

Deformed Calves

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Every year cattle producers encounter problems with calves that are born with congenital abnormalities. These abnormalities can be quite variable and may include calves born with deformed legs ('crooked calf disease'), crooked spines, cleft palates, absence of an anus, heart defects, hydrocephalus to name but a few of the more commonly encountered abnormalities. It is not uncommon to see a calf with multiple anomalies involving different organ systems. It has been estimated that from 0.5 -1.0% of calves are born with congenital defects (Leipold H., 1987 *Vet Clinics North Am* 3: 159-177).

Any agent (infectious, chemical, toxin, genetic, physical) that alters the normal development of the embryo or fetus is referred to as a teratogen. Pregnant cows are often exposed to numerous teratogens, but the fetus may not be affected unless the teratogen is present in the fetus at critical stages of development. In some instances the teratogenic agent acts very specifically in a narrow window of time of fetal organ development . A classical example of this is the development of a Cyclops condition in lambs and calves (Figure 1) as a result of the pregnant animal eating western false hellebore (*Veratrum californicum*) in the 13-14th days of pregnancy. Eaten before or after this narrow window of time, Cyclops malformation does not develop.

A common teratogen affecting cattle is the virus that causes bovine virus diarrhea (BVD). Depending on when the pregnant cow becomes infected with the BVD virus determines the degree of damage to the fetus; early in gestation infection may result in embryonic death, fetal death and mummification; later in gestation abortion and fetal malformations may develop. Some modified live BVD vaccines given to pregnant cattle will cause similar problems in the fetus. Blue tongue virus is also well known to cause fetal malformations in cattle and sheep. Another foreign animal disease that is teratogenic is Rift Valley fever virus.

There are many hundreds of chemical teratogens (<http://msds.chem.ox.ac.uk/teratogens.html>). Antibiotics such as tetracyclines may affect fetal development. Many pesticides are teratogenic to all animals. The sudden appearance of a congenitally deformed calf always warrants careful consideration of the chemicals the cow may have been exposed to during her pregnancy.

Cattle raised on rangelands are frequently exposed to plant teratogens. The most common plant-induced congenital abnormalities are attributable to lupines (*Lupinus* spp.), poison hemlock (*Conium maculatum*), locoweeds (*Astragalus* and *Oxytropis* spp.), and tree tobacco (*Nicotiana glauca*). These plants eaten by pregnant cows between the 40th and 100th days of gestation will cause 'crooked calf disease' (Figure 2). Affected calves are born with various deformities of the

bones of the legs and quite often have cleft palates. The latter problem results in a calf that has milk running out its nose as it suckles. As mentioned earlier, western false hellebore or corn lily (*Veratrum californicum*) common at higher elevations in the Rocky Mountains is a well known teratogen causing cyclopia. Other plants that grow in the western States that have been associated with calf deformities include sorghums, members of the *Prunus* genus (eg: choke cherries), jimson weed (*Datura stramonium*) and groundsels (*Senecio* spp.). Loss of pregnancy as a result of embryonic death in many cases may be due to teratogens. There are many other plants that are associated with abortions possibly as a result of teratogenic compounds in the plants.

In vitro fertilization must also be considered when investigating the possible causes of fetal malformations. Higher rates of abortion and fetal skeletal deformities have been reported with in vitro fertilization. Similarly rectal palpation and rectal ultrasound examinations for pregnancy detection in the first 42 days of gestation has been associated with increased atresia ani (absence of the anus) (Constable, 1989; *J Am Vet Med Assoc* 195:118-123).

Lastly, genetic abnormalities can result in numerous fetal malformations. Internal hydrocephalus (abnormal accumulation of fluid in the brain) is well known to be an autosomal recessive trait especially in some Charolais breed lines. The Simmental breed has a genetic defect that causes brachygnathism ('parrot mouth'). Polydactylism (extra digits) is another such inherited trait in cattle. Introduction of new genetic lines to a herd should always be suspected when calf malformations are encountered.