Schmallenberg Virus in the United Kingdom: Vaccinate, Vaccinate, Always Vaccinate!

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Schmallenberg Virus

Novel-emerging insect-borne Orthobunyavirus of sheep, goats and cattle.

First identified* in November 2011-Serum samples from cows farmed near Schmallenberg, Germany.

Acute disease in cattle: diarrhoea, loss of appetite, fever, milk drop in adult cattle (August, 2011).

Schmallenberg Virus (SBV)

SBV~Simbu serogroup, viruses associated with abortions, still births & malformations in ruminants (Asia, Africa and Oceania) e.g., Akabane virus-Arthrogryposis-Hydranencephaly Syndrome (AHS).

First malformations detected Holland November 2011.

Neurons are the predominant target in SBV-infected neonates.

No positive ruminant serology in Europe before June 2011.
Dr Rachael Tarlinton (BVSc, PhD, MRCVS) 
Lecturer in Veterinary Cellular Microbiology
Carolyn Baguley VetMB BA MRCVS
Presumptive SBV Cases
(Stillborns, Mummified Fetuses, Dysfunction of Neonates)
w/ Two or More

- Arthrogryposis (joint stiffness, tendon shortening)
- Hydranencephaly
- Ataxia
- Paralyzed Limbs
- Muscle Atrophy
- Joint Malformations
- Torticollis (twisted neck)
- Scoliosis (spinal curve)
- Kyphosis (hump-back)
- Brachygnathia Inferior (parrot mouth)
- Behavioral Abnormalities (Dummy Lambs/Calves)
- Blindness

Tarlinton et al., 2012
SBV Pathology

Photo: Courtesy of Rachael Tarlinton
SBV Epidemiology

Orthobunyavirus family Bunyaviridae (Rift Valley Fever Virus (Phlebovirus)~same family...)

Arthropod- transmitted (arbovirus) Culicoides obsoletus biting midge aka a "no-see-um"

Non-zoonotic~No human illness or positive serology from herdsmen or veterinarians

Over-winters in midge host~trans-ovarial transmission likely (structures)
Risk period for in-utero SBV infection: Sheep (145d gest.)~days 28-56; Cattle (283d gest.)~days 62-173 of pregnancy.

Viremic period 2-5 days post-infection (cattle).

Anti-SBV Abs likely convey long-term protective immunity.

Immunologically naive animals in 1st 2 mos. pregnancy (sheep) most susceptible, e.g. synchronized pedigreed ewes (early tupping).
British Livestock

22.9 Million Sheep (14.3 million breeding ewes)

5.3 Million Cattle (3.4 million breeding cows)

~1 in 4 flocks/herds infected w/ SBV, 2-5% of lambs/calves affected (>80% lambing losses~pedigree flocks)

Source: DEFRA 2012
The Plight of British Farmers

SBV~lambing/calving losses both psychological & economic

Endemic Bovine Tuberculosis (M. bovis) in cattle herds~badgers

Severe winter weather~Increased forage use & lambing losses

Hereford Times, 3 April 2013
Schmallenberg Virus—Other losses

Inset photo courtesy of Rachael Tarlinton
Global Food Security
The Human-Animal Bond
Origins of a Monster

- SBV: Out of Africa?
- Stowaway among fresh cut flowers~SBV-infected midges
- Unknown "back door" into middle-Europe
- Bluetongue virus 8 outbreak 2006-07 prima facie evidence for African origin

Beer et al. 2012, Tarlinton personal communication 2013
SBV Control Measures

Positive serology indicates previous infection, not basis for test and slaughter, export restrictions...

Early lambing/early tupping flocks & synchronized ewes vaccine candidates, high value animals.

Vaccine (3.5-4€/dose) 2ml IM 2X 4-weeks apart prior to service or AI (cows), Ewes 1X prior to tups.

Endemicity likely: 1.5 million deer in UK, naive replacement ewes & heifers, midges...

Photo: Ted Drummond.
Inset Photo: Carolyn Baguley.
Schmallenberg Virus in the UK
Summer 2013

SBV calf (dystocia) Aberdeenshire~NE Scotland

Via Store Cattle from Dumfriesshire~SC Scotland, presumed Midge Transmission

Vaccine (Bovilis-SBV) usage in Midlands (Scarsdale Veterinary Group) 10-12 farms out of 900 ~ 1% Uptake...
Small Ruminants & Food Security

Source of meat, milk products, kids/lambs.

The "cattle of the poor", ideal for marginal rangelands, portable, readily consumable.

Hedge against hard times/inflation.

Ready source of cash for medical expenses, foodstuffs, educational expenses.

Ownership of small stock by women~48% s. URT.
Goat Plague
(aka Peste des Petits Ruminants)

Highly contagious disease of sheep, goats, camels and wild small ruminants*. Morbillivirus-Paramyxoviridae (Measles, Rinderpest, Canine Distemper).

Characterized by depression, fever >106 F, oculonasal discharges, pneumonia, necrotizing stomatitis, abortion in ewes/does, diarrhea and death.

Mortality rates may exceed 90%, affected animals die within 5-10 days, goats more severely affected.

Enzootic throughout much of Africa and Asia.

*Gemsbok, Gazelles, Kobs, Impala, Indian Buffalo, Ibex, Oryx.
Goat Plague

Stomatitis
Pneumoenteritis
Complex

Photos: Courtesy Albano Mbyuzi
Goat Plague (PPR) & Global Eradication


PPRv~ One serotype! Live attenuated vaccines (Nigeria 75/1, Sungri/96) highly effective in conferring long-term protective immunity (cold chain...).

Short infectious period, no carrier state.

Sensitive/Specific Diagnostic Tests for PPRV (cELISA) for surveillance.

Transmission by close animal-animal contact.
Goat Plague In Southern Tanzania

Introduced February 2009 to Likuna village via infected "discounted" goats purchased & trucked from Pugu Livestock Market (679 km NW of Dar es Salaam).

An emerging disease? Rinderpest eradication~Loss of cross-protective immunity afforded by RPV for small stock, now immunologically naive...

Flocks commonly co-infected with Contagious Caprine Pleuropneumonia (CCPP)~Mycoplasma capricolum capripneumoniae.

Transmission exacerbated by co-pasturing, kraaling, high recruitment of kids/lambs w/ inadequate passive immunity.

Photo: Courtesy Albano Mbyuzi.
Goat Plague in the Southern African Development Community

15 Member states; Goat Plague currently circulating in DRC & URT. Comoros & Angola (Cabinda). Zambia?

Combined Population 277 Million~86% Dependent upon agriculture for their livelihoods.

59 Million head sheep and goats. Virtually ALL immunologically naive against Goat Plague.
Goat Plague Epizootic Southern Tanzania 2011

"Nodular" Form: Case Fatality Rate ~100%.

Photo courtesy Albano Mbyuzi
# Schmallenberg Virus vs. Goat Plague (PPRV)

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Questions...