ASTM F10 Committee on Livestock, Meat and Poultry Electronic Evaluation Systems
Len Huskey

[1]Our next speaker is Len Huskey from Swift & Company. He will discuss ASTM F10 Committee on Livestock Meat and Poultry Electronic Evaluation Systems. Len is the Vice President for Quality Assurance for Swift & Company and received his bachelors from Rutgers University and his MBA from Loyola University. He has been employed at Swift for forty-three years making fourteen relocations. He has held positions in product management, corporate planning, and as a plant manager spending the last twenty years in the quality assurance area. He is responsible for overseeing quality for all of the pork and beef products. Currently, he is the Chairman of the ASTM F10 Committee, which he is about to speak on. So, let's welcome Len Huskey. Thank you Deb and thanks for the opportunity to speak to you this morning about ASTM's F10 Committee on Livestock Meat and Poultry Electronic Evaluation Systems. I started out in the wrong room this morning. It seemed like everybody was massing over there. So, I joined that group before I realized that I was in the hands of the… over there talking about spices and packaging. So, I figured out where I was supposed to be and moved over here. Plus the fact that their segment was going to be two hours; so, already I was mentally calculating how was I going to reduce my presentation by about fifty percent to get everything in, but anyway, we got past that. If you heard Eric and Glen talk earlier about instrumentation in the industry, the ASTM F10 Committee is a good backup for those talks. We do have new technology or emerging technology and a need for standards for these systems, and actually, I think my topic is kind of the mystery topic, if you will, on the agenda, because ASTM is really not familiar to the meat processing industry. Hopefully, after we talk a little bit here, you'll have a better understanding of it.

[2]Historically, the livestock and meat processing industries have demonstrated willingness and an ability to integrate new technology, and that's certainly true of quality assessment systems. I've got a little video here that does take us back though about fifty years, long before today's technology first appeared on the horizon. [Video]. That's Marty O'Connor there in his early days. Or Jimmy, yes. So, as you can see there, while some things change, other things become pretty institutionalized.

[3]And really, in the evolution of quality grading, not a lot changed up until about twenty years ago, and beginning about that time, we began to see an accelerated evolution. As you can see here, lots of activity on the pork side especially where there are USDA grades, as you know, but really, it's not something that has been heavily utilized. After that, packers began to do a visual assessment of the carcass estimating the four lean cuts and using that at least for marketing programs along with the level to which the product was trimmed, and then, that was followed by the use of a ruler to measure back fat along with weight in the equation, and then some of the newer technologies; the optic probes, automated ultrasound, handheld ultrasound, electromagnetic scanning, machine vision, and as Eric indicated, we are still looking really for a good, reliable method of measuring pH online, and all of these are in use today to some extent, and really, starting about here anyway with the optic probe, we began to have a common endpoint prediction, and that was for percent lean meat in the carcass. So, that still held relatively true down through the development of these other technologies, and in the beef area, of course, as we saw in the video clip, we've had the USDA grading for a long time, and more recently, augmented by cameras and then following that perhaps, again, with cameras looking at machines – taking a machine vision look at the entire carcass in addition to the rib-eye area, and by the way, when we talk about the ASTM F10 Group, which we'll do here in a minute, as it pertains to beef grading, the beef grading is kind of on a separate track, because you've got AMS and ARS very, very involved in validation of that technology as an augmentation for beef grading, but it will be referenced in the ASTM Standards but separately developed. In the poultry area, traditionally, it's one of house grading and more recently there too being augmented by machine vision for detection of defects or damage.

[4]Here's the or one example anyway of an optic probe. You can see the suspension hook up there where it's suspended for ease for the operator to hold it, and here's

an aiming plate here that goes against the carcass before the probe is inserted to ensure that we have a consistent location of that probe entering the carcass, and these are calibrated with a test block.

[5]This is kind of a side view of the carcass here with the probe going in from the backside. It comes all the way through and into the cavity, but then, as it's coming back out, it makes a measurement based on light reflection measuring the depth of the loin eye, as it travels through that, and then what the different reflection is as it gets into the back fat also obtaining a measurement for back fat, and then, those readings are plugged into an equation to predict the percent of lean meat in a carcass, and with this technology, obviously, an operator is required, and it gives you just a single-point measurement on the carcass, but it does give you that depth measurement.

[6]With the use of any of these technologies, quality assurance programs are very, very critical, and for example, the probe is designed to be used in the same location in the carcass every time and that being between the third and fourth ribs. So, this is just an example here of a chart that tracks the ability to hit that location with a goal of eighty-three percent on the line running across there and at three different facilities and how that's been tracking over time, and this is just one element that's tracked with the use of the optic probe.

[7]This is kind of a busy diagram there, but again, it's the side view of a carcass, but with more recent technology, many measurements are possible. They can be linear. They can be area, angles, length of the carcass, width of the carcass, taking the entire carcass into consideration, or as you can see here, just different segments of the carcass to give you the ability to zero in more on particular primal cuts, and again, these linear or area measurements are plugged into a linear regression equation from which endpoint predictions for either individual primal cuts or entire carcass lean are developed.

[8]So, with the era that we are in of rapid technological change, we can make a case for the need for standards for these electronic evaluation systems. There is new technology that brings increased complexity. There are variations in the instrumentation, even for similar concepts such as ultrasound. The systems need to be reliable and auditable. They require accuracy and endpoint prediction, and very, very important and really key to the standards is the need for transparency and to have a trust in the value determination, and the standards provide basic requirements and continuity of approach across the industry.

[9]And there is also a matter of regulatory authority when it comes to the use of these technologies and the need for standards. The GIPSA or the USDA GIPSA or the Grain Inspection Packers and Stockyards Agency's regulatory authority comes from the Code of Federal Regulations, Title 9 on Animals and Animal Products, Part 201.99, Purchase of livestock by packers on a carcass grade, weight, or grade and weight basis, and we won't read through all of that, but it does talk about details of the purchase account, description of carcass trim and grading to be used, and down there at the bottom, if settlement and final payment are based upon any grades other than official USDA grades, then such other grades shall be set forth in detailed written specifications which in turn are made available to the seller or his agent. So, we have packers and stockyard representatives that visit our plants. They validate that the weighing is being carried out properly, but they are also looking at grading technology, and that's been in place with the optic probes now for some time, but with the advent of this new emerging technology, this gave emphasis to the need for standards for these technologies as well, and again, it's all about maintaining trust, relative transparency, and having a third-party oversight, which in this is the packers and stockyards.

[10]So, that's where ASTM comes into the picture, and with that background of technological innovation, discussion began actually back in 2001 about the need for development of standards, and it was a meeting that was initiated by packers and stockyards, but it brought together all of the stakeholders that would be impacted, and really, who better to assist in the development of standards than ASTM?

Formerly known as the American Society for Testing and Materials, if some of you are here from Pennsylvania and you know where West… is at, I had a hard time finding it the first time. It's almost as hard to find as it is to pronounce, but it's near Philadelphia, a really quaint little town, and that's where ASTM is based and where they develop standards for materials, product systems, and services. As you can see, they've been doing it for over one hundred years, and the organization is independent, and it's a not-for-profit corporation.

[11]I know you can't see this, but just to give you an idea of the flow, from their charter and by-laws at the top, it flows down to the board of directors, board committees, and then there are standing committees on operations and publications, and then down here at this level are the technical committees where committees such as F10 reside. That's where all of the grunt work is done to establish these standards. In the meantime, the ASTM has a president and a staff, and someone from this staff is assigned to every committee that is working on standards development, and Jim… has worked with us through practically all of our standards development. He has been a great help to us being sure that we stay on track with the ASTM principles.

[12]So, it provides a forum for producers, and when ASTM talks about producers, it's in a generic sense; those that manufacture… and not necessarily livestock producers, but then the users and consumers of those technologies and those with a general interest, whether it's government or academia, to bring those groups together and help to develop voluntary consensus standards. So, as you can see, there have been seventy-one volumes, and amazingly, they are adding ten thousand standards every year.

[13]This is from their catalogue, and just to give you a flavor for the areas in which ASTM has operated, if you look at the section titles there in orange, iron and steel, nonferrous metal, metal test methods and analytical procedures…

[14]…construction, petroleum products, paints…

[15]…plastics, rubbers, electrical installation and electronics, water and environmental technology, nuclear, solar, and geothermal energy…

[16]…medical devices, general methods, and then kind of a general category here where they maybe didn't know where to put some of the stuff, but that's where we wound up. It's kind of hard to find us, but we're way down here in Section 15, and it's hard to read so I'll read it to you. I'm not sure how we got in that category, but we are grouped with the – the first one is sensory evaluation. So, that kind of makes sense, but then, the other industries in that group are vacuum cleaners, security systems, and here's one that doesn't fit at all, detention and correctional facilities, food service equipment, and Homeland Security applications. So, as I indicated, not a lot of work had been done with the meat industry, but they found a place to put us.

[17]Looking at the diversity of representation within the F10 Committee, we started out with ten packers, seven vendors, NCBA, NPB, the Farm Bureau, and USDA GIPSA, AMS, and ARS and also universities; Texas A&M, CSU, the University of Nebraska at Lincoln, and Iowa State University, and hereto you can see that producers, that is the vendors, are represented as well as users and those with general interest, and as we go through and develop the standards, the steps were taken to be sure that voting is fairly represented across the different groups so that not one entity can have an undue affect on the outcome of votes.

[18]Officers are elected for two years, and again, just to point out here the diversity of representation, we have industry. We have the United States Department of Commerce-NIST, Jim Stouffer, who is here with us, on the equipment side, Joe Jury from the cattle feeding side, and Mark Nelson from the Farm Bureau.

[19]So, within the F10 Committee, we have five subcommittees dealing with design and construction, standard test materials, user requirements, development and

validation of prediction equations, and terminology.

[20]The first group, Generic Design Specifications for Equipment, deals with the indicators and recording elements. In other words, any of this technology has to meet certain requirements for having indicating and recording elements. There has to be specified units of measure, the temperature range across which the equipment will operate, and the ability to send an error when something is not working properly.

[21]Then, beyond the initial design criteria for the equipment, we have to have test methods for it. There has to be a reference material. The test method itself has to be repeatable, and there has to be a method of audit, obviously, or the test itself, and typically, this involves some kind of calibration object, whether that's a test block or a plastic pig or whatever form that takes, and there has to be a tolerance that's established that's acceptable for that test method, and then, the reference material itself needs to be verified by an independent third party.

[22]And then, user guides for the operators of the equipment; you have to determine whether an operator error is possible, and if so, what are the limits and how do you minimize that? How is the equipment installed, and how is it maintained, both by the maintenance department and by the day-to-day users of the equipment? The operator has to be trained. I know in our company we consider these skilled positions, and they are well up into the wage classification system for quality assurance technicians. Calibration has to be specified in terms of how often we do it, what's the method, and how is it documented, and then, quality assurance inspection of the use of the equipment. As we saw earlier, that control chart was just one example of monitoring what's going on with the equipment. So, all of these items are developed not in a vacuum but in concert with the vendor of the different technologies.

[23]Then, predictive accuracy is probably the standard that we struggled with the most because we were working on methods for data collection and analysis and looking at experimental design, proper representation of the variation and the population, repeatability and how would that best be determined in setting up regression equations or doing the experimental design, sample size and assessment of the variation in the population, and as we got into it, we came away with the conclusion that a statistician is strongly recommended for this part of the process, and the Committee doesn't mandate the endpoint, but it does specify that a standard procedure needs to be utilized for getting to those endpoints. Whether you are predicting the percent of lean meat in a carcass or the percent of saleable cuts or rib-eye area and those things will vary depending on how a company goes to market with their product, but you need to at least follow a standardized procedure to get there, and that's all in the standard, and again, we are not specifying that you have to have a minimum R2 of zero point nine or you have to meet a certain threshold for…, but again, it's all about following a logical procedure to get there.

[24]And at the end of the day, we had to have terminology as well for continuity, whether there's a common definition for terms that are used in more than one of these standards or if the term is used in a different sense than it is defined accordingly, according to that standard, because we learned that understanding is the key to useful standards.

[25]And just an example of one of the standards, this is the one we were just referring to on development and validation of prediction equations, and here, we talk about – the format is constant through the standards as we talk about scope, terminology, significance in use, and then the actual procedure itself, and you can see here where, in this particular standard anyway, we are referencing different statistical formulas as well as part of the standard.

[26]So, in summary, we developed consensus standards, and the word consensus is very, very important, for evaluation devices or systems for traits that are used to determine value. Another important part of what we were about was looking at technology that was involved in value determination, use in commerce. The Standards

are published by ASTM. Adoption is voluntary, but I would say strongly encouraged by industry or for industry. The NIST or National Institute of Standards and Technology part of the Department of Commerce is adopting these Standards in their Handbook 44, and then, once adopted, they will become the Bible for state weights and measures authorities just as the standard in Handbook 44 for correct weighment has become the Bible and the USDA's reference. So, packers and processors and the vendors are strongly encouraged to do a gap analysis to take a look at the technology currently in use in their business, in their company, their facilities and to do a gap analysis versus these F10 Standards for that particular technology. The F10 Committee will be ongoing and adapting to the development of new technologies.

[27]So, at this stage, we continue to work on dissemination of information about the Standards through trade associations, through publications, and through meetings such as this and encouraging folks in the industry to obtain the Standards through ASTM and to get going with that gap analysis. And just as a matter of interest for all of you, student memberships are available in ASTM. There is an area called Standards 101, which talks about how standards are developed, and even though you may not be personally involved in the F10 development, I think that just having a sense for how these standards are developed could be an asset to you in your own career development work as you go forward. So, I encourage you to take a look at the ASTM.org website.