

White Paper

Water and the Future of Animal Agriculture

Information synthesized from the National Institute for Animal Agriculture's Annual Conference, "Water and the Future of Animal Agriculture," conducted March 23-26, 2015, in Indianapolis, IN. Full presentations are available online at www.animalagriculture.org

DISCLAIMER: The information provided in this White Paper is strictly the perspectives and opinions of individual speakers and discussions at the 2015 Annual Conference of the National Institute for Animal Agriculture.

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ABSTRACT

The future of animal agriculture is inextricably linked to the availability of water. Without a plentiful supply, agriculture will cease to exist. As reports of entire states experiencing drought conditions dominate headlines, the prospect of running out of fresh, clean water is an ever-growing concern.

Water storage in many major aquifers is at an all time low and hydrologists are seeing a regional shift in annual rainfall across the world. Although there are droughts in many regions, there has not been a decrease in total freshwater. States in the Midwest and Northeast are seeing increased rainfall and snow, while areas like California and the Southwest are experiencing extreme drought conditions. These regional shifts are presenting a brand new set of challenges to producers today.

Great strides are being made on the technological front, allowing farmers to be able to use resources even more efficiently than ever before, regardless of their location or current situation. By embracing new technologies – including water conservation via more accurate water application, controllable drains, land forming and better data usage – producers are able to immediately address the problems they are facing.

If producers are to prepare for a future with increasingly limited resources while maintaining yields and profitability, new growing systems must also be an option to combat long term climate change.

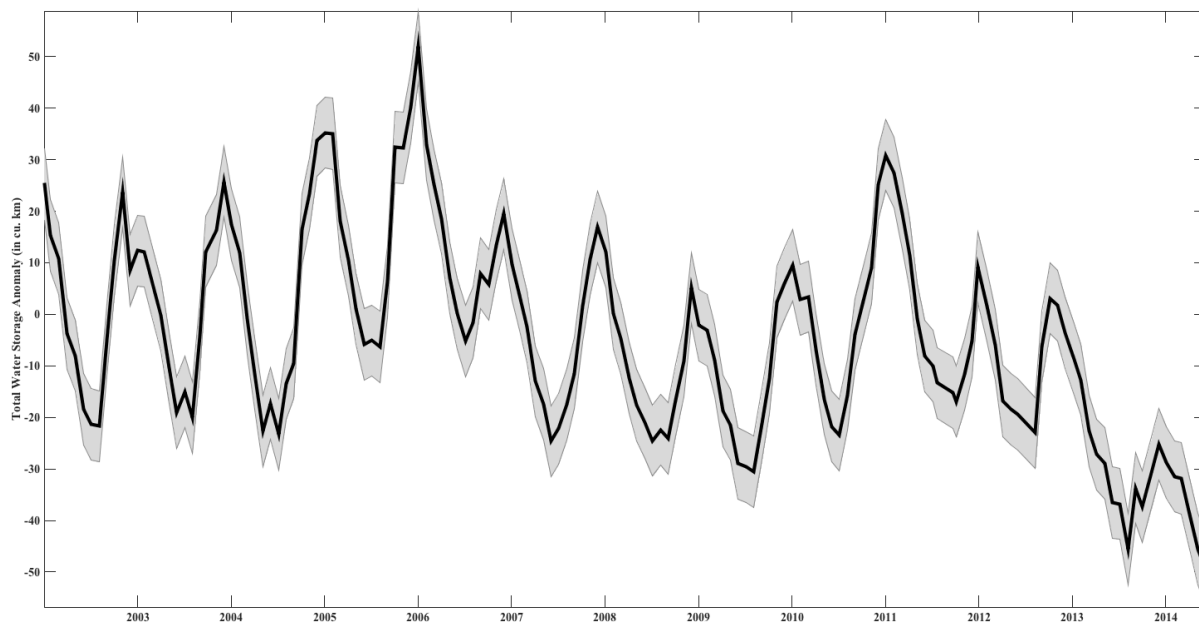
These conditions are creating a much more volatile operating environment for agriculture. The success or failure of future farmers and ranchers will be largely dependent on the industry's response to these challenges and the public's perception of actions taken. Today, producers are being asked to defend practices which used to be common. In the near future, decisions traditionally made in the field by the producer may be decided in a courtroom.

While media outlets continue to evolve, it is imperative young people are included in the conversation regarding water in the future. Emerging conditions will shift the public mentality from the "just eat it" mindset¹ to one in which the consumer is involved in the food production process. By opening the doors to the public through communication on social media and other popular media outlets, more intimate relationships can be developed with the consumer. It is through these connections producers and consumers can work together towards a more sustainable future.

PRESENTATION HIGHLIGHTS

More than ever before, technology is allowing scientists to track the amount of groundwater on earth. NASA's Gravity Recovery and Climate Experiment (GRACE) is tracking the amount of water in snowpack and groundwater on a monthly basis across the globe. According to data from this endeavor, California has lost eight trillion gallons of water per year for the last three years.¹

GRACE was launched in 2002 and functions like a "scale in the sky." The program is able to weigh the monthly increases and decreases in water storage within large (>200,000 km²) regions. Among other findings, GRACE has determined the Sacramento-San Joaquin River basin has had a downward trend in water storage since 2006, increasing in severity since 2011.



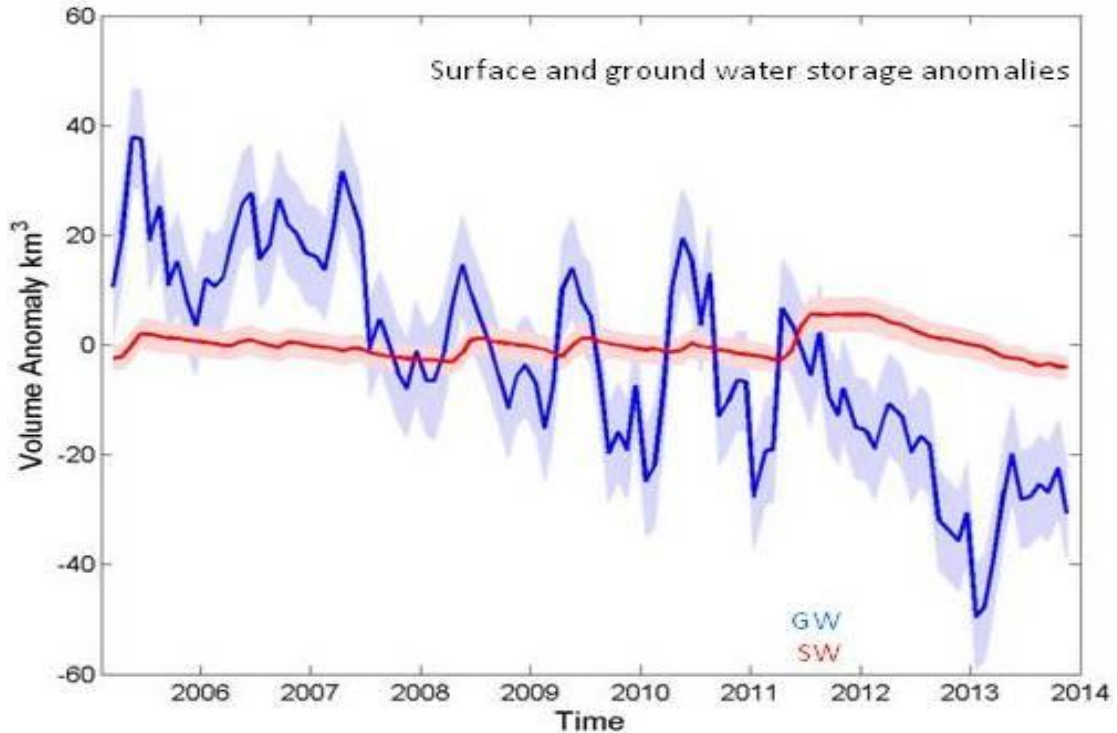
Change in total water storage in the Sacramento-San Joaquin River basins from GRACE 2002-2014

While GRACE tracks how freshwater availability is changing around the world, it is also being used to develop computer models to predict how water resources may change in the future. Based on these findings, the need has been established to start making changes now to prepare for the future.²

When surface water supplies run out in the near future, our water needs will turn to groundwater. This poses a major problem as groundwater is largely non-renewable and is currently unregulated in some areas.

More than two billion people worldwide rely on groundwater as their primary source of water with half or more of that used for irrigation.³

This can be demonstrated in Colorado, where water in the Colorado Water Basin has been declining over the last nine years. Due to drought, and the declining availability in surface water, people are increasingly reliant on groundwater.



Estimating groundwater storage changes with GRACE in the Colorado River Basin (2005-2013)



Historically, people turn to surface water to determine water availability. This is troubling as GRACE has found when surface water reserves suffer; groundwater depletion is nearly six times worse.⁴

Depending on the hydrology of the ground, excessive use of groundwater can cause terrain to "deflate." Areas in California have seen up to one foot per year of subsidence, creating severe threats to infrastructure. When surface water is readily available, groundwater is able to recover – slowing deflation – but the rate of recovery is much slower than the rate at which it is used. Groundwater storage has been on a decline all over the world since pumping began.

This is the definition of unsustainable: sharp decline with a very gradual recovery.⁵

Water is not necessarily being lost – the wet areas are getting wetter and the dry regions are getting drier. However, society must determine how it

will cope with these changes, whether by moving areas of production or an alternate solution.⁶ This will not be a steady redistribution. Flooding in wet regions and drought in arid regions poses a direct threat to supply chains and animal exposure.

In order for significant change to be realized the conversation much be changed from one focused on urban vs. rural distribution to one which determines how water use is used toward a common good.

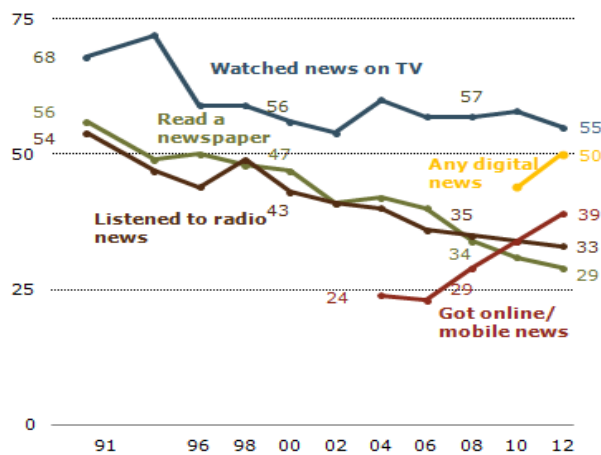
How much water should be allocated to produce food, environment and infrastructure growth?⁷ Can regulations limit the growth of a town for the good of agriculture?

In Alabama, *Martin v. City of Linden*⁸ decided that riparian landowners have first right to the water that their land touches. Water that is pumped must be used on that land as it will replenish the water in which the aquifer was taken. The city of Linden planned to pump water from one aquifer and use it elsewhere, as it was decided that would cause harm to the farmer that owned land above the aquifer and was not allowed. California is discussing the same idea now; cities in southern California want to pump water from as far north as Oregon and Washington in order to fill their water needs within municipal boundaries. What a local judge decides there will set precedent to other areas.

This decision is becoming more complex as people today are getting their media and news from different places than they did just 20 years ago. Today, there is a growing emphasis on web and digital media over traditional print media. This is increasing the turnover of news; people want quick, easy-to-

read articles because they are often reading them on mobile devices.

Where People Got News Yesterday



PEW RESEARCH CENTER 2012 News Consumption Survey. Q9, Q11, Q13, Q17, Q20 Q21, Q70, Q75, Q82, Q87.

The new definition of balance in media is a spokesperson from each side no matter how different the size or credibility of each respective party.⁹

According to Forbes and Time Magazine, some of the most influential critics are giving food and medical advice via talk shows and YouTube. However, they are often misinformed and wrong.

During the *New York Times Food for Tomorrow Conference*, Mark Bittman, opinion columnist for the New York Times and food

columnist for the New York Times Magazine, declared war on agriculture.

The 21st Century Water War is not about water. Society has shifted from an agrarian basis to that of a consumer. The modern consumer is 4-6 generations removed from the farm and the production of the food supply. They are also highly motivated by their opportunity for their purchase power to have effect

beyond the product itself. They seek authenticity and results and want to see the ethical credentials of the companies, organizations and brands they choose to interact with.¹⁰

According to the Environmental Protection Agency (EPA), less than 1% of the population is active in agriculture, compared to 25% in the 1940's. Yet the United States is producing 2.6 times as much product compared to back then in order to keep up with domestic demand and global markets, making the U.S. the largest net exporter of agricultural products.

Today's population seeks efficiency and farmers epitomize this because it is not economically viable for them to do more than what is absolutely necessary.¹¹

Most of the discrepancies between those popular within the media such as Bittman, other critics and those actually producing food stem from a lack of knowledge. By disparaging the myths we can work together to develop a better and more sustainable food system.

One myth circulating now states that it takes 2,400 gallons of water to produce a single pound of beef. While this may have been true 30-40 years ago, today it actually takes 441 gallons of water to produce a pound of beef. Taken out of context, this still seems like a lot. However, compared to the production of other items, it becomes much more understandable. For example, it takes 713 gallons of water to make a cotton shirt and 39,090 gallons to manufacture a car.

Meatless Mondays are one solution being professed as the savior to the environment. However, according to Dr. Frank Mitloehner at University of California-Davis, reducing meat consumption has a negligible impact on the environment.¹²

The EPA lists livestock as producing only 3.4% of greenhouse gases. Taking meat out of the entire population's diet one day a week would only reduce their carbon footprint by .2%.¹³

Ten pounds of vegetables produces a smaller carbon footprint than the same amount of meat but it also sustains fewer people.¹⁴ New technologies are helping to reduce animal agriculture's carbon footprint even more while sustaining an increased number of people.

Those in agriculture must adjust how they respond to myths in the media today. They must engage with those who are in the wrong and be authentic with those they are talking to in order to increase their credibility. Producers must hold themselves and others accountable; they cannot allow people who claim to know better off the hook and must educate those who don't know.

In order to truly inform the general public, it is critical producers show rather than tell. The communication landscape has changed immensely; agriculture advocates must learn to adopt new channels including Change.org and other similar websites. The impact of communication can be increased dramatically using multiple vehicles, including Twitter, Facebook and YouTube.

Today's consumers are emotionally invested in their purchases and are hesitant to change. This means, for the first time in history, farmers are being forced to explain their role in society and justify what they do to the public.

The producer's relationship with the consumer today is not an "us versus them" scenario but has instead developed into a "love triangle". The producers are fighting for the consumer's affection against the rising third party advocacy group. These advocacy groups have developed the idea that farmers don't know what they are doing and it will take regulations and mandates in order to change their ways.¹⁵

In relation to this "love triangle," farmers and producers have mistaken the consumer's need for food, fiber and fuel as the public's affection and understanding.¹⁶

The struggle between agriculture and third party interest groups has caused increasing problems for producers and low income families that rely on the U.S.'s low price, high quality food and cannot afford the high priced, special interest brand of social consciousness. A 25% increase in food cost has been predicted for the near future as a result of restrictions and mandates.¹⁷

The future depends on producers shifting from their current reactive state to one that is proactive. Farmers must voice their positions through emerging channels, not shy away when confronted by those who are misinformed. Those in agriculture need to be at the forefront of communication and be confident leaders. This will require them to embrace technology and efficient methods of production while showing this progress and educating the consumer.

According to Richard Schnieders, Chairman of Sysco Corporation, the era of industrial agriculture and the "just eat it" mentality is rapidly coming to a close. In order to be successful today, producers must give up the notion that people only want fast, convenient and cheap. Today, the modern consumer wants memory, romance and trust. Consumers seek out delicious, high quality food and want to know the story behind the food. The future of agriculture depends on the relationship between the producer and the consumer. Simply finding ways to solve the problem through better messaging will not suffice alone. The time has come to include the consumer to developing what they want from their food sources.¹⁸

The agricultural industry must look to technological fixes to cure our problems, while also vetting potential system changes. According to Joe Lewis, single tactic therapeutic intervention is not sustainable as it creates resistance and develops other problems.¹⁹

For example, rather than simply finding ways to eliminate pests, producers would be better to ask why the pest is a pest and what can be done to change that.²⁰

Stuart Firestein, PhD, Chair of the Department of Biological Sciences at Columbia University and writer of *Ignorance: How It Drives Science* explains that science is a process that is constantly changing.²¹ We frequently must be open to further investigation. Part of the process of science is to look to the future and determine what will become a problem.

If scientists don't continually contemplate the future, what is discovered today may not be as useful as it potentially could be. According to *The Big Pivot*, in the future, the world will be hotter, resources more scarce and the population more open to new ideas.²² Due to climate changes, human beings will not be

able to do the same things in the same ways. Resources – including water, energy (including oil), and minerals – are becoming scarcer. A system must be put in place to prepare to address these issues.²³

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.” Aldo Leopold, foreword to A Sand County Almanac (1949).

In order to remain competitive, farmers must increase production and deal with regulations efficiently, while maintaining water quality and addressing changing global weather patterns.

Dr. Matt Liebman, Iowa State University agronomy professor developed a ten-year study on crop rotation in which he compared two, three and four crop rotations. He found the three and four crop rotations have increased yield with fewer synthetic inputs. Iowa farmers who have implemented these same tactics have been able to use fewer synthetic inputs and increase soil absorption capacities.²⁴

Gabe Brown, a farmer in North Dakota uses cover crop and mob cattle grazing in his rotation and has decreased his inputs from \$4.50 a bushel to \$1.21 per bushel. Along with that, he has improved the overall health of the soil.²⁵

Technology to Increase Efficiency

Farmers tend to always have one of three problems: too much water, not enough water or water in the wrong place.²⁶ Navigation technology is being developed to help farmers deal with all of these challenges.

Three key ways in which technology is addressing these problems with technology is through the use of land forming, drainage water management and precision irrigation. These methods allow farmers to develop strategies to manage water – whether they have too much, not enough or it is in the wrong location.

Land forming solutions provide farmers with an accurate reading of their land, thus allowing them to develop plans to direct water where it needs to go. This can help optimize surface water distribution and drainage through furrow irrigation or leveling.

By utilizing GPS, technology can institute a drainage water management system that allows for variable drainage depths, allowing for the management of water table depth for optimal root development. They can also control how much water is released from the soil to avoid nutrient loss, or hold additional water in times of drought and when crops are not being grown.

Also, farmers can now utilize large amounts of data that have been collected for years in order to make better decisions on how much water to apply to the land.²⁷

One rain gauge in a field can be highly inaccurate due to varying amount of rain – even within a small area. Irrigation solutions allow farmers to put a variable rate of irrigation to the field via pivot. This helps avoid under or over applying water in any given area. This technology decreases production costs because the data collected by the pivots is immediately sent to the farmer on their smartphone. They

can monitor and control the irrigation system remotely, thus decreasing the amount of fuel used to drive to each field to check moisture levels. Fewer people are also needed to run this system, further decreasing the cost of production.

This technology is not limited to crop production. In New Zealand, dairy farmers are using the irrigation technology to control the disposal of effluent from lagoons to stay compliant with environmental regulations. They are avoiding fines by knowing precisely where and how effluent was applied to the land. Besides staying within government regulations, this precise application allows increased pasture uniformity and increased yield.²⁸

Yakima Valley Dilemma

Producers are urged to, “Do *exactly* what is asked of them, don’t keep records longer than required. Also, know what is happening locally, stay up to date and involved!”²⁹ In the case of the Yakima Valley Dairies, doing everything asked may no longer be enough.

In 2009 the EPA designated the Yakima Valley of Washington State as an Environmental Justice Showcase Community. Accordingly, five dairies were targeted in the Yakima Valley. These five dairies were cited as responsible for high nitrate levels in groundwater despite claims that the dairies were not the only culprit for the high nitrate level.

Due to the findings of the EPA, the Yakima Valley dairies were forced into a consent order, which required the installation of monitoring wells, regular groundwater and soil testing, the creation of detailed irrigation water management and soil application plans, and specific adherence to procedures as dictated by a professional agronomist under the direction of the EPA. These guidelines were more restrictive than what any other dairy has had to follow in the past.

Until recently, the Resource Conservation and Recovery Act (RCRA) has not been applied to agricultural systems. When RCRA was established in 1976, legislators determined agricultural waste was not within the definition of discarded waste because of its use as fertilizers and soil conditioners.³⁰ As recently as 2010, RCRA was dismissed from being applied to agricultural operation in a case against Tyson Foods.³¹

In February 2013, local environmental groups filed RCRA "citizen suit" actions against the same five Yakima Valley dairies that had agreed to the EPA's consent order, claiming they were in violation of RCRA and causing the public harm. Their claims were that although the lagoons were National Resources Conservation Service (NRCS) compliant, they were still causing harm to the environment and that any over-application of fertilizer, despite the reasoning, was considered discarding.

The Defendant’s (Yakima Valley dairies) motion to dismiss for the case was denied despite being duplicative and inconsistent with the EPA Consent Order. This proves that the future of production agriculture in relation to regulations can be highly volatile.³²

The decision made against the Yakima Valley dairies found them to be the first agricultural producers in the country to be found liable under RCRA. The court determined that any over-applied manure to crops is to be considered discarded and that NRCS-compliant lagoons are "designed to leak" therefore posing

a threat to groundwater. Furthermore, the court ruled any manure composted on native land is also considered discarded as it can leach into the soil and was destined for groundwater. The case is still ongoing; the judge will determine if manure within animal pens is considered discarded under RCRA, what surface water impacts there may be and if remediation efforts will be needed.

The decision in this case could have a nationwide impact on whether agricultural operations are to be held liable under RCRA and to what extent. If they are determined to be liable, agricultural producers could be held to increasingly high standards of waste disposal. Producers must be involved in this process, and be diligent in maintaining accurate records and adhere to the requirements.

While production agriculture uses a lot of water and produces a lot of waste, the fact remains that people must still eat. Today, the industry is fortunate to have the technology and resources to tackle these issues. With focused attention on these issues, producers across the country can work together to continue providing a safe, reliable and sustainable food supply.³³

FOOTNOTES

¹Famiglietti, Jay. (2015, March 24). 21st Century Water Security and Implications of Animal Agriculture. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

² Famiglietti, Jay.

³ Famiglietti, Jay.

⁴ Famiglietti, Jay.

⁵ Famiglietti, Jay.

⁶ Famiglietti, Jay.

⁷ Famiglietti, Jay.

⁸ Moody, Patrick. (2015, March 24). Water Rights. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

⁹ Riley, Janet. (2015, March 24). How Ongoing Negative Media Coverage is Impacting Animal Agriculture and What We Can Do About It. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

¹⁰ Bettencourt, Aubrey. (2015, March 24). Grab Your Whiskey - The Fight for Water in the 21st Century. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

¹¹ Bettencourt, Aubrey.

¹² North American Meat Institute. [meatnewsnetwork]. 2013, August 12. *Myth: Going Meatless One Day a Week Can Have A Significant Environmental Impact*. [Video file]. Retrieved from https://www.youtube.com/watch?v=_Ucwmbmo8R8

¹³ Bettencourt, Aubrey.

¹⁴ Drewnowski, A., Rehm, C., Martin, A., Verger, E., Voinnesson, M., & Imbert, P. (2014). Energy and nutrient density of foods in relation to their carbon footprint. *American Journal of Clinical Nutrition*.

¹⁵ Bettencourt, Aubrey.

¹⁶ Bettencourt, Aubrey.

¹⁷ Bettencourt, Aubrey.

¹⁸ Kirschenmann, Frederick. Referencing Richard Schnieders, Chairman of Sysco Corporation.

¹⁹ Lewis, W. J., van Lenteren, J. C., Phatak, S. C., & Tumlinson, J. H. (1997). A total system approach to sustainable pest management. *Proceedings National Academy of Science*. USA 94: 12243-12248.

²⁰ Kirschenmann, Frederick. (2015, March 25). Science of Land Health: Animals, Soil & Water. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

²¹ Kirschenmann, Frederick. Referencing Firestein, S. (2012). *Ignorance: How it Drives Science*. Oxford University Press.

²² Kirschenmann, Frederick. Referencing Winston, A. (2014). *The Big Pivot: Radically Practical Strategies for a Hotter, Scarcer, and More Open World*. Harvard Business Review Press.

²³ Kirschenmann, Frederick.

²⁴ Kirschenmann, Frederick.

²⁵ Kirschenmann, Frederick.

²⁶ van der Loo, Chris. (2015, March 25). Irrigation Technology to Address Farmer's Varying Needs: Water Efficiency & Optimization, Improved Yields and Reduced Runoff. *2015 NIAA Annual Conference*. Lecture conducted from, Indianapolis.

²⁷ van der Loo, Chris.

²⁸ van der Loo, Chris.

²⁹ Kristensen, Deb. (2015, March 25). When Animal Manure is Regulated like Municipal Dumps – Imposing RCRA Liability on Agricultural Operations. *2015 NIAA Annual Conference*. Lecture conducted from Indianapolis.

³⁰ Kristensen, Deb.

³¹ UPDATE ON THE POULTRY LITIGATION IN OKLAHOMA, Poultry litter is not a solid waste under RCRA. <http://www.acoel.org/post/2010/02/26/UPDATE-ON-THE-POULTRY-LITIGATION-IN-OKLAHOMA-Poultry-litter-is-not-a-solid-waste-under-RCRA-.aspx>.

³² Kristensen, Deb.

³³ Famiglietti, Jay.

SPEAKERS AND TOPICS

"21st Century Water Security and Implications of Animal Agriculture" Dr. Jay Famiglietti, PhD – Associate Professor at University of California-Irvine and Senior Water Scientist at the NASA Jet Propulsion Laboratory.

"How Ongoing Negative Media Coverage is Impacting Animal Agriculture and What We Can Do About It" Ms. Janet Riley – Senior Vice President of Public Affairs and Member Services at the North American Meat Institute.

"Grab Your Whiskey – The Fight for Water in the 21st Century" Ms. Aubrey Bettencourt – Executive Director at California Water Alliance.

"Science of Land Health: Animals, Soil and Water" Dr. Frederick Kirschenmann, Distinguished Fellow – Leopold Center for Sustainable Agriculture at Iowa State University.

"Irrigation Technology to Address Farmer's Varying Needs: Water Efficiency & Optimization, Improved Yields and Reduced Runoff" Mr. Chris van der Loo – Marketing Director for the Water Solutions Segment of the Agricultural Division at Trimble Navigation.

"When Animal Manure is Regulated like Municipal Dumps – Imposing RCRA Liability on Agricultural Operations" Ms. Deb Kristensen, Partner at Givens Pursley, LLP.

OTHER SPEAKERS AND TOPICS AT THE CONFERENCE (listed by committee/council)

Animal Care Council

"Update on Coalition for Sustainable Egg Supply Research" Richard Blatchford, PhD, Professor at UC Davis.

"Importance of Timely Euthanasia and the Impacts on Caretakers" Jan Shearer, DVM, Professor and Dairy Extension Veterinary Specialist at Iowa State University.

"AVMA's Euthanasia Guidelines" Gail Golab, PhD, DVM, MANZCVS, DACAW, Director, Animal Welfare Division at American Veterinary Medical Association.

"Euthanasia Panel" Jan Shearer, DVM, Iowa State University; Karen Jordan, Dairy Farmers of America; Joe Baker, DVM, Washington State Veterinarian; Sherrie Webb, National Pork Board; Jim Logan, DVM, Wyoming Livestock Board; Tom Lenz, Zoetis Animal Health.

Animal Health and Emergency Management Council

"Bad Weather in Texas – Animal Health Planning and Response" T.R. Lansford, DVM, Assistant State Veterinarian, Texas Animal Health Commission.

"HPAI Response" Mr. Victor Velez, Animal Health and Food Safety Services, California Department of Food and Agriculture.

"Winter Storm Atlas Response and Recovery in South Dakota" Mendel Miller, DVM, Assistant State Veterinarian of South Dakota.

"The Texas A&M Veterinary Emergency Team- Beyond Academics With Integrated All-Hazards Response" Matt Cochran, DVM, PhD, Texas A&M College of Veterinary Medicine.

"All-Hazards Animal Health Emergency Management: Perspectives" Panel-led Open Discussion.

Animal Identification & Information Systems Council

"USDA Update on Implementation of ADT" Mr. Neil Hammerschmidt, Program Manager, Animal Disease Traceability, USDA APHIS VS; Jack Shere, DVM, PhD, Associate Deputy Administrator, APHIS Veterinary Services.

"ADT Implementation and Marketing Facility Proposed Rule - An LMA Perspective" Mr. Jim Akers, National Livestock Marketing Association Government and Industry Affairs Committee Member

"South Dakota Solution to ADT Implementation at Markets" Mendel Miller, DVM, Assistant State Veterinarian, South Dakota Animal Industry Board

"An Industry Driven Solution to Implement ADT in the Pork Industry" Patrick Webb, DVM, Director of Swine Health Programs at National Pork Board.

"Phase out of American ID in the Dairy Industry" Robert Fourdraine, PhD

"UHF Trial" Panel Discussion, Paul McGraw, DVM, Wisconsin State Veterinarian; Rod Hall, DVM, Oklahoma State Veterinarian; Carl Heckendorf, DVM, Colorado State Veterinarian.

Antibiotics Council

"Metrics: What are the Agencies thinking of as their Benchmark for Success? " Dave Dargatz, DVM, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Centers for Epidemiology and Animal Health; Larry Granger, DVM, Senior Leader, U.S. Department of Agriculture's Animal and Plant Health Inspection Service, Veterinary Services; Craig A. Lewis, DVM, MPH, DACVPM, VMO, Center for Veterinary Medicine, U.S. Food and Drug Administration.

"Antimicrobial Resistance – You Can't Manage What You Can't Measure" Calvin Booker, DVM, MVetSc, Managing Partner at Feedlot Health Management Services, Ltd.

Aquatic Livestock Committee

"Future of Water in America and the Impact on the Livestock Industries" Ms. Aubrey Bettencourt, Executive Director, California Water Alliance.

"DVM Dx – Leveraging a Livestock Health Platform for Aquaculture" Mrs. Kasha Cox, Senior Territory Manager, US Aquatic Health, Merck Animal Health.

"Science-based Metrics – Tools to Improve Your Operation" Marty Matlock, PhD, PE, BCEE, Executive Director, Office of Sustainability, University of Arkansas.

Bovine Committee

"BVDV and How it Can Affect Your Operation" Ms. Sandy Grant, Laboratory Manager at Gold Standard Labs.

"Experiences with BVD in Beef and Dairy Cattle in Georgia" Lee Jones, DVM, Assistant Professor, Beef Production at the University of Georgia.

"BVD-PI Management" Robert Stout, DVM, State Veterinarian, Kentucky Department of Agriculture.

"Bovine Emergency Response Plan" Ms. Lisa Pederson, Beef Quality Assurance Specialist with North Dakota State University Extension Service.

Emerging Diseases Council

"HPAI Update" Mr. Victor Velez, Animal Health and Food Safety Services, California Department of Food and Agriculture.

"VSV Update" Christie Mayo, DVM, Colorado State University.

"Swine (Corona Virus) Update" Mark Engle, DVM, MS, Merck Senior Technical Services Manager, Swine Business Unit.

"Trichomoniasis Update" Dee Ellis, DVM, State Veterinarian, Texas Animal Health Commission Executive Director.

Equine Committee

"State of the Equine Industry" Mr. Keith Kleine, Industry Relations Director, American Association of Equine Practitioners.

"Time to Ride Initiative" Tom Lenz, DVM, MS, DACT, Zoetis.

Global Animal Health, Food Security & Trade Council

"How Water Issues Will Affect Animal Agriculture, Animal Health and Trade" Jay Famiglietti, PhD, Hydrologist, Associate Professor at University of California, Irvine and Senior water Scientist at the NASA Jet Propulsion Laboratory.

"HPAI Industry Perspective and Update" Joe Baker, DVM - Washington State Veterinarian.

Poultry Committee

"USDA HPAI Perspective and Update" Jack Shere, DVM, PhD, Associate Deputy Administrator APHIS Veterinary Services.

"Impact of Backyard Poultry on the Commercial Poultry Industry" Patricia Wakenell, DVM, PhD, Associate Professor of Avian Diagnostics at Purdue University.

Small Ruminant Committee

"Water Rights" Patrick Moody, JD, Legal Counsel for the Alabama Department of Agriculture and Industries.

"HPAI in Washington State 2014-2015...and Beyond?" Joe Baker, DVM, Washington State Veterinarian.

"Sheep Safety Quality Assurance Program" Jim Logan, DVM, State Veterinarian, Wyoming Livestock Board.

"Small Ruminant Grazing: A Water-Friendly Production System" Bret Taylor, DVM, Animal Research Scientist, USDA, ARS, US Sheep Experiment Station.

Swine Committee

"The Sustainable Pork Framework" Mr. Allan Stokes, Director of Environmental Programs, National Pork Board.

"Truck Wash Study" Butch Baker, DVM, Interim Director of the Iowa Pork Industry Center, ISU Extension and Outreach, Iowa State University.

"Swine Health Programs Update" Troy Bigelow, DVM, USDA, APHIS, VS.

"Modeling Emerging Disease in the US Swine Herd" Shweta Bansal, PhD, Assistant Professor, Department of Biology at Georgetown University.

2015 ANNUAL CONFERENCE PLANNING COMMITTEE

Mr. Michael Coe, Animal Profiling International, Inc.

Ms. Kathryn Britton, Marketing & Communications Director, Where Food Comes From/IMI Global, Inc.

Dr. Nevil Speer, Individual Member

NIAA'S 2015 ANNUAL CONFERENCE WAS FUNDED IN PART BY:

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Indiana Pork Producers

Livestock Marketing Association

Merck Animal Health

National Livestock Producers Association

Pork Checkoff

U.S. Department of Agriculture

Where Food Comes From

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