THE UNIVERSITY OF TENNESSEE KNOXVILLE

Tennessee Journal of Law and Policy

Volume 11
Issue 3 *Special Edition*

Article 7

October 2021

Agricultural Technology

Mike Buschermohle

John Dillard

Follow this and additional works at: https://ir.law.utk.edu/tjlp

 Part of the Law Commons

Recommended Citation

Buschermohle, Mike and Dillard, John (2021) "Agricultural Technology," *Tennessee Journal of Law and Policy*: Vol. 11: Iss. 3, Article 7.
Available at: https://ir.law.utk.edu/tjlp/vol11/iss3/7

This Symposium Material is brought to you for free and open access by Volunteer, Open Access, Library Journals (VOL Journals), published in partnership with The University of Tennessee (UT) University Libraries. This article has been accepted for inclusion in Tennessee Journal of Law and Policy by an authorized editor. For more information, please visit https://ir.law.utk.edu/tjlp.

Agricultural Technology

Mike Buschermohle[8]
John Dillard[9]

MR. SHANAHAN: Ladies and gentlemen, if I can have your attention. Please feel free to continue eating while we start our next panel. My name is Ryan Shanahan, I'm a second-year law student here and a *Tennessee Journal of Law & Policy* staff editor. Our next panel will focus on the use of technology in agricultural production and how the law shapes the way farmers can use some of these immerging technologies. We'll hear from two gentlemen who work with these issues on a daily basis.

Our first panelist, Dr. Mike Buschermohle, is Professor of Biosystems Engineering and Soil Science at the University of Tennessee Institute of Agriculture where his research and education efforts focus on precision agriculture, GPS/GIS applications in agriculture, variable rate application of production inputs, and grain drying, storage and handling. He holds a Ph.D. and Master's Degree in Agricultural Engineering from Clemson University and a Bachelor's Degree in Agricultural Engineering from the University of Kentucky. Dr. Buschermohle focuses frequently on agricultural technology to various groups across the state.

Our next panelist is John Dillard. He is an associate attorney at OFW Law in Washington, D.C. and concentrates his practice on litigation with an emphasis on agriculture, environmental and food-related matters. He has represented clients in complex matters involving Clean

[8] Mike Buschermohle, Professor of Biosystems Engineering and Soil Science at the University of Tennessee.
[9] John Dillard, Associate Attorney, OFW Law in Washington, D.C.

Water Act disputes, livestock odor nuisance tort actions, food labeling, GIPSA enforcement APHIS impoundments, biotech seed patenting, Native American agriculture, and food recalls. John also advises clients on legal issues regarding cutting-edge trends in agriculture, including "big data" and agriculture applications for Unarmed Aerial Systems, aka drones.

John, who grew up on a beef cattle farm in Amelia, Virginia, draws upon his extensive background in agriculture in serving clients. He received Bachelor of Science Degrees in Animal and Poultry Sciences and Agricultural and Applied Economics from Virginia Tech. He also earned a Master's Degree in Agricultural Economics from Purdue University. John worked as an agribusiness consultant and a USDA economist prior to attending law school at the University of Richmond. John is a prolific writer on legal issues affecting agriculture. His blog, Ag in the Courtroom, is featured on Agweb.com. He also writes a column for Farm Journal Legalese. John also speaks extensively on agriculture and policy, matters for producing groups and policy matters.

MR. BUSCHERMOHLE: Good afternoon, everyone. As Ryan said, I am a precision ag specialist with UT Extension, and I have the pleasure of working with producers and talking with them and trying to help them adopt technologies to help make their systems more profitable. And as John and I were talking about this panel session, he thought I would be the person to be able to kind of set the stage for what these technologies are, and then he would come back and talk about the legal issues.

Farming is not what it used to be. My granddaddy was born in 1912. He was the oldest of fourteen kids, they lived on a small family-owned farm outside of Bardstown,

Kentucky, and as he said, there was more limestone outcropping rock than there was poor dirt. He used mules and horses pretty much throughout his whole farming up until even in the fifties. I remember as a young boy, I was born in 1958, and he still had two draft horses on the farm. Their names were Kit and Molly, and he said that they were the best horses that he ever used, and he didn't have the heart to get rid of them after he started to switch to tractors. So they retired on the farm. I remember as a young boy, he used to put me on their back, and I was a little boy, and those horses were huge. So he farmed with two horsepower.

Today we farm with over three hundred horsepower tractors. In his day, everything was hand-harvested. If you look at corn, a good corn picker could pick two and a half acres a day. Today we have combines that can do that in a matter of minutes. And also tractors, I cut my teeth driving a John Deere B tractor, it has eighteen horsepower. Today we have the ability of tractors that can drive themselves if they're equipped with auto-guidance and use an RTK ray GPS. We can be within a centimeter of an inch anywhere in the field year after year after year. There's a lot of technologies and changes that he never got to see, but the three technologies we're going to talk about are biotechnology, big data, and unmanned aerial systems. You heard Rhedona talk a little bit about drones. I'm going to kind of give you a background of what we're using, what they are and things of that nature.

We look at biotechnology. If you look at corn years historically from 1860 up until about 2012, you can see from about 1860 up to right after the Great Depression, corn yields were pretty stable at about twenty-five bushel an acre. And then after the Great Depression, and really after World War II, all the way up into the mid-fifties, we

start to see an incline in yield. In 1983, I convinced the most sweetest, prettiest girl I have ever met in my life to marry far below herself, and her daddy was a farmer as well. He told me after he got back from World War II, he went to agriculture school. In agriculture school they taught him about fertilizer. Back then, what manure was on the farm was spread out in the fields, but it wasn't enough to meet the crop needs. He said his daddy and all the people around him made fun of him because he spent money on fertilizer, said he was going to lose his shirt. That year everybody else made twenty-five bushel an acre, he made seventy-five. And so after the Depression and up until the 1950s, management changed. UT Extension and all the agricultural extension services started helping producers become better farmers. Also, he started seeing a little bit about breeding up in those periods. But where we really see a lot of crop genetics in breeding is from the late fifties all the way up to the late nineties. We started seeing hybrids, we stopped seeing cross-figure, and you can see, the yields went up tremendously from the late fifties all the way up into the nineties.

What happened in 1996? Monsanto came out with Roundup-ready soybeans. Now we're talking GMOs. Two years later they came out with Roundup-resistant corn, and then we had Bayer Crop Signs come out with LibertyLink, we had all kind of things. If you look at the soybean crop, with Roundup-resistant and Liberty, that's a herbicide. We're spraying it across the top of the crop without killing the crop and we're able to control the weeds. Also about that time, we came out with insect resistance with BT varieties. Now, the folks that are doing that, I call them gene jockeys, but they're really geneticists. They're out there looking at how we can take and modify that crop to be able to be drought resistant. They're also looking at how we can take a soybean plant that fixes its own nitrogen

from the atmosphere and can we take that into other crops such as corn and wheat and things of that nature. What it's done, it's allowed producers to become larger. We've seen a big shift from folks that used to be great one thousand and two thousand acre farmers, and now they're up to four and five, and I even work with some folks that are thirty thousand acres. It's increased the yield because we're being able to manage the diseases, the insects, pressure of the weeds. And there's also some consumer benefits. We've got crops that we're eating that are higher in oil and protein content, and they're also using some of those for medicinal purposes. But there is a lot of controversy, as you well know, over GMOs.

The next technology we're going to talk about is big data. What is big data? If you go to any production field in the country, you'll find out that yields are not uniform across the field. There is yield variability, and there are a lot of things that cause that variability. There can be fertility, there can be soil type, topography, disease, insect, you name it, we see a lot of variability across that field. And we're now capturing data. We're talking about precision ag data. The things that really opened up precision ag and gave me an opportunity to work for UT Extension is when we started using GPS. Now we know the location of the field that we're sitting whether we're in a tractor or a combine, any type of implement as we go across the field, now we can measure the location. We have monitors in combines and systems that now measure yield. We have monitors in tractors now that measure how much seed we're putting out, where we're putting out that seed, are we using variety A or are we using variety B. All that information now with the onset of these GIS, these geographic information systems, we're able to take that information, and now I spend a lot of my career making pretty maps.

What is the thing now that everybody is talking about? I sat in the back and watched, and I did it too. I was on my phone. I see some of you on tablets. We're now more connected than we ever have been in this country. We've got cell phone technology, we've got tablets. We can be anywhere in the country, and with this big data that we'll talk about, we can monitor whatever is going on on our farming operation. So when you combine GPS and monitors and geographic information systems and the connectivity that we now have in this world, it's changed how we take it and utilize data in our farming operation.

What kind of data am I talking about? We've got yield maps. We can use imagery. There are satellites flying across taking snapshots at least once a week. We've got fertility data. We can go out now and we can do site-specific soil sampling, and we can be able to apply our nutrients and our inputs on a variable basis. We also have public data available to us. We've got soil maps coming off of NRCS, we know exactly when it's going to rain and when it's not going to rain or how much it's going to rain, and we can use that information as we do irrigation scheduling to try to reduce the amount of water that we're putting on crops.

We've also got analytics. We've got crop models, we've got big data co-ops that I'll talk about in a minute, that is data mining a tremendous amount of information that now producers are using to try to make management decisions. And if you've ever ridden in a combine or a cotton picker or a tractor with a producer, especially in the harvest season, and this is my favorite time of the year, they are always on their cell phone and they're always looking at what the current crop price is, because they're getting an idea of what their yields are and is it time to sell

now or is it time to sell later. What are we doing with all this data? We're trying to make management decisions to reduce our crop inputs or reduce the amount of money that we're putting into the crop, so therefore, we can increase our profitability. We can also reduce the environmental impacts that are being associated with agriculture. We are becoming more sustainable by using this technology and this data. We use it for variety selection, Rebel-rate seeding, irrigation decisions, where and when to apply chemicals.

What are the farmers doing with it? And there's kind of two different trains of thought. A lot of times I work individually with farmers that are trying to use their data only. They're taking their yield data, they're making yield maps, they've done site-specific soil sampling, they may have run a Veris machine and got soil electrical conductivity, but they're trying to capture data for their own farming operation, and they're trying to make management decisions based on a field by field basis. But we've also got producers out there that are sending their data into this magical cloud. And everybody is sending that to the magical cloud. These data co-ops are getting information from all over the country, whether it's different varieties, different planting rates, different insecticide, fungicide applications. And they're data mining that so when it comes time for a producer to make a decision on what variety should I plant in field A, they can say based on our information for your region, this is the variety that will give you the best yields.

We talk about being connected. My granddaddy never did go around a lot of places. When he was in his seventies, my youngest uncle took him to Disney World. Anybody ever been to Disney World? The Big Bear Jamboree, that fascinated my grandpa so much that he

talked about it until the day he died, and today he would be astounded. He could be sitting in the Big Bear Jamboree waiting area on his ipad being able to see what the crop was doing back in Kentucky, how much his yields were, and he could be on the stock market or the futures market being ready to make a decision on when to pull the trigger to sell. This thing with big data is tremendous, and it's going to get bigger. There are a lot of players in the big data realm, there's a lot of legal issues that we'll talk about, who owns the data. Can that data be transferred, what kind of contracts do you sign? Some producers are very reluctant to give their data, others are more willing, and there's a lot of legal issues.

The last technology I'm going to talk about is drones. No, we do not put missiles on drones and fly over agricultural fields and try to shoot bugs off of crops, but it's a big buzzword and it's a big growing issue right now. We start talking about unmanned aerial systems, we talk about it's a system. You've got a plane or a multi-copter, I call them flying devices. We've also got communications between the flying device. We now have the systems in the ones we own, they fly themselves much better than I can fly them. Then we have different cameras out there that we're capturing, and this all goes back to we're capturing parts of this big data. Has anybody ever flown a drone? Anybody own one? Recreational use, a lot of folks are using them. Right now we own, actually we own two multi-rotors. Multi-rotors is about like a little hop helicopter. They're really great for some of the things that we're going to do, and I'll show you with them, because they can land and lift vertically. If I'm going across the top of the crop, I can stop, I can drop down, I can hover. There's all kind of folks now looking at making devices where we can actually send a camera down under the canopy and be able to look at a leaf and take a picture of that leaf and run an algorithm

through it and determine whether we've got soybean rust or some kind of corn earworm damage.

You've also got fixed wings. Fixed wings give you a little bit more flying time. Our multi-rotor gives us the ability to fly about a fifty-acre field, and then we better find a place to land because we've got to change out batteries. With the fixed wing type systems, you're looking at probably upwards of five hundred to a thousand acres you can cover in one flight. What are we using them for? We're using them for a lot of things. We start talking about how do we communicate. And I'm going to talk about directed scouting in a minute. We're communicating two ways with these things. We're actually sitting there sending the signal to it to fly, but it's also a lot of times sending us data back. How many of you all know about a GoPro camera? A lot of folks -- we put GoPro cameras on the top of this, send it up in the air about four hundred feet, and basically what you see is a great birds eye view of the field. You can see that in the picture. So we're getting images back. We're also sending and communicating to it.

GPS is kind of interesting, but the recreational bunch, the recreational users, really revolutionized UAVs. There's a lot of free open software out there. We use it. We pre-plan a mission, we have a GPS on ours, we tell the thing where to fly, how to fly, how fast to fly and where to come back home, and then we send it up in the air. What are we capturing with this data? We're capturing a lot of pictures. GoPro video cameras are great, and you're going to see where we're doing directed scouting here in a second. Again, it's just amazing the quality of picture that we're getting back from these GoPro video, and that's going to help us in our scouting operations. But the next step is we're looking at mapping, and I'll talk about that in a minute. And we've got different camera applications that

we can put on there. You've got to realize that we see light. The light is the electromagnetic spectrum and it is made up of wave lengths, and with these different type cameras, we can capture parts of that wave length. If I want a color picture, I'm going to capture red, green and blue. Our multi-spec camera not only captures red, green and blue, it also captures things that our eyes cannot pick up. We're in the infrared range, and we're also between red where we can see in this infrared range is a red edge, and we can pick up red edge. Hyperspectral, we can pick up far more different bands than the camera that we have. All we're trying to do is be able to gather data, big data, to be able to stitch them together and make maps. And you'll see some of the maps here in a minute where we're trying to develop vegetative indices to help us make decisions. We can also put a thermal camera on there and detect heat. And now as technology is evolving, we can put cameras on there that now it's using laser technology to be able to give us the height of trees or the height of a stump or a height of anything that we want to collect.

We talk about directed scouting. We're going to end up seeing a lot of folks using multi-rotors. It gives you the ability to go up and down in a relatively easy place. Again, we can live stream the video back, so as we're flying over a field and we see something in that field that makes us say, whoa, we need to go take a further look and we can drop down and we can see whether or not we have an insect or disease problem. So when we get done with the field, we now have areas -- because these are geo-referenced as we fly through these patterns. We know where to go in the field, and we can be able to make better decisions on our scouting and probably cut our scouting time down to help the producers maximize their yield and minimize their inputs for that field. You can see the pretty pictures. We'll be looking for diseases and insects and all kinds of things,

crop progress, crop stress, weeds. Weeds are a big problem for us. We can also look at livestock. I can check fences, I can see if mama cow has had a calf. I can also use a thermal camera, because when an animal is sick, it becomes under stress, and it elevates its body temperature. So we can fly across a herd of cows and be able to pick out that Old Bessie or cow number thirty-five is sick and we need to go treat it and be able to save that cow or help its health.

If we go to mapping, we're probably going to do a lot with the fixed wings. We can cover far more area. It depends on what we really want to do with the data. But we're probably going to put some type of a multi-spec or hyper-spectral camera. We're going to capture the images, we're going to bring it back, and we're going to create some kind of vegetative indices map or some other type of map that's going to help us make decisions as far as our management goes. There are folks now that being able -- we're talking about the quality of pictures flying, you know, below four hundred feet. We're talking about centimeter resolution. So folks are out there working on how we can count soybean or corn plants in the field. You know, the last few years, we've had a tremendous amount of rain and we've had a lot of flooding and producers have got to make a decision, do I start all over or do I leave the crop, you know, if we have drowning or disease problems early in the season. So we can do drainage issues, crop insurance. Variable rate crop inputs is what everybody is looking at. Can we go in-season with cotton or corn and be able to put an in-season application of nitrogen to be able to give the crop what it needs, when it needs it to be able to maximize our profitability.

We're also looking at can we make irrigation decisions. Can we take a thermal image of a crop and

determine whether or not it's under stress enough that we are affecting yield. You can see right here on one of the pretty maps that we've made. We're looking, in this particular one, at some of our nitrogen trials in cotton. You can see the difference as we create these vegetative indices and how we can use these maps to be able to say, okay, we either need to reduce the nitrogen, increase the nitrogen. Our goal, our ultimate goal is to increase the sustainability of our producers.

Forestry, I mean there's just numerous applications that we can use with UAVs. And the thing with a UAV, it gives us real time. We can capture and have been capturing the same information with airplanes and satellites for years. But if a satellite flies over and it's cloud cover, guess what, you don't get an image. If a plane flies over and the cloud ceiling is too low, you don't get an image. Producers, when do they need the image? They needed it yesterday. And so with drones and UAVs, we're going to have more real time. When I'm talking with producers, the first question I ask from them is what do they want to do with the data. That's going to determine not only what cameras or what type of system. But this data processing is a big issue. With our system, every time we snap a shutter, we take five separate images. They're geo-referenced images. A fifty acre field, we had six hundred and ninety images. We're not talking kilobytes worth of data anymore, we're not talking megabytes, we're talking about gigabytes. So now, how do we process gigabytes? There's folks that are out there looking at how we can take this information as we snap it and send it to the cloud to these big super computers. We bought the biggest, hopped up, super portable laptop that we could possibly find to be able to run some of the software. And for a fifty acre field, we turn it on when we leave work at night and we hope the next morning when we come in it's finished.

There are a lot of legal ramifications and issues with the technologies that we've talked about, and it's an exciting time to be in agriculture and it's an exciting time to be working for UT Extension and as an Extension Specialist. I think we'll probably wait until questions after we're finished, or do we have them now?

MR. SHANAHAN: Finished.

MR. BUSCHERMOHLE: Finished. Perfect.

MR. DILLARD: Thank you. As you heard in the very long introduction, I am John Dillard. I am an attorney with Olsson, Frank, Weeda. I speak on a lot of kind of these issues and have started to encounter them more in practice, but have really been brought to it by Farm Journal with a lot of these, because it is an issue where we are seeing people out there that are interested in this type of stuff. It's kind of cutting edge.

I also want to note, this is my first time in Knoxville, so I appreciate the opportunity to be here. One thing I did not get the memo on was wearing all the orange. I come prepackaged, so I'm going to follow in kind of the same order that Dr. Buschermohle did in terms of covering biotechnology, big data, then moving on to the drones. There are actually a few legal issues dealing with biotechnology. One of them is, probably the two that kind of stick out, the one that's still ongoing, I mean that is going on as we speak, is the state labeling issue, which I'll get to. Here's another fight that kind of went on and it's been kind of settled at this point, and that's on basically patenting issues with biotechnology and biotechnology crops. I've actually had a little bit of a chance to get involved in that, but it was a really to come up with these traits, it's basically

taking a trait from one species and inserting the useful trait into another species. It takes a lot of money. I think the average for the commercial crops like the soybeans or sugar beets or corn, each trait takes about a hundred and fifty million dollars to get to market. And so with that big an investment of funds in kind of research and development and paying off all the lawyers to get this done, it costs a lot of money, and so you want to protect your investment in that. So the seed companies have looked to the U.S. patent system to kind of make sure they're able to recoup their investment in that.

One of the issues that's really come about, it started in like the 1930's, we started passing some laws that protected intellectual property with seeds. At first, it was more geared towards fruit tree breeders. You had apple breeders that want to protect their varieties, you know, if somebody used a cutting or whatnot, but it didn't really apply the same to like your row crops that are more commonly used. Corn has kind of a built-in intellectual property system in that you can't replant hybrids. With some of the major crops where we have biotechnology used, soybeans and cotton are both self-pollinating crops that don't lend themselves to hybrids, and so it's actually very easy to steal this technology or to basically, steal is maybe a controversial word, but replant or brown-bag the seed from some of these crops, so the patent system has kind of had to adjust to the idea of patenting living things. It's still a controversial topic, the last case involving this was actually decided by the Supreme Court in 2013, and it actually dealt with basically a farmer that was brown-bagging soybeans, which for those not indoctrinated, brown-bagging means, basically at the end of the season, you save back some of the -- let's say you plant some soybeans. They would come with the Roundup-ready gene in them, and you basically save those over and replant them

for the next year. If you buy, say, roundup-ready crops, you sign a technology agreement where you agree, you know, you recognize, hey, Monsanto has a patent on this, I'm not going to replant these, and so it's kind of by honor code.

We had a gentleman in Indiana that fought against that. He actually called up Monsanto and told them he was doing it. He was very confrontational in this, but he called them up and said, look, here's what I'm doing. I've been doing it for eight years. I'm not going to pay you any money. What are you going to do about it? They sued him. And that went to the Supreme Court. The real issue that they were dealing with was, does a patent extend to the second generation? If you have basically technology that's capable of self-replicating, does that patent extend to the second generation? The Supreme Court held that it did in a 9-0 decision. We actually worked with the National Corn Growers Association, American Soybean Association, several soybean groups, and put together an amicus brief for that, so it's a very interesting emersion into the world of patents. I really see that as being the last kind of fight on the patent side with, unless there's some type of substantive change to the law, which there may be.

The other controversial issue with biotechnology is kind of these state labeling laws. And I'm not going to hide my bias, I'm opposed to them, but by not hiding my bias, that allows me to be frank. A lot of the money behind these kind of state labeling initiatives is coming from the organic foods industry where there's a significant kind of motivation or incentive to kind of stigmatize biotechnology. The main group behind it is Just Label It. That's primarily funded by Stonyfield Dairy and kind of headed up in that direction, and they've had some successes. I know there have been several highly publicized ballot initiatives, mostly out on the west coast, and none of

those have been successful, but they have cost both sides in the matter a substantial amount of money. And then kind of in the New England area, there has been some success going through the state legislatures in terms of getting some type of labeling measure passed. There are none that are currently in effect, but I'm going to discuss it a little bit more.

How all of these look; it starts off with model legislation that's being pushed by the organic industry, but it requires products that contain ingredients produced with genetic engineering to bare labels saying either produced with genetic engineering or partially produced with genetic engineering. That depends on kind of the makeup of the product. They also have a prohibition on any of these products that contain genetically engineered ingredients. There's a prohibition on them having anything on their labeling indicating something along the lines of like all natural or naturally grown, naturally produced. It's kind of model legislation. It has passed outright in the State of Vermont. Like Vermont has a law that if nothing else changes, July 1, 2016, retailers or manufacturers are going to be held liable for whether retailers sell products containing the labels. Connecticut and the State of Maine have both passed measures saying that we want GMO labeling, but we don't want it bad enough to litigate. They have kind of trigger clauses built in, which basically if there's a critical mass of New England states that go along with this, then that would trigger their requirements. Maine's will probably not go into effect because they built into it that there has to be a contiguous state, there has to be a contiguous state that requires GMO labeling, and New Hampshire has repeatedly voted that down, and that's the only contiguous state to Maine. Its measure actually expires in 2018 if there is nothing passed. Another state that's likely to pass it is Massachusetts. They haven't voted on it, but

three-quarters of the legislature is co-sponsoring it, so I think it might get through. With that, what we have going on, the Vermont legislation has been challenged in the Federal Court system. The plaintiffs are the Grocery Manufacturers Association, the Snack Food Manufacturers Association, International Dairy Foods Association and National Association of Manufacturers, so kind of big food is going after this in a strong way.

The real issues that they're focusing on are constitutional issues. The primary one, kind of the main thrust is the First Amendment, and then some of the compelled Commercial Speech Doctrine. They are also going after it under the Commerce Clause, which there's some valid arguments there, but it's been kind of undercut by several decisions actually involving Vermont. Then there's a push for a Federal preemption argument which has certainly some legs to it.

Under the First Amendment, I have kind of a little diagram here, but under the First Amendment, the First Amendment protects speech, and that protection of speech is not only protecting your ability to speak but also protecting your ability to not speak when you would rather not. There's not as much protection for what is called commercial speech, so advertising or labeling, as there is for, say, something like political speech, but there is still protection. There's, in this case from the GMO labeling side, this is what is kind of referred to or analyzed as a compelled disclosure. It's Vermont saying, hey, you, you're required to print this, so there's basically two routes that can be taken on compelled disclosures, and it usually leads to very different outcomes. With the compelled disclosure, if there's something that is purely factual and non-controversial, for instance, like nutrition labeling. I guess there's not a label on this bottle, but I know it's water. But if

you're dealing with like a nutrition label, that's not controversial, it's purely factual. It's measured under what's called the *Zauderer* test, which requires basically there to be some type of reasonable relationship between the compelled disclosure and the government's interest in compelling that disclosure. On the other hand, if you have something that's not purely factual, if it's controversial, if it's up in the air, you apply what's called the *Central Hudson* test which is more of an intermediate scrutiny test that's supplied there. Some courts have actually applied strict scrutiny, which is pretty hard to get past, but kind of where the Supreme Court is on anything that's not purely factual or controversial, there are the *Central Hudson* test.

To kind of discuss the different sides, so Vermont is over here on the side, this is purely factual and non-controversial. What they're requiring, a label is -- if a product is, indeed, produced with genetic engineering, that's a fact, and their belief is that that's not controversial, meaning there's no controversy over is this or is this not genetically engineered. The Grocery Manufacturers Association obviously wants the heightened standard, the *Central Hudson* test to apply. And with that, their angle is that, okay, it may be purely factual that this product is produced with genetic engineering, but the whole topic of genetic engineering is controversial, and it's basically the government injecting itself and taking a stance into this topic or this area and basically creating almost a warning label, and that's controversial. That's kind of where everybody is coming from.

If the courts do apply the *Central Hudson* test, as I said, it's kind of in this intermediate scrutiny level, the question that has to be asked is, does the government have some type of substantial interest in compelling this, and does the compulsion kind of directly advance the

government's interest, and is it more necessary than, is it more extensive than is necessary to actually serve the government's interest. I think if the courts were to apply the *Central Hudson* test, I think that you would not -- you would see the labeling measure get struck down, and part of that -- kind of in terms of demonstrating that there's a substantial interest. This is really more satisfying consumer curiosity in terms of, you know, I want to know what's in my food. It's thrown around, I have a right to know what's in my food, and there's actually a decision from 1996 where the Second Circuit held once again, from Vermont, a measure that would have required milk produced with calcium received the hormone RBST to have some type of labeling on that. And the court said, this is just consumer curiosity, there's no actual demonstration that there's any difference in the milk, so this doesn't rise to a level that we're going to really try to bend the First Amendment, so I think there's a strong argument there that this is more of a consumer curiosity deal.

There are also a substantial number of exemptions from this labeling measure, which really cuts against the government's argument that there's a need for it. So if there had been a CVS closer to like my hotel, I would have brought in, I try to bring in like samples. The exemptions include alcohol. Most beers produced with crops that are produced through genetic engineering or any of your liquors that have corn in them, that's produced with genetic engineering, that's exempt. Any product that's inspected by USDA, so any meat products, not just like steaks, but if you have chicken noodle soup that has more than a de minimis amount of chicken in it, or the Poultry Products Inspection Act, that's exempt, or that's preempted from state labeling. But then right beside it, so you can have chicken noodle soup, you're not allowed to have a label right beside it. You would have like Campbell's tomato soup probably has high

fructose corn syrup; it would have a genetically engineered label. So actually, it's estimated that only about 40% of the products in a grocery store that contain genetically engineered ingredients would actually bear a label. But there's still a substantial amount of costs kind of put on this. Another major exemption is restaurants. So I think kind of under the more intermediate scrutiny level, I think it falls down, because if your consumers really need to know this, why does their right to know really depend on where they are and what they're eating or consuming. But there are other people that disagree.

The *Zauderer* test is a much more, is a lower bar to cross. It's basically, as I said, a reasonable relationship between that. And the arguments that Vermont has put forth is, there's still questions that we have, and people use the big argument, the argument that's gaining traction is kind of the use of these roundup-ready crops. People spray more pesticides than they used to. And then there's the argument that some religions want to know, people of certain faiths, want to know what their product is. I think that might run into an establishment clause issue actually, but it hasn't come up so much during this. But I do think if it falls under this standard, it's a really low standard. I think they can come up with some type of justification. Another issue with this, and it's kind of a side issue, I mean the big fight is the genetic engineering label, but there's also a prohibition on labeling products natural. With a prohibition on speech, unlike a compelled disclosure, when the government is coming in and saying, you can't say this for commercial speech, it comes under *Central Hudson*, so that's a higher standard for them to meet. That's kind of the First Amendment issues with this.

The Dormant Commerce Clause is probably, and there's several law students in here, and I'm sure you

studied the cases or are going through cases like the, I think the one that stuck out was like New Mexico, or maybe Arizona only allowed like trains of such length, where basically if you're running trains into Arizona, you had to stop at the border and uncouple them and then re-couple them back at the California border. I mean it's kind of the idea of with the Commerce Clause, we have fifty states where you're supposed to be able to conduct business easily between them. Under our kind of a theory of the Dormant Commerce Clause, you're not allowed to discriminate against interstate commerce, and you're not allowed to unduly burden. Vermont is a very small state, it's in a cold climate, it imports about eighty-five percent of its food despite a growing, I guess, local food market there, and it creates a real issue over if you're a company that's a multi, either a regional company or a national company, you're going to have to create different types of labels for this market, for a very small market, maybe six hundred thousand people. There are real concerns actually within the industry. You know, for some, it may not be worth it to actually try to come up with separate labels for Vermont to where they may step back away from the market, but there's actually some concerns rising with the industry of kind of anti-trust in terms of just if everybody stopped selling into Vermont. So there's a lot of companies that, understand that they're going to have to lose money just to like stay within, stay out of the FTC's scrutiny. So there is a real concern about the Dormant Commerce Clause.

The courts haven't really bought into it, but so much they look at it as a relatively minor incursion on the companies, and that a lot of that comes from -- there's actually another Vermont labeling case from the early 2000s where they required the fancy -- the really efficient light bulbs had to come with a label saying that there was mercury in them and just to be aware of that. That actually

was upheld at the Second Circuit, so it's really taken, at least from the Second Circuit perspective, which is where Vermont is, it has taken that argument off the table for the most part. I mean it's still made, but it doesn't go very far.

We have had a District Court decision in the GMO challenge. The District of Vermont held that the *Zauderer* test, kind of lower bar, applied to GMO labeling. They held that it was for the most part constitutional. Vermont's law did not provide exemptions for USDA inspected products, so it was found that it was preempted for products that are inspected by USDA, so anything with meat or poultry in it. And it did hold that the prohibition on labeling products natural was unconstitutional and failed under the *Central Hudson* test. Most of the Commerce Clause arguments were dismissed. Grocery manufacturers appealed it to the Second Circuit. They actually had arguments yesterday in New York on that. I had a reporter friend that attended that and I checked in with her, and she said it's hard to tell, you know, actually watching arguments where it's going to come down, but it sounds like there was one that was pretty receptive to GMA, one pretty receptive to Vermont, and then one judge in the middle. So we'll see how that goes. We'll probably have a decision by Christmas on that.

Understanding that this is going to continue to be an issue, Congress is actually wading into the GMO labeling effort, and it has come up with a bill that at first was a long-shot, but may actually stand a chance of passing. It's pushed by a representative, Tom Payo, from Kansas, it's oftentimes known as the Tom Payo Bill. But basically it would preempt state labeling laws, and codify the approval process that is currently already in use to approve genetically engineered trades. Where it's run into controversy is they're trying to set up standards for what constitutes a non-GMO product. So it has passed the

House. It actually passed the House with a pretty broad support. It's in the Senate. They're waiting for a democrat to kind of co-sponsor it before they move forward, so we'll see how that goes.

I realize I'm going to be pushing on time, so I'm going to speed up a little bit. Dr. Buschermohle discussed big data, so this is a transition to a new topic. On the big data, there were several legal issues. I take a little bit, jokingly, a little bit of a disagreement with it. There's one legal issue with big data. So, I mean, it's a huge issue, especially for the row crops. Row croppers out there, there's pulling gigabytes and terabytes of data off of land, and there is a real question of like who owns it, but there's no -- it's not like there's a framework of laws around this. Everything comes down to the contract. Now, there are a tremendous number of issues kind of within the contract of what needs to be considered. Basically this is the issue of what can your data be used for, who owns it. That's all determined by contract. At this point, Congress and state governments haven't stepped up.

Before I get into the contract issues, try to understand some of the risks that are out there, because it's -- I mean, it's funny. I grew up on a farm and came up, I think, in the farming community. There's a real tendency to kind of -- the first reaction to anything new is paranoia, and that's certainly the case with big data. Everybody wants to know what can go wrong with this. Then they need to be kind of pulled along to explain what are the benefits of having all this data out there. There are concerns with data breaches. I mean you see it all the time with different government databases, in different companies like Target with the credit card breaches. You have data breaches, and unlike others, I mean there are risks with anything that includes financial data, but here these are data breaches that

have geospatial data attached to them. You can identify a farm with it.

There are also concerns about what happens if you're a landowner and you have data from your property or from your land, what happens to it if it's sold to a third party. You know, who is getting that, what can they do with it? I think there are going to be in terms of regulatory enforcement kind of using big data. What's to stop it if you sign up with one of the CAS programs? What's to stop the USDA from getting that data and using that to enforce Swampbuster, or the EPA from enforcing the Clean Water Act? Then there's also concern that people could use this information for market manipulation. Like I said, it's kind of like my demonstration of the farmers -- paranoia in the farming community. Does does anybody in this room have any experience drafting up contracts kind of dealing with big data? You do. I'll be honest, I haven't done one for a producer, but I've kind of been in reading up on it, looking at it, there are several considerations in terms of drafting out these contracts. It kind of depends on who your client is with this.

Some of the considerations are what's the farmer's right, what's the -- the ag technology provider is kind of the term that's used for the, say, if you're using the CAS program or the Monsanto program. If you're getting data coming in from your friends or coming in from your yield monitors, you know, there's usually some type of party that provides the technological services behind that. There's real concern about what are everybody's rights under these arrangements. The ones that I take a look at kind of from the farmer's perspective, the concerns that I've noticed are will the farmer have notice or some type of prior notification before data is collected. That's something that I think I pick up more from like the cell phone world or

whatnot. I have an iPhone and I'm hooked to it, and it's killing me to be fifteen feet away from it right now. I mean you have all these apps or recording information on the background. They know how many times you open it a day, when you check it, how often you check it, how often you look at it. They're collecting a lot of information that you don't necessarily think is maybe germane to like Instagram, to know every single thing about what I do. I mean they're selling that information. I think there's also probably a market for that with some of this technology that you have on combines or planters or whatnot where it may not necessarily be something that's intuitive, but there could be some value from that in terms of like how often do you check this monitor, how often are you -- you know, things that are recording kind of in the background. I think that's a concern.

I think a lot of times producers want to know kind of what data they have of theirs that will be collected and be sent on and how will that data be used. Is there a limitation on the third parties or the types of third parties that can receive it? Is it something that could be passed on to government entities? Is it something that could be used for purposes beyond kind of agricultural production or making your farm more efficient? I will say -- like I said, I haven't contracted these, but unfortunately, it's kind of like a lot of things, there's usually not a lot of room for negotiations in terms of an individual farmer is probably presented with a form contract. It's still a consideration in terms of who owns it, what can they -- is there any way to like claw back this information once it's out there. So the contract issue, I think, is the most important. I think the one that people think is the most interesting, kind of getting back to people's paranoia, is kind of the regulatory considerations. So we have some data privacy laws out there. Probably if anybody has family or friends that work

in the health profession, you hear a lot about HIPAA. There are a lot of protections for like your medical information. It's also the Electronic Communications Privacy Act, which is more broad and general in terms of just regular electronic communications, so emails. There's nothing out there that's specific to farm data, but it would still fall under the Electronic Communications Privacy Act. Some of the groups that could use this information; the USDA, and of course, there's the Swampbuster, and the Swampbuster regulation, they also have a role in making sure that crop insurance isn't taken advantage of, so they do fraud monitoring. The EPA uses the Clean Water Act. I mean there are a lot of issues in terms of wetlands, and then kind of the same thing for state agencies.

There is, I think, an issue with the Fourth Amendment that maybe people aren't thinking of in terms of, I mean, obviously, the Fourth Amendment protects against unreasonable searches and seizures, and with this information going onto the cloud, that's really where you have Fourth Amendment issues that crop up. Because the Fourth Amendment hinges on this reasonable expectation of privacy. But even if you have what you think is an expectation of privacy in your data, or if your client thinks they have a reasonable expectation of privacy in their data, they're still sharing it with someone else, it's still going out onto the cloud.

If you have electronic communications that are held on a hard drive, that requires a warrant, which requires a higher burden to achieve. But if you have something that goes out onto a cloud or cloud data, kind of think of it in kind of this transition --I know when I was in law school, we initially started out using Outlook. I still use Outlook in the office, but actually a school switch halfway through to l partnering with Gmail. So it used to be the school sent an

email, and when Outlook would actually pull the email off of the school server, it was no longer on the school server, and so that email went into my hard drive, whereas with gmail everything stays on the server or stays in the cloud.

The Electronic Communications Privacy Act was written back when everybody had Outlook and pulled emails off the server. And so anything that's left on a server or left in the cloud for more than a hundred and eighty days is a lot easier to get at. You don't have to have a search warrant. You can get a court order, you can get a subpoena, and so this is something -- if you do have information that is out there in the cloud, that is something where it would be easier for the government to get that than if it was on a hard drive. I say all this, I don't really see it being an issue right now, but it's good red meat if you're into paranoia. I'll move to drones real quick. I do think I'm going to run out of time, which is fine.

The real issue with drones, I've been following it for about three years now. The real question has been are drones legal? My answer to it has changed a few different times, but the answer is now, yes. It hasn't always been, and I think it's like September last year I could start saying, yes. The agency has kind of struggled to keep up with the technology in terms of under what circumstances are they going to allow commercial uses of drones.

Now, the University of Tennessee and other fine research institutions have had a pass on this because there has been an exception for research in this all along. But kind of the origins of this idea of legalizing commercial drones actually started around 2007, but, in 2012, made it into statute. Congress ordered the FAA, by September 30th of this year, to integrate commercial drones into national airspace. They haven't done that, but they wouldn't be the

first government agency that's missed a deadline, but they have started a rule making process and they have also established an exemption process to allow some commercial operators to go into that.

When I say there's been a question about whether drones have been legal or not, there hasn't been a lot of data points on it. You've basically had the agency not really wanting to enforce against these small farmers, but they don't want a lot of people going out there because you're sharing the airspace with crop dusters and manned aircraft. The one data point we do have was, they went after a fellow, who was flying actually at the University of Virginia, and they've posted video of it. To be honest and frank, he was flying like a jackass, like that's how you have to fly to get the government to finally come after you. It made for a cool video, but he was flying near all these buildings super close, flying near statues, flying near people, flying in tunnels, flying over cars. I haven't actually operated one of these, but I've been at a few field days. Field day is where you have experts who are trying to show off their equipment. I've seen multiple really expensive drones just fall out of the sky and break, so it's not like it's super safe to fly these things around people.

The FAA brought a civil penalty against this guy; his name is Pirker, for reckless operation of an aircraft. Pirker and his attorneys actually challenged the case on the idea that a drone, meaning like a small remote controlled plane, or in this case rotocopter, was not actually an aircraft. The angle that they took on it was that the FAA's definition of an aircraft was too broad. They said because the definition was any contrivance invented, used or designed to navigate or fly in the air, the argument that they made was that this is too broad; this covers paper airplanes. It actually worked at the ALJ level, which I've said, you

know, this is ridiculous, this falls under more the definition of model aircraft. It was appealed to the NTSB, the National Transportation Safety Board, and they basically said, yeah, our definition is broad, and if we want to get into regulating paper aircraft -- paper planes, we will. Until then, we think your drone is an aircraft, and they did prevail. The upshot of that is the FAA does have authority over these drones, which was kind of up in the air before this case.

I think I have three minutes, so I'm going to try to pack in what I think is just more interesting to know, because they are regulating drones as aircraft. They basically have to fall under the same kind of parameters that you do for like a 747 in terms of kind of the different boxes that they have to check off even though you're flying like a remote controlled plane over farm fields, but you have to have operator qualifications. You have to have aircraft qualifications. Typically, you have to have an airworthiness certificate. I guess the one big distinction with drones is that they are exempt from having to produce that, because I think if you're manufacturing a real airplane, an air worthiness certificate takes anywhere from six to eighteen months or three years or something like that. The rapid pace of technology is just going too fast. That's the one big difference from the 747. Then you have to have operational kind of parameters in terms of what airspace you can use, what type of communications capabilities you have to have.

Real quick, the operator, the one big difference is under the proposed rules which are expected to go into effect this next spring, you're not required to have a pilot's license. You do have to take a test, but not the same type of test that you would have to take to fly an actual plane. That's different from what's being allowed now under these

conditional operating permits or exemptions. I don't know, when you all operate, do you have to have a licensed pilot?

MR. BUSCHERMOHLE: You have to have a licensed pilot and an observer that's passed a class two physical exam. We've got two operations that we can fly at now: our research station at Milan and Ames Plantation. That's the only place the University of Tennessee and my group can fly legally.

MR. DILLARD: Yes. So, yes, that's really held back a lot of the innovation on this just because you do have kind of that restriction. That's going to go away. I mean they would still have to have some type of qualifications test, but you aren't going to have to have a pilot.

In terms of the operational requirements, I'll end on this. One of the things that's in the rule is kind of the horizontal limitations are going to be what's known as unassisted line of sight. So whoever the operator is has to at all times be capable of seeing where the aircraft is so you can't fly five miles around. It also has to be below 500 ft. ceilings. These, to like a casual observer, sound like pretty reasonable. You don't want remote controlled aircraft like this going way off past where you can see it. I represent the National Association of Wheat Growers on this matter, and you have a lot of people out in Idaho or Washington where they don't see an issue with flying one of these things ten miles away, because what are they going to hit? It's just a wheat field. So it does actually slow them down, the sight. The sight limitations and the height limitations actually make it to where they have really a lot of challenges in terms of covering a substantial amount of ground in a day. If you have a twenty thousand acre wheat operation and want to take observations of your property, it's going to

take you three or four days just because you're having to pick up and move. So that's one thing.

I'll close in terms of where the technology is heading on this. In my involvement with the Wheat Growers, you end up at these coalition meetings in D.C. Right now, you have a lot of farm groups and a lot of the like input suppliers, but you are also having Boeing and Lockheed-Martin, and these companies that traditionally are not involved in the ag space showing up. I think eventually you are going to have long-range drone flights that are used to gather a tremendous amount of information out there. It's an exciting field. Any questions?

UNIDENTIFIED SPEAKER: Just to do a little clarification, you had indicated that UT and other universities were exempt from these requirements, but I guess we don't feel very exempt because we have to get a COA to fly.

MR. DILLARD: Yes. You're not exempt from the COA requirements.

UNIDENTIFIED SPEAKER: They're pretty intrusive requirements. You have to have a pilot's license, and you have to pass physicals. It takes us how many months to get one, Dr. Buschermohle?

MR. BUSCHERMOHLE: It took us about six months to get our first one, and then the second one, it's taken much longer because the FAA finally allowed these 333 exemptions. We do have one commercial operation in Tennessee now that's pretty much able to fly pretty much all of West Tennessee. When they opened that up, it flooded them with the amount of applications, and so it slowed everything down.

UNIDENTIFIED SPEAKER: Our position is that you may not fly if you're an employee unless you have a COA.

MR. DILLARD: Yes. That's an interesting point. I should say all of this discussion has been looking at the national level, but one of the things that they're mentioning, these certificates of authorization. So one of the things that you have to have to fly is approval from your local air traffic controller, and it's known as a certificate of authorization. That's really where we're seeing a lot of kind of regional disparities.

UNIDENTIFIED SPEAKER: It's a federal requirement now you can't fly anything greater than Class E airspace.

MR. BUSCHERMOHLE: They've probably got a 333 exemption.

UNIDENTIFIED SPEAKER: But aren't they specific for aeronautical research, not agriculture research; isn't that also correct?

MR. DILLARD: You know more than I do I think.

UNIDENTIFIED SPEAKER: We've got folks chomping at the bit to go do work with drones, and we spent a long time with legal here at UT trying to be as permissive as we could, because we like to stay ahead of our farmers in this technology. At least our interpretation through legal is what we were allowed to do is that we may not fly unless we have a COA. The COA is not, I guess, as big a deal, except how many licensed pilots do you have in your organization is where you really get slowed down.

MR. DILLARD: Yes. It's certainly a situation where the government is way behind the technology, and it doesn't have to be that way. Japan, Canada, and the EU are all leaps and bounds ahead of us in terms of having regulations in place to kind of allow and promote this technology. Now, I think we're catching up very quickly, but it's still very frustrating I think to the people who are out there in the field.

MR. SHANAHAN: Thank you.