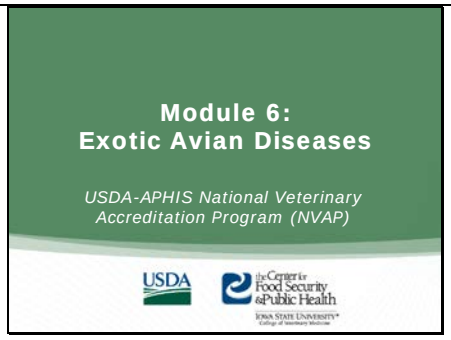
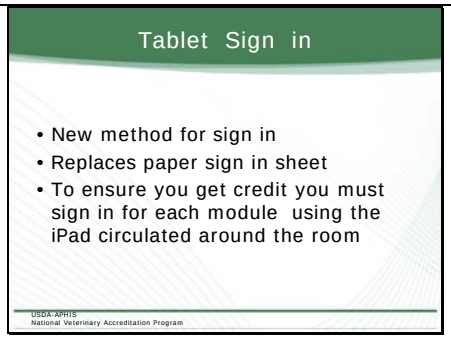
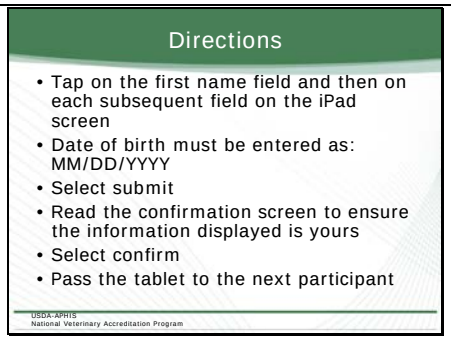
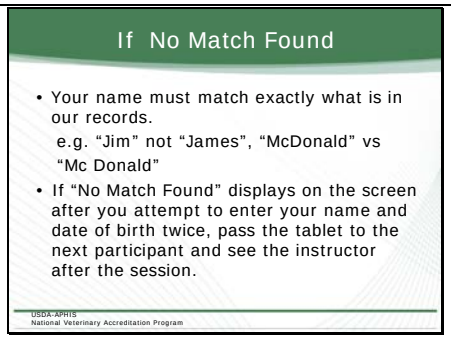
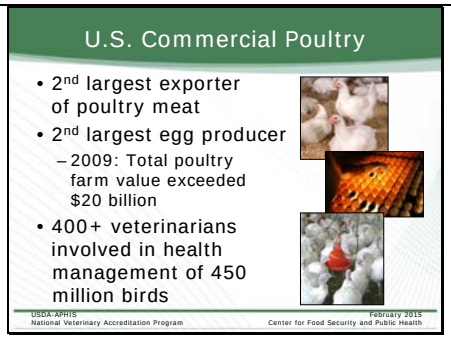
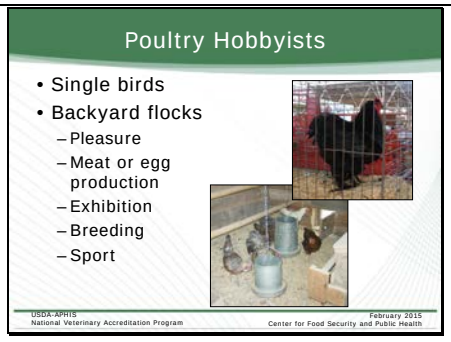
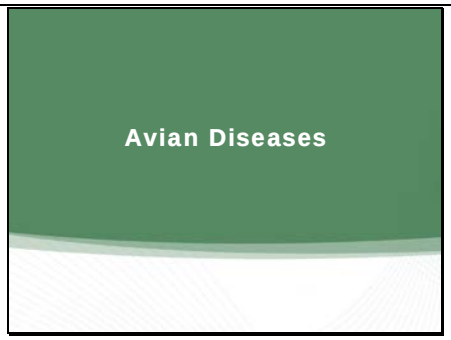
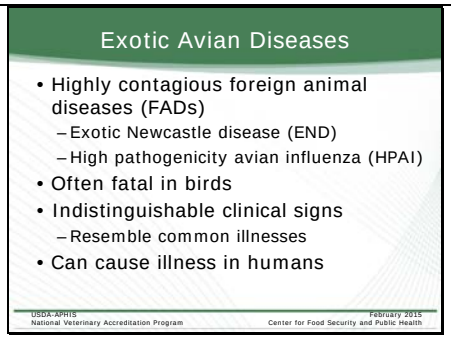
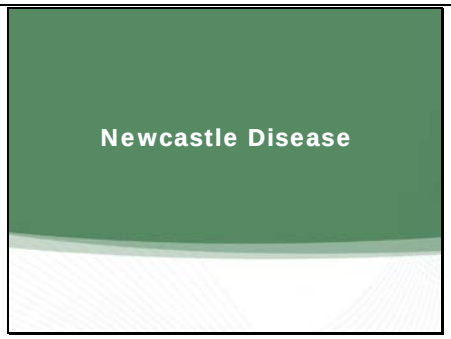
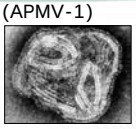
Slide 1		**Welcome to Module 6: Exotic Avian Diseases**. This module was developed as supplemental training for the USDA-APHIS National Veterinary Accreditation Program (NVAP) by the Center for Food Security and Public Health at the College of Veterinary Medicine, Iowa State University. The content for this module was finalized in February 2015. *Presenters: As designed, slide completion time ranges from 30 to 90 seconds each, such that the entire presentation can be completed in 60 minutes. For this topic, there are four handouts that will be referred to during this presentation and two factsheets that are resources for you to prepare and answer questions. All can be found at the end of this PDF and are available in the corresponding web module and print manual. You may want to print out hard copies and have them with you for demonstration purposes and to answer questions during the presentation.*
Slide 2		We have a new tablet method for allowing accredited veterinarians to sign in for AAST. This method will replace the paper sign in. In order to ensure the AV gets credit for each module they must ensure they sign in for all sessions delivered. So if they sit through 4 modules of AAST they must sign in using the iPad 4 times.
Slide 3		In order for the key pad to display the participants must first tap the first field on the screen (first name field). This will display the key pad. The participant must then either tap the stylus pen or their finger into each subsequent field on the screen. The user must tap into each field for birthdate - meaning they must tap into the month field, into the day field and into the year field. Participants must not forget to enter the year as a 4 digit value - i.e. 1969 not just 69.
Slide 4		However if they have not entered the data the way it is entered into our database they will get a No Match Found message. They should attempt to re-enter the data two more times and then pass the tablet to the next participant. They must see the instructor after the presentation to ensure they do get credit for the module they have taken. Certain reasons their name is not displayed include: Their name is not entered correctly - James vs Jim, McDonald vs McDonald vs Mc Donald etc.

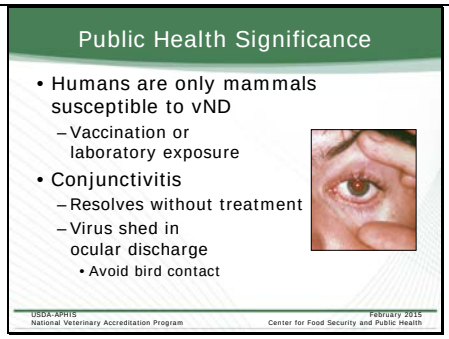
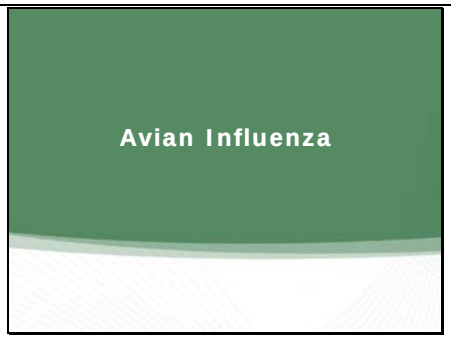
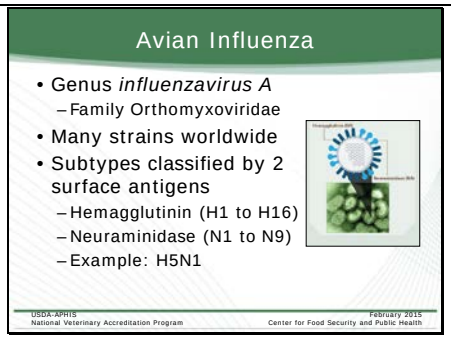
Slide 5	**Supplemental Training** 1. Print clearly on the sign-in sheets. 2. It is critical that we have your current email address for your accreditation renewal. 3. If you do not know your 6 digit National Accreditation Number, please see me at the conclusion of the presentation. 4. You will receive a Certificate of Completion during the presentation. 5. Keep your Certificate of Completion forever- **do not send it to APHIS**. USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	
Slide 6	**Supplemental Training** • All APHIS Approved Supplemental Training (AAST) modules are also available on our Website with interactive features and links to additional Web resources. • Type "NVAP" into your search engine e.g. Bing, Google, Yahoo. USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	
Slide 7	**Supplemental Training** • Familiarize accredited veterinarians with animal health regulatory concepts and activities – Does not supersede the regulations • For the most up-to-date regulations and standards, please refer to: – Code of Federal Regulations – Local VS District Office USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	*Presenters: Please make sure your audience understands the intent of this information by reading what is written here.* This informational presentation is intended to familiarize accredited veterinarians with animal health regulatory concepts and activities. Information presented here does not supersede the regulations. For the most up-to-date regulations and standards, please refer to the Code of Federal Regulations and your local VS District Office *(website listed on the slide)*.
Slide 8	**Overview** • Economic impact • Hazards of less virulent forms of avian influenza (AI), Newcastle disease (ND) viruses • Clinical signs of HPAI and END • Biosecurity measures • Reporting an exotic avian disease USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	This presentation will: • Describe the economic impact of an exotic avian disease outbreak, • Describe the hazards presented by less virulent forms of avian influenza (AI) and Newcastle disease (ND) viruses, • Demonstrate the clinical signs associated with high pathogenicity avian influenza (HPAI) and exotic Newcastle disease (END), • Review basic biosecurity measures for these diseases, • Describe how to report a possible exotic avian disease and the investigative process

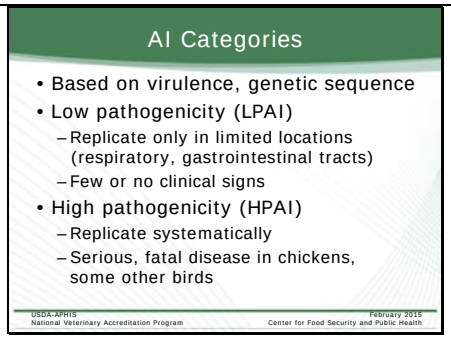
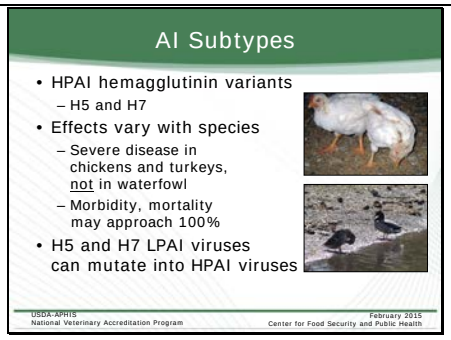
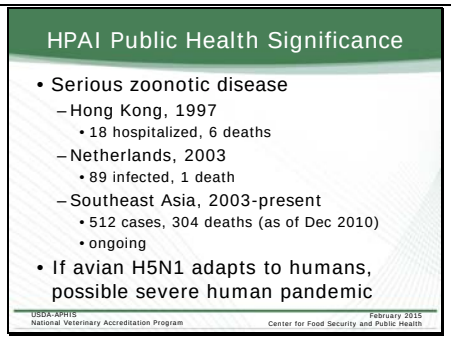
Slide 9		Over 140 veterinarians, board certified in avian practice, along with many more practicing veterinarians, care for the nation's **pet bird** population. It is estimated that 4% of U.S. households contain pet birds. Mean veterinary care expenditures for the nation's 11.2 million pet birds was $9 per bird; approximately $100.8 million. *Source:* 2007 U.S. Pet Ownership and Demographics Sourcebook, American Veterinary Medical Association.
Slide 10		The **U.S. commercial poultry** industry contributes to the global market. The U.S. is the world's second largest exporter of poultry meat and the world's second largest egg producer. In 2009, total farm value of U.S. poultry production exceeded $20 billion. There are over 400 veterinarians involved in the health management of more than 450 million birds in this country.
Slide 11		**Poultry hobbyists** consist of individuals who keep single birds or backyard flocks for pleasure, meat or egg production, exhibition, breeding or sport.
Slide 12		**Avian diseases** that can be transmitted from pet birds to the commercial poultry industry.

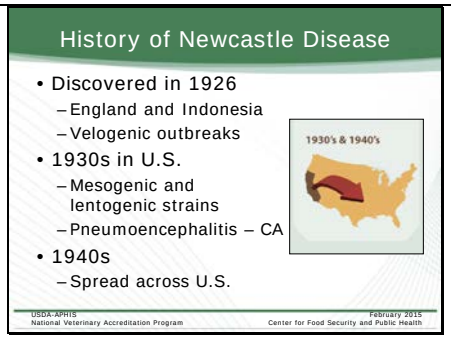
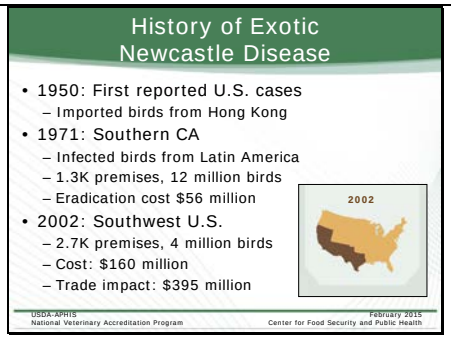
Slide 13		**Avian diseases** can be introduced and spread between bird populations in a variety of ways. Birds kept as companions or raised as a hobby often have less strict biosecurity protocols in place as compared to commercial poultry. Exotic Newcastle disease (END) and high pathogenicity avian influenza (HPAI) are two exotic avian diseases that can be spread on fomites* and by people. *Fomites are contaminated inanimate objects. For instance, clothing worn while handling pet birds and then into a commercial poultry facility has the potential to harbor disease agents. Small flocks of backyard poultry used in illegal cockfighting have been implicated in the transmission of contagious diseases to commercial poultry operations. Backyard poultry also have contact with wild birds and could introduce disease agents acquired from these birds to commercial flocks. Exotic avian diseases can be introduced through the illegal smuggling of birds into the United States. It is estimated that over 25,000 birds are smuggled in each year. Birds that carry disease agents may appear ill or they may be subclinically infected.
Slide 14		The two **exotic avian diseases** that are the focus of this presentation include Exotic Newcastle disease (END) and high pathogenicity avian influenza (HPAI). They are highly contagious foreign animal diseases (FADs) and often fatal in birds. Their clinical signs are indistinguishable from each other. These serious FADs can also resemble some common illnesses seen in poultry and pet birds. Both can cause illness in humans, from mild conjunctivitis with an END infection to severe respiratory disease and death from HPAI. The prompt recognition and control of these diseases is imperative to protect animal and human health.
Slide 15		*Presenters: The Exotic Newcastle Disease (END) Disease Brief handout provides additional disease information to prepare for this presentation and to answer questions should they arise. It can be found at the end of this PDF. If participants are interested, they can obtain the handout in the web module and in the appendix of the print manual.*

Slide 16	**Newcastle Disease (ND)** • Avian paramyxovirus-1 (APMV-1) – Genus *Avulavirus* – Family Paramyxovirus • Pathotypes based on virulence – Lentogenic, mesogenic, velogenic • Clinical forms, often overlap – Neurotropic: Respiratory, neurologic signs – Viscerotropic: Hemorrhagic intestinal lesions  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	**Newcastle disease** viruses are of the serogroup avian paramyxovirus-1 (APMV-1) in the genus *Avulavirus* (family Paramyxovirus). APMV-1 isolates can be classified as one of three pathotypes, based on their virulence for chickens – lentogenic (least virulent), mesogenic (moderately virulent), or velogenic (most virulent). The milder strains are endemic in the U.S. We will discuss the pathotypes in more detail on the next slide. The pathotypes can also be subdivided into a neurotropic form, which is typically associated with respiratory and neurologic signs, and a viscerotropic form with hemorrhagic intestinal lesions. These clinical forms overlap and are rarely clear-cut.
Slide 17	**Newcastle Disease Pathotypes** USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	**Newcastle disease (ND) pathotypes** include lentogenic, mesogenic, and velogenic. Lentogenic APMV-1 viruses are common in wild and domesticated birds throughout the world. These viruses are often carried subclinically, but they sometimes cause mild respiratory disease, decreased egg production and/or weight loss. The mortality rate is usually negligible. Lentogenic and mesogenic viruses can decrease productivity, but do not affect international trade. Mesogenic APMV-1 viruses, which are uncommon, are intermediate in virulence. These viruses can cause respiratory signs, decreased egg production and quality, and weight loss. They are occasionally associated with neurological signs, but the mortality rate is relatively low. Lentogenic and mesogenic viruses can decrease productivity, but do not affect international trade. Velogenic APMV-1 viruses are absent from domesticated birds in the U.S and cause one of the most serious poultry diseases in the world. These viruses are so virulent that, in very susceptible species such as chickens, many birds die before showing any clinical signs. Their presence in commercial poultry can shut down international trade. Velogenic APMV-1 viruses are often introduced in imported birds, but they may also arise by mutation from less pathogenic APMV-1 viruses.
Slide 18	**Definition of Newcastle Disease** • END = Viscerotropic velogenic Newcastle Disease (U.S.) • vND = Virulent Newcastle Disease (International) • Both reportable to OIE • Gallinaceous birds: highly susceptible – Chickens, turkeys, pheasants, partridges, quail • Wild, domesticated: mild to severe • Psittacine species: carrier state USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	In the U.S., **exotic Newcastle disease (END)** is **defined** as the viscerotropic velogenic form of the disease. However, all highly pathogenic APMV-1 viruses, including neurotropic velogenic strains, impact international trade and must be reported to the World Organization for Animal Health (OIE)*. For the purposes of this module, END will be the term used for the disease caused by any highly pathogenic (velogenic) APMV-1 virus. The term END may not be recognized outside the U.S. When filling out an international health certificate, the disease should be referred to as velogenic Newcastle disease (vND). *The World Organization for Animal Health, formerly known as the Office International des Epizooties or OIE, is the international body that sets standards for important animal diseases ("OIE-listed diseases") affecting international trade. The OIE also collects and disseminates information about disease outbreaks. Nations recognized as free of an OIE-listed disease must report any change in this status to the OIE immediately. END and HPAI are both OIE-

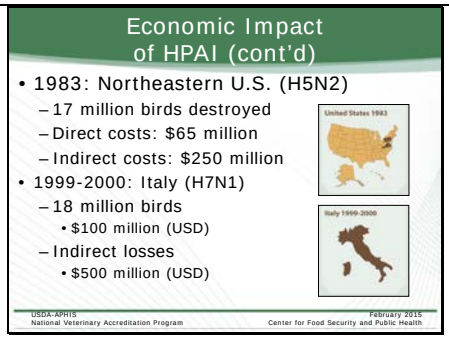
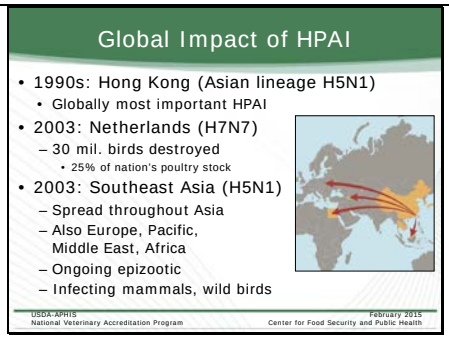
Lentogenic	Mesogenic	Velogenic
Common	Uncommon	Absent in U.S.
Subclinical	Intermediate virulence: Occasional neurological signs	Most serious poultry disease in world
Mild respiratory disease, decreased egg production & quality, weight loss		Death without clinical signs
Negligible mortality	Low mortality	High mortality
No effect on trade		Shut down trade

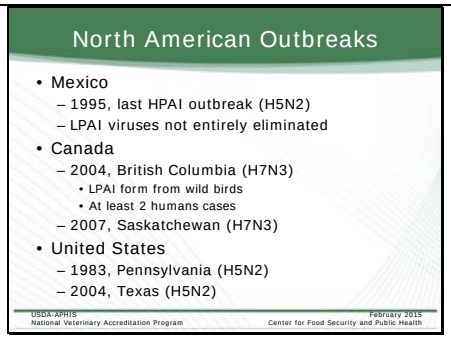
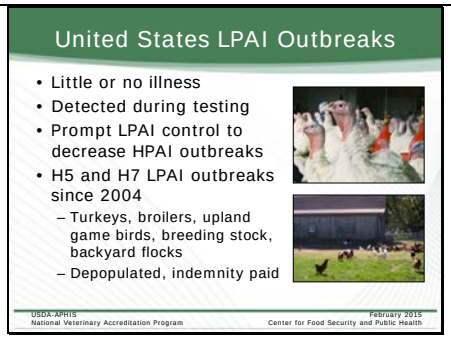
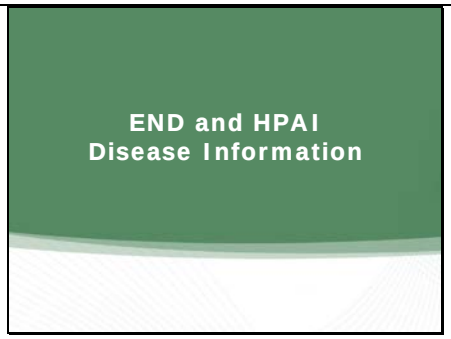
		listed. END is highly contagious and has serious consequences for infected poultry. Chickens and some other gallinaceous** birds are very susceptible to this disease; the morbidity and mortality rates can be as high as 100%. Other species of wild and domesticated birds can be mildly to severely affected. A carrier state exists in some birds, particularly psittacine*** species. **Gallinaceous: Family of birds that includes chickens, turkeys, pheasants, partridges, quail and other related birds. ***Psittacine: Family of birds which includes parrots, macaws and parakeets.
Slide 19		Next we will review the **public health significance** of exotic Newcastle disease. Humans are the only mammals known to be susceptible to velogenic Newcastle diseasen (vND). Exposure to large amounts of the virus, typically during vaccination or in the laboratory, has resulted in conjunctivitis. This generally resolves rapidly without treatment but the virus is shed in ocular discharge up to one week; avoiding bird contact during this time is suggested. Photo: A person with conjunctivitis, which is a sequellae to exposure to END virus without wearing the proper personal protective equipment.
Slide 20		*Presenters: The high pathogenicity avian influenza (HPAI) Disease Brief handout provides additional disease information to prepare for this presentation and to answer questions should they arise. It can be found at the end of this PDF. If participants are interested, they can obtain the handout in the web module and in the appendix of the print manual.*
Slide 21		Worldwide there are many strains of **avian influenza** (AI) viruses (genus *influenzavirus A*, family Orthomyxoviridae). Two highly variable surface antigens, the hemagglutinin (H) and neuraminidase (N) proteins, are used to classify AI viruses into subtypes. There are 16 hemagglutinin (H1 to H16) and 9 neuraminidase (N1 to N9) proteins. H5N1 is an example of a subtype. Within a subtype, there are many related and unrelated strains with varying virulence.

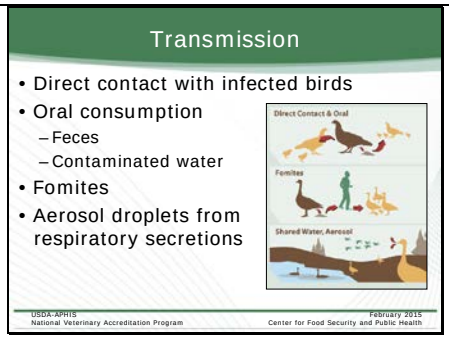
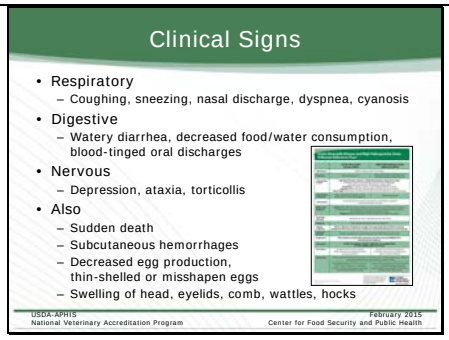
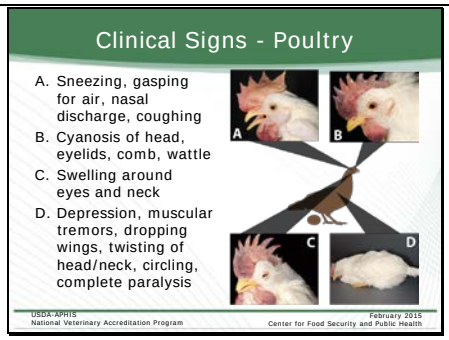
Slide 22		**Avian influenza viruses** are classified into two **categories**, low pathogenicity and high pathogenicity, based on their virulence in chickens and their genetic sequence. Low pathogenicity avian influenza (LPAI) viruses can replicate only in limited locations (primarily the respiratory and gastrointestinal tracts), and usually cause few or no clinical signs in infected birds. High pathogenicity avian influenza (HPAI) viruses have changes in the hemagglutinin proteins that allow them to replicate systemically. HPAI viruses typically cause a serious and often fatal disease in chickens and some other birds.
Slide 23		**Avian influenza subtypes**: Only two hemagglutinin variants, H5 and H7, are found in HPAI viruses. The effects of HPAI vary with the species of bird. Although there are exceptions, most of these viruses cause severe disease in chickens and turkeys, but not in waterfowl such as ducks and geese. In susceptible species, morbidity and mortality may approach 100%. Any AI virus with the genetic characteristics of an HPAI virus is now classified in this group, even if it only causes mild illness. Also important to note is that H5 and H7 LPAI viruses can mutate into HPAI viruses, and outbreaks of any type of avian influenza need prompt attention.
Slide 24		Next we will review the **public health significance** of **high pathogenicity avian influenza (HPAI)**. Although many cases of HPAI have been limited to conjunctivitis or mild flu-like signs in people, HPAI can also be a serious zoonotic disease resulting in serious illness and deaths. The first time an AI virus was shown to infect humans occurred in Hong Kong in 1997 when H5N1 hospitalized 18 people and six died of the illness. *Source*: Avian Influenza A Virus Infections of Humans, Centers for Disease Control and Prevention. The 2003 outbreak of H7N7 in the Netherlands infected 89 people. Most developed only conjunctivitis, but a few people had influenza symptoms and one veterinarian became severely ill and died. The most significant HPAI outbreak affecting humans to date began in 2003. H5N1 emerged in Southeast Asia and as of December 29, 2010, 512 confirmed human cases had been reported to the World Health Organization; 304 of these cases were fatal. Most of these infections have been reported from Asia and Egypt, and a few cases have also been confirmed in Africa, Azerbaijan, the Middle East and Turkey. There are fears that an avian H5N1 virus could eventually become adapted to humans, resulting in a severe human pandemic. Updated human statistics can be found at The World Health Organization website.

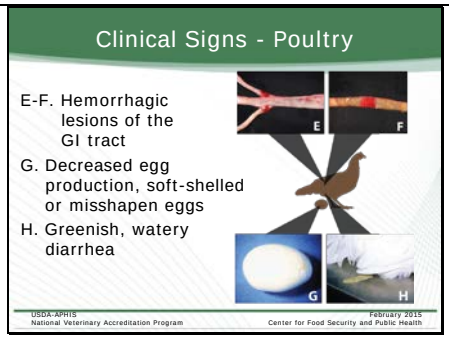
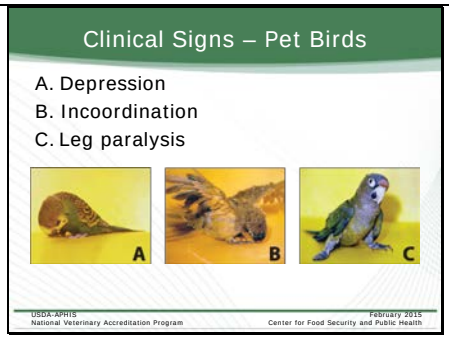
Slide 25		
Slide 26		**Newcastle disease** was discovered in 1926, at Newcastle-on-Tyne, England and in Java, an island in Indonesia. These outbreaks were caused by highly virulent (velogenic) viruses. Several panzootics* followed. The first, which began in 1926, spread very slowly. Later outbreaks spread much more rapidly, because transportation of animals and people had become more efficient. Milder forms of Newcastle disease, caused by mesogenic and lentogenic strains, were discovered later. Such forms were first recognized in the United States in the 1930s, with outbreaks of pneumoencephalitis in California. By the mid-1940s, the disease had spread across the United States. *A panzootic is an outbreak of infectious disease in animals that spreads across a large region (several countries, a continent, even worldwide). Referred to as a pandemic in humans.
Slide 27		The first reported cases of **exotic Newcastle disease (END)** in the United States appeared in 1950 and occurred in partridges and pheasants that were imported from Hong Kong. The disease spread to five farms, but it was quickly eliminated by destroying the infected birds. In 1971, a major outbreak of END occurred in commercial poultry flocks in southern California after the arrival of infected pet birds from Latin America. It took nearly 2.5 years to eradicate the disease, and almost 12 million birds were destroyed on over 1,300 premises. At the time, the eradication effort cost taxpayers approximately $56 million. In October 2002, END was confirmed in the State of California. Subsequently, the disease spread into Nevada, Arizona, Texas, and New Mexico. The spread of the disease was due in part to illegal cockfighting. Approximately 4 million birds on 2,701 premises had to be depopulated. Eradication efforts surrounding this outbreak cost taxpayers $160 million. The impact from trade restrictions was estimated at $395 million, which included the direct costs of lost exports along with additional indirect costs.

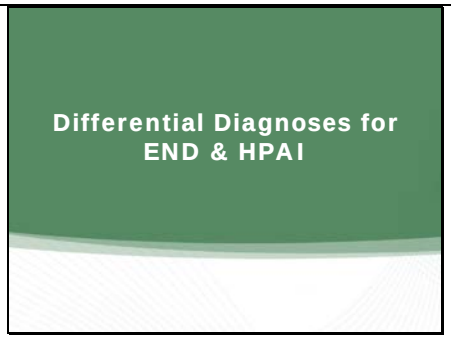
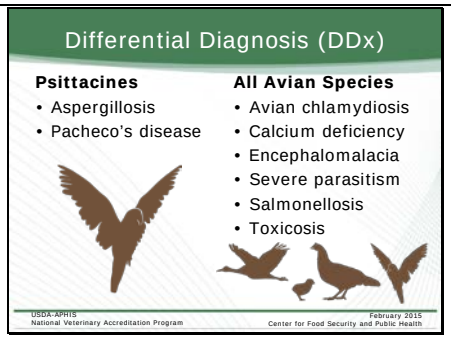
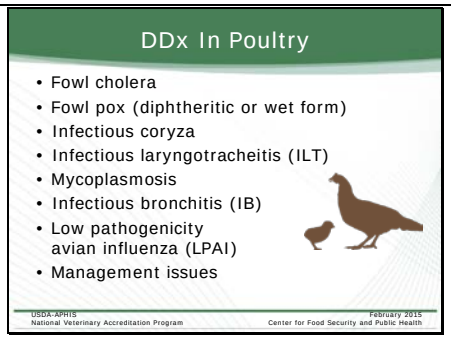
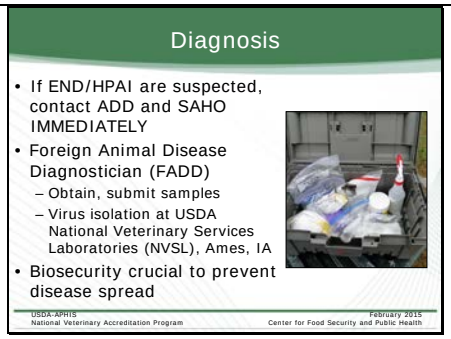
Slide 28	**Global Impact of END** • Developed countries – Costly to eradicate – Continuing economic loss • Vaccination, repeated testing • Developing countries – Limits development of well-established commercial poultry industry – Affects quantity, quality of food  USDA-APHIS National Veterinary Accreditation Program February 2015 Center for Food Security and Public Health	The **global impact of END** is enormous. In developed countries, outbreaks of END are extremely costly to eradicate in order to minimize international trade losses. Control measures, including vaccination, are also a continuing economic loss. Countries free of END are faced with repeated testing to maintain that status for trade purposes. In developing countries with endemic END, this disease limits the development of a well-established commercial poultry industry and creating sustainable trade links. Many developing countries also rely on village chickens to supply a significant portion of dietary protein in the form of eggs and meat, especially for women and children. Continued losses from END directly affect the quantity and quality of the food for people living on marginal diets.
Slide 29	**History of Avian Influenza** • 1878: Italy HPAI epizootic • 1924: First U.S. outbreak • 1901-1930: Europe, North and South America, Egypt, China, Japan • Early 2000s: H5N1 (HPAI) viruses established in Asia, Egypt – Repeated, severe epizootics – Spread to other continents USDA-APHIS National Veterinary Accreditation Program February 2015 Center for Food Security and Public Health	**Avian influenza** was first identified in Italy, during a high pathogenicity avian influenza (HPAI) epizootic* in 1878. The first HPAI outbreak in the U.S. was reported in 1924. Between 1901 and 1930, the disease was also documented in Europe, North and South America, Egypt, China and Japan. Since that time, outbreaks have occurred sporadically in many countries throughout the world. Since the early 2000s, H5N1 (HPAI) viruses have become established in Asia and Egypt. These viruses have caused repeated, severe epizootics in that region and, in some cases, have spread to other continents. *Epizootic is an outbreak among animals that occurs at a particular time but does not persist.
Slide 30	**Economic Impact of HPAI** • Direct losses – Costs of depopulation, disposal, cleaning, disinfection, quarantines, surveillance, indemnity – Damage to economy from trade restrictions • Indirect losses – Lost wages, reduced commerce, lower prices for poultry products, higher consumer prices – Decreased tourism – Cost of replacement animals USDA-APHIS National Veterinary Accreditation Program February 2015 Center for Food Security and Public Health	The **economic impacts from high pathogenicity avian influenza (HPAI)** vary depending on the strain of virus, species of bird infected, number of farms involved, density of poultry populations, control methods used, and the speed of implementation of control or eradication strategies. Even under favorable conditions, outbreaks of HPAI can be extremely difficult to control. Direct economic losses due to an HPAI outbreak include the costs of depopulation, disposal, cleaning, disinfection, quarantines and surveillance, as well as indemnities paid for the elimination of birds, production losses, and damage to the economy from trade restrictions. Indirect losses result from things such as lost wages, reduced commerce, lower prices for poultry products due to increased supply in domestic markets, higher prices for consumers in countries no longer receiving U.S. product, decreased tourism, and the cost of purchasing replacement animals.

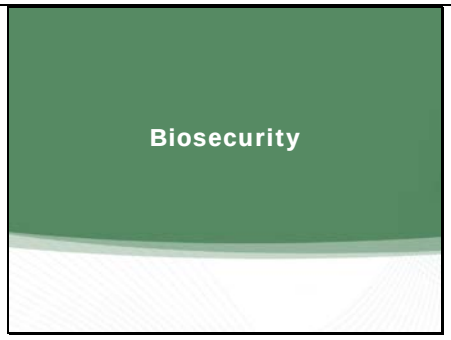
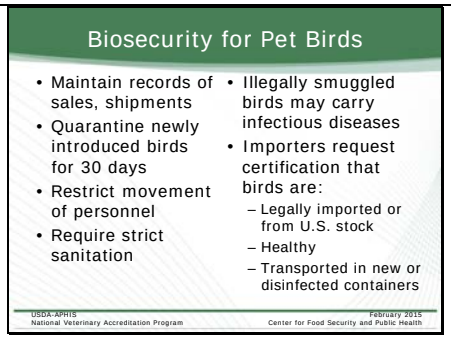
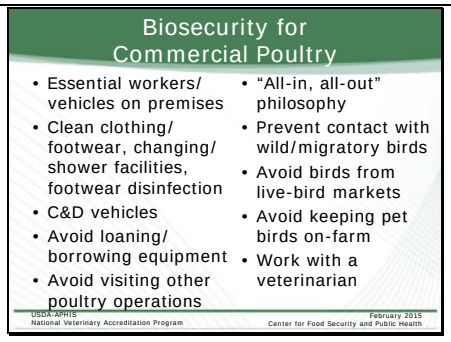
Slide 31		Additional **economic losses from HPAI** occurred in 1983 from an outbreak of H5N2 in the northeastern United States and took 2 years to control. This outbreak resulted in the destruction of more than 17 million birds and direct losses totaling nearly $65 million (which corresponds to approximately $143 million dollars in 2010). A 30% increase in retail egg prices and indirect costs estimated at more than $250 million were also reported. Outbreaks in other countries have also been costly. In the 1999-2000 outbreak of HPAI (H7N1) in Italy, the government paid farmers $100 million (USD) in compensation for 18 million birds. Total indirect losses were estimated at $500 million (USD).
Slide 32		**Globally** the most important HPAI viruses are the Asian lineage H5N1 viruses. These viruses caused outbreaks among poultry in Hong Kong in the late 1990s. The 2003 outbreak of high pathogenicity avian influenza (H7N7) in the Netherlands, which spread to Germany and Belgium, resulted in the destruction of 30 million birds in the Netherlands – a quarter of the nation's poultry stock. In 2003, H5N1 viruses emerged in Southeast Asia and caused widespread outbreaks among domesticated poultry. These viruses eventually spread into domesticated or wild birds in other regions of Asia, and have also affected parts of Europe, the Pacific, the Middle East and Africa. Although some countries have eradicated Asian lineage H5N1 viruses from their domesticated poultry, this epizootic is ongoing and worldwide eradication is not expected in the short term. The Asian lineage H5N1 viruses have also caused disease in other mammals including various large felids, housecats, dogs, palm civets, stone martens, mink and raccoon dogs. These viruses have been detected in domesticated pigs and wild pikas, and experimental infections have been established in foxes, ferrets, rodents and rabbits. Their full host range may still be unknown. Asian lineage H5N1 (HPAI) viruses have been found in many species of wild birds, which is unusual. Some of these birds have been severely affected. The cost of eradication and lost trade can reach millions of dollars from a small, controlled outbreak with only regionalized exports banned. In a larger outbreak, this figure could reach into the billions of dollars.

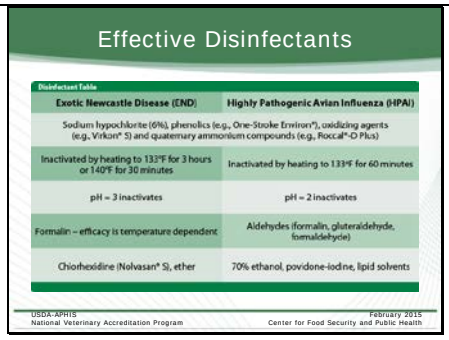
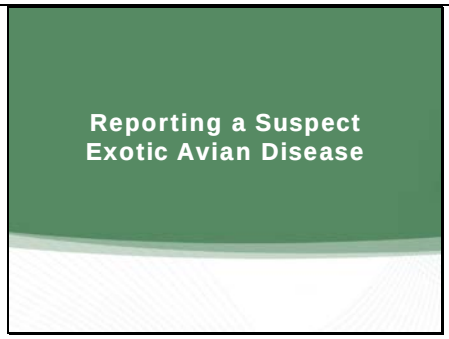
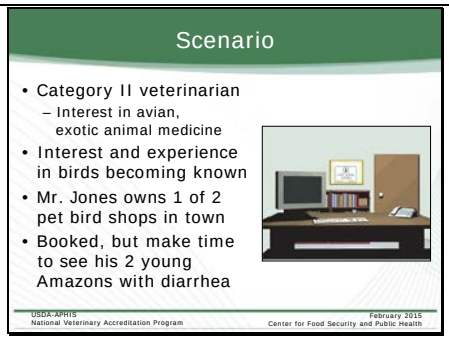
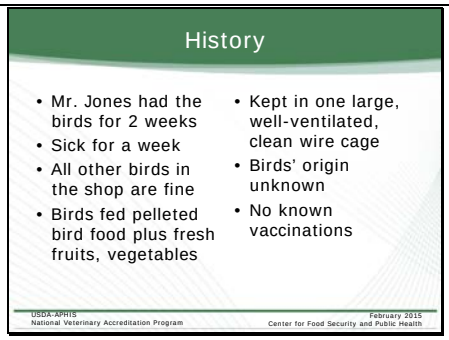
Slide 33		**North America** has experienced **HPAI outbreaks** in recent years. The last outbreak of HPAI (H5N2) in Mexico occurred in 1995, but related low pathogenicity (LPAI) viruses have not been entirely eliminated from the country. These viruses persist despite years of vaccination and eradication efforts. Canada reported its first outbreak of HPAI to the OIE in 2004. This H7N3 virus was probably introduced into a poultry flock, in the LPAI form, from wild birds in British Columbia. It was linked to two cases of conjunctivitis and flu-like illness in people, with several other suspected but unconfirmed cases. In 2007, a different H7N3 virus caused an HPAI outbreak in Saskatchewan. It also seems to have come from wild birds. In the U.S., no HPAI outbreaks were reported for approximately 20 years after the 1983 H5N2 epizootic in Pennsylvania. In 2004, an H5N2 HPAI virus was isolated from a Texas broiler chicken flock that supplied live bird markets. This virus did not cause severe disease when tested in chickens, but its genetic makeup suggested it could. For this reason, it was classified as an HPAI virus and the flock was depopulated.
Slide 34		In the **U.S., LPAI outbreaks** are carefully monitored. LPAI viruses cause little or no illness and they may not be detected unless the flock is tested regularly for AI viruses. Since the birds develop immunity to the LPAI viruses, related HPAI viruses that arise may cause less obvious clinical signs. Prompt control of LPAI cases is necessary to decrease the likelihood of HPAI outbreaks. The U.S. has identified several H5 and H7 LPAI outbreaks since 2004 affecting turkeys, broilers, upland game birds, breeding stock, and backyard flocks. In each case, the flocks were depopulated, and indemnity and response costs paid. These outbreaks illustrate the hazards of H5 and H7 LPAI viruses in poultry flocks.
Slide 35		Both END and HPAI are highly contagious, often fatal diseases that are CLINICALLY INDISTINGUISHABLE from each other. Mortality rates can be up to 100% for both diseases.

Slide 36		**END and HPAI are transmitted** through direct contact with infected birds, by oral consumption of the virus (often from feces or a contaminated water source), on fomites, and by aerosol droplets from respiratory secretions.
Slide 37		**Clinical signs of HPAI and END** involve the respiratory, nervous, and digestive systems as well as some systemic effects. Respiratory signs of HPAI and END include coughing, sneezing, nasal discharge (may or may not be blood tinged), dyspnea, and cyanosis. Digestive tract signs include watery diarrhea, decreased food and water consumption, and blood-tinged oral discharges. Central nervous system signs include depression, ataxia, and torticollis*. Also commonly referred to as "wry neck". Other signs including sudden death without clinical signs, subcutaneous petechial and ecchymotic hemorrhages, decreased egg production, thin-shelled or misshapen eggs, and swelling of the head, eyelids, comb, wattles, and hocks may also be present. The *END and HPAI Reference Chart* (as pictured) is available as a handout in the web module and in the appendix of the print manual for more detailed information. Clinical images will be shown next. *Presenters: This handout can be found at the end of this PDF. If you printed a hard copy, hold it up for demonstration purposes.* *Torticollis means a contraction, often spasmodic, of the muscles of the neck, chiefly those supplied by the spinal accessory nerve, which results in the head being drawn to one side.
Slide 38		**Clinical signs** of END and HPAI **in poultry** include the following: A. Sneezing, gasping for air, nasal discharge, and coughing B. Cyanosis of the head, eyelids, comb, and wattle C. Swelling of tissues around eyes and neck D. Depression, muscular tremors, drooping wings, twisting of head and neck, circling, and complete paralysis

Slide 39		**Clinical signs** of END and HPAI **in poultry** also include: E & F. Hemorrhagic lesions of the gastrointestinal tract G. Decreased egg production; soft-shelled or misshapen eggs H. Greenish, watery diarrhea
Slide 40		**Clinical signs** of END and HPAI **in pet birds** include the following: A. Depression B. Incoordination C. Leg paralysis
Slide 41		**Clinical signs** of END and HPAI **in pet birds** also include: D. Watery diarrhea E. Hemorrhagic lesions of the gastrointestinal tract If you identify any of these signs in poultry or pet birds and a suspicious history, call your State Animal Health Official (SAHO) or USDA's toll free number at 1-866-536-7593 After hours:800-940-6524 for a local contact.
Slide 42		**Clinical signs** of END and HPAI **in pet birds** also include: D. Watery diarrhea E. Hemorrhagic lesions of the gastrointestinal tract If you identify any of these signs in poultry or pet birds and a suspicious history, call your ADD and SAHO USDA's toll free numbers are 1-866-536-7593 After hours:800-940-6524

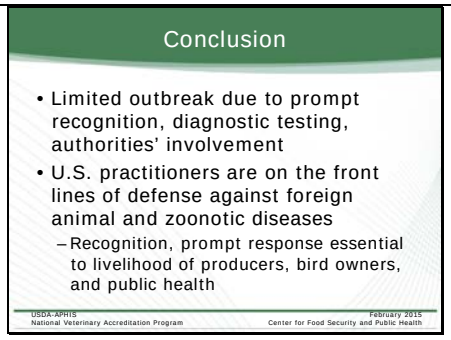
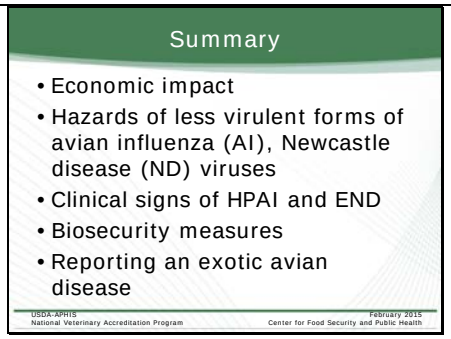
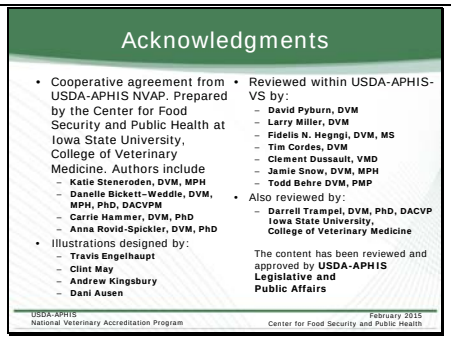
Slide 43		**Differential diagnoses** for diseases that share some or all of the clinical signs of **END** and **HPAI** in all avian species, psittacines, and poultry. As mentioned previously, END and HPAI are CLINICALLY INDISTINGUISHABLE from each other, and other diseases of pet birds and poultry also share some of the same clinical signs and would be included on a different differential list. A handout, "Differential Diagnoses for END/HPAI", provides more details than covered here. *Presenters: This handout can be found at the end of the speaker notes PDF provided. If you printed a hard copy, hold it up for demonstration purposes.*
Slide 44		**Differential diagnoses (DDx) for HPAI and END** in **psittacines** includes aspergillosis and Pacheco's disease. While neither of these diseases is reportable to OIE, aspergillosis is a zoonotic disease. DDx for **all avian species** includes avian chlamydiosis, calcium deficiency, encephalomalacia, severe parasitism, salmonellosis, and toxicosis. Avian chlamydiosis is reportable to OIE, as is salmonellosis in some states. Some parasites carry zoonotic diseases. Avian chlamydiosis and salmonellosis are also zoonotic diseases. Graphic: This left image depicts a parrot as an example of a psittacine bird. The right image includes four different avian species, all of which are affected by these diseases.
Slide 45		**Differential diagnosis (DDx) for HPAI and END** in **poultry** includes fowl cholera, fowl pox, infectious coryza, infectious laryngotracheitis (ILT), mycoplasmosis, infectious bronchitis (IB), and low pathogenicity avian influenza (LPAI). Of these diseases, certain strains of fowl cholera, ILT, mycoplasmosis, IB, and LPAI are reportable to OIE – contact your ADD and SAHO. LPAI is also a zoonotic disease. Management issues may also cause some of the same clinical signs.
Slide 46		If END or HPAI are suspected as the **diagnosis** of clinical signs, ADD and SAHO should be contacted IMMEDIATELY. A Foreign Animal Disease Diagnostician (FADD) will likely be assigned to obtain samples and submit them to an authorized laboratory. Virus isolation is required for a definitive diagnosis of END or HPAI. Diagnosis of an exotic avian disease requires laboratory testing at the USDA National Veterinary Services Laboratories (NVSL). The NVSL is composed of 4 testing laboratories, three of which are located in Ames, Iowa. The fourth laboratory is the Foreign Animal Disease Diagnostic Laboratory which is located on Plum Island, New York. In general, the Assistant District Director authorizes submissions of United States-origin samples to the NVSL. All exotic avian disease samples are sent to Ames, IA. This diagnostic testing is a free service and incurs no cost to either the owner or local veterinarian. Because these diseases are so highly contagious and the impact of an outbreak so severe, biosecurity is very important to prevent disease spread and will be discussed next.

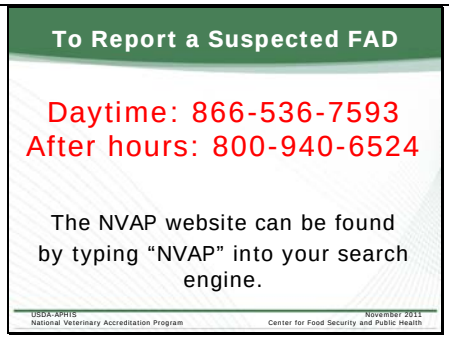
Slide 47		The next section addresses **biosecurity** for pet bird enthusiasts as well as the poultry industry to prevent the introduction or spread of END and HPAI.
Slide 48		END and HPAI are disease threats to the caged-bird industry and poultry hobbyists if **biosecurity** is not practiced. In order to best protect avian populations, individuals in the **pet bird** industry should: • Maintain records of all sales and shipments of flocks • Quarantine all newly introduced (purchased or acquired) birds for at least 30 days • Restrict movement of personnel between new (quarantined) and old birds • Require strict sanitation of personnel and/or equipment that is shared between new (quarantined) and old birds Birds illegally smuggled into the United States that are not quarantined and tested by the USDA may carry infectious diseases. Individuals importing birds must request certification from suppliers that birds are: • Legally imported or are from U.S. stock, • Healthy prior to shipment, and • Transported in new or thoroughly disinfected containers.
Slide 49		Good management and **biosecurity** practices are of the utmost importance to the **commercial poultry** industry. Essentials of good biosecurity practices should include: • Only allowing essential workers and vehicles on the premises. • Providing clean clothing/footwear and changing or shower facilities and footwear disinfection for employees. • Cleaning and disinfecting (C&D) contaminated vehicles entering and leaving the premises. • Avoid loaning or borrowing equipment or vehicles from other farms. • Personnel should avoid visiting other poultry operations including live-bird markets. • Maintaining an "all-in, all-out" philosophy of flock management with a single-age flock. • Preventing poultry flocks from coming into contact with wild or migratory birds. • Avoid bringing birds from live-bird markets back to the farm. • Avoid keeping pet birds on the farm. Employing workers who own pet birds exposes poultry to increased disease risk; advise accordingly. • Working with a veterinarian to submit diseased birds to a veterinary diagnostic laboratory for examination.

Slide 50		**Disinfectants effective** against both END and HPAI are sodium hypochlorite (6%), phenolics (e.g., One-Stroke Environ®), oxidizing agents (e.g., Virkon® S) and quaternary ammonium compounds (e.g., Roccal®-D Plus). **END** is inactivated by heating to 133°F for 3 hours or 140°F for 30 minutes; pH = 3 inactivates; formalin – efficacy is temperature dependent; chlorhexidine (Nolvasan® S), ether. **HPAI** is inactivated by heating to 133°F for 60 minutes; pH = 2 inactivates; Aldehydes (formalin, gluteraldehyde, formaldehyde); 70% ethanol, povidone-iodine, lipid solvents.
Slide 51		
Slide 52		**In this scenario**, you are a Category II veterinarian with an interest in avian and exotic animal medicine. Your interest and clinical experience in birds is becoming known in the area. You are seeing more cases every month and are enjoying this new practice builder. A new client, Mr. Jones, called this morning to make an appointment. He owns one of the two pet bird shops in town and you look forward to referrals from his business. You are booked up, but make time for him and his two young Amazons that have diarrhea.
Slide 53		Mr. Jones arrives for his appointment and you begin by taking a patient **history**. You learn he has had the birds since he picked them up about two weeks ago. They have been sick almost a week but all the other birds are fine. The birds eat a pelleted bird food along with fresh fruits and vegetables. They are both housed in one large wire cage. Mr. Jones' shop is very clean, with good ventilation and the birds are well taken care of. Mr. Jones' pet bird shop is part of a chain and the parent company handles the inventory. The birds did not receive any vaccinations to his knowledge.

Slide 54	**Physical Exam** • Well fleshed birds • Diarrhea • Fluffed feathers • Mild coughing • Mild depression • Mild dehydration  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	Upon **physical exam**, you observe well fleshed birds with diarrhea, fluffed feathers, and mild coughing. The birds seem mildly depressed and mildly dehydrated. You begin to think about rule outs.
Slide 55	**Treatment** • Obtain blood sample for CBC, chemistry panel • Obtain fecal sample for float/smear/culture • Administer: – Subcutaneous fluids – Antibiotics, vitamins • Birds return to pet store • Wait for test results  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	Prior to administering **treatment**, you take blood to run a CBC and chemistry panel as well as feces for a float/smear/culture. While waiting for your results, you give the birds subcutaneous fluids and start them on antibiotics and vitamins. You send the owner and birds back to the pet store while waiting for results.
Slide 56	**Next Day** • 1 sick bird died • Several others sick • Some showing neurological signs • Mr. Jones overwhelmed – Jason just quit – Jason's family raises backyard chickens  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	The **next day** Mr. Jones calls in a panic. One of the sick birds has died and now several other birds in his shop are acting sick as well. Some birds are now showing neurological signs. Mr. Jones is overwhelmed with work as one of his weekend employees, Jason, just quit. Jason had a lot of experience as his family raises chickens in a backyard flock.
Slide 57	**Further Investigation** • Suspect an infectious disease • Last 2 birds obtained from friend for a "great price" • New birds not quarantined  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	Your differential list is narrowing as you now suspect this is an infectious disease. You question the Mr. Jones **further** regarding the source of the birds and he reluctantly tells you that, although he normally gets all his birds from the parent company, these last two came from a friend in the business for a "great price". You also learn that these birds were not separated from the other birds upon arrival.

Slide 58	**Second Exam** • Examine one of the sick birds – Pasty vent – Difficulty breathing – Mild torticollis • "Wry neck" – Petechial hemorrhages on shanks • Case details…  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	Mr. Jones brings in one of the sick birds for a **second physical examination** and the dead bird for a necropsy. You examine the moribund bird and observe a pasty vent, difficulty breathing, mild torticollis, and petechial hemorrhages on the shanks. After examining this second sick bird, let's review what is known about this case.
Slide 59	**Definitive Diagnosis** • ADD and SAHO assign FADD • FADD performs necropsy at clinic – Hemorrhagic lesions in intestines – Edema of submandibular region • Samples sent to NVSL in Ames, IA • Lab isolates END – Lung from dead parrot – Cloacal swabs of sick bird USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	To achieve a **definitive diagnosis**, both the ADD and SAHO have access to trained Foreign Animal Disease Diagnosticians (FADD) in the area that can move this investigation forward. A FADD is sent to your clinic and performs the necropsy, which reveals hemorrhagic lesions in the intestines and edema of the submandibular region. The FADD packages and sends the samples to the National Veterinary Services Laboratories (NVSL) in Ames, IA as this is a suspicious FAD in an avian species. The laboratory isolates Exotic Newcastle Disease (END) virus in lung tissue from the dead parrot and in the cloacal swabs from the sick bird.
Slide 60	**Additional Follow-up**	Besides cleaning and disinfecting the pet bird shop and veterinary clinic, **additional follow-up** steps need to occur. We will review that next.
Slide 61	**Final Investigation Report** • Exotic Newcastle Disease (END) diagnosed – Veterinary clinic and pet bird shop quarantined – Sick, contact birds euthanized • Virus introduced by parrots from questionable source – May have been smuggled – Trace-back surveillance • Isolated introduction of END  USDA-APHIS National Veterinary Accreditation Program · February 2015 Center for Food Security and Public Health	The **final investigation report** diagnosed Exotic Newcastle Disease (END) which resulted in your veterinary clinic and the pet bird shop being quarantined, and all sick and contact birds were euthanized. Findings from the investigation of this case would suggest that the virus was introduced by the young parrots purchased from a questionable source. The fact that the seller could not be located after the sale would suggest that the birds may have been smuggled into the U.S. Trace-back surveillance by state and federal officials of all birds sold during the estimated time that the virus may have been present in the pet store did not detect any other positive birds, nor from any of your clients that were in the clinic on the day Mr. Jones was there. Because there were no other reports of problems in pet birds in this and other states, it was concluded that this was an isolated introduction of END.

Slide 62		Due to prompt recognition, diagnostic testing, and involvement of the authorities, this outbreak was limited in its scope, unlike the 2002 outbreak in the southwestern U.S., where millions of birds had to be destroyed due to END. As a practitioner in the U.S., you are on the front lines of defense against foreign animal and zoonotic diseases. Your recognition of and prompt response to potential exotic avian diseases are essential to the livelihood of poultry producers and bird owners, and to public health given the zoonotic nature of HPAI.
Slide 63		In **summary**, this module described the economic impact of exotic avian disease outbreaks. As a practitioner in the U.S., you now have the tools to understand the differences in the types of avian influenza viruses as well as Newcastle disease viruses. When clinical signs present themselves in pet birds or poultry, you should be able to promptly recognize them, implement biosecurity measures to limit disease spread, and report your suspicions to the ADD and SAHO.
Slide 64		*Presenters: Make sure your audience members know about obtaining credit for their attendance.* This informational presentation has been approved expressly to serve as one unit of **supplemental training** for participants in USDA's National Veterinary Accreditation Program. Please ensure you complete, sign and retain a certificate stating that you attended this presentation. Contact your VS District Office for more details on accreditation renewal.
Slide 65		This presentation was made possible, in part, by a Cooperative Agreement from the USDA-APHIS for the National Veterinary Accreditation Program. It was prepared by the Center for Food Security and Public Health at the College of Veterinary Medicine, Iowa State University. Authors include Katie Steneroden, DVM, MPH; Danelle Bickett-Weddle, DVM, MPH, PhD, DACVPM; Carrie Hammer, DVM, PhD; and Anna Rovid-Spickler, DVM, PhD. The illustrations in this presentation were designed by Travis Engelhaupt, Clint May, Andrew Kingsbury, and Dani Ausen. The content was reviewed within USDA-APHIS-VS by David Pyburn, DVM; Larry Miller, DVM; Fidelis Hegngi, DVM, MS. The content was also reviewed by Darrell Trampel, DVM, PhD, DACVP at the Iowa State University College of Veterinary Medicine The content has been reviewed and approved by USDA-APHIS Legislative and Public Affairs.

Slide 66		These numbers are available on the NVAP website. We recommend you copy these numbers and put them on your phone for quick reference. Offer to answer any questions while this slide remains visible.