Schmallenberg Virus: A New Threat?
by Dr. Dennis Wilson

An emerging livestock disease caused by the Schmallenberg Virus (SBV), first detected in Germany in late 2011, is causing deformities in newborn lambs, goat kids and calves on farms in numerous European countries. The virus was identified in samples collected from dairy cows with mild to moderate fevers, loss of appetite and body condition, diarrhea and reduced milk production in the summer/autumn of 2011. Dairy cows in the Netherlands were then seen with similar signs. By December 2011, it was determined that the same virus that affected the cows in Germany was associated with the sick dairy cows and congenitally malformed lambs in the Netherlands. As of March 30, 2012, there are numerous reports of SBV in congenitally malformed newborn lambs and calves in Belgium, France, Germany, Italy, Luxemburg, the Netherlands, Spain and the United Kingdom (UK). Although malformations in newborns were being reported during the winter of 2011, virus transmission to pregnant females most likely occurred concurrently with insect activity earlier in gestation.

The Schmallenberg Virus, named for the German town of the original incident, is a single-stranded RNA virus, belonging to the family Bunyaviridae, genus Orthobunyavirus. It is related to the Simbu serogroup, particularly the Shamonda, Akabane and Aino viruses; to date, genetic sequencing suggests it is most closely related to Shamonda virus. The known host range includes cattle, sheep, goats and bison; there is no evidence that SBV could cause disease in humans. Orthobunyaviruses are typically spread by biting insects making direct animal to animal transmission unlikely. Researchers at the Antwerp

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Institute of Tropical Medicine and the Belgium Veterinary and Agrochemical Research Center have identified three species of midges that are capable of transmitting SBV from animal to animal - Culicoides obsoletus, Culicoides dewulfi and Culicoides pulicaris. The virus can also be vertically transmitted across the placenta.

Clinical presentation for cattle includes fever (> 104° F), anorexia, up to 50% reduction in milk production, diarrhea and loss of body condition. Recovery occurs rapidly in individual cows over several days and within 2-3 weeks for a herd. Clinical signs of disease have not been reported in adult or growing sheep, although there is anecdotal evidence of milk drop in milking sheep in the Netherlands. Abortions, following infection of the dam, or stillbirths and congenital malformations (arthrogryposis, hydrocephaly, brachygnathia inferior, ankylosis, torticollis and scoliosis) are seen mainly in lambs, but also in kids and calves. Some animals appear without physical deformities at birth, but have nervous signs such as dummy presentation, blindness, ataxia, recumbency or an inability to suck. Fetal abnormalities seem to vary depending on when infection occurred during gestation. No vaccine currently exists for SBV.

The SBV can be identified through polymerase chain reaction (PCR) testing, seroneutralization test and indirect immunofluorescence, but these tests are not suitable for mass serosurveillance for the virus. Suspect cases are sampled for histopathological and virological examinations; confirmation of infection is by detection of virus sequences using a real-time polymerase chain reaction tests (RT-PCR). Although RT-PCR can detect the pathogen, the shortness of the viremic period limits its usefulness for detecting the virus in live animals. Serological test development is underway. Scientists in the Netherlands and Germany recently developed an antibody-based test (viral neutralization) suitable for mass SBV screening.

There have been no reports of the virus in the United States (US) at this time, but the unfolding events associated with SBV in Europe warrant observation. Report suspect cases to State Animal Health Officials or the USDA Area Veterinarian in Charge. On February 21, 2012, the United States Department of Agriculture (USDA) placed additional restrictions on shipments of ruminant semen and embryos (germplasm) originating from the European Union (EU) and countries that follow EU legislation to address the emergence of SBV in Europe. The EU does not apply any trade restrictions on live animals, their meat, milk or animal by-products related to SBV or other Orthobunyaviruses. The current assessment of risk for meat, milk, semen and embryos is available on the OIE website. Other entities, particularly the EU, are also formulating advice. USDA is also collaborating with US veterinary diagnostic laboratories to conduct passive surveillance on ruminants with compatible clinical signs.

Did you know?

Wooden shaft sampling swabs have Polymerase Chain Reaction (PCR) inhibitive and virucidal properties. Formaldehyde treatment of the wooden shaft of swabs is the reason the virucidal and inhibitive properties arise. Calcium alginate swabs exhibit the same properties. Due to these properties, the National Veterinary Services Laboratory highly recommends using only Dacron swabs on a plastic shaft for PCR and virus isolation tests.
In the Fall of 2011, the United States Department of Agriculture (USDA) published a proposed rule to enhance animal disease traceability in the United States (US). The rule, expected to be finalized in 2012, focuses on enhancing interstate traceability of cattle. Current interstate movement requirements for other species will remain in effect.

Why trace animal movements?

Animal traceability is a complex proposition due to the nature of livestock production when ownership and location of animals may often change multiple times during the production cycle. Most importantly, animal health officials need the ability to trace animal movements to minimize the impact of disease outbreaks. Producers and companies with an interest in providing consumers with assurance programs and product differentiation (age and source, organic, etc) also need the ability to trace animal movements.

Canada recently implemented a “book-end” traceability system - all cattle receive an official radio frequency identification (RFID) ear tag at birth and the RFID tag is read at terminal markets. A central repository maintains the data. In the United Kingdom, all cattle receive a tag at birth and a “passport document” for recording every change in physical location of the animal during its life. In Japan, consumers place high value on meat which has information about the producer and when and where the animal was born. In some Japanese supermarkets and restaurants, a picture of the farmer with a smart phone-scannable bar code is available that, when scanned, provides a detailed animal history.

USDA estimates that less than one third of the more than 100,000,000 head of cattle in the US are officially identified. Most of the cattle with official identification are from the West and Midwest, where several states mandate brucellosis vaccination of female cattle and the application of official “metal orange tag” identification. Some US cattle receive other forms of official identification, such as RFID ear tags, to meet age/source verification requirements for domestic and foreign markets or for herd management. With limited participation in these programs, the majority of US cattle lack official identification.

How will the animal disease traceability rule affect veterinarians?

The identification of all cattle to be moved interstate with official identification (ID) and the use of Interstate Certificates (Continued on page 4)
Many veterinary practitioners in California have clients with rabbits as pets, youth projects, for meat production or research. Rabbit farming has grown from raising a few rabbits for family consumption to large commercial operations with thousands of rabbits. The potential for outbreaks of a rabbit Foreign Animal Disease (FAD) in the United States (US) is of ongoing concern to the US rabbit industry. The economic impact of an outbreak of an FAD in our rabbit population would be significant.

Rabbit Hemorrhagic Disease (RHD) is a highly contagious disease caused by a Lagovirus in the family Caliciviridae that affects only rabbits of the Oryctolagus cuniculus species, the European rabbit. Most domestic and commercial rabbits in the United States are derived from this species and are susceptible to infection. Though not completely understood, the origins of the disease may have emerged from avirulent caliciviruses circulating asymptomatically in the rabbit population in Europe.

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Rabbit Hemorrhagic Disease (continued)

The virus is stable in blood for at least nine months at 4°C and longer if frozen. RHD causes major problems throughout the world where rabbits are reared for food and clothing, but is an FAD to the US. Live rabbits, rabbit carcasses, raw rabbit pelts and angora wool from countries endemic for the disease are all potential sources for virus introduction to the US. The United States Department of Agriculture does not have any animal health requirements or quarantine for importation of rabbits to the US, unless they have been inoculated with a pathogen for scientific purposes. There are no Center for Disease Control and Prevention or US Fish and Wildlife Services restrictions or requirements on importation of rabbits as pets, so imported rabbits could easily be a source of an outbreak.

The first known outbreak of RHD occurred in China (1984) spread by imported angora rabbits from Europe. The disease killed 14 million domesticated rabbits in nine months. Due to the highly contagious nature of the disease, outbreaks were subsequently reported in forty (40) countries and RHD became endemic in wild rabbit populations in Europe, Asia, Africa, Cuba, Australia and New Zealand. The species of North American wild rabbits, cottontail rabbits (*Sylvatagus floridanus*) and jack rabbits (*Lepus spp.*), are not susceptible to infection. There is no indication that RHD causes disease in man. There have been several independent outbreaks of RHD in the US in 2000 (Iowa), 2001 (Utah, Illinois and New York), 2005 (Indiana) and 2010 (Minnesota). These outbreaks were all aggressively controlled by Animal Health Officials. Upon further investigation, a rabbit calicivirus, similar but distinct from the FAD agent RHD virus, was reportedly responsible for the 2010 disease outbreak in Michigan. This novel virus was subsequently termed Michigan rabbit calicivirus (MRCV).

Transmission of RHD is by direct contact with infected animals or indirect contact with virus-contaminated objects and insect vectors. Natural infection is most likely by oral, nasal or conjunctival exposure. Experimentally, the virus can also be transmitted through inoculation by subcutaneous, intramuscular and intravascular routes. RHD has a short incubation period (24-48 hours); rabbits older than 8 weeks of age may die suddenly within 48 hours of exposure to the virus. Morbidity is generally high; mortality is usually 90% or more. Replication of the virus in fixed intravascular macrophages is thought to contribute to terminal disseminated intravascular coagulation (DIC), an important aspect of the pathogenesis of this disease, seen in many organs, particularly the heart, lungs and kidneys.

There are three different clinical courses of RHD:

a) the *peracute* form is characterized by sudden death with no previous clinical signs
b) the *acute* form involves fever (up to 105°F), depression, anorexia, rapid respiration, anemia, abdominal distress with death in 1-3 days
c) the *subacute* form has mild clinical symptoms with recovery as an immune animal in 2-3 days.

The subacute form is likely the source of asymptomatic carrier animals that may shed virus in urine and feces for 30 days or more and remain a carrier for far longer. The subacute form is most common in a rabbit less than four months of age. Generally, no mortality occurs in animals less than 4 weeks of age probably due to maternal immunity to a closely related virus or to reduced susceptibility of the immature liver.

There are few rabbits diseases to confuse with RHD. A presumptive diagnosis of RHD may be made based upon a history of multiple sudden deaths after a short period of lethargy and fever and characteristic signs of hepatic necrosis and hemorrhages. Samples of fresh liver and blood along with formalin-fixed samples of liver, spleen and other organs are beneficial in obtaining a diagnosis. Real-time polymerase chain reaction (RT-PCR), ELISA and virus isolation tests are (Continued on page 6)
On April 22, 2011, bovine tuberculosis (TB) was detected in a San Bernardino County dairy herd following the diagnosis of TB in a cow during routine slaughter surveillance. The herd is on a “test and removal plan”; seven (7) cows removed from the herd were found infected with the same TB-strain type as the index cow. During this investigation, 14,022 head of cattle in twelve (12) trace herds were TB tested; more than 350 cattle were sent to necropsy or slaughter with no evidence of disease spread and no indication of the source of infection to the herd found. Dairy workers for the herd were evaluated and found to be negative for TB. Public health officials confirmed that the Center for Disease Control and Prevention database does not have any human Mycobacterium bovis (M. bovis) isolates that match the strain identified in this herd.

On October 7, 2011, bovine TB was detected in a second San Bernardino County dairy herd following the diagnosis of TB in a cow during routine slaughter surveillance. The herd is on a “test and removal plan” and the investigation is ongoing. To date, fifty-eight (58) TB-infected cattle have been removed from the herd. Fifty-seven (57) isolates had the same genotype as the index cow; one isolate had a single VNTR (variable number tandem repeat) loci change.

On December 7, 2011, bovine TB was detected in a third San Bernardino County dairy herd. The diagnosis was made after the herd was TB-tested as a trace herd in the investigation of the herd detected in October 2011. Herd testing revealed one (1) animal with TB-suspicious lesions observed during necropsy; the M. bovis cultured from this cow was the same genotype as that isolated from the herd detected in October 2011. The herd is on a “test and removal plan” and the investigation of this herd is ongoing.

The strain of bovine TB in the last two affected herds differs from that in the herd detected in April 2011 suggesting two different disease introductions. Neither strain has ever been previously detected in U.S. cattle herds, but both strains are consistent with those historically found in Mexico.

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**Rabbit Hemorrhagic Disease (continued)**

available for diagnosis. Histologically, diffuse hepatic necrosis with a periportal pattern and microthrombi in multiple organs is characteristic of the disease. Virus can be concentrated from liver homogenates and visualized with electron microscopy using negative stains. There is no treatment for this devastating disease. Many countries endemic for RHD around the globe use vaccination, strict sanitation, closed colonies and biosecurity as means of protecting the highly valued rabbit populations. There are no vaccinations for RHD available for use in the US.

The California Department of Food and Agriculture encourages prompt reporting of sudden, suspicious rabbit deaths, especially in groups of rabbits, in a short period of time. If an FAD is suspect, Animal Health Officials will investigate and collect appropriate samples for diagnostics. As with other species, implementation and consistent practice of biosecurity for rabbits will serve to protect this valuable US industry.
January 2012 came in with a storm of confirmed Equine Herpes Virus-1 (EHV-1) cases. In early January, on an Orange County multi-discipline boarding facility, a gelding displaying neurologic signs was confirmed positive for Equine Herpes Myeloencephalopathy (EHM) – in this case, caused by the neuropathogenic strain of EHV-1. With EHV-1, prompt isolation is the most critical disease control measure. Like many equine facilities, this premises had space constraints with close quarters in barns and limited availability for strict isolation stabling. Fifteen (15) additional horses on the premises were subsequently found with compatible clinical signs of EHV-1 and confirmed positive for EHV-1 (neuropathogenic strain); only the index horse displayed neurologic signs of disease.

In late January, on a large multi-discipline facility in Riverside County, a mare became acutely ataxic; the mare was confirmed positive for EHM (neuropathogenic strain). At the onset of the clinical signs in this case, the private practitioner immediately moved the index horse to an isolation pen set up in a parking area of the facility. The prompt movement of the index horse to isolation was followed by complete cleaning and disinfection (C&D) of the exposed stabling area. Due to progression of neurologic signs, the index horse was euthanized. Prompt isolation, C&D of the stabling area and implementation of strict biosecurity measures contributed to disease control; fortunately, no additional horses on this premises were diagnosed with this disease.

CDFA strongly recommends immediate isolation and implementation of enhanced biosecurity measures for any horse displaying an acute onset of neurologic signs, particularly hind limb ataxia. As a result of the excellent biosecurity efforts by the owners/management of both of the quarantined premises in these incidents, the disease was contained on the individual premises. A thorough epidemiologic investigation revealed that the January 2012 incidents were unrelated.

Equine Herpesvirus Myeloencephalopathy

In March 2012, a Monterey County gelding and a San Diego County gelding began displaying neurologic signs (hind limb ataxia) compatible with Equine Herpes Myeloencephalopathy (EHM) upon their return to the home premises from the HITS Thermal Horse Show (March 5-10, 2012). Both horses were test positive for Equine Herpes Virus-1 (non-neuropathogenic strain). An additional case of EHM was subsequently confirmed on the Monterey County premises in a horse also shown at the HITS Show in Thermal; this horse also tested positive for the non-neuropathogenic strain of EHV-1. The investigation of these incidents suggests that disease exposure may have occurred at the horse show. The most current information on the status of EHV-1 cases in California may be found at:
http://www.cdfa.ca.gov/ahfss/animal_health/equine_herpes_virus.html

CDFA encourages equine event management, equine event exhibitors and equine veterinarians to review the recently published Biosecurity Toolkit for Equine Events at:
http://www.cdfa.ca.gov/ahfss/Animal_Health/Equine_Biosecurity.html
Case Report: Screwworm Detected in Horse at Miami Import Center

In January 2012, a polo pony stallion was imported to the United States from Argentina with a load of approximately thirty (30) polo ponies. The stallion arrived at the Miami Animal Import Center with a health certificate documenting that the required pre-import screwworm procedures, to include oral administration of ivermectin three (3) days before export, inspection of the penis and application of coumaphos solution to the prepuce and penis, had been completed.

A USDA animal caretaker at the Import Center noticed a bloody discharge stain on the dorsal aspect of the lower hind limbs, which is recognized as sign of screwworm infestation. Import Center personnel sprayed the prepuce of the horse with a pyrethrin solution. After larvae dislodged, the preputial area was examined revealing a screwworm-infected wound in the fossa glandis. The USDA National Veterinary Services Laboratory, Ames IA, confirmed the larvae as Cochliomyia hominivorax, the New World Screwworm.

Screwworms are parasites that can cause great damage to domestic livestock and other warm-blooded animals, including man. Screwworm larvae enter open wounds of a host animal and feed on raw flesh. Through an extensive eradication program, C. hominivorax was eliminated from the United States (1966), Mexico (1991) and Central America (2006). The parasite remains prevalent in South America, particularly in Argentina, which has an annual estimated $618 million loss to screwworm myiasis in livestock. Since 2000, seven (7) horses imported into the United States from Argentina and one (1) horse imported from Venezuela were confirmed infested with the New World Screwworm. Federal Import Center personnel detected these infestations in seven (7) of the eight (8) horses during quarantine. One (1) horse had larvae discovered by an astute private veterinary practitioner after release from quarantine.

Since California is a receiving state of many imported animals from South America, particularly horses from Argentina, private practitioners should be aware of the ongoing risk of screwworm infestations in imported animals. Screwworm myiasis is a Foreign Animal Disease reportable to Animal Health Officials within twenty-four (24) hours of discovery.

Noteworthy

The California List of Reportable Conditions for Animals and Animal Products is reviewed and updated annually. Please see the website hyperlink for the revised 2012 list.

http://www.cdfa.ca.gov/ahfss/Animal_Health/pdfs/CA_Reportable_Disease_List_Poster.pdf
Dairy Cattle - FDA Drug Labeling Clarification

The Food and Drug Administration (FDA) Center for Veterinary Medicine recently clarified the term non-lactating dairy cattle to avoid misinterpretation that drugs approved for use in non-lactating dairy cattle are safe for use in dry dairy cows. According to the FDA, the term non-lactating dairy cattle includes replacement dairy heifers, replacement dairy bulls and dairy calves - classes of dairy cattle that have not or never will produce milk for human consumption. The term “non-lactating dairy cattle” does not include dry dairy cows. This is an important human food safety issue because of the potential for residues of drugs labeled for non-lactating dairy cattle to be present in milk of treated cows and tissues of calves born to the treated cows. To receive approval of these drugs for use in dry dairy cattle, residue depletion studies in dry dairy cattle would be necessary to determine if residues are in the milk and the calves subsequently produced by treated cows. FDA is working with drug firms to revise labeling to clarify the terminology. For additional information, contact FDA 240-276-9300.

Are you an Accredited Veterinarian?

The National Veterinary Accreditation Program (NVAP) has ten (10) USDA Supplemental Training Modules available online for Accredited Veterinarians at no charge. These training modules are one of three ways for Accredited Veterinarians to obtain accreditation-specific continuing education to meet renewal requirements. NVAP renewal is necessary every three (3) years. Three (3) units of supplemental training per renewal period are required for Category I veterinarians and six (6) units for Category II veterinarians. Additional training modules are under development. 


Reminder to Private Practitioners

The Certificate of Veterinary Inspection – Livestock and Poultry (CDFA Form 77-010), that veterinarians obtain from CDFA, is for use in shipments of livestock and poultry. California accredited veterinarians may order Form 77-010 from the Animal Health Branch by calling (916) 900-5002.

The United States Interstate and International Certificate of Health Examination for Small Animals (APHIS Form 7001), that veterinarians obtain from USDA, is for use in shipments of dogs, cats, Nonhuman primates, ferrets and rodents. 

Office Technician Cecilia Shevlin brought a wealth of valuable experience with her when she joined the Animal Health Branch in February 2012. Cecilia was a stay-at-home mom for three children until the children began school. Initially, she worked part-time in the printing industry and took printing certificate courses at Sacramento City College, where she gained valuable office skills. She eventually returned to school, obtained a real estate certificate, worked for two years as a student assistant for the Sacramento Assessor’s office and then began her career with a major builder/subdivision developer. Starting out as administrative assistant, Cecilia worked her way to become a project manager and contract administrator. With the housing market crash, Cecilia returned to school earning two certificates in horticulture before starting with the State of California in the Department of Corrections and Rehabilitation, where she worked for two and a half years before transferring to CDFA.

Cecilia spends much of her time off with family and enjoys the company of four grandchildren. She dislikes cold weather but loves to travel, especially in search of places where the sun is shining! She is an avid gardener and loves to read about health, nutrition, gardening and landscape design. On a sunny weekend you will find her in her backyard from sunup to sundown, reading while basking in the sun or working in the yard planting flowers, plants or trees!

Livestock Inspector Virginia (Gin) Townley joined the Animal Health Branch team in January 2012 working in the Livestock Movement Section. Gin grew up on a cattle ranch in the San Jacinto Mountains of Southern California and has been very active in the animal health industry for most of her life. As a child, she was active in 4-H and enjoyed showing horses. For 12 years, she owned Sun Hunter Farm, a full-service equine facility in Orland, CA, offering training, riding lessons, boarding, breeding and lay-ups. Over the past 10 years, Gin worked for a large animal health distributor as a regional sales representative covering Idaho, Washington, Oregon, Northern Nevada and Northern California. In this position, Gin had extensive interactions with cattle producers, dealers and veterinarians. Through the considerable work-related travel, she knows her way around the highways and byways of the wonderful northwest!

In her free time, Gin enjoys spending time with her two sons. Her oldest son, Caleb, is the manager of the UC Davis Meat Science facility and her youngest son, Nathan, is a Senior Honor Student at Chico State who will be graduating in May 2012. She lives in Sacramento and still enjoys riding horses, hiking, camping and hunting upland game birds with her yellow Lab, “Doozie”. To create balance in her life, she also enjoys live theater, playing guitar, antiquing and gardening.
### District Offices

<table>
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<tr>
<th>Location</th>
<th>Veterinarian In Charge (VIC)</th>
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<tr>
<td>Redding</td>
<td>Dr. Charles Palmer 2135 Civic Center Drive, Room 8 Redding, CA 96001 (530) 225-2140</td>
</tr>
<tr>
<td>Modesto</td>
<td>Dr. Randy Anderson (Acting) 3800 Cornucopia Way, Suite F Modesto, CA 95358 (209) 491-9350</td>
</tr>
<tr>
<td>Tulare</td>
<td>Dr. Clementa Frederiksen 18830 Road 112 Tulare, CA 93274 (559) 685-3500</td>
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<tr>
<td>Ontario</td>
<td>Dr. Predrag Pecic 1910 South Archibald Avenue, Suite Y Ontario, CA 91761 (909) 947-4462</td>
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### Animal Health Branch

- **Dr. Kent Fowler, Chief**  
  Headquarters: (916) 900-5002  
  Fax: (916) 900-5333  
  Permit Line: (916) 900-5052

### Additional AHFSS Branches

- **Bureau of Livestock Identification**  
  Greg Lawley, Chief (916) 900-5006

- **Milk and Dairy Food Safety**  
  Dr. Stephen Beam, Chief  
  (916) 900-5008

- **Meat, Poultry and Egg Safety**  
  Dr. Douglas Hepper, Chief  
  (916) 900-5004

#### United States Department of Agriculture

- **Area Veterinarian In Charge**  
  Dr. Gary Brickler  
  (916) 854-3950/Toll Free: (877) 741-3690