Outline

- What are congenital defects?
- Main classes of congenital defects
- Several examples of Genetic congenital defects
- Environmental congenital defects
What is a congenital defect?

- “A physiological or structural abnormality that develops at or before birth and is present at the time of birth, especially as a result of faulty development, infection, heredity, or injury” (Stedman's Medical Dictionary)

- Congenital defects have been a heavily reported topic. A pub med search for “congenital abnormality cattle” yielded 1676 results.
Classes of defects

- Genetic
  - Most often the result of autosomal homozygous recessive gene
  - Rare compared to environmental
- Environmental
  - Nutrition
  - Toxic plants or other toxic substances
  - Infectious diseases
  - Other factors (heat stress)
Types of defects

- Musculoskeletal
- Neural
- Ocular
- Gastrointestinal
- Skin
Genetic defects

- If an abnormality occurs in a group of related animals it is more likely genetic than environmental.
- Using breeding records in combination with pattern of defects, the original affected animal can sometimes be identified.
- This allows for selective breeding to avoid the genetic condition, often however the line has been used due to positive traits (fertility, milk production, muscle size... etc).
- With some conditions genetic testing can identify carriers of recessive traits, and avoidance of creating more carriers or afflicted animals practiced.
Also called “curley calf syndrome”
Recognized as a genetic defect September, 2008 that was affecting the Angus cattle population.
Calves are born dead or die shortly after birth.
Spine and legs appear twisted and the joints of the legs are often fixed in position with front legs contracted and rear limbs contracted or extended.
There may be a cleft affecting the nose or palate.

Picture from Amer. Angus Assoc. website
American Angus Assoc. is beginning to require animals to be Arthrogryposis Multiplex free (AMF) for breed registration.

- Heifers born on or after 1/1/2012, must be tested and only those that test AMF can be registered
- Bulls born on or after 1/1/2010, must be tested and only those that test AMF can be registered (AM Fact Sheet, www.angus.org)
Hypotrichosis (Hairlessness)

- Seen in several beef breeds
- Predisposes to cold stress
- Autosomal recessive genetic defect
Syndactyly (Mulefoot)

- Fusion of the two toes of the foot
- Most often affects the front feet
- Condition is most common in Holstein, Chianina, Angus, and Simmental cattle
- Autosomal recessive genetic defect

Picture from Beef Cattle Handbook
An accumulation of excessive fluid within the ventricular system of the brain.

Animals are generally born dead or die within a few days after birth.

It is inherited as a simple autosomal recessive gene in Herefords and Shorthorns.

Also caused by intrauterine fetal infections of BVD (d 100 to 150 of gestation). and bluetongue viruses

Picture from Beef Cattle Handbook
Cerebellum is small or absent.

- Occurs as a genetic defect in many breeds.
- Also caused by intrauterine fetal infections of BVD (d 100 to 150 of gestation), and bluetongue viruses.
Atresia coli

- A failure of development of a segment of the colon, often transverse colon
- Calf will be born alive but will fail to thrive, fail to pass feces, and become bloated during first 48 hours of life
- Euthanasia is only treatment option
- Can have other congenital abnormalities, cleft palate
Epidemiologic analysis based on 28,373 cattle < 2 mo of age admitted to North American veterinary schools between 1964 and 1993 identified 291 cases of atresia coli in 13 breeds, with the marked preponderance of cases occurring in Holstein-Friesian calves (228/291, 78%). (Constable P, 1997, *Theriogenology*)

Causes have been reported to be of genetic origin and possibly of manipulation of fetal membranes before day 40. (Syed M, *J Dairy Sci.* 1992)

The manipulation claim has been debated in the literature with articles supporting and refuting.
An example of atresia coli seen in a 3 day old Holstein calf at Green Meadows 8/6/10

Courtesy of Kenny Rogers
Easier to correct then genetic causes.

Elimination of inciting source in the environment will remove the problem.

Conditions that demonstrate an abnormality that is likely to be environmental:

- Coincided with an environmental factor and was absent upon removal of the factor.
- Occurred in groups of non-related individuals.
- The symptoms are similar to those of an abnormality known to result from environmental factors.
Infectious diseases
- BVD, Bluetongue Virus, Rift Valley fever, Akabane virus

Toxic plants
- Lupines

Other
- Hyperthermia
- Iodine deficiency
Infections cause of genetic defects.

Infection within gestation at 100-150 days

Exposure of the fetus to BVDV within this period can result in calves with congenital abnormalities that may include cerebellar hypoplasia or degeneration, thymic hypoplasia, arthrogryposis, microphthalmia, cataracts, optic nerve injury, hydrocephalus, musculoskeletal malformations, and a variety of skin lesions such as alopecia.

Ataxia, tremors, wide stance, stumbling, and failure to nurse are all clinical signs of calves for which BVDV must be ruled out.
Overall there are many possible congenital defects that can affect cattle.

Some of these can be identified to be from genetic or environmental origins.

Many however cannot be traced to identifiably causes and are idiopathic in nature.


