

Diseases of Cattle

Differential Diagnoses for Oil and Gas Industry Associated Chronic Toxicoses

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Objectives of Presentation

- **Discuss differential diagnoses for causes of herd health problems when chronic toxicoses are suspected.**
- **Discuss diagnostic procedures to confirm or rule out these other diseases.**

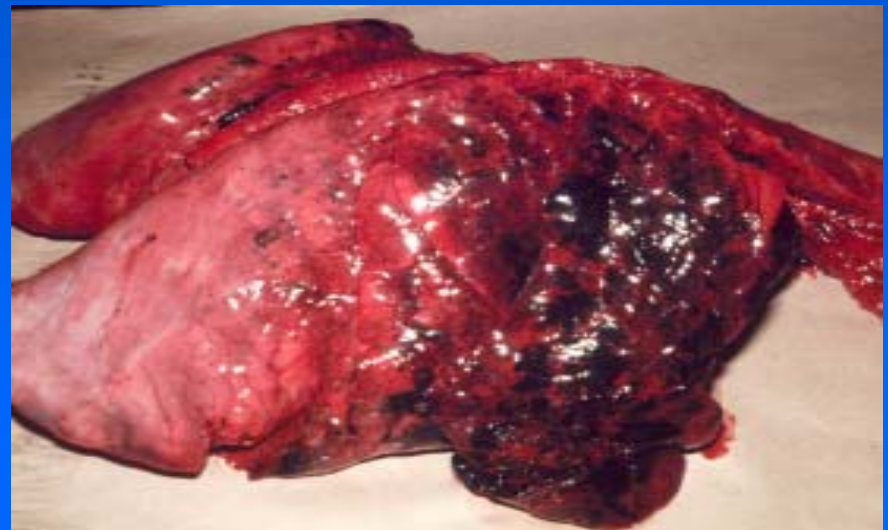
Oil and Gas Industry Associated Acute Toxicoses

Acute toxicoses are generally more easily confirmed or ruled out than chronic toxicoses.

Clinical signs of acute toxicoses:

- found dead**
- gastrointestinal irritation, diarrhea**
- aspiration pneumonia**
- neurological signs**

Acute Oil Toxicosis



Oil and Gas Industry Associated Suspected Chronic Toxicoses

Clinical signs:

- weight loss or reduced growth rate**
- infertility and early abortions**
- abortions**
- perinatal deaths**
- congenital defects**

The Disease Investigation

- Obtain a complete history.
Records are very important to support claims of disease and lost production.
- Case definition; what is the problem?
- Clinical examination of the herd.
- Examination of the environment, feed, and water.
- Collect appropriate samples for laboratory diagnostic testing, do postmortem exams, if appropriate.

Diagnostic Procedures

Purposes of diagnostics:

1. Rule out other diseases
2. Confirm toxicoses

Suspected Chronic Toxicoses

Differential Diagnoses

Causes of weight loss or reduced growth rate:

malnutrition

- protein-energy deficiency
- mineral, trace mineral (Cu, Se) deficiency
- vitamin A or E deficiency
- inadequate water supply

GIT disease – nematode parasitism, Johnes disease

lice

other toxicoses

- plants (chronic hepatopathy)

other chronic disease

- pneumonia

Diagnosis - Weight Loss/Reduced Growth

Clinical examinations

- examine the herd, including body condition scoring to assess state of nutrition
- take photographs
- examination of feed, feed testing, assessment of feeding management, consultation with nutritionist

Clinical pathology

- CBC – blood in EDTA tubes
- serum chemistry – blood in red top tubes including minerals, trace minerals (Cu, Se), vitamins A and E

Diagnosis - Weight Loss/Reduced Growth

Pathology - biopsy

- tissues determined by clinical findings
- e.g. dermatitis - skin
- myopathy/myositis - muscle

Serology – blood in red top tube

- Johnes serology (elisa)
- bank sera

Diagnosis – Weight Loss/Reduced Growth

- Collect feces (cold storage and transport)
 - parasitology - flotation
 - bacteriology - culture or PCR
Mycobacterium paratuberculosis
- Collect water (cold storage and transport)
 - routine analysis
 - toxicology
- Collect feed
 - analysis for nutrients
 - toxicology
- Collect plants and environmental samples
 - for identification and toxicology

Diagnosis - Weight Loss/Reduced Growth

Pathology – necropsy

- perform complete necropsies
- record and photograph lesions
- collect and submit samples to diagnostic labs for histopathology, toxicology, microbiology, etc.

Consult with diagnostic pathologists, toxicologists.

In addition to routine tissues and tissues with lesions collect:

- entire abomasum and contents and feces for parasitology
- liver for Se, Cu

A Case Report: Malnutrition and Sarcocystosis

History:

- **May, 1981, Alberta Agriculture veterinarians requested to do a disease investigation by a practitioner in central Alberta.**
- **Beef cow-calf farm, 120 cows, with complaint of poor-doing cattle and increased mortality suspected to be caused by toxicoses associated with a nearby gas plant.**

A Case Report: Malnutrition and Sarcocystosis

History:

- **Problem occurring over the previous 10 years and becoming more serious; 15 of 23 yearlings had died during the past 2 months.**
- **Veterinarians had examined a few cattle during the previous 10 years and treated them for pneumonia.**

There had been no laboratory submissions and no complete disease investigations.

Malnutrition and Sarcocystosis

Laboratory Findings:

Cattle submitted to Alberta Agriculture vet lab

5 day old calf

- diarrhea, dehydration, nutritional myopathy

2 yearlings

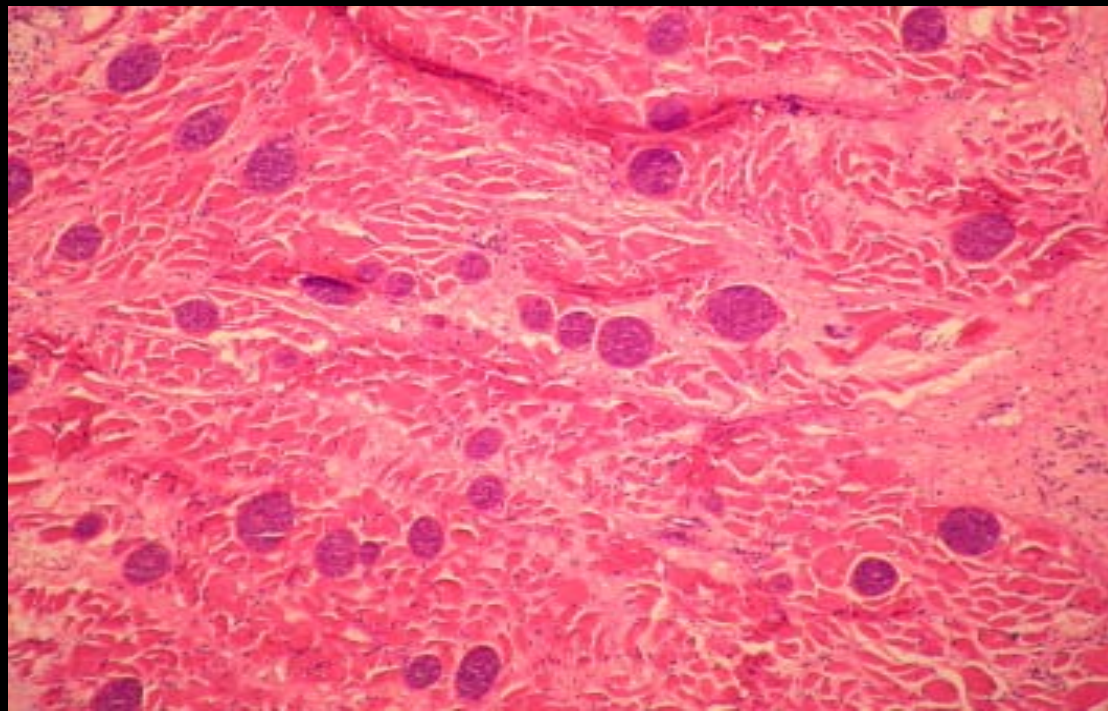
- protein-energy malnutrition
- sarcocystosis

mature cow

- chronic reticuloperitonitis
- sarcocystosis

2 week old calf

- necrotic laryngitis, nutritional myopathy



Malnutrition and Sarcocystosis

Clinical Findings:

Diagnoses made during farm visit:

- **Mismanagement**
- **Malnutrition - inadequate nutrition**
 - **protein-energy and selenium deficiency.**

Over the previous 10 years the herd size had been increased from 40 to 120 cows on the same pasture.

Malnutrition and Sarcocystosis

Clinical Findings:

■ Sarcocystosis

There were several yearlings in poor body condition with generalized lymphadenopathy.

In muscle biopsies there was severe sarcocystosis.

Additional history: 15 dogs had lived in the hay stacks and mangers, dogs had eaten cattle carcasses.

Suspected Chronic Toxicoses

Differential Diagnoses

Causes of Infertility and Early Abortion:

- bull infertility due to reproductive disorders and miscellaneous health problems**
- poor breeding management**
- inadequate nutrition**
 - protein-energy deficiency**
 - mineral (P) and trace mineral deficiency**
 - vitamin A and E deficiency**

Suspected Chronic Toxicoses

Differential Diagnoses

Causes of Infertility and Early Abortion: infections

- *Tritrichomonas fetus*
- *Campylobacter fetus*
- *Neospora caninum*
- BVD v

plant toxicoses

- *Pinus sp*, *Astragalus sp*, and
nitrate containing plants

Diagnosis - Infertility and Early Abortion

Clinical examinations of cows and bulls:

- complete exam, especially reproductive tracts.
- body condition scoring.
- fertility exam of bulls and cows, semen exam.

Diagnosis - Infertility and Early Abortion

Pathology

Fetuses

- best to submit entire fetus and placenta to lab.
- if submitting tissues for histo, virology, bacteriology, etc, submit a complete set of tissues in formalin and unfixed, Consult with pathologist at diagnostic lab.

Reproductive tracts from slaughtered cows and bulls

- submit to lab for pathology +/- microbiology.

Diagnosis - Infertility and Early Abortions

Collect sera

to assess nutrition – blood in red and royal blue top tubes

- minerals (Ca, P), trace minerals (Cu,Se,Mn)
- vitamins A and E

for serology – blood in red top tubes

- appropriate representative sampling
- cases and controls (nonaffected herd mates)
- acute and convalescent sampling for VN titers
 - BVDv, IBRv, Leptospira spp
- acute only samples
 - *Neospora caninum* (elisa)
 - *Brucella abortus* (elisa and CF)
 - BVDv extended VN titer

Diagnosis - Infertility and Early Abortions

Collect preputial washings and cervical swabs for culture or PCR to test for:

- *Tritrichomonas fetus* (Diamonds media in pouches or get media from lab)
- *Campylobacter fetus* (Cary Blair media)
- *Ureaplasma diversum* (get media from lab)

A Case Report: Abortions Caused By Neospora caninum

History:

- **October, 1997, abortion outbreak in northern Alberta in a 350 cow commercial beef herd.**
- **Abortions started soon after weaning and continued for 3 months, most occurred in the first month.**
- **Estimated 20% of cows aborted.**

Abortions Caused By *Neospora caninum*

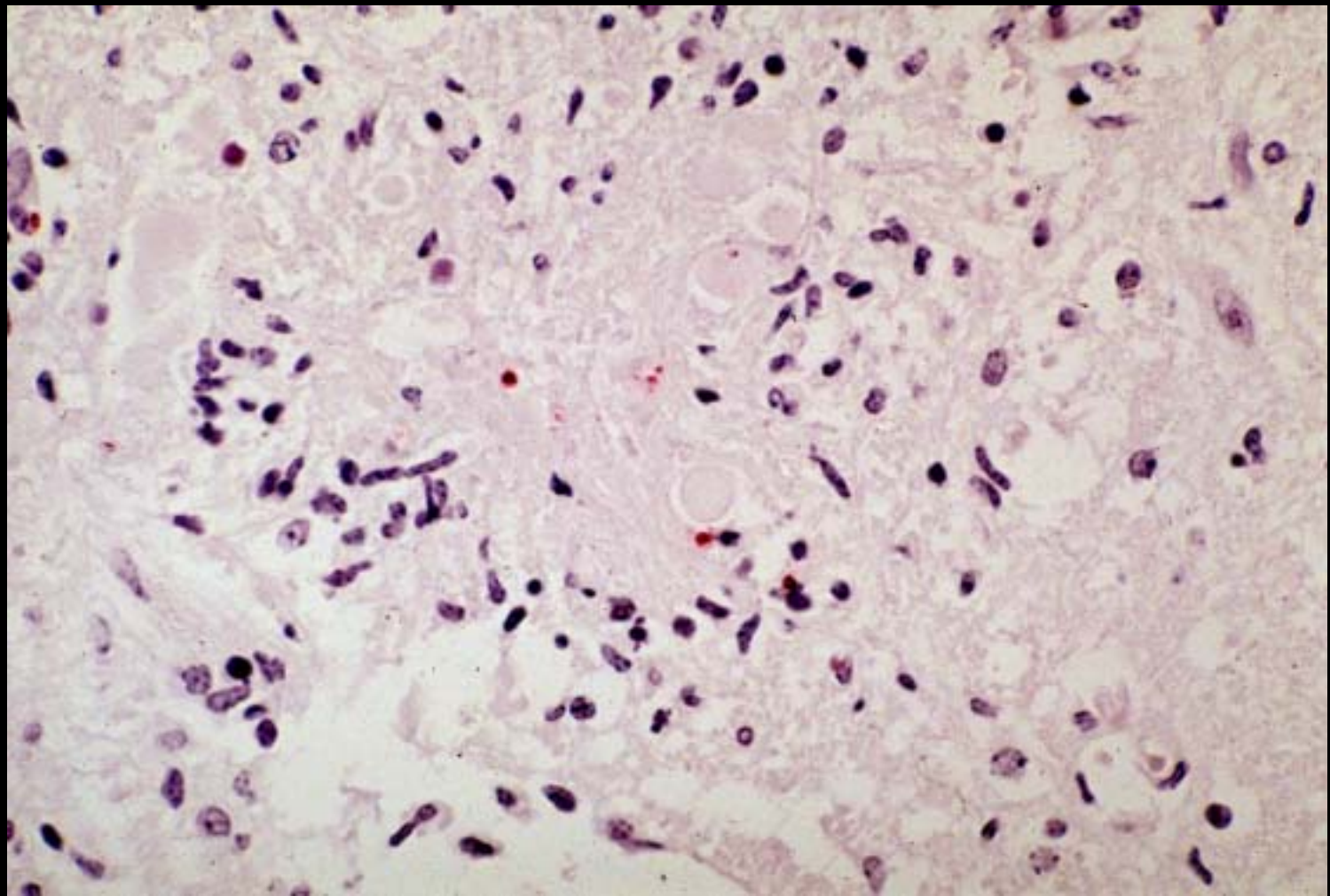
Laboratory Findings:

- VPL received 4 fetuses during 3 weeks early in the outbreak.
- Abortion caused by *Neospora sp* was diagnosed in all 4 fetuses based on histological lesions at VPL and the diagnosis was confirmed at WCVI by immunohistochemistry.

Abortion caused by *Neospora caninum*



Abortion Caused By *Neospora caninum*



Neospora caninum abortions: Disease Investigation

**Outbreak of abortion associated with
Neospora caninum infection in a beef
herd.**

**Cheryl Waldner, Eugene Janzen, James Henderson
and Deborah Haines, JAVMA, Vol 215, No. 10,
Nov 15, 1999, 1485-1490.**

**Investigation of Reproductive Problems in
Beef Herds.**

CL Waldner.

www.canadianveterinarians.net/larounds

Suspected Chronic Toxicoses Differential Diagnoses

**Causes of abortions, perinatal losses,
and congenital defects**

Causes: (VPL cases Nov 1- Apr 30 for each year)

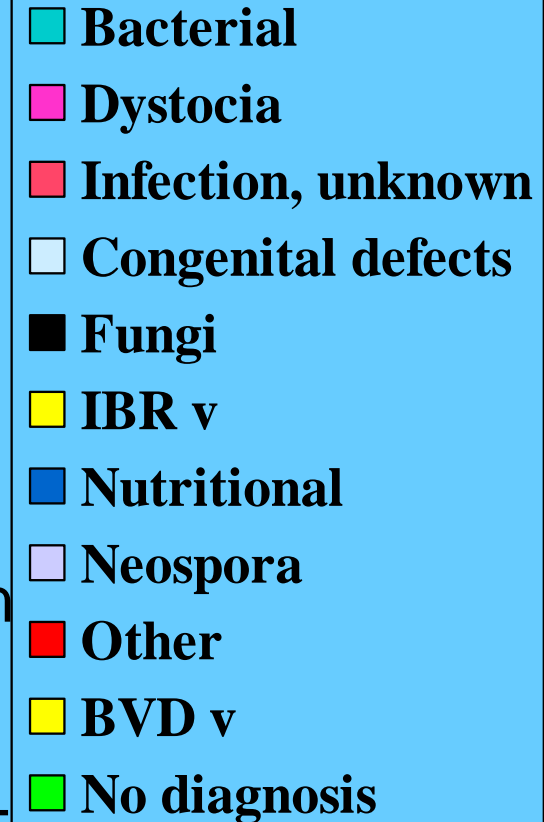
	1997	1998	1999	2000	2001
Bacterial	103	60	89	72	63
Dystocia	95	51	64	45	52
Infection, unknown	42	23	61	47	33
Congenital defects	29	20	14	17	16
Fungi	24	19	21	18	18
IBR V	13	5	8	9	6
Nutritional	13	3	8	3	5
Neospora	5	8	7	6	9
Other	6	6	5	1	2
BVD V	13	5	8	9	6
No diagnosis	199	151	121	137	142

Diagnoses 1996-2001

2131 cases

No diagnosis 809

Bacterial 413



Dystocia 293

Infection unknown 208

Cong defects 105
Fungi 76

IBR 42

Neospora 37

Nutrition 38

Other 25

BVDv 15

Causes of Perinatal Mortality

dystocia

malnutrition

hypothermia

infections of fetus, uterus, or placenta

congenital defects

Congenital Defects Detected in Fetuses and Newborn Calves

defects most frequently detected

multiple systems	37
cardiac	17
skeletal	16
brain	15

Causes of Congenital Defects

unknown

infections

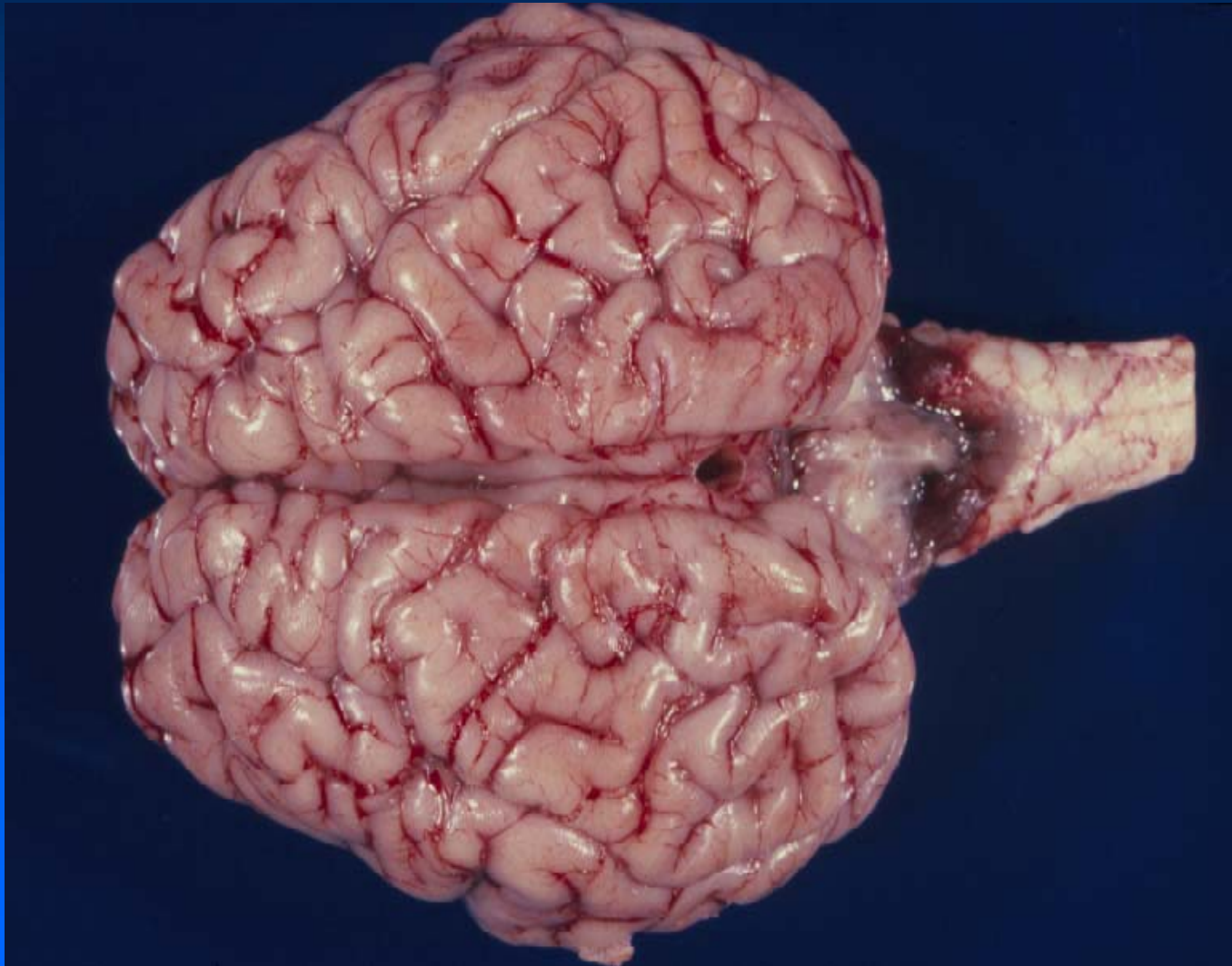
genetic

toxins

BVDv infection – cerebellar hypoplasia



BVDv infection – cerebellar hypoplasia



BVDv infection

- hypotrichosis and cataracts**



Arthrogryposis and Crooked Calves



Congenital Articular Rigidity

- **Hereditary congenital articular rigidity with cleft palate in Charolais**
- **Environmentally induced congenital articular rigidity caused by:**
 - fetal infection
 - locoweed, lupins
 - manganese deficiency

Congenital Joint Laxity and Dwarfism in Beef Calves

Lesions

- generalized joint laxity**
- disproportionate dwarfism**
- sometimes superior brachygnathism**

Cause:

**unknown; associated with feeding clover or
grass silage**

**Reference: Ribble C.S. Janzen E.D. and
Proulx J.G. Can Vet J, 30, April 1989, p331.**

Diagnosis – Congenital Defects

Important Features of the Disease Investigation

- case definition; what is the problem?
- obtain complete history
- assess health and breeding records
- pathology

Important to adequately document lesions.

Best results when entire fetuses or calves are submitted to a diagnostic lab for a complete necropsy.

Diagnosis – Congenital Defects

Infections – BVDv diagnostics:

Consult with the diagnostic lab.

Confirmation of BVDv infection:

Serology - VN titer (pre-colostrum) in calf
- extended VN titer in cow

Detection of BVD virus:

Histopathology and immunohistochemistry

PCR – necropsy tissues, blood

Virus isolation – necropsy tissues, serum,
plasma or blood

FAT – necropsy tissues

Antigen ELISA – serum or plasma

BVD virus Diagnostics

Consult with the diagnostic lab.

Detection of PI cattle:

IHC – skin biopsy or ear notch

PCR – blood, bulk milk samples

antigen ELISA – blood, serum, ear notch

virus isolation – blood, serum, plasma

Diagnosis – Congenital Defects Genetic Disorders and Toxins

Difficult to make a definitive etiological diagnosis.

Presumptive diagnosis is obtained based on pathology, breeding and health records, identifying conditions similar to known genetic disorders or toxicoses.

Diagnosis – Congenital Defects Genetic Disorders and Toxins

Genetic Disorders:

Confirmation of genetic defect by molecular biology (PCR) is possible, but rarely available.

Toxins:

Detection of teratogenic agents is difficult.

Lupins, locoweeds – identify plants and toxins (alkaloids) in feed or pasture.

Summary

When investigating health problems in cattle suspected to be caused by oil and gas industry associated chronic toxicoses it is important to take appropriate measures to rule out other causes of disease with similar signs.

