A One on One Interview with Dr. Don Huber

Part 1 (Hour 1)

By Dr. Mercola

DM: Dr. Joseph Mercola

HR: Dr. Don Huber

Introduction:

DM: Hi! This is Dr. Mercola. Today I'm joined by Dr. Don Huber, who is an expert in an area of science that relates to GMOs. He's going to help us understand some of the nasty insider tricks of what's going on with this GMO issue. He's actually gotten quite a bit of notoriety for his expertise in these areas. So welcome and thank you for joining us.

HR: Thank you, Dr. Mercola.

DM: I'm wondering if you can tell our viewers what your specific training is, and how you came to attain this knowledge and information on this very specific area of GMO toxicity.

HR: My area of training is soil-borne diseases, microbial ecology, and host-parasite relationships. In realizing that agriculture is a system and not just a bunch of little blocks that fit together, you have to understand how that system works. Realize that anytime we change one part of that system, we really change the interaction of all the other components as they work together. So each time we have a change, whether it's crop rotation, fertility (two different fertility programs), or herbicide interactions, we see those changes as they affect those components in the system.

My research over the last 55 years has been devoted to looking at those changes, how we can change them, and manage that system for more effective crop production, better disease control, improved nutrition, and safety of our food crops. When we look at such a major change you have in a genetic disruption from a genetically engineered process – as we understand it in our limited knowledge now – we see that there are opportunities and actual changes in all of those components. They fit in to the agricultural system, from the plant, the physical environment, the dynamics of the biological environment, and of course, pests and diseases as they interact together. Those have been the areas of my research over time that brought me to this point.

DM: Let's just go back a little bit to your background. You're currently living in Idaho. Were you raised in Idaho?

HR: I moved to Idaho in high school with my family. We moved the dairy up from Arizona.

DM: So your parents were dairy farmers?

HR: My parents were dairy farmers. I was raised on a dairy farm. I was at the University of Idaho as a professor for eight years, before going to Purdue University. I worked there on staff as a professor for 35 years.

DM: What do you teach at Purdue?

HR: Plant pathology, soil microbiology, those micro-ecological interactions as they relate to plant disease.

DM: I'll just review my understanding and you can modify that as we go along. I suspect your expertise in this area is related to the fact that one of the major modifications that's done in GMO crops – by Monsanto primarily –is an herbicide resistance against the pesticide. The most common pesticide used in the U.S. and I suspect the whole world, which is Roundup, and which is also glyphosate pesticide, I believe. As a result of that, they are able to essentially kill the weeds, more efficiently or cost-effectively produce crops, and supposedly at a lower price. That's the working premise. That's a whole other issue, whether that's true or not.

But what I like you to comment on is how the introduction of that resistance, which allows and displays massive amounts of this very toxic glyphosate pesticide into the environment, how that impacts the soil microbes. One wouldn't think that it would affect it necessarily, because it's an herbicide, which are directed toward plants – not necessarily animals or even bacteria – but apparently it does. We'd like you to elaborate on that, because you have found some really interesting observations.

HR: What you have to do is realize what an herbicide is, or a pesticide. They are metal chelators, in other words they are able to immobilize specific nutrients. That's how they perform their function as a pesticide, by immobilizing an essential nutrient that is required or kind of keyed for a specific enzyme.

DM: Do they work on a variety of different mineral chelators, or there's one or more that they target specifically?

HR: Most of our pesticides or our herbicides are quite specific. For instance, if you look at a phenoxyprop or Tordon, those will be copper chelators, in other words they're specific for particular copper relationship. By chelator, we mean it's a compound that can grab onto another element and change either its solubility or its availability for that critical function that it has physiologically. We have those herbicides and pesticides that are quite specific just for a particular essential micronutrient like copper, zinc, iron, or manganese.

Glyphosate is very unique and was first patented as a chelator by Stauffer Chemical Co. in 1964, because it could bind with any positively charged cation. If you look at the essential minerals for plants, you see calcium, magnesium, potassium, copper, iron, manganese, zinc, and all of those other critical transition elements as well as structural components for some of them.

But you see that there are all cations. They all have an ion that is associated with them. But it's the micronutrient that's a cation that is a transition element or that element that really is critical for a particular enzyme function.

If you can chelate and, in that chelation process, essentially immobilize that essential nutrient, you have provided an opportunity to either kill a weed or damage and kill an organism. Any organism, any weed, or plant that would have that particular requirement for that physiologic pathway with glyphosate or the shikimate pathway, then you have an opportunity to have a very effective herbicide.

You have to realize all that mode of action is immobilizing a critical essential nutrient. Those nutrients aren't just required by the weed, but they're required by microorganisms. They're required by us for our own physiologic functions. So if it's immobilized, it may be present if we do a regular test. But it's not necessarily physiologically available in the same efficiency that would have been if it wasn't chelated with that glyphosate or other chemical chelator.

DM: For those who aren't familiar with a chelator, chelator just means it's complex. When it's complex to these essential minerals, it essentially forms a barrier around it, which prevents whatever life form is seeking to utilize that element from utilizing it properly. I'm wondering if it's a side effect of glyphosate to affect the bacterial organisms in the soil that you're an expert at, because it seems to me it wasn't designed to be a part of it. It's sort of a side effect that they haven't anticipated. Does that seem to be the case?

HR: Again, any organism that has the same physiologic pathways is going to be impacted the same. What you need to remember, though, in a genetic engineering process there's nothing in the technology that does anything to the chemical it supplied. All it does is ascertain other gene that make it possible for you to apply that chemical directly to the plant without damaging that particular plant.

The glyphosate – even in that herbicide tolerant plant, that Roundup-ready plant – still has an impact on 25 or 26 other enzymes, because it's also chelating or immobilizing critical micronutrients. Those cations that are required as the keys to turn on those physiologic engines that make that organism or plant really function.

In our genetic engineering technology, we do nothing to reduce the chelating ability. We only provide an alternative pathway for that plant to survive the application of this toxic chemical being applied to it.

DM: Would it be fair to assume that because that plant doesn't have access to those critical nutrients that other metabolic pathways are impaired, the result is not going to be able to provide that same of nutrition to the end consumer who is consuming that plant?

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HR: Well, it is well documented that the nutritional efficiency – just having that foreign gene inserted – reduces the capability of that plant to take up nutrients and to translocate nutrients. Then when you apply the chemical, you have a further compounding effect in reducing the efficiency of the plants at rates is low as a half-pound per acre –12 grams per acre.

DM: *[Laughs]*

HR: It's been demonstrated that you reduce the uptake and efficiency of iron by 50 percent of manganese that's critical for liver function and immune response by 80 percent. But then if you look at the translocation from roots to shoot, you also have a reduction in zinc and all three of those critical elements of 80 to 90 percent. Greatly compromised is the nutritional efficiency, as well as the ability of that plant to accumulate and to store those nutrients not only for its own use, but also for us and for our animal's nutrition in that process.

DM: Thank you for pointing that out, because my impression is that most people who are even moderately familiar with GMOs tend not to fully appreciate what you just said. It's a really important concept. Somehow they think that when it's a genetically modified food, it's magically more efficient. They don't understand that this application to pesticide has a complication on the plant itself, which just impairs its own nutrition, but doesn't magically disappear.

That pesticide is still loaded in the plant. Not only are you getting a compromised plant from a nutritional quality perspective, but you are also getting toxic residues of the very herbicide that was used to provide a supposedly more efficient and more cost-effective plant. You're compromising your own health.

There's this whole other component that you're getting genetic modification itself, which is inserted into the gene and which has been shown in a number of animal studies to have complications such as decreased fertility. It's just panoply of problems.

HR: Glyphosate, of course, is very unique and it's systemic in the plant, so it accumulates in most growth points.

DM: Oh, so it's not just on the surface?

HR: No. That's going to be within the plant.

DM: And you can't wash it off?

HR: No. It's going to be in your root tips, your shoot tips, your legume nodules, and in the food that we eat. Because it's in those reproductive structures, that's where it accumulates. The later it supplied, now that they're using glyphosate – as ripening agents to kill a plant to kind of speed up its harvest process – the only place that it can go is right into the seed. About 20 percent of it moves out of the roots, so it moves down out into the soil where it has the same effect on many of the beneficial soil microorganisms that it has on weeds, because they have that same critical, essential metabolic pathway.

But our residue levels are increasing every time we have a new Roundup-ready crop approved. We also see an increase in tolerance levels in the crop.

DM: We could end the interview here now, because I think you've just given us enough information to be more excited of the process of becoming an activist to eliminate this threat to our food supply. You've got a lot more information. But what I'd like you to comment on now – which where you have your area of expertise – is how a pesticide or an herbicide influences microbial organisms within the soil. You certainly understand this at a very deep level, and I think many people do, but many don't.

The quality of the food is almost always related to the quality of the soil. The most foundational, vital, critical components of the soil are the microorganisms that are thriving there, rather than the necessary nutrients, because it's the microorganisms that allow the plants to utilize those nutrients. So I'm wondering if you can comment on that.

HR: The plant can only utilize certain forms of all the nutrients. For instance with manganese, most iron has been in reduced form. The way that it becomes reduced in the soil is through those

beneficial microorganisms. We also have those microorganisms for legumes like soybeans, alfalfa, peas, or any of the other legumes that can fix up to 75 percent of their actual nitrogen for protein in amino acid synthesis that actually comes from the air through the microorganisms in the soil.

Glyphosate is extremely toxic to all of those organisms. What we see with our continued use and abuse of this powerful pesticide, this powerful weed killer is it is also totally eliminating many of those organisms from the soil. We no longer have the same balance that we used to have.

Consequently, we see an increase of over 40 new diseases or 40 diseases that we used to have managed under fairly effective control, but all of a sudden are another serious problem for us.

DM: These are plant diseases?

HR: These are plant diseases. The other thing we see is that the normal biological control organisms, even in the animal, are very sensitive to the residual glyphosate levels. I was just reviewing a paper – as I flew out here yesterday – on chronic botulism or toxic botulism type problem. This is where you have the Clostridium botulinum in the intestinal tract. It's a common soil organism everywhere. But all of a sudden we're seeing cases now, especially in dairy and other situations, where the animals are dying and becoming impaired from the botulism toxin from the Clostridium in the intestinal tract, and rumen in the stomach. That normally didn't occur before, because you have all of those organisms that provided the natural biological control.

In this paper, what they show is that residues of glyphosate that are permitted in our feed and food products are high enough to kill those normal biological control organisms – your Lactobacillus, your Alcaligenes. The numbers of those organisms are very effective in preventing the toxin production by Clostridium that those organisms are eliminated by glyphosate levels that can be in our food and feed supply. Then the animals suffer the same effects as with giving them treatment of this very intense biological warfare chemical that is produced naturally in the intestine, without that balance again.

Again, agricultural system, as well as our own ecology, is really a balance. It's a system, not just a bunch of silver bullets that are stacked in a chamber of a revolver. It's how that ecological system is modified and changed that brings us a new level of diseases and problems with sustainability of our agriculture, our own health, and well-being.

DM: That's fascinating. Can you outline the major crops that are affected by glyphosate now and the new ones that are in the pipeline that might hit the market soon?

HR: Those that have been genetically engineered for herbicide tolerance, of course, are the major crops. You have corn, soybeans, canola, alfalfas…

DM: Does corn have resistance to glyphosate? I thought it was the – Oh, it was the cotton that had the BT toxin.

HR: Yeah. Well, you have cotton and corn that are both BT and Roundup-ready.

DM: Oh, I didn't realize that.

HR: Also several other herbicides that they're now putting genes into.

DM: So, it's in cotton and soy? I mean cotton, corn, and soy.

HR: Right.

DM: All the major ones?

HR: All the big ones there. We've just approved – our USDA just deregulated alfalfa. So here you have a crop, a perennial crop. A legume, you put glyphosate on it. You do two things. One is you take out your nitrogen fixing efficiency. Because it's very toxic to the radio rhizobium and rhizobium that fix the atmosphere at nitrogen, those organisms that are critical for that process.

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Again, as a systemic chelator for nutrients, it chelates the nickel required as a co-factor for that enzyme process, so it just turns it off. You may have a nodule. You may have even some bacteria present, even though at greatly reduced numbers. But you don't have the functional capability because all of that system has been disrupted.

Alfalfas are fourth most important economic crop, by far the most nutritional feed for our herbivores. They all of a sudden can definitely be threatened not only because of the direct effect of glyphosate on those microorganisms, but also because it predisposes and can make that plant very susceptible to some common diseases that are very effectively controlled. We can see this one on corn. We haven't seen it on alfalfa, because we don't have the Roundup-ready out long enough. But we certainly see it on corn where we have the sister organism with the Goss's wilt, a bacterial disease. In that situation, we find that when we put the glyphosate on, it nullifies all the genetic resistance such as in the past made that disease of almost no consequence to us, very limited situation, very sporadic, and any severity.

Now we find it from coast to coast, East to West, from Mexico to Canada. For four years now, we have a major epidemic in a major food production area in the Midwest. Just from that disease, that is a direct result of our genetic engineering process that reduces the genetic resistance and the application of the herbicide that it was designed to tolerate.

DM: Now I'm wondering if this glyphosate is fat-soluble, because if it is, it's bad enough that we're eating these pesticide-contaminated crops and then consuming these genetically modified cells in our body. If it's, in fact, the number one crop for the herbivores, alfalfa, and it's contaminated with this herbicide, I'm wondering if the herbivores that eat it, do it bio-accumulate in their systems, so that you get levels and concentrations that are much higher than the plants that they are eating, because of the bioaccumulation effect?

HR: I think from Dr. Hannah Mather's research at Ohio State University with perennial crops, she had shown that the crops will continue to accumulate it for 68 years. That's the length of her studies.

DM: So the crops are accumulating?

HR: The crop is accumulating.

DM: Is it accumulating from the soil or just repetitive applications?

HR: It can do it either way, but from application, certainly it accumulates it. We generally think of glyphosate being such a powerful chelator that it will also be detoxified as it generally gets into the soil with a little bit of time. It will combine with the calcium, magnesium, iron, manganese, and other nutrients in the soil. So it's not necessarily degraded, but it's detoxified. Later on then, it can also be reactivated just through the application of phosphorous fertilizers.

Again, for subsonic crops, it can be a very active chemical or plant toxin in the release and uptake by the plant.

Again, it doesn't take very much. You look at a half ounce per acre from acre studies, and that from just the 140th of the normal application rate, which should be an extremely low drift rate. We're talking more of what we're starting to see in our air and water anymore. Those extremely low rates, you have a very powerful effect on reducing the nutrient efficiency and nutrient quality of the plant as well as for its health and our own health. Because of its effect on those intestinal organisms or normal biological organisms that are in the environment for us…

I think that's the importance of this paper that will be coming out. I saw the presentation when I was in Germany two weeks ago in one of the meetings. I had the opportunity to (I mentioned flying over here to visit you) to review that paper. I saw again that there's enough residual glyphosate potential in our feed and food to all of a sudden make an extremely benign organism fatal or lethal in that process.

We have recognized the potentials of those organisms with infant botulism, where they don't have that full intestinal microflora and one of the reasons why we probably don't recommend feeding a lot of our basic foods to our infants until they can develop that natural biological ecology to control many of those organisms.

Certainly, the potential's there, but for our dairy farmers and parts of the world, that's not a potential. That's a real life situation that they have to face and address right now.

DM: So the individual who's consuming non-organic food, which is virtually the majority, almost everyone in the United States, to some extent or another – when they're consuming this glyphosate-contaminated food, does it interfere with our own good ecology, the way it does with the plants? Is the mineral chelator activated and disturb our own good ecology?

HR: I think two things are involved here. One is that the research hasn't been done, but should have been done probably 15 or 20 years ago. The other thing is the reduction in mineral contents through chelation by the glyphosate makes an individual much more susceptible.

As Dr. Jeffrey Seaford at the University of Minnesota, a veteran toxicologist, reported this year and studying malfarmed animals and also the increase in disease and silvers. He found that in 100 percent of the cases they're deficient in manganese. You have to ask why because 15 years ago, the nutritionists were saying that we're probably a little high and we have to cut back, not realizing at the same time that we introduced Roundup-ready crops that can have as much as 50 percent less manganese available in the plant that we're feeding to those animals. So the intake is down, and ours also.

You have that effect from a nutritional standpoint, but then you also have the direct toxicity of the glyphosate to those beneficial organisms that have been demonstrated in animals. I don't think there's any reason to assume that they're not going to have the same effects on our own microbial ecology in our intestine, as they would on animals, because they are similar organisms.

DM: So the studies that have been done with animals show that it does impair the good ecology. And to your knowledge, these haven't been performed on humans yet, no one's looked?

HR: I think people haven't even thought or even looked at it, because the advertising says it's such a safe product. Why do we even do the research?

DM: It's so shockingly tragic. I think part of it is related to the fact that very few physicians really fully appreciate the impact of our gut flora on our health. I mean there's a small contingency to do. But in my perspective that is probably the single most important physical factors to our health – to optimize our gut flora. Many of the dietary changes we recommend, such as avoiding sugar and eating plenty of fruits and vegetables, they work primarily by optimizing our gut flora. *[Laughs]* If they continue consuming foods that are damaging to them, it's obvious that it will have an enormously detrimental impact.

I'm still curious, though. When the cows primarily and the other herbivores are fed with these contaminated alfalfa crops with the glyphosate, does it bioaccumulate into their tissues that when you eat non-organic meats that have been fed these contaminated crops, are there higher levels of glyphosate than when you're eating the plants?

HR: We don't know. That's one of the questions.

DM: We don't know! *[Laughs]*

HR: That's one of the reasons why I wrote a letter to the Secretary of Agriculture!

DM: Okay. *[Laughs]*

HR: That was, let's do the research before we jump off the cliff!

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DM: *[Laughs]* Oh, I think we jumped already. We're falling and we haven't hit the ground yet.

HR: That research hasn't been done. It's being done on animals.

DM: What's your guess? You have been a scientist for decades – for many decades. What would you… It seems that it would.

HR: Oh I don't think there's any question that when you consume that, it's going to have the same effects on those organisms. It's in the 1988 review on glyphosate. It mentioned that it's a very powerful herbicide and a very potent biocide, very effective against certain organisms at extremely low concentrations. Those low concentrations are all permitted in our food and feed approvals.

DM: Is this fat-soluble? I don't know, is it?

HR: I don't know.

DM: Okay, we don't even know.

HR: Certainly, it's water-soluble.

DM: It's absolutely water-soluble. Because if it was fat-soluble, I think it's no question it would bioaccumulate. If it's not then it may be less of an issue, because it's excreted in the kidneys.

HR: We know that it moves through the animals. There's a slight degradation, but most of it moves because we can find it in the manure. We do find a certain percentage of it that will be to the first degradation product of glyphosate that is the (ANPA 31:29), which is even more toxic than glyphosate is. You can have partial degradation, but we're finding very high levels of glyphosate even in the manure when you consider how much is going into the animal. We don't know how much is accumulating because much of that research hasn't been done.

DM: You've mentioned you wrote a letter to the Department of Agriculture or the USDA. The secretary of that is Tom Vilsack. Maybe you can review the relationship that he has with Monsanto. He wasn't directly employed, but he was certainly a proponent of working with them when he was a governor of a state not too far from here. I'm wondering if you could comment on that relationship first and then we'll go to the other issues.

HR: I really don't know what that relationship it's been. I hear about it, but I really don't have any direct information.

I wrote the letter as a very private letter to learning to the fact that what we're seeing now in agriculture isn't normal. We have some very serious concerns that are raised for crop production, for animal production, as well as for human health, that need to be addressed. My request in that letter was kind of four-fold, but it was to learning those increased plant diseases that we were seeing and reduced nutritional value of our feed and food. Also to a new entity that was causing reproductive failure.

The request is assistance and the resources of the USDA in obtaining that information before deregulation of Roundup-ready alfalfas, so that we could do the research rather than suffer the consequences.

DM: Have you had any response from the secretary yet?

HR: Yes. I wrote the letter on the 17th of January. I received the response from Dr. Parham, head of the USDA-APHIS, who would be then the natural person to respond to that letter. I got a letter in response on May 2nd, assuring me that all of the decisions that the USDA makes are based on peer-reviewed science and so I responded to that letter. I have had an opportunity with some other scientists to visit with those people, top administrators. We tried to work out a cooperative and working relationship rather than an adversary one.

But I did respond to that letter and pointed out 130 published peer-reviewed articles that documented the concerns that I have. Then I asked if they could provide me a peer-reviewed scientific study that would justify the regulation of those products. I'm still waiting for that. I haven't found anyone that can produce that type of document.

Certainly, when we looked at the Gallagher study – as commissioned by the Indian Supreme Court to evaluate data that are submitted to a governmental agency for deregulation of a genetically modified crop – you find certainly in that situation, as they summarize, that data doesn't meet international standards for that type of study. Certainly, you wouldn't justify the health and safety risks that are indicated by the limited data that was available for their analysis. We just haven't done the research. We have assumed safety based primarily on marketing potential rather than based on science in those decisions.

DM: I'm curious about your dialogue with the chief scientist over at the USDA about this topic. It sounds that they were able to meet with you. You exchanged, that you wrote this letter expressing that you have yet at this point (which is right by Thanksgiving that we're doing this interview) received a response. But it seemed from your perspective that they were open to dialogue – or do they just take this information because they were doing the job and sweep the data under the carpet?

HR: I think we had a good dialogue with them. It's not much a dialogue, but an opportunity for those of us that took the question that concerns them. It was an opportunity to share our concerns. We had very excellent discussion in that process of what research was needed, where the holes are in the understanding, and what's happening. They indicated they would do some background investigation in that process. I hope that they would do it as a result of the initial letter.

I did receive a call from Risk Management about two weeks after writing the letter, asking if I could provide details, because there wasn't anything in the letter. The letter was written to a politician. I didn't want to disclose names of scientists or details because of the retaliatory effect that we see with anyone researching this area – they can be either fired from their job or their program shut down. That's a real fact.

DM: Wow. That's a pretty amazing statement you just made. I'm wondering if you could expound on that. If you'd be willing to, because there's a suggestion that the industry is really funding the research in academic circles that are doing the peer-reviewed studies that we can use to either document the safety or the lack of safety of it. It appears that someone's voice could dissent from this position that they're squelched. I'm wondering if you could expound on that.

HR: I think that's fairly well-documented. All you have to do is look at the statement of what the 26 North Central entomologists wrote. This is where the scientists who were set up as a regional project to determine the biosafety of genetically engineered crops. As a point of frustration perhaps, they wanted to notify the EPA, which they did. That public document that they sent in, they asked that their names be withheld because all 26 of them said that their funding is dependent on industry support.

But in that statement they learned that the EPA, the fact that they really denied access to the materials they were appointed to determine safety of. If they did the research, they were prohibited from publishing it. So the consequence was that the EPA had no objective science to base a regulatory decision on, because that science isn't either available or accessible to them, or the research hasn't been conducted on it because of the proprietary products that they're prohibited to evaluate.

DM: So because of the patent, they would be breaking the law if they did a research on that?

HR: That's right.

DM: How did they – is this through political lobbying? They created this structure, this crazy legal system that makes it illegal to evaluate something for human food safety?

HR: If you even read the technology agreement that the farmer has to sign, he can't even do research on his own farm to compare whether this crop or this product is better than another one without violating the terms of that technology agreement.

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It's essentially a closed system to guarantee success.

DM: I'm getting so angry. I want to get the baseball bat and start swinging.

From your view, from your perspective as a veteran research scientist, as an insider in this industry, if this is a risqué system and there really is no way around this because of the control, that primarily Monsanto and other industry leaders have been able to manipulate the system to essentially make it illegal to do a research with a funding to do? They have essentially monopolized the whole regulatory process. From my perspective, it seems that way. This is an important issue. If we can't do it the way it was designed to be done, we have to do a workaround. So what's your take on it?

HR: Certainly, a group of us that are working together on the new entity causing reproductive failure, also some of these crop disease problems, and some new situations. As we try to look at that, we have even obtained private funding, taking it to the experts in the areas of specific diseases, and tried to encourage them to work on it. In the past year, they have been prohibited from working on it by their universities or department heads.

DM: Even though they had private funding?

HR: Even though there was outside funding for us. That's one of the reasons why we needed that contact with the USDA officials, in hopes that we could share the problems that concern them, that they would recognize the serious nature of this, and that we could obtain their support and use their resources for funding of individuals and specialists. So that we could overcome that barrier that seems to be there for anyone working on genetically engineered crops that might indicate that they're quite not everything that they were cut out to be. It's almost as though you have to belong to that religion, if you're going to do any research or publish your research.

DM: Which is obviously highly biased and prejudiced, which is not going to produce objective truth.

HR: We're hoping that they promise that they all seriously consider grant proposals. Those are being written now to address the issues. We're hoping that the indication that they gave us, they will be more than willing to consider that financial support for those who plan to research. We're hoping that in a cooperative role, we can work together in the process.

It's certainly very critical for the new entity, as well as for just the mushrooming type of an effect that we're seeing on crop and animal production. When you look at the tremendous increase in human diseases that can have a potential tirade directly back to either the chemical or the engineering process, it's critical for that research to be done as quickly as possible. We need that resource to do it. The private funds, again, aren't going to do everything because there's just too much to be done.

DM: It's not only the funding, but also the prohibition by most of the senators that actually have the resources to do it. Even if you have a billion-dollar grant to do it, you're not going to be able to do it, because the research will kick you out. I guess you can start your own lab, but that's not very likely. I'm wondering if you can comment on these novel organisms that are having impact on the crop failures or the entities.

HR: We're not sure what it is. It was first identified by veterinarians who were confronted with very high reproductive failure in animals. This was probably in 1998 or 2000. It was a sporadic, kind of a limited situation. We initially thought that it might just be one of those bubbles that happen and never be able to really explain it, but it's continues to become increased in severity.

We received a call, Monday for instance, from a county extension educator, indicating that he has a dairy that has 70 percent abortions. You put that on top of 10 to 15 percent of infertility to start with, and you're not going to have a dairy very long. In fact, a lot of our veterinarians are now becoming very concerned at the (48:07) for being able to have replacement animals.

DM: Quick question on the timing of this observation in the veterinary medicine. Was it prior to the introduction of the genetically modified alfalfa, which should seem to make this problem probably even worse?

HR: We introduced our first genetically engineered crop in the States, 1995 or 1996 period. It was 1996 when the Roundup-ready soybeans really took off. Two to three years after that you started seeing it – there's typically a lag period for a lot of those things, so that would fit. It continued to increase and attracts fairly well with what we see with the increase usage of our genetically modified crops, especially with the Roundup-ready or the BT traits in them.

DM: Do you expected to see more in the livestock from the introduction the foods that they were primarily eating with the alfalfa as opposed to the soy or the corn or do they still feed them corn?

HR: They're feeding the soy and corn.

DM: Oh, okay.

HR: Roundup-ready alfalfa was just deregulated here this year. Now, deregulated in 2005, 2006, and then held off the market through a lawsuit. Then it was deregulated here again this year.

DM: But do the livestock eat more of the alfalfa or more of the soy and corn?

HR: They're having this problem through the soy and corn.

DM: Okay. But what do they eat more of? What I'm trying to tell is if they eat more of the alfalfa, it's going to be a larger problem.

HR: Yeah. All that would do is exacerbate the problem.

DM: Right.

HR: If we see the same thing in it that we see in corn and soybeans. With corn, they also get it in the silage.

With the veterinarians, they have completed the Koch's postulates, so they have established the cause-effect relationship with this new entity.

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DM: And they publish this?

HR: They haven't published.

DM: Okay.

HR: The reason is we don't know what it is.

DM: *[Laughs]*

HR: It's not a fungus. It's not bacteria. It's not a mycoplasma or a virus – about the same size of a small virus. You have to magnify it from 38 to 40,000 times.

DM: They have pictures of it?

HR: They have pictures of it? Oh yes. You can see the interactions with it. They can now culture it. It's self-replicating and cultured. It doesn't grow very well by itself. Like most of our very fastidious organisms, it tends to die out three or four sub-culturing, but grows very well with other organisms. If you have yeast, bacteria, or a fungus in the culture, this entity goes very well.

We're waiting on getting enough material, pure material, for DNA analysis, but also looking at some other possibilities. We haven't published. Until you can put a name on it, all it does is create a great deal of speculations. That's one of the reasons why the letter was sent as a very private letter. The other reason was it could have a tremendous potential and impact on our exports, because where we find high populations of this – or in our soybeans, in our corns…

DM: This novel entity?

HR: It's a novel entity – new to science.

DM: But it's actually in the feed? It's in the corn.

HR: Oh yeah.

DM: Okay. Is it a virus, because most viruses don't they…?

HR: Well, it's not a virus.

DM: Okay, I'm sorry. We don't know what it is. I'm sorry. I just made an assumption. It has yet to be identified.

HR: But we know a lot about it. We know what it is, but we don't know what it is.

DM: *[Laughs]*

HR: Because it appears to be common in nature, but new to science. It's novel to our knowledge, that's why it has been a little slow to get all the information, because we're working with something from scratch.

DM: Do you have any guesses as to how this organism came about? Is it because of the chelating effect of the glyphosate created in the environment that sort of bred this new entity from the soil?

HR: One of the possibilities is it's boiling down to one or three potentials. None of the three are happy considerations. So rather than speculate on them, we felt like it's better to have that knowledge so then we'll know how to address or how to respond, because the response will be a little different for all of them. But what we do know is that it causes reproductive failure, infertility, as well as miscarriage for cattle, horses, pigs, sheep, and poultry. We can anticipate with that broad spectrum of animal species, which is extremely unusual, that it will also be with humans.

We see an increasing frequency of miscarriage and a dramatic increase in infertility in human populations in just the last eight to 10 years.

DM: Has this been documented, this increase in the infertility of human populations?

HR: Yes.

DM: Okay.

HR: You look at the numbers of fertility clinics that have sprung up. One area where they had one in the past, they have 14 now. I had a woman call me and said, "Well, let me tell you what my situation is. My five-year old came home from kindergarten and said, 'Mom, why don't I have any brothers and sisters?"' She said, "You do. You've got an older brother and a younger sister." And he said, "No. I don't have any brothers and sisters. Everybody else in school has a brother or a sister." What he was referring to was they had a twin or a triplet. This woman said that when she checked around with the other parents, the only way they get to have children is through in vitro fertilization.

DM: Multiple inseminations.

HR: If you look at where this entity is – again, with the veterinarians when they have identified it and the American Cattlemen's Association testified to it before Congress in 2002 – there were two conditions that were threatening the industry. One was this reproductive failure – as many as 40 to 50 percent of the pregnant animals losing their offspring. The other one was premature aging. A research in Iowa three years ago…

DM: Premature aging of the animals?

HR: Of the animals.

DM: It was accelerated by what rate?

HR: When they take an animal – a two or two and a half year old animal's prime beef – to market, it's downgraded to that of a 10-year old cow.

DM: Holy… *[Laughs]*

HR: There are studies three years ago in Iowa with non-GMO and GMO feed. I can show you some pictures of what that tallow looks like around the stomach lining. It's yellow and not that pretty white collar. Again, it's premature aging.

The other entity was this infertility. We see dairies with 30 and 40 percent – as I mentioned, they called Monday that they wanted some help. I got them the veterinarians so that they can verify that this is the entity. They have ruled out all the other known causes. So we can rule out the (56:30) virus, the botox, the mycotoxins, and all of the other known causes. But this is a situation.

When the veterinarians wanted to find the source for this entity, they went to the feed. The first place where they found high concentrations was in the soybean mill. Since then we find it in the corn. We find it in silage. Primarily in high concentrations only where we have a genetically engineered crop that has glyphosate applied to it. Those are the crops that we also see high Goss's wilt, high SDS. They are all correlated together in that relationship.

The other place you see it, though, is where they have used the manure that has a high glyphosate residue level in it. The manure also has very high concentrations, if the chickens or the animals that have been fed these feeds with high concentrations. We see it when that manure is applied to pastures and cattle graze on it. We also see high infertility rates there. It occurs in the placenta, in the fetus, in the sperm and inseminators. Stating that it takes twice as much semen now to get a conception and as many as four to eight inseminations rather than the typical 1.2 to 1.5 for a dairy because of that reduced fertility.

I was on a plane with that bull breeder who commented that 40 percent of his bulls had to be pulled out of service, because they can't get conception anymore.

If you look at the decrease in human sperm, it's less than half of what it was 20 years ago. That is, again, attributable to the endocrine hormone-disrupting chemicals we've had. After zein, we've had a number of others. Glyphosates are a very potent endocrine disruptor. It's a half part per million. You see an inhibition for amytase and other functions in the endocrine hormone systems not just for reproduction, but for thyroid function, pituitary function, any of those other levels, because all of those entities require critical micronutrients in that process as keys for those enzyme engines that drive those processes.

When you have a very potent chelator, then it disrupts all kinds of systems, not just the EPSPs system that we find in certain microorganisms and plants, but also all of the other systems involved in liver function, blood function, and hormonal function. They all go right back to that basic nutrient process that keeps all systems functional.

[END Part 1; hour 1]