

White Paper

"U.S. Animal Agriculture's Future Role in World Food Production - Obstacles & Opportunities"

Information synthesized from the National Institute for Animal Agriculture's Annual Conference, "U.S. Animal Agriculture's Future Role in World Food Production - Obstacles & Opportunities" conducted April 3-6, 2017, in Columbus, Ohio. 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 2017 Annual Conference of the National Institute for Animal Agriculture.

Table of Contents

BACKGROUND.....	3
PRESENTATION HIGHLIGHTS.....	5
GLOBAL TRENDS AFFECTING AGRICULTURE.....	5
GLOBAL TRADE: OPPORTUNITITES AND CHALLENGES	6
OPPORTUNITIES IN THE ASIA/PACIFIC REGION	9
CONSIDERATIONS WHEN GOING GLOBAL: BEEF AND BRANDING	10
BIOSECURTY: HIGHLY PATHOGENIC AVIAN INFLUENZA.....	12
ANIMAL AGRICULTURE 2.0	13
FUTURE OF ANIMAL AGRICULTURE, ANIMAL CARE	18
FOOTNOTES	21
OTHER SPEAKERS AND TOPICS (listed by committee/council).....	23
2017 ANNUAL CONFERENCE PLANNING COMMITTEE	28
NIAA'S 2017 ANNUAL CONFERENCE WAS FUNDED IN PART BY	29
CONTACT INFORMATION.....	30

BACKGROUND

"U.S. Animal Agriculture's Future Role in World Food Production - Obstacles & Opportunities" was the theme of the 2017 National Institute for Animal Agriculture's Annual Conference hosted April 3-6, 2017, in Columbus, Ohio. Understanding future trends within the animal industry is of critical importance and conference presenters provided a holistic perspective on this topic.

Presenters in the Opening General Session and Closing General Session were:

"Welcome"

*Dr. Tony Forshey, State Veterinarian, Ohio Department of Agriculture,
Mr. David Daniels, Ohio Department of Agriculture,
Mr. John Saunders, CEO & Chairman, Where Food Comes From, Inc.*

"More than Nine Billion to Feed in 2050"

Dr. Douglas Southgate, Professor Emeritus, The Ohio State University

"Economic Impact"

Ambassador Darci Vetter, Served as Chief Agricultural Negotiator, Office of the U.S. Trade Representative, 2014 -Jan 2017

"Global Consumer Trends and the Opportunity for American Agriculture"

Dr. Mark Lyons, Global Vice President & Head of Greater China, Alltech

"Highly Pathogenic Avian Influenza (HPAI) Update"

Dr. Robert Stout, Kentucky State Veterinarian; Dr. Charles Hatcher, Tennessee State Veterinarian

"Future of Animal Agriculture"

Dr. Lonnie King, Acting Dean, College of Food, Agriculture and Environmental Sciences, The Ohio State University

"1 Billion Pounds & International Trade"

Mr. Mark McCully, VP, Production, Certified Angus Beef

The 40-plus experts speaking during Committee and Council Meetings provided further insight into future animal industry from a species--specific or highly targeted topic angle:

Animal Care Council
Animal Health Emergency Management
Animal Identification & Information Systems Council

Antibiotic Council
Aquatic Livestock
Bovine Committee
Emerging Diseases Council
Equine Committee
Global Animal Health, Food Security and Trade Council
Poultry Committee
Small Ruminant Committee
Millennial Sunrise Speakers
Swine Committee

The National Institute for Animal Agriculture (NIAA) is a non-profit, membership driven organization that unites and advances animal agriculture: the aquaculture, beef, dairy, equine, goat, poultry, sheep, and swine industries. NIAA is dedicated to furthering programs working toward the eradication of diseases that pose risk to the health of animals, aquaculture, wildlife and humans; promote the efficient production of a safe and wholesome food supply for our nation and abroad; and promote best practices in environmental stewardship, animal health and well-being.

NIAA membership encompasses producers, producer organization leaders, veterinarians, scientists, academicians, livestock and poultry extension personnel, Federal and State government representatives and allied industry professionals.

PRESENTATION HIGHLIGHTS

There are many questions as to what the 21st century holds for animal agriculture with a shifting climate, uneven population and income growth worldwide, associated changes in consumer preferences, the rising dominance of the non-agriculturally educated millennial generation, and political uncertainty, etc. As such, it is imperative that the challenges and opportunities confronting animal agriculture be preemptively identified and acted upon.

Global Trends Affecting Agriculture

A variety of pertinent global trends affecting agriculture have arisen from the unprecedented population and food production increases since the mid-1900s. The human population has risen from 2.5 billion in 1950 to 7.2 billion in 2013 with a further 3 billion projected by 2050. This is despite a drop globally in total fertility rates between 1982 and 2007. Food consumption, particularly meat consumption per capita, has also increased as living standards rose in China post-1970s, India post-1980s and more recently other areas of the world such as Vietnam, Thailand, Iran, Brazil, etc. As a result, cropland has risen 45% and grazing land by 10% since the early 1960s. This is despite post-Green Revolution doubling in cereal yields and corresponding 75% decline in real grain prices between the 1950s and 1980s.¹

Given a variety of global trends, Professor Douglas Southgate of Ohio State University offers the following predictions for food demand up-to 2050:

There will be little change in affluent nations belonging to the Organization for Economic Co-operation and Development (OECD). Human numbers have stabilized in these nations, which had a combined population of 1.3 billion people in 2013. Additionally, a per capita consumption is increasing slowly, so a modest growth in food demand is predicted.

In emerging economies with 5.0 billion people in 2013, substantial increases in food demand are predicted due more to rising average incomes rather to population growth, which is expected to taper off during the next few decades. Per-capita consumption of livestock products, feed grain, and other edible goods continues to go up, although the rate of growth is slowing as living standards rise. In contrast, food demand will increase rapidly well past 2050 in the world's least developed countries, which had a combined population of 0.9 billion people in 2013. Predominantly located in Sub-Saharan Africa, these countries are experiencing rapid population growth not least because of elevated human fertility (currently 4.5 births per woman, on average) Furthermore, income growth tends to translate directly into food purchases in poor parts of the world.²

Within these world segments, there is varied ability of domestic food producers' ability to meet domestic demands, much less increase exports. Wealthy nations will continue to feed their own population with ease. Emerging economies are expected to feed themselves with a combination of domestic production and imports funded by non-agricultural exports. Some localized food insecurity is possible – for example in northern India, where water shortages are commonplace. In least developed countries where human numbers are expected to triple to 2.9 billion in 2100, food insecurity is widespread as is reliance on food aid. These countries require significant increases in domestic food production, which will be difficult to achieve in many places. As such, there is great need for agricultural exporters to meet rising world food demand.³

Global Trade: Opportunities and Challenges

United States (U.S.) animal agriculture will play an increasingly international role both as global population and average income rises around the globe. Today, livestock exports are a significant employer and contributor to both producers' bottom lines and U.S. GDP. For instance, exports of beef and beef products account for \$7 billion in profits and add \$307 per head in value. For pork, 26% is exported which adds \$62 per head in value to each hog marketed. There are 100,000 jobs necessary for pork exports alone.³

While tariffs complicate free trade, it is the sanitary and phytosanitary barriers (SPS barriers) which most affect producers. Once applied, those rules are difficult to change much less remove and they are often difficult to follow from both a technical and financial standpoint. Furthermore, many of these regulations are protectionist in nature rather than actually intended to protect human, animal and plant health. Even if these SPS measures are warranted and not motivated by a desire to keep out foreign products, they may be applied inequitably towards international producers. Finally, many SPS measures lack transparency and even clear guidelines.⁴

The U.S. government has addressed these tariff and nontariff barriers primarily by negotiating free trade agreements which enlarge quotas and eliminate tariff barriers and state trading, and by attempting to enact more effective and transparent SPS rules. As a result, there is a much larger trade volume between the U.S. and the 20 plus countries who participate in 14 trade agreements.⁵

The U.S. government has also participated in international organizations such as the World Trade Organization (WTO) to create a set of general international standards, rules and guidelines to facilitate international trade. The stated goal by Ambassador Darci Vetter, Chief Agricultural Negotiator for the U.S. Trade Representative, is "less strict, but more effective SPS

measures.” There is also assistance for countries not yet capable of conducting their own risk assessments and monitoring, so they do not simply ban imported products. In this context, our relationships build capacity and efficiency.⁶

As of April 5, 2017, it is unclear how the current Trump Administration will employ the aforementioned tools.⁷ There exist three primary international trade areas where questions remain for the new administration and have large implications for producers:

First, is the future of the North American Free Trade Agreement (NAFTA) which has, looking at livestock and livestock product export growth to Mexico and Canada, greatly benefited American producers. Exports rose from \$0.4 billion in 1990 to \$46 billion in 2016, and U.S. animal products currently hold a 60% market share in Mexico.⁸

While President Trump’s tone has softened on NAFTA since the campaign, a formal letter of intent is expected from the White House to Congress outlining the Administration’s intent to renegotiate NAFTA. Renegotiating NAFTA may mean facing tariff barriers and depending on the negotiation processes, less cooperation and goodwill. Even small changes in market sourcing by Mexico has the potential to add significant market volatility to the U.S.⁹

The second outstanding global trade unknown is the impact of dynamism in the Asian/Pacific region. That region includes China and many of the countries that were part of the last 7 years of Trans-Pacific Partnership (TPP) negotiations such as Brunei, Japan, Malaysia, Singapore, Vietnam and Indonesia. These economies offer a number of opportunities for U.S. animal agriculture. With the fastest growing middle classes and disposable incomes, trade agreements such as TPP would enable U.S. exporters to “get in on the ground floor”, creating brand loyalty and customer identity.¹⁰

More importantly than the physical export opportunities these countries represent, these countries were willing to liberalize every agricultural product and create a set of standards that could then be shared with the wider globe. For instance, Canada was willing to open up their borders to dairy, poultry and eggs, and Japan to its ‘6 sacred products’ of beef, pork, dairy, rice, wheat, sugar. This presents an opportunity to export a model which includes transparency, contract sanctity, and the U.S. government practice of inviting input during the rulemaking process, which is not currently available in many other countries.¹¹

While the current Trump Administration acknowledges the importance of the Asia/Pacific region, they intend to move forward bilaterally rather than using the TPP multi-country model.

It is unclear in that case which countries would be prioritized for bilateral negotiations and whether normative values for rules such as SPS are possible in one to one trade agreements.¹²

The final outstanding question in international trade is how the U.S. will interact with international organizations such as WTO to create the frame for international trade. The institutions become more important as agricultural trade increases in volume, value and variety. Although the WTO has struggled to complete and enforce multilateral agreements, it still provides important norms and disciplines for countries engaged in international trade.

The Trump Administration's "America First" approach may further compound this difficulty if the U.S. pulls back from these organizations. The Codex, for instance, has taken an European Union centric approach and factored in social aspects instead of solely focusing on science in part because the U.S. did not contribute enough to the infrastructure of the institution.¹³

Although the Trump Administration has added uncertainty to the future of U.S. agriculture on an international stage, there remain clear steps members of the agricultural industry should take to remain competitive:

1. Industry members should position themselves as key leaders in the conversations around feeding the world.
2. Remind their trading partners that they are long-term partners no matter short-term policy changes, to create strong business-to-business bonds.
3. Let foreign government representatives know there is a strong industry voice advocating for strengthening trade relationships.
4. Stay informed on new innovations in technology, methods, regulations, etc. Invest in traceability now, early in the process.
5. Realize this is an opportunity for industry to become effective partners with international institutions like Codex, the WTO, WHO and others.
6. Get involved in U.S. negotiations. Ensure Congress is educated. "Knock on the doors" as new Members of Cabinet and their Deputies take their offices in Washington and tell them industry expects collaboration, e.g. USDA, USTR, FDA and Foreign Commercial Service.
7. Be prepared to help overcome barriers such as negative perceptions towards agriculture.
8. Remember the importance of consistent voices advocating for animal agriculture and reminding the world U.S. livestock products are high quality, consistent and safe.¹⁴

Opportunities in the Asia/Pacific Region

Delving deeper into the dynamism in of the Asia/Pacific region, many opportunities for U.S. animal agriculture emerge. The value of trade between China and the U.S. has increased 207 times between 1979 and 2016 to hit \$519.6 billion. This value is poised to rise further as China has left behind its role as an exporter, as the 'factory of the world', to become a huge import market catering to domestic consumers not foreigners.¹⁵

Currently, China has 188 cities larger than Chicago. Over the last 30 years, in the largest ever economic transformation, 400 million people have emerged from poverty. A newly empowered, young middle class is driving consumption. Mainland China's middle class will account for more than a third of its population by 2030, which would take consumer spending to levels currently seen in the European Union. By 2030, approximately 35% of the Chinese population will have more than \$10,000 in annual disposable income by then, up from about 10% today. That 25% increase is equivalent to the size of the current U.S. population. Furthermore, no longer is China 'cheap', e.g. employees now expect a 10-20% annual wage increase. These new consumers want "safe food, environmental protection and traceability." All of these trends represent opportunity for exporters of high quality livestock products.¹⁶

China has invested significantly in agricultural as well as urban development over the last 20-30 years and that is continuing for the foreseeable future. The 2017 "No.1 Document" released from Beijing outlines China's current agricultural policy goals. These include protecting farmland and raising lending rates to farmers in an effort to narrow the wealth gap between rural and urban areas. There is an intention to modernize agriculture through technology and continued scale/consolidation. There are also stricter food safety/quality improvements and environmental regulations discussed.¹⁷

Larger farm scale has been promoted since the 2007/2008 Melamine Crisis. Dairies and feed mills in particular have seen significant consolidation. Hog farms too have seen consolidated; in large part due to environmental protections passed in an attempt to prevent the 300 billion tons of sewage 80 million hogs produce from entering waterways. The stated goal by the Chinese government is zero environmental impact of agricultural residues in five years.¹⁸

As such, opportunities for U.S. pork exports are already manifesting. Pork exports in 2016 were double those of 2015 to reach \$1 billion in value. The poultry market too is a large opportunity should the U.S. ban on Chinese poultry be lifted. Currently 20% of U.S. poultry is exported, but the vast majority never leaves the northern hemisphere and misses the 1.4 billion consumers in China.¹⁹

Chinese markets are not, however, the only export opportunity in the Asia/Pacific region. While the much touted 'next big economies' of the 'BRIC' countries (Brazil, Russia, India and China) certainly offer a plethora of opportunities, the 'MINT' countries (Mexico, Indonesia, Nigeria and Turkey) also are worth exporters' attentions.²⁰

Looking specifically at the BRIC countries: Brazil is made less appealing to exporters by virtue of a very highly priced economy, poor infrastructure, dependence on commodity exports, and protectionist policies. Russia has a shrinking population, is dependent on oil and gas exports, and has crumbling infrastructure. India has inefficient government/poor governance, a messy democracy making business challenging, worsening public finances, and demographic divisions may result in social unrest.²¹

Turning towards the MINT countries: average income and GDP is expected by the International Monetary Fund to skyrocket by 2050. For instance, average income in Turkey is expected to increase from the current \$4,100 to \$48,500 while Indonesia's is expected to rise from the current \$800 to \$21,000. Further opportunities exist in countries such as Mongolia, Myanmar, and Vietnam which have growing economies and middle classes.²²

When entering countries as an exporter there many considerations. It is important for export companies to be considerate of local culture while maintaining their core values. To this end, companies should develop a set of global values. Companies should bring something unique and have a reason to be in the country. Companies should 'Go early'. And finally, companies should remember these countries represent opportunities to make a difference as well as economic opportunities.²³

Considerations when Going Global: Beef and Branding

The Certified Angus Beef Brand (CAB) sold over 1 billion pounds of beef in 2016, sending 50 million in premiums back to beef producers. Founded in response to beef producers struggling with dissatisfied customers, CAB launched a comprehensive rebranding effort. That CAB brand is now licensed to 17,000 plus packers, processors, distributors, retailers and restaurants in 50 countries.²⁴

Since the 1970s, producer and consumer expectations worldwide for beef have changed (Figure 1). Producers now expect a high price and consumers expect a high quality product. The most common means of increasing consumer satisfaction is raising marbling levels. This increasing customer satisfaction with increasing meat grade translates to a \$200 plus difference between select and prime carcass prices. This difference is particularly pronounced in Pacific Rim

markets. By increasing marbling in end cuts such as brisket, CAB has increased premiums by 3% between 2010 and 2016.²⁵

When considering branding for the modern consumer it should be recognized that while a brand's value proposition remains the classic combination of the functional and emotional,

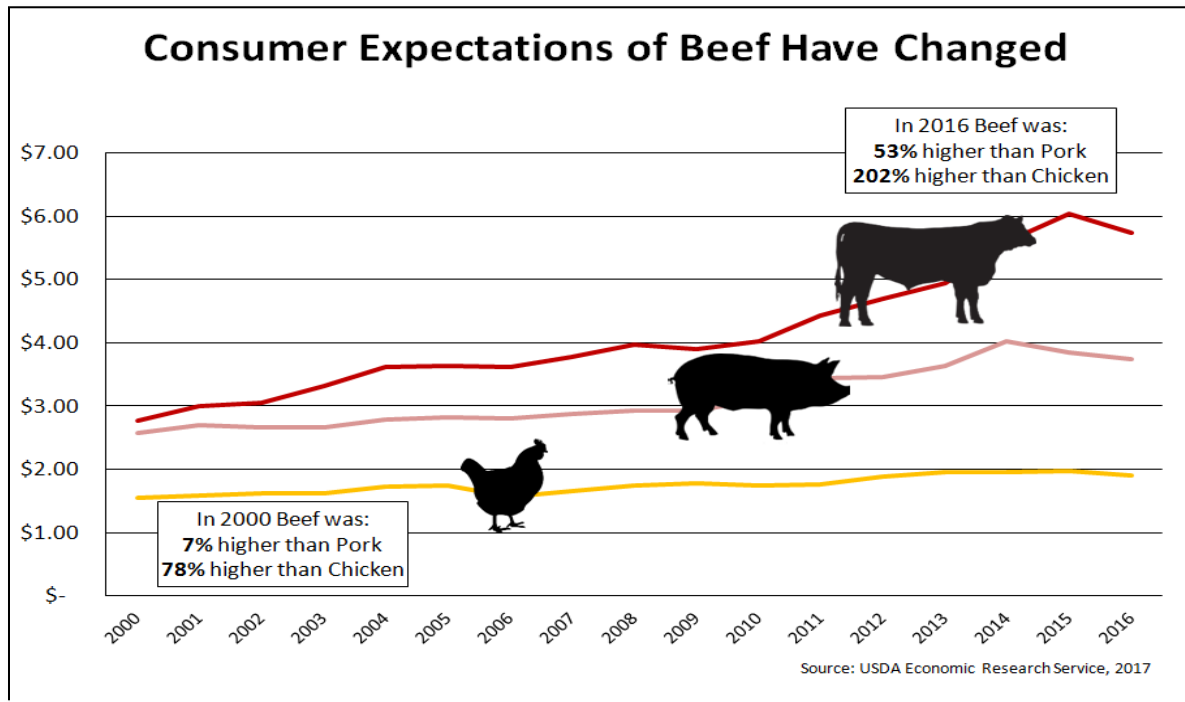


Figure 1: Consumer expectations of beef 2000 – 2016 (McCully, Mark).

there is an additional aspect today: the “environmental/social”.

This environmental/social component has become not merely a differentiation point, but something many consumers are willing to pay a premium price. For livestock products to successfully meet this third criteria, it is important to “double down on education” and transparency. For instance, CAB has built a culinary center for hosting ‘chef summits’ which combines good food, farm visits and agricultural courses. Essentially, opportunities such as these ‘build connections’ through which ecological and social values may be shared.²⁶

Developing relationships are equally crucial when ‘going global’. For instance, CAB has grown its Japanese demand 153.7% since 2015 in large part because of a new Japanese representative who already has excellent in-country relationships and is successfully forging new connections. The lesson here is to work with the local leaders and experts even when that means leaving the ‘American approach’ behind.²⁷

Additional considerations when going global include: currency exchange rates, as this can determine whether products are price competitive or not. There are language and societal differences which often render direct translations useless. Factor duties and taxes into budgeting. For instance, in 2016 duty in Japan was 38.5% per pound of chuck eye roll; by the final cost tally, the retail price ran 73% over the base cost. Be aware of the 'global ripples' from non-intuitively important events. The interconnectedness of the global marketplace can amplify events. Finally, be aware of the wider product positioning and mix. For example, while U.S. beef is a premium product in Japan, Kobe beef is the true elite. Finally, developing and maintaining market access is critical. As such, CAB supports multilateral trade agreements. When bovine spongiform encephalopathy cases, aka Mad Cow disease, were discovered in the U.S. in 2003, Japan immediately closed its markets to beef and beef products which cost livestock exporters millions in lost profits.²⁸

Biosecurity: Highly Pathogenic Avian Influenza

The 2003 presence of Mad Cow disease in the U.S. also demonstrates the fundamental importance of effective prevention, detection and control of livestock pathogens. The U.S. agricultural industry and relevant state departments have already done significant planning and setup of incident command structures in case of a pathogen outbreak. The discovery of and response to highly pathogenic avian influenza (HPAI) in both Tennessee and Kentucky commercial poultry flocks provide illustrative examples of strong biosecurity protocols.²⁹

In Tennessee (TN), poultry just edges out cow-calf as the largest agricultural industry with three primary breeders for poultry meat genetics located in state. As such, TN has a strong vested economic as well as ethical interest in containing pathogens before domestic and export markets are threatened.

As of April, 2017, TN had experienced three types of avian influenza: no path (not H5 or H7), low pathogenic and high pathogenic (H5 or H7) in commercial flocks. State responses vary significantly depending on which pathogen form is discovered. In early 2017, within 10- days and the same control area, TN officials were alerted to a high pathogenic H7 outbreak, a low pathogenic H7 case, then another high pathogenic H7. The response was immediate; despite flock depopulation and strict monitoring, there were restrictions by over 30 countries on poultry imports from TN counties, TN the state and even the whole of the U.S. One company reported losses of 5 million in planned exports alone. Although significant losses were recorded, this incident provides valuable insight into appropriate and effective biosecurity processes.³⁰

Dr. Robert Stout, previous Director of Homeland Security and current State Veterinarian for Kentucky offered the following general overview of how to prepare for and respond to disease outbreaks. The first aspect is awareness which requires effective monitoring and audits. Poultry operations across the U.S. have the most surveillance installed out of all livestock operations. This is essential for pathogen containment as well as maintaining open exports markets. With effective monitoring, the state is able to set 'surveillance zones' around outbreak focal points and, when necessary, depopulate all 'presumptive positives'.³¹

The second step is preparedness/planning which includes 24/7 biosecurity measures and test exercises conducted by state and industry members. This is an opportunity to not only determine how best to handle outbreaks, but also see "who we (the state) was dealing with" in terms of industry. These tests are an opportunity to build trust and partnerships between state agencies and industry members. Dr. Stout credits a test run conducted two weeks before an effectively controlled 2009 outbreak with building a crucial partnership between himself and the involved companies. Because of current high trust levels in industry, Dr. Stout has been able to evaluate on-site, all large poultry producers' biosecurity plans.³²

Dr. Stout also emphasized the importance of using already established pipelines to educate and build partnerships. For instance, the Kentucky Poultry Federation has been the key avenue for reaching industry and spreading a general plan for HPAI outbreaks. Other state agencies can also be valuable. For instance, Fish and Wildlife monitors the wild birds for evidence of HPAI. Extension services are a valuable means of educating 'backyard' producers to appropriate HPAI responses. Furthermore, the Department of Public Health is charged with the crucial task of updating the local government and the public. The collaboration of various state departments and industry members in the prevention and response to HPAI is a vital component of effective biosecurity measures.³³

Animal Agriculture 2.0

Animal and human health are inexorably intertwined. Looking towards the future of animal agriculture, what might be termed 'Agriculture 2.0', there is a need for consciously re-imagining agriculture to not just acknowledge, but to *act*, from a place where animal agriculture and human health are synonymous. The most serious challenge and opportunity alike identified by DVM Lonnie King at The Ohio State University is reestablishing agriculture's "social responsibility and relevance as a positive factor in improving lives." This requires a "shift into animal agriculture 2.0".³⁴

Rural America, states King, remains a "key part of the U.S. and our future". Agriculture has moved past the idyllic red-barn era so vividly portrayed by Norman Rockwell. Today, agriculture

operates on the cutting edge of technological innovation. The past and continued modernization has, however, been accompanied by a rising public anti-agriculture sentiment.³⁵

Animal Agriculture 2.0 addresses this sentiment by capitalizing upon the fact that agriculture is involved, at some level, with our key determinants of health that collectively impact approximately 75% of our human health outcomes. For instance, many of our chronic human illnesses directly relate to food. Figure 1 below shows the broad combination of factors which drive population health; many of those factors are directly and indirectly impacted by agriculture, e.g. the physical environment, biological, social and economic, etc. By targeting 'strategic inflection points' (Figure 2) within the One Health Domains of human, animal and environmental health, agriculture can maximize its positive effect on health and wellbeing worldwide.³⁶

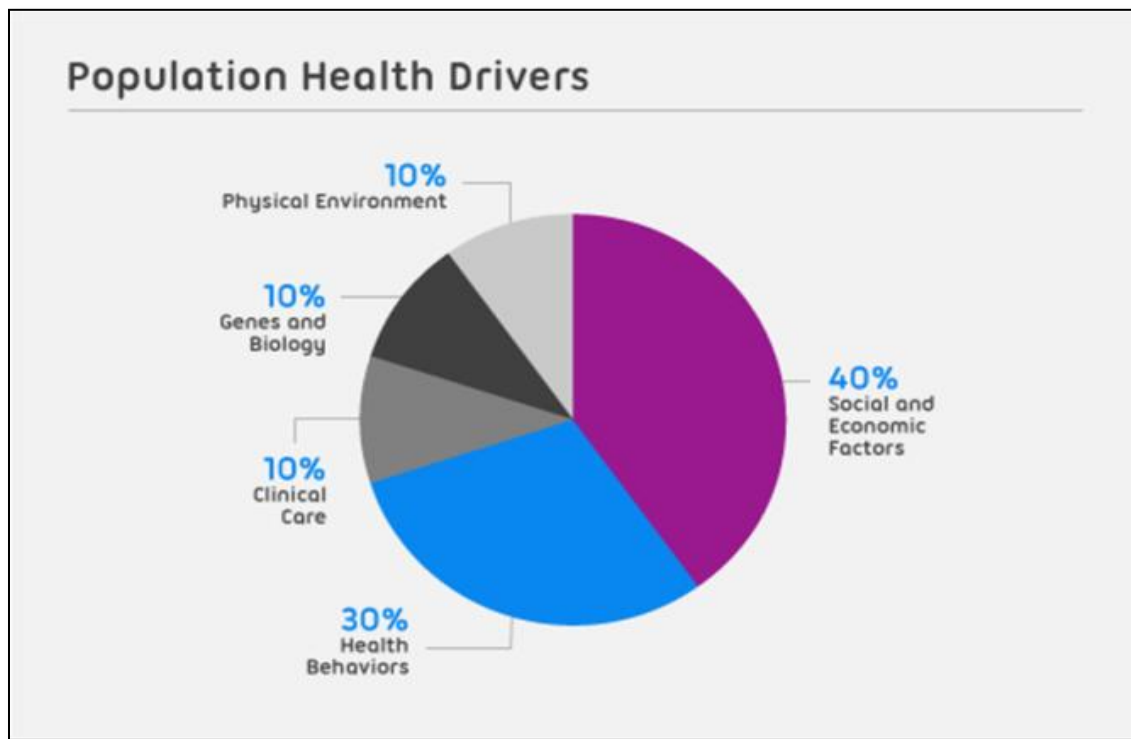


Figure 2: Population health drivers (King, Lonnie).

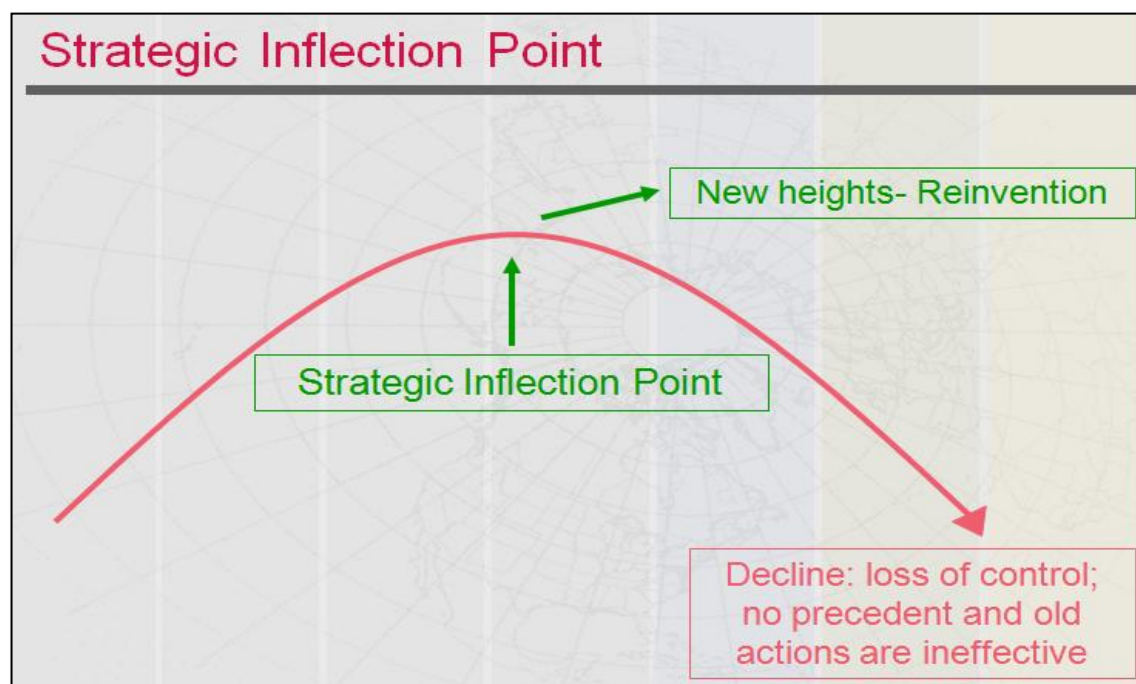


Figure 3: Strategic inflection point (King, Lonnie).

Food security, malnutrition and under nutrition are clear starting inflection points. With the global population rising by 1 million per week for the next 40 years, agriculture will need to provide more food over that period than during the last 500 years.

That food must meet nutrition standards, not just caloric needs. Where production increases during the Green Revolution were primarily supply of modern technology driven, the current increase in animal protein needs is demand driven. Projections show this demand will increase 50% by 2025, especially in developing countries (Figure 4). Meeting this demand is an opportunity for animal agriculture to improve human nutrition.³⁷

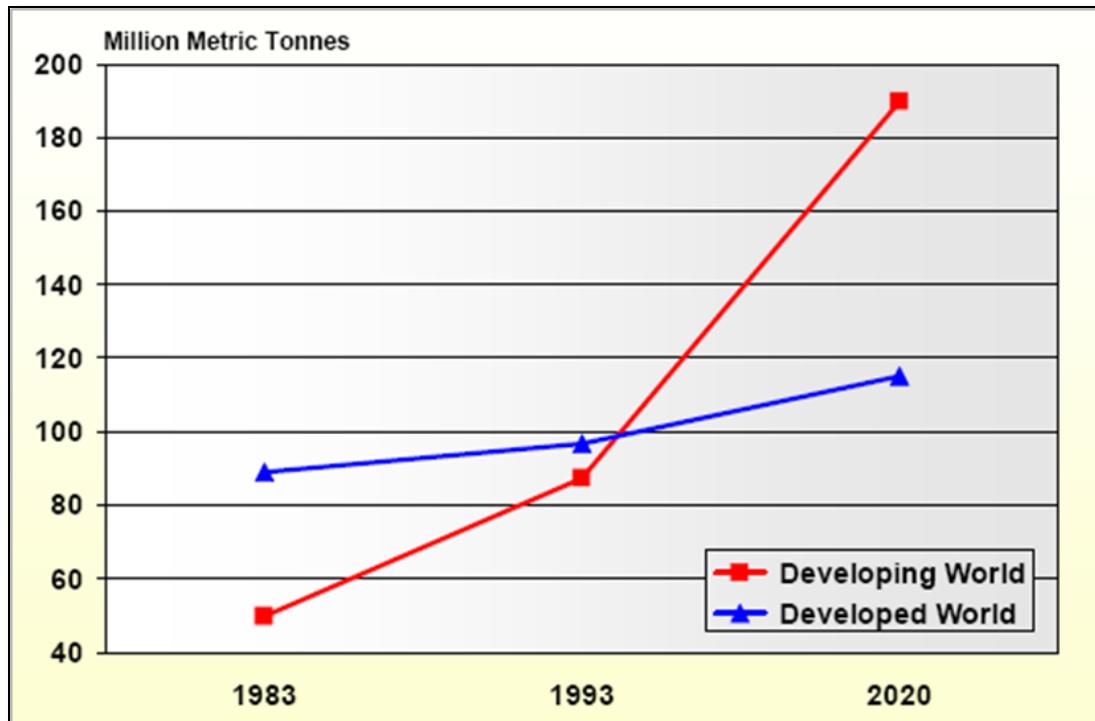


Figure 4: Historic and projected beef demand 1983 – 2020 (King, Lonnie).

While eating meat is an excellent source of essential amino acids, iron, zinc, vitamins D and B12, etc., livestock carry the inherent risk of zoonoses exposure. Worldwide, 70% the rural poor and 30% the urban poor depend on livestock. In these situations, sanitation is generally less than ideal. Thus it is unsurprising that 56 zoonoses are responsible for 2.5 billion cases of human illness and 2.7 million deaths annually. These numbers may in fact be even higher when considering the ‘massive’ under-reporting of the large illness burden in the 1 billion people earning under \$2 a day. By implementing and sharing appropriate biosecurity measures including, wildlife management, agriculture has an opportunity to mitigate the burden and cost of zoonoses.³⁸

The impact of animal agriculture on human health is not, however, limited to developing nations. Healthcare currently costs the U.S. \$3.3 trillion and agriculture affects many first world health determinants such as development of ‘agricultural’ (animal products used as medicine), water quality, new energy source adoption, nutrient management, access to healthy food, food matching personalized medicine, disease prevention, job availability, economic strength in rural areas, etc. Food offers a tremendous source of value, wealth, and great potential to reduce poverty which results in poor health in developed and developing nations alike.³⁹

A coalition that is here to stay composed of multiple groups and individuals including much of the millennial generation voices concerns of animal welfare, food safety and nutrition,

genetically modified organisms, vaccines, labor conditions, antibiotics, feed additives, “industrialized farming”, local production, environmental degradation, carbon footprints, water resources, etc. The publicity and impacts of these concerns are amplified both by the emotional responses these issues evoke and by the disconnection of farmers/producers from the public.⁴⁰

Animal agriculture must adapt to adequately respond to this coalition. “An organization that can’t re-imagine its deepest sense of what it is what it does, and how it competes and operates will soon be rendered obsolete” states King. Moving into animal agriculture 2.0, requires a new level of thinking, one that goes beyond the thinking processes that have created the current problems and challenges. The current systems dynamic issues cannot be addressed by yes or no questions or by the solutions which worked in the past.⁴¹

Reinventing Animal Agriculture 2.0 requires a fundamental reset. Agriculturalists value their independence, but there is already interdependence between agriculture, consumers, retailers, other industries, including the government. These partnerships should be embraced, and used. Interdependent collaborations result in innovation, new scientific and technological findings and their adoption. This discovery and adoption process also requires more equitable research funding, and agriculturalists should demand this greater equity.⁴²

Animal agriculture must strongly articulate its value, its societal benefits. No longer is the mission of animal agriculture merely rearing animals, it is improving human and community health and vitality. This is accomplished by being proactive and transparent, by having conversations around key strategic animal, environmental and human health inflection points. At this time, the agricultural industry does not articulate the value of its products and its benefit to human and community health and vitality.⁴³

Finally, animal agriculture must embrace food and health in all its dimensions. Commit to helping address the poverty and corresponding health problems in the rural U.S. while also leveraging global protein demand to support poverty alleviation and good health globally. Commit to traceability through the entire production process. Commit to carbon neutral production. Commit to sustainable, innovative production that ensures agriculturalists’ role as stewards of the land and a healthy future for our planet.⁴⁴

Although there exists much uncertainty today - technological, political, regulatory, global trade, demographics, the environment, climate and weather, etc. - there is a clear leadership role for animal agriculture. Animal agriculture can galvanize a new era of improved animal, environmental and human health.

THE FUTURE OF ANIMAL AGRICULTURE, ANIMAL CARE

Animal well-being remains a pertinent conversation amongst agriculturalists and the general population alike. An industry discussion of the issues surrounding animal care was hosted following the 2017 NIAA Annual Meeting.

Topics and speakers included:

“Animal Welfare Standards: Good for animals. Good for farmers.” Dr. Janet Helms, National Director, American Humane

“Overview & Comparison of State Farm Animal Welfare Legislation”, Chelsea Good, J.D., Livestock Marketing Association

“Legal Perspective, What to Expect, and How to Handle the Activists”, Linda Chezem, Of Counsel, Foley, Peden, and Wisco & Judge (ret.) Indiana Court of Appeals

“Animal Welfare Standards from the Research, Government, and Trade Groups”, Dr. Tony Forshey, State Veterinarian, Ohio Department of Agriculture; Mike Bumgarner, President & CEO, United Producers Association; Dr. Candace Croney, Director, Center for Animal Welfare Science, Purdue University; Dr. David Glauer, State Veterinarian Ohio (ret.); Bryan Black, Past President of the National Pork Producers Council and Member of Ohio Livestock Care Standards

“Animal Welfare Standards from the Processors & Retailers”, Sarah Wilbourn, Director, Animal Welfare, United Egg Producers; Jose Rojas, Vice President, Farm Operations, Hormel Inc.; Mike Brown, Director, Dairy Supply Chain, Kroger Foods; Christine Summers, Product Safety & Quality Assurance, Costco

“The Role of Science and Public Expectation in Animal Welfare Policy”, Dr. Candace Croney, Director, Center for Animal Welfare Science, and Associate Professor, Animal Behavior and Well-being, Purdue University

“What We've Heard, Learned and Next Steps?”, Andy Vance, Feedstuffs

When discussing animal care it must first be acknowledged that while the majority of people in the U.S. are concerned about animal welfare, in the general non-agricultural population, most people believe animals are insufficiently protected. Farm animals are a particular point of concern and this has led to pressure for increased on-farm animal welfare regulations.⁴⁵

With the rise of ‘ethical consumerism’ animal welfare has become a key component in customers consideration of what constitutes a ‘good purchase’ (Figure 5). In an attempt to purchase products that do least harm, ethical and sustainable production plays a crucial role in

consumer decision making (Figure 5). For instance, 14% of survey participants reported decreasing their pork consumption average reduction of 56% over the past three years due to animal welfare concerns. This demonstrates the strong correlation between consumer behavior and their values and perceptions of social responsibility (Figure 5). This presents a challenge for scientists, regulators and producers within the animal industry who must find a balance when merging science, ethics and public perception for maximum animal welfare.⁴⁶

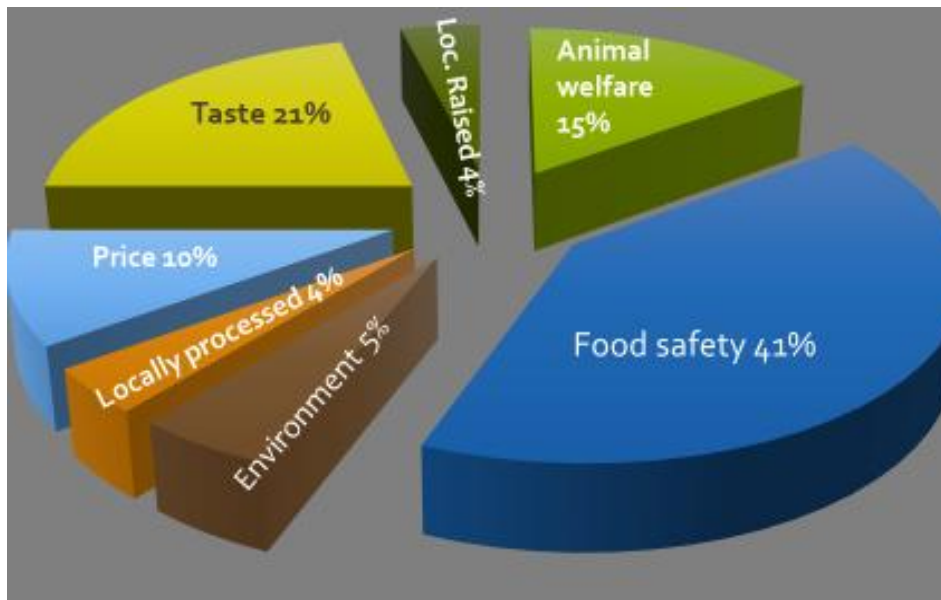


Figure 5: Consumer considerations when purchasing a food product (Croney, Candace).

There exist many current animal well-being issues for U.S. agriculture to address including: intensive confinement, animal handling, pain assessment and alleviation relative to production practices such as dehorning and castration, euthanasia and mass depopulation, use of antibiotics, growth promotants, and housing conditions.⁴⁷

When considering each of these areas, there exist three primary conceptions of animal welfare which should be considered. First, is the animal capable of functioning well, e.g. in good health, exhibiting normal growth and reproduction patterns, etc. Second, does the animal feel well, e.g. are negative feelings such as pain and fear minimized while positive feelings such as contentment maximized. Third, are animals able to lead reasonably natural lives, e.g. performing natural behaviors such as socializing and living in spaces with natural elements.⁴⁸

To meet each of these concepts of animal welfare there has been impressive environmental engineering advances in animal care. For instance, improvements in indoor air quality through ventilation and temperature and humidity control, improved manure handling and storage, reduced animal densities, exacting reed regimes and management practices, etc.⁴⁹

There remain, however, new challenges for scientists. Scientists must consider the dynamic system that is a farm or ranch to optimize economics, energy consumption and environmental impacts as well as animal needs. There must be improved determination of which systems work for small vs. large scale operators. More broadly, there must be consideration of which systems are socially acceptable.⁵⁰

Although science is crucial to meeting these and many more challenges, there are constraints to science where ethics dominates. For instance, the question of ‘what constitutes an acceptable quality life for animals?’ requires both scientific and value judgements.⁵¹

The public, consumers have a role in making these ethical decisions, but they must first be informed. Consumers have high expectations for and high interest in food production. They prioritize safety, affordability, nutrition and often use their perception of an animal’s welfare as proxy measure of desirable ‘quality’ attributes. The public overwhelmingly dislikes animals in boxes, any cutting of animals and animals in pain/distress. These concerns have been amplified by recent information on animal behavior, intelligence, capacity for positive emotional states, range of pain sensitivity, etc. Food has become more than sustenance, now it is a statement of values, of social justice.⁵²

Widespread education around food and farming is a crucial arena for all of the animal agriculture industry to collaborate in and is a component of the Agriculture 2.0 model discussed above. When it comes to animal welfare information, 56% of people lack an information source. While engaging in educational activities, dialog and discussion, it should be remembered that a majority of consumers feel knowledgeable about *food* but *not* about agricultural practices. This offers a tremendous opportunity for the animal agriculture industry to educate around agricultural practices and science while engaging in value sharing.⁵³

FOOTNOTES

¹ Southgate, Douglas. "More than Nine Billion to Feed in 2050," 2017 National Institute for Animal Agriculture Annual Conference, April 3, 2017.

² Southgate, Douglas.

³ Southgate, Douglas.

⁴ Vetter, Darci. "Economic Impact," 2017 National Institute for Animal Agriculture Annual Conference, April 3, 2017.

⁵ Vetter, Darci.

⁶ Vetter, Darci.

⁷ Vetter, Darci.

⁸ Vetter, Darci.

⁹ Vetter, Darci.

¹⁰ Vetter, Darci.

¹¹ Vetter, Darci.

¹² Vetter, Darci.

¹³ Vetter, Darci.

¹⁴ Vetter, Darci.

¹⁵ Lyons, Mark. "Global Consumer Trends and the Opportunity for American Agriculture," 2017 National Institute for Animal Agriculture Annual Conference, April 3, 2017.

¹⁶ Lyons, Mark.

¹⁷ Lyons, Mark.

¹⁸ Lyons, Mark.

¹⁹ Lyons, Mark.

²⁰ Lyons, Mark.

²¹ Lyons, Mark.

²² Lyons, Mark.

²³ Lyons, Mark.

²⁴ McCully, Mark. "1 Billion Pounds & International Trade," 2017 National Institute for Animal Agriculture Annual Conference, April 3, 2017.

²⁵ McCully, Mark.

²⁶ McCully, Mark.

²⁷ McCully, Mark.

²⁸ McCully, Mark.

²⁹ Stout, Robert. "Highly Pathogenic Avian Influenza (HPAI) Update," 2017 National Institute for Animal Agriculture Annual Conference, April 6, 2017.

³⁰ Stout, Robert.

³¹ Stout, Robert.

³² Stout, Robert.

³³ Stout, Robert.

³⁴ Stout, Robert.

³⁵ King, Lonnie. "Future of Animal Agriculture," 2017 National Institute for Animal Agriculture Annual Conference, April 3, 2017.

³⁶ King, Lonnie.

³⁷ King, Lonnie.

³⁸ King, Lonnie.

³⁹ King, Lonnie.

⁴⁰ King, Lonnie.

⁴¹ King, Lonnie.

⁴² King, Lonnie.

⁴³ King, Lonnie.

⁴⁴ King, Lonnie.

⁴⁵ Croney, Candace. "The Role of Science and Public Expectation in Animal Welfare Policy". 2017 National Institute for Animal Agriculture Annual Conference, April 6, 2017.

⁴⁶ Croney, Candace.

⁴⁷ Croney, Candace.

⁴⁸ Croney, Candace.

⁴⁹ Croney, Candace.

⁵⁰ Croney, Candace.

⁵¹ Croney, Candace.

⁵² Croney, Candace.

⁵³ Croney, Candace.

OTHER SPEAKERS AND TOPICS AT THE CONFERENCE

(Listed by committee/council)

Animal Care Council

“Power of the Animal Care Review Panels”, Allyson Perry, The Center for Food Integrity; Dr. John Deen, University of Minnesota; Dr. Janice Swanson, Department of Animal Science, Michigan State University

“USDA International Standardization Organization – 34700 Animal Welfare Assessment”, Dr. Craig Morris, Deputy Administrator, USDA

“Bovine Castration/Dehorning Update”, Dr. Eric Gordon, The Ohio State University

“Tail Docking Update”, Emily Meredith, Chief of Staff, National Milk Producers Federation

“Regional Perspective & Update on Livestock Marketing Channels”, Mike Bumgarner, President & CEO, United Producers

Animal Care Standards Workshop

“Animal Welfare Standards: Good for animals. Good for farmers.” Dr. Janet Helms, National Director, American Humane

“Overview & Comparison of State Farm Animal Welfare Legislation”, Chelsea Good, J.D., Livestock Marketing Association

“Legal Perspective, What to Expect, and How to Handle the Activists”, Linda Chezem, Of Counsel, Foley, Peden, and Wisco & Judge (ret.) Indiana Court of Appeals

“Animal Welfare Standards from the Research, Government, and Trade Groups”, Dr. Tony Forshey, State Veterinarian, Ohio Department of Agriculture; Mike Bumgarner, President & CEO, United Producers Association; Dr. Candace Croney, Director, Center for Animal Welfare Science, Purdue University; Dr. David Glauer, State Veterinarian Ohio (ret.); Bryan Black, Past President of the National Pork Producers Council and Member of Ohio Livestock Care Standards

“Animal Welfare Standards from the Processors & Retailers”, Sarah Wilbourn, Director, Animal Welfare, United Egg Producers; Jose Rojas, Vice President, Farm Operations, Hormel Inc.; Mike Brown, Director, Dairy Supply Chain, Kroger Foods; Christine Summers, Product Safety & Quality Assurance, Costco

“The Role of Science and Public Expectation in Animal Welfare Policy”, Dr. Candace Croney, Director, Center for Animal Welfare Science, and Associate Professor, Animal Behavior and Well-being, Purdue University

“What We've Heard, Learned and Next Steps?”, Andy Vance, Feedstuffs

Animal Health Emergency Management

“The Impact of USDA Reporting a Foreign Animal Disease to OIE”, Dr. Rosemary Sifford, Executive Director National Import Export Services, Veterinary Services, USDA Animal and Plant Health Inspection Service (APHIS VS)

“The Economic Impact on a Foreign Animal Disease or Disease Outbreak”, Dr. Stephanie Shwiff, USDA

“Permitted movement, lessons learned and changed made dealing with highly pathogenic avian influenza (HPAI)”, Dr. Stacey Schwabenlander, Senior Veterinarian, Minnesota Board of Animal Health

“One Health, working together to safeguard agriculture”, Dr. Matthew J. Salois, Elanco Animal Health

“Compartmentalization and its Impact on trade”, Dr. Alberto Torres Rodriguez, Export Manager, Cobb-Vantress

Animal Identification & Information Systems Council

“Panel Discussion - Disease Traceability Update – What have we learned? Challenges? Opportunities? Next Steps?”, Mr. John Saunders, CEO & Chairman, Where Food Comes From, Inc. (Cattle); Mr. Bryan Black, Past President, National Pork Producers Council (Swine); Dr. Jim Logan, State Veterinarian, Wyoming Livestock Board (Small Ruminant); Mr. Mike Bumgarner, President & CEO, United Producers (Livestock Market); Dr. Charles Hatcher, State Veterinarian, Tennessee Department of Agriculture (State Veterinarian/ID Coordinator)

“Interstatelivestock.com website Progress & Update”, Michael McGrath, Director, TraceFirst

“NIAA & USAHA Equine Forum Update”, Dr. Carl Heckendorf, Livestock Disease and Animal Health Veterinarian, Colorado Department of Agriculture

“APHIS VS Vision/Assessment/Priority for ADT/USDA Update on Stats on ADT”, Dr. Sunny Geiser-Novotny, Animal Disease Traceability Veterinarian, USDA Animal and Plant Health Inspection Service (APHIS)

“Traceability & Trade – Implications/Opportunities”, Marie-Christine Talbot, National and International Development, Agri-Traçabilité International

Antibiotic Council

“Discussion on the Veterinary Feed Directive Integration in Minor Species”, Dr. Dave Smith, President, Freshwater Farms (Aquaculture); Mark Dykes, Chief Apiary Inspector, Texas A&M University (Bees); Dr. Eric Gordon, The Ohio State University (Small Ruminant)

“2016 Antibiotic Symposium Review & Survey Evaluation”, Dr. Eric Moore, Director of Technical Services, North America, Norbrook, Inc.

“Animal Medicinal Drug Use Clarification Act (AMDUCA)”, Dr. Patrick Gorden, College of Veterinary Medicine, Iowa State University

“Alternatives to Antibiotics”, Dr. Cyril Gay, Senior National Program Manager, USDA Agricultural Research Service (ARS)

Aquatic Livestock Committee

“Aligning Aquaculture KPI Metrics with Other Livestock Sectors to Accelerate Industry Growth”, Dr. Marty Matlock, Center for Agricultural and Rural Sustainability, University of Arkansas

“Lifecycle Assessment of Aquaculture and Aquaponics Systems in Hawaii and How They Can Improve your Operation”, Dr. Marty Matlock, Center for Agricultural and Rural Sustainability, University of Arkansas

Bovine Committee

“Livestock Exporting...Facts and Fiction”, John Surber, President and CEO, Premiere Solutions, LLC

“The Role of 3rd Party On-Farm Audits”, Matt Jones, Vice President of Auditing, Validus Services

“Export Certification of Live Animal Commodities”, Dr. Kellie Hough, Veterinary Services, USDA Animal and Plant Health Inspection Service (APHIS VS)

Emerging Diseases Council

“Update: New World Screwworm in Florida”, Dr. Michael Short, State Veterinarian/Director, Division of Animal Industry, Florida Department of Agriculture and Consumer Services

“Bovine Tuberculosis: Indiana’s Progress Report”, Dr. Bret Marsh, State Veterinarian, Indiana State Board of Animal Health

“Caribbean Integrated Surveillance System on Antimicrobial Resistance in Agriculture”, Dr. Armando E. Hoet, Director, Veterinary Public Health Program, Department of Veterinary Preventive Medicine, The Ohio State University

“Emergence of Influenza A in Agricultural Fairs”, Dr. Andy Bowman, Assistant Professor, College of Veterinary Medicine, The Ohio State University

Equine Committee

“Equine Committee Presentation: Transportation”, Larry Baker, Baker Livestock & Horse Transport LLC

“EDCC Update /Equine Microchip Searchability - Past, Present and Future”, Dr. Nathaniel A. White II, Professor Emeritus of Equine, Surgery, Virginia Technology Marion duPont Scott Equine Medical Center; Jean Anne Mayhall, Equine Division, Microchip ID, Inc.

Global Animal Health, Food Security and Trade Council

“Food Security Implications with an Animal Disease Incident”, Dr. Wondwossen A. Gebreyes, Director of Global Health Programs, The Ohio State University

“The Role of Global One Health Capacity in Global Food Systems”, Dr. Ben Wileman, AgForte/Wilmar Poultry Company”, Dr. Wondwossen A. Gebreyes, Director of Global Health Programs, The Ohio State University

Poultry Committee

“How We Grow Chickens at Sanderson Farms”, Dr. Phil Stayer, Sanderson Farms

“Poultry Welfare Issues for Turkey Producers”, Dr. Molly Parker, Food Safety & Animal Care and Well Being, Butterball, LLC

Small Ruminant Committee

“Panel Discussion on Small Ruminant”, Dr. Jim Logan, Wyoming State Veterinarian, Wyoming Livestock Board; Dr. Don Knowles, Professor & Research Leader Veterinary Microbiology & Pathology Animal Disease Research Unit, USDA Agricultural Research Service (ARS); Dr. Bret Taylor, Research Leader, USDA Agricultural Research Service (ARS)

“The Wildlife-Livestock Interface and its Impact on the Sheep Industry”, Dr. Don Knowles, Professor & Research Leader Veterinary Microbiology & Pathology Animal Disease Research Unit, USDA Agricultural Research Service (ARS)

“On the Fringe of Food-Animal Production: A Place for Small Ruminants”, Dr. Bret Taylor, Research Leader, USDA Agricultural Research Service (ARS)

Millennial Sunrise Speakers

“Sunrise Breakfast with Millennial Minds”, Anya Gandy, Cornell University; Sierra Jepsen, The Ohio State University; Merritt Ogle, The Ohio State University; Carley S. Snider, The Ohio State University; Moderated by Sarah J. Bohnenkamp

“A Morning with a Millennial Farmer and Entrepreneur”, Jay Hill, Hill Farms

Swine Committee

“Food Safety – Bringing food safety back to the farm; a swine perspective”, Dr. Annette M. O’Connor, Professor of Epidemiology, College of Veterinary Medicine, Iowa State University

“Influenza A Virus Environmental Contamination in Exhibition Swine Settings”, Jacqueline M. Nolting, MS, Laboratory Operations Manager, Dept. of Veterinary Preventive Medicine, The Ohio State University

“Discussion: Swine Gut Health”, Dr. Sheila Jacobi, Assistant Professor, The Ohio State University

2017 Annual Conference Planning Committee

Ernie Birchmeier, Michigan Farm Bureau

Kathryn Britton, Where Food Comes From, Inc.

Dr. Kent Fowler, California Department of Food and Agriculture

Chelsea Good, J.D., Animal Care Standards Planning Chair, Livestock Marketing Association

Dave McElhaney, Allflex, USA

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THE 2017 ANNUAL CONFERENCE WAS FUNDED IN PART BY:

Allflex, USA

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Livestock Marketing Association

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