

Episode 2: The Great Grain Robbery – Or How Weather Came to the WASDE, December 13, 2021

HOST STEPHANIE HO: If you eat, and I'm guessing you do, then, whether you think about it or not, the U.S. Department of Agriculture touches your life every day. USDA owes its existence, and its outlook, to Abraham Lincoln – not only did he establish USDA in 1862, he later dubbed it the People's Department.

Initially, the nickname may have referred to the fact that about half of all Americans in Lincoln's time lived on farms, compared with about two percent these days. Now, though, even in the 21st century, the nickname, the People's Department, is still appropriate because of the breadth and depth of USDA's work.

I'm Stephanie Ho, with USDA's Office of the Chief Economist, and I'm going to bring you a series of podcast stories that highlight ways USDA helps improve the lives of all Americans through work on food, agriculture, economic development, science, natural resource conservation and a whole host of other issues. In other words, this podcast series -- called USDA, Now You Know -- looks at how the agency is still the People's Department.

MUSIC BRIDGE: [Robert John, "Reverie", Creative Commons BY-NC-SA 4.0](#)

SH: This episode answers the question -- "why are there meteorologists on the staff of USDA's World Agricultural Outlook Board?" The World Board is responsible for putting out the World Agricultural Supply and Demand Estimates, or WASDE report, every month, so it makes sense that there are economists, who are commodity experts, on staff.

However, to understand how important weather is too to the WASDE report, we have to go back almost 50 years, to the 1970s – specifically to 1972. Some of the top songs that year were Roberta Flack's "The First Time Ever I Saw Your Face" and Don McLean's "American Pie." I'm not going to play either of those songs for you because I don't have copyright permissions, but it is highly possible you may have heard them before.

MUSIC BRIDGE: [Voodoo Suite, "Little Grass Shack", Creative Commons BY-NC-SA 3.0](#)

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SH: 1972 was a busy year. Within the first six months, the Dallas Cowboys won the Superbowl, President Nixon visited China, The Godfather was released in movie theaters, scandalous activity was taking place at the Watergate building, and Hurricane Agnes brought death and destruction to the East Coast. Amid all that, something happened in the second half of 1972 that had a lasting impact on USDA -- even though that impact was not immediately clear at the time.

USDA CHIEF METEOROLOGIST MARK BRUSBERG (MB): The big event that led to the development of USDA's economic intelligence system, if you will, was referred to as the Great Grain Robbery.

SH: Mark Brusberg is USDA's Chief Meteorologist. He unwinds the story of the Great Grain Robbery.

MB: And what happened was in 1972, in July and August, the Soviet Union made a series of purchases – not just of our grain stocks, but of some other countries as well, like Australia – and we really didn't have a system in place that could monitor that.

SH: Fundamentally speaking, that chain of events started off as a weather story. A severe drought in the then-Soviet Union devastated that country's crops and compelled Moscow to shop for grain in world markets – and it wasn't just a little bit of grain, it was a lot of grain.

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MB: By the time anyone realized what had happened, we ended up selling off a substantial portion of our reserves. And about a year later, in Aug 1973, prices of some commodities had doubled or tripled.

MUSIC BRIDGE: [Fabian Measures, “Subtle Library”, Creative Commons BY 4.0](#)

SH: How is that possible, you might ask? If the former Soviet Union were making huge grain purchases, we should know about it immediately, right? One crucial difference to keep in mind was that back in 1972, it took a lot longer for important information like this to get to everywhere it needed to go. The Soviet Union was able to take advantage of that time lag to buy up huge quantities of wheat from the United States – and at a highly favorable subsidized rate. Following these purchases, prices went up.

MB: So, not only had the prices in the US gone up, they had gone up across the world, and it had ripple effects – like it impacted our ability to help hungry countries, because we had to hold on to some of our grain stocks. And, USDA was taken to task for not monitoring the purchases closely. But, underlying why it happened was there was a drought in the Soviet Union that nobody paid attention to. Other parts of the govt knew that the Soviet Union was having a drought. Some of the earlier satellite products could see that there was a drought – not only in the Soviet Union, but parts of Europe – but we didn’t have a system in place that could determine or estimate whether or not a country may be in need of additional food – we had nothing in place.

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SH: So, following the Great Grain Robbery of 1972, USDA recognized the importance of having its own weather intelligence, and it reached out to other government agencies to make sure everyone was talking to each other.

MB: There were agreements put into place, between USDA and the National Weather Service, to develop a joint facility to monitor global weather. It was called the Joint Agricultural Weather Facility, and we were placed under what is now the World Agricultural Outlook Board. And that way, we could provide weather intelligence directly to top economists within the USDA, so that surprises like that wouldn't happen again.

MUSIC BRIDGE: [Ketsa, "Criss Cross Skies", Creative Commons BY-NC-ND 4.0](#)

SH: Nearly five decades ago, satellites were comparatively few and far between. Nowadays, in the 21st century, information derived from satellites is quite common – both domestic and international. USDA meteorologist Eric Luebehusen gives an example.

USDA METEOROLOGIST ERIC LUEBEHUSEN (EL): So, let's just say hypothetically, we're looking at a corn area in the Ukraine. And so, for that week, and that spot, they began to essentially rank the pixel over the history of that location for both the vegetation and the temperature.

SH: Along these lines, he says one of the most useful satellite-provided data points is the Vegetation Health Index -- or the VHI.

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EL: And the VHI uses both the vegetation signal as well as the temperature signal – because we know that temperature heat stress often takes a little bit to show up in the vegetation – so that provides an early heads up that you will have problems in the crop signal.

SH: He adds that modern computing capability has been a huge help in terms of more quickly carrying out complicated calculations and then comparing that data over longer spans of time.

EL: The VHI is a satellite product. It looks again at a particular spot – and essentially it goes back and ranks, “Is this the best we’ve ever seen it? Is this the worst we’ve ever seen it? Or is it somewhere in between?” And it essentially ranks it, with a building climatology, and it does it for each week in that spot. And then, with each successive week, it updates that value for the corresponding week. So, it’s not comparing the value to the previous week, it’s comparing that value, to that space, over the preceding 30 years or more, for that spot that week.

MUSIC BRIDGE: [Metre, “Rolling”, Creative Commons BY-NC-SA 4.0](#)

SH: One highly watched component of the WASDE report is crop yields. Luebehusen says the key concept to getting an accurate crop yield picture is to look at a crop's growing degree days.

EL: And growing degree days are simply a summation of temperature/heat, over time. So, it essentially accounts for how much warmth do you need for a crop to add growth?

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SH: Unsurprisingly, different crops have different baseline temperatures that they need, in order to add vegetative growth. He says this is why the concept of growing degree days is important because it emphasizes a crop's stage of development at a certain time, rather than just what time of year it is.

EL: The crop stages vary a lot by year. And this is something that kind of jumped out at me, even before I was doing the yield modeling, where we would have these meetings discussing the Former Soviet Union, and the analyst back then would say, well the NDVI – which is Normalized Difference of Vegetation Index – it's another satellite product, very similar to the VHI – and he would say, well the NDVI is worse than last year, for this week – but my point to him is you aren't comparing apples to apples – what was the crop stage at this time last week? Do you get what I'm saying?

SH: To make it even more clear, he notes that crop development stages not only can take place at different times of the year, each year, the trend is that they also have been taking place sooner in the year than they used to. He uses observations of wheat in Turkey as an example.

EL: You can see early in the cycle, 1991 through basically 2000, the weeks were generally clustered around week 22, which would have been late May, early June. And then, as we move forward, you start to see more and more occurrences – like 2001, 2010 and 2018 – where it's getting earlier and earlier. So, in 2018, (Turkey's) winter wheat crop hit flowering, in April – but then the preceding year, it hit it in May. So, this really highlighted (it) to me – and I'm seeing, it's not as pronounced with summer crops, but it's still there.

MUSIC BRIDGE: [Ketsa, "Falling Leaves"](#), [Creative Commons BY-NC-ND 4.0](#)

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SH: Many lessons were learned, and following the Great Grain Robbery, weather was added as a key component for USDA's monthly WASDE crop forecasts. Again, Mark Brusberg is USDA's Chief Meteorologist.

MB: We like to joke that a lot of govt programs are because something bad happened, and somebody got in trouble – and that's basically what happened. So, now, we supply weather intelligence to the WASDE – and we look at weather data – we partner with other agencies to get the weather data – we still have an agreement with the National Weather Service. We also have agreements with other National Oceanic and Atmospheric Administration organizations to get other information, including some satellite-derived information. And we also partner with USDA's Foreign Agriculture Service (FAS), who uses their own methodologies, rooted in satellite intelligence.

SH: So, just how important is it for the World Board to have meteorologists on staff?

MB: Without having solid weather info or even to be able to peek at satellite imagery, they would be flying blind, they would be at the mercy of other groups to get the weather info – and that's not really a secure system if you're going outside what we like to call the wooden doors (of) the WASDE process.

SH: He stresses that one key factor of weather information provided in-house is that USDA employees are prohibited from making any financial gain from the information they provide.

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MB: Everybody who works on the report, including the meteorologists, signs an agreement that says they will not deal with commodities, they will not invest in commodities. You can't say that about private sector meteorologists, or private sector analysts. They don't have an agreement that they sign – so, when the economists come to us for weather info, they know that they're getting the best that we can give them. And we really don't have any, you know, we don't have any reason to tell them it's dryer than it really is, or it's wetter than it really is – so, we're all a team working together on this. That's one of the things that we're most proud of is that we are a part of the team – the meteorologists working with the economists, to try to come up with the best number every month.

SH: Most importantly, this impartiality benefits the public, by providing a WASDE report that objectively reflects current conditions.

MUSIC BRIDGE: [Marcos H. Bolanos, "A Simple Life", Creative Commons BY-NC 4.0](#)

SH: Again, WASDE is the acronym for the World Agricultural Supply and Demand Estimates – a report that USDA makes available every month to the public via the internet. That's all we have time for in this episode. I'm Stephanie Ho, with USDA's Office of the Chief Economist. Thanks so much for listening.