UNITED STATES DEPARTMENT OF AGRICULTURE

FOOD SAFETY AND INSPECTION SERVICE

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ADVANCES IN POST-HARVEST INTERVENTIONS TO REDUCE *SALMONELLA* IN POULTRY

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The Loudermilk Center
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I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

(8:30 a.m.)

DR. ENGELJOHN: I'm Dr. Dan Engeljohn with the Food Safety and Inspection Service, and I'm going to facilitate this morning's presentation again.

We're going to get started and move through the six presentations that we have this morning. And I'll sort of gauge how you're all doing with regards to a need to take a break. But the intention is to do each of the six presentations, and then we'll have a break after that.

Our first speaker this morning is Dr. Richard Roop. He's senior vice president, science and regulatory affairs, with Tysons.

Correction here; I'm sorry. This is Dr. Robert O'Connor with Natural Chicken -- with the National Chicken Council. He has a veterinary degree from the University of Tennessee and a Master of Avian Medicine from the University of Georgia.

His work with the poultry industry has included laboratory diagnostics and production veterinary medicine, including breeders, hatcheries

and grow-out. Most recently, as the director of quality and food safety for a commercial broiler company, he's worked extensively with processing plants producing ready-to-cook chicken products. And controlling *Salmonella* is a special interest area for him.

So welcome very much, Dr. O'Connor.

DR. O'CONNOR: Thank you very much for that introduction. Can you all hear me? Yes? Okay.

I am from Foster Farms. Foster Farms is a long way away from here. Foster Farms is the largest producer of poultry on the west coast. I think some people think I work in Guam, but actually I am part of the United States. The challenges, I would say, that we face on the west coast really are not that different from what you face here in the epicenter of the industry, which is the southeast.

What I'm going to talk about today is a validation study that we did at one of our processing plants in California. And in this talk, I'll review, you know, what was the objective of this validation study; what were the methods used; what were the

results on a discrete step-by-step basis; and then what was the overall picture.

So really, just going straight to the objective, the objective really was to look at the process. And when I say the process, I'm really talking about first process or slaughter. And in that process, those steps that we felt could either reduce or eliminate or at least control microbes -- that's what we were trying to validate.

So we were looking at general microbial populations, your aerobic plate counts, your total coliforms, your *E. coli*'s. We were looking at *Salmonella* from a presence/absence standpoint. And we looked at *Campylobacter*, which --I have done other validation studies, but I had never looked at *Campylobacter*.

And in a way, I would say that I did this for this study in part because the district manager in California asked me. He wanted to know what about *Campylobacter*; what does your process do relative to *Campylobacter*. And since I really didn't have an answer, I said, Well, I'll just validate it. So I

added it to this validation study.

I will add, though, that looking at *Campylobacter* from an incidence and a numeration standpoint -- it does add a lot to the cost of a validation study like this. It was very costly to add *Campylobacter* to this study.

And that might -- I think it will make me in the future look at other validation studies and say, Can I use this validation study and extrapolate onto processes which are basically the same?

The other objective, I would say, in this study was to look at the individual intervention steps, the discrete steps, and say, you know, Are they working in and of themself, or are they not working? Or what do I get from looking at individual steps?

And then the last objective really is to just look at the overall process and say, Does it work or not with regards to pathogen control?

We didn't actually do the validation study. And by that, what I mean is I farmed the validation study out to a third-party laboratory, the Institute of Environmental Health. I had done two

other validation studies with this group. I was confident of their work.

Quite frankly, it's easier to have someone else come in on the graveyard shift and do the sampling with their team versus you up at 2:00 a.m. doing the sampling.

I think the design of the study -- I was very confident with Dr. Stopforth, the Ph.D. microbiologist who led the team, that we were scientifically based; we were statistically based. The 95 percent confidence interval was there.

So in a way, I think a validation study that's performed by a third-party lab in and of itself adds confidence for me to the result.

Really what they did is they came in for five different visits. And on each visit, they took these five discrete steps in first processing, and they sample. And they sampled at each step at each visit 15 pre and 15 post carcass samples. So over five visits, we had 75 pre and 75 post, for a total of 150 samples per step that we were validating.

The methodology they used involved carcass

rinses. And it was no different than that that would be used by the Agency when rinsing carcasses, looking at things like *Salmonella*.

In terms of the lab methodology, there was both enumeration, and there was incidence. So for the general microbes, your aerobes, your total coliforms and your *E. coli*, they did dilutions, and then they enumerated. For *Campylobacter*, they did the same thing. They diluted and enumerated.

For *Salmonella* and *Campylobacter*, they also did enrichment, prescreening, selective media, and then confirmation of culture results for positives.

So again, for *Salmonella*, there -- it was really two-pronged. We did both -- or not for *Salmonella*; I'm sorry. For *Salmonella*, it was strictly presence/absence. For general microbes, it was enumeration. And *Campylobacter* had both enumeration and presence/absence.

The next probably eight or so slides -- they're going to look very similar, so once you get used to the background, you'll understand what we're

looking at. Really what you have here is each of the discrete steps. And I look at it in terms of the first slide is the enumeration, and the second slide is the incidence.

So the first slide is always going to contain your general microbes and the lab value that we found pre and post. So this would be your pre and your post. Your *Campylobacter* is the light blue. And again, that's enumerated.

So I think one of the things you can see from this initial slide is our levels of general microbes. If I looked at just aerobes, it comes in a little bit -- about four and a half. And one of the interesting things, I think, for me to note -- because I really didn't know what it was going to look like -- is that the *Campylobacter* level at the New York was fairly low coming in. It was at half a log.

If I look at the discrete step and I say to myself, What effect did I have pre and post, I'd actually say, you know, I really can't speak to much elimination or reduction. I would say that I maintained control at each step at the New York wash.

The next slide is the same step. It's the New York wash. But here's I'm just looking at presence or absence of *Campylobacter* and *Salmonella*. So this is an interesting slide just to note that from an incidence standpoint, I came in at 46 percent positive for *Campylobacter* and about 30 percent positive for *Salmonella*.

There was a slight reduction of *Campylobacter* and about a 10 percent reduction for *Salmonella* at this step.

Okay. The next step, which if you really look at the process is pretty far down the line from New York wash -- because the next step is IOBW number 1. So you've gone through this evisceration. You've gone through inspection. You've gone through organ harvest. And now you're starting to clean the inside and the outside of the bird.

And I think one of the things to note is that I actually already have a reduction from even my post New York wash number. My post New York wash number was above log four, and now I'm below. So there are actually some actions and some steps that I

didn't measure, but they're taken in between the New York wash and the first inside/outside bird wash.

And what I would say those are is the many nozzles and rinses that we have of the evisceration equipment, as well as, you know, just focused washes on some of the carcasses. And those focused washes would be with chlorinated water of 20 to 50 parts per million.

The *Campylobacter* -- and I'm really -- that did not drop all that much from the post New York wash to this step. You're still at about half a log. At this particular step, if I look at it on its own, did I eliminate; reduce or maintain -- again, for the general microbes, I would say I just maintained, but I maintained at a lower level than what I was at at the New York wash.

And there was a slight reduction that you could measure of *Campylobacter* at this step. For incidence of *Campylobacter*, we went down about 10 percent. And the *Salmonella* was cut in half at this step from a presence/absence standpoint.

For the inside/outside bird wash number 2,

which was the third step that we validated, again, we maintained, I would say, in the general microbe area. And coming into this step, you can see that basically we were at zero for *Campylobacter*, and we maintained that.

From an incidence standpoint, presence/absence, we took the *Campylobacter* from 26 percent to 14 percent. And the *Salmonella* hovered between 2 and 5 percent, which essentially -- 2 and 5 percent really, in my book, is not that much different when I'm talking presence/absence.

The next step is the online reprocessing cabinet. And we did use trisodium phosphate in this cabinet. If you look at the enumeration numbers for microbes, this is actually where I can say you start to really see a decline in a discrete step. For *Campylobacter*, we maintained it at or close to zero.

Now, this is an interesting slide, because I think this speaks to the idea of enumeration versus presence/absence. If you remember, the *Campylobacter* incidence at the inside/outside bird washing were 2. Post that step, it was 14 percent.

Well, if I just look at incidence here, we're at 32 percent. So we might say, Well, what happened between IOBW number 2 and your online reprocessing cabinet? And that is the question that I asked when I saw this.

And I think I can answer that question, I guess, theoretically by saying when I look at incidence, presence or absence, I'm really only looking -- do I have the presence of one cell or maybe a hundred cells. I don't really know.

So what I really turned to was the enumeration data. And the enumeration data -- I'm sorry. The enumeration data for *Campylobacter* showed me that I had an extremely low level, and I maintained it in the OLR cabinet.

So from that standpoint, I was satisfied that there really wasn't an issue here, that looking at incidence, you know, might not be as all-telling as I might look at it if that's the only information I had.

From a *Salmonella* standpoint, incidence-wise, I reduced it from 16 percent to 4 percent.

And the last step, really, that we looked at was the chiller. And this was a chiller that used chlorine and CO2 for acidification. And again, here with the general microbes, you actually do see a decline in the chiller. So I can say I had reduction of about a half log here in the chiller. And again, the *Campylobacter* was maintained at or very close to zero.

And interestingly enough, if I look at my incidence now for *Campylobacter*, you know, I'm at 23 percent, and I drop to 14 percent. And I'm at 6 percent for *Salmonella* and drop to 3 percent. I would still -- even those -- even though these numbers look very good for *Campylobacter*, I still think those numbers for enumeration tell me the story I want to hear, which is that I'm practically zero coming out of the chiller.

This is really the last slide, which I would say speaks to the idea of a multiple-hurdle approach, because this is the whole picture from New York wash through the chiller exit. But this is also a slide you have to have a little explanation for.

Because this number here, these data points, they represent pre New York wash. And then the data points that follow -- they really represent the post New York wash sample combined with the pre sample of the next step.

The solid lines represent your enumeration, and the dotted lines represent your incidence. So if I just look at my solid lines, I'm very satisfied with kind of a long gradual decline, you know, from here to here. If I look at my incidence curves, I do have some jogs upward here, you know, downstream in the process.

But again, I kind of go back to the idea that, you know, if this is my *Campylobacter* incidence, this is my *Campylobacter* enumeration. And even though I have a slight jog upward here, I'm maintaining control. So really, to me, what this slide tells me is that my overall process, just by the pattern of decline, is in control.

And if I were to look at it from an enumeration standpoint, my *Campylobacter* numbers are very good as we go through this process.

And I will probably use my general microbes as a proxy to my *Salmonella*, because I did not enumerate *Salmonella*. But I've got *E. coli*; I've got total coliforms in there, and I think I can use those graphs or those lines as a proxy.

So in conclusion, for this study I feel what we did is we validated -- we did validate changes. We validated reductions in microbes of log one and a half to two and a half. So I had over 95 percent reduction in my general microbes.

My *Salmonella* incidence dropped from 30 to 3 percent, so that's very good. And for *Campylobacter*, which -- again, that was sort of a point of interest for this study. I went from 46 percent to 14 percent if I'm going to put an emphasis on incidence.

And I think this number is fairly accurate, because if you look at U.S. Poultry and Egg, their survey which they're doing of the entire industry -- and they are including *Campylobacter* -- their chiller eggs incidence number runs about 20 percent, I believe. So this 14 percent is in about

that range.

And in terms of load, what I saw was much less of a load coming in than I expected, but we maintained and really reduced that load. And I think that's a good thing.

I think individual interventions -- I think they're very important to look at. But what I saw was that up-front, you more or less plateaued. And your declines really occurred further out in the process, at the OLR cabinet and the chiller.

But I think overall, the biggest picture, you know, to look at is that last slide -- and to look at the pattern of that slide. And I think when you walk away from the pattern of that slide, that's when you really say, Do you have the process in control or not?

And I think from this validation study, I would say that, you know, in that plant the process is under control for pathogen reduction.

So appreciate the time, and I'll answer questions at the question and answer period.

(Applause.)

DR. ENGELJOHN: Thank you very much, Robert. That was excellent in terms of providing some perspective of how to conduct a validation study and demonstrate that a processing operation works and where actually interventions are in fact effective.

Now Richard Roop will present. He's senior vice president of Tyson Foods. He's out of Springdale, Arkansas. And his role is with food safety, quality assurance, regulatory compliance, laboratory services, statistics, consumer relations, and animal welfare.

Welcome.

DR. ROOP: Thank you very much. I had the honor of speaking about fecal contamination today. And fortunately for me, several folks have already mentioned some of the studies that I'll reference in my talk, and so you'll see a couple of the same citations in my talk that you saw earlier.

The first thing I want to do is clarify what this is. This is a presentation assessing the relationship between pre-chill visible fecal contamination and the incidence of *Salmonella* on post-

chill carcasses.

What this is not. This is not a criticism of FSIS's original HACCP expectations or requirements relative to visible fecal material. And it is not a presentation recommending the elimination of zero-tolerance standard for visible fecal contamination.

The final rule, which went into effect May 5, 1997, was published in the Federal Register in February 1997. And a couple excerpts from that final rule -- said that this zero-tolerance policy for visible fecal contamination is an important food-safety standard, because fecal contamination is a major vehicle for spreading pathogenic organisms such as *Salmonella* to raw poultry.

It further went on to say that fecal contamination is a reliable indicator of the likely presence of microbial pathogens, a food-safety hazard which all slaughtering establishments will necessarily address in their HACCP plans.

Additionally, critical control points to eliminate visible fecal contamination are predictable and essential components of the HACCP plan for all

slaughter establishments. For establishments' HACCP plans to be validated, they will have to achieve a zero tolerance for visible -- excuse me; a zero tolerance for visible fecal contamination at the point where carcasses enter the chiller.

Well, let me explain why this is important. In 1975, Blankenship did a study comparing the microbial quality of inspection-passed carcasses and condemned broiler carcasses. And his conclusion was, our results also suggest that *Salmonella* incidence associated with fecal contamination is no greater among contaminated carcasses processed through the final washer than it is for inspection-passed carcasses.

Dr. Jones from the University of Arkansas conducted a broiler study. It was actually done between February and May 1998. It consisted of 14 processing plants from 3 separate integrators. And during this study, he looked at the relationship of *E. coli*, *Salmonella*, fecal-compliance citations and NRs.

Well, I have one slight correction. N was not a hundred. N was 1889, and there were a hundred

positives for *Salmonella*. The data was -- the *E. coli* counts in isolation and the *Salmonella* were all done using USDA methods, and they were aggregated and analyzed using SAS.

I've boiled the data down to one very simple slide here looking at the correlation between percent salmonella incidence, NRs for fecal contamination, and average *E. coli*. And the correlation between *Salmonella* and fecal contamination was .094, and for *E. coli* it was .102.

And for those of you that are not familiar with correlations, a perfect correlation is 1, and absolutely no correlation is zero. So the conclusion Dr. Jones made was that these data indicate the parameters have virtually no correlation with each other.

A notice was published in the Federal Register in 1997, and this is a quote from that notice. And I just wanted to highlight the one sentence here that preparation for implementation of HACCP system regulations has not changed the Agency's conclusions about the appropriateness of this standard

under the FMIA as well as PPIA.

In fairness to FSIS, this came out before Dr. Jones's study was published. But the point I want to make here is that these regulations and notices were out there. And obviously industry began implementing CCPs for zero tolerance.

So in January, all broiler establishments entered the HACCP era with a CCP for zero tolerance for fecal prior to the chiller. At that time, *Salmonella* numbers across the industry appeared to be trending downward.

And then in 1999, or about a year after the implementation of the CCP for zero tolerance, NRs for zero-tolerance deviations appeared to be trending downward, which makes sense. It got a lot of attention.

So people therefore concluded that the enforcement of zero tolerance, the resulting regulatory enforcement actions and the industry attention, was having the desired effect on broiler-carcass contamination.

But then something happened, as we all

know, and we saw a trend upward in *Salmonella* contamination. In 1994, a very large spike in *Salmonella* -- and everyone started scrambling for answers. So we initiated another study of the data -- this was a non-published study, by the way -- looking at zero tolerance and *Salmonella* percentages post-chill.

We looked at the data from 36 different processing plants for zero-tolerance failures from 1998 through 2005. And as you can see, the zero-tolerance failures did drop, and they pretty much leveled out. There's a slight increase there, but it's not statistically significant.

Same time period, *Salmonella*'s trending upward. Now, intuitively you'd say there's a correlation there, a negative correlation. Well, we ran the stats on that. And of course, these are the same charts just blended together.

We ran the stats on that and found that in three of the plants, there indeed was a negative significant correlation between *Salmonella* incidence and zero tolerance. Eighteen plants had a negative

correlation, but it was not significant. Twelve had a positive correlation, but it was not significant. And three had a positive significant correlation.

So what does that tell you? It's pretty random. And overall, statistically, there's no significant correlation between zero tolerance and *Salmonella* contamination.

So we concluded from this study that zero-tolerance failures -- we learned that they decreased about one zero tolerance per plant per year from the time the standard was set. But we also know that *Salmonella* increased since the year 2000. *Salmonella* percentages and zero-tolerance failures are not significantly positively related.

At about the same time, Cason published his article concluding the same thing on the effect of pre-chill fecal contamination on numbers of bacteria recovered from broiler-chicken carcasses, saying that bacterial counts on fecally contaminated carcasses halves were not different from paired non-contaminated carcasses after chilling.

So what's the overall conclusion here?

Well, *Salmonella* can and does reside in broiler feces, hence the FSIS's position on zero tolerance. However, the level of contamination is not significant enough to increase *Salmonella* incidence, or the process is adequate to reduce the level of contamination to that of non-contaminated carcasses.

I think the most important conclusion here is that it's important to focus on visible fecal contamination from a quality and a regulatory standpoint, but don't focus on visible fecal contamination in an effort to reduce *Salmonella*. Thank you.

(Applause.)

DR. ENGELJOHN: Thank you, Richard, very much. That was very telling and has a very important message in for everyone to actually hear and take account of. So I think we, the Agency, also are very interested in your presentation.

Our next speaker is Dane Bernard. Dane is the vice president of food quality and quality assurance at Keystone Foods. Dane's going to talk to us about process mapping in poultry slaughter systems.

Just a note about Dane's background. I worked with Dane quite a bit on the National Advisory Committee for Microbiological Criteria for Foods. And prior to his work at Keystone, Dane was an officer with for food safety at the National Food Processors Association.

So thank you, Dane. Welcome.

MR. BERNARD: Thanks, Dan. And thanks to FSIS for organizing this meeting. I think it has been very timely and informative. And Dan, if you ever get tired of regulatory writing, I think you have a career in MC'ing. You've been doing a super job.

I was asked to talk on process mapping in poultry slaughter systems in support of multiple-hurdle approach to achieving microbiological results. It's a lot of words there. But I think the bottom line is if you listened closely to Bob O'Connor's talk, which was an excellent depiction of how this works, there's really very little else for me to say. But I have 15 minutes, so I'm going to spend it anyway.

What's a hurdle? This is a term that's

been around in certain areas of microbiology for some time. It's rather poorly defined. But as applied in this case, it's a barrier to microbial growth or a way of killing or removing microorganisms.

It's in fact everything lumped into one general term. Kill them, keep them from getting worse, keep them from being there in the first place. All of those would qualify as what a hurdle does.

And multiple hurdles basically is what you do when you have a -- when you have no single intervention that can get you where you want to be. And we have no single intervention that we have found in the poultry industry that will get us into the zone where we want to be with *Salmonella* and other pathogens that may be there.

So it is in fact an approach which -- to get the kind of control -- the level of control that we need, we have to look at the entire process and use all the tools that may be at hand.

And so my definition -- since I could not find any that would fit, I made something up, as I normally do. Intervention. I would prefer to have

interventions defined as a specific treatment that we apply to produce a measurable level of reduction in the population of a target microorganism. It is something that we do -- a process that we intend to achieve a reduction with.

Well, on the other hand, a hurdle may be a step in the process that minimized contamination or reduces or prevents a situation from getting worse. Interventions would be hurdles. Hurdles would not necessarily be interventions.

Process mapping or line profiling. Well, what are we talking about there? It's sampling at selected points in the process where contamination levels can be assessed for the purpose of measuring microbiological status of birds against a specific target organism or class of organisms.

So what I'm going to present in terms of the actual information is based on data gathered by multiple companies in multiple facilities, each facility with multiple lines. And I want to thank the companies, most of whom -- who are here, for contributing data to this presentation. It came to me

in a blinded form, so I don't know whose data was whose.

And it also came to me in various different ways. Certain companies averaged their data. Some companies sent broad data tables. Some sent charts that I had to pick points off of. And some sent very detailed graphs.

So it was a bit of a challenge to look through that and decide how to bring this to you. So because of the differences in the studies and because of the differences that you'll see in the data, all I can bring you today as a result of those studies is some very general parameters.

But the point of the presentation is not to give you information in terms of the -- we've solved the issues, and this is what this step does, and this is what that step does. The point of the presentation is to introduce to those who are not already -- not introduced to this concept a tool that can help you assess your operation and a tool that can be used to judge improvements in an operation and determine where to go.

These are the sampling points that -- this is a composite of all the sampling points that were presented to me pre scald. And this is an interesting one where the bird, feathers on, is whole-rinsed. Post scald, obviously after the scalder, again, a feathers-on whole-bird rinse.

Post picking. Post washing. Post rehang. Post evisceration. Pre cropper. Pre inside/outside bird wash. Post inside/outside bird wash. And most plants have two IOBWs in line. Some plants actually sample in between IOBW 1 and 2, but the data that is going to be shown later is after IOBW number 2.

Post online reprocessing. Post chiller. Certain plants submitted data on chiller water, and some that had after-chiller intervention submitted data taken on birds rinsed after the post chill interventions.

The three that are here in yellow are the common sites that all companies sampled. And -- but the rest of them were not sampled by every company involved in submitting data for this presentation.

The organisms tested for. Everybody did

test for *Salmonella*, and that was a presence/absence test in all cases. Everybody did test for *E. coli*, and that was an enumerative test. Other organisms include total coliforms, aerobic plate count, and *Campylobacter*. And some enumeration on *Campylobacter*, some positive/negative on campy. Excuse me.

And as I said, the common organisms that everybody tested for was *Salmonella* and *E. coli*, and those are the ones that I'm going to talk about as we go forward.

The interventions used in these multiple plants included -- and nobody obviously used all of these in any one plant. Some used a combination. Some did not. FreshFX. And I'm sorry; I don't know what chemical compound that is. I went to the website, could not find that. So I'm not familiar with that one.

Chlorine dioxide. Cecure, which is, we've heard yesterday, the cetylpyridinium chloride. Sanova, which is acidified sodium chlorite. Inspexx, which is peroxyacetic acid-based antimicrobial. Chlorine in the 20 to 50 parts-per-million range. And

acidification using sodium acid sulphate to reduce the pH to six and a half in combination with free available chlorine in the three and a half to five parts-per-million range in chillers.

And I'm sure I've probably left some out. So if my colleagues who are here want to comment on their own operations in terms of interventions, certainly you're welcome to do so. But from the data that I had, this was as close as I could come to the interventions that were in use.

So with the differences that were seen plant to plant, I'm not going to attempt to draw any overall conclusions regarding process capabilities. By the way, no data was submitted regarding quality aspects of using any one of the particular antimicrobials, so I have no information to share with you in terms of the quality effects of any of these antimicrobials.

The data. You know, after looking through tables and tables, I wish I could bring to you a succinct presentation that had more interpretation to it. But the best I could do was put the minimum and

maximum ranges that I found from all the studies at each of the sampling points where there was sufficient data to report.

I did not include in the charts any data point which had less than four sets of data submitted with it. I did not report on any data-sampling point where only one company submitted data from that sampling point. So the number of sampling points that you see here is not as comprehensive as the list I showed you earlier, but the difference is because of the data gaps that were there.

It would be a misinterpretation of the data to look at the maximums on *Salmonella* and say that nothing happens before the online-reprocessing step. If you look at the maximums only, you may get that impression. But if you look at the minimum, clearly there is some things going on earlier than the online reprocessing.

And if you remember the data curve that Bob showed you in his presentation, you'll remember that he did show a steady decline across the process. And in fact, most plants' data did show a steady

decline across the processing steps. And there are a couple of exceptions that I will talk about earlier.

This is the number of plants that were included in that particular data point. I'll call your attention to this one, post wash. We had one outlaw plant that -- the first sampling point they listed was post wash, and they came in at 7 percent. And that's the lowest. And of course that lowered the curve on the rest of us. But it is there, and it is what it is.

I will say that most of the other plants would have been somewhere in here, with some exceptions. Obviously, we had one or two that were well above that. But most of the plants were kind of in the 10 to 20 percent range at that particular point.

Post inside/inside bird washer. Again, I ask you not to interpret these points as being industry averages. They simply are not.

Okay. Moving along. A lot of *E. coli* counts, minimum and maximum log *E. coli* counts. Bob did a very good job of explaining to you the

differences that you can see when you're looking at percent prevalence, which we had on *Salmonella* which was in the graph before, versus counts.

You'll see a steadier decline in count reductions on those organisms that we can enumerate than you're going to see with the percentages as we do on the prevalence data with *Salmonella*. I did not put a graph together, a line graph on the *Salmonella*, simply because it would have been a misrepresentation of the data.

The *E. coli* counts, on the other hand, seem to show more of a pattern of a steady decline across the process. And again, you can look at the minimum and maximum log counts that we saw here. And in most cases, we were getting down to very decent levels here at online reprocessing.

And I apologize that these lines are probably not very visible to those of you in the back. My inability to enhance lines in Excel is the problem here, not the data. But I did put a graph on the data from the previous slide just to give you an idea that even when you agglomerate data, as I had to do here,

you're seeing a steady decline across the process.

On an individual-plant basis, you'll see data, like as Bob presented to you earlier, that'll show you a much more clear picture of the lines.

So why go to all this trouble? And I know that my poultry colleagues have probably already tired of hearing the beef analogy, but for those of us who wear both hats and went through, quite a bit the same issue with beef.

We found on the beef side that the next intervention came along, and we were under pressure to do improvements, and we would put it in. And it's kind of like cocking the shotgun and firing off, and you hope you hit it. And sometimes we did, and sometimes we didn't.

And it really was not until we began to do this type of study in the beef industry that we began to have a baseline by which we could judge the effectiveness of the interventions, by which we could judge whether the interventions were themselves not working or whether it was a certain other part of the process before the intervention that wasn't working.

And it was said yesterday that none of the interventions will give you a complete reduction in microorganisms. And it was said yesterday that if you overload an intervention by feeding to it too many organisms, it won't work as well.

And until you do the line mapping, you don't know how one step is affecting the next which is affecting the next. So process mapping provides the baseline for assessing microbiological impact of any anticipated changes that you may want to make.

I will also show areas where immediate improvements can be made. If you go in and you know something should be performing better than it is because it's designed to perform better than it is, and it simply isn't, then you have a basis to go in and take a look at that particular step in the process. And it'll also provide a basis for judging the effect of individual process adjustments.

In summary, some preliminary observations on the data. No one intervention was universally effective. We still have a good deal of unexplained -- but I do not personally think it is

unexplainable -- variation in processed birds.

Obviously we have some variability in the birds themselves and some variably in the processes that we have yet to define. But I -- as I said, I think with more data we will find out that those are definable.

In general, *Salmonella*, *E. coli*, coliforms, campy and the aerobic plate counts declined throughout the slaughter process with two notable exceptions. We've already heard about picking, and I think it was fairly uniform that counts and things went back up at picking. Some in certain areas -- they seemed to go up more than others. But it's a continuing opportunity.

And I -- after yesterday's rather pointed questions on water chilling, I wish I hadn't put this one in there, but it's a reflection of the data. It is not universal in the data that chilling seemed to cause counts to go back up or contamination back up, but it was there probably more frequently than I would have expected at this point in time.

And I think we know how to manage chillers

better than we ever have. And it's just a reminder to my industry colleagues not to take our ball -- our eye off the ball relative to this particular processing step.

I urge you to have caution when comparing *Salmonella* prevalence to reductions in counts of other indicators. Bob's already covered this very well. But we need an inexpensive way to enumerate *Salmonella*. It would help us a great deal.

Right now, using the MPN method, it costs about 200 to $300 per sample to do a good *Salmonella* enumeration. It simply doesn't lend itself to the type of online controls or quick turnaround that we would like to have to be able to better assess our process. And I know there are some methodologies on the horizon. We look forward to those.

And for my micro colleagues, I apologize for this stand-in enterobacter here. I know that you all realize that's an 0157:H7 instead of a *Salmonella*, but I just simply didn't have a *Salmonella* to plug in there when I needed it at midnight. So thank you very much.

(Applause.)

DR. ENGELJOHN: Thank you, Dane. That was very informative as well.

Our next speaker is Dr. Bruce Stewart-Brown. He's vice president of Food Safety and Quality for Perdue Farms. He's had experience with the poultry vaccine industry -- and as well as fine-tuning health programs for Cornish, broiler, roaster and primary-breeder operations.

Since '99, being at Perdue, he's coordinated health programs for all operations and is responsible for company-wide activities at Perdue.

Welcome.

DR. STEWART-BROWN: It's nice to be here. If I was to say in my way of thinking what we're trying to do or trying to figure out is we need four or five ways in the plant to get a 50 percent reduction. And let's say you bring a hundred percent on -- in on feathers, which -- I'd like that not to be the case. We're working hard for that not to be the case.

But having said that, when we've looked at

the live-sign operations and looked at ceca in the chicken house, we have some operations that run close to 10 percent positive ceca in the birds in the chicken houses. That's low. That's really low.

And where only 30 percent of those houses are positive for *Salmonella* at processing -- and yet, when they go to the processing plant and you do the feather rinse pre-scald, they're a hundred percent positive on the feathers.

Now, I would say average in the ceca and the -- in the chicken house might run about 40 percent positive ceca, at least in our experience. Now, I'd rather take the 10 percent positive ceca, even if I'm going to get a hundred percent positive feathers, because I think the interventions will work better, because I would guess through enumeration you'd understand that there's less *Salmonella* they're going to have to deal with.

But let's say we don't have enumeration right now, and we have strictly this yes/no. You've got a hundred percent positive feathers or 90 percent positive feathers. Let's say you got four 50 percent

reductions. Well, that's a hundred to a 50. That's one. Fifty to 25. That's two. Twenty-five to 12 and a half. That's three. Twelve and a half to six and a quarter. That's four.

That -- six and a quarter percent with four 50 percent reductions. Another one gives you three and an eighth. That's assuming you have nothing in the process that made it go up. Let's say that we understand from picking you're probably going to have a 50 percent increase or could have a 50 percent increase.

Now, if you were hoping you had four and knew you had four, but you got this picker, you better get the fifth. So if you said of all the stuff that everybody's talked about this morning, done really well, worked really hard on this mapping -- we need five places to get 50 percent reductions in *Salmonella* to be at three and a quarter or six and -- three and an eighth or six and a quarter, something like that.

And that's probably a big stretch with all the mathematics and stuff. But once you look at the mapping, I think you'll start to think like that. I

need some places where I get 50 percent drops. How many do I have?

Well, we talked about these quite a bit, all these processes, and these talks flow really well. A lot of us worked hard, threw our data into a big pot, tried to work on exactly what we can get done, scald or pick or New York, rehang, IOBWs, OLRs, chillers and post-chill dip or spray.

So of all those places, I want nothing that goes up, and I want four or five places where it drops in half.

If you said, though, really, of these, how many do I really have designated process control for *Salmonella* -- I got a lot of process control for temperature. I got a lot of process control for fecal -- presence or absence of fecal or ingesta.

But if you said how many have I really worked out the process control processes -- and do I measure them and do corrective actions on -- as it relates to *Salmonella*, well, it's a little bit disappointing in the end.

And I would say I believe some of us have

it in other places, but the places where we got it the most are OLR and perhaps on the post-chill dip or spray. We have a thing we can measure that makes us comfortable that that will give us that 50 percent reduction.

Now, some of you might say, Well, I think some of those interventions might give us more than 50 percent reduction at times. Well, they might, but if you said I want it consistently; I want it all the time; I want it to be dependable as much or all the time as I can have, then I think a 50 percent reduction is probably asking the right question. To ask for something more than that's probably not dependable over time.

So why is it that that's all we know? Well, first of all, I'm saying why is it that we only know real good process control for OLR post chill? Well, one is it's microbiology. And when you get into it -- as Dane and Bob and Rick have put some numbers -- and I know numbers were put up yesterday also.

There's a lot of variation once you get

into it. You have to do multiple days, multiple time periods. Your process -- to get an idea of how the process performs, it takes quite a lot of dedication of time and resources. And you got to be prepared to knock it with numbers to get the variation such that you can understand it.

Every plant's different. Everybody knows -- I'm sure all of you know that a plant as it was designed when it was built is phenomenally different than how it's done today. Matter of fact, if you go in today and then come back in six months, how many of you would say that the plant's probably made a few changes since then?

I know in my experience you have got to stay after it to understand all the changes that might go on in a period of time. And process controls in place are generally aimed at things that we've aimed at because of good reasons in the past, which are temperature and fecal and ingesta and those kinds of things.

So what needs to be done? We need to identify the potential variables. That's been

described in a number of different talks -- develop a dependable way to measure them.

Dependable. That's a -- it doesn't mean we're having somebody run out and put, for instance, chlorine -- the best way is not generally to run out and run a paper test every so often. Although the state of the art of chlorine measuring and different ways has got to go so that we can depend on the data and get it on a routine basis.

Measure all the variables. But one of the things that really frustrate our folks, as you guys know, is that if you say, Here's all the things that are important; measure them all, and I want to know if we ever deviate off what all this list -- is what -- I'm going to give you a laundry list of things I think we need to do and then make sure it's all there.

Well, in fact, there's a few of those that are more important than others, and we need to know which ones those are. And then we of course need to implement it.

How variable is it? I took some of the data that Dane presented and did it a little different

way. And I said, I'm going to take ten scalders, six pickers, 12 IOBWs, 12 OLRs, 60 birds in a line, 60 birds before they go through that, and 60 birds after, spread over five days. So ten -- six sets of ten. Do yes/no on *Salmonella*.

And what you see is -- I need to take a second to explain this. This means that there's a *Salmonella* reduction of 75 percent or more. So the *Salmonella* went down that much. If it went this way, the *Salmonella* increased to a hundred percent. So if it was 20, it went up to 40. If it was 50, it went up to a hundred or more.

These are the interventions I picked to put on this to show you how this might look. And OLR cabinet -- and these are the number of those OLR cabinets that performed at that level of *Salmonella* reduction or increase.

Well, here's one OLR cabinet that's relatively disappointing, between 25 and 50 percent reduction. Here's nine OLR cabinets giving me what I would hope is at least a 50 percent reduction.

The variability of these scalders is

disappointing, because I need the scalder to give me a 50 percent reduction. And yet I got two up here that are not doing anything. If anything, they're going to the high side. I got one phenomenal one down here giving me a better than 75 percent reduction. I've got too much variation in these scalders.

I got pickers increasing it, of course, and you've heard that before. I got one picker 75 percent to a hundred. Now, one of the things is I had to pull some pickers out, because it's not fair to say a picker kept it even if it went in at a hundred and came out at a hundred.

That would have said the picker didn't add to it. Well, I wouldn't say that picker's doing a great job because it kept it at a hundred. So I had to take out some pickers that showed you gave a decent number going in.

So let's say a scalder's working good. You're going 40 percent into the picker. Well, a good scalder -- a great scalder, in my mind, would have kept it at 40. That would be awesome. I'd like some scalders that would keep -- I'm sorry; pickers that

would keep it at 40.

For instance, if you -- here's my comment overall. I think if we're going to get five things that cause a 50 percent reduction -- I like the opportunity. I think we've got the processes for scalders. I think we got a good OLR opportunity. That's a relatively good one to do.

Chillers. We do know enough about chillers. However, every chiller you get into's way different. And I don't think that we're defining enough of the variables associated with chillers to make them dependably give you a 50 percent reduction day to day. We've got a lot of work to do to get that done.

So scalders, OLR, chillers. One of the underutilized or -- we need IOBWs to give us a 50 percent reduction. And if you said, How is IOBW going to give you a 50 percent reduction -- well, we've got to get away from the current control process which might be -- zero fecal and maybe chlorine are the two things that judge an IOBW's success or failure.

And if you look at why a plant messes with

an IOBW, why we mess with an IOBW, it's because it's not doing what we want it to do generally on a fecal issue. You change the nozzles, change the pressure maybe. But what we end up monitoring is basically success on fecal and maybe chlorine.

What it could be is chlorine level, how much water at what pressure with what spray pattern at what capture rate and how much coverage. A lot of details to get to on IOBWs to make them a successful 50 percent reduction tool.

I think they can do it, but I don't think they can do it just looking at process control that's up in this area.

I did this just for fun. If you said -- took all those plants and give me the best of -- I want the best scalder, picker, New York dress, IOBW, OLR, chiller, post chill. Well, they happen to -- unfortunately, there are none in the right -- they're all over the place.

So I took -- I had to pull it from plant 1, plant 2, plant 3. Actually, plant 3 had two of the best. Plant 4's got the best OLR. Plant 2 is here on

picker and chiller. And post chill on plant 5. Well, we got 82 percent reduction in that scalder. I want more of those.

This is the best we can expect from a picker, unfortunately. We got work to do on pickers as an industry to get pickers to stay -- could they at least keep it even? That would be awesome.

New York dress. I don't know what to expect from New York dress, but I need something to come from New York dress. I believe we need something to come from New York dress. Well, at least in this case, down 33 percent.

IOBWs got to do better consistently. OLR good. Chiller good. Can be all these real good -- that'll get you to zero percent if you had the best of. Matter of fact, you don't need all that to get some pretty awesome numbers.

Unfortunately, I don't have all this in one plant. I'm not sure exactly how to reproduce it. But that's what I would call this best-of action plan, which is if you don't know all the process control things you need to do, one of the things is

you go judge them all.

Go judge and find what works the best. Then define that. Then take that definition and move it around. And that's what we as an industry are trying to work on. It's frustrating. It takes a lot of time. You got to do a lot of numbers.

You got to work together really hard, because somebody's best of is -- not everybody has best of every piece of that. It takes a lot of work to find that. So find the best, move it around, put process control in place that assures it stays in control, check it, verify it, adjust the process control through continuous learning.

And I can guarantee you once you get it defined, you will get the process control in place. And you guys all know this. The plant for good reasons will change process. That means that whole thing has got to go again, because something that was best of now becomes average, because a change was made in the process for good reasons.

It just means it's a really ongoing energy-sapping resource-depending activity. But all

real good work. I'm for it.

Basically, that -- the message is we need four -- at least four, if not five, 50 percent reductions. We need to figure out how we can get rid of any place where it goes up. We need to find best of, define it, move it around, talk to each other about it, get more of those going. We'll be successful with that.

(Applause.)

DR. ENGELJOHN: Thank you very much. It was very informative.

We have a change in the program. Dr. Beth Krushinskie was supposed to come and make a presentation on *Salmonella* interventions in the U.S. broiler industries, but we are aware that she had a conflict which was not timely in the sense that she really needed to take care of the other issue.

And so today we have a stand-in who's capable of presenting the information that Beth was going to present. We have John Rice. John is with Sanderson Farms. And he's a native of Georgia, a graduate of University of Georgia and Clemson

University. He's out of Mississippi. And he's responsible for quality assurance, food safety, and laboratory operations.

Welcome, and thank you, John.

DR. RICE: Thank you, Dan.

Well, if I'd known I was going to present this talk, I might have packed a tie and might have packed a razor. Those that really know me well know I might have worn the tie, but I wouldn't have used the razor.

Anyway, this presentation -- I had the opportunity to look it over once last night. But this is a survey that was done of the industry. It was voluntary. And Beth is just summarizing the results here. If there's any conflict between what I'm saying and what you're reading, take what you're reading as the gospel truth, because I might misinterpret something.

So we got to look at the -- we're going to have an overview, look at some results and industry comments that were made -- and also a summary there.

This is a long ways from being a

scientific survey, because it was voluntary, and it is not statistically valid, not a random sample, because only the results we have -- are those that voluntarily responded.

Is it meaningful? Yes, probably it is, because I feel like we got comments from people that were using things that they thought were effective. And also, we got some comments from people that were using things that they felt were maybe not quite so effective. But it does pretty well represent the common practices that are currently being used in the broiler industry in the States.

Now, this did cover a hundred broiler-processing facilities, eight integrated companies. And we had five treatment points that were mentioned, the pre-scald brushes to remove debris, online reprocessing, the chiller, the chiller acidification, and post-chill treatments.

First question was do you have an antimicrobial intervention at any of these locations. And the answers were, in most case, yes. And here are the percentages where there was *Salmonella*

intervention in place of these hundred plants.

At 18, they had something at the scalder. Eighty-six had online reprocessing. Ninety-three had some intervention at the chiller. Twenty-one had an acidification program for the chiller. And 12 had some type of post-chill treatment.

All right. If so, what product or what compound are you using as your intervention? In the scalder, we had two things mentioned. One of hypochlorous acid, and the other was sodium hydroxide to raise the pH.

And I really don't have any information as to exactly what reduction you would get with sodium hydroxide raising the pH. I have heard that you need to get the pH up to about 8.5 or 9 to have an effect. And of course, we did have a mention earlier yesterday about a low pH having an effect. So either a very high or a low pH may have an effect.

And then also we had some comments that we used in sodium hydroxide in the scalder --

Now, scalder interventions. Out of 18 that had, we had half of use using hypochlorous acid

and half using sodium hydroxide.

The online reprocessing. As you're aware, there are a lot of compounds that have been approved by USDA for this purpose. And I'm not going to go through and read all these to you, because they've already been mentioned previously.

Here is the -- there' the incidence of the different types of online-reprocessing interventions. The most popular has been sodium chloride, followed by TSP, chlorine dioxide, and hypochlorous acid. And then you get into the rest of them that have been used in just a few plants.

And then we looked into the chemicals that are used in the chiller itself as antimicrobials. There are five products mentioned, bromine, chlorine dioxide, hypochlorous acids, monochloramine, and peracetic acids.

And this is showing the number of plants that are using each of these compounds. By far, the majority of plants, 72 out of 93, were using hypochlorous acid in the chiller, followed by 18 using peracetic acid.

And then we get into chiller acidifiers to reduce the pH to make the chlorine more effective. Had two mentioned, carbon dioxide and citric acid. And I -- in addition, I know of at least one other plant in the country that is using food-grade sulfuric acid to reduce the pH of their water.

This is a situation where their -- they've got a lot of dissolved solvents in the water, and the water's very hard. And it is work -- with the university to determine what would be the best. And they did look at chlorine dioxide. They did look at citric acid. But they decided that sulfuric acid would work better. And the result at that plant is -- I 've been told have been very good.

And here, of these plants that are acidifying the chiller, most of them are using CO2, in fact, 90 of those. And then ten were using citric acid.

Post-chill treatments. We have three compounds mentioned here, acidified sodium chlorite, chlorine dioxide, and hypochlorous acids. Well, here is the numbers of plants that are using these. Most

of the plants -- 67 that are using sodium chlorite, 25 using chlorine dioxide. And I believe this is eight using hypochlorous acids.

Third question we had. What are your overall impressions of the efficacy of these interventions? Several comments. It is difficult to say which are most effective or least effective because of the many variables in the plant that affect performance.

And this includes seasonality. It includes the incoming load on the bird, which we still don't have a really good way to measure. Water quality and also the different types of equipment that Bruce Stewart-Brown was talking about -- that you don't always have the best of everything in one plant.

There were also -- you got these other things that are listed, your wastewater impact, your export country restrictions. If you're shipping to some countries, you can't use some of these interventions.

We also had comment that yes, multiple hurdles are required. None of these interventions

will work without attention to the whole process. And a very important point is regardless of what some of your suppliers are trying to sell you, you can't just put these things in and forget about it. Somebody has got to be paying attention to what is going on, because you can have problems with the system that's feeding your chlorine.

You can have problems with the system that is acidifying your chiller water. There's even been situations that -- what I found out in one of our plants -- they were using a unit to measure the free available chlorine that was not working properly. So all these things you need some controls on.

Comments here. A lot of people feel that the high pH in the scalder does appear to be effective. And also, some feel the chlorine dioxide in the chillers is not very effective. Something we had discussed earlier in a meeting in Washington is that the limit of five parts per million free available chlorine in the red-water return needs to be reassessed.

We feel like --that this is a point where

we could get better control if we were allowed to go up a little bit on this. Because you really can't aim right at five, because sometimes you're going to be above that. And when you're above five, then you're above the limit that's allowed in USDA's policy. So if we could get a little higher level of chlorine into the chiller at that point, we feel like this would help.

And of course, you're all aware that you do need to get your pH of your water around six for your chlorine to be most efficacious. And this doesn't matter -- whether it's in the chiller or your online reprocessing or your other rinsing locations that you have throughout the plants.

As far as post chill, there doesn't appear to be much confidence in Sanova or Inspexx in the chiller or as online reprocessing. However, Sanova in a post-chill dip tank is effective if used in combination with Sanova at the online-reprocessing location.

Also, the TomCO system has been used by several companies, and they think it is doing very

well. This involves adjusting the pH with CO2 and then monitoring the levels of chlorine. And these are the only two interventions that one comment -- one commenter said that they would support.

Of course, there's a lot of other chemicals on the market with those eleven that were mentioned. No single product has been determined to be highly effective. I could go back about ten years when TSP first came out, and this was several years before online reprocessing came onto the scene.

Well, we did a long study looking at TSP, pre chill through a -- it was that outside bird washer. And when you looked at birds post chill, we couldn't find any effect on bacterial levels, *Salmonella* incidence, or shelf life.

So the majority of chillers are treated with chlorine, and they do work best when the pH is optimized. One thing that we do need to do is automate the chlorine concentration and the pH control to minimize the human elements.

There is an increasing incidence of brushes such as TomCO is using. There is a gain in

popularity of use of post-chill dips. However, there are several things that people have used as post chill that you got to be careful about your organoleptic quality of your product.

If you're going to a chill-pack product that's going straight to a consumer, you want to be careful about any discoloration or changes in flavor that might happen. If you're -- a part of the process is just deboning it, then you might not be quite so concerned about it.

But we don't have any intervention that really gets us to where we want to be by itself, so we're back to the multiple hurdle. Thank you.

(Applause.)

DR. ENGELJOHN: Well, thank you, John, very much for stepping in and making that presentation with a summary of what you found within your industry.

Our final presentation this morning from the industry perspective is from Dr. Randy Huffman. He's the vice president of scientific affairs for the American Meat Institute Foundation. Randy has had extensive experience with the field, particularly in

beef industry.

He comes to us with degrees in animal science from Auburn, a master's in animal science from University of Florida, and a Ph.D. in meat science from the University of Florida. And Randy's going to talk to us about the success of the beef program with regards to *E. coli*.

Thank you.

DR. HUFFMAN: Thank you very much, Dan, and thank you for the invitation to share with you today some comments regarding a different specie and a different pathogen than you've been talking about for the last day or so.

I am very pleased to be here. And Dr. Engeljohn at FSIS has felt that this topic would be a useful example of how a separate segment of the regulated industry is dealing with control of the food-borne pathogen in a raw product.

Certainly everyone in this room would recognize that there are very important differences between poultry and beef. Obviously the livestock themselves, the processing systems, the

microbiological differences are all very important differences. And also, the interventions that are used to increase the margin of safety are certainly different.

But my desire today is to provide you with insight from the beef industry's experience that may assist the poultry industry and FSIS as we discuss the issue of controlling *Salmonella* in poultry.

As Dan mentioned, I'm with the American Meat Institute Foundation, which is the research, education and information arm of the American Meat Institute. And we represent the interests of processors and packers in the U.S.

Since the early 1990s, the beef industry has invested significant resources to reduce the occurrence of *E. coli* 0157 in raw beef products. Technologies such as thermal pasteurization of carcasses, steam vacuum, the use of organic acids, routine testing at various points in the process, and the implementation of good management practices have all been proven to reduce the prevalence of this organism in raw beef products.

The limited time today and probably the interest of this group -- I won't go into great detail on all of those interventions. I really want to try to address these three main points.

First, it's our belief that the zero-tolerance policy implemented for *E. coli* 0157 initially created a disincentive for industry and stymied progress on beef safety. I will point out when I refer to zero tolerance throughout this talk, I am talking about the adulteration policy for 0157 on beef and not necessarily the zero tolerance for fecal contamination on beef.

Second, a variety of industry initiatives which were bolstered by a spirit of cooperation and information sharing in a noncompetitive fashion were instrumental in creating improvements in beef safety.

And my third point will be that regulatory initiatives that moved beyond the reliance on the zero-tolerance framework and allowed industry to adapt and improve are very important.

I think it's important for us to have a brief history of this issue and a background. One of

the -- well, *E. coli* 0157 was first isolated in 1975, and the symptoms of that disease were described in about 1982. Everything changed, as many of you know, in 1993.

In the Pacific Northwest, there was a major outbreak of *E. coli* 0157 illness linked to undercooked ground beef. And that triggered a major public health concern and an outcry for a significant government response to this problem. It certainly changed a lot for our industry, as well for FSIS.

One of the initial responses from FSIS was to strictly enforce the policy of zero tolerance for fecal contamination on beef carcasses.

However, by 1994, after a second *E. coli* 0157 outbreak was linked to undercooked ground beef, the FSIS had announced an unprecedented new policy when then administrator of FSIS Mike Taylor announced somewhat unexpectedly at the AMI convention in 1994 that *E. coli* 0157 would be declared an adulterant on raw ground beef and that FSIS would begin an end-of-the-line pathogen-testing approach to enforce this policy.

Testing products for safety. That was the mantra among industry critics at the time and some in government. The initial reaction by industry to this newly announced policy was predictable negative, primarily because of the significant data gaps and uncertainly that this new business paradigm created.

Businesses that thrive do so because they sell safe food, and they do so because they have good information and are able to appropriately manage business risks. Whether those risks are financial, market risk, or in this case food-safety risk, information is important.

And in this case, the understanding of the risk of *E. coli* 0157 in ground beef in 1994 just -- we just didn't have good information. There was a dearth of scientific data. And there was very little known about its prevalence, about the sources, about the shedding patterns, the seasonality, the transmission, and all the other relevant scientific facts that today we somewhat take for granted. We've learned a lot in the last 12 to 15 years.

In light of these major data gaps in 1994,

it would be entirely predictable and expected that businesses faced with this type of uncertainty would want to collect more data. Unfortunately, this onerous regulatory policy of zero tolerance for a pathogen in raw products punished a business for collecting the data that they so badly needed to collect. And that just -- that environment didn't create a very constructive environment for change.

In that 1994 speech by then administrator Taylor, he included the following remarks, and I'd like to quote. “In the case of 0157 in raw ground beef, the only satisfactory public-health goal is to eliminate contamination.”

We must look for ways to reduce the likelihood that contaminated animals will enter the stream of commerce, reduce the risk that any pathogenic bacteria present in the intestinal tract will contaminate meat during the slaughter process, and reduce the potential for subsequent growth of any organism that may be present.

In short, technological innovation in production, slaughter, and processing must be

harnessed and applied aggressively if we are to move effectively toward our public-health goal. Close quote.

These concepts were very appropriate then. I would believe that they're very valid today. However, when these concepts were coupled with an unachievable regulatory performance standard and a lack of knowledge about this organism at the time, very little progress toward the goals articulated in that speech were made immediately.

So I guess I pose the question that's at the bottom of this slide. Did the regulatory focus initially on zero tolerance for 0157 in raw ground beef result in a -- at least an initial lack of progress?

The scientific community at the time certainly had an opinion about this, and I'd like to quote from two different sources, first the International Commission on Microbiological Specifications for Food in their book 7, 2002.

And I quote. “No feasible sampling plan can ensure complete absence of a pathogen. It cannot

be guaranteed that the lot is completely free of the organism no matter how large the number of sample units."

A second group, Blue Ribbon Task Force, organized by the American Meat Science Association in 1999, published a document called The Role of Microbiological Testing in Beef Food Safety Programs, The Scientific Perspective.

One of the conclusions that is in that document is the following. Declaration of a food-borne pathogen as an adulterant in raw products, first, discourages testing for that pathogen, second, leads to a false sense of security among consumers, third, discourages the evaluation of control measures, and finally, encourages the inappropriate use of microbiological control measures.

So that was the opinion, at least at the time, of the scientific community on this particular topic.

So to summarize the first point, I think the zero-tolerance policy did have some negative impact, at least initially, on the collection of data

and movement toward the goal.

But during that period from '94 to 2000, one thing that FSIS did provide was routine testing data and establishment of prevalence of the organism on raw ground beef. It was initially assumed to be very low. And as methods for sampling and testing improved, that prevalence estimate was increased to around 1 percent. And that's based on about 5 to 6,000 samples analyzed annually by FSIS.

Early focus of control was on the carcass surface, and industry was compelled to comply with the fecal zero-tolerance regulation, testing for generic *E. coli* as an indicator of process control and seeking and validating various carcass interventions.

However, by 1999, during an FSIS public meeting much like this one today -- and this was on 0157 -- the Centers for Disease Control shared data that the public-health burden was not improving for illnesses associated with *E. coli* 0157. And FSIS shared data that indicated a rising trend in the prevalence of the pathogen on raw products. This is in 1999.

At about this time, industry had also been made aware of data showing that the prevalence of 0157 on livestock arriving at the meat plant were much higher than previously thought and that the primary source of *E. coli* 0157 transfer was not the fecal-ingestor route. However, it was determined to be primarily from the hide. And that was certainly a new finding with data collected during this time frame.

What was occurring really at this point in time was an evaluation in the understanding of this pathogen and its transference to beef. And the data was beginning to become available to make valid assumptions about how to use the data and to control the organism.

The rate of understanding and adoption of new technology rapidly increased during this time frame. One significant driver of change was when the AMI board of directors voted unanimously to consider food safety as a noncompetitive issue within the industry.

This led to a lot of data sharing and cooperating among companies that -- and it looks like

I'm seeing a lot of that within the industry represented here today as well, and that's great.

The other thing that occurred during this time frame was significant investment in beef-safety research. Two groups that invested significant dollars in this area were the AMI Foundation as well as the National Cattlemens Beef Association. These efforts were focused primarily on the post-harvest controls initially, and then also work has been done in the pre-harvest area, which I'll talk about a little more in a minute.

Beef-industry customers certainly played a role by working cooperatively with suppliers on auditing and sampling programs that enhanced our knowledge about 0157.

One very significant driver of change has been the implementation by industry of expanded and robust *E. coli* 0157 trim-sampling and testing programs based upon ICMSF sampling and testing guidelines that provide establishments with a reasonable confidence that the organism will be found in a given lot if it is present.

FSIS has now adopted a version of this industry-initiated approach to sampling for -- in the current raw-ground-beef products baseline survey.

Better data about processes will lead to more effective control measures, and these data can be used to verify that best practices are working.

Implementing processes and system changes is never an easy or inexpensive task, as Bruce has just pointed out. And these issues present a major challenge. Development and implementation of best practices by industry and the joint sharing of this information across all segments of the chain was accomplished in a variety of ways.

One of the those ways has been the organization of the Beef Industry Food Safety Council, which is managed by the NCBA, the National Cattlemens Beef Association. And this is a coordinated effort of producers, processors, retailers, and food-service operators.

And these -- this group has collectively developed guidelines for industry best practices for every critical step in the beef-processing chain.

I've listed the current documents that are available on the BIFSCO website. These are dynamic documents that are updated on an annual basis or, as needed, more frequently.

We also meet at least once per year at the Beef Safety Summit in the spring and on an ad-hoc basis as needed.

Another way that best practices have been shared is through workshops by various trade organizations. One example is the AMI Foundation's workshop for sharing of best practices on slaughter practices. This was held in 2003 in Kansas City. Certainly for those of you that were there, there was an excellent time for sharing of information.

The other area that I wanted to talk about was the pre-harvest work. And quite a bit of research has been funded in finding and looking for interventions on pre harvest. However, there -- to date very few that have been proven effective in large field trials. And certainly this is an area that we continue to focus on.

My third point today is really the

relationship of FSIS policy to -- toward improvements. And their policy certainly has evolved since 1994. And while zero tolerance still exists, there are new directives that are more reasonable.

And these initiatives have continued to keep significant focus and pressure on beef-processing establishments. In-depth food-safety assessments have identified weaknesses in HACCP plans and have led to needed adjustments in HACCP plans.

One example is the identification of the need to consider the risk of trim harvested on the slaughter floor prior to the complete set of carcass interventions. Things such as this have been identified through this process. The in-depth FSAs serve as a constant pressure point for industry to improve.

Challenges exist as industry and FSIS evaluate data though. This is a really important factor. One of the steps that FSIS has taken is that when testing for *E. coli* 0157, FSIS now acknowledges that under certain circumstances, negative testing results can be used to discern acceptable product from

unacceptable product.

As a result of a recent directive, when the pathogen is found in a test sample, only product predetermined to be represented by the sample is deemed unacceptable or adulterated. This implementation of policy, while still burdensome, allows businesses to collect the data that they need and to manage the risk.

However, I would ask how should FSIS and industry react when a single positive 0157 result occurs that from a statistical process-control perspective is simply the result of common-cause variation, for which there is not meaningful corrective action.

When data indicates a process is in control, yet low-level positives exist, AMI continues to advocate to FSIS that they must adopt process-control-based reactions to positive test results rather than requiring meaningless HACCP reassessments and unproductive efforts aimed at corrective actions.

Industry and FSIS must be more in tune with generally recognized scientific principles for

statistical process control and the realization that a certain low level of positives in raw product will continue to occur.

I want to conclude with some data to just show improvement that has been made. And this is from routine FSIS sampling of ground beef. It represents about 5 to 6,000 samples a year, I believe. And there has been a continuing decline since 2000.

I show the data only since 2000, since that's the point in time when the sampling and testing methods have been consistent. And it also shows the point in time where we had the peak and prevalence of about .8 percent. It looks like this decline is sustained at this point, and we certainly hope that we'll stay that way.

Combined with that, we've seen a decline in recalls. Certainly this is an important factor. It's driven by a variety of things such as hold and test programs. But certainly we've seen a reduction in the number of announced recalls each year, and that's a great thing. None so far in 2006.

But I would say that the most important

data is from Centers for Disease Control and their FoodNet Data set. And this data shows that since the establishment of FoodNet and the tracking of illnesses related to 0157, that we've seen a steady decline -- an important decline. In fact, CDC reports that there's actually a 42 percent decline over the baseline years of '96 to, I believe, '98.

The efforts have led to the achievement of the healthy people 2010 public-health goal of one illness per hundred thousand population. And we've achieved that goal five years ahead of schedule. So that's certainly something that government and industry should be proud of.

So I'd like to close today with some questions for you to consider. I certainly have my opinions about the answers to these questions, but I'd strongly encourage each of you to formulate your own honest answers to these.

First, is the *E. coli* 0157 problem in beef solved? Second, have improvements in the safety of beef been made in the last decade? Certainly I hope the data I showed would say -- would tell you yes.

Has zero tolerance for 0157 caused change in the beef-processing industry? Well, certainly it caused change. There's no denying that. The question is was that the best policy at the time.

Have the changes led to reduction in human 0157 illnesses related to beef consumption? The CDC data that I just showed would indicate that the answer to that possibly is yes, although I would encourage our public-health officials to improve our ability to track and attribute foods -- specific foods to illness.

That certainly is an area that is lacking today. The data that CDC collects is for all food sources, not any one particular one in the FoodNet data.

And finally, the question has zero tolerance for 0157 been good public policy? That's certainly a debatable question, and we'd all have our own opinions. I would encourage both FSIS and the economic research service to take a retrospective look at this policy now after a number of years and to consider both the cost and the benefits.

We have a lot of new data now on prevalence on illnesses, and certainly we can generate a lot of data on the cost, because this policy has been a rather expensive one. I think it would be a good exercise to evaluate the policy at this point in time.

So to summarize -- and I'll try to maybe reiterate my three main points in a slightly different way. First, achieving enhanced meat safety should begin with a rational and achievable regulatory policy that is based upon a necessary public-health goal that is measurable.

Second, collect data to fully understand the process and use the data to develop valid control strategies and best practices. And finally, industry must share the knowledge and best practices in a noncompetitive fashion.

I sincerely appreciate the attention today and will close by saying that the industry's food-safety record is good and getting better. And as I think several speakers have already said, there are no silver bullets. It takes dedication and hard work and

continued effort. Thank you very much.

(Applause.)

DR. ENGELJOHN: Well, thank you.

I think if we could we'll go ahead and ask the panelists to remain up here, and we'll take questions now and then move into a break after that. So we'll see how this goes.

But as we did yesterday, if you would move to the central microphone in the room, announce who you are and who you represent, and then ask your question, and we'll try to get you an answer.

And perhaps if we could just turn the lights on. Somebody else get up to the microphone, and we'll figure out the lights.

Are there any questions on the phone, since we have none hear in the room?

MS. PETERSON: Hi. My name is Robin Peterson. I'm with PURAC. And I have a general question to the members of industry. I'm wondering, in terms of the incidence and the prevalence of *Salmonella* coming in on live birds -- that's obviously -- this -- as I understand it, been

increasing. And this may relate to the pre harvest.

But I'm wondering what the effect of reduction of antibiotic use is playing in that, as well as numbers of birds in houses. And I'm assuming that companies are looking at the live end as well as the back end. And again, this may have been a more appropriate question for the last public session that you held. I'm just wondering if there's any comments.

DR. ENGELJOHN: Any of you want to take it? Just --

DR. ROOP: Yes. Thank you. Richard Roop, Tyson Foods. Actually, I was asked that question yesterday about the effect of reduction -- use of non-therapeutic antibiotics and its relation to reduction in -- in crease in *Salmonella* incidence.

That's certainly been a factor that's been discussed among the industry technical folks. However, there have been no conclusive studies to say that for sure. As I mentioned to an individual yesterday, I think that would be an excellent Ph.D. thesis for that to be determined.

DR. STEWART-BROWN: One comment. If --

it's absolutely irrefutable in my mind that if gut health is influenced negatively, *Salmonella* carriage goes up. Those two go together almost every time we've looked at it that way.

If you don't take care of gut health when it goes bad, you're not -- that's a detrimental approach to food safety overall. So the -- if you say whether the reduction of antibiotics in the feed -- and then that has resulted in more variability in gut health. I think that's a very valid question and an appropriate question.

If you said does the presence of antibiotic in a healthy gut negatively or positively influence *Salmonella* carriage, that's quite another question. But the biggest piece as far as I'm concerned is that if you have a gut-health issue, you need to get it right. And -- because it's a detrimental component to your *Salmonella* carriage.

DR. ENGELJOHN: Any other questions in the room?

DR. O'CONNOR: I actually have --

DR. ENGELJOHN: Yes.

DR. O'CONNOR: It's more of a comment or a question to your question, which is -- I think you prefaced your question with almost stating a fact which I'm not sure is a fact, that the level of *Salmonella* coming into the plant has increased. Is that the case is my question.

MS. PETERSON: You would know better than I.

DR. O'CONNOR: I think that's a very good question, and it's actually one that we've tried to look at within this group from an industry standpoint. Because I think one of my questions has always been what's the most appropriate way to measure your *Salmonella* load coming into the plant.

So for instance, I do a lot of drag swabs in broiler houses. But I know other people sitting here -- they'll do ceca pouches, you know, and they'll collect, you know, six from six birds in a house. And are those persons -- are their results really comparable, you know, to mine?

If I had to look at data from 2001 when I first started drag-swabbing houses to 2006, I'm not

really sure that I can say that -- well, I certainly can't say the load has increased, because I don't do enumeration of *Salmonella*.

But in terms of the incidence, presence or absence, what I see is kind of a normal distribution curve. You know, I have some farms that just don't show up positive. I have some that oftentimes show up positive. And then I have a very kind of middle average group that sometimes are positive and sometimes are not.

So I still question even my own monitoring on the live side in terms of the significance of that information. I think it's a good question. I just don't know if I, from my own data, see an actual increase coming in from the field.

DR. ENGELJOHN: Question, Felicia?

MS. NESTOR: I'm Felicia Nestor with Food and Water Watch, and I have a question for Dr. Huffman. On the slides, you were talking about -- and I don't know where you're sitting right now. Okay. You were talking about the continuous decline in recalls and findings of *Salmonella* -- I'm sorry; *E.*

coli.

And there was a real extreme drop between 2002 and 2003. And in the consumer community -- and we've -- you know, we take a look at that, and we say, What happened there, because, whatever happened there, we like it.

And one of the things that happened in 2002 was the ConAgra recall. And at that point, immediately, FSIS announced that no large plants -- no plants would be exempt from FSIS testing. Prior to that, if you had a -- if you performed a certain number of processes or certain particular processes, you wouldn't get FSIS testing. So all of a sudden, no plant would be exempt from FSIS testing.

And secondly, the Agency said it was going to keep a database of suppliers so that when FSIS found *E. coli* further along the distribution chain, like at the smaller plants or the smaller grinders of retail, that it would keep a database of the slaughterhouses.

So I mean to us, that looks like it was accountability. All of a sudden, accountability was

forced into the system, and the producers of trim and the producers of course-ground product no longer could sort of fly under the radar screen.

And if I'm not mistaken, Bill Smith said that after they implemented that, that's when test and hold went up really a lot in the large plants. And if I'm not mistaken, you know, that's when inspectors told me all of a sudden, you know, chili became a favorite. And we've got a lot of lots of contaminated *E. coli* product now going to chili factories as opposed to, you know, out into the market in raw form.

So we talk about this in the consumer groups. We want to know what -- how do you respond to the idea that it could have been that accountability? That's relevant to one of the changes that FSIS is proposing in the new Fed Register notice, which I think we're going to discuss later.

DR. HUFFMAN: First of all, that graph -- and it's not up on the screen. But it's important to recognize -- you characterize that drop as -- I'm not sure of the word you used, but significant. Certainly there's an important decline, but it's important to

recognize that those bars represented percentages that were all under .8 percent.

So the decline -- I haven't done any statistics on those data, and I'm not sure it would be appropriate, since they are routine regulatory samples. But it was a modest drop, if you will, in terms of true numbers, because the rate of positives is less than .8 at the peak.

So with that as a basis for our discussion, I appreciate your question. One of the points that I did make in the talk was the recognition of a regulatory policy that allows for a company to define the lot that is represented by a sample and the recognition that a negative result would allow that product to be considered safe for distribution.

That particular change did allow for a significant increase in testing and data collection.

MS. NESTOR: So you're saying that the industry itself then started testing more, and up until that point, they wouldn't do the testing.

DR. HUFFMAN: Certainly there was an increase in the amount of industry testing over this

time frame that I described in the talk. Yes.

MS. NESTOR: So -- and can you tell me the years on that again? You're -- so you don't think that industry testing really went up in 2002.

DR. HUFFMAN: I think that it probably did, yes, as a result of that policy.

MS. NESTOR: Okay. I know you're saying that the numbers didn't go down that much in terms of like absolute numbers. But if you look at the CDC data as well on a month-by-month -- if you chart it month by month, there's a real good drop in 2002 as soon as these new policies were adopted, and that number hasn't gone up since then.

DR. HUFFMAN: Well, I guess I would say that testing is certainly one component of the total system that is addressing pathogen. And one of the points I wanted to convey in that talk is that collection of data is the key component of assessing the effectiveness of the entire food-safety system and all the interventions that have been put in place.

And by the collection of that data and the evaluation of those systems, I don't think you can

state that any one particular intervention has any greater impact. It's a total-systems approach.

MS. NESTOR: One of the other reasons I'm focusing on the accountability is because if you look at the OIG ConAgra report, it shows that in the months prior to that recall, ConAgra had found *E. coli* in trim, you know, 46 out of -- I can't remember how many days.

And the OIG found that ConAgra did not do the right thing about that. So, you know, ConAgra was testing. ConAgra knew. But it wasn't until the accountability was forced into the system that the numbers go down.

I don't know. Maybe it's not correlated. It looks to us like it's correlated and --

DR. HUFFMAN: Okay. I just -- say I'm not necessarily disagreeing with you that there was a decline over that time period. And I don't want to comment on the OIG report, so --

DR. MASTERS: I guess -- this is Barb Masters. And I would just comment -- and I think it's consistent with what Dr. Huffman is saying. I think

that's the point at which we asked the industry to reassess their HACCP programs.

And they looked at the design of their HACCP programs, and they significantly redesigned their programs. And it's the entire redesign of their programs, and it's the total package of the interventions they put in place as well as the testing that they put in place to verify the changes they put in place that I think -- that you're seeing the changes.

It's not just the testing, but it's the interventions they put in place as well as the testing to verify the effectiveness of those interventions that I think -- you're seeing the changes, Felicia. So that's the point at which we asked them to reassess their programs, and that's where we believe you start seeing those declines.

So it's not just the testing, but it's the overall reassessing their programs. They had the interventions, but it's putting them into their overall food-safety programs. They're not all in their HACCP plans.

It's prerequisite programs. It's SSOPs. It's HACCP plans and the testing they're doing to verify the effectiveness of their interventions. And so it's the overall package that I think Randy's talking about. It's the interventions and how effectively they're working. It's the total package that -- I believe you start seeing the declines.

DR. ENGELJOHN: Thank you.

Next question.

DR. BAILEY: Stan Bailey, Agriculture Research Service. A little bit of a comment and a question to Randy and maybe others. And it's spurred by your data that you showed, Randy. 0157 is attributable almost exclusively to beef, not totally, but primarily to beef.

And so as an accountability or a measurability of the results of the industry's and regulatory agencies's perspectives, it's fairly easy to see that you're getting us pretty significant reduction in 0157 coming from your beef products.

And CDC at the same time is showing a fairly significant reduction in human illnesses. So

it's at least superficially fairly easy to draw a line between the two things.

Salmonella's remained flat in the CDC data. Salmonella is pretty flat or actually slightly going up maybe in the poultry industry data, which is not a good thing in that that's something that most people are working toward trying to pull down. And whatever measures need to be taken need to be taken. No argument there.

But as those of us in government and, I suspect, in industry -- we all have milestones and guidelines we're working against to show measurability. If we reduce *Salmonella* in chicken 50 percent, 75 percent, are we going to be able to have any accountability, measurability across to the human side?

Because *Salmonella* isn't just a poultry-industry issue. It certainly is a poultry-industry issue. But whereas 0157 is almost exclusively a beef-industry issue, *Salmonella* is spread out in a lot of different directions.

And the attribution data we have is not

particularly great, and that leaves some openness for discussion. But of the attributions that we can definitely know about, probably only -- less -- well less than 50 percent are directly related to chicken.

So when we look down the road and decide if our efforts are going to be effective, how are we going to measure those, I guess, is the question.

DR. RAYMOND: Dan, I'll take a crack at that.

Dr. Raymond. There's a couple things. And it's a good point. And sometimes I fail to acknowledge that when I give talks. *Salmonella* comes from a lot of sources. We know that. And thank you for bringing that back up and back on the table.

And it may not be the same correlation as I -- and, Randy, yesterday morning when I opened up, I used the same slides you used -- not exactly the same. You -- somebody made yours; somebody made mine. But it's the same talk that I've given many times.

We see a reduction in the sampling. We see a reduction in recalls. We see a reduction in human illness. That's nice because some of the

naysayers will say, Sure, you got a decrease in sampling, because you're sampling just the first shift or whatever; you made a change in when you sampled or what you sampled, and, you know, numbers lie, and we can manipulate that stuff.

But when you have a recall based on investigations of outbreaks, when you have sampling in the plants and when you have human illness proved by culture and those things correlate as nicely as they do for *E. coli*, it doesn't take a rocket scientist to say they must be related.

Salmonella is down 8 percent during the same time that *E. coli* is down 42 percent -- overall for *Salmonella*. If you look at *Salmonella* Typhimurium, it's down about 42 percent, just about like *E. coli*. But if you look at some of the other serotypes, they're going up.

And some of the *Salmonella* serotypes are related more to eggs or more to product or produce. I mean, by doing more serotyping, we can, hopefully, help answer your question to a degree. Is it coming from eggs? Is it coming from produce? Is it coming

from poultry?

It's not going to be as perfect or as easy, but we will try to do that. And we have requested extra funding to do more *Salmonella* testing and serotyping for our risk-based inspection program that we'd like to get into so we can make those correlations.

But we're also seeing some shifts like -- Enteritidis, which used to be, Well, it must have come from the eggs. But now we're seeing it coming from the carcasses. And *Salmonella*'s a strange bug that way, it seems to me, that it can make those shifts.

It's becoming more heat labile. Heat is not killing it like it used to. It -- there's a lot of things going on with *Salmonella* that will -- and I mentioned yesterday public health continues to change, and we must try to keep the science going so we can change with it.

So again, I just thank you for bringing it on the table. I was criticized yesterday very privately for not acknowledging that. I understand.

And -- but to the -- for the industry -- I want them to know that we do understand. I do understand that *Salmonella* -- human-borne illness can come from other resources.

I hope to see a reduction in the sampling product. I hope to see a reduction in human illness. And we'll make kind of a vague leap of faith that that must be related. Because I can't control produce. And sometimes we can control eggs, and sometimes we can't control eggs.

But we can work with the poultry industry for carcasses and ground product.

DR. MASTERS: This is Barb Masters. And I will add to that. We are working with our public-health partners at the Centers for Disease Control, and we have put some funding towards some attribution studies. They're very acutely aware that we're interested in having attribution.

And the first place we've asked them to begin to work is on *Salmonella* because of the recognition that certainly while not *E. coli* 0157:H7 comes from beef -- we recognize there's a little bit

more correlation there. And so we've asked them to begin their work on *Salmonella*.

So there is work going on with CDC. So that work has begun. It's not an easy project, and it's not an inexpensive project, but there is funding going towards that attribution work at CDC.

DR. ENGELJOHN: As the next speaker walks up to the microphone, if there is one -- and I'll just chime in as well -- this is Engeljohn from FSIS -- and just point out that the Federal Register document that we did publish wasn't specific to broilers. It was to all the classes that were all products we regulate.

So we recognize there's a need to look at those for which there is a special concern and then go through all the product classes. So that's our intention.

Did anyone else want a question here in the room? We'll ask again on the phone.

And while that's happening, for those of you who might be listening on the webcasting -- the netcasting or on the phone, we are directing those individuals who are watching this and listening to

this that you can call in. So just make sure that if you see that information on the webcast, that you do -- we'll welcome your questions.

Any other questions here?

(No response.)

DR. ENGELJOHN: All right. Then let's take a break.

(Whereupon, a short recess was taken.)

DR. ENGELJOHN: Welcome back, everyone. We're going to start the last portion fo the day-and-a-half session that we've had on post-harvest controls for *Salmonella*.

Our speaker from FSIS is a new employee to FSIS. She joined us in July 2005. Dr. Patty Bennett graduated with her doctor of veterinary medicine degree from the University of Florida and has a master's degree in biology.

We welcome her. She's one of our technical analysis staff officers. And she's going to talk to you about the FSIS policies on *Salmonella* that we published this last Tuesday on our webpage. And that will be officially published in the Federal

Register this coming Monday.

Dr. Bennett.

DR. BENNETT: Thank you, Dan.

As -- since Dr. Bailey, as he walked back to his seat, walked past me just to harass me, it reminded me that I'd like to thank all of the presenters these past couple of days. You've actually been very wonderful. You were very gracious while Laura and Bill and I were harassing and haranguing and intimidating you to turn in your information.

And I do like to thank you, because again, you all did a wonderful job. And you were very good about stepping up to the plate, especially Dr. Rice, who showed up today to give Dr. Krushinskie's presentation.

So what I would like to talk about today is -- are the policy initiatives that have been put forth in the Federal Register notice that, like Dan said, will be officially posted this coming Monday. However, for those individuals who are interested in reading it now, it is actually posted on the Agency website and has been so since this past Tuesday.

And what these initiatives will do is to explain the changes that FSIS is going to take regarding reporting and using the results from his *Salmonella* verification sampling program.

The purpose of the policies are basically to enable the Agency to better assess the process control for pathogens in all classes of raw products. FSIS is especially interested though in assisting the broiler industry in reversing the upward trend of high-positive *Salmonella* sample sets.

And as -- it's been mentioned before, but I will say it again. Since 2003, the poultry classes, particularly broilers, have experienced an upward trend, which is actually above what they had previously obtained at lower levels.

There are eleven actions that have been put forth in the federal notice, and I will make mention of each one very briefly. And I will do so in the order that they have been presented in the Federal Register notice.

So action 1. The results of individual sample tests will be sent to establishments as soon as

those results have been made available. That means that FSIS intends that establishments take this information and adjust their process controls as needed.

Action 2. FSIS will post quarterly, rather than annually, the nationwide *Salmonella* data by product class.

Action 3. FSIS will begin collecting swab samples from turkey carcasses. Now, in this way the Agency will be able to assess the process control for this class according to the baseline performance levels, which right now are at 19.6 percent.

What the Agency is also hoping is that by working with the turkey-carcass class and helping them with their process control, that this will also help the ground-turkey class and their process control. Right now they have the -- actually the highest performance standard of all of the classes for raw products, and that's at 49.9 percent.

And again, if the source material are turkey carcasses, then by again making sure that the turkey-carcass class has improved carcass control,

then it should trickle down, and we should see a positive effect with the ground-turkey class.

Action 4. To better allocate Agency resources, FSIS is going to characterize establishments by their performance within three categories. And again, this has been mentioned before, so this is isn't new, but I'll go ahead and repeat the categories just so you don't forget.

So category 1. In category 1 -- this is best pathogen control. Establishments are producing products that have very low exposure of the public to *Salmonella*. With category 2, we have more intermediate pathogen control. Again, these establishments are producing products with elevated exposure of the public to *Salmonella*.

And then with category 3, this is where we find the least pathogen control. Again, establishments are producing products with the greatest exposure of the public to *Salmonella*.

Action 5. Now, based on those categories, scheduling frequencies will be modified. Therefore, for those establishments that are actually showing

poor performance, poor process control -- they may be scheduled much more frequently with multiple sets in a year's time.

Whereas for establishments that are showing good control -- they may be scheduled as infrequently as once every two years.

Action 6. FSIS will conduct food-safety assessments in those establishments that, again, are showing poor performance. And we want to do this before they actually have a failed set. And in addition, the Agency wants to focus on those sample sets that contain serotypes that are known to cause human illness.

And we also know that when there is increased agency scrutiny in terms of food-safety assessments, we find that plants tend to have improved performance regarding control of *Salmonella*. Fancy that, but that's what we found.

Action 7. FSIS will issue compliance guidelines regarding *Salmonella* during slaughter of broilers. Now, Dr. Engeljohn just asked me two minutes before I made this presentation where the

compliance guidelines are.

And since I'm one of the writers, I will tell you right now, please don't expect them this afternoon. Don't expect them Monday either. But I do promise that when I return to D.C., this will be the first thing that I work on.

Action 8. FSIS will more quickly determine serotypes for the sample sets.

Action 9. FSIS will pursue policies on subtyping or fingerprinting *Salmonella* utilizing or using pulsed-field gel electrophoresis. FSIS is part of Pulsenet, which is a national network coordinated by the CDC. Other members include the FDA, state health departments -- as well as local health departments.

Some of the objectives of this network is to provide real-time communication among partners, as well as to facilitate early identification of common-source outbreaks.

Action 10. In order to ascertain that we are indeed seeing pathogen reduction in organisms like *Salmonella* and *Campylobacter*, FSIS will conduct

ongoing baseline studies in all classes of raw products. And in addition to determining whether or not yes, we've got it; no, we don't, the Agency will also be looking at what kind of changes in serotypes are we seeing, as well as patterns of antibiotic resistance.

And action 11, the final one. Again, the Agency will be watching these categories that are in 2 and 3 and showing less process -- good process control -- and that they are adequately moving into category 1, which is best pathogen control.

Now, the first focus of the Agency will be on the control of *Salmonella* in slaughter establishments. But that doesn't mean that the Agency is disinterested in the ground-product classes. But we do realize that you first need to control what's going on with the source materials before you're going to control what's going on with the ground-product classes.

FSIS is very interested in improving the process control regarding *Salmonella* in all classes of raw products. To that end, they Agency is considering

increased steps to improve control of levels of *Salmonella*.

Now, what you see on this slide are incentives that the industry is considering. So with establishments that are showing poor performance, poor process control, the Agency is considering publishing the names of those establishments as well as their performance status on the Agency website.

For those establishments that are showing good process control, the Agency is considering allowing increased slaughter volume.

Now, these actions will go into effect immediately, but that doesn't mean that we are not encouraging people to make comments on what we have put out. And there will be an open-comment period for individual stakeholders to provide input to FSIS regarding this notice.

And in fact, we are very much hoping that people will participate and that you will give us your feedback and your suggestions so that we can make this as good as it can be. And I think that's it.

(Applause.)

DR. ENGELJOHN: Well, with that, run through the options contained within the Federal Register document. At this time, we are open to any questions that the attendees here may have, as well as those on the phone, that we can clarify or give additional information about.

Yes.

DR. BAILEY: Stan Bailey, Agriculture Research Service. Dr. Bennett, just for some clarification for me and I suspect others, you talk about the different classes. And I don't remember the numbers from Sean's presentation, but say the lower -- class 1, the lower 25 percent.

If that number is six -- then you bring in the different serotypes and different considerations there. If you -- if that number 6, whatever it is -- I don't remember what it is, but if that number's 6, and you have five Kentuckys which are not a human and one Enteritidis or Heidelberg or something else, does that put you in category 2, or are you in category 1 because the majority of them are Kentuckys?

DR. ENGELJOHN: I'll take that question

and give you a response. And again, this is the type of information that we would encourage you to write in terms of your comments to the document, so we can make sure we get them on the record and that we do have a process in place to actually address the issues.

But from the perspective of the Agency, process control is the issue. And there are limitations to the data that we do collect. We collect one rinse sample per bird per day.

There are issues about whether or not we're actually identifying all the types of *Salmonella* that may be present within that rinse sample, because we know that our policy and our procedures that we have posted on the webpage actually do have us selecting the most dominant colony that we find. And so there may in fact be other types of *Salmonella* present. So more information about that is something that we would be looking into.

We look at the issue of *Salmonella* process control as an indicator of what's happening. We certainly are going to take into account the types of *Salmonella* that are present. And as you mentioned,

Kentucky may in fact be the only one that's identified in the sample that we collect and that we've analyzed for, and that is a factor that we would take into account.

You should know that the Agency does have a team of technical experts that are preparing for our purposes -- of how we will guide our district managers and our inspection resources with regards to when and how we would target frequency and type of testing and activities that we would do. And so that would be one of those issues that we would take into account.

Certainly good process control over time is what we're gearing for. The serotypes provide us an additional piece of information.

MS. JOHNSON: Trisha Marsh Johnson, Veterinary Environmental Technical Solutions. I'm concerned about what the Agency intends to do with the antimicrobial-resistant pattern monitoring given that 1, the presence of antimicrobial-resistance genes does not indicate process control, and 2, given the fact that when you look at the antimicrobial-resistance patterns for *Salmonella*, those basically are (the)

antibiotics that are used in human medicine.

They are not antibiotics that are used in poultry. And so therefore, most processing establishments would have absolutely no way to influence the antimicrobial-resistance patterns of what's present.

DR. ENGELJOHN: And thank you for that comment. It certainly is something that -- we as an Agency are interested in feedback from you as stakeholders to provide us guidance on what you think would be appropriate action. But from the perspective of the Agency, we've found that we can no longer just be looking at a pathogen, *Salmonella*, first of all, and then taking it as a positive/negative.

We really do need to be looking more at what is coming into the facilities that are being regulated, and are the establishments doing something about that for which they have control over. And so the issue becomes -- maybe in broilers the significance of antimicrobial resistance may in fact be different than what it is for turkeys or for dairy cattle.

And so I think it's pieces of information that provide us better information to assess what's coming into the human food supply and then what's happening in terms of human illness. These are things for which I think we set the stage now to say that we're looking into better using information and providing that to the establishments.

So we don't have any definite answers as to what we do when we find the antimicrobial resistance. These are case-by-case things that we'll take into consideration. But we do think that you as an industry need to take this into account.

MR. LINK: Can I ask a question from over here?

DR. ENGELJOHN: Yes.

MR. LINKS: Is that okay? It's Charles Link with Cargill. The actions that were just kind of outlined by Dr. Bennett appear to be obviously focused on broilers, but there's mention of turkeys and starting to do some turkey testing, swab testing on turkeys.

How do plan to catagorize turkey plants?

Have -- I guess you've give that some thought. But just -- you don't have a lot of data right now, I guess.

DR. ENGELJOHN: That's true. We don't have a lot of data to work from, and we're starting now to collect that information. And we would welcome any information you as an industry would provide to us. Again, the sharing of data is critical.

But from our perspective within the Agency, we have looked at the classes of products that we regulate and that we already have information for. We believe that there are similarities across the product classes when we segregate them into three categories. And process control is something that obviously has some consistency or at least some comparability across the product classes.

But you should expect for the turkey class, which we're going to begin routinely testing as we do for most of the other raw-product classes, that this should be considered to be a baseline year of assessing that information and then moving forward from there.

We did lay forward in the Federal Register document a process by which -- at the moment we consider we will look at in terms of categorizing establishments. And that would be at least having enough information from a sample set -- more than just one sample set to make a decision, because we're looking for that consistent, persistent process control.

So we did actually identify it in the Federal Register document that it -- initially, anyway, we'll be looking at the two most recent sample sets that we have. For the poultry classes, broilers right now I think is at 51 consecutive days of information. And for turkeys, I believe it's 59 days consecutively. So that gives us a picture over a period of time.

Yes, Dane.

MR. BERNARD: Thanks, Dan.

I think I'm still a little confused, if you will. Stan's question about the serotypes and the other question about the antibiotic resistance -- and, you know, obviously the Agency is interested in

process control at the centerpiece. And you're concerned about other factors as well.

But if we're to comment on the rule, I think we need some other idea or some more idea as to how that information might play into classification or what it is you may intend to do with it.

And, you know, Stan's question was the same question I have -- is if you have -- if you're below the 50 percent level in performance, but the majority of your isolates happen to be a strain of concern, where does that leave you?

And I think -- more important for us to look at our own operations in terms of where the Agency may want this issue to lead. What should we be testing for? Serotyping is not an inexpensive thing. We're not used to doing that routinely. It can be done.

Running antibiotic resistance patterns -- is not something that I would think too many of us have an idea of what profiles we're running. So I think we would love to have a little bit more insight into where the Agency is thinking in these regards,

because it will help to guide us in terms of what we need to be prepared for.

DR. ENGELJOHN: Dr. Raymond.

DR. RAYMOND: For those who may have been multitasking during Sean's presentation yesterday, I'll remind you that in his presentation, for those plants that fell consistently into the category of six or fewer positive tests, less than 50 percent, they gave them a baseline for how many of their samples would contain human pathogens.

For those plants that fell into the second category, between seven to 12 positives, we saw a ninefold increase in *Salmonella* human pathogens. And for those that fell into the third -- I think it was a thirteen-fold increase.

So to give you some reassurance, Dane, if your plant is having six or fewer positive samples, the chance that those samples are going to have five that contain human -- but we just have not seen that.

But if we did see that five out of the six contained Enteritidis, probably we would take different action with that particular plant than

perhaps a plant that had eight positive samples, but they're all Kentucky. We will individualize based on the risk to humans.

But we saw a tremendous increase when you went from six to seven to 12 samples positive.

DR. ENGELJOHN: Dr. Masters.

DR. MASTERS: Just to be a little bit clearer, I think what we're saying at this point as an Agency, for our intent and purposes as we start out, we would put you in category 1 regardless of the serotype. So if you had six or fewer and they were all Kentucky, we would put you in category 1, to be very clear to Stan's question.

We are interested in your feedback as to how you would perceive how we should use the categories. But that's how we would start out. We will be providing you serotype data as we receive that information to assist you as an industry in what's useful.

We have found that the most -- obviously, because there's more *Salmonella* in categories 2 and 3 -- obviously there's more *Salmonella* of human

serotypes of concern in categories 2 and 3, which is why we prefer all of the plants to be in category 1, which is why we're trying to drive plants to category 1.

But we are interested in providing you that information, as well as antimicrobial-resistance information, because as you heard Dr. Huffman say, we don't want to be in a situation further down the road that you're working in a vacuum of data.

And so we are trying to provide that information now, because we recognize as we move forward those are going to continue to be questions on the forefront. And so we're trying to provide information now, because we recognize antimicrobial resistance as a topic that is not going away. Serotype information is a topic that's not going away.

So we're trying to provide you as much data as we can as an industry to be useful to you. But as we do categories, we're not going to categorize you based on your serotype, but on your sheer numbers of *Salmonella* at this point. But we welcome your feedback.

As we determine which plants to do food-safety assessments in before you exceed the standard, we may take into consideration whether or not those were Kentucky or whether or not they were serotypes of human concern, because we have x number of resources. So it may help us determine where to do a food-safety assessment.

But at this point, for our purposes, we're going to do categorization based on the actual numbers of positives. But we certainly welcome feedback on the total Federal Register package that we've laid out. But we will do it based on raw numbers at this point, if that's helpful.

DR. ENGELJOHN: Next question.

As she's walking up to the phone, I also -- this is Engeljohn -- just point out that the whole approach here is to take some preventative approach to addressing the issues of process control as opposed to waiting until there's failure and then stepping in.

We've found that we need to change our process. And this really is about how the Agency is

going to redirect its resources.

Yes, the questioner.

MS. NESTOR: Felicia Nestor, Food and Water Watch. Two questions. Are -- is FSIS considering publishing the fingerprints on the website? I see you're going to share them with public-health agencies. What about on the website?

DR. ENGELJOHN: I think that's an issue for which -- clearly, getting that into the record is something that the Agency had anticipated that we didn't include in that particular document, because there are issues related to how we want to go forward.

But from the perspective of the Agency, our goal will be to be as transparent as possible and to provide as much information as possible. And as we develop that particular process and the mechanisms associated with it, we'll take that into account.

But our goal is to make information available that's timely so that the industry can react to it and so that our public-health partners can also be aware of it.

In a preventative type of approach, we

would like to be in the position of preventing a food-borne outbreak by alerting our public-health partners that in a particular region or in a particular area of the country or at a particular period of time, we're seeing an increase in a pathogen that may in fact present a special concern, so that the public-health individuals in those areas may in fact determine to start culturing where they may not before.

So the whole issue here is to get the information out so that we can have better attribution so that we can prevent food-borne illness rather than reacting to one that's already occurred.

MS. NESTOR: Thank you. Second question is in regards to the positive incentive of allowing increased line speeds at a plant that's performing well. How do you intend to increase line speeds given the current -- I think it's a requirement that inspectors can look at 33 chickens per minute or something like that.

Will you add another inspector, or are you talking about more plants transitioning into HIMP?

DR. ENGELJOHN: This is Engeljohn from

FSIS. I would say on that issue -- and we did actually use wording in the document to make very clear that we don't have this already predetermined as to how it will work. We're looking to see what the industry thinks would work, first of all, what the consumers think would work, what employees think would work or shouldn't work.

The issue really is to focus on performance -- and that if the public health is in fact better protected and that we have a system in place that's delivering food safety in a manner that is enhanced -- then our issue is that the inspectional procedure should not inhibit innovation.

We would take it into account, whatever the industry may want to study. And we will at least study those issues collectively and have answers to them before we just do it. So the issue is to make clear we don't already have -- we have not already decided what is going to be acceptable or not.

We want to know what is on the minds of those that are affected and then figure out a way to make it work.

MS. NESTOR: Okay. Thanks.

DR. ENGELJOHN: Dr. Masters.

DR. MASTERS: Felicia, I would just offer, because we have a, you know, significant amount of time to look at this process, we've indicated that we'd look at a year's worth of data. Depending on the types of comments that we get, this is something that we may choose to put through our third-party process moving forward.

So it will certainly depend on the types of comments that we get. And I'd suggest to everybody in the room and on the netcast to certainly take that into consideration. And we welcome any types of comments, both on the positive incentives as well as the other incentives as we move forward.

And depending again on the substantive types of comments that we receive, we would be open as we move forward to looking at the third-party process as a means of getting comments on the comments that we receive moving forward.

DR. O'CONNOR: Yes. I just had a question on timing. Dr. Bennett said the actions are to go

into effect immediately. So in terms of categorizing the different processing plants, does that occur based on historical sample sets, or is that going to happen after your next sample set?

DR. ENGELJOHN: I -- and that's -- this is Engeljohn with the Agency. And the issue for that is that we have looked at the 2005 data. So as -- just so we know where things were in 2005. And we have put together a team that's making a recommendation back to management officials within the Agency to decide how do we need to go forward.

I think Dr. Masters mentioned that at the moment, we just -- we consider everyone at the moment to be in category 1 as we move forward. The issue isn't to automatically put you into a position of punitive measure. We want to start from this day forward with a means by which we improve process control.

And so I think you should consider the fact that the actions listed in the document are FSIS resource specific. And it really is a direction for us to start the process of making more transparent how

we move forward.

You should expect that there will be policy documents that issue over the course of time that will make clear how we're doing various things. So from the perspective of saying, "Are we going to wait until the comment period is over before we do something," no. We're -- we've already started the process of looking at how we go forward.

As quickly as we issue a directive on the inspectional procedures for swabbing turkeys, we will begin swabbing turkeys, as an example.

DR. O'CONNOR: Thank you.

DR. ENGELJOHN: Yes. Loren Lange, with the Agency.

MR. LANGE: Yes. Hi. This is Loren Lange from OPHS and FSIS. Back to yesterday. I just wanted to follow up on questions at the end of the day about rinsates and TSP and pH.

And I tried this morning to get -- we have two microbiologists that have been following and continue to follow and will continue to follow this issue very closely. Unfortunately -- I wanted to get

one on the phone, but one's recovering from surgery, and the other one's at the doctor's office this morning. So I'm what you get.

But I was able to put together -- is that our microbiologists continue to have a high level of confidence in our ability to consistently recover *Salmonella* from our rinsates. And this is really based on three factors.

It's buffering capacity. It was mentioned we use a 400 milliliter buffered peptone water solution. The dilution factor that -- it's 400 milliliters -- and that we are sampling after drip lines so that the amount of fluid that remains on the carcass has been decreasing.

And I want -- a couple other things to point out. I mean, this method was developed when we put this program in place for the specific purpose of being able to maintain pH relatively consistently in the pre-enrichment phase under a wide variety of conditions.

And it does have a very high level of buffering capacity. Our labs were able to send me a

piece of data that at one time they tested that 60 milliliters of a very alkaline solution, 9.72 pH -- and it didn't raise the pH of the 400 milliliters even a whole point.

It raised it from 7.09 to 8.03. And eight is certainly well within the range that the literature would indicate *Salmonella* tolerate. It's -- their optimum growth is 6.5 to 7.5, as the staff says. But they tolerate up above nine. So thank you.

DR. ENGELJOHN: Thank you.

Dr. Raymond.

DR. RAYMOND: I just -- since there's nobody else going to ask a question, for those who knew Loren, I just have to point out that was -- was that one last thing?

DR. ENGELJOHN: I don't see any other hands. Could we ask on the phone if there's any questions?

Yes. Dane Bernard.

MR. BERNARD: Dane Bernard with Keystone. I was probably multitasking at the moment. If I could ask for maybe a little bit more of the intent of

the guidance which is -- which you're going to work on as soon as you get back, I know. But -- don't rush on our account. But --

DR. BENNETT: I've already started, Dane. It's too late.

MR. BERNARD: -- give us just some idea of the intent of the guidance.

DR. ENGELJOHN: Yes. The -- and Patty, please correct me if I get your assignment wrong.

But the issue with regards to the guidance is that we recognize -- particularly the presentation that Dr. Laura Hulsey made yesterday, which walks you through the entire slaughter-dressing process and identified the points at which, from a literature review -- that our technical-service-center experts had conducted points at which there are in fact known effects with regards to intervention controls.

And I think it's fair to say that the document that we're working on will take that information and put it into a form that is easily followed in terms of following the points and understanding the information as well as providing a

literature review.

And so the first process here will be to capture the information from that presentation, which is a rather extensive literature review on the issues at slaughter dressing, and then as we've captured information from this meeting, get in additional information from the industry.

As we get the transcripts back and the questions and answers that can in fact answer questions within the document, we will modify that compliance guideline over time.

Our intention is to provide compliance guideline in an effort for industry, particularly small businesses, to be able to understand how to take the science related to an issue and practically apply it. So it really will be a walk through the slaughter-dressing process with a literature review associated with it as a first cut. Okay.

There were no questions on the phone and no more questions in the room.

Well, I do want to encourage all of you to submit your written comments to the Agency. I believe

you have 90 days to do so. And I would say, as we pointed out in the document -- the Federal Register document, we're going to study this at least for the course of this next full year in order to see what progress we see.

We have a particular interest in the change from categories 3 and 2 down to category 1, but we certainly will take your input into the assessments that we're making about this policy. We want this policy to work, and we know we need to work with you to do so.

And so the goal here will be to -- we'd like to get your comments within the next 90 days. We'll accept that at any time. I should always say that. Even though a comment period closes, we as an Agency are open to input as you generate it.

So if I could then, I'm just going to start into my presentation, and then we'll wrap up this morning. Oh, I'll get the lights. I can multitask. And for those of you who don't know me, I'll introduce myself here at the end of the presentation, but -- at the session that we've had

here.

But I've -- my name is Daniel Engeljohn. I have about 25 and a half years or so experience with USDA, both with the agriculture and marketing service and with FSIS. My major issues within the Agency, particularly over the last 15 years or so, have been in process, products and policy development.

So my responsibilities in the Agency are developing the regulations, the directives and notices that guide our -- you know, our inspectors on their daily activities. So I'm within the policy office.

And my educational background is in animal science and meat science and mycobiology, as well as human nutrition.

I'm going to summarize the meeting for you as I saw it occurring over the last day and a half. On day 1, we had some presentations related to the purpose and the background, the reason why we need to have this meeting at this time, and to start the ball rolling on making changes within the behavior of the industry, as well as how the Agency utilizes its resources.

So we talked about the original pathogen-reduction strategy. Really, what was -- the final role was really the stimulator here. You received information about the most current *Salmonella* data from 2005, which I understand should be made available by the Agency by the time we close here.

We talked about the new risk-based focus on pathogen reduction in broilers. This really was why did we select the categories that we did, categories 1, 2 and 3.

We had an excellent presentation on using evidence-based information to address what research has been done and how effective is it through the systematic review of intervention strategies.

And then we got an extensive overview of the poultry-slaughter process, which will be translated into a compliance guideline within days as opposed to weeks that would be available to the industry.

And our goal within the Agency will be to ensure that every plant has a copy of that information and that our employees do as well, as well as provide

you the public a means by which you can request that information. So that information you should find out about through our constituent updates. So we'll make that information known as to how you can obtain a copy.

And then you got a summary of the food-safety assessment report on vulnerabilities that we as the Agency have found have been those issues within the food-safety systems that we have found not being attended to that, when attended to, tend to result in establishments having control over their pathogens.

In the afternoon -- began the process of having an ante-mortem controls overview where we looked at pre-harvest issues, environmental considerations, and particularly small-plant concerns. And we as an Agency are always looking at what we need to do to address small-plant concerns, not only for the industry itself, but for our employees that are employed within those facilities.

Our goal is to ensure that the guidance that we make available to the industry can in fact be applied by the individuals with the least amount of

resources so that we are actually giving them the how-to to meet the expectations of the Agency.

And then we got an overview of the slaughter-dressing controls related to the scalding, defeathering, evisceration, chilling, and grinding, and the effectiveness of antimicrobial interventions.

Today then we had a summary of presentations related to industry perspectives. And I think you got an excellent overview of what has worked within the industry, particularly within the poultry industry, as well as some of the activities that are going on right now in order to better characterize the effectiveness of the food-safety systems.

And then, I think importantly, we all got to hear what the beef industry considers to be their perspective as to what worked with regards to ultimately gaining control over *E. coli* 0157 in beef. And we as an Agency are in concurrence with the industry in that together --I think both of us work together to ensure that we in fact had a real positive impact on public health.

And I think our message to you as an

industry as well, beyond just beef, is that we're at the beginning stages now with regards to *Salmonella* control where we need to work together to make this work.

And then you got a perspective from FSIS on our next steps, the current thinking that we're going to be pursuing with regards to how we want to ensure that there's better process control with regards to *Salmonella* particularly.

But I do want to point out that although we have had a focus on *Salmonella*, we also have issues with regards to *Campylobacter* as well as other pathogens that need to be controlled within the food-safety systems.

And I think you will find in the future that we won't be just looking at one pathogen, one process. We really need to collectively know what's happening in the food-safety systems with regards to the pathogens of public-health concern.

And from the Agency's perspective, we -- and part of my job specifically is to ensure that whatever policies we put in place are measurably

having an impact, and in this case, on exposure of the public to pathogens of public-health concern -- but most importantly, as we get better attribution data, that the public health is in fact being better protected to food safety.

I have some take-home messages, three that I want to just reinforce as you leave today. Effectiveness of *Salmonella* control will closely mirror the continued focus that we've had on beef for *E. coli* 0157:H7 control.

I don't want anyone to believe that we're going to step down our focus on *E. coli* 0157 in beef or in any other product for which we find it emerging. We have the resources an capability to ensure that we continue to focus on this particular pathogen and that we don't lose the progress that was in place.

Having said that, we also want to ensure that we use our resources in a way that we can address other problems. And we consider *Salmonella* in all classes of products to be a problem.

Our initial action will be on broiler carcasses because of the persistent upward trend that

we've seen there. We're going to follow that up as quickly as we can with beginning to test turkey carcasses -- and to begin establishing a baseline for where we are in that particular product class.

And I do know that the industry has done some baseline studies within maybe the older broiler -- or older turkey classes. And the Agency has not received that information. But I'm inviting you as an industry on any of these raw-product classes -- that if you have information that collectively you want to submit as an industry, you should consider doing that.

The Agency is trying to find ways to work with you on the data that you have so that we don't use it against you, as many of you have often in the past felt that the sharing of data resulted in punitive measures. And we're trying to overcome that by demonstrating that we can assess the information you have and work together to enhance public health.

We also have problems in hog carcasses. I just want to reiterate that there has been an increase in the hog-carcass classes with regards to *Salmonella*,

although it's been erratic. It's been up and then down. But we do have an interest in focusing there as well.

And then more importantly with the ground products -- because the highest prevalence or at least the percent positives that we're finding is in the ground products. And it's the source materials that we want to focus on first, and then we'll focus on those ground products.

And the *Salmonella* when we're dealing with raw products -- unlike 0157:H7, which we know undercooking was a problem -- we do know that with the raw classes of products, that cross contamination of the raw products can in fact be a major pathway by which people are transferring the organisms onto other surfaces or other foods.

And so just fully cooking the product isn't going to take care of the issues with regards to *Salmonella* on raw products.

The second take-home message I want to leave you with is that the industry-wide shift to category 1 level process control for *Salmonella* is

expected to be timely. We as an Agency have set forward some markers, or at least we put in the document that we'd like to have 90 percent of the industry in category 1 this next year.

We'd like to see what the industry is going to do to gather information that they're going to share with each other, as well as to enhance their food-safety systems to address this issue. We think it is necessary to have a timely response.

The public-health benefit regarding reduced exposure to serotypes causing common human illness will be more closely tracked. We in fact are telling you that we believe that, although we're looking at *Salmonella* process control, we in fact are looking at those serotypes that are causing human illness.

We're working with CDC and other public-health partners to ensure that we are in fact having a major impact on public health with regards to control for *Salmonella*.

And then finally, we expect to seek a means to continue the dialog with all the

stakeholders. This will ensure that we have continuous improvement for the control of *Salmonella* and other pathogens of public-health concern in raw products.

We don't have any set and firm decision made as to how we're going to move forward, other than we've told you we're getting control over the resources that we have within the Agency as to how we are going to be looking at the industry's control with raw-product classes.

But we're open to hear from you how you think things would work better. What incentives do you think would provide you the appropriate means to justify the added expense of having a measurable impact on reducing pathogens of public-health concern?

If you have concerns other than production volume and you think that there are other things that would encourage you within the industry to actually expend the resources to have better process control, we want to know what those are.

And we'll find a way to work with you on ensuring that our regulatory process is not an

impediment to innovation.

Those are the three messages I wanted to leave you with. We're open to hear from you. We've heard 28 speakers in a day and a half. And I want to thank all the speakers. Every one of you did in fact stay within your time frame.

I think every one of you gave us valuable information. I myself learned a great deal. I hope you did as well. We will capture this information and make it available to you as quickly as we can. And I thank all of you for your participation. Have a safe trip home.

(Applause.)

(Whereupon, at 11:45 a.m., the meeting was concluded.)