Webinar: America's Farms and Ranches at a Glance, 2024 Edition

December 10, 2024

Transcript

Ashley Murdie: Good afternoon, everyone. My name is Ashley Murdie, your host for today's webinar. On behalf of USDA's Economic Research Service. Welcome and thank you for joining us today. Our webinar presents the 2024 edition of the America's Farms and Ranches at a Glance report. Before we begin, let me quickly note that this webinar is being recorded and will be posted on the ERS website next week. If you have any questions during today's presentation, please submit them through the Q and A feature at the bottom of your screen. Today, our presenters are ERS Economist Katherine Lim and Jonathan McFadden who will be joined by ERS Economist Noah Miller during the Q and A.

Katherine Lim is a research agricultural economist in the Farm Economy Branch of our Resource and Rural Economics Division, where she studies farm households. Prior to joining ERS Katherine was an economist at the Federal Reserve Bank of Minneapolis, studying the effect of labor market institutions on low- and moderate-income workers. She also served as a financial economist with the U.S. Department of the Treasury focusing on tax issues related to pass-through businesses.

Jonathan McFadden is a research economist in the Structure, Technology and Productivity Branch of our Resource and Rural Economics Division where his work centers on environmental economics and industrial organization as they relate to agriculture. His research at ERS focuses on the development, commercialization and adoption of technologies and management practices that increase the productivity and environmental performance of U.S. agriculture. Prior to ERS, Jonathan was an assistant professor in the Department of Economics at the University of Oklahoma.

Noah Miller is a research agricultural economist in the Farm Economy Branch, also in our Resource and Rural Economics Division, where his research focuses on agricultural banking and the impact of marketing decisions on farm financial well-being. Before joining ERS, Noah received his Ph.D. from the Department of Agricultural Economics at Kansas State University.

Thank you all for joining us today, Katherine, I'll go ahead and turn it over to you now.

Katherine Lim: Thank you, Ashley, and thank you all so much for joining me today as I present the key findings from the 2024 edition of America's Farms and Ranches at a Glance.

This report was released at 9 a.m. Eastern Standard Time today. And before I get started, I do want to acknowledge my co-authors. As Ashley mentioned Jonathan McFadden, Noah Miller, and Katherine Lacey. The 2024 edition of America's Farms and Ranches at a Glance describes the characteristics of nearly 1.9 million U.S. farms in 2023.

Specifically, the report examines what farms produce, aspects of their financial situation and their participation in Federal agricultural programs. The report also provides information on the household well-being for family farms, which I will define shortly.

There are two new sections in this year's edition, which provide new insights on farmers, risk management and their production practices. The first section reports on farmers level of unpriced commodities stored both on and off farm, while the second section provides some information on the use of precision agriculture technologies across different farm types as well as farmers' stated reasons for adopting different technologies. The data for this report come from the 2023 Agricultural Resource Management Survey, which we refer to as ARMS. ARMS is a unique annual survey of farm and ranch operations that's conducted by the economic research service, which we abbreviate as ERS, and the National Agricultural Statistics Service, which we abbreviate as NASS. ARMS is USDA's primary source of information on farm businesses and their households. The 2023 ARMS covers farm activities during the 2023 calendar year, and it was conducted at the start of 2024. So, we refer to the current report as the 2024 edition since it's published in 2024. But the statistics presented here today are for the 2023 calendar year.

Before I present the findings from the report, I want to define some important terminology I will use throughout the presentation. So, USDA defines a farm as any place that sold or normally would have sold at least $1,000 worth of farm products in a given year. As I've already done earlier in this webinar, I will be referring to the term family farms. And a family farm is any farm where the majority of the business is owned and operated by an operator, and any individuals related to that operator. So, in 2023, around 96% of U.S. Farms and Ranches were considered family farms. Finally, the principal operator of a farm is defined as the individual most responsible for making decisions for the farm or ranch.

Okay, before I cover a few more definitions, I want to provide some background on family and non-family farms. So, in this chart we separate family farms into small, midsize and large. The first bar of this chart shows the proportion of farms in each category, where the yellow portion represents small family farms, the light green portion represents mid-sized family farms, and the dark green portion represents large-scale family farms. Together. these 3 categories make up 96% of all farms and ranches. The remaining 4% of farms are non-family farms. So before explaining this figure further, I'm going to provide some more detail on the farm typology that we use throughout the report.

In order to study farms in smaller but similar groups, ERS has developed a farm typology based on family farm status, the principal operator's main occupation, and the size of the farm based on gross cash farm income, which we denote as GCFI. Gross cash farm income is a measure of total income received by the farm, and it includes cash receipts, government payments, and other farm related income.

I will use the figure presented on this slide when defining the eight farm typology groups. This might seem like a lot of information, but I'll break the figure up into sections over the next couple of slides, and then return to the entire figure shortly.

Let's first look at small family farms. So, a small family farm is defined as a family farm with gross cash farm income of less than $350,000 per year. The small family farm category is broken into four different groups. First, we have retirement farms, which is a small family farm where the principal operator reports having retired from farming while continuing to farm on a small scale. An off-farm occupation farm is a farm with a principal operator who reports a primary occupation other than farming. Next, we have farming occupation farms meaning the principal operator reports farming as their primary occupation. And this category is split into two groups based on size. So low sales are

farming occupation farms with gross cash farm income of less than $150,000 per year, while moderate sales are those with gross cash farm income, greater than or equal to, $150,000 but still less than $350,000 per year.

Midsize family farms are family farms with gross cash farm income greater than or equal to, $350,000 but less than 1 million dollars a year. Large-scale family farms are family farms with gross cash farm income greater than or equal to 1 million dollars per year. And this category is further broken down into 2 groups: large farms with gross cash farm income less than 5 million dollars per year, and very large farms with gross cash farm income greater than or equal to five million dollars per year. Finally, the last category of the farm typology is non-family farms. These are operations where no operator and the individuals related to them owns a majority of the farm business. These farms can vary widely in size, income, and ownership structure. So, some examples of non-family farms are those with two operators from different families, large farms operated by publicly held corporations, or farms operated by a hired manager who's unrelated to the owners.

So, throughout the presentation some figures will focus on the categories in the second column, small, midsize, large scale and non-family, while others will show statistics for all eight groups in the third column.

Okay, now that we have our typology, let's return to that first figure. So, if you recall, the first bar represents the share of farms in each category. The second bar in the figure shows the percentage of acres operated while the third bar represents the percentage of the value of production. As you can see, 86% of farms are considered small family farms. And these farms account for 41% of agricultural land operated and 17% of the value of production. On the other hand, 4% of farms are large scale family farms accounting for 31% of agricultural land operated, and 48% of the value of production. Finally, non-family farms make up 17% of the value of production in 2023, which is up from 11% in 2022.

We can separate the value of production into the production of selected commodities. So, in this graph, we can see that large scale family farms accounted for the largest share of production for most commodities. This includes beef, hogs, cash grains and soybeans, cotton, dairy, and specialty crops. In the two remaining commodities, poultry and eggs and hay, small family farms and mid-sized family farms dominated the production. The value of production attributed to non-family farms ranged from 8% to 28% across all commodities.

Now let's move from commodity specialization to financial vulnerability. The measure of financial vulnerability or financial risk we use in this report is the operating profit margin or OPM. OPM is equal to the ratio of operating profit to gross income from the operation. The operating profit margin is a benchmark for the operation's financial health. So, for example, operations with low OPM may be at a high risk of financial stress. In this figure, we categorize farms into three different categories based on their OPM. We consider a farm high risk if the operating profit margin is below 10%. The farm is considered a medium financial risk if the OPM is between 10 and 25%. And if the OPM is above 25%, the operation is considered in low financial risk. The OPM cannot be calculated for farms with 0 or negative gross farm income, which could occur when operations have a large decrease in their value of inventory. As seen in this graph most small family farms have an operating profit margin in the high-risk zone. While not on this slide, a statistic that is included in the report is that at least 90% of low sales, off-farm occupation, and retirement farms earn the majority of their income from off-farm sources. So, the profitability of the farm does not necessarily equate to the

well-being of the associated farm household. Generally, we see the share of farms in the high-risk zone decreases as farm size increases. And a majority of midsize and large-scale family farms are in the medium risk or low risk zones.

Okay, now that we've looked at financial risk, let's explore farm operations' use of credit. So, credit is an important resource for farmers and ranchers to support the capital needs of their operations. I will discuss the share of farms with debt, their level of debt reported, and the size of debt relative to gross cash farm income. In general, around 28% of all U.S. farms and ranches held any debt in 2023. Credit usage and credit amounts generally increased with farm size. Around 5.5% of retirement farms had farm debt compared to 79.5% of very large family farms. Among low sales farms with debt their average debt was equal to $162,000, while for very large family farms with debt, they held an average of 3.7 million dollars. This is consistent with the fact that farming is capital intensive and large scale. Family farms account for the majority of U.S. agricultural production. When we scale debt levels by gross cash farm income, we see that smaller family farms have higher relative levels of debt compared to mid-size, large-scale family farms, and non-family farms.

Okay, next, we're going to turn to farm operations, participation in government payments and crop insurance. Not shown here, but provided in the report, we find that overall, 24% of all farms report receiving some type of government payment. But participation rates varied. The share of farms receiving government payments ranged from 21% for small family farms to 44% for midsize and large-scale family farms. This chart shows the share of payments for selected government programs received by farms of different types. Small family farms received 76% of conservation reserve program payments. This program removes environmentally sensitive cropland from production. Countercyclical payments are made to farmers when prices or revenue for a particular commodity are low. Small family farms received 21% of countercyclical type payments, while midsize and large-scale family farms received the majority of these payments. If you recall from an earlier slide, small family farms tend to account for a larger percentage of poultry and egg and hay production relative to all other farm types. And these commodities aren't covered under countercyclical type payment programs. Mid-size and large-scale family farms account for the majority of the value of production for cash grains and soybeans, and cotton, which are commodities that are targeted by counter cyclical type programs.

Another government program we looked at was Federal crop insurance. Overall, 16% of U.S. farms participated in Federal crop insurance programs, but participation rates varied widely across farm type. Although midsize and large-scale family farms made up 10% of all U.S. farms in 2023, these farms accounted for 42% of Federal crop insurance participants, 67% of all harvested cropland acres, and they received 67% of indemnities from Federal crop insurance. These family farms were also the most likely to participate in Federal crop insurance. Nonfamily farms received 18% of indemnity payments from 20 in 2023, which was up from 8% in 2022.

Okay? So, in the past few slides, we've been discussing statistics that relate to the farm operation. Next, I'd like to move from the farm operation to the farm household. So, the farm household statistics that I'm going to show you are calculated for the principal operator's household, and they only include family farm operation. In the next few slides, I will show information on farm household income and wealth. And these measures include both on-farm and off-farm sources of income and wealth. Farm income includes the earnings of the principal operator's household from the farm business as well as earnings from other farming activities, such as rents received from renting out

farmland to others. Also, farm income is net of expenses, which means it can be, and often is, negative. The main sources of off-farm income for farm households include wages and salaries from off-farm employment and unearned income, such as dividend income from social dividend, income from social security or income from private pension plans. Farm household wealth is equal to the household share of farm and non-farm assets, less farm and non-farm debt.

So, first, we compare family farm households to all U.S. households. This is not shown in this chart but is included in the report. Median family farm household income was around $98,000 in 2023, which exceeded U.S. household median income for that year, which was around $81,000. Median total farm household wealth was 1.4 million dollars in 2023, which was higher than median U.S. household wealth of $201,000. The chart on this slide shows the share of farm households with income and wealth below their respective U.S. median. Overall, 42% of farm households have income below the U.S. median, but the share varies by farm type. Among retirement and low sales farms over half of farm households have incomes below the U.S. median compared to 10% of principal operator households of very large family farms. Overall farm households generally have higher wealth than other U.S. households. As shown in this chart, 5% of farm households have wealth below the U.S. median.

Next, we explore the sources of income for farm households. So, this chart shows the share of farm households with negative income from farming in the yellow bars, and the share of farm households that receive the majority of their income from off farm sources in the green bars, for each farm type. Overall, a little over half of farm households have negative income from farming. This is especially likely to be true for households, operating in retirement, off-farm occupation, and low sales farms. Consistent with receiving negative income from farming, the majority of farm households, 85% receive most of their income from off-farm sources like wages and salaries from off-farm jobs. Again, retirement, off-farm occupation and low sales farms are most likely to receive the majority of their household income from off-farm sources.

So, as I mentioned before, this report includes a new section based on questions asked in the most recent ARMS for farm operations to report the amount of their unpriced stored corn, soybeans, and wheat for each quarter in the calendar year. Unpriced stored commodity are crops that are intended for sale but are not under a contract with an agreed upon price. These commodities can be stored on farm or off farm, with off farm storage, incurring a fee to the farmer. Holding unpriced stored commodity can be a strategy farmers use to receive higher prices post-harvest, but the practice involves risks to the farmer if prices decline. The total amount of unpriced corn, soybeans, and wheat stored by farms varied across the year. The highest amounts of unpriced corn and soybeans were stored as of December 1st, 2023, while for wheat the highest amounts were reported as of September 1st, 2023, with December 1st, 2023, very close behind.

Next, we look at the share of farms with on-farm and off farm, unpriced commodity by farm type as of December 1st, 2023. Overall, 23% of farms reported that they had on-farm storage of unpriced commodity. The share with unpriced commodities stored on farm ranged from 6% for retirement farms to 60% for very large family farms. Off-farm storage was less common overall at 15% of farms reporting off-farm unpriced stored commodity and the share using off-farm storage varied less across farm types than the share using on farm.

At this point. I'd like to turn the presentation over to my co-author, Jonathan McFadden, who's going to discuss the second of the 2 new sections in this report, which is on the adoption of precision, agriculture, technologies, and farmers, motivation for their use.

Jonathan McFadden: Thanks, Katie. So, for several decades since the mid-1990s and into the 2000s farm operators in the United States have been making use of precision agriculture technologies for a variety of reasons, including the potential for increased yields and reduced input costs. At the same time these technologies have been used to help streamline operators, day-to-day management of their farms. Now this tends to straight away, invite the question, just what is precision agriculture? So various organizations have defined precision agriculture in various ways and those definitions have tended to change over time as technologies have improved and the structure of us farming has evolved. But currently we can think about precision agriculture as a set of tools that most would consider to be advanced technologies making use of data from many sources to help improve farmers, site-specific and livestock specific management practices.

So, in 2023, USDA asked farm operators in each of the 48 contiguous states about adoption of multiple, distinct precision, agriculture, technologies as well as the reasons why, they adopted them or didn't adopt them. So, generally speaking, the technologies we asked about, and their main purposes are the following. So, yield monitors are screens in the cabs of equipment that provide illustrations. Usually heat maps of crop yields that are produced in real time, as the crop is harvested, which can then be used to print, yield maps of farmers' fields. Soil maps made from analysis of soil, samples or information from equipment on sensors to pick variability in physical and chemical properties. So, these would be things like soil texture and nutrient levels in farmers' fields at a spatially detailed level. Guidance auto steering systems rely on satellite signals to automatically steer equipment, such as tractors and harvesters across a field. Next variable rate technologies, or what I'll term as VRT, allow farmers to vary seeding rates or application rates of pesticides and fertilizers across a field in real time. Drones are small, unmanned aerial vehicles or UAVs used to collect field imagery to support various management practices or carry out field operations like pesticide spraying. Robotic milking consists of automatic milking systems that automate most or all steps of the milking process. And then finally wearable livestock technologies help to monitor livestock animals, health and behavior. So, things like location, nutrient intake, body temperature, heart rate, among many others to help farmers better assess animal well-being and productivity.

So, broadly speaking, what we found is that patterns of precision agriculture use vary substantially by both farm type and by technology. For example, technologies that mainly provide information to support operators, decision making such as yield monitors, yield maps, and soil maps were used on 13% of small family crop producing farms, but 68% of large-scale crop producing farms. Now, although it's not shown in the figure here, it's important to point out that low usage rates of these technologies on small family farms were driven by two subcategories of small family farms. So, the first of these subcategories is retirement farms, of which 5% adopted. The second subcategory is low sales family farms, which had a 9% adoption rate. Now, on the other hand, guidance, auto steering systems on tractors, harvesters, and other equipment were used on 9% of small family farms, 52% of mid-sized farms and 70% of large-scale crop producing farms. The adoption of these systems, as with several other precision agriculture technologies increases with farm size, mainly because larger farms can benefit more from employing these tools than smaller farms. Now, VRT was used moderately across the farm size distribution with adoption rates of 5% for small farms, 32% for mid-sized farms, and 45% for large-scale farms. Adoption of drones was quite limited, as

was use of precision, livestock farming though with some variability based on farm size. So, for example, the adoption rates for wearable technologies on farms with livestock commodity scales ranged from 1% of small farms to 12% of large-scale farms. Somewhat more popular, though, is robotic milking, which was adopted on 19% of large-scale farms that produced milk.

So, equally as important as understanding adoption rates is understanding farmers' perspectives about why they chose to use the technologies. So, as we can see from the table, their motivations for adoption were diverse, but broadly consistent with the stated benefits of the technologies. So, for example, of the farms adopting yield monitors, yield maps, or soil maps, 55% did so to increase yields, 41% indicated one reason was to reduce purchased input costs, and 40% indicated one reason was to improve soils or reduce environmental impacts. These same 3 factors were among the most common for VRT, although a greater share of the RT adopters, 62%, were motivated by reducing purchased input costs. Now, on the other hand, reduced labor, time and operator fatigue spurred farmers to adopt precision agriculture technologies having substantial labor-saving potential. Half of all farms on which guidance auto steering systems were used indicated that saving labor time was a reason for adoption, while the share of farms with robotic milking indicating this as a reason was 77%. Likewise, the reduced operator fatigue was the decision factor for 64% using guidance auto steering and 41% of those using robotic milking. And then last, while 52% of farms using wearable livestock technologies tended to indicate yield increases as a reason for adoption, many adopting farms were also influenced by other things like broadband Internet access.

So just to summarize in this report, we found that: family farms remain the dominant type of farm in the U.S. Small family farms made up 86% of the farm count and operated 41% of the farmland but generated 17% of the total value of production. USDA Conservation Reserve Program Payments were more concentrated among small farms than other government programs' payments. Overall, 16% of farms participated in Federal crop insurance in 2023, up from 14% in 2022 with participation varying by commodity.

Most farm households received over half of their income from off-farm sources and 51% had negative income from farming. The share of farms that held on-farm unpriced commodity increased with farm size, but no similar trend was observed with off-farm storage. And last, the use of precision agriculture technologies varied by technology and farm type as did the motivations underlying their use. So, I'd like to thank everyone for attending the webinar here today. For those of you who are interested. A full copy of the report can be found online at the ERS website. At this time my co-authors and I are happy to answer any questions you may have in the next few minutes during our Q and A.

Ashley Murdie: Thanks, Jonathan, and next slide, please. Let's go ahead and open the floor for questions. Now, as a reminder, questions can be submitted through the Q and A feature at the bottom of your screen. Let's see here for our 1st question, Katherine, how does the financial risk of farms in 2023 compare to 2022?

Katherine Lim: It's a great question. Thanks. In general, if we compare statistics, putting all farms together, the share of small- and large-scale family farms in the low-risk zone actually fell in 2023 compared to 2022, but overall, we see around 69% of all farms had high risk OPM in 2023, which was actually the exact same percentage as 2022. But in this report, we actually don't explore long-term trends of OPM.

Ashley Murdie: Thank you. Alright, next question looks like one for Jonathan. Why is there such a stark difference in precision agriculture adoption rates between the small farms and larger farms?

Jonathan McFadden: Yeah, excellent, excellent question. So, as we mentioned in the report, some technologies like guidance, auto steering increase with farm size primarily because larger farms can benefit more from employing these tools than smaller farms. However, in our report on precision agriculture that we released last year in February, we discussed how there is also sort of this large literature on the digital divide between farm operators who are technologically savvy and those who are a little less technologically sophisticated. So, this may also play some role, though I would refer readers to that particular report for more details.

Ashley Murdie: Thanks, Jonathan. Alright, this question looks like one for Noah. Why were unpriced wheat amounts high for both September and December, while corn and soybeans were high only in December?

Noah Miler: Yeah, thanks for the question. So generally unpriced stored commodity levels will be highest right after harvest. And since we included all types of wheat in this analysis, and they have different harvest dates, that is contributing to what the data looks like. Thanks.

Ashley Murdie: Great thanks, Noah. For this next question, why do most of the Federal crop insurance payments go to large farms?

Katherine Lim: Oh, thanks for the question. That actually has a lot to do with commodity specialization. So overall, about 16% of farms participated in crop insurance, but 66% of row crop operations participated in crop insurance compared to 17% of farms that were growing specialty crops and 12% of farms producing livestock. So, in addition to commodity specialization, we see there are differences across size, right? So, row crop operations tend to be large farms and large farms like, I said, are more likely to participate in crop insurance.

Ashley Murdie: For our next question, was cost looked at as a factor in precision, agriculture?

Jonathan McFadden: Yeah, great, great question. So, you know, I would refer back to the table that we had. You know, in the slides where we look at where we asked farmers, you know, about their reasons for adopting. And you know, one of the reasons we asked was reduce purchase input costs. And you know that did that did play a role. So, you know, 41% of those adopting yield monitors, yield maps, or soil maps did so to reduce purchased input costs. And the rate was even higher among those adopting VRT, so 62% of variable rate technology adopters did so to reduce purchase input costs. Now, the rates are a little bit lower for some other technologies. So, technologies like robotic milking and wearable livestock technologies, but they were, you know, at sort of what we would see, think of as sort of an intermediate level for things like guidance, auto steering as well as drones. So, to be sure, you know, what we found in this particular report was that you know, reducing purchased input costs played a played a role in farmers decisions to adopt particular technologies. A similar finding that we have with the precision ag report that we published last year.

Ashley Murdie: Thanks, Jonathan. For this next question, I think this will be one for Katherine. I know you mentioned early on in the presentation some definitions, but this individual is asking, how are you defining a family farm?

Katherine Lim: Great thanks for the question, yeah. So just a reminder in in this presentation, we have a specific definition of family farms. It's a farm that is owned at least 50% owned by at least one operator, and all individuals related to them.

Ashley Murdie: Thank you. All right. Next up for Noah. Why is unpriced commodity storage an important issue for farmers?

Noah Miler: Thanks. That's a great question. So, as Katie mentioned in the webinar, it's a common risk management practice for farmers. So, if farmers can store their crops, they may be able to get a higher price for them than they would at harvest time. It doesn't always play out this way, though, and it depends on post office market prices. What we found in the report was that the average share of total stocks, as of December 2023 that were unpriced, ranged from approximately 20 to 40% depending on the commodity. These large shares represent a high level of price risk for farmers; however, they also represent potential opportunity to receive higher prices in the future.

Ashley Murdie: Thank you, Noah. Alright, next up: Adoption rate of robotic milking system is higher than precision livestock systems. Why do you think this is happening despite higher cost for Rms than other small-scale technologies.

Jonathan McFadden: Right? So that's another good question. So, we do see some differences in adoption rates between robotic milking and wearable livestock technologies. And some of that's being driven by you know, who the users are, you know, robotic milking users are dairies, whereas wearable livestock technologies can be used among different types of livestock. But you know, I would really just point out that the differences in adoption reasons for adoption. So, 77% of those adopting robotic milking did so to save labor time. So, it's a fairly large percentage. By contrast, only 34% of those adopting wearable livestock technologies did so to save labor time. Now, 52% of those adopting wearable livestock technologies do so to increase yields. And so, you know, one of the factors driving the differences in adoption rates here are just the intended use. Beyond that, again, I would refer you to more details in the in the report, as well as some information that we provided in our report that we published last year. Although that report didn't specifically focus on robotic milking or wearable livestock technologies, it discusses at a fairly broad general level various drivers of uses of these types of technologies.

Ashley Murdie: Thank you, Jonathan. For our next question in terms of percent crop value, what percentage of the crops were insured?

Katherine Lim: I don't believe we reported or calculated that statistic in this report. We only provided the share of farms that had purchased farm operations that had purchased insurance.

Ashley Murdie: Good to know. Thank you. Next up, how are precision, agriculture technologies actually impacting U.S. farmers' real-world yields?

Jonathan McFadden: Alright, great, great question. So, you know one important thing to keep in mind with the results that we're presenting in the precision ag section of the report is that they're based on survey information directly from farm operators about their reasons for adopting these technologies. So, like a lot of research in this area, we aren't, we aren't directly measuring farmers yields and examining how you know those yields correlate with technology use. But in our report on

precision agriculture release last year, we did look into those types of correlations and found them to be positive but small. And so, you know, although that particular report measures, correlations, ERS does have another published research. Finding that that both yield maps and soil maps do cause increased efficiency in corn production in the in the Midwestern states. Now those findings came from another phase of ARMS data, though for earlier years.

Ashley Murdie: Thanks, Jonathan. All right. Let's see here, next question: Have there been trends in the farms that are considered to be in the high-risk zone as identified by operating profit margin?

Katherine Lim: That's a great question. Thanks. So, as I mentioned, this report is mostly just a snapshot, so we didn't look at long term trends in, say, operating profit margin. But I would take a look at previous reports, because, as I mentioned, you know, I compared it to 2022. We have reported OPM by farm type. So, the person asking the question could look at previous reports to see whether that's varied by farm type. And if you want to follow up, I think we may at ERS have some published research thinking about risk management for farms and financial performance of farms. So, please feel free to follow up if you want some additional resources. But we did not look at trends in this report.

Ashley Murdie: Thanks, Katherine, and any follow ups, you know, if people would like to learn more, you can visit the ERS website or contact the address here listed on the slide as well. For our next question, does the report look at trends around geographic proximity to urban areas versus rural areas for farming?

Katherine Lim: That's an interesting question. No, it doesn't. We didn't separate farms geographically. This report, historically, and this current report looks mainly at farm types. But yeah, that's an interesting potential avenue, I think, for future research.

Ashley Murdie: Thanks. And this is a follow-up to that same question. Are family farms moving closer to urban centers in more recent years, or staying in rural areas?

Katherine Lim: That's another great question. I wouldn't, but maybe I'd say it a different way. I wouldn't know that family farms were moving, or whether development was sort of potentially happening around farms. That's not something you know that this report looks at, and I'm not sure if ERS has anything published on that topic. Feel free to follow up, and me or my co-authors would be happy to look into that for you. But, as I mentioned, I do think that's a great question potentially for future research.

Ashley Murdie: Thanks, Katherine. Next up, why is broadband use a relatively large decision factor among farmers choosing to use wearable livestock technologies?

Jonathan McFadden: Yeah, thanks for your thanks for your question. So, you know, although high speed internet isn't necessary for some wearable devices that collect data locally and transmit smaller amounts of data, it is necessary if a large amount of information need to be sent virtually for real time analysis and decision making. But that said, though farms are indicating broadband access as a reason to adopt these technologies also, so those farms also tended to indicate other reasons for adoption, such as to increase yields. So, there are a lot of different, a lot of different reasons. And you know, many, many farm operators indicate for more than just one reason.

Ashley Murdie: Thanks, Jonathan, all right. Why are the average loan amounts for large farms so much larger than small farms?

Katherine Lim: That's a great question. So large firms operate at a much, you know, larger scale. We saw that they account for the majority of agricultural production and

Katherine Lim: agriculture is a capital-intensive industry, and so the amounts of money they need to borrow to purchase capital equipment is just larger.

Ashley Murdie: Got it. Alright, next question here, you mentioned, farm income can be negative. Can you provide more information on which types of farms have negative income?

Katherine Lim: Sure, thanks so much. This is a great question. So, I didn't show a table in the webinar, but in the report on page 16. There's a detailed table which presents farm operator income both by income, source and farm type. So overall 52% of family farm households had negative farming income. But when we look at average farming income, it's negative for off farm occupation farms and low sales farms. That doesn't mean they're the only farms with negative income, just that the average income within that farm typology group is negative.

Ashley Murdie: Thanks, Katherine. Next up, in many of the figures, non-family farms do not look like small family or large family farms. Can you give a little context, some background on the characteristics of non-family farms?

Katherine Lim: Sure, this is a great question. So, as I mentioned in the webinar, this group of farms includes a lot of different types of farms. This category is based on ownership. It's not based on size, so it can have a variety of different sized operations in it. We do provide a statistic in the report that among non-family farms around 16% had gross cash farm income of 1 million or more, and that these farms accounted for 93% of non-family farm production, so, as you might expect, production is concentrated in those largest non-family farms. But that group of non-family farms does include small farms as well.

Ashley Murdie: Thanks, Katherine. For our next question, they ask: Last year's report included data on socially disadvantaged producers. Why did this year's report not include demographic data?

Katherine Lim: That's a great question, and I'm so glad that the person asking it looked at last year's report. So that was one of the special sections in last year's report, and one reason we were able to do that section is that there was a targeted sample of socially disadvantaged producers in the 2022 data for ARMS. And that really allows us to look at things, say by race or ethnicity in a way that we can't every single year, because the sample size just isn't there to be able to compare those groups? So, the 2023 arms did not have a targeted sample of socially disadvantaged producers. So that's that was just a special section for that year.

Ashley Murdie: Thank you, Katherine. This next one looks to be one for Jonathan, and it asks, how does precision agriculture relate to the broader concept of digital agriculture?

Jonathan McFadden: Okay, yeah, that's a great, a great question. Lot of things there. So, you know, traditionally, precision agriculture technologies have been thought of as site-specific technologies. You know, regardless of how technologically sophisticated they were. So those could have been

tools like, you know, manual soil testing using soil cores, paper, soil maps, paper yield maps and things like that. But you know, more recently the concept of digital agriculture has tended to encompass digital technologies that may or may not be designed for use on, you know, really specific parts of farmer's fields. So, you know, these kinds of technologies usually incorporate things like predictive analytics, machine learning, automation, or even you know, artificial intelligence, you know, more broadly. And so, examples like that include, you know, gene editing, cellular agriculture, things like blockchain, or even fully autonomous tractors. But there's not complete overlap, though. So, you know, not all site-specific inputs are applied precisely, and not all digital technologies really have, you know, location, specific production aspects. And so, you know, the middle ground, so to speak, is really what our what our report focuses on the current what we would sort of currently view as modern precision agriculture.

Ashley Murdie: Thank you, Jonathan. All right. We have time for a few more. Next up, low sales and retirement farm households were most likely to have incomes below the U.S. median. Can you discuss some of the differences between small family farm household income?

Katherine Lim: Sure, thanks for this question. As I mentioned, there is this table with much more detail on household income in the report. And it's true that there's a lot of variation in Median total household income across different small family farm categories. So, low sales family farms do have the lowest Median household income at $58,300 while off farm occupation, farm households have the highest. And when we look at income sources, we can see that both off farm occupation and low sales farm households have negative average farming income, but off farm occupation households are receiving an average of over $153,000 a year in off farm income compared to only $78,000 for low sales households. So, it's a difference in their composition of income that's driving the overall differences in total household income.

Ashley Murdie: Thanks, Katherine. Okay, let's see here for our next question, the commodity market outlook has changed more negative since this survey. What can you share about the current Ag economic cycle for row crop farmers risk management and credit availability?

Katherine Lim: Sorry. Could you repeat the question again?

Ashley Murdie: Sure thing, yes. It asks the commodity market outlook has changed more negative since this survey. What can you share about the current Ag economic cycle for row crop farmers, risk management and credit availability.

Katherine Lim: Got it. Okay. I wasn't sure if that was for me or Noah at first, because I wasn't sure if it was about unpriced commodity. That's not something we looked at in this report. It's really looking backwards. And looking at 2023 kind of a snapshot without talking about forecasting or thinking about future conditions. I will say that there is a team at ERS, you know, that does the farm income forecast looking out to 2024, and in, I believe, in their February release they'll be looking out to 2025. So, I may point the questioner towards those resources for thinking about the future.

Ashley Murdie: Thanks, Katherine. We'll do one more question here, and then close. So, for our final question, is there a statistic on farms that fall into more than one category. If this was captured. Do you see losses or gains from one category of farm, and not the other?

Katherine Lim: Yeah, so this is a great question. The way the ERS typology works is that these are mutually exclusive categories. So, farms can't fall in more than one category, just you know, based on the way things are defined. It's like you're a small farm or not. And then, based on the small family farms you get put into, say, retirement or off farm occupation. If you are considered a midsize or large-scale family farm. I mean technically, you could say you are retired, but you wouldn't fall in that retirement category. So that's not something. We looked at overlapping categories. But that is sort of an interesting alternative way of grouping farms, but they are mutually exclusive here. Farms are only counting in one category.

Ashley Murdie: Good to know. Thank you, Katherine, Jonathan, and Noah, for sharing these insights into America's farms and ranches, and thank you to our listeners for joining us today. We hope this has been helpful. Next slide, please. Before closing. I'd like to share a few other ways to stay up to date with ERS research. In addition to our website, where a recording of this website will be posted next week, you can find visual snapshots of ERS research through our charts of note mobile app, which is free and available on both apple and android devices. You can also find us on social via LinkedIn and X. That's all for now. thanks again for joining us today. This concludes our webinar.