

# **Akabane virus infection in domestic animals**

## **Akabane virus infection....**

Is an infectious disease of the bovine, ovine and caprine, fetuses cause **Congenital arthrogryposis-hydraencephaly syndrome** .

- The disease caused by **Akabane virus** which related to Simbu group of arboviruses of the family Bunyaviridae
- The disease occur via intrauterine infection to fetuses ,Interference with fetal development and transmitted to the dam by gnats or mosquitoes
- The disease considered as the major cause of epizootics of congenital malformations in ruminants, Since fetal infection may cause abortions, stillbirths, premature births, mummified fetuses, and various dysfunctions or deformities of fetuses or live born neonates.
- The disease is common in numerous tropical and subtropical areas ,As, it had been recognized in Asian countries ,Australia, ,African countries and some other where in the world
- The virus is well known as teratogenic type of pathogen and have the ability to cross via ruminants placenta during different stages of pregnancy period.
- The stage of pregnancy during which the cow is infected determines the range and severity of clinical signs seen

## **Pathogenesis**

Viremia occurs in the dam for 2-4 d, with an antibody peak 4-5 d after the viremia and a subsequent secondary rise. In calves born alive, the disease appears in different forms,

**A-**Calves infected at an older fetal age (5-6 months) are born with arthrogryposis (which result from abnormal development of the spinal cord, thereby abnormal nerve supply of the musculature, resulting in failure of normal development of muscles, hence ankylosis of joints as a result of this failure may cause severe dystocia).

**B-**Calves which infected with early stages of pregnancy might get multiple limbs affected, while animals infected with later stages of pregnancy might only have a single affected limb.

**C-**Sometimes earlier infection results in calves born with arthrogryposis and hydranencephaly with deficient of the cerebral cortex and replacement of brain tissue by a fluid-filled sac.

**D-**Sometimes when calves affected at 3-4 months fetal age hydranencephaly were primarily seen only .

### **Epidemiology ....**

1-The infection was reported in cattle, sheep, goats, pigs, buffaloes and camels, Although antibodies were also detected in horses, but no clinical evidence of fetal infection has been reported

2- Akabane virus infection sometimes were also call **Curly calf disease, Silly calves, and Acorn calves** which affected mostly newborn animals as congenital anomalies

3- Adult animals are not clinically affected while actively infected with the virus

**4-Moreover the virus does not affect humans**

5-Spreading of akabane virus was always related to the distribution of the insect vector populations and the seasonal conditions will approve their spread, Thereby, akabane disease may be seasonal and /or sporadic depending on the distribution of the insect bite population like mosquito or midge. (*Culicoides brevitarsis* and *C. nebeculosus*).

### **Clinical signs ....** Diseased calves show signs of

1-Seasonally sporadic epizootic of abortions, stillbirths, premature births, and deformed or anomalous bovine, caprine, and ovine fetuses or neonates with

2-Dullness ,lateral recumbency

3-Signs of Arthrogryposis and of Hydraencephaly which include(Appearance Blindness ,Nystagmus ,Deafness,Curled toes of fore and /or hind legs with Ankylosis and Unable to suck ,Torticollis of head and /or of the neck ,Tremor ,hypersensitivity and ataxia , and in some cases paralysis of hind limbs were detected).

4-Badly deformed fetuses are usually dead at birth, and the limbs are locked in the flexed or extended position

5-On clinical examinations, there was an increase in body temperature, respiratory and heart rate of diseased calves.

- Note :-
- **Mildly affected animal may improve their mobility with time. However, most mostly die within 6 months as a result of blindness and other neurological defects**

### **Clinical pathology....**

1-Detection of viral antibodies in calves serum or dam colostrum using ELISA ,Hemagglutination test and ,microneutralization test .

2- For histopathological analysis pieces of brain ,spinal cord ,spleen, liver, lung, kidney, heart, lymph nodes and affected muscle, in 10 % percent buffered formalin.

3- Virus isolation should be attempted from placenta, fetal muscle, or fetal nervous tissue. The chances of success are very low

### **Post Mortem lesions ...**

In general animal will affected with necrotizing non-suppurative encephalomyelitis and polymyositis.

1-The affected animal have arthrogryposis and hydranecephaly or both syndromes.

2-Affected joints cannot be straightened even by application of force because of ankylosis of the joint in the extended or flexed position.

3-Fibrinous polyarticular synovitis, fibrinous navel infection, ophthalmia, cataracts, and presternal steatosis occur.

4-Within the CNS, hydrocephalus, agenesis of the brain, microencephaly, porencephaly and cerebellar cavitation, fibrinous leptomeningitis, fibrinous ependymitis, and agenesis or hypoplasia of the spinal cord are variously reported

### **Differential diagnosis ....**

1- Cache Valley virus

2-Bluetongue virus infections of pregnant ewes

3-Aino Virus infection

4-Bovine viral diarrhea

5-Rift valley fever

6-Wesselbron viral infection

7-Chuzan viral infection

### **Treatment and control .....**

1-No treatment are affected

2-Control of insect bite

3-Vaccination :

a-Formalin-inactivated, aluminum phosphate, gel-absorbed vaccine been developed in Japan for Akabane virus

2-An effective killed vaccine for Akabane virus has been developed but not marketed in Australia