

## **Webinar Transcript: [A Look at the Economic Research Service's Commodity Costs and Returns Data](#)**

Good afternoon everyone, welcome to our webinar a look at the *Economic Research Services Commodity Cost and Returns Data*. My name is Valerie Negron and I will be your host today. This webinar is being recorded and will be posted on the ERS website next week. At any time during the webinar you may enter a question into the chat feature at the bottom left corner of your screen and our speaker will answer questions at the end of the presentation. Our speaker today is Samantha Padilla. Samantha is a research agricultural economist with our markets and trade economics division. Her research interests center on production economics, farm input markets, technology adoption, agricultural policy, and economic development. Samantha holds a PhD in agricultural food and resource economics from Michigan State University and a bachelor's degree in economics from Saint Mary's University. Thanks for joining us today Samantha, we're ready for you to begin.

Thank you for the introduction Valerie and welcome everyone, good afternoon and today we will be talking about the commodity costs and returns data product. I will be talking to you about why these estimates are important, some of the examples of the current estimates, how we calculate them, and how you can access them on the ERS website.

So, let us begin with a small introduction about the commodity costs and return to data product. So, the ERS-Economic Research Service calculates how much it costs to produce certain commodities and the expected returns of production every year for 12 different commodities. These estimates have been put out on our website since 1975 and they are updated twice a year. So when we mean estimates, some of the things that we calculate are operating costs that can be thought of as variable expenses, such as seed fertilizer and fuel, allocated overhead things that are usually considered an opportunity cost, or general farm overhead such as taxes, insurance, and building maintenance. And the value of production so this includes things like yields, prices, and quantities, sold for the different commodities.

So, right off the bat I want to talk to you about why these estimates are important. So, in order to design targeted agricultural policy that is going to support farmers today and, in the future, policy makers and USDA need to have estimates on how much it costs to produce certain commodities. In order to forecast costs for the next 10 years and see the uncertainties and major forces that can affect agricultural markets and farmers, we need these estimates. So that is the policy reason as to why these are important. On the sense of the estimates, these are important because they are used by everyone; academics, students, policy makers, and even local governments to inform on what is happening in the United States and in these 12 commodities. We calculate these estimates for the U.S., for different regions, and for some states... for some state and size estimates that are representative of commodity producers. We use survey data that some universities and budgets might not have access to and this is what makes our estimates unique and important.

So, now that I've hopefully conveyed the importance of these estimates let's talk about and discuss what I mean by 12 commodities. So, these are the 12 commodities that we put out estimates for. Today I will be talking to you about cotton, an example of a livestock enterprise would be milk, and I'll talk a little bit about the wheat estimates. But all of them represent important major U.S. commodities that affect states and communities throughout the United States.

So, here is a little bit of an overview of the current May estimates. So, as I mentioned earlier, we released these estimates in May and October. We just released the 2020 estimates last week so these are some of the changes in the value of production less operating costs that we saw between 2019 and 2020. And let's decompose a little bit what I mean by value of production. The value of production in this case is almost like a measure of revenue less operating costs, so minus operating costs, would be all the variable expenses. And for things like commodities, crop commodities mean the cost of fertilizer, the cost of seed, the cost of chemicals, and these in a sense are a measure of profit. So, as you can see for barley, corn, cotton, oats, wheat, and hogs, there was a decline in the value of production less operating costs between 2019 and 2020. The largest of these declines was seen in cotton and I will decompose a little bit about why we saw these declines in the estimates and hopefully show you some supporting evidence as to why these estimates make sense. On the livestock side we saw a huge increase in cow-calf. So, an important aspect about these estimates is that I can tell you what change within an estimate, I can change what price is driving, what we're seeing, what yield, is it the operating costs that are changing? Is it the growth value of production that is changing? But really the reasons driving that change, whether it's a weather change or maybe some sort of shock that is happening to a certain region that is affecting the price, that is really up to the researchers to dive in and really decompose why are we seeing these changes and provide trend analysis and studies to show how these changes affect the US and regions differently.

So, I mentioned earlier that the ERS provides regional estimates on the cost of production and the regions that we use are the ERS farm regions that were developed in early 2000s. So, these regions take into account local differences in soils and more importantly in the specialization of a region in different types of commodities. So, the old ERS regions would be determined by states. So, a couple of states would be aggregated together, and it wouldn't really account for any terrain differences, or soil, or even the different types of commodities. So a region might have produced a lot of different things and it wouldn't really make sense to aggregate it that way but with the access to county level data we can better decompose and create regions that really speak to the estimates and commodities that we're trying to represent.

So, an example about why regional analysis is really important, looking at costs and returns for certain commodities would be an example for barley. So, this is showing the operating cost for different regions for barley in 2020. So, as you can see the vertical line is showing the United States first, followed by the region Fruitful Rim, followed by Basin and Range, Northern Crescent, and the Northern Great Plains. And on the horizontal axis we have dollars per acre

planted in cost. So, these bars represent all the operating costs that each region face and, as you can see, the Fruitful Rim, the second bar, it has a lot higher operating cost compared to the Northern Great Plains, so the last bar. So, if we were just to look at the United States and see the dollars per acre planting we would miss the variation that exists in these costs and how important it is to know what's happening in certain regions you know what's happening with the weather what's happening with prices in that region that is driving these estimates. So this is a real benefit of the commodity cost and returns that ERS produces that we can do regional analysis and really understand what is driving these changes across different regions in the U.S.

So, let's dive in we're going to begin with my personal favorite this is an example of the current estimate for cotton. And what I'm showing you here is the value of production less operating costs. So just a little reminder what I mean by value of production in the context of cotton it would be the yield for cotton times the price plus the yield of cotton feed plus-the times the price of cotton seeds added together. So that would be the value of production in this context minus the operating cost would be again things like how much the farm spent on seed fertilizer and chemicals. So, the horizontal axis is demonstrating dollars per acre planted and then the vertical axis is demonstrating the region and then the vertical axis is demonstrating dollars per acre planted. And the first set of columns is the United States where the orange column represents the value of production minus operating cost in 2019 and the blue column represents the value of production and operating costs in 2020.

So just really decomposing the differences and calculating the percent changes we can see that the United States experienced a 32 percent decline in the value of production minus operating costs and that it's the same number that I've shown you in the highlights a couple of slides back but what is really driving that change? So as we can see some regions in the United States such as the Heartland, the second set of columns in this chart, really improved the value of production minus operating costs but other regions such as the Prairie Gateway, the third region in the chart, and the Fruitful Rim, the fifth region in the chart, experienced a big decline in the value of productions that are really driving what we're seeing overall in the United States. So, let us dive in into why we observe these changes and why these estimates might be supported by information created by researchers.

So, a deeper dive into cotton. So, this is an example of a table that you can see if you download our product in the ERS website. I have removed some of the rows to make it easier to read and understand. So, the first three rows represent the growth value of production. First for the primary cotton, primary product which is cotton and then the secondary product which is cotton chain and then those two are added together and it's the gross value of production. Then the next row represents the total operating cost. I have not shown all the operating costs because they're expensive and I wanted to make sure that the point really comes across. And then the last column in the top part of the table is the value of production less operating cost. So, let's begin with the United States. The first column to the left, it represents the estimates for 2019 and the column to the right represents the estimates for 2020. So as you can see the gross value of production for

the United States went from \$513.87 to \$449.10, we saw a big decline in that category so in order to really calculate value production we have to look at gross value of production and operating cost. So, what are we seeing in operating costs? If we look below on the text box highlighted for the United States, we actually see that operating costs decline between 2019 and 2020. So, they went from \$427.21 to \$390.57. So, we know that if we are looking for what is driving the value of production minus operating costs it won't be operating costs since they're actually declining, but we're seeing a decline in the gross value of production. And a similar story can be seen for the Prairie Gateway region and the Fruitful Rim. So, these are the two regions to the right of the chart the last two and they show a similar story. We see that the gross value of production declined from \$301.43 in the Prairie Gateway region in 2019 to \$241.65 in 2020. Similarly, the Fruitful Rim had dollars per acre of \$731.56 to \$618.23, and as we can see operating costs also declined so those went from \$263.21 in the Prairie Gateway region in 2019 to \$244.26 in 2020 for that same region. And for the Fruitful Rim we saw a decline from \$636.65 to \$598.90. So when we're looking at the value of production, we know that we have to really decompose what's happening with the gross value of production and as I mentioned earlier, what really goes into the calculation of gross value of production is cotton yield price cotton seed yield and price. As you can see for these regions, the price in dollars per pound has actually increased for the United States as a whole the Prairie Gateway region and the program. So, in the supporting information part of this chart this would be the second row, price dollars per pound. So, for the United States that would be \$0.61 per pound and it increased to \$0.63. So, for the Gateway region it increased from \$0.57 to \$0.58 and for the Fruitful Rim it increased from \$0.80 cents to \$0.82. So, what is really driving that negative change that we saw in the United States is not price it is actually cotton yield. So, as you can see cotton yield in pounds per acre per planted acre decreased from 695 to 579 for the United States and, similarly, for the other two regions we also saw a decline of almost 100 pounds per planted acre in the Prairie Gateway region and up almost 76 pounds per acre planted for the Fruitful Rim region so this can be seen in this- in the first row under supporting information. So, what is really happening in this region and we can really look at the USDA cotton outlook for February 2021 and we know that a possible explanation for what we're seeing is that the abandonment rate. And what I mean by abandonment rate is when a farmer goes to the field and they decide to plant the field they prep it but then when it comes time to harvest, they don't harvest. So, they let the plant the field planted but not harvested. And a possible explanation as to why they decided to abandon is because maybe the cost of harvesting would outweigh what they would get if they were to harvest and sell the product. So, the abandonment rate in the United States climbed to 28% in 2020 and the three-year average for the previous three years was 19% and specifically for 2019 it was 15%. So that really is driving the decrease in the pounds per acre- per planted acre that we're seeing in the estimates. So here is a clear example where we have the estimates and we have existing research that supports our estimates

So, let us transition into a livestock enterprise and the example I have for you today is dairy farms. So, an interesting notion that we often think with dairy farms is economies of scale. So

here I have a chart showing gross value of production and cost. So, this is demonstrated by farm size so if you look at the horizontal axis you see different classifications for farms. So, the first one is farms that have fewer than 50 cows, followed by farms that have 50 to 99 cows, 100 to 199 cows, all the way up to more than 2,000 cows. So, the first column is demonstrating the gross value of production and that is in the color blue. And what is interesting about this-about the gross value production estimate is that for farms that have fewer than 50 cows they get \$24.18 per 100 weight sold while farms that have over 2,000 cows, so all the way to the right in the chart, they get \$19.81 per 100 weight sold. So, this is an example of where we can see something really interesting that doesn't really convey the entire story. So what I mean by that is that yes- so some of the reasons why few- farms with fewer than 50 cows might realize a higher revenue is because almost 20% of their milk sales come from organic milk, and that carries a higher price premium than conventional milk. While larger farms have less than five percent sales in organics.

So- yes that might indicate that it might be better to have a small dairy farm but as we know from a recent report in U.S. dairy farming, so this would be the consolidation in U.S. dairy farm and released in July 2020, we know that there's really a big benefit to economies of scale that larger farms realize over smaller farms. So, as you can see here, we have a chart where the horizontal axis is showing dollars- sorry showing the base years starting in 2005 all the way to 2018. And on the vertical axis we have dollars per 100 weights sold. So, the light blue line demonstrates farms that have between 50- so the net returns for farms that have between 50 and 99 cows while the dark blue line shows the net returns for farms that have over 99- over 999 cows. So, what this is really showing is that on average, larger farms have lower production costs than smaller farms and these differences are substantial and consistent across different herd sizes. So, if you look at this chart, you see that as the number of cows in a farm increase, the net returns also increase consistently. Even though smaller farms on average might realize higher gross value of production per 100 weights of milk sold. So, this is a more complete story where you don't necessarily always need to look at the returns but you need to look at the combination of returns-cost and returns to really understand how a sector is changing and how a sector varies by size, or by region, or even by state.

So, I want to continue the examples for the May estimates looking at wheat farms and I specifically want to look at the Prairie Gateway region. So, as you can see in the map that this would be in the center of the United States covering Texas, Oklahoma. And why is this region important in this example?

So, I apologize for the small graph but bear with me. As you can see the United States had a decline in the value of production less operating costs. So, this can be found in the blue box highlighted, so towards the end of the graph, and it has the similar format as the cotton graph-sorry table, that shows 2019 and then 2020. As you can see for the first two columns there is a decline in the value of production that operating cost from \$120.40 to \$116.45. And looking at all the other regions, and we'll look at them together, no other region had experienced this

decline except the Prairie Gateway region. So, looking at the Northern Great Plains, which would be the next 10 columns, it went in 2019 it went from \$129.61 to \$144.92. Then our gate-our region of interest, which is the Prairie Gateway region, so with the third set of columns, would be going from \$87.02 to \$55.86. And similarly, the Basin Range also experienced an increase compared- as did the Northern Great Plains and it went from \$186.92 in 2019 to \$194.41 2020. The Fruitful Rim also saw an increase of \$11.21. So, it went from two thousand-\$200.18 to \$211.21. The Northern Crescent region which is the- the second to last column starting on the right went from \$194.72 to \$249.36. And finally, the Heartland region in 2019 went from 38- \$138.67 to \$199.05. So, as I mentioned earlier the only region that experienced a decline was the Prairie Gateway region and that is really driving out what we're seeing in the United States. So that four-dollar decline in the value of production minus operating costs. So, if we look closely again at the Prairie Gateway region, we can understand what is driving that decline and it would either be the gross value of production or total operating cost. So, the gross value of production, so this would be the price of wheat times the wheat harvested plus the straw and grazing times the price of the straw and grazing added together and that went from \$192.30 to \$159.54. So, we're really seeing a decline here and, on the other hand, looking at operating costs we see a decline so we know that the- the difference between 2019 and 2020, in terms of value of production minus operating cost, is being driven by the gross value of production declining. So, over here it again comes to the story of yields. So, yields went from 44 bushels per planted acres to 36.02 bushels per planted acres, while price actually- for wheat actually increased. So, what's really driving is a change in yields.

So this is an example, oops sorry- this is an example of a region that in a commodity that experienced a decline that we observe and that it's driving the united- the decline that we see in the United States, in terms of value of production minus operating costs, but there is no ongoing research that would explain why we see this decline. And here is where we work with researchers, extension agents, to try to understand what is really- what really happened in that period that we saw a declining yield. Was it you know a freeze? Or a rain? Or something that would change yields by that much. So, I invite researchers to question this and use these estimates to develop interesting questions and interesting results that could explain these estimates.

So now that we've talked about a little bit on what we saw in the current estimates, I want to discuss on what data do we use. So, a real benefit of their commodity cost and return estimates is that we use survey data to inform our estimates and to derive our estimates from what farmers actually use why they- what they report they used and, the- the quantities of inputs that they use in their farm. So, the first major source of data that we use is the agricultural resource management survey, known as ARMS. And this is a survey that happens every year and commodity specific versions of the survey are conducted on rotations from four to eight years. So, this survey is jointly -administered by USDA- ERS and the USDA National Agricultural Statistics Service – NASS. And they we're the ones that put out the survey and get information

from farmers this way. The second main source of information that we use is other NASS data on current prices and yields for non-survey year estimates.

So here I've introduced a term that I have not talked about, non-survey year estimates. So, what I mean by non-survey year is an update year. So, I will explain this difference in the context of corn. So, corn farmers were last surveyed in 2016. So, this is where NASS and enumerators into the field and they collected information from farmers, and they filled the ARMS survey and then we used the answers from the survey directly and we created survey year estimates. So, after 2016 we use those estimates as a base and use price indices and other data to update these 2016 survey year estimates for 2017, 2018, 2019, and 2020. So those estimates for the years that we do not have a year survey are called update year estimates.

So how do we develop these estimates? And this is a very important question because when you think of cost there's so many different ways that you can try to approach in developing a cost. Like what do I use, what a farmer is telling me that they spent on seed, or do I find prices of seed and try to get an average of how much seed is used on fields? And there's just many ways that you can use information available to develop these estimates. However here at ERS we use the American Agricultural Economic Association, AAEA, task force handbook on commodity costs and returns. So, this was first developed in 1996 by a joint effort of USDA academics and extension specialists from land-grant university. And really the beauty of this is that everything is standardized, and it's based on economic theory. So, they decided that it would be beneficial to have a way that people can approach these estimates and no matter like what commodity you want to study, or what crop you want to study, you can refer to the handbook and you'll know exactly how we generated those costs in return estimates. And what kind of theory is behind the estimates we develop.

So, there are four different estimation methods that we use. The first one is direct costing, followed by gathering input quantities, indirect costing, and then allocating whole farm expenses. And this is really where I wanted to point out that there's many different ways to get at a cost and we use four methods depending on the type of information we have available to us.

So direct costing, this basically is the- when we take survey responses to questions, and about the amounts paid for each input, and we use that to as the estimate- we take the average and that is the estimate spent, for example on seed or fertilizer, or even purchase water.

The second type of method is valuing input quantities. So, this would be, for example, if we take survey data on the quantities of something used and then we multiply it with secondary data on input prices. So, a good example of this would be land. So, you might already own the land that you use for your field and you might not have a cash expense for that. But, for our estimates we still need to know the opportunity cost of the land. So, we would find out how much land was used for certain commodities and we would multiply it by a rental rate to find out how much it cost to produce and how much was the cost of land. Even though there was no cash expense the farm incurred for- for land, and this is really important because it gets at the idea of opportunity

cost. So what is the second best use that you can do for land? So if you're a farmer and you own the land you could potentially rent it out to someone, you could sell it, you know you could convert it into something that's not production, There's many alternatives that you can use and we want to account for those alternatives when we're calculating these costs.

So, the third method that we use is indirect costing. So this is when we combine information from production practices and technical information from the machine such as how much is being used, how old is it is, what model, and we put all that information into engineering formulas to determine things like the cost of replacing your machinery, or fuel expenses would go in here, drying equipment, and things like that have to do with machine performance and mostly imputing it into engineering formulas.

Finally, we have allocating whole farm expenses. And this relates to the idea that you can't really attribute, for example, the taxes that you pay on the entire farm to a specific commodity. You can't say well you know my farm is mostly corn and soybeans, but I think corn is more important so all the costs would be allocated to corn. So, what we use is an allocation scheme and basically, we estimate how much of the total farm operating margin, and this is value of production minus operating costs, each commodity represents. So, if, for example corn, represents 30% of the total farm operating margin 30% of the farm overhead costs would be attributed to corn. So that would be taxes, and insurance, the cost of repairing buildings, things that are usually included in farm overheads.

So I want to conclude this presentation by talking about how we can access the data and if you know our website [www.ers.usda.gov](http://www.ers.usda.gov), you can access it from clicking on the data product column and then really clicking on any one of these topics; animal products, corn, farm economy, will take you to a list of data products.

So, once you click on that you can scroll down and look for commodity custom returns. So, this is how our website looks in this specific data product, and to the left we can see an overview the interactive visualization which I'll talk about in a bit, readings and documentation. So, if you click on readings, you can see some of the more recent reports that feature our data product. Documentation, this is where most of the information from this presentation comes from. You can access, you know, what each term means, the regions, and what kind of cost we develop with each method. You can also access the task force- the AAEEA task force manual that we use to calculate our estimates, if you click on that it will take you to a different page but it's free to download. And you can access sorry- right below the ERS farm research regions and I pointed this out because if you want to look at earlier estimates earlier than 2000 you can also access our old ERS regions and understand estimates using those regions as well.

So back to the base page, if you click on recent costs and returns it will take you to something like this. So each of these files represents an excel file and as you can see it was last updated on May 3<sup>rd</sup>, 2021, and the next update would be in October 1<sup>st</sup>. Once you click on that it will



download an excel file and you can access data as a pivot table to facilitate, you know, chart and understanding of the data.

So, a very special tool that we have in the ERS website is our interactive data visualization. So, this allows you to create queries to look at different costs and returns, compare different regions for some of the row commodity- row field commodities. So how do you access this visualization tool is you go to our base page for the commodity cost and returns, and to the left on the second- on the second option there's the interactive visualization, U.S. commodity cost and returns by region and by commodity field crops.

So, you can here click the different types of costs and returns that you want to look at and the different commodities. So, this is showing the corn farmers that we surveyed in the different regions and it's showing since I- since the first was selected crop costs and returns you can see a chart showing just that. So the gross value production operating cost and cost listed, and if you want to download this information you can go to the bottom right corner and click on the middle-middle button, so it looks like a box with a pointing down arrow, and that will prompt you to select a type of download that you can get. So, this would be the type of file that you want your data specified in.

So a takeaway from the commodity cost and returns data product that I want you to remember from this presentation is that it's based on information provided by farmers, it is easy to access on our website, and you can find specifically how we calculate any costs and the rationale that we use behind each cost, and that these tools that we use are standardized methods that were developed by experts in the field, and that really take into account economic theory behind the estimation of these costs. And that there are important building blocks for research and policy. They're used throughout the United States and there are important points of starting when you're really thinking about what's changing in a commodity in terms of cost and return.

So, with that I conclude my presentation and I thank you very much for being here with me today.

Thank you, Samantha looks like we have some questions coming in, but before we begin, I'd like to introduce four of our colleagues who will be supporting Samantha with today's questions. With us today we have Acting Branch Chief of the Animal Products and Cost of Production Branch Senior Economist: Jeffrey Gillespie, Agricultural Economist: Amy Boline, Research Agricultural Economist: Kate Vaiknoras, and last but not least, Research Economist: Monte Vandever. Thank you all for joining us today.

Now for our first question: Samantha, can you explain more about how the estimates differ between survey years and years in which they are updated?

Thank you so on the years between survey years- we on the survey year estimates we try- we use our survey to develop the estimates, and on the years when there is no survey we use the base survey estimates that we have and we combine it with information from that. So that would be,

for example, the price indices for seed, for fertilizer, the changes in the wage rate that were seen that year, and the harvest price for different months, to try to get the estimates to be consistent across regions- across years.

Perfect, our next question is: Do your costs and returns estimates include crop insurance and government farm programs?

Thank you for that question. I think this question would be best be answered by my colleague Monte

Hi, yes, thank you Sam. No, we do not include crop insurance or government farm programs in the product and the cost and production estimates. We're just looking at costs and returns that are directly related to the farm and not from a government source.

Thank you, Monte. Next question: Are historical ERS commodity data adjusted for inflation? If not, what index would you recommend using to adjust them?

Thank you. My colleague, Jeff Gillespie will answer this question

Yes, they're- they're in the past I think, you know, what I've seen in- in some of- in some of our publications what we've used is NASS prices paid index for- for this type of for de-trending in this way. So that's- that's one way that would probably be a good- a good one to use.

Thank you, Jeff. Next question: Does the USDA do commodity cost of production estimates for other countries as well?

Thank you for the question. Unfortunately, we only provide estimates within our branch in this data product we only provide estimates for the commodity costs and returns for U.S. farms and regions.

Okay next question: Are estimates available for all farm resource regions for each of the commodities?

Not necessarily. That depends on how many survey responses we get for each region. So there's a minimum number of surveys responses that we need to get in order to, you know, report for example corn estimates for the Fruitful Rim region. So to answer your question, it depends on what server responses we get.

Perfect thank you, Samantha. Next question: Do you publish state level estimates?

We publish state level estimates for dairy estimates only.

Next question: Are the cost and return estimates used in any forecasting?

Thank you, I will let my colleague Amy answer this question.

Thanks Sam, so yes, the cost and returns data is used to- we produce a two-year forecast twice a year. So, December and June you can find those on the website. The same website where our

cost and returns are that Sam told you how to get to it and then we also help out with the ERS's long-term ag baseline projections which is a 10-year forecast.

Thank you, Amy. Next question: Can the commodity cost and returns data be used to examine differences in cost and returns by production system, such as organic versus non-organic?

I will pass the mic to my colleague, Jeff Gillespie.

Yes, the- the cost- the cost of production team has conducted research comparing cost and returns by production system. For example, on our cost and returns website and web page you'll find milk, wheat, soybean, and corn, cost and return estimates by organic versus conventional production system. Similar types of analyses can also be conducted for other systems as well. If, you know, if the system is say queried within the ARMS survey.

Thank you, Jeffrey. Our next question: Is why does USDA include land costs and its commodity cost even if the land is fully owned by the operator?

This is really to get at the idea that the estimates that we produce with ERS are- include economic costs instead of accounting costs. So, what we're truly really trying to estimate here are not necessarily only cash expenses that the farm incurred, but the opportunity cost, or the second-best option, that might come with that. So in the term- in terms of land, the farmer or might-if he owns- or he or she owns the farm they can sell it, they can rent it, they can do many other things instead of farming the land. So what we're really trying to get at, first of all, is the true cost of- the true cost incurred by anyone of planting or harvesting that commodity and that includes the potential cost of, you know, doing something else with the land. Also, I want to add that their estimates are not only- they're used by people, maybe, that want to go into business of certain commodities, they are used by people that are trying to understand these changes, and not every- every farmer owns the land that they use. So it's important to considerate well if I want to get into business I'm- I'm going to have to rent land or buy it, and that's an important cost in factoring the budget of- that I need to spend on engaging in this in- this in this type of business.

Thank you, Sam, that's very interesting. Our next question up is: Will the cost and returns data be available at the county level?

Thank you, I will let my colleague Jeff Gillespie answer this question.

No, we don't- we don't generally have not made those- those kinds of that data available we've- we've not had- you have to have enough, for one thing you have to have enough observations in order to be able to provide an estimate. And we typically would not have enough observations to provide a county level estimate for any commodity.

Thank you, Jeffrey. Next question is: How do you estimate fertilizer costs?

Thank you for the question, my colleague Kate Vaiknoras is best suited to answer this question, Kate.

Thanks Sam, so for fertilizer costs we use a combination of two methods that Sam mentioned in her presentation. Generally, for the majority of observations, we use direct costing so the ARMS survey just asks farmers directly, how much did they spend on fertilizer in their field for that commodity in that year. Sometimes farmers don't provide this information, so we also, for those that are missing this information, we value input quantities. So that we also ask farmers to give information on every fertilizer application on their fields, for that year. So that includes total quantity of each different nutrient, and then we use state level nutrient prices to calculate those costs and we sum it up for the field. So that allows us to get that information for the farmers that don't provide the direct costing information.

Thanks, Kate. Our next question is on farms: Dairy farms continue to expand in size how might one use the commodity costs and returns data to examine the size of farms where economies of scales are exhausted?

Thank you, my colleague Jeff Gillespie, will answer this question.

Yes, the cost and returns data can be used to examine cost economies of size by commodity. I mean it could potentially be able to do this for any of these commodities. But I think this was specifically for dairy and so for example on the milk cost of production website, which can be reached through our commodity cost and returns website, you can see cost and returns estimates for milk by farm size. We have a number of different size categories there I think it's a net less than 50 cows, 50- 99 cows, 100 to I think 100- 199 cows, and on up to over 2,000 cows. And that type of analysis, I mean you can really- you can compare those costs and returns for each one of those categories, and that can be as I said it, can be conducted for other commodities as well by sorting the data in the different size categories. There will be other ways also to do it, but that's one way to do it that you can see directly on our website.

Thanks, Jeffrey. Here's a question from one of our USDA colleagues: Do you publish survey questions and survey results including response rates and waiting of responses to arrive at what you end up publishing?

We do publish the questionnaires- we do publish the questionnaires for each of the commodity surveys and our phase three survey for ARMS. That can be found in the ERS website, and I think the best way to find information on response rates would be to access the NASS website. And they are the ones that put out any sort of information on response rates and it reports as to what is happening with ARMS. We only publish in our website the questionnaires and for both phase two and phase three.

Thanks, Sam. How do you estimate home grown feed cost and grazing cost for livestock and dairy?

Thank you, Jeff Gillespie will answer this question.

Yeah, we -is for homegrown, we do not estimate actually the cost of producing homegrown food. But instead, we are using sort of the valuing input quantities procedures for- that we ask how much of each of these different feeds that are fed to animals was grown on the farm. And then- we then value that feed at its market price. So that's how we do home grown feed. I think you asked about grazed feed as well. And for graze feed we- we determine that based on the rental rate for pasture. So, it's the rental rate per pasture by state is how-we value grazed feed.

Thanks Jeffrey, that's very insightful. Next question: How do you allocate costs of farm machinery and equipment over all the farm enterprises? For example, a farmer might use their tractor for several crops or livestock enterprises.

So, we use the whole farm allocation method, so we calculate the total farm margin for each commodity and we use that as a share of the total cost of using the machine. So that would be if corn represents 30% or 40% of the farm operating margin, we would use we would use that as a baseline to say they also represent they also use 40% of the farm machinery cost and farm overhead costs.

Thank you, Samantha. We're approaching the end of the webinar, so we'll answer a few more questions. As a reminder you can submit your questions on the left-hand side of the chat feature. Next question, Samantha: Why does USDA include unpaid labor expenses in its commodity cost? Doesn't including those overstate the cost of producing the commodity?

Thank you. This, again, relates to the idea of opportunity cost. So, what we mean by unpaid labor is if you us- if you're the farm owner and you work on the farm and if your family works on the farm, there is something else that they could be doing with their time that would get them some sort of income- some sort of wage. So, we try to account for that, and to try to get the opportunity cost of unpaid labor included in the overall expenses. And yes, it might seem it might seem like it's overestimating costs but we're getting economic costs, again, so not accounting costs. So for someone who does not have, you know, children to work on the farm or sources of unpaid labor, they would want to know how much it really cost to hire label- labor out and the cost of labor for producing starting commodity.

Thank you, Samantha. Looks like we can ask a lot question before we conclude: Could you contrast these commodity costs and return estimates with enterprise budgets that are typically provided by universities?

So, ERS commodity costs and returns estimates and budgets are calculated using survey data and actual responses from farmers and they are representative. So, I will pass the question to Jeff Gillespie who has extensive experience in estimating these costs and returns at the university level.

Yeah, thanks Samantha. Yeah, in addition to what Samantha said, many of the enterprise budgets at universities sometimes their projections and our estimates are actually for the past year as well as historic cost to production based on our survey data. Also, you know another thing that's

different, is that the you know most of the time the state enterprise budgets are generally state estimates and of course, what you find on our website is we typically will have, except for milk, where we have state level estimates we have either national or regional estimates. And so, we do provide those national and regional estimates versus in the states where they typically will provide an estimate for their state.

Thank you, Jeff. Thank you, Samantha, and all of those who joined us today. Looks like those are all the questions we have time for today. We appreciate you all being here as a reminder the commodity costs and returns data product can be found on our website [ers.usda.gov](http://ers.usda.gov). A recording and transcripts of today's webinar will also be posted to the webpage next week. And now this concludes our webinar, I hope you all have a great rest of the day thank you.