could produce similar or even higher net returns than late-drilling, given the lower expenses associated with the former planting method.

Third, since seeding rates and target termination dates were not statistically significant factors affecting net returns to cereal rye in the no-grazing scenario, farmers could benefit from further research exploring the use of lower seeding rates and flexible termination dates to minimize costs subject to achieving their environmental goals. Marcillo et al. (2019) reported less negative private net returns to cereal rye at lower seeding rates.

Finally, the finding that 45.2% of the plots under grazing obtained average net returns of $43.32 per acre suggests that cereal rye could be profitable for a sizeable share of the integrated row-crop and cow-calf production systems in Iowa when the rye biomass is used as forage. Figure 1 illustrates the relation between net returns to cereal rye in the grazing scenario and total biomass produced by termination date (both grazed and left in the field). It seems to suggest that in order to be profitable while providing ground cover and its associated environmental benefits, cereal rye had to produce a total biomass of at least 1 ton (2,000 lbs) per acre by termination date. However, this is a testable hypothesis that should be further explored with a larger sample size.

*For the complete list of references from this article, see the full report: Plastina A, Acharya J, Marcos FM, Parvej MR, Licht MA, Robertson AE. Does grazing winter cereal rye in Iowa, USA, make it profitable? Renewable Agriculture and Food Systems. 2023;38:e45. doi:10.1017/S1742170523000388.

Table 1. Descriptive statistics of corn yield differences between treated and untreated plots, ΔY.

	All Observations					Negative Yield Difference		Positive Yield Difference	
Treatment	N	Mean Difference (bu/a)	StDev (bu/a)	Min (bu/a)	Max (bu/a)	% of N	Mean Difference (bu/a)	% of N	Mean Difference (bu/a)
All	45	-4.7	14.3	-45.4	33.3	64.4%	-12.1	35.6%	8.8
Planting Date-Method									
B	21	-12.0	11.7	-45.4	5.1	90.5%	-13.6	9.5%	2.7
D	24	1.8	13.3	-28.1	33.3	41.7%	-9.3	58.3%	9.7
Seeding Rate									
L	15	-2.1	10.7	-23.1	14.1	66.7%	-7.4	33.3%	8.5
M	15	-5.5	12.2	-26.4	20.6	66.7%	-11.8	33.3%	7.0
H	15	-6.3	19.2	-45.4	33.3	60.0%	-17.6	40.0%	10.7
Termination Date									
14	33	-4.0	13.6	-45.4	33.3	63.6%	-10.7	36.4%	7.9
3	12	-6.6	16.5	-28.1	20.6	66.7%	-15.8	33.3%	11.7

Table 2. Descriptive statistics of net returns to cereal rye in the absence of grazing.

	All Observations					Negative Net Returns		Positive Net Returns	
Treatment	N	Mean ($/a)	StDev ($/a)	Min ($/a)	Max ($/a)	% of N	Mean ($/a)	% of N	Mean ($/a)
All	45	-$50.08	$70.31	-$256.11	$125.26	82.2%	-$70.77	17.8%	$45.63
Planting Date-Method									
B	21	-$85.90	$58.59	-$256.11	$5.24	95.2%	-$90.45	4.8%	$5.24
D	24	-$18.73	$65.38	-$172.12	$125.26	70.8%	-$47.61	29.2%	$51.40
Seeding Rate									
L	15	-$29.34	$51.77	-$130.89	$49.50	73.3%	-$50.34	26.7%	$28.43
M	15	-$54.46	$58.96	-$155.29	$72.03	86.7%	-$69.36	13.3%	$42.39
H	15	-$66.43	$92.80	-$256.11	$125.26	86.7%	-$89.47	13.3%	$83.27
Termination Date									
14	33	-$46.67	$66.50	-$256.11	$125.26	84.8%	-$63.51	15.2%	$47.65
3	12	-$59.45	$82.33	-$172.12	$72.03	75.0%	-$93.35	25.0%	$42.26

Notes: B: early-broadcast; D: late-drill; L: low seeding rate; M: medium seeding rate; H: high seeding rate; 3 = target termination date 3 days before planting; 14 = target termination date 14 days before planting.

Table 3. Descriptive statistics of total cover crop biomass produced.

	Total Cover Crop Biomass Produced				
Treatment	N^	Mean (lbs/a)	StDev (lbs/a)	Min (lbs/a)	Max (lbs/a)
All	42	776	916	38	3,855
Planting Date-Method					
B	21	1,264	1,059	129	3,855
D	21	288	311	38	1,092
Seeding Rate					
L	14	724	1,027	38	3,855
M	14	732	800	57	2,916
H	14	871	967	69	3,813
Termination Date					
14	30	541	498	38	1,635
3	12	1,363	1,395	103	3,855

^ 2019/20 treatments in the northwest farm were excluded due to the unavailability of biomass data.

Table 4. Descriptive statistics of net returns to grazed cereal rye.

	All Observations					Negative Net Returns		Positive Net Returns	
Treatment	N	Mean ($/a)	StDev ($/a)	Min ($/a)	Max ($/a)	% of N	Mean ($/a)	% of N	Mean ($/a)
All	42	-$6.17	$57.95	-$130.79	$133.00	54.8%	-$47.05	45.2%	$43.32
Planting Date-Method									
B	21	-$3.22	$57.29	-$130.79	$133.00	47.6%	-$50.45	52.4%	$39.72
D	21	-$9.12	$59.88	-$103.19	$132.37	61.9%	-$44.44	38.1%	$48.28
Seeding Rate									
L	14	$7.30	$48.51	-$55.39	$133.00	50.0%	-$27.86	50.0%	$42.47
M	14	-$11.64	$55.51	-$92.45	$118.36	57.1%	-$49.44	42.9%	$38.76
H	14	-$14.17	$69.72	-$130.79	$132.37	57.1%	-$61.46	42.9%	$48.88
Termination Date									
14	30	-$11.17	$51.24	-$130.79	$132.37	56.7%	-$45.15	43.3%	$33.26
3	12	$6.34	$73.19	-$103.19	$133.00	50.0%	-$52.44	50.0%	$65.13

Notes: B: early-broadcast; D: late-drill; L: low seeding rate; M: medium seeding rate; H: high seeding rate; 3 = target termination date 3 days before planting; 14 = target termination date 14 days before planting.

Internal and external uses compete for hay and grazing land

By Lee Schulz, extension livestock economist, 515-294-3356 | lschulz@iastate.edu

Cow-calf producers need forages. Corn stalks can supplement forage supplies. Still, pasture and hay are the key forage resources. Growing forages takes land.

On-farm land use decisions involve trade-offs. If you choose to grow hay to earn income from cattle, you give up the opportunity to earn income from growing something else, corn for example, on that land. Economists call earnings you forego to use your resources where you choose, rather than employing them somewhere else, *opportunity cost*. All resources–land, labor, machinery, capital–can be employed somewhere else. Thus, all resources have opportunity costs wherever you choose to employ those resources.

How to evaluate resource allocation decisions

The more clearly you can define your opportunities and alternatives, the better you position yourself to more easily evaluate trade-offs. This will help eliminate some alternatives, which will limit the number of alternatives that require number crunching. The thought process may go something like this:

- What resources do you have?
- What opportunities or alternative ways do you have to use those resources?
- What are the advantages and disadvantages of each of those alternatives?
- How much income, costs, and net earnings would each alternative have?

Some opportunity costs are straight forward

Explicit opportunity costs are costs that can be seen and are obvious from choosing one option over another. For example, renting out land or enrolling it in Conservation Reserve Program (CRP) to collect a payment forego income you could earn by farming the land yourself.

Agricultural production involves a bundle of resources, rather than a single input. Typically, the goal is to maximize the return to the bundle of resources. That complicates calculating opportunity costs for individual resources.

People often value the excitement of earning today significantly higher than future earnings. It's human nature. It's the tug of immediacy of a promised benefit versus a payoff that's possibly years down the road. That's a trade-off.

People may forego potentially higher returns for other reasons. Some people really like seeing cows on pasture and realizing the environmental benefits of grazing cattle.

An Iowa Beef Center Cow-Calf Producer Survey, store.extension.iastate.edu/product/Iowa-Beef-Center-2014-Cow-Calf-Producer-Survey, indicates the four largest competitors for buying or renting pasture or hay acres are conversion to row crops, other livestock producers, CRP and recreation.

Twenty-five percent of Iowa farms have cattle

The Census of Agriculture is a complete count of US farms and ranches and the people who operate them. Even small rural and urban parcels of land count if they normally produce $1,000 or more of agricultural products per year. USDA released data from the Agriculture Census for 2022 on February 13, 2024.

Iowa has a total land area, including non-agricultural land, of 35,747,295 acres. Iowa has 86,911 farms, totaling 29,978,165 acres. Average Iowa farm size is 345 acres. Iowa has 21,750 farms that have cattle, comprising about 9.7 million acres operated or 447 acres per farm. Many of these farms have both crop and livestock enterprises. To know what business farms are primarily engaged in, the North American Industry Classification System can be used. Iowa has 8,311 beef cattle ranching and farming operations (think cow-calf) and 1,478 cattle feedlots (Table 1). Iowa has 1,317,872 acres in beef cattle ranching and farming averaging 159 acres per farm. There are 788,222 acres in cattle feedlots or 533 acres per farm.

According to an **Iowa Beef Center Feedlot Operator Survey**, store.extension.iastate.edu/product/Iowa-Beef-Center-2014-Feedlot-Operator-Survey, 84.1% of respondents indicated that they produce 50% or more of their feed needs on their own farm. Respondents also reported having (owning or renting) sufficient land to utilize manure produced by their own operation.

Competition for land is intense

Most agricultural land in Iowa, 25,881,597 acres or 86.3% of the total land in farms, is used to grow crops. Of this cropland, 23,520,694 acres are harvested cropland, 2,078,005 acres are cropland idle or used for cover crops or soil-improvement, but not harvested and not pastured or grazed, 255,065 acres are other pasture and grazing land that could have been used for crops without additional improvement, 27,213 acres are cropland on which all crops failed or were abandoned, and 620 acres are cropland in summer fallow.

Woodland accounts for 1,224,543 acres or 4.1% of all agricultural land in Iowa. A majority of this is woodland not pastured versus woodland pastured at 921,340 acres and 303,203 acres, respectively. Permanent pasture and rangeland, other than cropland and woodland pastured, accounts for 1,687,658 acres or 5.6% of all agricultural land in Iowa (Figure 1). Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. is 1,184,367 acres or 4.0% of Iowa's agricultural land.

In 2022, Iowa had 1,619,175 acres enrolled in CRP, Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP) or Conservation Reserve Enhancement Program (CREP) (Figure 2). Operations

Figure 1. Iowa land in permanent pasture and rangeland, other than cropland and woodland pastured. Data source: USDA National Agricultural Statistics Service, Census of Agriculture.

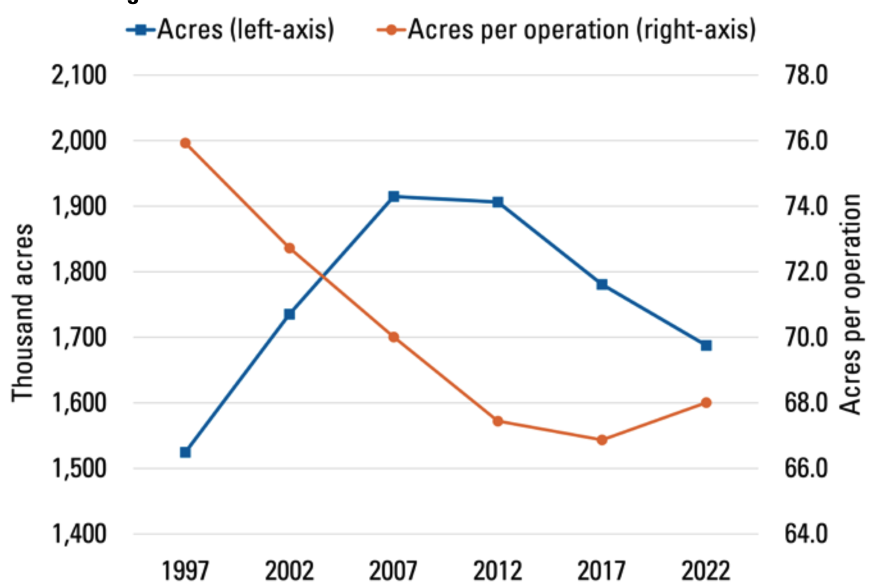


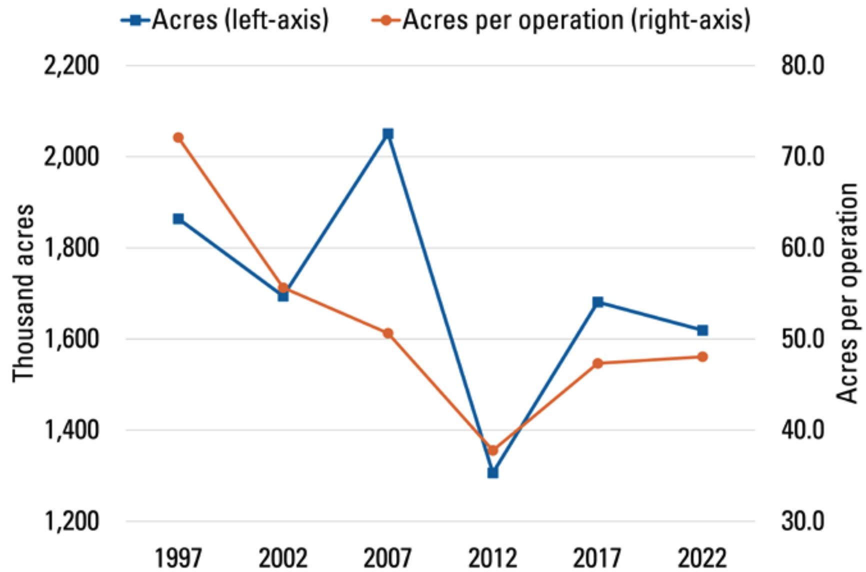
Table 1. Summary of farms and land in farms in Iowa by North American Industry Classification System–2022. Data source: USDA National Agricultural Statistics Service, Census of Agriculture.

	Total	Oilseed and grain farming (1111)	Beef cattle ranching and farming (112111)	Cattle feedlots (112112)	Dairy cattle and milk production (11212)	Hog and pig farming (1122)	Poultry and egg production (1123)	Sheep and goat farming (1124)
Farms								
Number	86,911	43,653	8,311	1,478	662	3,748	1,234	1,898
Percent	100.0	50.2	9.6	1.7	0.8	4.3	1.4	2.2
Land in farms								
Acres	29,978,165	23,504,486	1,317,872	788,222	315,122	1,282,463	126,504	58,355
Average acres per farm	345	538	159	533	476	342	103	31

with land enrolled in these government programs are counted as farms, but the acres are not counted as agricultural land.

Clayton county had the most CRP, WRP, FWP, or CREP in Iowa with 45,631 acres in 2022. Polk county had the lowest enrollment with 4,644 acres. There were seven counties with 30,000 or more CRP, WRP, FWP, or CREP acres, 25 counties with 20,000 to 30,000 acres, 16 counties with 14,000 to 20,000 acres, 13 counties with 12,000 to 14,000 acres, 21 counties with 9,000 to 12,000 acres, and 17 counties with less than 9,000 acres.

Figure 2. Iowa land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs. Data source: USDA's National Agricultural Statistics Service, Census of Agriculture.



Shifts in global competition

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

Over the past several months, the corn and soybean markets have been fixated on the potential production coming from South America. As our harvest was wrapping up last fall, the chatter about the upcoming South American crops began. And that speculation continues today, as the release of the March World Agricultural Supply and Demand Estimates (WASDE) report was more anticipated for its adjustments to global supplies than its shifts in domestic supply and demand. The global markets have expanded dramatically over the couple of decades. Production and consumption have both increased at rates faster than population, and corn and soybean trade has more than doubled since 2000. Much of that growth has occurred in South America.

Global corn market

For corn, the 2023-2024 crop is the largest the world has ever seen. Table 1 outlines global corn production for the last two years. The 2023-2024 crop of 1.2 billion tons of corn produced translates to roughly 48.4 billion bushels. The US produces nearly one-third of that total. But it is the Brazilian crop most are watching currently. USDA's current estimate of the Brazilian corn crop is 124 million tons or 4.88 billion bushels. USDA's counterpart in Brazil, CONAB (National Supply Company), has an estimate of 113 million tons or 4.45 billion bushels. Traders are searching for indications to verify which of these estimates are closer to the harvested reality.

The 433 million bushel gap between the USDA and CONAB numbers has significant implications for US corn exports. While Brazil does not produce nearly as much as the US does, Brazil has recently become the largest corn exporter in the world. Figure 1 shows global corn exports since 2000. For most of that time, the US has been the dominant corn exporter.

Only during the drought-riddled year of 2012 had the US lost that top slot. But with the continuing growth of corn production within Brazil, they moved into the top slot with last year's crop and this year's projections have them maintaining that position. The growth in corn exports is not limited to Brazil. As the figure shows, corn export levels have grown in Argentina, Ukraine, and Russia. The 10 countries shown in the figure are currently the top 10 corn exporters, ordered by projected 2023-2024 export levels. The graphic shows that the growth in global corn exports has basically been captured by other countries and not the US.

Any reduction in Brazilian supplies would create some potential openings for US corn, but we would face some stiff competition to capture those sales. Despite the war in Ukraine, corn supplies from the Black Sea region are entering the global market. Given the military need for funding on both sides of that war, both countries have been "motivated sellers" of crops. Recent corn export bids cataloged by the International Grains Council show Ukrainian corn priced roughly 10% below US or South American corn. The gains US corn has made thus far on the export front have been impressive, despite the challenges.

Figure 1. Global corn exports. Source: USDA FAS.

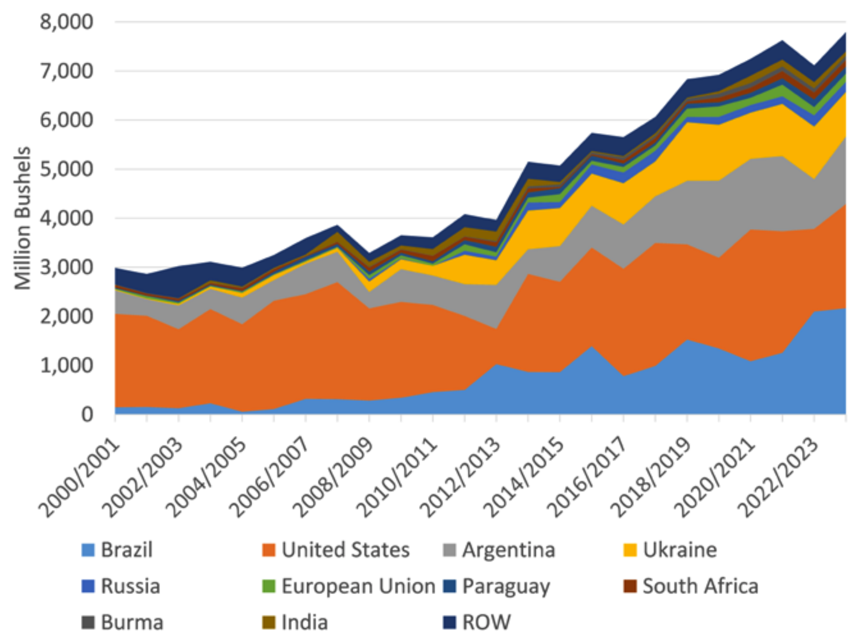


Table 1. Global corn production. Source: USDA-WAOB.

Country or Region	2022-23 Estimate	2022-23 Change from February 8	2023-24 Forecast	2023-24 Change from February 8	2023-24 Change from 2022-2023
			Million tons		
World	1,157.5	1.6	1,230.2	-2.3	72.7
United States	346.7	--	389.7	--	43.0
Foreign	810.8	1.6	840.5	-2.3	29.8
Argentina	36.0	1.0	56.0	1.0	20.0
Brazil	137.0	--	124.0	--	-13.0
Mexico	28.1	--	24.0	-1.0	-4.1
Canada	14.5	--	15.1	--	0.5
European Union	52.4	--	60.1	--	7.7
Serbia	4.3	--	6.6	--	2.3
FSU-12	47.7	--	52.6	-1.1	4.9
Ukraine	27.0	--	29.5	-1.0	2.5
Russia	15.8	--	16.6	-0.4	0.8
South Africa	17.1	--	15.5	-1.3	-1.6
China	277.2	--	288.8	--	11.6
India	38.1	--	35.5	--	-2.6

Global soybean market

The global soybean market has experienced very significant changes as well over the past couple of decades. Global production and consumption have grown dramatically. In fact, world production has set a record in each of the past two years. Table 2 outlines global soybean production for the last two years. The 2022-2023 crop of roughly 378 million tons of soybeans produced translated to roughly 13.89 billion bushels. The 2023-2024 crop of roughly 397 million tons of soybeans produced translates to roughly 14.58 billion bushels. The 690 million bushel increase in global supplies from one record year to the next is impressive. As with corn, the US produces nearly one-third of that total and it's the Brazilian crop most are watching currently. USDA's current estimate of the Brazilian soybean crop is 155 million tons or 5.695 billion bushels. USDA's counterpart in Brazil, CONAB, has an estimate of 147 million tons or 5.4 billion bushels. USDA's lower estimate this month reflects continuing concern for the South American crop, but as the CONAB estimate, USDA is still maintaining levels above Brazilian and private industry estimates.

The gap between the USDA and CONAB soybean estimates is 294 million bushels. Those potential bushels definitely impact the export markets. US soybean exports have retreated over the past couple of years, but the long-run trend for global soybean exports is strongly positive. Figure 2 displays global soybean exports since 2000, tracking the current top 10 countries for soybean exports, along a rest-of-the-world (ROW) aggregate. Global soybean exports have doubled since 2009 and tripled since 2000. While the US has captured a small piece of this growth, it has been Brazil that has expanded to meet the world's soybean needs. Brazilian soybean exports account for over half the world total. The US had been the largest exporter in the vast majority of years before 2012, but Brazil took the lead then and has widen the gap between sizably. Based on current estimates for the 2023-2024 crop, Brazil's soybean exports will be more than double the US total. The possible reduction of Brazilian supplies could open up some additional US soybean sales, but USDA's outlook doesn't show a rebound in the total number of soybean

Figure 2. Global soybean exports. Source: USDA FAS.

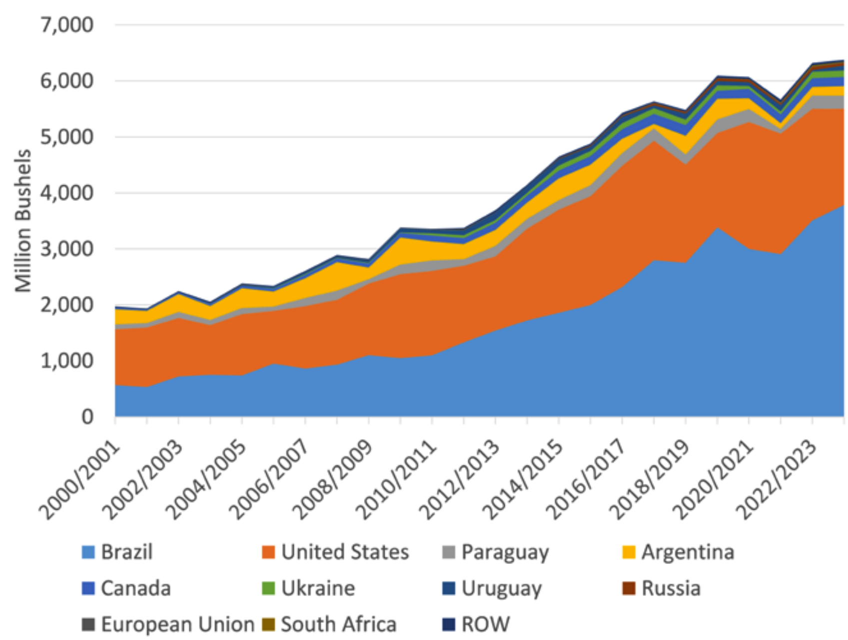


Table 2. Global soybean production. Source: USDA-WAOB.

Country or Region	2022-2023 Estimate	2023-2024 Estimate	Change from February 8	Change from 2022-2023
	Million tons			
World	378.1	396.8	-1.4	18.8
United States	116.2	113.3	--	-2.9
Foreign	261.8	283.5	-1.4	21.7
Argentina	25.0	50.0	--	25.0
Brazil	162.0	155.0	-1.0	-7.0
Paraguay	10.1	10.3	--	0.2
Canada	6.5	7.0	--	0.4
India	12.4	11.0	--	-1.4
China	20.3	20.8	--	0.6

bushels exported from the US until the 2024 crop.

Looking ahead

Throughout my talks this winter, I have highlighted the importance of exports to the US crop markets. It was the strong export pace during the 2020 and 2021 crop years that supported the price recovery after COVID and the return to $6 corn and beans in the teens. But that export pace cooled during the 2022 and 2023 crop years due to a combination of greater global supplies and high US prices relative to the rest of the world. And I feel export demand holds the key to pricing as we move through 2024. The limited corn export recovery is providing some support to stabilize corn prices this spring, with the potential to add upward pressure on prices, depending on the size of the Brazilian crop. Meanwhile, the soybean market is searching for signs the decline in US exports is over. The growth in soybean usage for biofuel is helpful, but exports still set the pricing picture.

Listen to the **March 2024 Crop Market Outlook video**, https://youtu.be/OEbApbt1MJU, for further insight on outlook for this month.

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