Welcome to the Mississippi Master Cattle Producer Program Self-Study Program Herd Health and Handling training module. This program is administered by the Mississippi State University Extension Service. For answers to questions about this training program, contact Dr. Jane Parish, MSU-ES Extension Beef Cattle Specialist. For answers to specific herd health questions, contact a local veterinarian.

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Mississippi Master Cattle Producer Program

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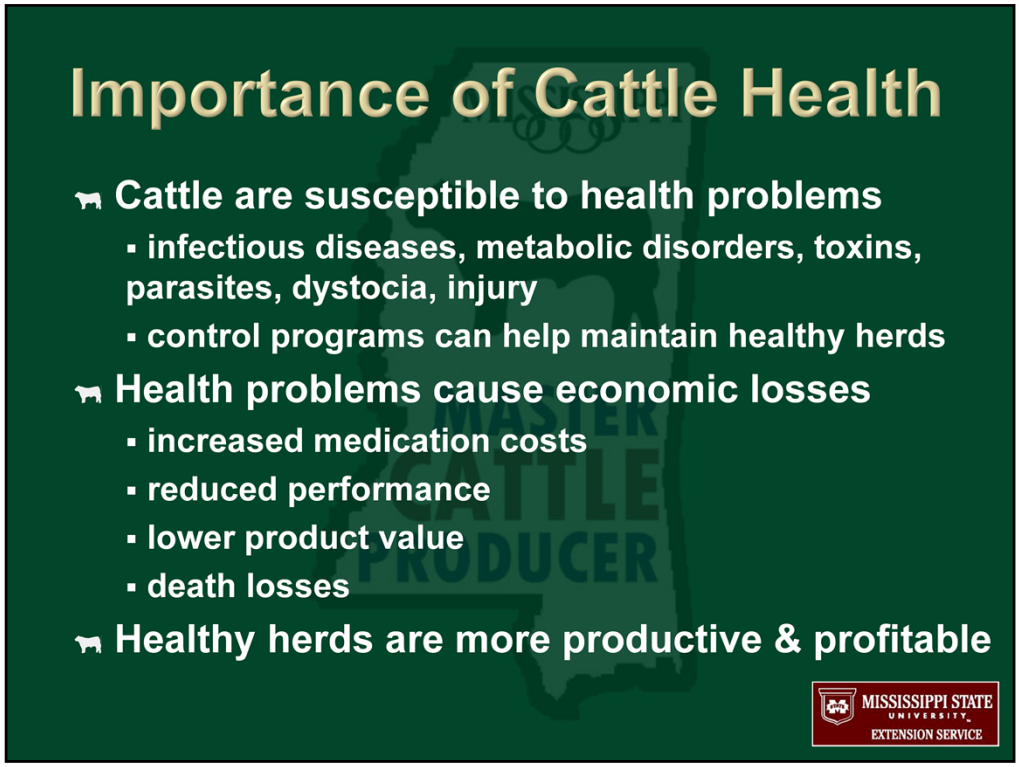
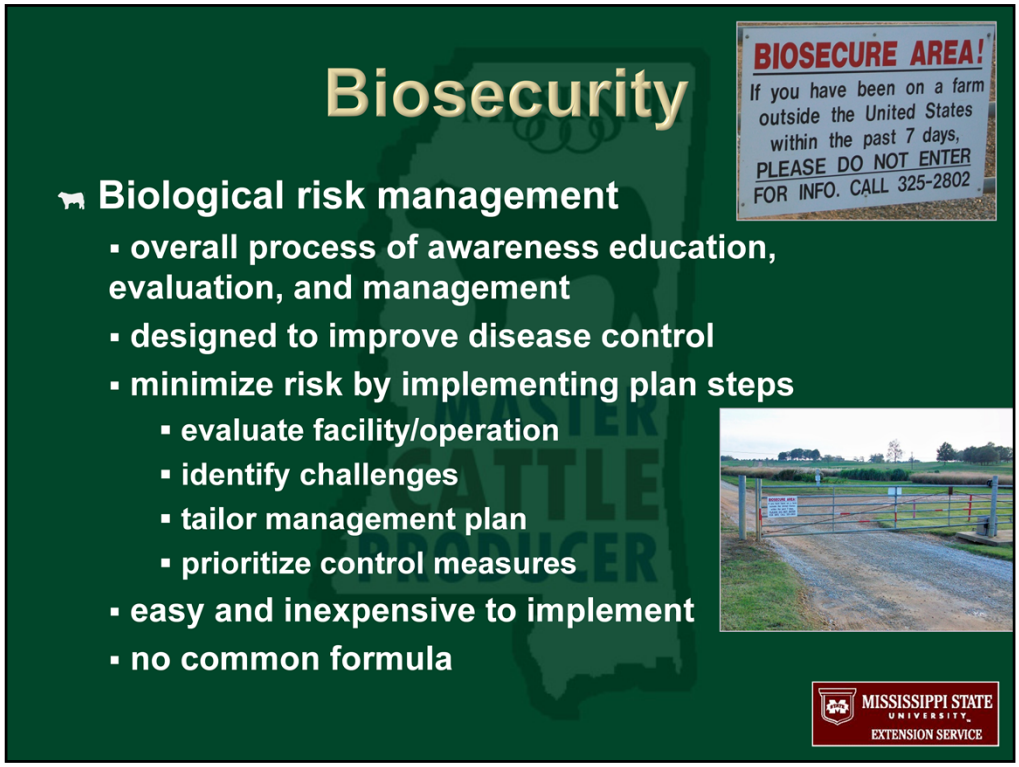


Like other species, cattle are susceptible to infectious diseases, metabolic disorders, toxins, parasites, neoplasia, calving difficulty (dystocia), and injury. Health management and biosecurity programs can help maintain and protect healthy herds. Base control programs on risk assessment and effectiveness of available products. Economic losses are reduced by early intervention through health management programs. Healthy herds have lower medication costs, less death loss, and are more productive and profitable. Keeping cattle healthy is a serious responsibility shared by all cattle owners, managers, and handlers.

Veterinarians play a critical role in preventing, diagnosing, and treating disease in beef cattle. Local veterinarians can develop herd health programs on an individual basis to fit specific ranch needs. It is very important that beef cattle operations establish and maintain a proper veterinarian-client-patient relationship (VCPR). Producers should work with a veterinarian and nutritionist to determine the risk of infectious, metabolic, and toxic diseases and to develop effective management programs when designing a herd health plan. Producers and their employees should have the ability to recognize common health problems and know how to properly utilize animal health products and other control measures. When prevention or control measures are ineffective, the producer should promptly contact a veterinarian for a diagnosis and treatment program to reduce animal suffering and losses.

Veterinarians can provide a variety of services of benefit to beef cattle operations. Disease prevention programs (vaccinations, parasite control) are a major area in which veterinarians can offer expertise. Producers should consider contacting a veterinarian for advice or assistance if cows or heifers have calving difficulties that cannot be corrected by the producer within a reasonable amount of time. Veterinarians may treat injured or ill cattle at a clinic or on the production operation. They can perform Breeding Soundness Evaluations on prospective herd sires or sale bulls. Veterinarians are often involved in pregnancy diagnosis at sale barns or ranches. Veterinarians can facilitate disease monitoring and certification programs such as Brucellosis, BVD, or Johne's disease programs. Necropsies are another valuable service that veterinarians can provide or facilitate for beef cattle operations.

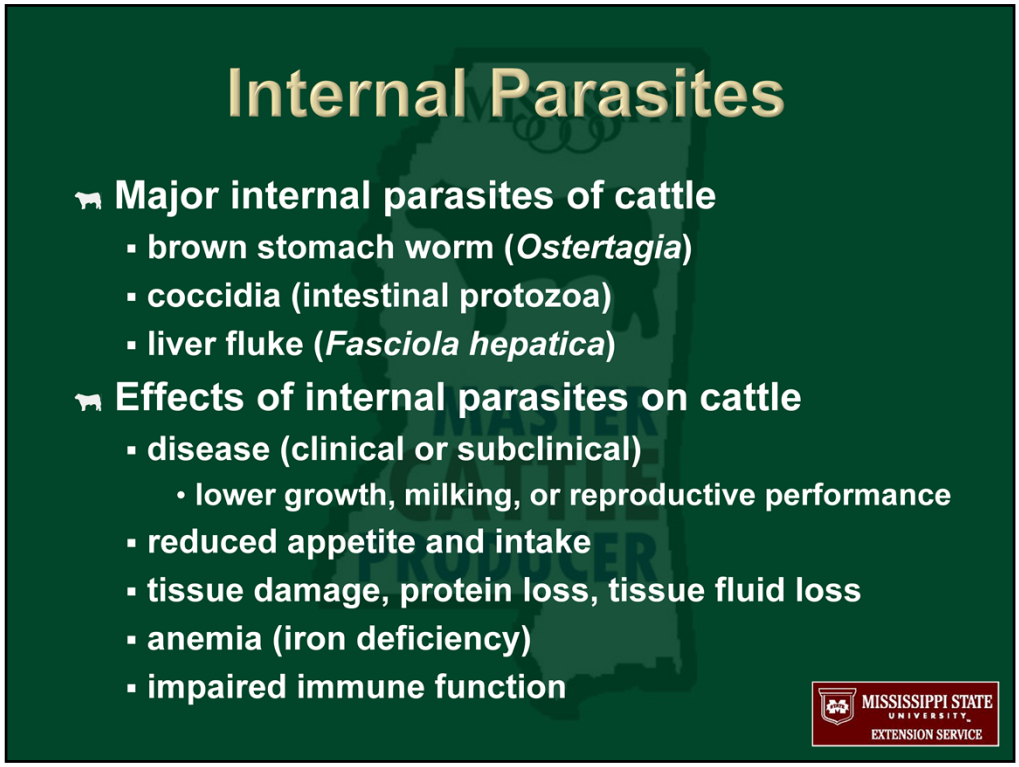


Biological risk management (biosecurity) is the overall process of awareness education regarding the risk of infectious diseases entering or spreading through an animal facility. It also involves evaluating and managing those risks. Biological risk management is designed to help livestock producers understand the need for disease control, not only for foreign animal disease threats but domestic diseases as well. Biological risk management provides the tools to minimize the risk.

Once a facility or operation has been evaluated, the challenges to implementing a successful biosecurity plan can be identified. Only then can a tailored management plan be proposed and implemented. When first working on change, prioritize those items that are relatively easy to implement, inexpensive, yet yield rewards. There is no common formula for what that entails, and rewards will be different for every operation. Simply reducing disease exposure can be beneficial.

Implement disease prevention steps to reduce disease risk on the operation. Limit contact with animals that may present a disease risk by coordinating with neighbors to avoid fence line contact between herds. Prevent dogs and cats from roaming between farms. Maintain fences (repair/replace posts, tighten wires) to minimize the risk of animals escaping or other animals entering and commingling with other livestock or wildlife species, which increases their risk of disease exposure. Establish and follow biosecurity protocols for delivery vehicles and personnel to follow on the ranch. Install gates as a barrier to human entry, and then lock them to prevent animal contact and subsequent disease exposure.

Remove cattle that are identified as ill from the rest of the herd immediately. Place them in an isolation area where ventilation, feed, water, and other equipment are not shared and direct contact with other animals does not occur in order to minimize the risk of disease spread. Newly introduced animals, including show cattle/calves that have been away from the ranch, may carry diseases, so quarantine them for a period of time. Time spent in isolation and quarantine varies depending on the risk so this should be determined together with a veterinarian. Before taking animals out of isolation or quarantine, it is a good risk management plan to test them for key diseases (determined together with your herd veterinarian) and make sure they are not carrying diseases that could be introduced into the home herd.



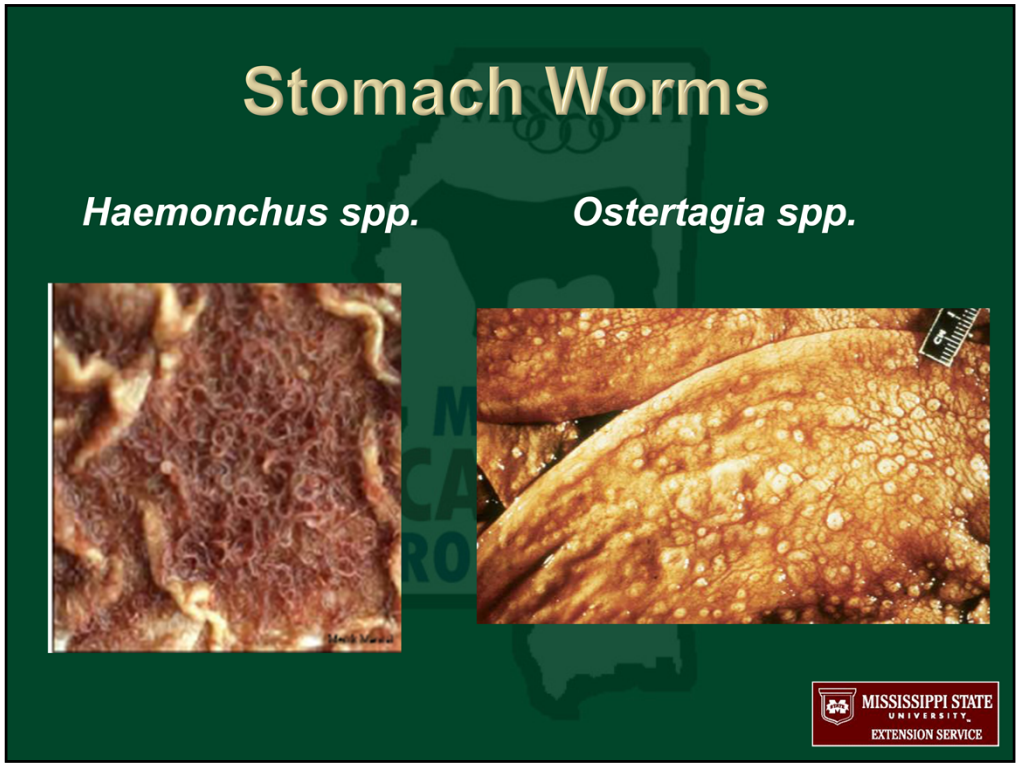
A parasitic relationship exists when one organism (the parasite) profits at the expense of the other (the host). The major threat to cattle health and performance comes from internal parasitic nematodes (worms), especially those found in the stomach and intestines (gastrointestinal parasites). Internal parasites can hurt animal health and performance without clinical signs of disease being present. Lung worms can also be a problem in cattle.

Cattle production in Mississippi is concentrated on heavily populated, permanent pastures where gastrointestinal parasites are abundant. Young, growing cattle through 2 years of age are especially vulnerable to harmful effects of internal parasites. Replacement cattle brought in to Mississippi from areas with low parasite loads (such as western U.S. states) are also highly susceptible to internal parasites. Adequate nutrition and parasite control make a difference in animal performance and health.

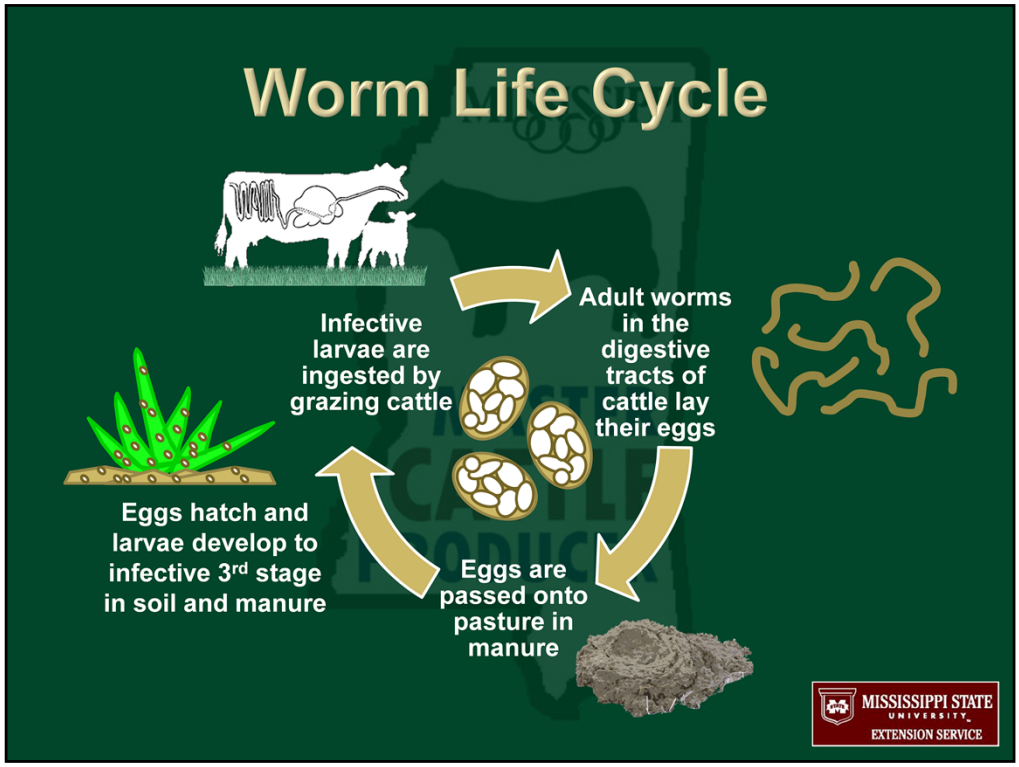
Stomach worms are bloodsuckers that cause irritation and inflammation to the stomach and intestinal linings. This reduces nutrient absorption and results in reduced animal performance. The lungs, abomasum (true ruminant stomach), small intestine, and large intestine can be infected with worm parasites.

The brown stomach worm, *Ostertagia*, is the most common internal parasite in cattle. It causes the highest economic losses and most severe symptoms. Cattle younger than 2 years of age are most susceptible to brown stomach worm problems. Young animals show the most severe clinical signs, which will continue until the calves die or are treated. *Ostertagia* clinical disease is characterized by severe greenish diarrhea, swelling under the jaw (bottle jaw), and rapid weight loss.

Other stomach worms that can cause problems in beef cattle include *Haemonchus placei*, the barber's pole worm, and *Trichostrongylus axei*, the small stomach worm.

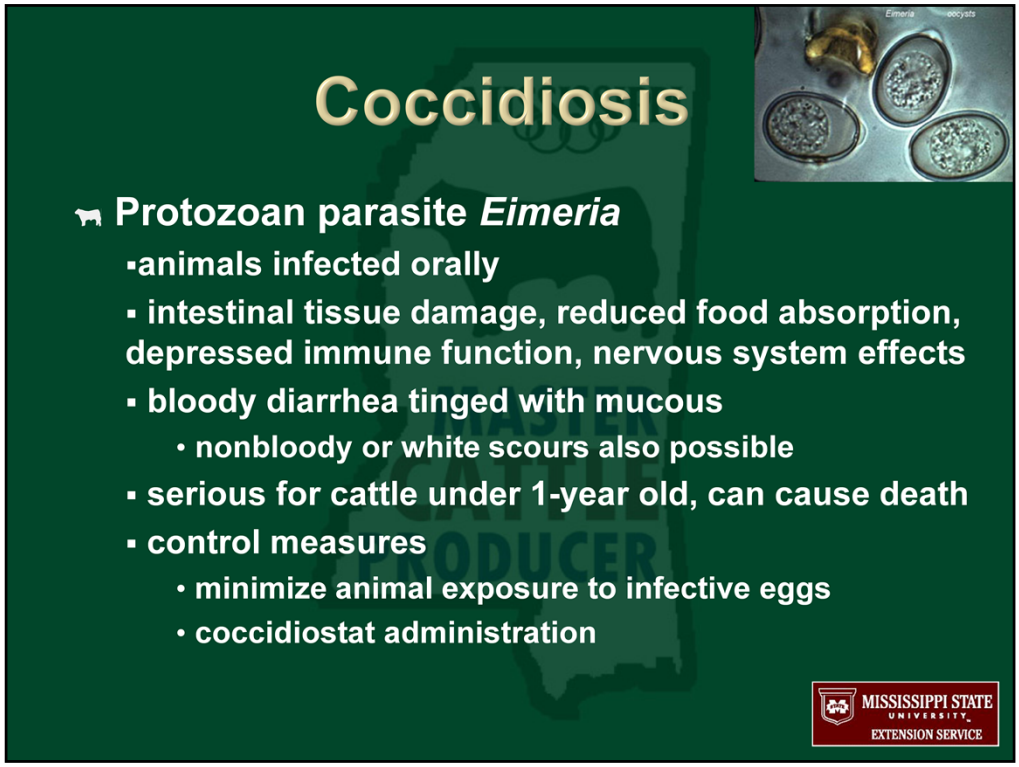


Illustrations of common stomach worms infesting cattle appear above.



Adult nematodes (worms) in the digestive tracts of cattle lay eggs. These worm eggs are passed out of the digestive tract and onto pastures in manure. The eggs hatch and larvae emerge in soil and manure. Parasite larvae can survive from weeks to months in grass cover. In Mississippi, internal parasite eggs and larvae can survive well in pasture during the winter and survive through winter in most years. A severe, prolonged freeze probably kills most eggs and larvae on pasture. Larvae can survive in dry manure pats and emerge after a rainfall event. Larvae develop to the infective 3rd stage on pasture and are ingested by grazing animals. The complete nematode life cycle can be complete in 3 weeks.

Brown stomach worm larvae are inhibited in wall of the abomasum in summer. These larvae cannot survive on pasture. June to July treatment to remove inhibited worms in the abomasum of cattle is a form of strategic deworming. A variety of short- and long-acting dewormers are available for use on cattle. Dewormer administration can be pour-on, injectable, or oral. Long-acting dewormer products typically continue to kill worms for 2 to 4 weeks after treatment. Treating cattle for worms and periods of hot weather decreases pasture nematode contamination and overall worm burden.



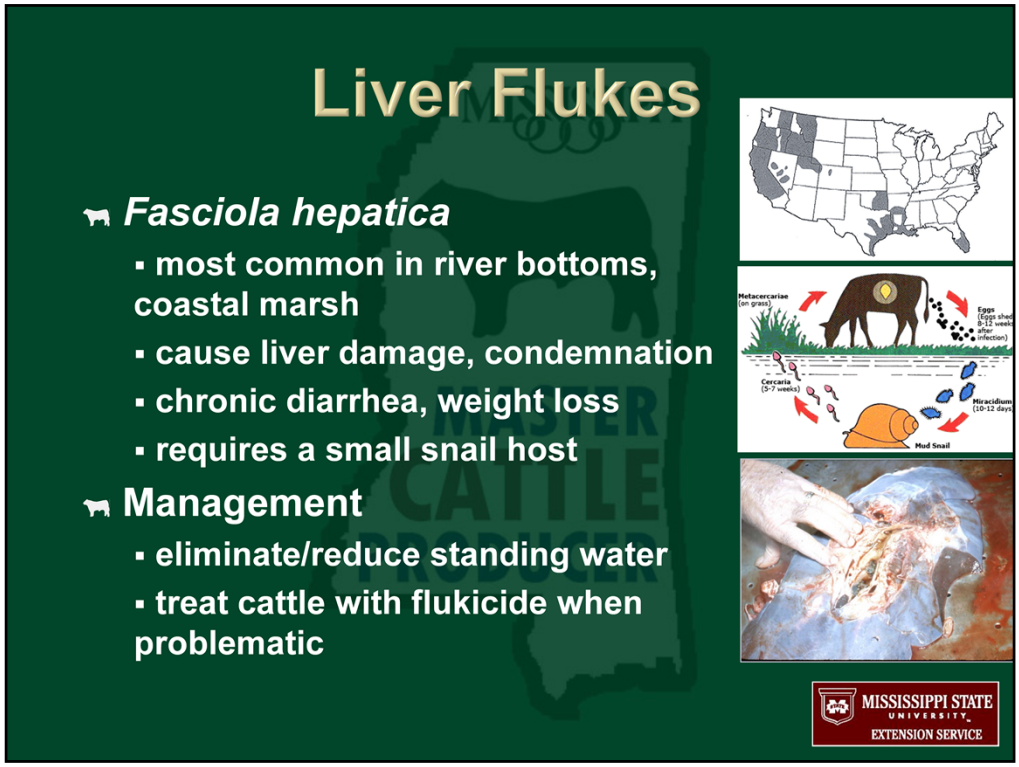
Coccidiosis is a very serious parasitic problem that particularly affects young calves. It is an economically significant disease affecting the intestinal tract of cattle. It typically occurs in confinement or pasture when sanitation is poor or the environment is wet. Calves ingest coccidial oocytes (eggs). Eggs may be picked up by cattle in contaminated forage, water, or by licking themselves or other cattle soiled with contaminated manure. The eggs hatch inside the animal, and the coccidia develop through several life stages during which they damage the digestive tract. Mature coccidia produce eggs which continue the life cycle. Animal stress facilitates coccidiosis development.

Coccida damage intestinal tissue, cause blood loss, and reduce nutrient absorption. This leads to depressed immune function and sometimes nervous system effects. Nervous coccidiosis is a condition seen occasionally in calves and yearling cattle, more commonly in western states and feedlots. It can appear soon or much later after onset of other signs and can result in animals falling and having leg spasms in a bicycling-type motion. Coccidiosis can cause death in young cattle, especially those under 1-year old.

Fecal tests can confirm coccidia presence. Cattle producers may recognize bloody diarrhea tinged with mucous as a common clinical sign of coccidiosis, although nonbloody or white scours are also possible in affected calves. Soiled hindquarters are evidence of continued diarrhea. Affected calves may continue straining to have bowel movements. As the condition progresses, dehydration, anemia, unthriftiness, poor weight gains and general loss of condition become evident. Weakened calves are very susceptible to pneumonia and may die. After recovery, calves may still be “poor doers”.

Coccidiosis control measures include minimizing animal exposure to infective eggs by keeping young cattle in large, clean, dry areas and keeping feed and water clean and free from manure contamination. Minimize stress from weaning, shipping, and diet changes, especially in young calves during wet, cool weather. Several coccidiostats are available as feed or water additives for prevention and treatment efforts. Oral sulfa boluses are a long-acting treatment option. Some ionophores also work to help control coccidiosis. Coccidiostats can be toxic to livestock (do not feed to horses at all), so be sure to follow label directions for use and ensure proper feed mixing.

National Animal Health Monitoring System 2007 data show an incidence rate of coccida in fecal samples from cow-calf operations of 63.1% in the Southeast U.S. and 59.9% nationally.



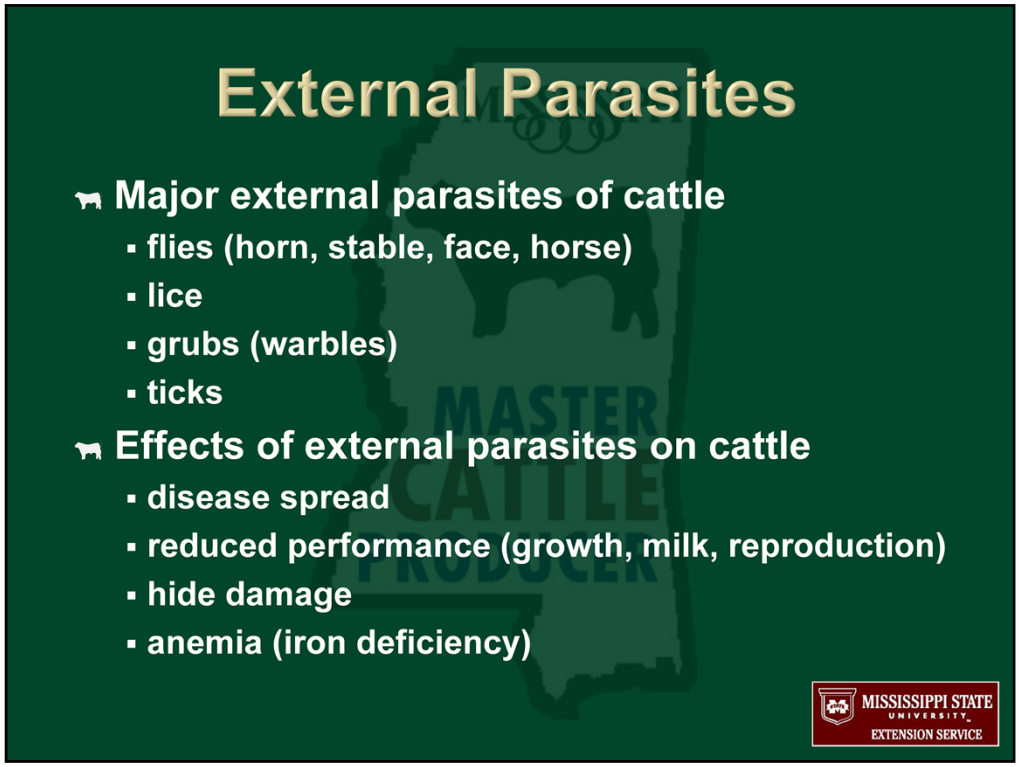
Liver flukes, *Fasciola hepatica*, cause liver damage in cattle and can lead to liver condemnation and associated carcass value losses at harvest. The condemnation of damaged livers at slaughter and the losses in beef production associated with fluke infections are economically significant. Infestations in cattle cause chronic diarrhea and weight loss. Fascioliasis (liver fluke disease) is associated with reduced fertility of the brood cow herd, lighter calves at weaning, slower growth of replacement heifers, higher culling rates in cow herds and lighter weight cull cows.

Although liver flukes are not a problem in many regions of the country, some areas of Mississippi can have significant infestations of liver flukes. Liver fluke infestations are most common in areas with standing water such as river bottoms, low-lying areas, and coastal marshes. In areas where liver flukes are a problem, drain standing water when possible and treat cattle with a flukicide according to a schedule recommended by a veterinarian. For example, treat every autumn to remove adult egg laying flukes from liver. If late winter is wet, also treat in April or May. The small snail necessary for survival and multiplication of fluke larvae can often be found in watery hoof prints in pastures.

The adult liver fluke lives in the bile ducts of the animal's liver. The adult liver flukes produce eggs which are carried with bile to the gut and are then passed in the feces. In the fecal pat, a ciliated larva called a miracidium develops inside the liver fluke egg. When a fluke egg is exposed to sunlight miracidium hatches.

Snails are required for liver flukes to complete their life cycle. After hatching, the miracidium must find and penetrate a suitable snail host within a few hours or die. Inside the snail host, the miracidium multiplies and transforms into many tadpole-like cercariae which exit the snail. After exiting the snail the cercaria attaches to vegetation and completes its development into an encysted metacercaria containing a fully developed immature fluke, the infective stage of the parasite. The length of time that metacercariae survive on pasture is dependent on both moisture and temperature. A minimum of 70% relative humidity is considered necessary for prolonged survival of metacercariae. Metacercariae can be killed within 2 days when exposed to direct sunlight in temperatures of 98.6° to 105°F.

Cattle become infected by ingesting the metacercariae attached to forage or by drinking water contaminated with metacercariae attached to soil particles or vegetative debris. Once ingested and after reaching the small intestine, the infective fluke larva, penetrates the wall of the small intestine and enters the abdominal cavity. After migrating through the abdominal cavity for approximately a week, the fluke larva penetrates the liver capsule and migrates slowly through the liver for 6 to 8 weeks. Finally, the fluke larva enters the bile duct where it matures and begins to produce eggs that are carried in the bile to the gut, thus completing the liver fluke cycle. Cattle are usually infected with numerous liver flukes at any one time rather than a single liver fluke.



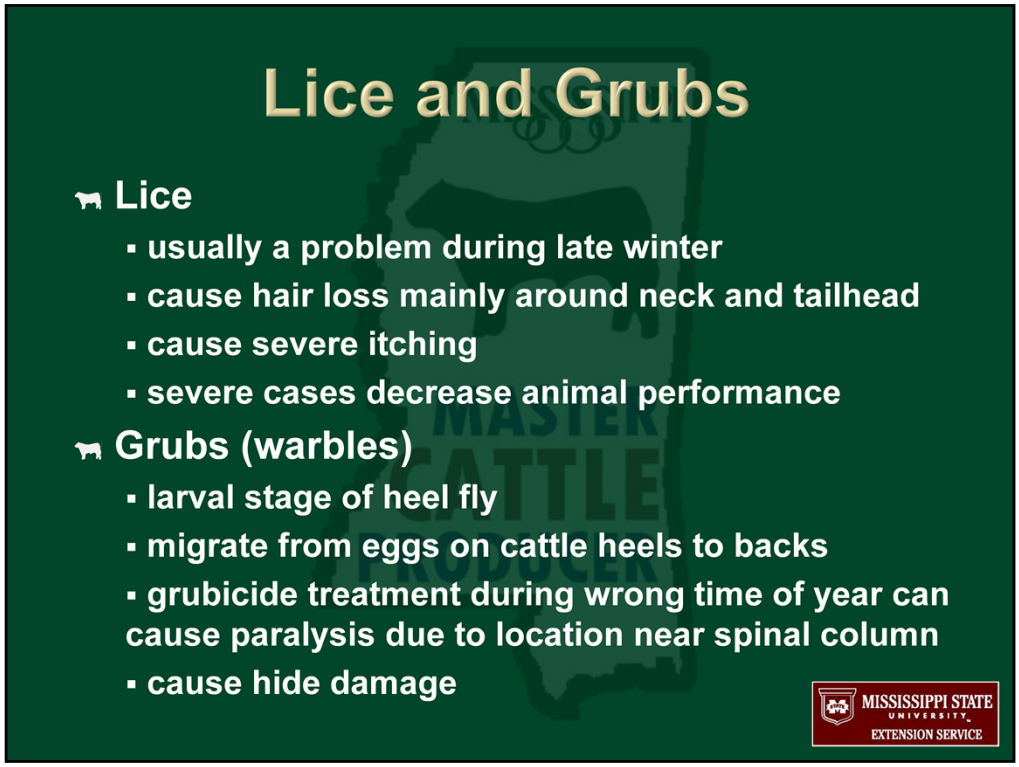
Parasite control programs should address both internal and external parasites. External parasites are a nuisance that cause cattle to spend time and energy trying to ward them off by swatting or stomping. These parasites spread disease, reduce animal performance, damage hides, and cause anemia due from animal blood loss. Major external parasites of beef cattle include several species of flies, lice, grubs, and ticks.

Horn fly infestations are a common problem for beef cattle. These flies are readily noticeable on cattle and characteristically appear to be facing downward. Horn flies irritate and annoy cattle, causing them to change their grazing and feeding behavior. Horn flies create discomfort for cattle and sometimes open wounds. Cattle may spend less time eating and significant time swatting and otherwise trying to deter the flies if heavily infested with horn flies. Economic losses from reduced productivity are experienced at or above approximately 200 flies per animal (100 flies per side).

Face flies are often found around the eyes. Face flies can spread pinkeye.

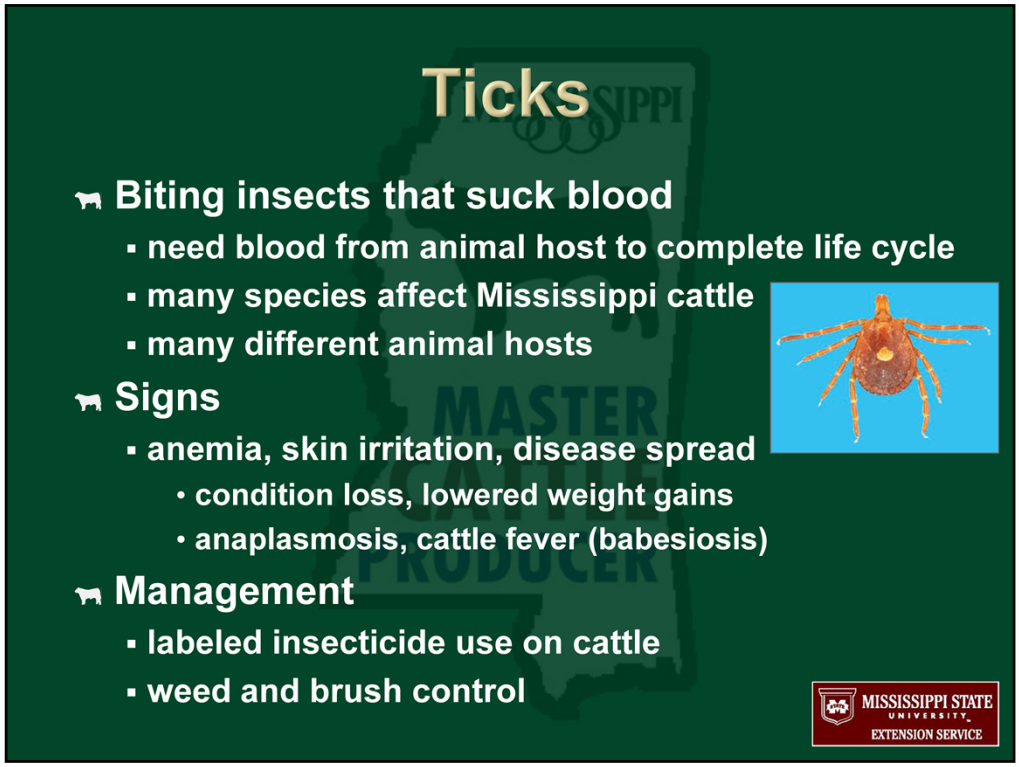
Horse flies are large insects that draw blood with painful bites.

Fly season (period where the number and severity of fly infestations of cattle increase) generally occurs during the warmer months of the year. In Mississippi, fly season typically begins in early spring and extends well into autumn. Cattle are constantly exposed to flies and can do little themselves other than temporarily deter them with swatting, shivering, and stomping. Fly control measures must be implemented to provide relief to cattle from fly infestations. A wide variety of fly control products are available including dusts, sprays, pour-ons, insecticidal ear tags, and oral larvacides. Make sure to alternate insecticide chemical classes (pyrethroids, organophosphates, organochlorides) on a routine basis and remove ineffective insecticidal ear tags in a timely manner to reduce the risk of fly populations building resistance to these chemical control products. Avoid performing castration and dehorning during fly season when possible. Treat open wounds promptly, and apply fly deterrents to promote wound healing without fly irritation.



Lice and grubs are common but sometimes overlooked external parasites of cattle. Lice infestations are usually a problem during late winter (January and February). Lice cause hair loss, particularly around the neck, top of the back, and tailhead. Lice produce severe itching in cattle and can reduce animal performance in severe cases. Hide damage is a problem with lice infestations.

Grubs (warbles) are the larval stage of the heel fly. Grubs migrate from eggs on the heels of cattle to their backs. Follow veterinary recommendations and grubicide label instructions when treating cattle for grubs to prevent problems with animal paralysis. Treating cattle for grubs during the wrong time of year can be serious because of the proximity to the spinal column. Grubs also produce hide damage, lowering the value of this important beef production byproduct.



Tick bites are irritating and cause the infested animal to rub and scratch, resulting in a scabby skin condition, sometimes followed by secondary infection. Heavy infestation of ticks on cattle results in a loss of condition, failure to gain properly, and a severe degree of anemia. Ticks frequently use wild animal hosts to maintain high populations in the vicinity of treated cattle herds. Ticks on wildlife can reinfest treated cattle, continually posing a problem. Ticks are also capable of transmitting diseases such as anaplasmosis to cattle.

There are four stages in the life cycle of ticks: the egg, the six-legged larva (seed tick), the nymph, and the adult which has eight legs. The larva, nymph and adult obtain food by piercing the skin of animals and sucking blood. Ticks thrive in high humidity conditions. Regular weed and brush control in pastures decreases humidity and greatly reduces tick populations. For tick control, use only recommended insecticides on cattle and follow label directions carefully. Do not treat sick or weakened animals. Avoid treating young calves unless the pesticide is labeled for such use.

The Lone Star tick (*Amblyomma americanum*) is the most abundant and annoying tick species in Mississippi. It is nonspecific, feeding on a wide variety of birds and mammals, and it often occurs in extremely large numbers. Adults are especially common on white-tailed deer. Larval stage lone star ticks are sometimes called “seed ticks” and are active in late summer and early autumn in Mississippi.

The American Dog tick (*Dermacentor variabilis*) is important not only because its bite is annoying and because it is a vector of Rocky Mountain spotted fever and tularemia, but also because its bite sometimes causes paralysis in livestock and man. The preferred host of the adult stage is the domestic dog, but it readily bites numerous wild and domestic animals as well as man. This tick may cause annoyance to domestic livestock, but it is not a known vector of cattle disease. This tick species occurs in all Mississippi counties.

Black-legged tick (*Ixodes scapularis*) adults are commonly encountered during the winter months in Mississippi. Adults usually parasitize large mammals including deer and livestock. This tick is an efficient vector of the agent of Lyme disease and is probably responsible for most cases of true Lyme disease in the southern U.S. *I. scapularis* has been collected in Mississippi in almost all counties except the northern ones bordering Tennessee, where it seems to be absent.

The Gulf Coast tick (*Amblyomma maculatum*) is a relatively large species that is most abundant along the Gulf and Atlantic coasts. Adults feed on a wide variety of medium and large mammals such as deer and cattle. In Mississippi, the Gulf Coast tick has been found in 17 counties, primarily in the southern third of the state.

The winter tick (*Dermacentor albipictus*) is active in the late autumn winter, and early spring and is a significant pest of horses, cattle, and wild hoofed mammals. This species is irregularly distributed in several southern states. In Mississippi, it has been collected from several central and southern counties.

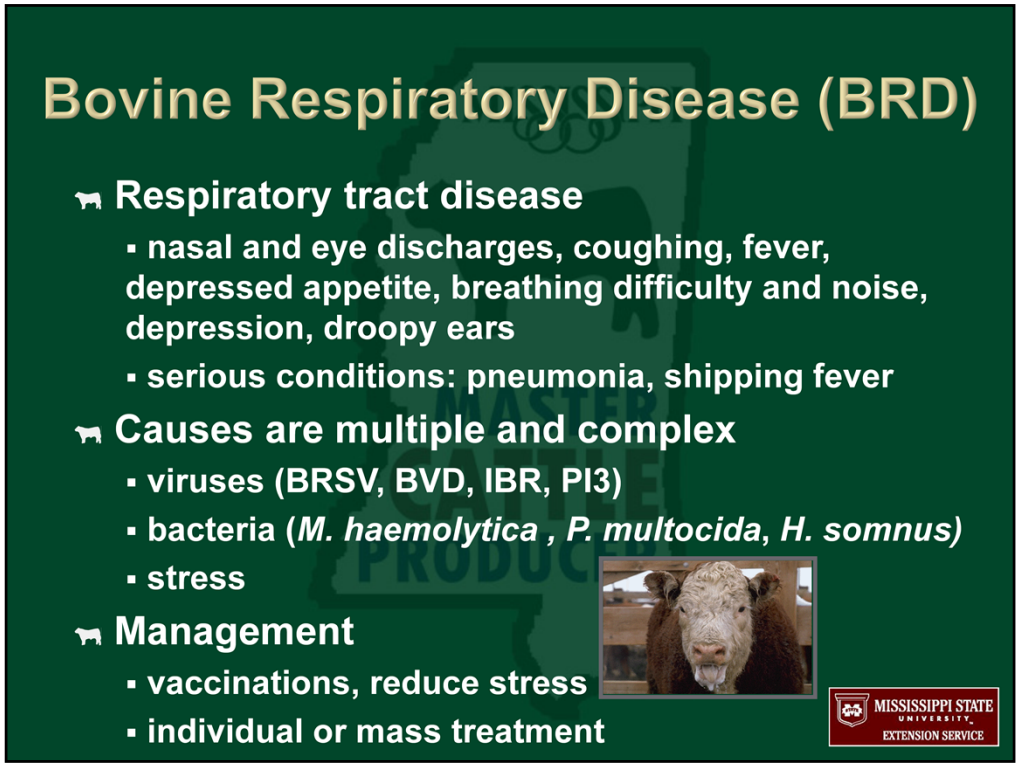
The Spinose Ear tick (*Otobius megnini*) is widely distributed throughout the western U.S. (but is often introduced into eastern states) and is an important parasite of horses, mules, sheep, cats, dogs, and especially cattle. Records of this species in Mississippi are limited to cattle in Warren County.

The Cattle Fever tick (*Boophilus annulatus*) feeds on ungulates, especially cattle, deer, horses, mules, sheep, goats, and bison. Texas cattle tick fever or bovine babesiosis is a protozoal tick-borne disease (that destroys red blood cells) found worldwide, but was eradicated from the U.S. in 1943. The parasites, *Babesia bigemina* and *Babesia bovis*, utilize the *Boophilus* species of tick as a vector to transmit the disease between animals. Tick control is the most effective method of disease control. Cattle Tick Fever is associated with high economic costs as it causes significant morbidity and mortality and production losses in cattle. The Cattle Fever tick was widely distributed in the southern U.S. in the early 1900s but is now eradicated from Mississippi due to the National Cattle Fever Tick Eradication Program. There is only one collection record from Mississippi dated December 31, 1914, from Franklin County. Surveillance of livestock and wildlife for *Boophilus* ticks is still conducted in a 500-mile permanent quarantine zone along the Texas-Mexico border.

Blackleg (*Clostridial* disease) is primarily caused by *Clostridium chauvoei*, a bacterium. These bacteria exist in a spore form in the presence of oxygen. In the spore form, they are resistant to environmental changes and disinfectants and can survive in the soil for years. Blackleg is spread through ingestion of contaminated feedstuffs.

Blackleg is mainly seen in cattle from 6 months to 2 years of age, infrequently affecting cattle greater than 2 years of age. It is a non-contagious and highly fatal (nearly 100%) disease of skeletal and heart muscle of cattle. When conditions in the animal are right, the bacteria enter into a rapid proliferation phase, producing toxins that cause muscle death and, subsequently, the animal death. Clinical signs include depression and swelling and lameness of the affected limb(s). Initially, fever and pain to the touch of the affected limb is seen. Later, the swollen area becomes cold and non-painful to the touch. Often, when the swollen area is palpated, there is the perception of air under the skin. Cattle can be found dead without first displaying clinical signs.

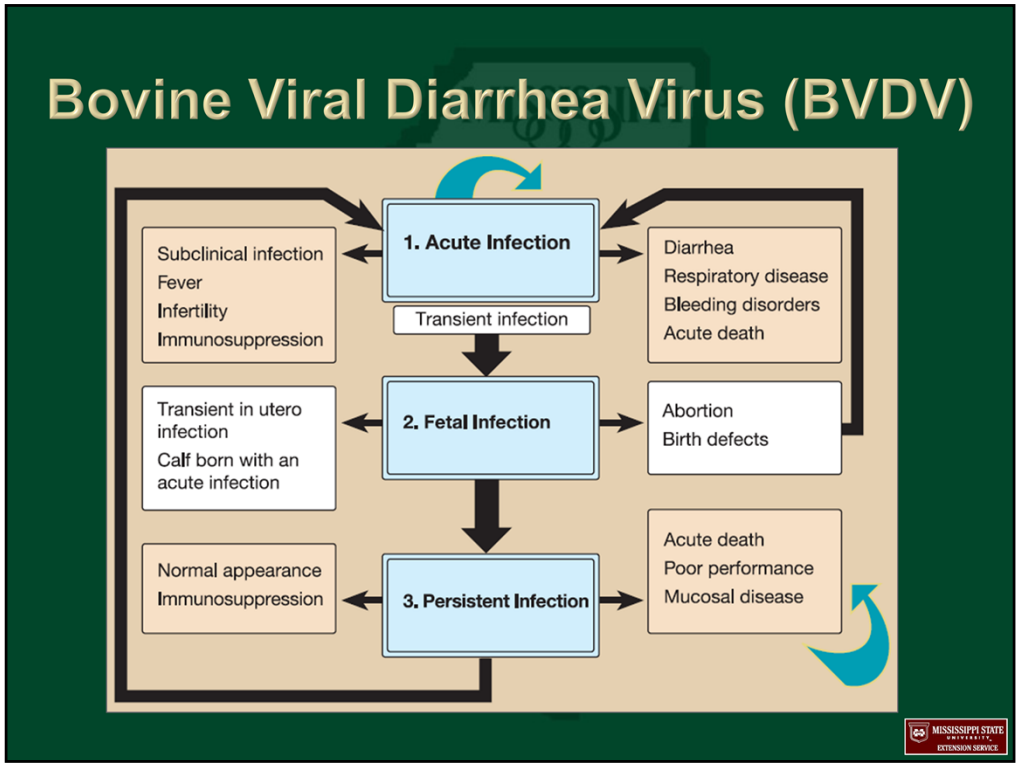
Treatment of blackleg is usually futile. However, vaccination of healthy calves with *Clostridial chauvoei* bacterin is very effective in disease prevention. Be sure to properly dispose of the carcass of an animal that dies of blackleg to prevent the further premise contamination.



Disease of the respiratory tract is a major and widespread problem for cattle that causes serious economic losses for producers. Bovine respiratory disease (BRD) causes increased death losses as well as medication costs, labor, and lost production. The most common signs of BRD are nasal and eye discharges, coughing, fever, decreased appetite, varying degrees of breathing difficulty and noise, rapid breathing, open-mouthed breathing, depression, and droopy ears. These signs vary greatly, depending on the stage and extent of the disease process. Pneumonia and shipping fever can be very serious lower respiratory tract (lung) infections. Even if animals do not die from BRD, permanent lung damage can result in "poor doers" and carcass defects.

Many different infectious agents may cause similar clinical signs. Multiple agents are often involved in the development of BRD. Secondary bacterial invasions are infections caused by bacteria that invade tissue after an initiating event, such as a previous viral infection, which has established conditions that allow these secondary bacteria to invade tissue and cause disease.

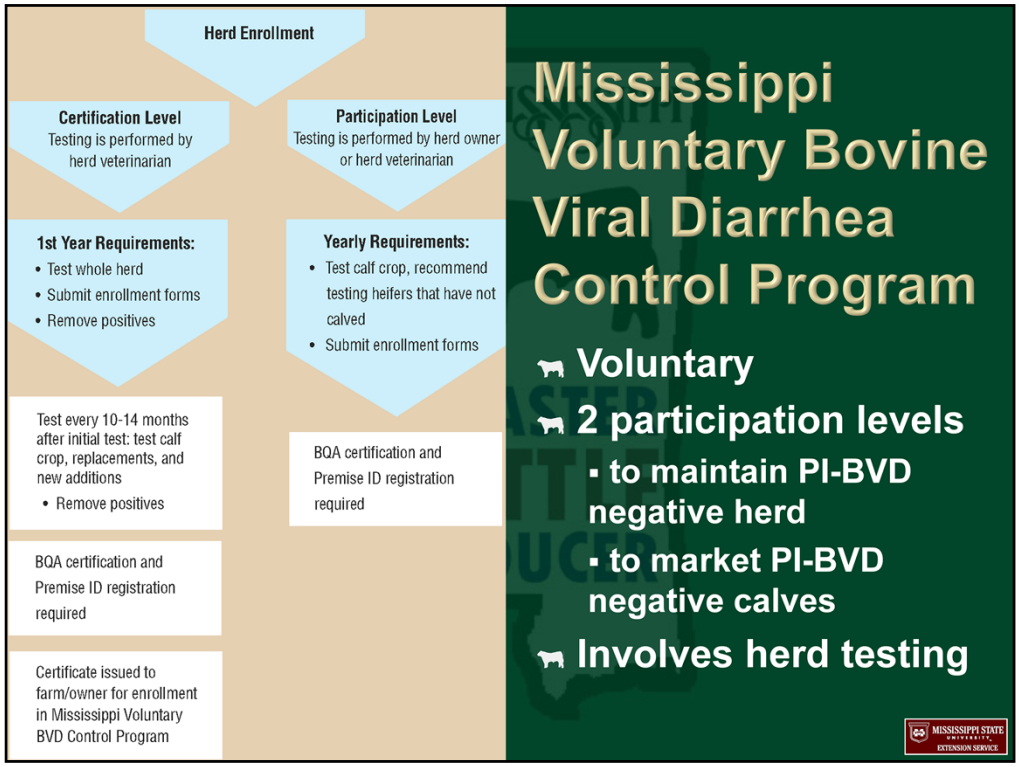
Preventing BRD focuses on minimizing stress, providing adequate nutrition and internal parasite control, establishing an effective and early immunization program (preconditioning), and maintaining biosecurity by minimizing exposure to diseased and unfamiliar cattle. Vaccines are available for several infectious respiratory disease agents of cattle including the viruses IBR (Infectious Bovine Rhinotracheitis or Rednose), PI3 (Parainfluenza-3), BVD (Bovine Virus Diarrhea), BRSV (Bovine Respiratory Syncytial Virus), and the bacteria *Mannheimia haemolytica*, *Pasteurella multocida*, and *Histophilus somnus*. The critical period for disease detection is the 3 weeks immediately following weaning, placing on feed, or shipping of cattle. Avoid mixing (comingling) cattle from different sources during this highly critical 3-week period. Bovine respiratory disease may not be eliminated, but through proper management and animal health practices, its severity can be minimized. Successful treatment of BRD depends upon early detection and proper antibiotic use. Consult with a veterinarian on preconditioning, receiving, and treatment protocols.



Bovine viral diarrhea virus (BVDV) can be a serious problem for cattle operations. When BVDV was first identified, the most common clinical symptom associated with the virus was diarrhea, hence the name bovine viral diarrhea (BVD). But since its discovery, BVDV has also been implicated as a cause of infertility, abortions, shipping fever (bovine respiratory disease), immunosuppression (weakening of the immune system that leads to other disease problems), and much more.

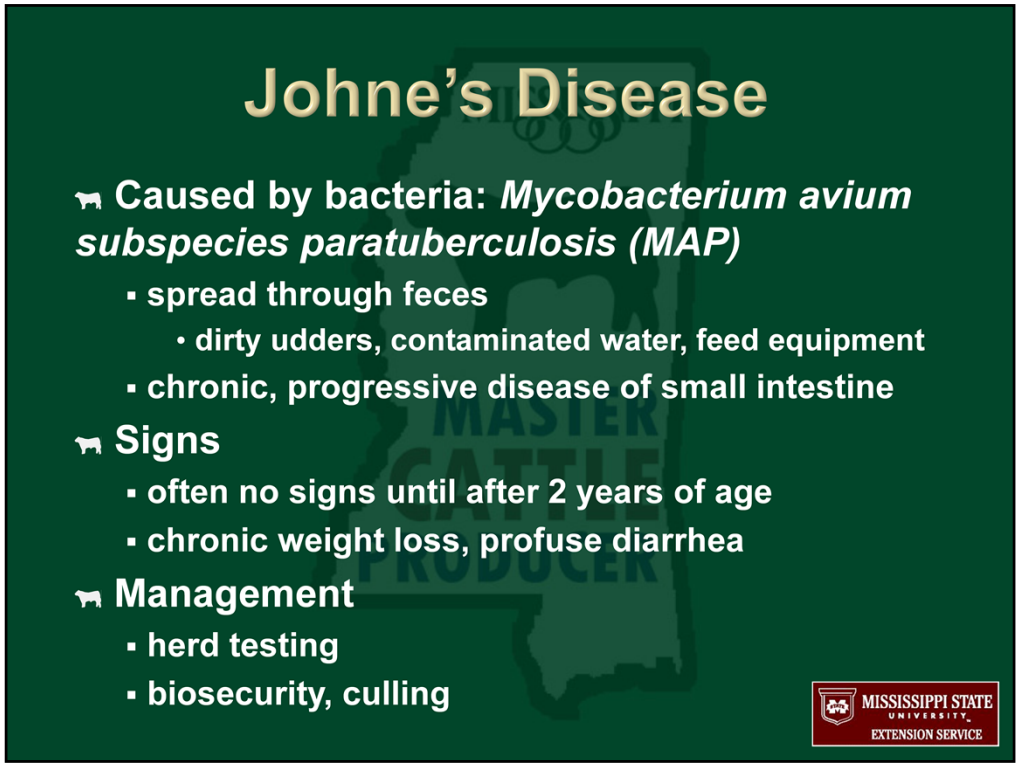
BVDV infections are classified into three clinical syndromes: acute (transient) infection, fetal infection, and persistent infection (PI). Acute (transient) infections result in fever, depression, diarrhea, respiratory disease, reproductive problems, and much more, depending on the age and immune status of the animal infected, as well as the strain of BVDV involved. Some animals show no outward signs of illness (subclinical disease), but the immunosuppressive effects of the virus leave them susceptible to other diseases. Most animals recover from acute infections, but some animals die.

BVDV does not usually survive in the environment very long (less than 3 weeks), so direct transmission between animals is the most common route of transmission. Acutely infected animals are a temporary source of BVDV transmission, but PI animals shed millions of viral particles every day. PI animals, therefore, serve as a constant source of BVDV exposure in a herd because they continuously shed virus in saliva, mucous, tears, milk, feces, urine, and any other bodily secretion. Infected herds must, therefore, identify PI animals and remove them from the herd.



A cooperative effort between the Mississippi Board of Animal Health (MBAH), the Mississippi State University College of Veterinary Medicine, and the MSU Extension Service has developed the Mississippi Voluntary Bovine Viral Diarrhea Control Program. This program consists of both a “Certificate” Level and a “Participation” Level for producers wishing to test their herds for infected animals. The Certificate Level has been developed for producers wishing to maintain a PI-negative BVD herd. The Participation Level has been developed for producers wishing to market PIBVD negative calves.

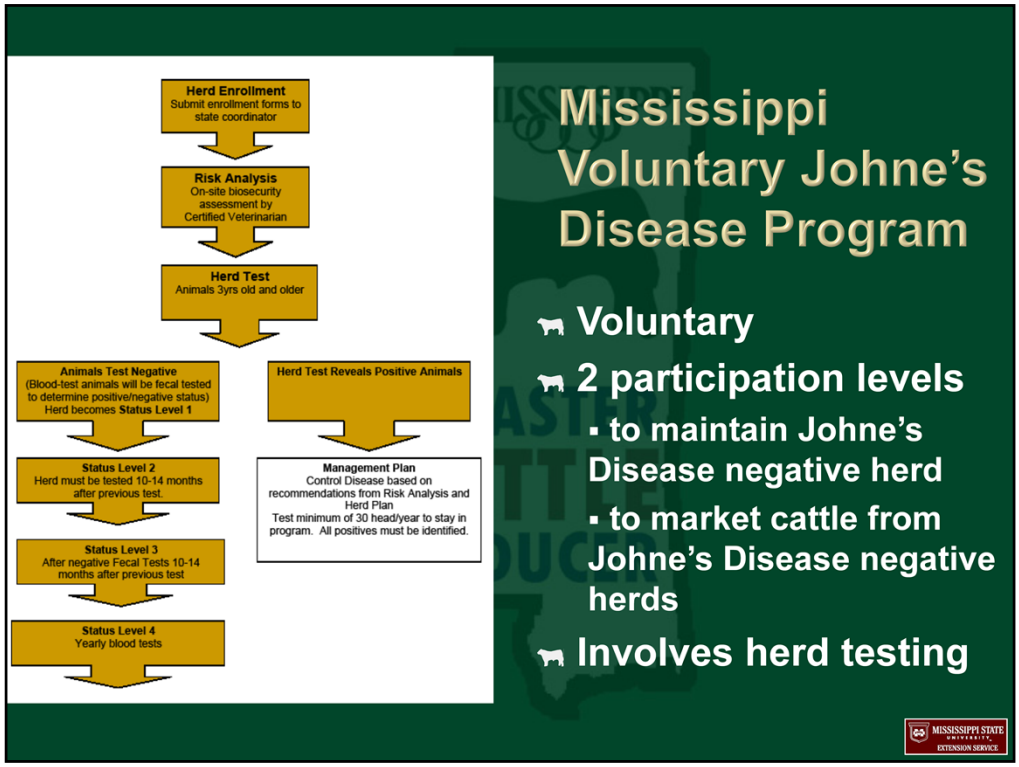
This program follows the guidelines of the Uniform Program Standards for the Mississippi Voluntary Bovine Viral Diarrhea Control Program. For more information on BVD or the Mississippi Voluntary BVD Control Program, contact your herd veterinarian. Additional information is at *http://www.mbah.state.ms.us/disease_programs/bvd/* or contact Dr. Carla Huston, BVD Program Coordinator, at 662-325-1183. Specific BVDV prevention and management tips are provided in Mississippi State University Extension Service Publication 2480, “What You Should Know about Bovine Viral Diarrhea in Cattle”.



Johne's (pronounced "yo-knees") disease is an infectious bacterial disease caused by *Mycobacterium avium subspecies paratuberculosis (MAP).* It is a chronic progressive disease affecting the small intestine of cattle and other ruminants, including sheep, goats, and deer. First described by Heinrich Johne in 1895, the disease has become widespread throughout the United States and many other parts of the world.

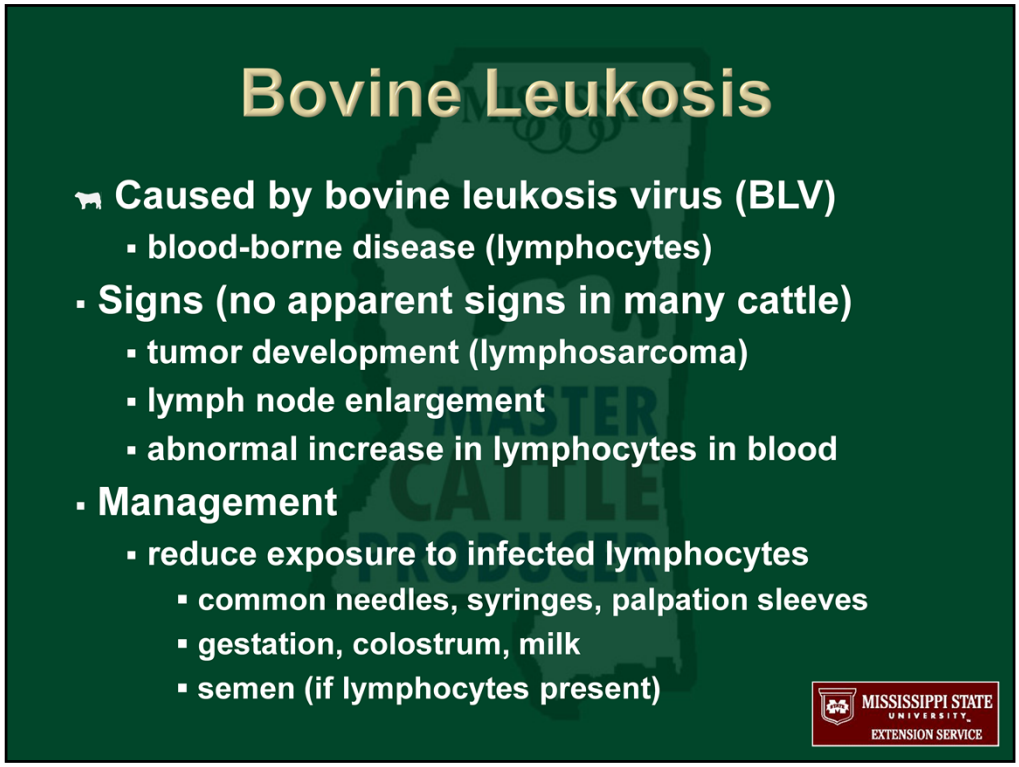
Johne's disease is an infectious disease with profuse, persistent diarrhea and chronic weight loss, despite a normal to increased appetite. Animals infected with the organism often show no signs of the disease until after 2 years of age, although it is believed most animals are infected shortly after birth. Infected animals pass the MAP organism through their feces. Calves commonly become infected through drinking contaminated milk or colostrum or through contact with dirty udders or other contaminated feed and water equipment.

Because Johne's disease develops slowly, an infected animal can remain in the herd for many years before clinical signs appear. These apparently healthy, but infected, animals can infect other animals in the herd. The organism lives a long time in the environment, making elimination difficult. Sudden herd outbreaks rarely occur. Instead, there may be months or years between individual cases of disease.



A cooperative effort between the Mississippi Board of Animal Health (MBAH) and the USDA APHIS Veterinary Services has developed the Mississippi Voluntary Johne's Disease Program. This program consists of both a test-negative "Status Program" for producers wishing to certify the status of their herds for marketing purposes and a "Management Plan" for herds participating in testing and control strategies. It follows guidelines recommended by the National Johne's Disease Working Group of the United States Animal Health Association (USAHA).

For more information on Johne's disease, contact your local veterinarian or the State Johne's Disease Coordinator at the Mississippi Board of Animal Health at (601) 359-1170. Additional information is at *http://www.mbah.state.ms.us/disease_programs/johnes/* or contact Dr. Carla Huston, BVD Program Coordinator, at 662-325-1183. Specific Johne's disease prevention and management tips are provided in Mississippi State University Extension Service Publication 2457, "What You Should Know about Johne's Disease in Cattle".



Bovine leukosis is a blood-borne, cancerous disease of cattle caused by the bovine leukosis virus (BLV). This retrovirus survives in white blood cells, called lymphocytes. These cells are part of the immune system. Only about 5% of the cows infected with BLV ever develop a clinical disease. Typically, this is a disease of adult cattle, although a juvenile form of lymphosarcoma can occur in younger animals. When clinical disease does occur, the primary sign is the development of malignant tumors (lymphosarcomas). Tumors are typically found in the uterus, abomasum, heart, spinal canal, and/or lymphoid tissue behind the eye (which makes the eyeball protrude). Sometimes most, or all, internal lymph nodes enlarge and become readily apparent under the skin. Affected cattle may experience weight loss, gastrointestinal obstructions, paralysis in the hind limbs, and/or infertility because of tumors in the uterus. A few infected cows (10-20%) will develop lymphocytosis (a persistently elevated lymphocyte count), but nothing else. Most infected cows show no signs of the disease. When an animal is in the clinical stages of leukosis, the disease is diagnosed by the presence of the previously described tumors and/or general lymph node enlargement. If clinical disease is not present, BLV infection is diagnosed by blood tests that detect the presence of BLV antibodies.

The virus spreads primarily by transferring blood or other body fluids with blood cells from infected animals to noninfected herdmates. Blood (and BLV virus) is readily spread from animal to animal with blood contaminated needles and/or syringes, obstetrical sleeves, saw or gouge dehorners, tattoo pliers, ear taggers, hoof knives, nose tongs, etc. and by feeding unpasteurized mastitic waste milk. The virus also appears to spread to a limited degree through animal to animal contact. It is likely that close contact allows the lymphocytes in nose and eye secretions from infected cattle to gain entry into susceptible animals via their mucous membranes.

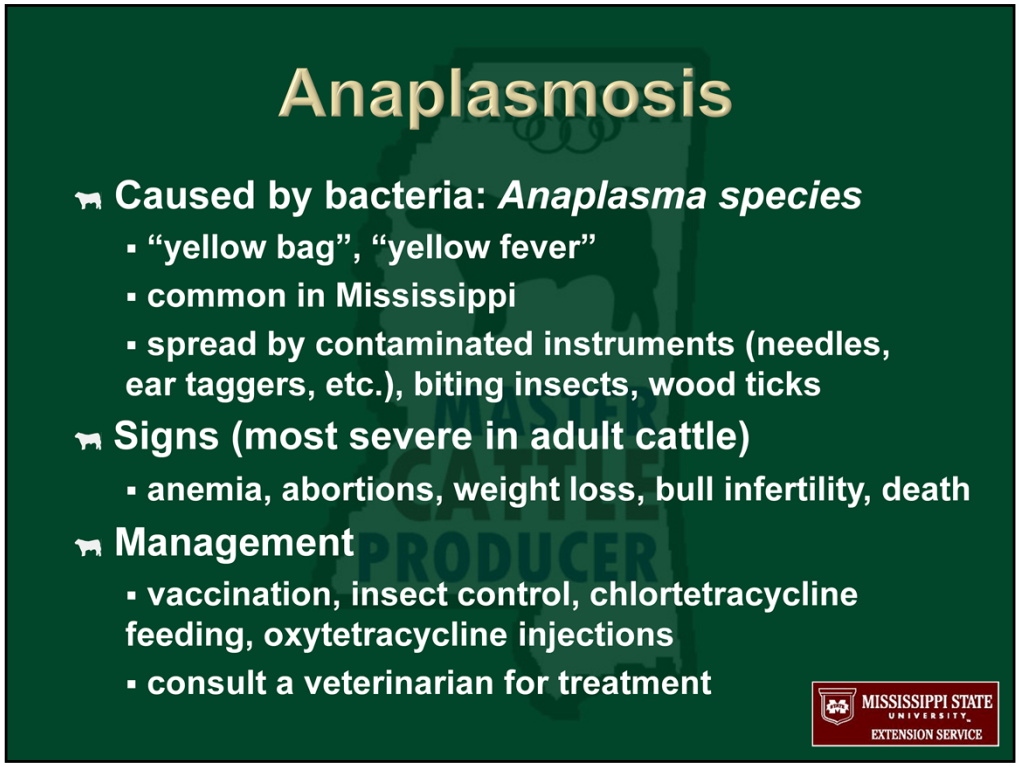
Although insects are often suspected of being mechanical vectors of BLV, research evidence is lacking to show that they routinely play a major role in the spread of this disease. Because there are lymphocytes in milk, BLV can spread by feeding whole milk and/or colostrum from infected cows to calves. *In utero* transmission (from infected cow to gestating calf) of BLV also occurs, but to a limited extent. Cows with persistent lymphocytosis may be at greater risk for transmitting BLV to fetuses during gestation. Bovine Leukosis Virus is not spread in semen or properly washed embryos. However, if embryos are transferred to BLV-infected recipients, some calves may be born infected due to *in utero* transmission. Similarly, BLV is not spread in the semen from a healthy BLV-positive bull. However, if a BLV-positive, natural service sire has seminal vesicultitis or some other reproductive disease, infected lymphocytes resulting from this condition might contaminate the semen and subsequently infect inseminated cattle.

Direct BLV losses include increased replacement costs, loss of income from condemned carcasses of cull cows, and the inability to export cattle, semen and embryos to countries that maintain BLV control programs, such as the European Union. Further losses may include reduced reproductive efficiency and decreased milk production.

Calf scours is a clinical sign associated with several diseases characterized by diarrhea. Diarrhea prevents the absorption of fluids from the intestines. Body fluids pass from the scouring calf's body into the intestines. The scouring calf becomes dehydrated and suffers from electrolyte loss and acidosis. Infectious agents cause the primary damage to the intestine, but death from scours usually results from dehydration, acidosis, and loss of electrolytes.

Noninfectious causes are management problems which appear as nutritional shortcomings, inadequate environment, insufficient attention to the newborn calf, or a combination of these. Inadequate nutrition of the pregnant dam, particularly during the last third of gestation, hurts both the quality and quantity of colostrum. Give special attention to energy deficiencies and/or vitamin A and E shortages. The calf is born without scours-fighting antibodies. The calf will acquire these antibodies only by nursing colostrum early in life. Muddy lots, crowding, contaminated lots, calving heifers and cows together, wintering and calving in the same area, storms, heavy rainfall, etc. are stressful to the newborn calf and may increase the chance for easy exposure to infectious agents. The wet and chilled newborn calf experiences excessive loss of its body heat, may be severely stressed, and often lacks the vigor to nurse sufficient colostrum early in life. Sufficient attention to the newborn calf, particularly during difficult birth or adverse weather conditions may be needed to ensure timely and adequate colostrum intake. To reduce the risk of calf scours, provide fresh, dry calving grounds for late gestation cows and heifers. Move cow-calf pairs to fresh pastures after calving.

Infectious causes of calf scours include: bacterial causes (*Escherichia coli*, *Salmonella spp.*, *Clostridium perfringens*, and other bacteria), viral causes (Rotavirus, Coronavirus, BVD virus, IBR virus), protozoan parasites (Cryptosporidium, Coccidia), and yeasts and molds. Calf scours prevention is a year-round effort, not a set of activities centered only around the calving season. Pay particular attention to nutrition, environment, sanitation, and care of the newborn calf. A well-planned and consistent vaccination program is an effective tool to prevent scours if the management aspects are first covered. Focus treatment efforts on correction of dehydration, acidosis, and electrolyte loss. Consult with a veterinarian for vaccination and antibiotic therapy recommendations.



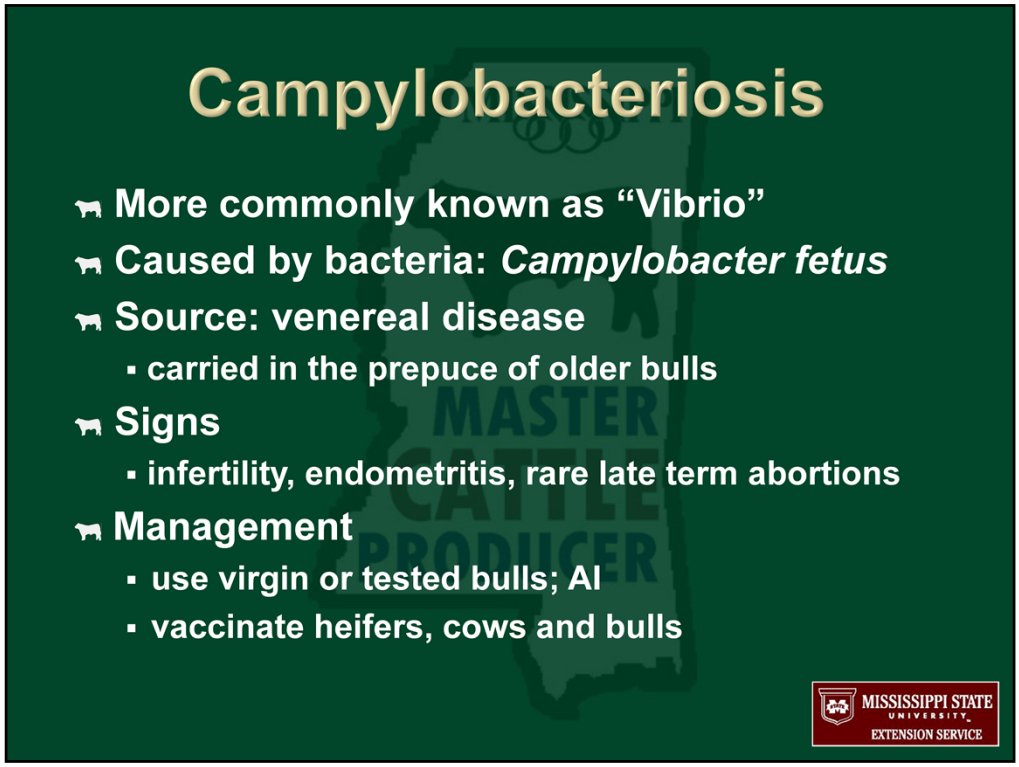
Anaplasmosis is an infectious disease of cattle caused by several species of the blood parasite, *Anaplasma*. *A. marginale* is the most common pathogen of cattle. Anaplasmosis is also called "yellow bag" or "yellow fever" as affected animals can develop a jaundiced appearance. It is a common disease in the southeastern U.S.

Anaplasmosis can be transmitted mechanically when red blood cells infected with *A. marginale* are inoculated into susceptible cattle. This can occur through needles, dehorners, ear taggers, castrating knives, other surgical instruments, and tattoo instruments. Biting insects, such as biting flies, can also transmit the disease. Face flies, houseflies, and other non-biting insects do not transmit the disease. Horn flies, although they bite, typically do not go from animal to animal so they are not thought to spread *Anaplasma*. Mechanical transmission of infected red blood cells must occur within a few minutes of the blood leaving the infected animal, because the blood parasite does not survive more than a few minutes outside the animal. *Anaplasma* can also be transmitted through its biological vector, *dermacentor,* or wood ticks. Once in the tick, the parasite can remain active throughout the lifecycle of the tick and can be transmitted several months later.

Anaplasma organisms multiply in the bloodstream and attach to the animal's red blood cells. The animal's immune system destroys both infected and uninfected red blood cells in an attempt to fight off the infection. The animal becomes anemic. It takes 3 to 6 weeks for clinical signs to appear after the animal is infected. Anaplasmosis tends to cause outbreaks in a herd, which can lead to adult cattle deaths. Other economic losses include abortions, decreased weight gain, bull infertility, and treatment costs. Anaplasmosis outbreaks typically occur in the spring and summer, but they can happen at any time of the year.

Infected calves less than a year old usually do not show clinical signs of the disease but will become carriers. Carrier animals carry *Anaplasma* in their bodies, but do not show clinical signs and are able to infect other animals. Clinically ill and recovered animals can spread the disease as well. Cattle 1 to 3 years old will show increasingly more severe clinical signs. Newly infected adult cattle over 3 years will show the most severe clinical signs, and have a significant probability of dying from the disease if not treated early.

Dead cows are sometimes the first thing noticed with an anaplasmosis outbreak. Observe cattle carefully for weakness, falling behind the rest of the herd, refusing eat or drink, pale or yellow skin around the eyes and muzzle, rapid weight loss, constipation, high fever, labored breathing, and aggressiveness or abortions due to oxygen deprivation). Consult a veterinarian for anaplasmosis prevention, diagnosis, and treatment. Vaccinations, insect control, chlortetracycline feeding in mineral or feed mixes, and oxytetracycline injections are measures to help control the disease.



Bovine campylobacteriosis is often called vibriosis or vibrio because the bacterial agent was previously named *Vibrio fetus*. It is a venereal disease characterized primarily by early embryonic death, infertility, repeat breeders a long calving season, and rare mid- to late-term abortion. It is one of two sexually transmitted diseases in cattle, the other one being trichimoniasis. Campylobacteriosis is caused by *Campylobacter fetus venerealis or Campylobacter fetus fetus*, both gram-negative bacteria.

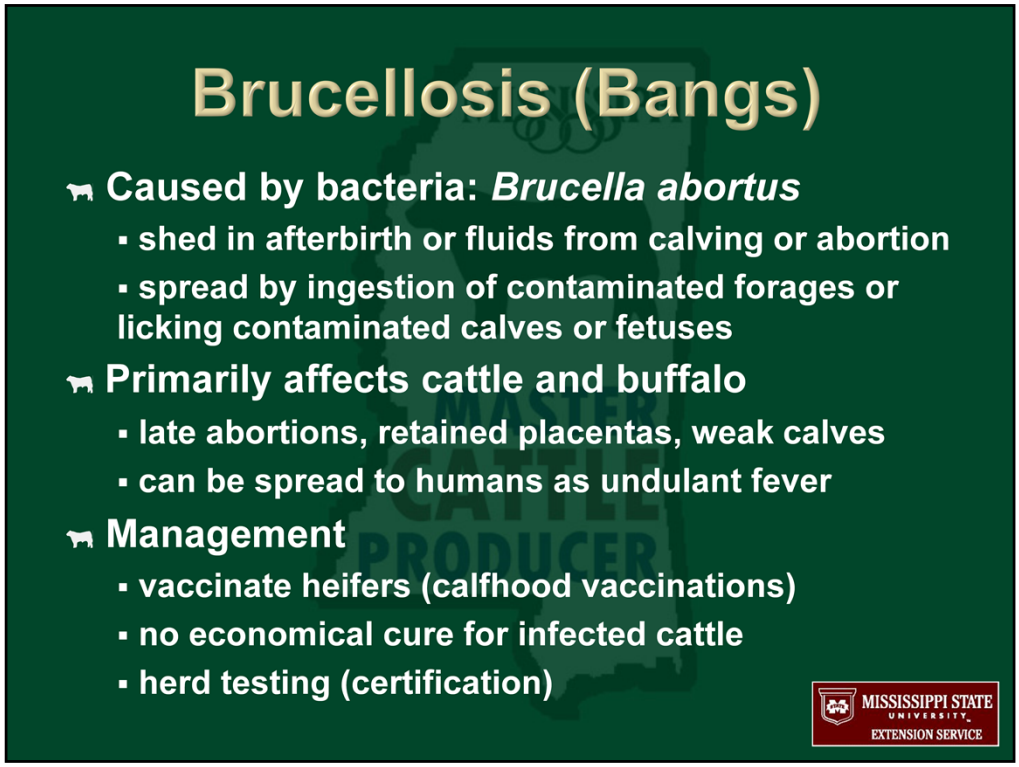
Campylobacteriosis can be prevented by using virgin bulls or by testing older herd sires. Strict use of artificial insemination will also eliminate exposure but is often not feasible. Vaccinating all mature breeding animals can also control the disease. Vibrio vaccinations are often administered as part of "prebreeding" vaccinations.

National Animal Health Monitoring System 2007 data show an incidence rate of *Campylobacter* on cow-calf operations of 32.5% in the Southeast U.S. and 44.5% nationally.

Leptospirosis is an infectious bacterial disease that can be contagious between livestock and many wildlife species. The source of infection is most often urine from infected animals that contaminates pasture, drinking water, or feed. There are more than 100 serotypes of the bacterial agent, but only 7 serotpyes have been recognized in U.S. cattle. One of the more disruptive serotypes in cattle is *hardjo bovis.*

Leptospirosis can produce an abortion rate of up to 30 percent when it occurs during the final third of pregnancy in cattle.

Several management practices will help limit infection by leptospirosis. Eliminate cattle access to surface water or streams used by other livestock or wildlife. Make sure urine does not drain into water sources. Reduce contact between cattle, other livestock, rodents, dogs, and wildlife as much as possible. Vaccinate susceptible animals for relevant serotypes. "Lepto" vaccinations are often administered as part of "prebreeding" vaccinations.

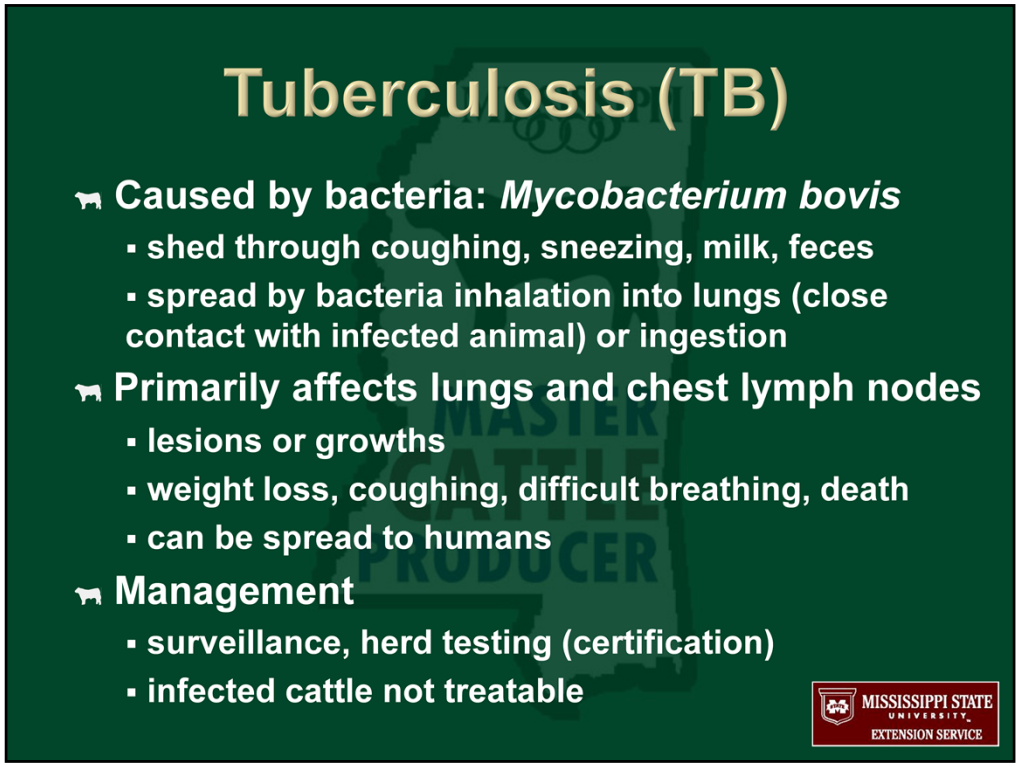


Brucellosis (Bangs) is an infectious and contagious bacterial disease of animals and humans caused by *Brucella abortus* bacteria. The disease primarily affects cattle and the American buffalo. In cattle, brucellosis causes abortions during the last trimester of pregnancy, retained placentas, and weak calves at birth.

Millions of bacteria are shed in the afterbirth and fluids from infected cows calving or aborting. It is spread to other cattle by ingestion of contaminated forages or licking contaminated calves or aborted fetuses. The *Brucella* bacteria are easily killed by sunlight, high temperatures, and drying but are difficult to control while they are in the animal. There is no economical cure for infected cattle.

Brucellosis sometimes infects horses, dogs, swine, and humans. In humans, *Brucella abortus* causes undulant fever, a disease characterized by intermittent fever, headaches, fatigue, joint and bone pain, psychotic disturbances, and other symptoms. It is contracted through exposure to *Brucella abortus*-contaminated milk and infected organs from infected animals.

Nationwide brucellosis eradication programs have helped control the disease. Cattle operations can vaccinate heifers as calves against Bangs by contacting a veterinarian or the Mississippi Board of Animal Health. Brucellosis herd testing and certification programs are also available. Many consignment sales require proof of a negative Bangs test or herd certification to qualify cattle for these sales. Mississippi and other states have state entry requirements for cattle regarding Brucellosis. Consult the Mississippi Board of Animal Health for updated entry requirements. Check with states of destination before shipping cattle across state lines.

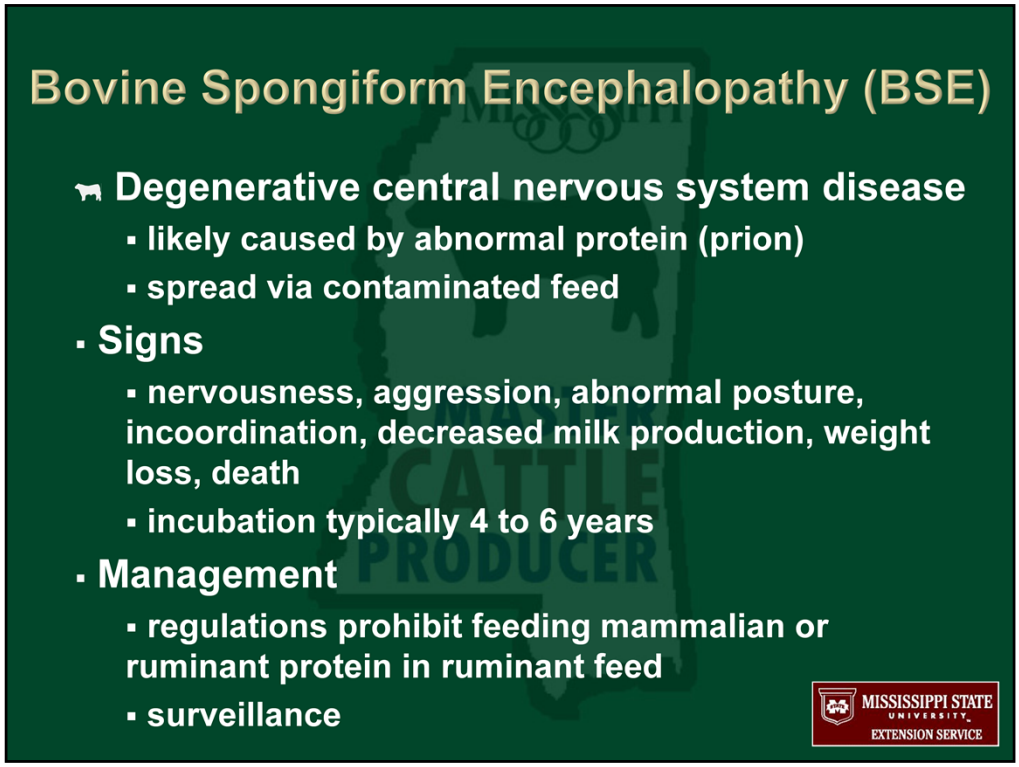


Tuberculosis (TB) is primarily a respiratory disease affecting lungs and chest lymph nodes and occasionally resulting in gastrointestinal and mammary infections. It is caused by *Mycobacterium bovis* infection. *Mycobacteria* are intracellular germs that survive and multiply inside white blood cells. These bacteria are primarily shed through coughing or sneezing. In addition, the bacteria may be present in the milk and feces of infected animals. Tuberculosis is spread through inhalation of *Mycobacteria* into lungs following close contact with infected animal. Infection also occurs from bacteria ingestion.

When exposed to cattle tuberculosis, an animal's immune system fights the invasion by encapsulating the bacteria. This can cause the formation of lesions or growths in and on lymph nodes, lungs, mammary glands, and other internal organs. Although infected, the animals may appear healthy until the latter stages of the disease. Disease signs may include progressive weight loss, chronic coughing or breathing difficulties, and unexplained death. The disease is not treatable in livestock.

In addition to cattle, tuberculosis affects captive elk, exotic deer, bison, goats, swine, cats, and humans. Although bovine tuberculosis is still a human health threat, other forms of tuberculosis, such as the human and avian strains, now pose the greatest risk of tuberculosis exposure to persons.

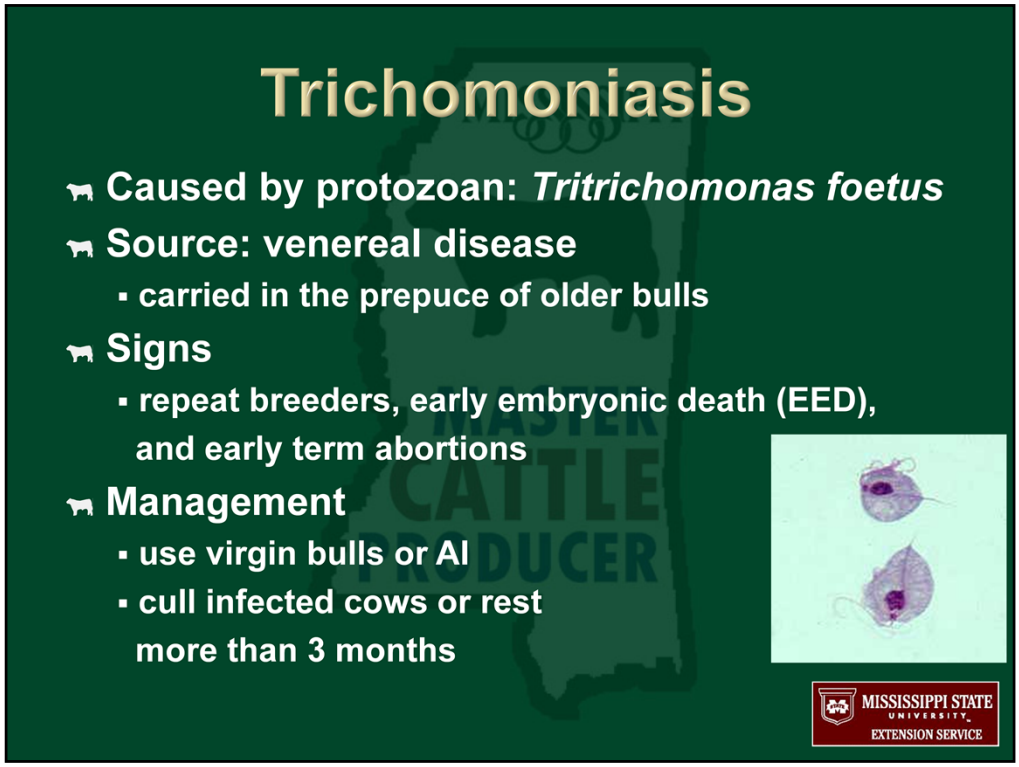
Nationwide tuberculosis eradication programs have helped control the disease. Mississippi and other states have entry requirements for cattle regarding tuberculosis. Consult the Mississippi Board of Animal Health for updated entry requirements. Check with states of destination before shipping cattle across state lines.



Bovine spongiform encephalopathy (BSE), widely referred to as "mad cow disease," is a chronic degenerative disease affecting the central nervous system of cattle. BSE belongs to the family of diseases known as transmissible spongiform encephalopathies (TSEs). In addition to BSE, TSEs include scrapie, which affects sheep and goats; transmissible mink encephalopathy; chronic wasting disease of deer and elk; and in humans, kuru, both classic and variant Creutzfeldt–Jakob disease (CJD), Gerstmann–Straussle–Scheinker syndrome, and fatal familial insomnia. The agents that cause BSE and other TSEs have yet to be fully characterized. The theory most widely accepted in the scientific community is that the agent is a prion, an abnormal protein.

The incubation period (the time from when an animal becomes infected until it first shows disease signs) averages 4 to 6 years, although the period can be longer or shorter. Cattle affected by BSE experience progressive degeneration of the nervous system. Affected animals may display nervousness or aggression, abnormal posture, difficulty in coordination and rising, decreased milk production, or loss of body weight despite continued appetite. All infected cattle die.

The primary source of BSE infection in cattle is commercial feed contaminated with the infectious agent. Consumption of feed contaminated with the BSE agent is the only documented route of field transmission of BSE. Scientific evidence shows that feed contamination results from incorporating ingredients (for example, meat-and-bone meal) that contain protein derived from rendered infected cattle. Regulations prohibiting the inclusion of mammalian or ruminant protein in ruminant feed, including cattle feed, are used to prevent BSE transmission. The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), in cooperation with the Food and Drug Administration (FDA) and USDA's Food Safety and Inspection Service (FSIS), has taken aggressive measures to prevent the introduction and potential spread of BSE in the United States including a surveillance program.

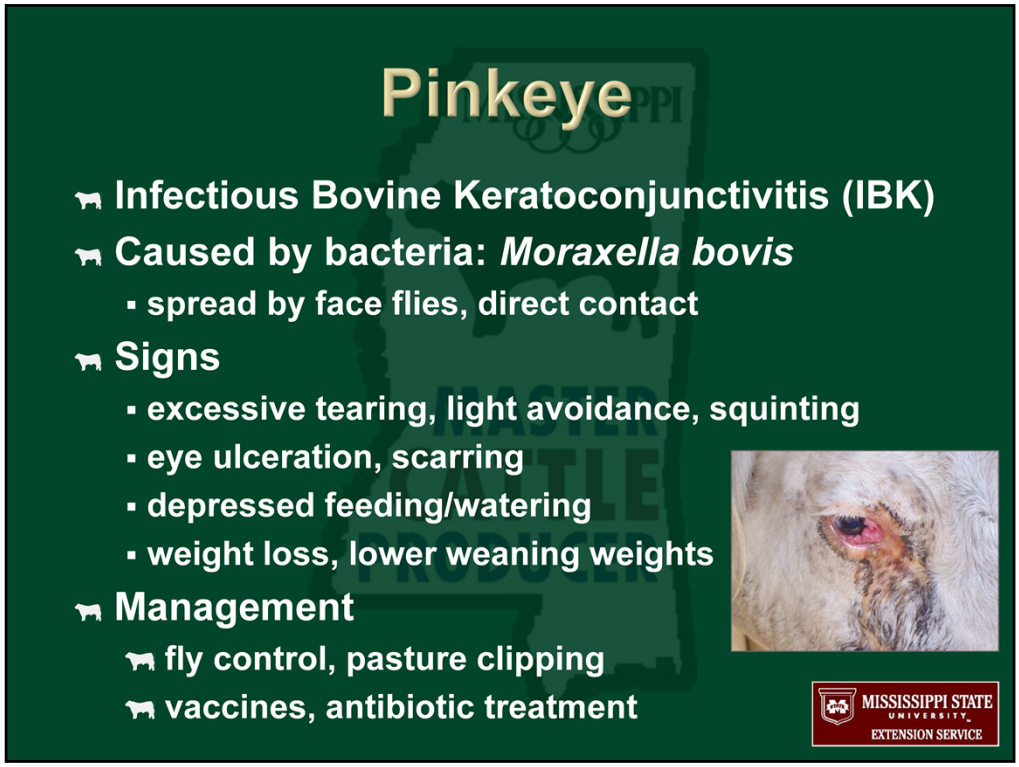


Trichomoniasis is a venereal disease in cattle caused by the protozoan *Tritrichomonas foetus*. It causes infertility, early abortions and uterine infections, resulting in "repeat breeder" cows and an extended calving season.

Bulls become infected by breeding an infected cow and then spread the disease to other cows. The bull harbors the protozoa in its sheath. Most cows will clear themselves of the infection within 3 months. Bulls more than 4-years old become infected permanently.

Trichomoniasis can be prevented by using virgin bulls or by testing older herd sires. Strict use of artificial insemination will also eliminate exposure but is often not feasible.

Trichomoniasis is discussed in detail in Mississippi State University Extension Service Publication 2609, "Trichomoniasis in Beef Cattle".



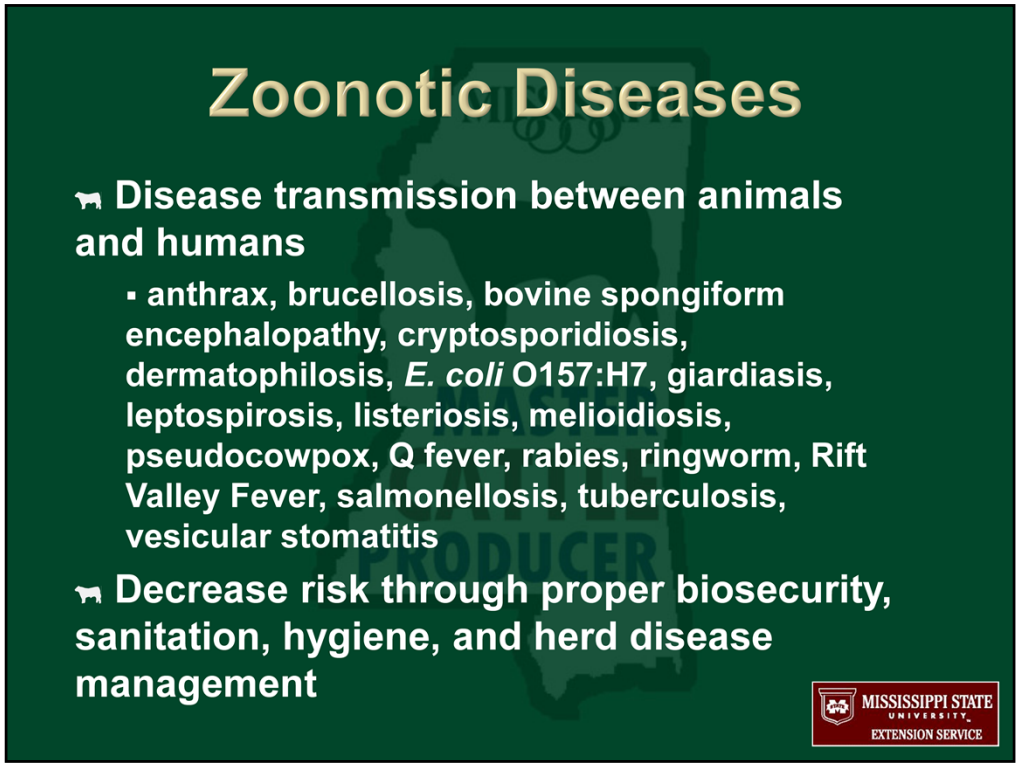
Most commonly, Pinkeye infections are due to the bacteria, *Moraxella bovis*. Although *M. bovis* is the only germ proven to cause pinkeye, other organisms have been associated with this disease. While the pinkeye bacteria can be spread directly from animal to animal, it is more often spread by face flies. Higher face fly populations lead to more pinkeye in the herd.

The first sign of pinkeye infection is excessive tearing, avoiding light, and squinting. This is also the stage of the disease where treatment is likely to be most effective. Within 24 to 48 hours of the first signs, an ulcer is seen in the affected eye, usually, but not always, near the center of the eye. The ulcer appears as a punched out area with a cloudy, gray appearance. Within about four days of the first signs, new blood vessels will begin to grow from outer edge of the cornea toward the ulcer giving the cornea a reddish-pink color. It may take 10 days for these blood vessels to grow to the ulcer bringing in various blood elements important to the healing process. White blood cells may give the ulcerated area a cream or white color. The ulcer will begin to scar covering the ulcer and reducing the pain. Often the animal will begin to open the affected eye revealing a slightly raised pink area where the ulcer was originally. This entire process will require 3 to 8 weeks. The pink area will be become a white scar which may be visible for months or be permanent. Some cases of pinkeye may be very severe with permanent blindness resulting. Affected cattle eat and drink less resulting in significant weight loss.

Calves are more likely to be affected than adults, though maternal immunity protects most calves up to three months of age. Calves born to heifers tend to have more pinkeye problems than calves born to adult cows. The severity of pinkeye problems in a herd can vary from year to year. Pinkeye is seen more frequently in the summer and autumn, likely due to increased ultraviolet light intensity and higher fly populations. Wind, dust and pollen can result in eye irritation making pinkeye more likely. Infection with the IBR virus and modified live virus vaccination during pinkeye season can make pinkeye infection more likely and perhaps more severe. Poor mineral supplementation may result in increased susceptibility to pinkeye.

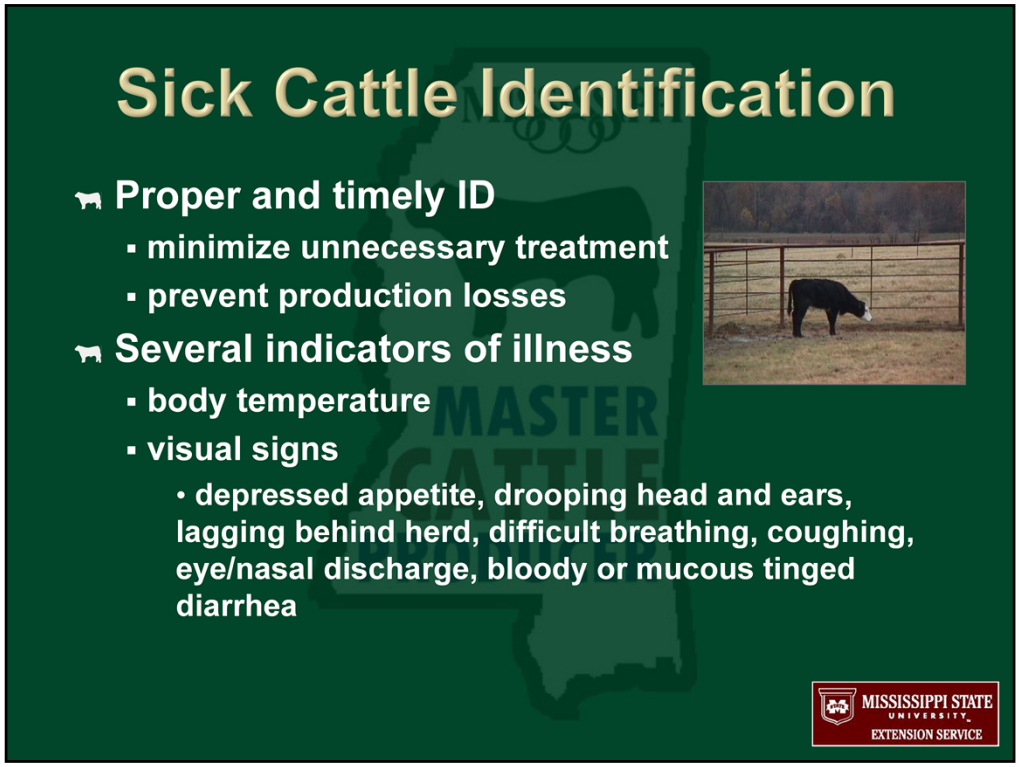
Pinkeye control measures include fly control, removal of eye irritants (pasture clipping, eye injury hazard removal), and vaccinations. Antibiotic (tetracycline) injections and eye patches can be used for treatment of this condition.

Pinkeye is discussed in detail in Mississippi State University Extension Service Publication 2608, “Pinkeye in Cattle”.



A safety factor to consider is the possibility of disease transmission between cattle and humans. Some of the diseases cattle carry can be transferred to people. Animal diseases that people can catch are called zoonoses or zoonotic diseases. About 75 percent of the new diseases affecting humans in the past decade can be traced to animals or animal products.

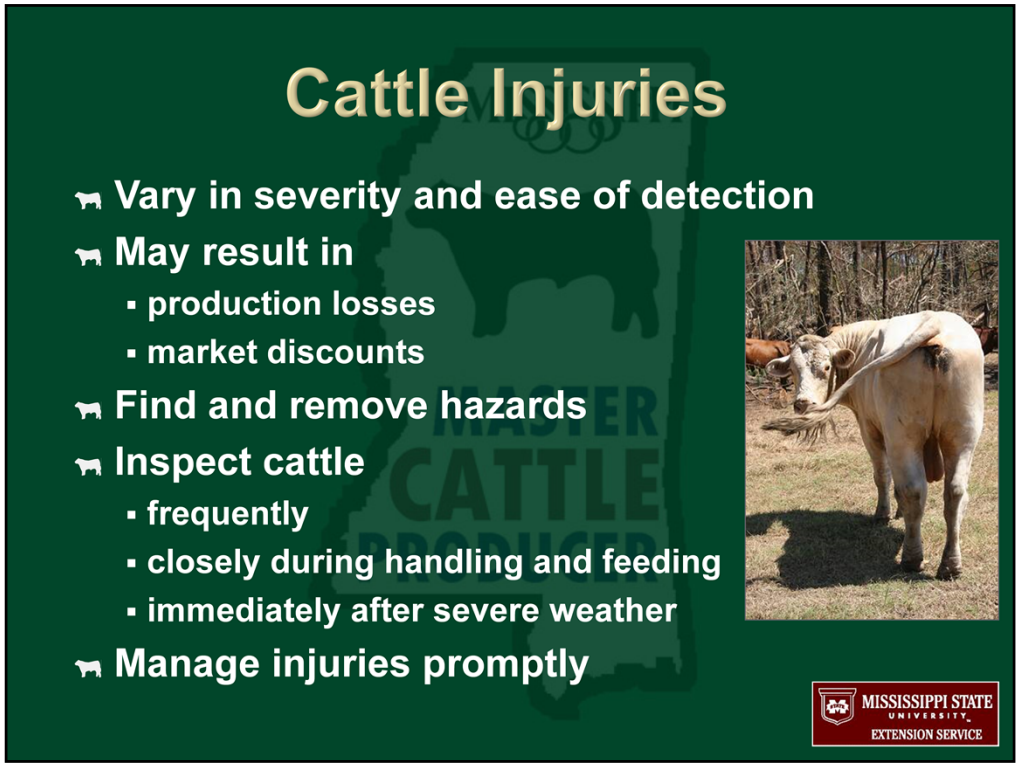
Humans can get a disease directly from an animal, or indirectly, through the environment. To limit disease risk, use plastic sleeves or gloves when needed. Practice good hygiene and sanitation at all times. Follow biosecurity practices for herd health and personnel protection. All zoonotic diseases are transmitted by a few common routes. By managing disease in cattle herds, zoonotic disease transmission risk decreases. Although disease risk cannot be completely eliminated, it can be managed.



Proper and timely identification of sick or injured cattle helps minimize unnecessary treatment expense and preventable production losses. When properly used, body temperature can be a good indicator of illness. One common rule of thumb used in beef cattle operations is to designate cattle with rectal temperatures of 104 degrees Fahrenheit or greater as sick. Consider visibly ill cattle sick regardless of body temperature. Body temperature rises in cattle infected with a disease-causing organism as the immune system begins to fight the infection. Make sure that body temperatures are not taken too late in the day when false positives for illness might occur. Cattle generally need several hours past sundown to dissipate heat and cool down from an extremely hot day. It is critical to take temperatures before mid-morning. Producers measuring cattle temperature in the afternoon, even on a cold day, and letting cattle stand around for three or four hours before processing may identify cattle for treatment that are actually healthy. Minimize exercise and stress just prior to measuring temperatures. Cattle should never stand for more than 20 minutes in alleyways or chute of handling facilities before temperatures are taken. Once in the chute, measure body temperatures immediately.

When using visual appraisal, one of the most important signals of illness is appetite suppression. Feed consumption of cattle exposed to respiratory disease begins to decrease about 48 hours before increased body temperature is observed. The most effective time to observe the feeding behavior of cattle is when they are fed each day. It is difficult to monitor daily feeding patterns of grazing cattle or calves on self-feeders, so observe signs of gut fill. Cattle that have not been eating and drinking properly will appear gaunt, and their abdomen will often bounce when they walk. Rapid weight or body condition loss also indicates illness. Other later occurring signs of illness include labored breathing, deep coughing, eye and nasal discharge, bloody diarrhea, or depression. Depression is noted as drooping head and ears, excessively slow movement, lagging behind the rest of the herd and reluctance to get up when approached. These symptoms occur after sick cattle have gone off feed and their rectal temperature has risen. Thoroughly observe cattle daily to catch illness early and begin an effective treatment protocol. Vaccination administration can produce signs of illness in some situations. Discuss with a vet expected effects of specific vaccines on cattle prior to administration to distinguish between an animal that is ill or one that is suffering a temporary side effect of vaccination.

Examining cattle manure can also help identify sick animals. Loose manure with large feed particles, mucus, or blood can indicate illness or injury. While it may be difficult to identify specific animal in grazing situations, producers can at least be alerted to watch the herd closer. Cattle often defecate during handling, so plan to observe manure during this time.



Injuries in cattle may be minor or severe. Some injuries are relatively easy to detect upon observation such as injuries that result in lameness or inability to stand up or walk (a non-ambulatory or "downer" animal). These types of injuries can prevent marketing of an animal or result in market discounts. Other injuries are more subtle in appearance including bruising and internal organ injuries like hardware disease. Suspect these types of injuries when cattle display behavioral changes such as appetite changes or reluctance to move.

Examine the animal's environment for potential hazards or conditions that may have caused an injury. Horns contribute to bruising in animals housed together. Injuries to breeding animals often occur during the breeding season as a result of mounting behavior. Inadequate feed trough space increases competition for feed and chance of injury. Sharp objects such as wire and nails in pastures or handling areas also contribute to cattle injuries.

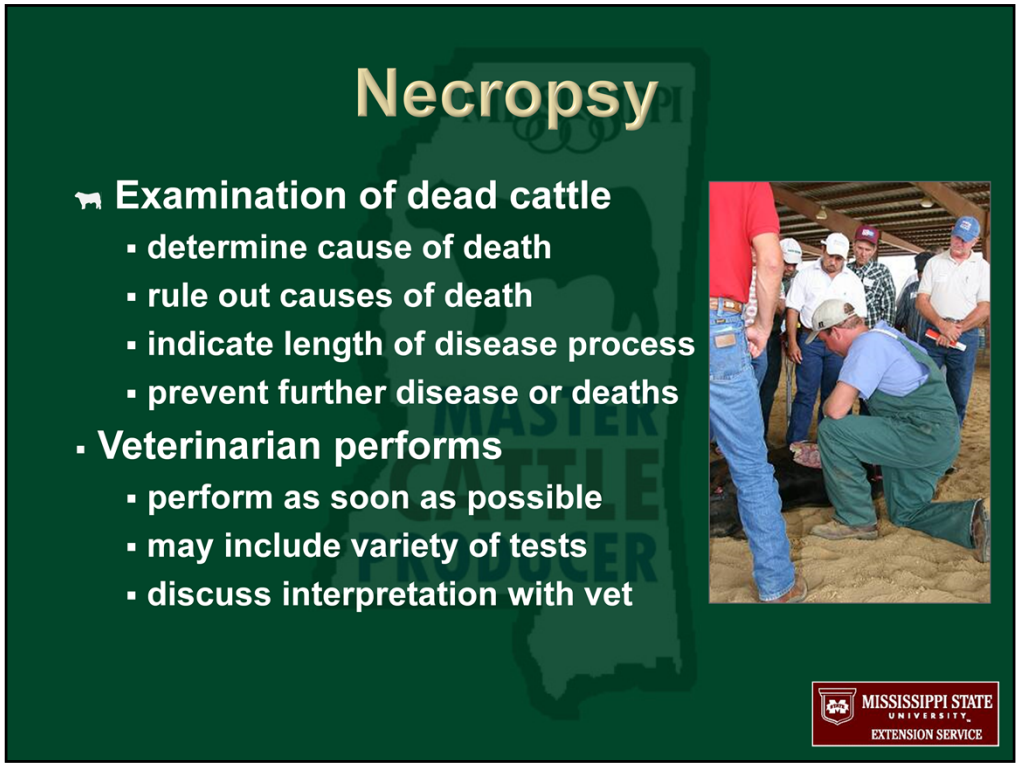
Inspect cattle closely during feeding and animal handling to identify injuries that are not easily seen in pasture settings. Foot injuries, eye injuries, mouth injuries, minor lacerations (cuts), hematomas (blood vessel rupture and blood pooling under the hide), penis injuries, and biting insect damage are examples of injuries that sometimes require close inspection to identify. By identifying injuries during animal handling, animals can be treated while restrained.

Identify and manage sick or injured cattle promptly. When cattle go "down", it is often because their initial problems were ignored. A treatment plan should be in place once sick or injured cattle are identified. Consult with a veterinarian to develop this plan. Then follow the plan closely. Seek out veterinary advice for situations that may require treatments not outlined in standard herd health plans. For more information on this topic, refer to Mississippi State University Extension Service Publication 2551, "Identifying Sick or Injured Cattle".

"Downer" cattle are non-ambulatory. They are unable to walk or move normally. A prompt diagnosis should be made to determine whether the animal should be humanely euthanized or receive additional care. Provide adequate feed and water to non-ambulatory cattle at least once daily. Move downer animals very carefully to avoid compromising animal welfare. Dragging downer animals is unacceptable. Likewise, animals should not be lifted with chains onto transportation conveyances. Acceptable methods of transporting downers include a sled, low-boy trailer, or in the bucket of a loader. Animals should not be "scooped" into the bucket, but rather should be humanely rolled into the bucket by caretakers. When treatment is attempted, cattle unable to sit up unaided (those that lie flat on their side) and which refuse to eat or drink should be humanely euthanized within 24-36 hours of initial onset. Even though signs of a more favorable prognosis may exist, cattle that are non-ambulatory must not be sent to a livestock market or to a processing facility. Marketing cattle promptly before this issue occurs will promote better quality of life for the animal and economic benefit for the operation.

Foot rot is a bacterial infection in the skin and subcutaneous tissue between the toes of the foot that can extend into tendons, ligaments, joints, and foot bones. The bacteria that cause foot rot include *Fusobacterium necrophorum* and *Porphyromonas levii*. These bacteria are common in the environment but need the right conditions to grow and cause disease. They enter the animal and cause infection through skin lacerations or breaks. If the infection spreads to an animal's joints, it can cause severe lameness and necessitate culling. If one animal develops foot rot, conditions may be ideal for other cattle to contract the disease. In addition, the discharge from wounds of infected animals contaminates the ground with disease-causing bacteria. Foot rot management includes treating infected cattle with anti-infectives, using foot baths, spreading lime with 5 to 10% added copper sulfate around waterers and feed troughs, providing dry areas for cattle to stand, and removing foot injury hazards.

Evaluate feet and leg structure initially at selection. Correct conformation of feet and legs and how they blend into the shoulder and hip structure directly impacts how well cattle can forage and walk to water. Also evaluate toe structure. Make sure each toe is the same width and length. If toes are of uneven width, weight will not be distributed evenly. This is especially important for bulls as it will affect weight distribution on legs and hips during breeding. Look for signs of screwclaw. One toe will be thinner and will grow over the other toe. This will eventually lead to lameness and loss of production. This condition is heritable. Cull cattle with genetic foot problems such as screw claw.



A necropsy is the examination of a dead animal to determine why it died or to at least rule out potential causes of death. It involves both external and internal examination of the carcass. A proper diagnosis from a necropsy may help form a specific treatment plan for the rest of the herd or pen. It may also impact development of future treatment protocols or use of antibiotics. Necropsies provide an indication as of underlying health problems and can help determine how long a disease process has been underway. The value of the necropsy is in the ability to use diagnostic information to prevent further illnesses or deaths.

It is important to submit animal samples for necropsy as soon after death as possible. As the time between when the animal died and when the necropsy is performed lengthens, the diagnosis becomes more difficult. This is especially true in hot weather as the carcass rapidly decays.

There is additional testing on animal tissues and organs that can go hand in hand with examination of the carcass. Some of these tests may be run in a veterinarian's clinic, but many will require samples to be sent off to a state diagnostic lab. Work with a veterinarian to determine which tests are warranted and how they should be interpreted. Necropsy findings help classify illness, and further diagnostics can then identify specific pathogens involved.

Information on proper livestock carcass disposal is available from the Mississippi Board of Animal Health. Proper disposal of one or more carcasses and offal of cattle is as follows.

1. Carcass(es) must be buried at a depth sufficient to prevent offensive odors, fly breeding, and unearthing by other animals, and shall be covered under at least 2 feet of compacted earth and after each settles, more dirt shall be placed over surface to prevent a ponding effect.

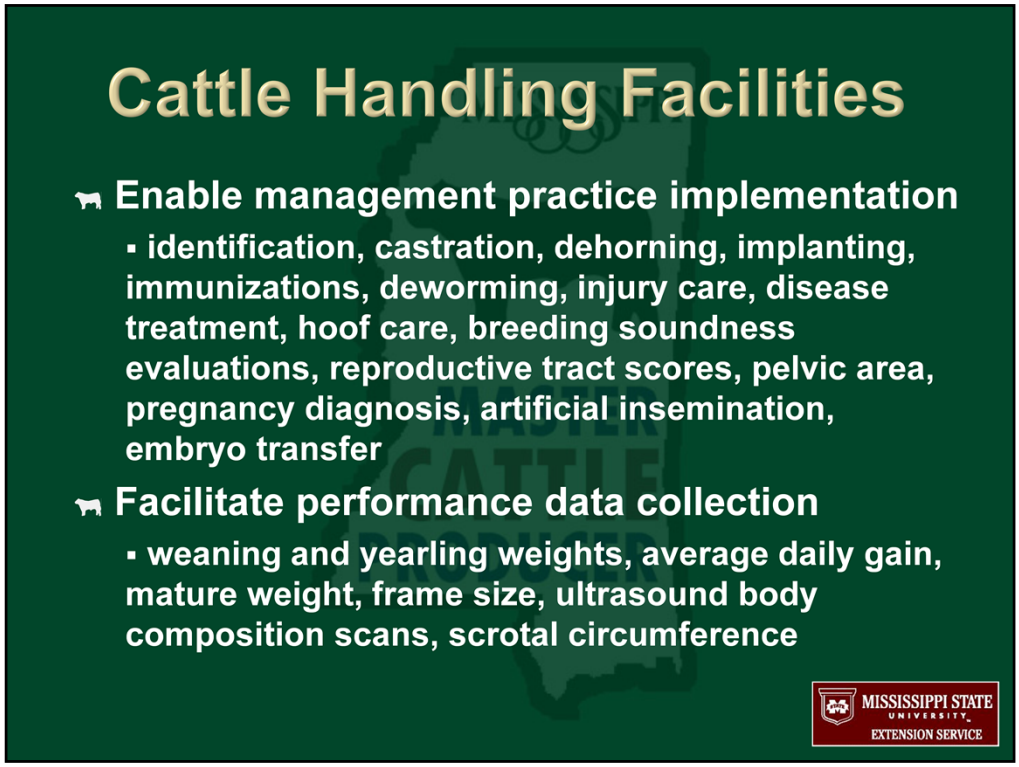
2. Carcass(es) shall be buried on the owner's property, or on another's property with specific approval of the owner, or in permitted landfills. The carcass(es) shall be buried at least 150 feet from adjoining landowners property, at least 300 feet from an inhabited dwelling, or on land not in cultivation. All carcasses shall be buried before the end of the work day unless weather or environmental conditions absolutely prohibit.

3. Composters and incinerators may be used with written permission from the State Veterinarian.

4. In case of the disposal of large numbers of animal carcasses due to catastrophe or disease, it will be necessary to contact the Board of Animal Health for approval of the disposal site. A trench or pit shall be constructed in such a manner not to allow rainwater to drain and must be approved by the state veterinarian.

5. Offal from processing facilities need a disposal permit from the State Veterinarians Office.

The Mississippi legislature passed a bill to help limit liability for farmers and ranchers. Livestock handling facilities and ranch entrances are good places to post notification signs about this legislation. Make sure signs are easily visible to visitors and ranch personnel. Be sure to keep cattle housing and handling facilities in good repair, use only trained personnel in cattle handling activities, and follow proper animal handling guidelines.



Good cattle handling facilities are a necessity for all cattle operations. A cattle handling facility is a tool used to restrain individual animals so that management practices can be applied to them (vaccinations, health treatments, pregnancy diagnosis, etc.). They also facilitate performance data collection, which is critical to herd genetic improvement and marketing efforts. These facilities can be as rudimentary as a rope used to restrain a calf in an open pasture or as complex as a transportable set of pens and hydraulic chute.

For detailed information on cattle handling facilities, refer to Mississippi State University Extension Service Publication 2787, “Beef Cattle Handling Facilities”.

Most cattle handling facilities consist of a pen, or set of pens, to initially catch the cattle in prior to working them. The catch pen(s) can also serve as a place to preliminarily sort cattle into management groups. A main lane will lead from the catch pens to the crowding pen where cattle line up to move single-file through the alley. The alley leads to the squeeze chute where the cattle are restrained while worked. Finally, set up pens off of another lane in front of the chute so that the cattle can be sorted after working.

There are several important issues to consider when developing new, or renovating existing, animal handling facilities. The most important consideration is the intended uses or objectives. Consider whether the facility will be used to handle 30 cows and calves just a few times per year or whether it will be used to process a load of stockers each week. Very basic, well-designed and maintained handling facilities are usually sufficient for the average cow-calf production unit in Mississippi and are often the most cost effective.

The location chosen for cattle handling facility placement should consider existing or planned fence placement, site drainage, proximity to neighbors (for courtesy and privacy reasons), proximity to utilities, ease of access by vehicles and from pastures, and amount of acreage and cattle capacity served. In some situations, multiple cattle handling sites are needed on one operation to efficiently and effectively accommodate cattle volume and pasture layout. Efficiency refers to the amount of animals that can be worked over a given amount of time and should be balanced with cost and safety. Many amenities can be added to a handling facility to improve flow and increase efficiency. However, most require extra investment and might not be justified for the original objectives. Again, assess the intended uses of the facilities. Consider factors such as the need to have cattle near handling facilities during calving seasons and the need to have tractor trailer access to facilities for loading and unloading, if applicable.

Safety of both the animals and handlers should be one of the primary considerations in developing handling facilities. All the other concerns listed here are pointless if the facility injures handlers or animals.

The crowding pen is also known as a sweep tub. The circular design of a sweep tub allows cattle to go with their natural instincts to follow each other while limiting their vision of potential obstacles or distractions ahead. A curved alley also maintains flow by limiting sight such that cattle only see the cattle directly in front of them and naturally follow them. Having solid sides on alleys makes sure that movement outside of the alley does not slow cattle movement.

A squeeze chute with a head catch ensures safety for both the cattle and handler. The head catch keeps the animal from backing up and allows access to the head and neck. Squeezing the sides of the chute limits movement of the cattle while they are being worked. It also provides a calming effect for the cattle and makes them feel more secure, also leading to decreased movement.

Having sorting pens situated in front of the working chute decreases labor by allowing cattle to be individually directed to the appropriate management group. Make sure that the gates swing in the proper direction to move cattle directly into the pen.

A palpation cage is an extension of the squeeze chute with a door that swings across the alley. It allows easy and safe access to the rear of cattle restrained in a squeeze chute. It is especially important for cow-calf operations where pregnancy diagnosis and other reproductive management techniques are frequently used.

Covering handling facilities with a permanent barn or portable structure allows producers to work cattle during inclement weather and ensures that management practices are performed in a timely and low-stress manner. If a permanent barn structure is used, incorporating skylights will improve visibility and safety while decreasing lighting requirements during daylight hours.

Alley back stops are used to, as the name implies, keep cattle from backing up as they move down the alley. These devises are usually made of pipe and hinged to the top alley brace so that they move up as the cattle go under them but then fall back down below hip level after cattle move past these stops. Make sure to place backstops in strategic locations within the alley to make handling more efficient.

Flooring is a design issue that is often overlooked but can create safety issues for both cattle and handlers if not done correctly. Dirt floors are the most common, but, depending on the environment, can become dusty or muddy. Mud can harbor infectious diseases, and dust can aggravate the respiratory system, both leading to increased incidences of disease. Concrete flooring is a good alternative to dirt floors but must be textured to reduce slipping. Cattle that slip on smooth concrete flooring can be severely injured and pose an injury risk to the people handling them. Concrete can be textured as it is poured or after it is poured. Planning ahead will save money and time, because it is easier and cheaper to texture concrete while it is being poured.

Loading and unloading ramps can be permanent or portable. Ramp heights needed differ depending on the type of trailers used. Maintaining loading ramps of different heights or an adjustable height loading ramp can facilitate a variety of transportation options. If tractor trailers are to be unloaded, these ramps should be single file (30 inches for mature cattle) to accommodate the 30-inch wide rear doors standards on most U.S. tractor-trailers. Ramps can be narrowed to less than 30 inches when only calves will be handled. To avoid cattle striking the sides of the trailer during loading, ramps should not be wider than the trailer opening. Self-aligning dock bumpers and telescoping ramp panels are useful for blocking gaps from misaligned trucks. Injuries can occur if unloading ramps are too steep. Target a loading ramp height of 20 degrees for a permanent ramp and 25 degrees for an adjustable ramp. Grooved stair steps are recommended for concrete ramps. Design steps to be 4 inches high and 12 inches deep.

There are many additions available that will improve the speed and efficiency of basic cattle handling facilities. A catwalk on the alley leading up to the chute enables handlers to position themselves above the cattle to keep cattle flowing down a solid-sided alley, read ear tags in advance, and apply pour-on products. Building the catwalk from expanded metal provides traction and allows debris to fall through. Climbing up and down a catwalk all day can be tiring. Make sure that it is wide enough to be safe but that handlers can reach over it easily if cattle only need light prodding.

A double-loading alley provides two single-file lines of cattle ready to be loaded into a common squeeze chute. Having two alleys maintains constant flow at the chute, because cattle are ready on one side even if the other side is vacant. Due to higher initial costs, a double-loading alley is most applicable to facilities that handle large numbers of cattle on a year-round basis (marketing facilities, large stocker operations, and large feedlots).

Working tables next to the squeeze chute and head gate where cattle are restrained are useful. Use these areas to spread out working supplies. Tables provide a surface for preparing animal health products for administration, marking ear tags, writing down records, and completing other organizational tasks that take place during cattle handling. Use tables with drawers or cabinets at the working site to store extra supplies that might be needed during a cattle handling event. Be sure to return any supplies that need temperature-controlled or locked storage to appropriate locations after cattle handling is completed.

Slider gates in alleys act similarly to back stops by keeping cattle from backing up. They are very effective at staging individuals for maintained flow, but they are usually manually operated and require attention from a handler. They are most effectively used at the back of permanent scales or between the chute and palpation cage. Use care when operating sliding gates to avoid being struck by a gate in motion.

Incorporating utilities such as electricity and water into cattle handling facilities can greatly increase the functionality of the facilities. Electricity can be used to provide lighting to extend effective cattle handling hours and improve visibility for performing cattle handling procedures. Electronic scales, clippers, and ultrasound machines are just some of the devices that may need electricity sources on site. Battery-powered devices can be an option as well but have limited battery life before needing recharging. Fresh water supplies at cattle handling facilities are useful for cleaning the facilities and supplying penned cattle with water during extended stays or hot periods at the facilities.

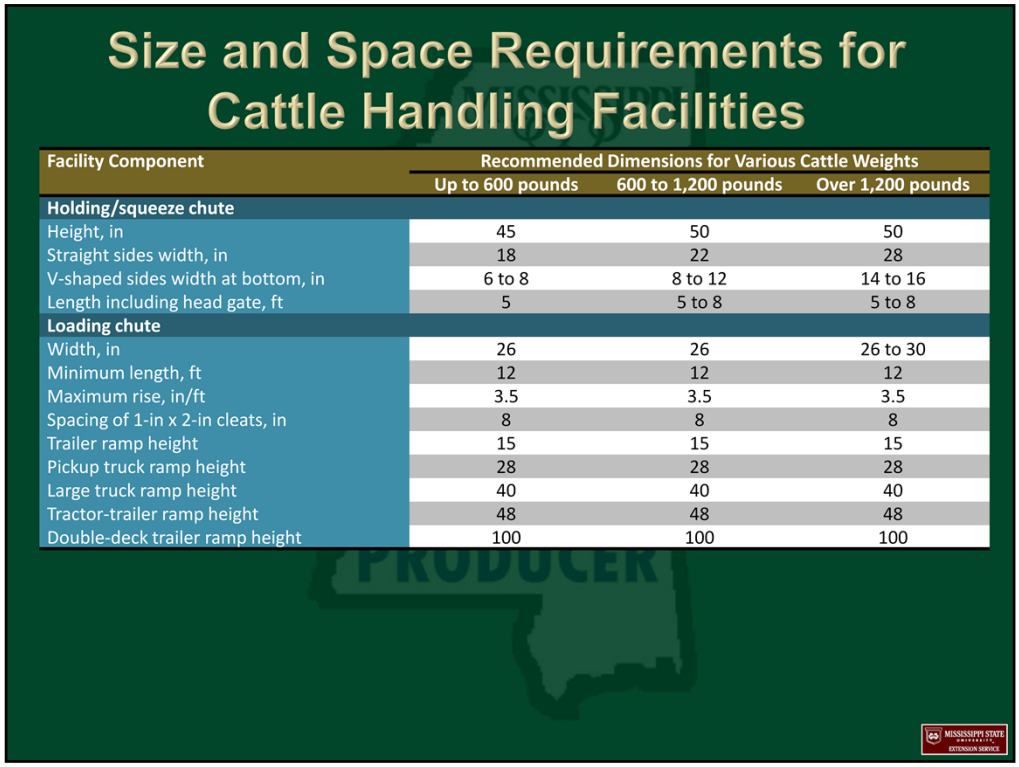
Capturing cattle weights is important for herd performance programs and genetic improvement efforts, nutritional management, and animal health product dosing. Integrating scales into the alley improves efficiency by letting a handler record cattle weights while other handlers are performing management practices in the squeeze chute. This can be accomplished by using permanent scales behind the chute, load bars under the chute or portable “weigh pans” placed in the alley floor.

Size and Space Requirements for Cattle Handling Facilities

Facility Component	Recommended Dimensions for Various Cattle Weights		
	Up to 600 pounds	600 to 1,200 pounds	Over 1,200 pounds
Holding pen			
Space per head, sq ft/hd	14	17	20
Pen fence height, in	60	60	60
Post spacing, ft	8	8	8
Post depth in ground, in	30	30	30
Crowding pen			
Space per head, sq ft/hd	6	10	12
Post spacing, ft	4 to 6	4 to 6	4 to 6
Solid wall height, in	45	50	50 to 60
Working chute, straight sides			
Width, in	18	22	28
Length, minimum ft	20	20	20
Working chute, sloped sides			
Width at 4 ft height, in	20	24	28
Width inside at bottom, in	15	16	18
Minimum length, ft	20	20	20
Working chute fence			
Post spacing, ft	7	7	7
Post depth in ground, in	36 to 48	36 to 48	36 to 48
Solid wall height, in	54 to 60	54 to 60	60
Top rail height for gentle cattle, in	54 to 60	60	60
Top rail height for temperamental cattle, in	60 to 72	60 to 72	60 to 72

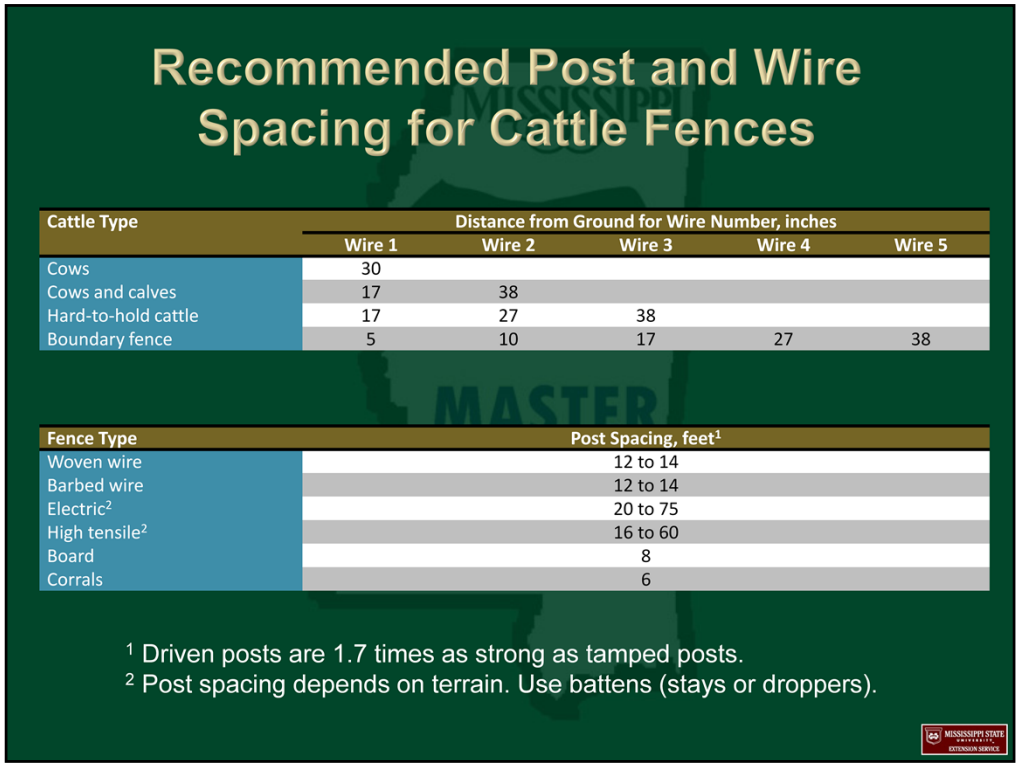
The crowding pen must be of either circular shape (¼ or ½ circle) or funnel shape. The working chute should be curved or offset at an angle of 30 degrees maximum.

The working alley, that leads to the squeeze chute or head gate, should be at least 20-feet long to avoid delays in efficiently moving cattle. The width of this alley varies depending on the size of the cattle being processed. It should be wide enough for cattle to move forward without much resistance but not wide enough for them to turn around. Eighteen inches is a good width for calves but will not accommodate larger cattle. Some commercially available working alleys are adjustable. However, it might be more cost-effective to build a 22- to 26-inch wide working alley and hang spacers over the side when working smaller calves. As with the loading ramp, solid sides will keep cattle moving forward without balking at motion or noises outside the chute.



Commercial squeeze chutes effectively restrain cattle, improve processing efficiency, and increase overall safety. One of the most important considerations in buying or building a working chute is the ability to give all injections in the neck. Make sure that this can be done quickly and, most importantly, in a way that does not put the handler's arm in danger of being injured.

Loading and unloading ramp heights differ depending on the type of trailers used. Maintaining loading ramps of different heights or an adjustable height loading ramp can facilitate a variety of calf transportation options. If tractor trailers are to be unloaded, these ramps should be single file (30 inches for mature cattle) to accommodate the 30-inch wide rear doors standards on most U.S. tractor-trailers. Ramps can be narrowed to less than 30 inches when only calves will be handled.



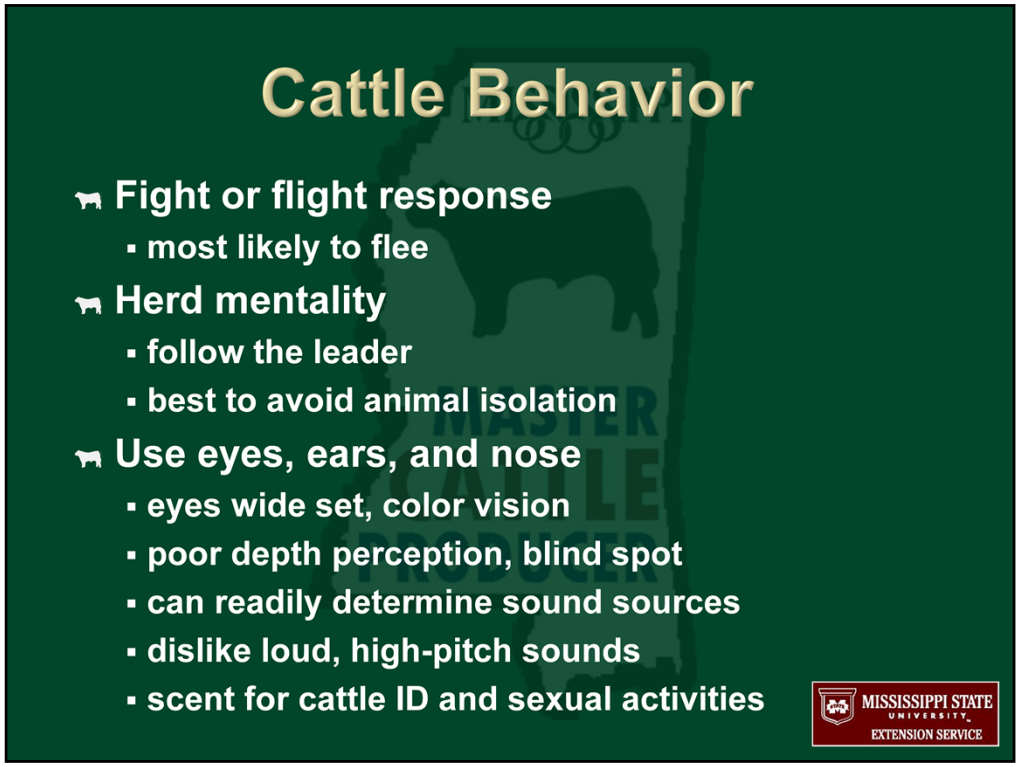
Three main types of wire are used in livestock fencing: barbed wire, woven wire, and high-tensile wire. Barbed wire fences contain strands of horizontal wires twisted together with barbs spaced every 4 to 5 inches. Woven wire fences are smooth horizontal and vertical wires made of mild steel. High-tensile wire is used for both nonelectric and electric fencing. It is lighter than mild steel and has greater elastic capacity. Depending on animal size, 12½ gauge high-tensile electric wires (180,000 to 20,000 psi strength) with a galvanized coating Class 3 are commonly used for permanent fences. Each high-tensile fence wire should have one inline tightener for every ¼ mile of straight run to adjust tension. Usually two "hot" wires are used to restrain livestock in lanes and paddocks, but the wire number and spacing depend on the type of livestock being constrained. Board fencing may also be used to constrain cattle. Board fencing may be most appropriate for pens, alleys, or corrals as part of cattle handling facilities.

Setting posts correctly is one of the most important factors in fence strength. The first consideration is setting the post at the correct depth. The proper depth depends on the diameter of the post and soil type. Generally, in medium to heavy clay soils, a post should be placed at a depth equal to 10 times its diameter. In sandier soils, the depth should be 15 times the diameter. These depths ensure that the post would break before it would uproot.

If posts are too short or it is impossible to dig a deep enough hole, a "foot" may be used to anchor the post. A foot can be constructed from a 1-foot piece of four by four nailed or wired to the bottom of the post to form a "T". The "T" helps hold the post in the ground. A foot may also be necessary if there are dips or angles greater than 10 degrees in the fence line.

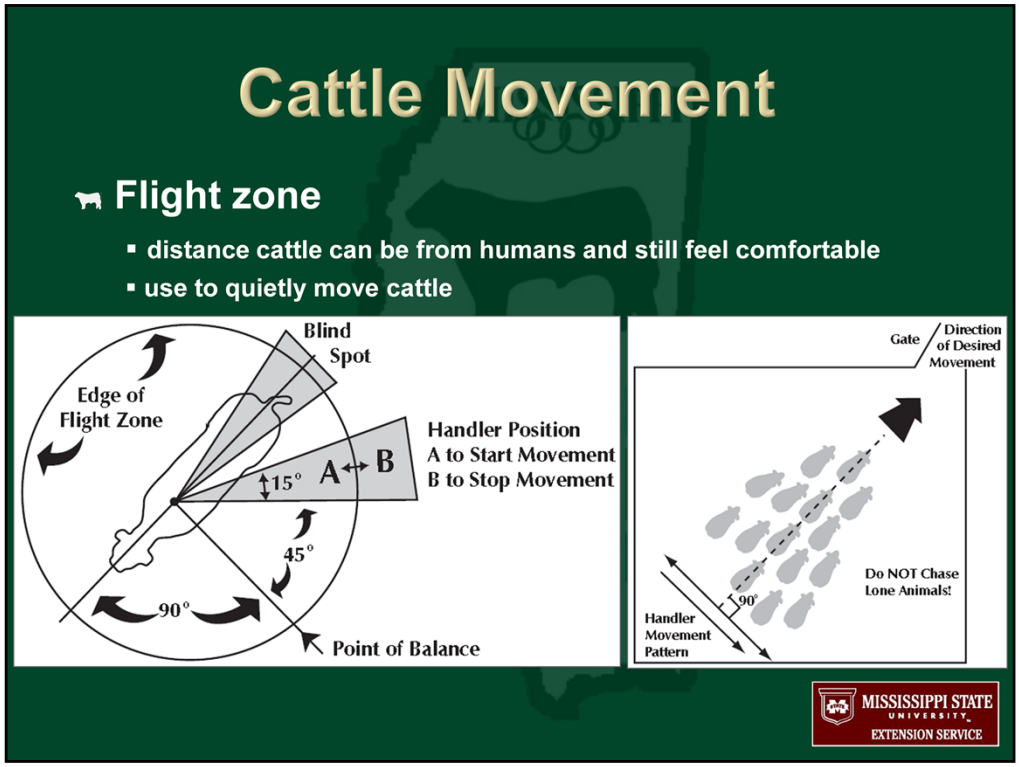
Post spacing varies with the fence type and the contour of the land. Where the land has dips and angles, place posts at the top and bottom of the dip to make sure the fence follows the contour of the land.

Additional fencing construction and management recommendations are provided in Mississippi State University Extension Service Publication 2538, "Livestock Fencing Systems for Pasture Management".

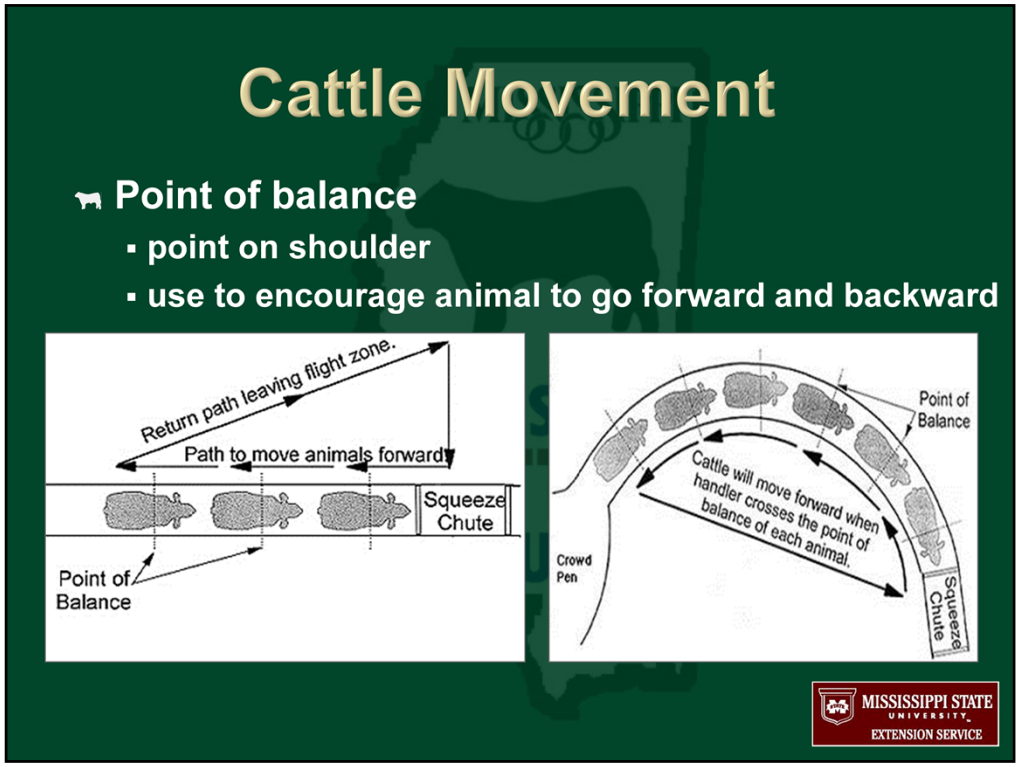


By understanding cattle behavioral concepts and sensory characteristics, cattle handlers can take advantage of natural behaviors of cattle for low stress handling. Cattle are easily spooked and will often retreat when facing an uncomfortable situation. Cattle tend to move in groups. This herd mentality can be used to move groups with less stress by focuses on getting the lead animal(s) to move in the desired direction and then allowing the rest of the herd to follow. Avoid isolating individual animals when possible. Isolated animals are more likely to seek escape routes and display nervous behavior, leading to increased injury risk or performance losses. Highly temperamental cattle may attack handlers when isolated. If an animal needs to be penned away from the herd, place a companion herdmate in the pen or nearby.

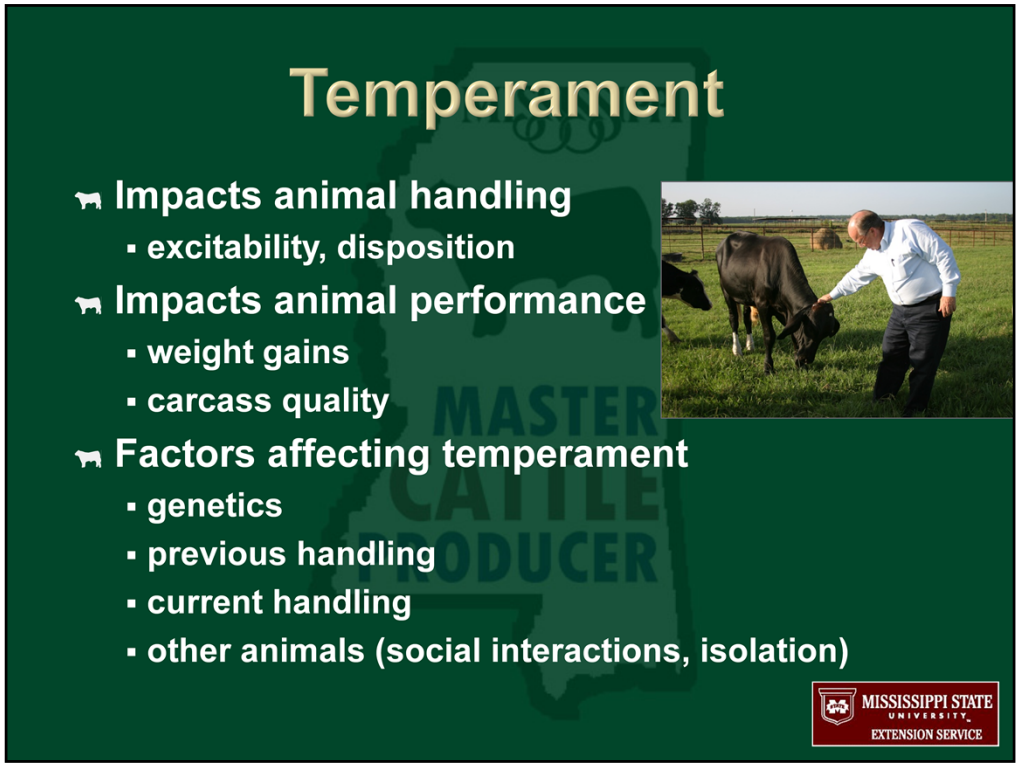
Cattle sense their environment primarily using their eyes, ears, and nose. The eyes are wide set with color vision. They can see a wide area around them but not directly behind them. Cattle have poor depth perception and may balk at stark contrasts in lighting. Cattle can readily determine sound sources and dislike loud, high-pitch sounds. Thus, quiet handling is advisable. Cattle use their sense of small to identify other cattle and for heat detection and breeding activities.



The flight zone is the distance that the cattle can be from handlers and still feel comfortable. It can be used to quietly move cattle. When a person enters the flight zone, the animal moves away from the person. The animal stops moving when the handler moves out of the flight zone. Cattle have a wide area of peripheral vision, with only a small blind spot immediately behind them. Do not approach cattle from directly behind. Do not chase lone animals either.



The point of balance is a place on the shoulder of the animal. Handlers can use this point to encourage the animal to go forward and backward. Cattle will move forward (or backward) when a handler crosses the point of balance of each animal. When not intending to move cattle in the opposite direction, be sure to exit the flight zone when crossing the point of balance. Move cattle calmly and slowly. Quick movements or loud noises can spook cattle and make moving them more difficult.



Important behaviors to beef cattle production include reactions to processing through a squeeze chute, maternal instincts at calving, newborn calf vigor, bull serving capacity, and foraging behavior. Among the most important of behavioral traits, temperament reflects the ease with which animals respond to handling, treatment, and routine management. Animals with disposition problems are a safety risk to handlers, themselves, and other animals in the herd. Disposition affects handling equipment requirements, operation liability exposure, beef quality assurance, and performance. Highly excitable cattle are more likely to have lower average daily gains and carcass Quality Grades.

Subjective pen or chute scores can be used to evaluate cattle temperament. The Beef Improvement Federation scoring scale for processing through a chute is below. For genetic selection and herd improvement programs temperament scoring should be conducted at weaning or yearling ages because an animal's behavior can be influenced by past experiences. This will reduce the extent to which current behavior has been influenced by prior handling experiences. Some breeds have developed temperament-related expected progeny differences (EPDs) such as a docility EPD. Cull highly excitable cattle from breeding herds.

Score 1 – Docile: Mild disposition. Gentle and easily handled. Stands and moves slowly during processing. Undisturbed, settled, somewhat dull. Does not pull on headgate when in chute. Exits chute calmly.

Score 2 – Restless: Quieter than average, but may be stubborn during processing. May try to back out of chute or pull back on headgate. Some flicking of tail. Exits chute promptly.

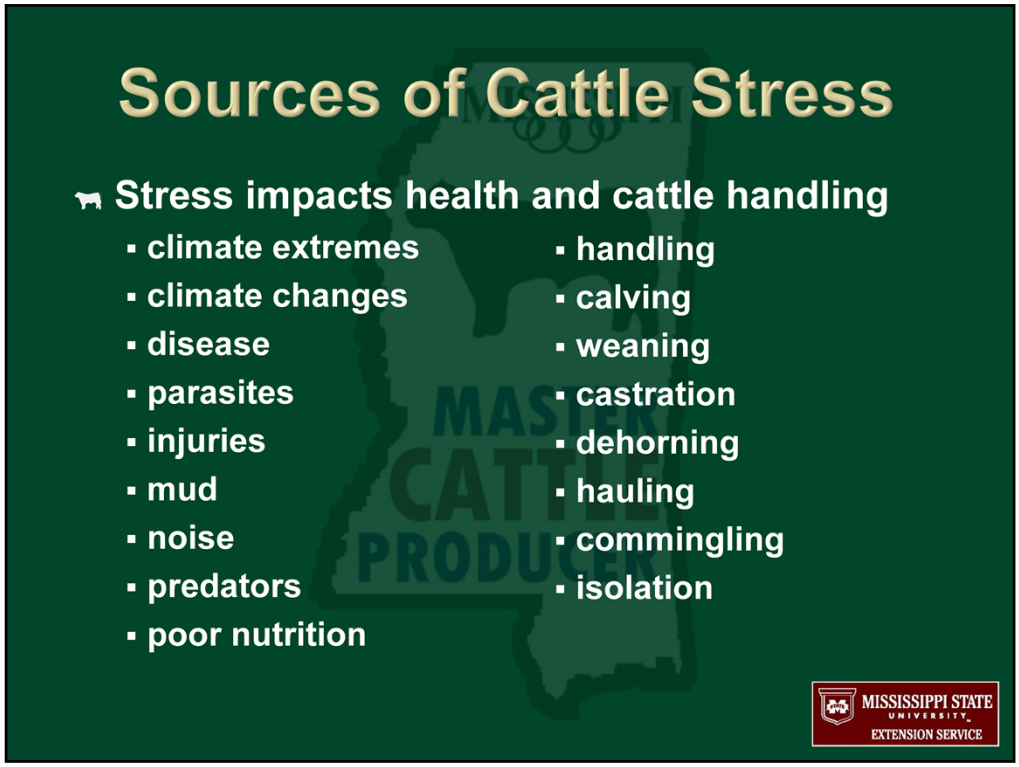
Score 3 – Nervous: Typical temperament is manageable, but nervous and impatient. A moderate amount of struggling, movement and tail flicking. Repeated pushing and pulling on headgate. Exits chute briskly.

Score 4 - Flighty (Wild): Jumpy and out of control, quivers, and struggles violently. May bellow and froth at the mouth. Continuous tail flicking. Defecates and urinates during processing. Frantically runs fence line and may jump when penned individually. Exhibits long flight distance and exits chute wildly.

Score 5 – Aggressive: May be similar to Score 4, but with added aggressive behavior, fearfulness, extreme agitation, and continuous movement which may include jumping and bellowing while in chute. Exits chute frantically and may exhibit attack behavior when handled alone.

Score 6 - Very Aggressive: Extremely aggressive temperament. Thrashes about or attacks wildly when confined in small, tight places. Pronounced attack behavior.

Cattle use several different methods to protect themselves. A spooked animal (even a small calf) can run into or over a person and cause severe injury. Mature cattle and calves kick and can pack a powerful punch. Cows tend to kick with a roundhouse motion, whereas calves tend to kick straight back. Leave plenty of room between cattle and people when working animals. Even tame cattle can injure handlers, especially if surprised. Standing behind a gate (even a latched gate) can result in injury if cattle kick or run into the gate. Cattle will also butt or intentionally run over people, particularly when provoked. Cattle restrained in squeeze chutes can still sling their heads, stomp, and cause injury. Standing between a gate and a fence or otherwise in the path of cattle can crush a person between the gate and the fence or between cattle and the fence. The weight of cattle can put a great deal of force on a person. Even an animal turning can press a person against a fence and cause injury.



Stress compromises cattle health and makes cattle handling more difficult. There are many potential sources of cattle stress. Some of these factors are difficult to control or avoid, whereas others can largely be controlled by management. Plan ahead to minimize cattle stress.

Heat Index

High Temp, °F	Relative Humidity, %											
	35	40	45	50	55	60	65	70	75	80	85	90
100	106	109	114	118	124	129	136	143	150	158	167	176
99	104	107	111	115	120	126	132	138	145	153	161	170
98	102	105	109	113	117	123	128	134	141	148	155	164
97	100	103	106	110	114	119	125	130	136	143	150	158
96	98	101	104	108	112	116	121	126	132	138	145	152
95	96	99	102	105	109	113	118	123	128	134	140	147
94	95	97	100	103	106	110	114	119	124	129	135	141
93	93	95	98	101	104	107	111	116	120	125	130	136
92	92	94	96	99	101	105	108	112	116	121	126	131
91	90	92	94	97	99	102	105	109	113	117	122	126
90	89	91	92	95	97	100	103	106	109	113	117	122
89	88	89	91	93	95	97	100	103	106	110	113	117
88	87	88	89	91	93	95	98	100	103	106	110	113

At a constant temperature, the heat index (temperature humidity index) increases as the relative humidity increases. Each one mile per hour increase in wind speed decreases the heat index by approximately one. Extreme heat conditions (shaded area of the chart) exist when temperature and humidity are at levels to create a heat index of 100°F or higher. These extreme conditions can be problematic in Mississippi and pose a significant health risk to stressed cattle. When cattle are stressed during extreme heat conditions, they are more likely to become non-ambulatory, get sick, and die. In addition, feed intake may be depressed in these conditions. Breeding programs in Mississippi should consider cattle heat stress tolerance and ability to adapt to their regional environment.

During periods of high heat and humidity and little wind, take actions to minimize the effects of heat stress as cattle are processed. Provide adequate water. If possible, avoid handling cattle when the risk of heat stress is high. If cattle must be handled, a general rule is to work them before the Heat Index reaches 84, if possible. Work cattle more prone to heat stress first, earlier in the day. Limit the time cattle spend in handling facilities where heat stress may be more significant. Heat management tools, such as shades and sprinklers, should be considered if sufficient natural shade is not available.

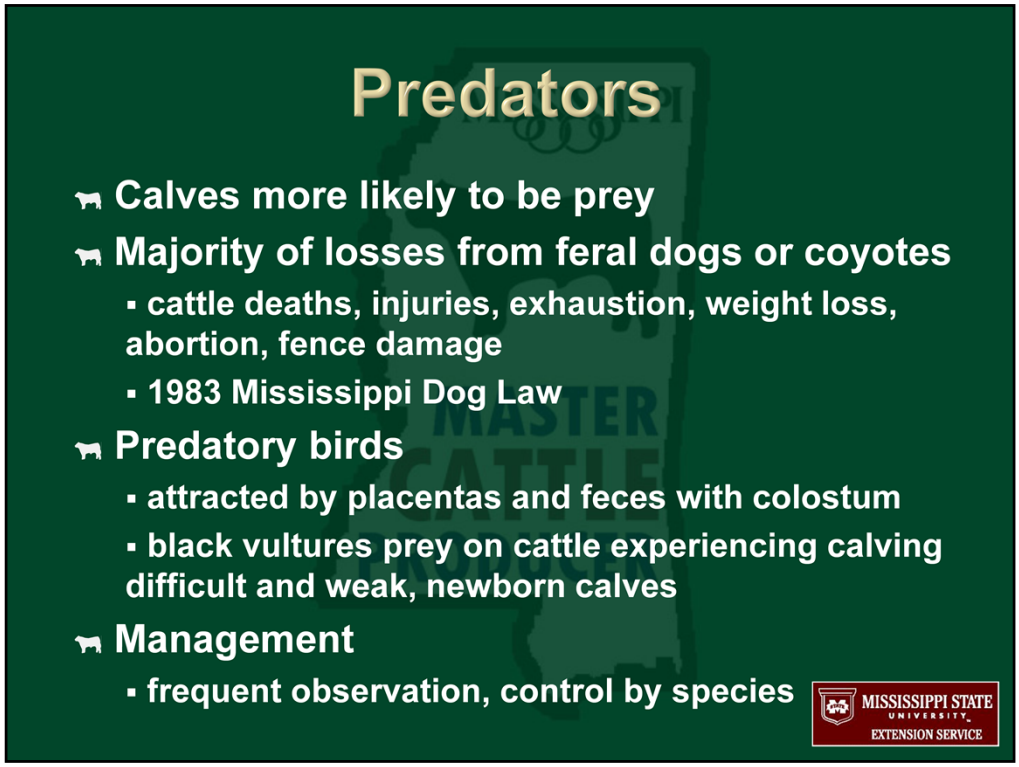
Avoid transporting cattle in extreme heat conditions when possible, particularly during the hottest part of the day which typically occurs between 11:00 am and 4:00 pm. If cattle must be hauled during these conditions, avoid unnecessary stops, and deliver cattle to their destination as quickly as safely possible. Make stop durations as short as possible, stop only during cooler parts of the day, and select shaded areas for stops. Reduce trailer stocking densities (put fewer cattle on trailers) during extreme heat conditions. Handle cattle especially gently and patiently during these conditions.

Wind Chill Index

Low Temp, °F	Wind Speed, mph											
	3	5	7	9	11	13	15	17	19	21	23	25
26	30	23	17	13	9	6	4	1	-1	-3	-4	-6
24	28	21	15	10	7	4	1	-2	-4	-5	-7	-9
22	26	18	13	8	4	1	-2	-4	-6	-8	-10	-12
20	24	16	10	6	2	-2	-5	-7	-9	-11	-13	-14
18	22	14	8	3	-1	-4	-7	-10	-12	-14	-16	-17
16	21	12	6	1	-3	-7	-10	-13	-15	-17	-19	-20
14	19	10	4	-2	-6	-9	-13	-15	-18	-20	-22	-23
12	17	8	1	-4	-8	-12	-15	-18	-21	-23	-25	-26
10	15	6	-1	-6	-11	-15	-18	-21	-23	-26	-28	-29
8	13	4	-3	-9	-13	-17	-21	-24	-26	-28	-30	-32
6	11	2	-5	-11	-16	-20	-23	-26	-29	-31	-33	-35
4	9	0	-8	-14	-18	-23	-26	-29	-32	-34	-36	-38
2	7	-3	-10	-16	-21	-25	-29	-32	-35	-37	-39	-41

Extreme cold and wind conditions (shaded area of the chart) exist when the wind chill index is below 0°F. These extreme conditions can have drastic adverse effects on cattle health and can dramatically increase cattle maintenance energy requirements. If cattle are wet, the danger is even greater. Unprotected cattle hauled at highway speeds can be subject to dangerous wind chill. Avoid transporting cattle in extreme wind and cold conditions when possible. If cattle must be transported during these conditions, avoid unnecessary stops, and deliver cattle to their destination as quickly as safely possible. Do not haul cattle during icy conditions.

Muddy conditions are common on Mississippi cattle operations, particularly after heavy rains or extended periods of precipitation. Areas where cattle congregate such as around feeding troughs, water sources, or shade are particularly susceptible to trampling damage and mud accumulation. Lanes where cattle move through in groups are also areas that are likely to become muddy. Excessive mud hurts animal performance and creates additional disease and health risks. Mud creates suction on cattle hooves and legs, making it more difficult to move. This reduces competitive feeding behavior. Mild mud (4 to 8 inches of mud) can lower feed intake of cattle by 4 to 8% and reduce average daily gains by as much as 14%. Severe mud (12+ inches of mud) may be belly deep and can lower feed intake by nearly ⅓. Mud harbors disease-causing pathogens and can increase risk for foot rot, calf scours, and naval ill. Mud also creates hazards for newborn calves to become chilled or trapped. Extreme mud may trap cattle of any size.



Relative to sheep and goat losses, cattle losses from predators are less common. However, Mississippi cattle operations still experience economically damaging losses from predators each year. Calves are more likely to be lost to predators than mature cattle.

At least half of the calf death losses due to predators in Mississippi are from feral dogs or coyotes. Both domestic and feral dogs can cause extensive damage once they start to attack livestock. They often range in packs, and these dog packs can harass and chase livestock for several hours at a time. Injured animals may be chased persistently. Losses from dogs running and attacking cattle can include damaged fences as a result of livestock attempting to escape, cattle injuries, exhaustion, weight loss, calf loss, and abortion.

Predators are more likely to be a problem for cattle producers during periods when predator densities are high relative to available food supplies. Black vultures, ravens, and crows commonly scavenge carcasses. In some instances, these birds of prey may attack live animals. Cattle that are unable to escape or defend themselves may be killed. These predatory birds frequently attack first at the eyes, nose, navel, and anal area. They often blind the victim cattle by pecking out the eyes even if they do not kill them. Placenta and fresh feces containing colostrum or milk on the calving grounds may attract scavengers including vultures. Cattle that experience calving difficulty and weak, newborn calves may become the targets of black vultures.

Necropsy of a livestock carcass is an example of a useful tool that can assist in deciding if predators contributed to the loss. Observation of changes in cattle behavior can also help in determining is predators are responsible for livestock losses. Cattle behavior in herds which are chased or attacked repeatedly by predators becomes more alert and defensive.

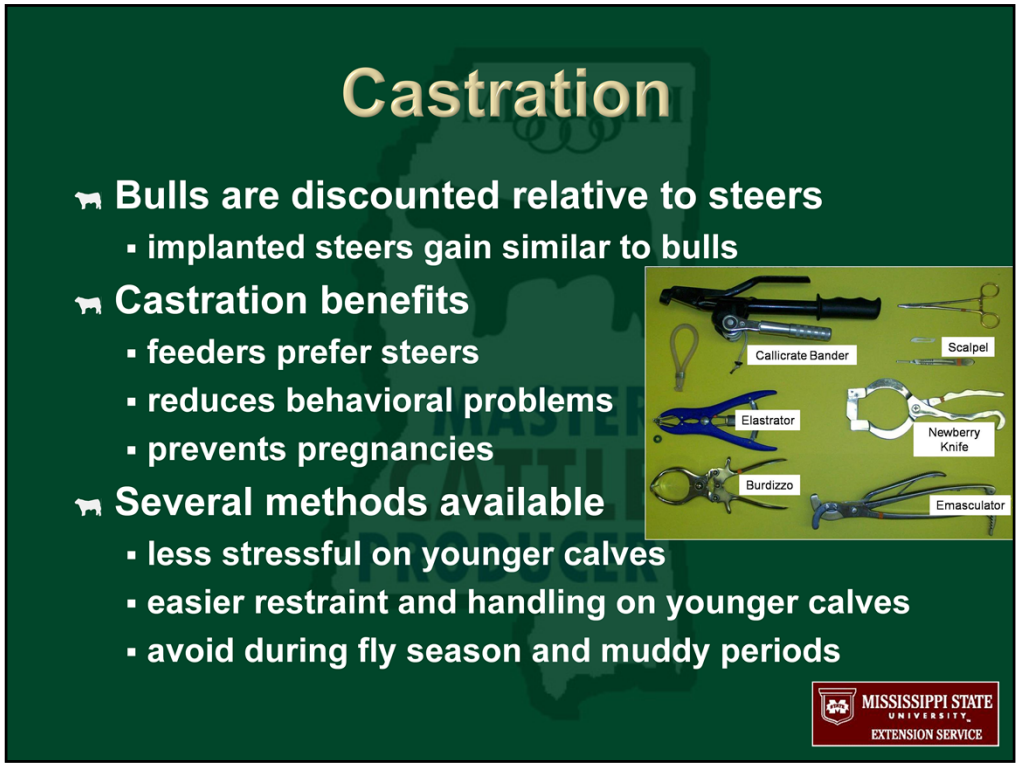
Predator control options vary by predator species. Some predator species may be protected by federal law, so it is important to stay informed of current laws when considering implementation of various predator control methods including lethal methods. Mississippi instituted legislation in 1983 that addresses the issue of livestock owner rights and dog owner liability in cases when dogs threaten livestock. The 1983 Dog Law essentially made it legal for cattle producers to destroy dogs that kill livestock and to hold the dogs' owners responsible for the damage.

Predators of cattle are discussed in detail in Mississippi State University Extension Service Publication 2661, “Predator Control on Beef Cattle Operations”.

Wean calves at least 45 days prior to sale or according to the requirements of the specific preconditioning program. A large amount of stress is associated with weaning. Use techniques that minimize calf stress during this time to improve health and growth performance. Sorting and hauling freshly weaned calves to the sale facility the day before the auction can result in increased shrink compared to preconditioned calves. Preconditioning calves can minimize shrink and add additional sale weight.

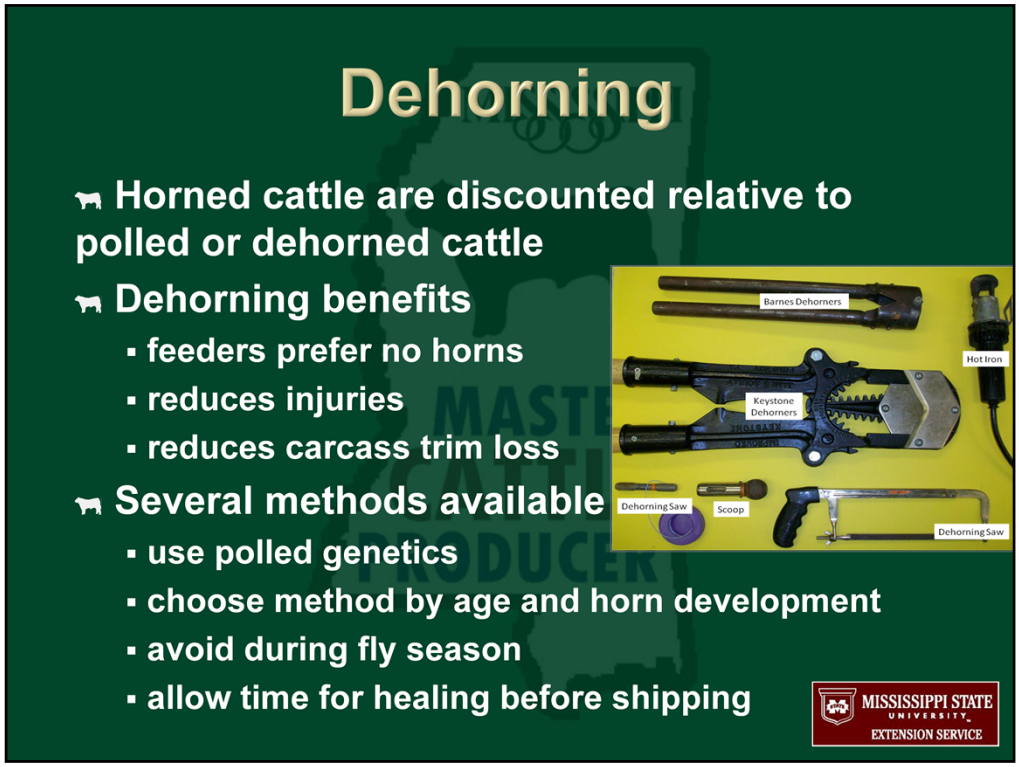
Focus on weaning techniques for preconditioning programs that reduce calf stress. Stress at weaning can increase the likelihood of calves developing respiratory infections. Additional stress results when calves are introduced to unfamiliar surroundings post-weaning. Give calves access to the weaning area a few days before weaning. Corrals, drylots, or small pastures can serve as weaning facilities. Good fences will prevent calves from returning to their mothers to nurse. Small lots may reduce fence walking or pacing, but dust or mud can become problems in dry or wet conditions.

Fenceline weaning, where calves remain in sight of and close to their mothers, may reduce weaning stress. Cows will initially graze close to their calves gradually moving further away during the days after weaning. One weaning technique involves initial nose-to-nose contact between cows and calves followed by gradual increases in separation distance by moving electrified wires or tapes further from each side. Train cattle to respect electric fencing prior to weaning to facilitate the weaning process. Fenceline weaning also allows high-quality pastures to be used as weaning facilities in place of dusty drylots. Allow calves to creep-graze into these high-quality pastures prior to weaning to give calves time to become familiar with their surroundings prior to weaning, at which point the creep-gate can simply be closed. Fenceline contact with dams at weaning minimizes losses in weight gain in the days following separation. Calves totally and abruptly separated from their dams do not compensate for losses in weight gain even after 10 weeks post-weaning compared to fence line weaned calves. Properly weaned calves are “bawled out” and readily consuming feed and water well before the preconditioning period ends.



Steers are castrated male cattle. Although intact bulls typically gain faster than steers, most feeders are not interested in feeding bulls. Utilizing growth implants in steers typically produces gains similar to those of intact bulls. Castration reduces behavioral problems and prevents unwanted pregnancies where male calves are co-mingled with heifers in post-weaning production programs. If weaned bull calves are sold, then the cow-calf producer essentially pays the next owner to castrate the calves via discounts for intact bull calves. A recent USDA NAHMS survey of cow-calf management practices revealed that 25.5% of operations did not castrate bull calves before they were sold.

Castration becomes increasingly stressful as bulls get older. Younger bulls experience less bleeding, infection, and weight gain depression than older bulls. Calves castrated later in life may exhibit an undesirable “staggy” appearance. Seedstock producers often wait until weaning to decide which bull calves to castrate and which to develop as future breeding stock. In a commercial cow-calf operation, perform castration of bull calves as early in a calf’s life as possible. Restraining and handling younger calves is easier than working older, larger bulls. An ideal time to castrate nursing bull calves is during the first 36 hours of life. Many producers prefer to wait and castrate large groups of calves at once. In this case, all calves should be castrated at three months of age or less. To reduce infection risk, avoid castration during fly season and on wet days when the calf may lie in mud. Various castration methods and tools are available.



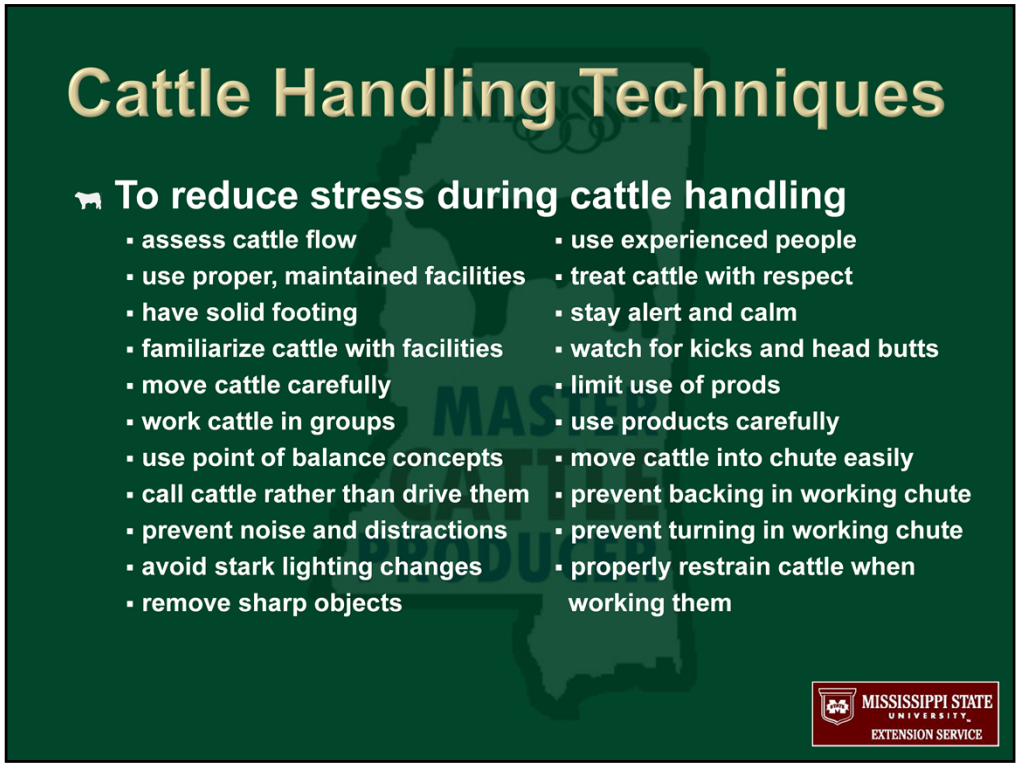
Cattle buyers discount calves for the presence of horns. Horn-related injuries may occur during shipping as well in the feedlot and are thus undesirable to cattle feeders.

A recent USDA NAHMS survey of cow-calf management practices determined that only 49.7% of non-polled calves in the Southeast region of the U.S. were dehorned before being sold compared to the national average of 61.1% and that the average age for dehorning was 130 days. Results of the 2000 National Beef Quality Audit indicate that 23.7% of cattle evaluated on the harvest floor had horns, down from 32.2% in 1995.

One way to produce calves without horns is to use a homozygous polled herd sire. Several options are also available for physically removing horns from cattle. Dehorning methods differ by animal age and stage of horn development. Horn tissue is formed in specialized cells in a small ring surrounding the horn button. Perform bloodless dehorning methods prior to significant horn growth to destroy this ring of cells. Mechanical dehorning can be performed at any age or animal size. It involves the physical removal of the horn along with a small ring of skin surrounding it. Minimize stress and complications associated with dehorning by dehorning at a young age, preferably at less than one month of age.

Use sharp, disinfected dehorning instruments when dehorning adult cattle. Because damaged bone tissue may be more susceptible to infection, cut bone tissue rather than crushing it. Problems with infection are usually not encountered, except in situations where dehorning leaves an opening into the sinuses of the head. Use disinfectants on dehorning instruments to prevent wound infections and the spread of infectious diseases. Dehorn outside of fly season to reduce the risk of infections. Treat wounds with blood coagulant powder and fly spray.

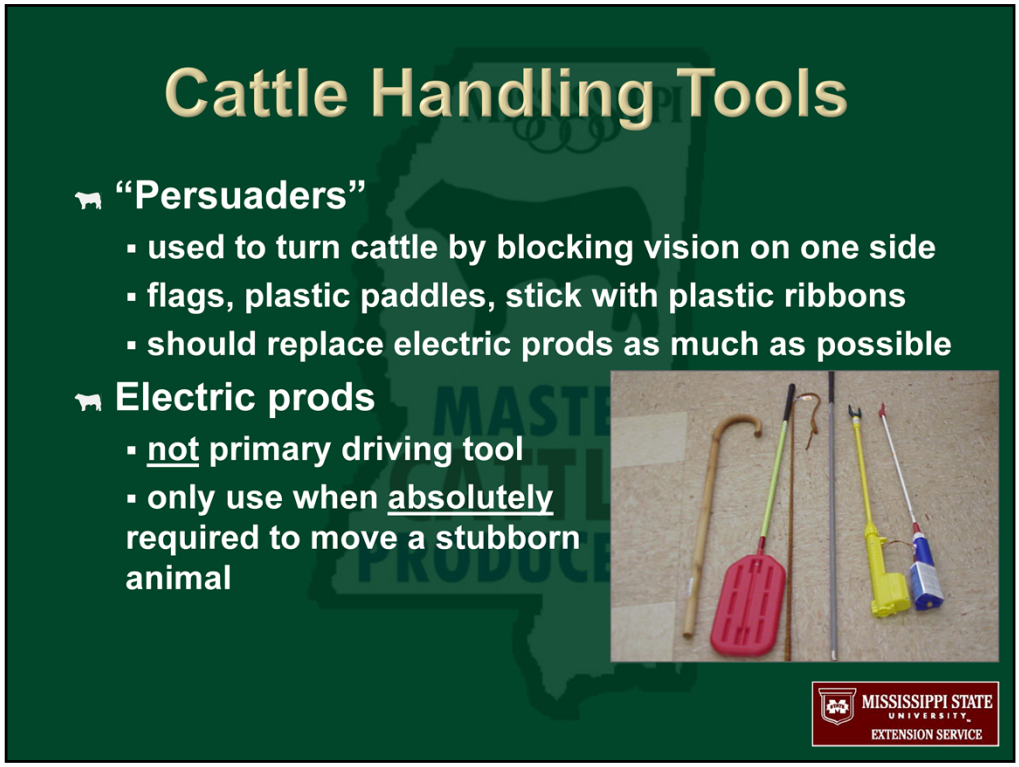
As with castration, ensure that calves are properly restrained for physical dehorning. Dehorning requirements for preconditioning programs may involve complete dehorning or only tipping horns back to the hairline. In either case, dehorned calves should be fully healed before shipment.



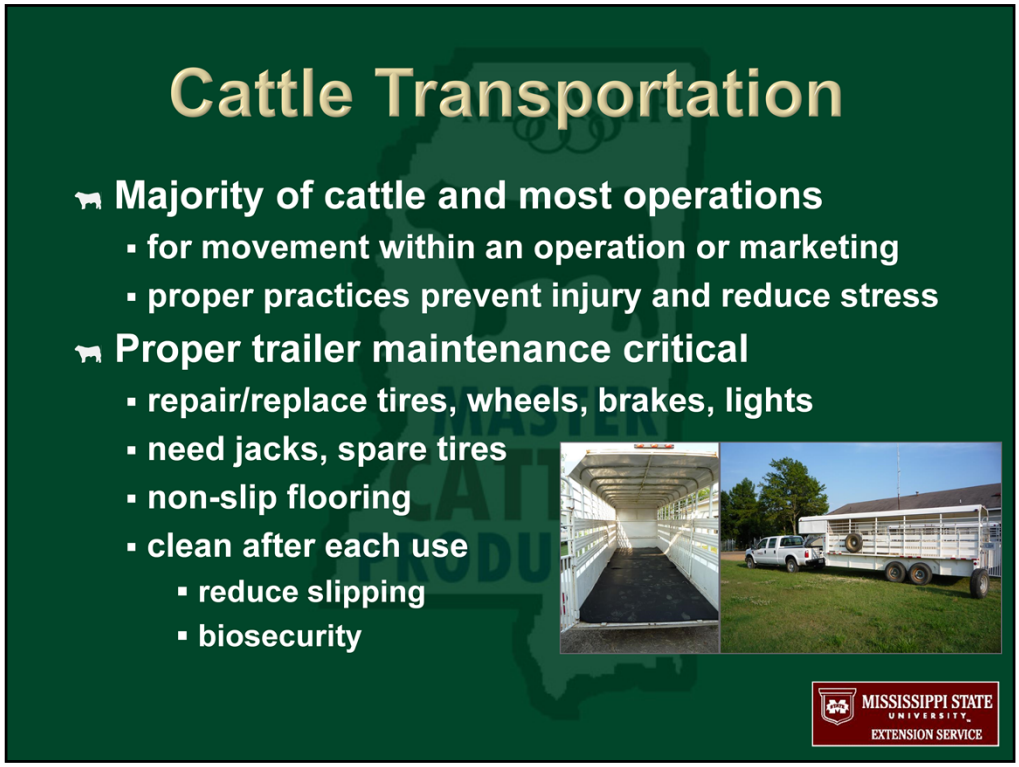
Reducing cattle stress during handling improves cattle performance, health, and well-being. Use of proper cattle handling techniques is critical for low-stress handling. Employ the cattle handling guidelines listed above to make working cattle easier and safer for people and cattle. Adhere to best management practices and Beef Quality Assurance guidelines for cattle handling.

Cattle can cause serious injuries and death to people. Being careless or in the wrong place at the wrong time can be costly. The National Safety Council reports that livestock are second only to machinery in the cause of farm accidents. Livestock are involved in 17 percent of all farm accidents. These are just the reported accidents. Many injuries are never reported.

The first consideration in working cattle should be safety for workers and livestock. Good facilities are important in providing a safe working environment for handlers and cattle. Good pens, gates, and equipment help prevent injuries. Proper restraint is important when working with animals. If cattle are immobilized, they are less likely to be able to injure people during handling. Paying attention to what is going on will help keep injuries from occurring. A person is more likely to be injured if they are distracted from the work at hand. Individuals working cattle should work calmly and try not to get in too big a hurry or get frustrated. Getting impatient and trying to go too fast can be the cause of many injuries.



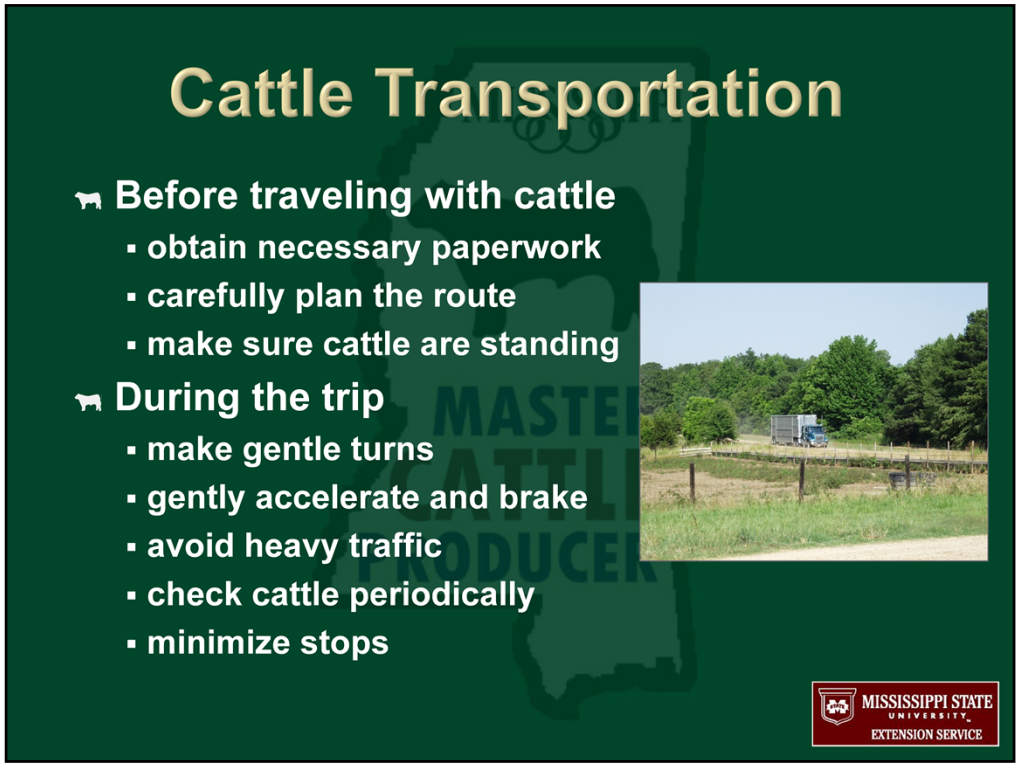
Take advantage of cattle's flight zone and point of balance to move them. For safety and welfare reasons, minimize the use of electric prods. Use non-electric driving aids ("persuaders"), such as plastic paddles, sorting sticks, flags, or streamers affixed to long handles to quietly guide and turn animals. These tools can be used to turn cattle by blocking their vision on one side and should replace electric prods as much as possible. An electric prod should not be a person's primary driving tool. It should only be used when absolutely required to move a stubborn animal and then should be put back down. When cattle continuously balk, investigate and correct the reason rather than resort to overuse of electric prods. When cattle prods must be used, avoid contact with the eyes, rectum, genitalia, and udder. Never use driving aids powered by AC current unless manufactured and labeled specifically for that purpose.



The majority of cattle are transported during some point in their lives, and hauling is an integral part of most operations. Much of this transportation occurs as part of the marketing process or among pastures or other operational locations. Ensuring that proper transportation practices are used can reduce stress and prevent injury to the cattle.

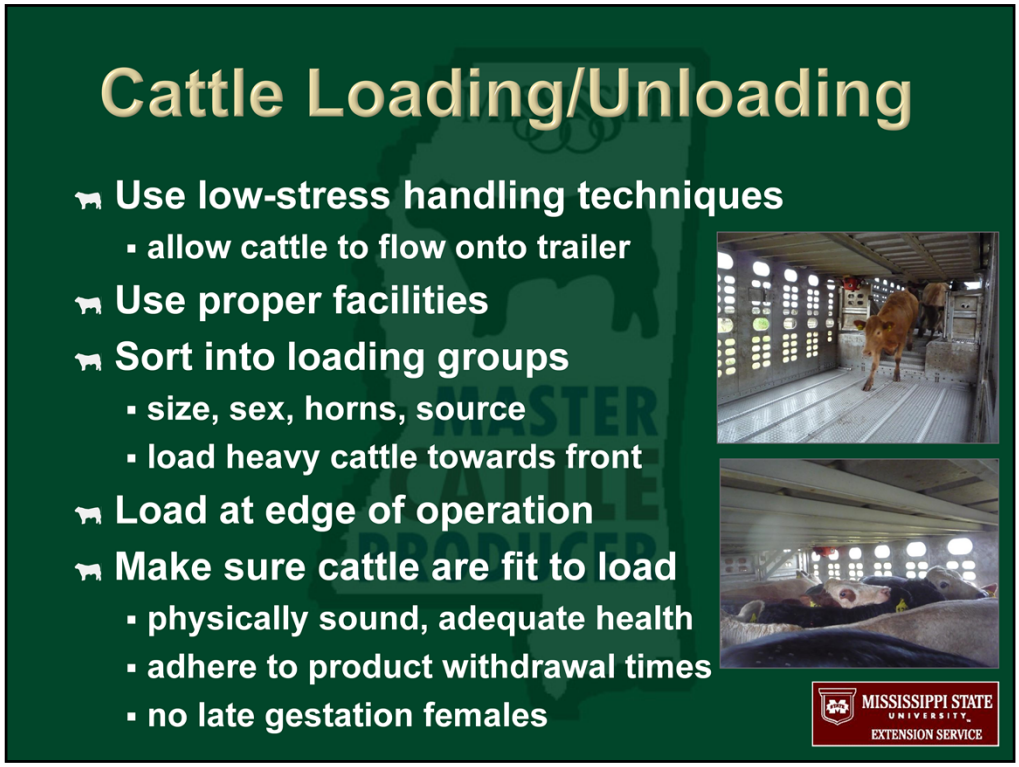
Livestock trailers should be kept in good condition with all repairs made as needed. Tires should be checked for proper air pressure, tread wear, and should be free of dry rot. Wheels should be maintained and greased according to manufacturer recommendations. A jack capable of lifting the loaded trailer, block, and spare tire(s) should be kept with the trailer. Inspect trailer wiring and lights to ensure that they are properly functioning prior to hauling cattle. Ensure that brakes are in good working order. Inspect the trailer floor and repair/replace as needed. The useful life of a wooden floor is probably less than 10 years and even less if not cleaned out on a regular basis. Any trailer used to haul cattle should have a non-slip floor. Options include wire cattle panels or rubber mats. If wire cattle panels are used, make sure the panels are securely held down by using ample staples to hold them in place. Clean the trailer after each use. Cleaning will help prevent injuries from slipping, assist in biosecurity, and help prevent disease spread.

For detailed information on cattle transportation, refer to Mississippi State University Extension Service Publication 2797, “Transporting Beef Cattle by Road”.



Make sure that any paperwork needed for transit and unloading is in the driver's possession. Check the truck on all sides before traveling to make sure all cattle are standing and ready for travel. Careful driving can prevent bruises, injuries, and even death when hauling cattle. Pull away from the chute slowly. Making gentle turns is especially important during the first hour on the road while cattle are getting their balance. Defensive driving is highly encouraged. Prior to hauling cattle, plan routes carefully. Avoid heavy traffic and sharp turns, and minimize stops (especially in extreme heat or cold conditions). Minimize stress and help prevent injuries with gentle acceleration and braking. Check cattle on a long haul after two hours on the road and then every four hours after that. Have a biosecurity and emergency action plan for cattle transportation in case it is needed.

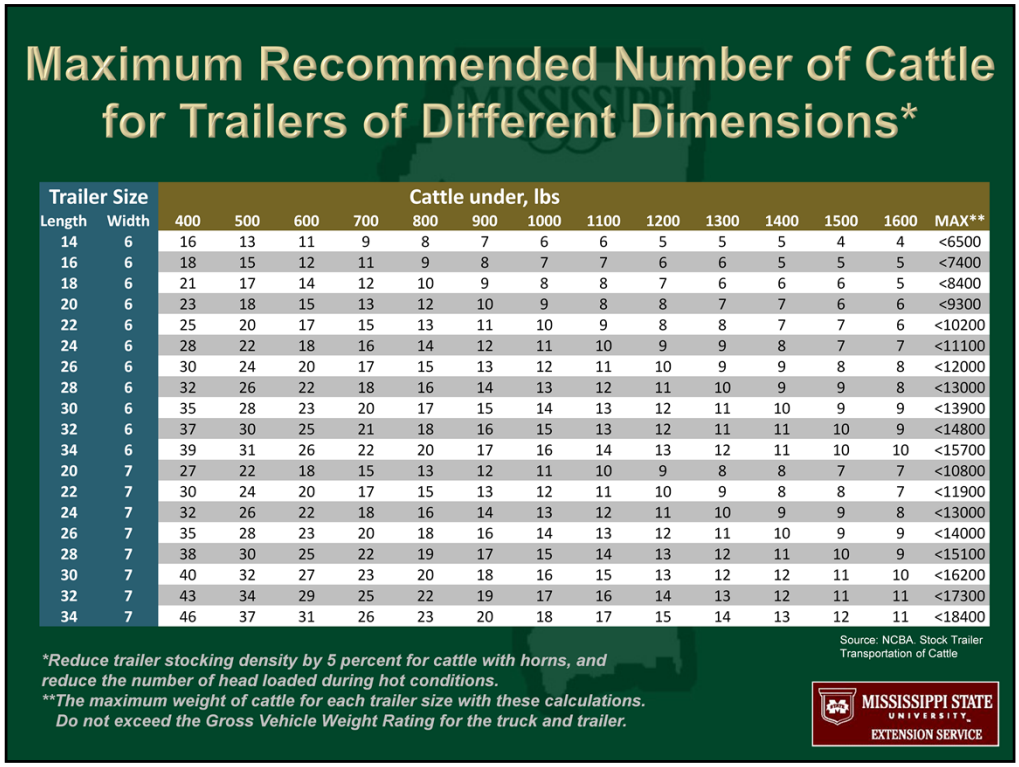
There are economic incentives to properly transport animals. Cattle that are injured will sell for less, and cattle that are injured or bruised will have a greater degree of trim loss. This is especially true for market cows and bulls which usually do not have enough fat thickness to help provide protection from bruising.



When loading cattle onto a trailer, take care to move the cattle slowly and quietly. Use low-stress handling techniques when moving, loading, and unloading cattle. Avoid using electric prods and aggressive use of canes, whips, and sorting sticks. This will minimize stress, help prevent the animals from getting excited, and lessen the amount of shrink. Use proper facilities for loading cattle. Sort cattle into groups based on size, sex, and horns. Load different groups into separate compartments. Load heavier cattle towards the front of the trailer. Bulls that have not been together should be loaded into separate compartments. Separate cattle that are purchased from separate sources or different groups. This will prevent them from trying to establish a new social order on the trailer. Minimize the height that cattle must step onto the trailer by backing the trailer into a slope. No gap which would allow injury to an animal should exist between the ramp, its sides, and the vehicle. Load cattle at the edge of the operation to help support the biosecurity plan and minimize introduction of health problems. Allow the cattle to establish a flow onto the trailer. This will reduce a lot of the stress.

Make sure that cattle are fit to load. Cattle must be physically able to be loaded and unloaded several times. They must be able to walk normally bearing weight on all four legs. They should not be suffering from advanced stages of health disorders such as cancer eye, open wounds, mastitis, emaciation, malnutrition, exhaustion, or deformity. Each animal should be able to keep up with the rest of the group. If cattle have been treated, the withdrawal time should have passed. Special hauling considerations may be needed for completely blind cattle. Do not haul female cattle that are in the late stages of pregnancy.

Before unloading, make sure the truck is at the correct facility. Back the truck up to the unloading chute squarely and evenly. Make sure the gates to the destination pen are open and the path is clear. Be sure the holding pen gate is shut for the cattle before pulling away from the chute. Give all documents to the recipient of the cattle.



Maximum Recommended Number of Cattle for Trailers of Different Dimensions*

Trailer Size		Cattle under, lbs													
Length	Width	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	MAX**
14	6	16	13	11	9	8	7	6	6	5	5	5	4	4	<6500
16	6	18	15	12	11	9	8	7	7	6	6	5	5	5	<7400
18	6	21	17	14	12	10	9	8	8	7	6	6	6	5	<8400
20	6	23	18	15	13	12	10	9	8	8	7	7	6	6	<9300
22	6	25	20	17	15	13	11	10	9	8	8	7	7	6	<10200
24	6	28	22	18	16	14	12	11	10	9	9	8	7	7	<11100
26	6	30	24	20	17	15	13	12	11	10	9	9	8	8	<12000
28	6	32	26	22	18	16	14	13	12	11	10	9	9	8	<13000
30	6	35	28	23	20	17	15	14	13	12	11	10	9	9	<13900
32	6	37	30	25	21	18	16	15	13	12	11	11	10	9	<14800
34	6	39	31	26	22	20	17	16	14	13	12	11	10	10	<15700
20	7	27	22	18	15	13	12	11	10	9	8	8	7	7	<10800
22	7	30	24	20	17	15	13	12	11	10	9	8	8	7	<11900
24	7	32	26	22	18	16	14	13	12	11	10	9	9	8	<13000
26	7	35	28	23	20	18	16	14	13	12	11	10	9	9	<14000
28	7	38	30	25	22	19	17	15	14	13	12	11	10	9	<15100
30	7	40	32	27	23	20	18	16	15	13	12	12	11	10	<16200
32	7	43	34	29	25	22	19	17	16	14	13	12	11	11	<17300
34	7	46	37	31	26	23	20	18	17	15	14	13	12	11	<18400

Source: NCBA. Stock Trailer Transportation of Cattle

*Reduce trailer stocking density by 5 percent for cattle with horns, and reduce the number of head loaded during hot conditions.
**The maximum weight of cattle for each trailer size with these calculations. Do not exceed the Gross Vehicle Weight Rating for the truck and trailer.

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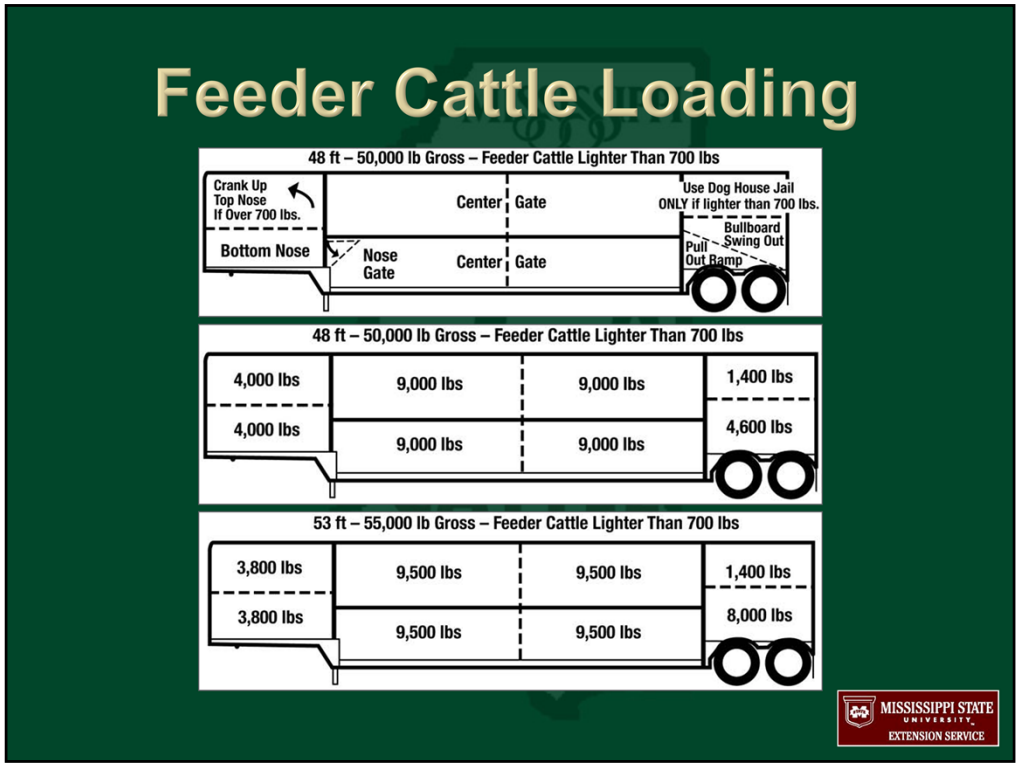
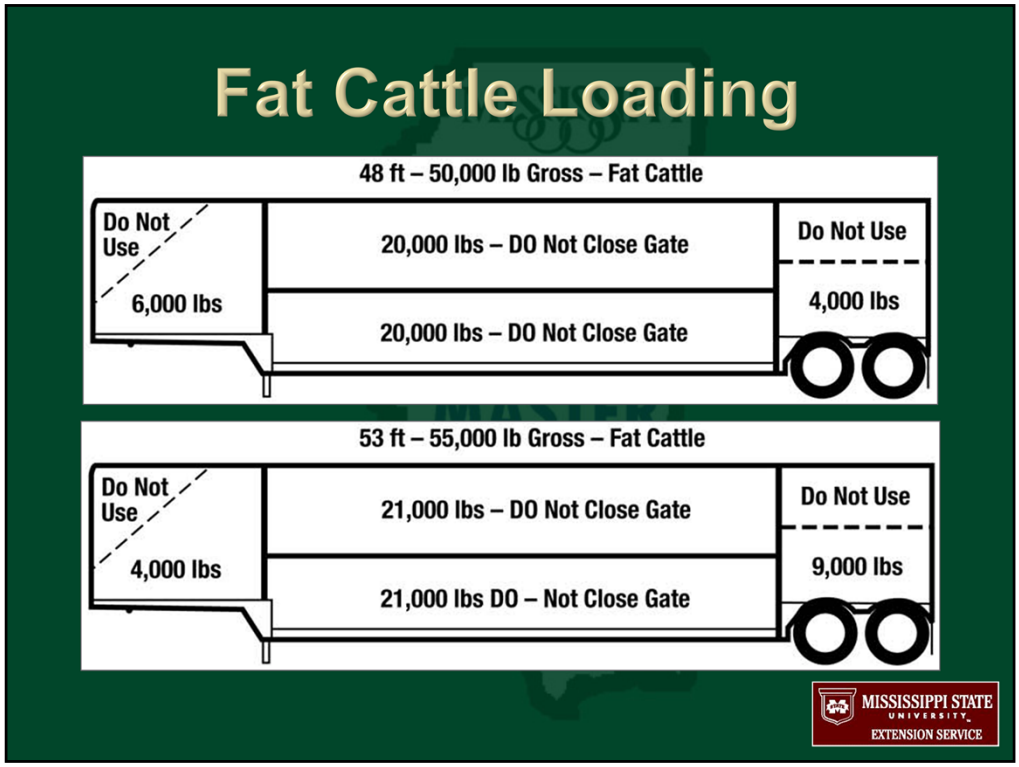
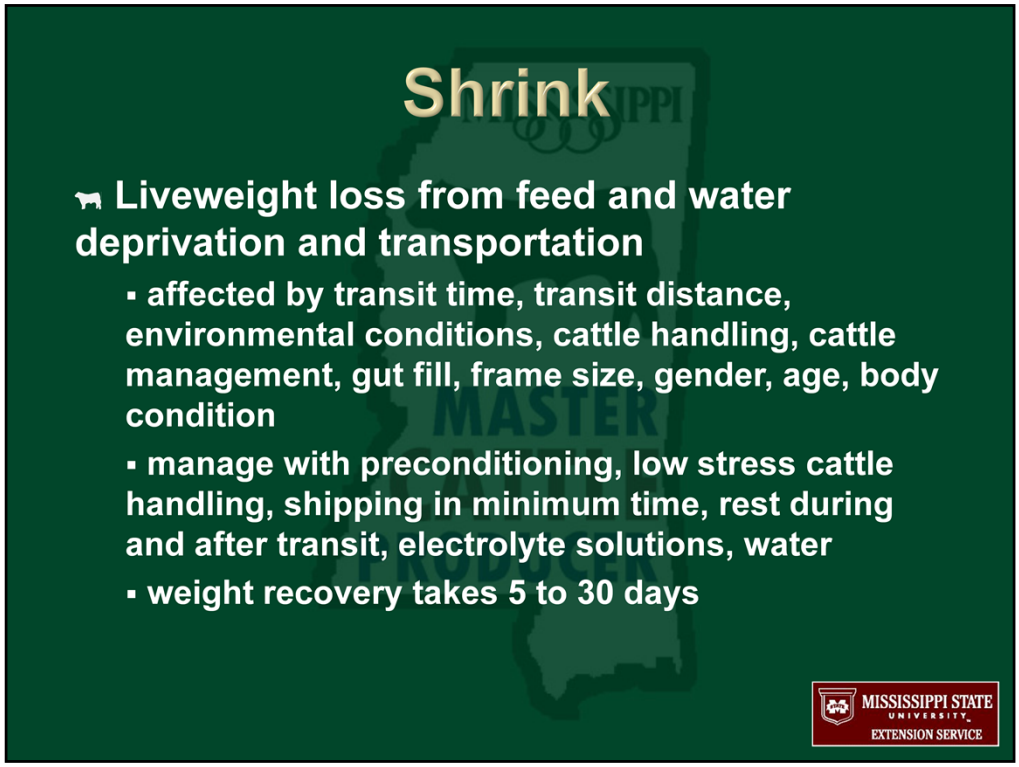
The maximum recommended numbers of polled or dehorned cattle for trailers of different dimensions are listed in this table. Using this loading density chart helps ensure that there is adequate floor space per head to minimize stress, bruising, injury, and possible death losses. The presence of horns on cattle reduces the number of recommended cattle to be loaded together on a trailer. Reduce trailer stocking density by 5 percent for cattle with horns. Be sure to reduce the number of head loaded during hot conditions. Also do not exceed the Gross Vehicle Weight Rating for the truck and trailer. Strictly adhere to safe load levels with regard to animal weight and space allocation. Ensure that adequate space is provided so that cattle have sufficient room to stand with little risk of being forced down because of overcrowding. When the vehicle is not full, safely partition cattle into smaller areas to provide stability for the cattle and the vehicle.



It is the driver's responsibility to know trailer dimensions, load only the size of cattle that will safely and humanely fit the trailer, and adhere to the maximum legal load limit for the states in which they are operating. Recommended loading examples for feeder cattle are shown for 2 trailer sizes in these diagrams. Take care when opening and closing gates. If the cattle are overloaded, there can be a great deal of tension on the gates causing them to spring forward when unlatched. Similarly, cattle can hit the gates causing them to spring forward.



Recommended loading examples for fat cattle are shown for 2 trailer sizes in these diagrams. Fewer fat cattle than feeder cattle will fit on a given trailer due to the differences in cattle size and weight.

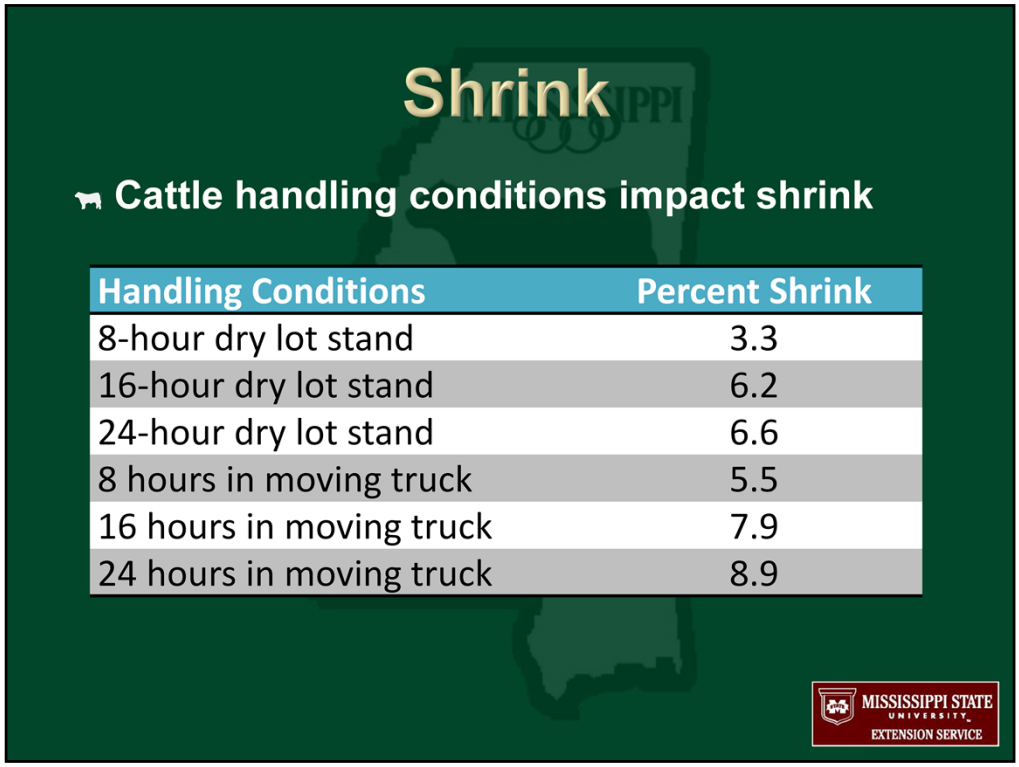


Liveweight loss in cattle that results from feed and water deprivation and transportation is commonly referred to as shrink. Shrink can also refer to a loss of weight in carcasses or retail cuts. Several factors impact shrink including transit time, transit distance, environmental conditions (weather and transit conditions), cattle handling methods, and cattle management including nutrition.

The combined effects of shipping and handling result in greater weight loss than holding cattle off of feed and water alone. Transit shrink in beef steers has been demonstrated to represent as much as 68% of the shrink from the combination of both fasting and transport. Weight loss varies depending on the circumstances, but a good rule of thumb estimate is that about 0.75% of cattle body weight will be lost per day with feed and water deprivation, and the weight loss will not necessarily be the same amount each day. When feed and water are unavailable, cattle shrink about 1% per hour for the first three to four hours and then roughly 0.25% per hour for the next eight to ten hours. This weight loss can increase several-fold when transport stress is added. Increased transit time tends to increase shrink. Increasing transit time exacerbates feed and water deprivation and leads to dehydration. Emphasizing low stress cattle handling and shipping in minimum time can benefit both buyer and seller by reducing cattle shrink, stress, morbidity, and cost to regain lost weight.

The amount of fill can affect the degree of shrink. Lush grass, silage, and haylage diets usually produce more gut fill than hay or high-concentrate diets. Cattle shipped directly off of milk and grazing may undergo a greater percentage shrink than cattle off of a preconditioning or hay and grain diet. In addition, calves shipped directly off of their dams must deal with weaning stress and possible unfamiliarity with feed bunks and water troughs. Much of this weight loss is gut fill, feces, and urine that can be easily replaced. However, some of this weight loss is actual loss of body tissue. Tissue loss takes longer to regain than weight loss from urine and feces. Because muscle contains more water than fat, higher levels of shrink are typically encountered in cattle with higher lean to fat ratios. Therefore, cattle frame size, age, sex, and body condition can impact degree of shrink.

Management strategies to deal with transport stress and reduce shrink include preconditioning programs, rest periods during and after transit, potassium supplementation, and use of electrolyte solutions. Transported or feed and water deprived cattle are challenged with a mild metabolic acidosis which may be the result of body water loss. Either electrolyte solutions or water can help alleviate this dehydration and some stress in transported cattle. Any added stress such as overloading the truck, unfamiliarity with confinement, or extreme temperature and moisture conditions can increase shrink. Cattle with temperament problems may be subject to higher levels of shrink as well. Early-weaned calves maintained onsite before shipping might be more tolerant of the stressors associated with transportation and feedlot entry.



Shrink can be managed by improving cattle handling conditions. Be familiar with weather forecasts, and avoid working or transporting cattle during extreme temperatures. Protect animals from weather during hauling.

Move slowly and quietly when handling and loading cattle. Avoid rough cattle handling. For cattle working, get help from people familiar to both the cattle managers and cattle. Sort cattle at the ranch of origin. Avoid exposing cattle to strange environments such as new pastures or pens or with new groups of cattle without preconditioning.

Do not overcrowd cattle in trailers. Group cattle into compartments to take pressure off end animals when the truck starts, turns, or stops. Avoid underloading trailers to reduce stress and bruising. Keep trips as short as possible. Prevent equipment breakdowns by maintaining scales, handling facilities, trucks, trailers, and other equipment. Allow cattle to rest during long hauls. Avoid transporting cattle on rough roads, and always provide them with good footing.

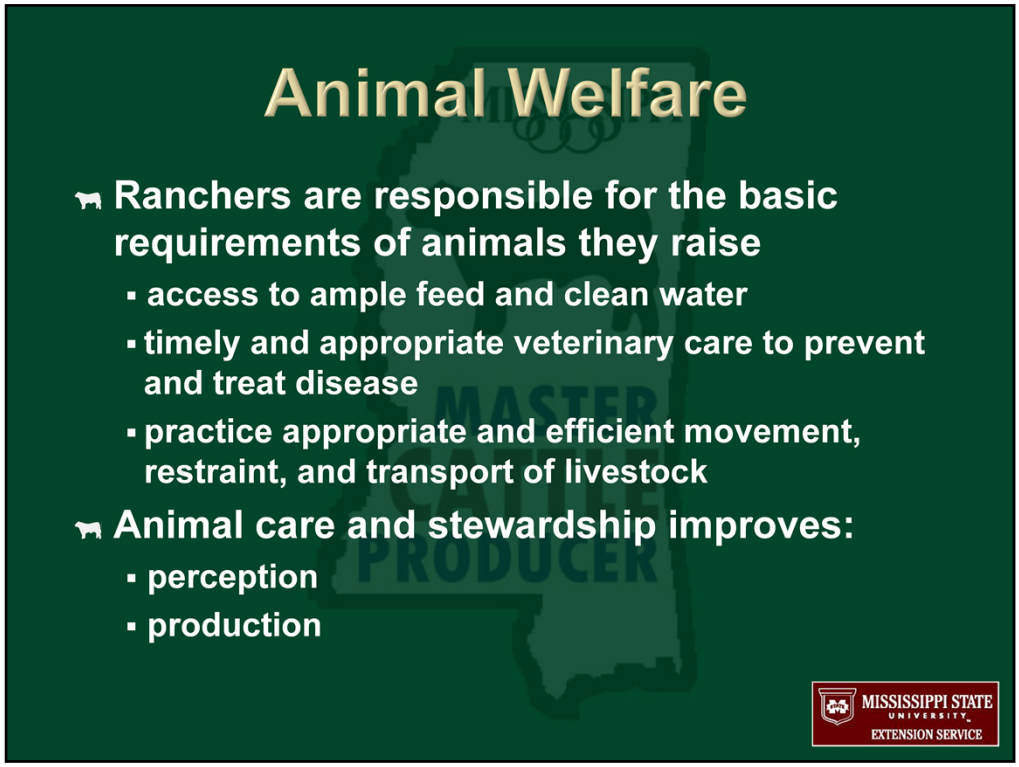
Provide feed and water to cattle when possible, paying attention to its quality during rest stops and at the destination. Avoid stressful diet changes right before shipping, and be sure to allow free-choice access to grass hay. Withhold water 2 to 3 hours before shipping. Withhold grain and alfalfa or clover hay within 12 hours of shipping due to the laxative effect of these feedstuffs on cattle. Precondition cattle coming off of lush forages or high-moisture feeds with a dry feed to limit scouring and excessive urination.

Shrink is discussed in detail in Mississippi State University Extension Service Publication 2577, “Understanding and Managing Cattle Shrink”.

Cattle must be offered adequate space for comfort, socialization, and environmental management. Pen maintenance, including manure harvesting, will help improve pen conditions. Accumulation of mud on cattle should be monitored as a measure of pen condition and cattle care in relation to weather conditions. Dust reduction measures should be used where needed to improve animal performance. Floors in housing facilities should be properly drained. Barns and handling alleys should provide traction to prevention injuries to animals and handlers. Handling alleys and housing pens must be free of sharp edges and protrusions to prevent injuries to animals and handlers. Design and operate alleys and gates to avoid impeding cattle movement. When operating gates and catches, reduce excessive noise, which may cause distress to the animals. Adjust hydraulic or manual restraining chutes to the appropriate size of cattle to be handled. Regular cleaning and maintenance of working parts is imperative to ensure the system functions properly and is safe for cattle and handlers. Mechanical and electrical devices used in cattle housing facilities must be safe. Abuse of cattle is not acceptable under any circumstances.

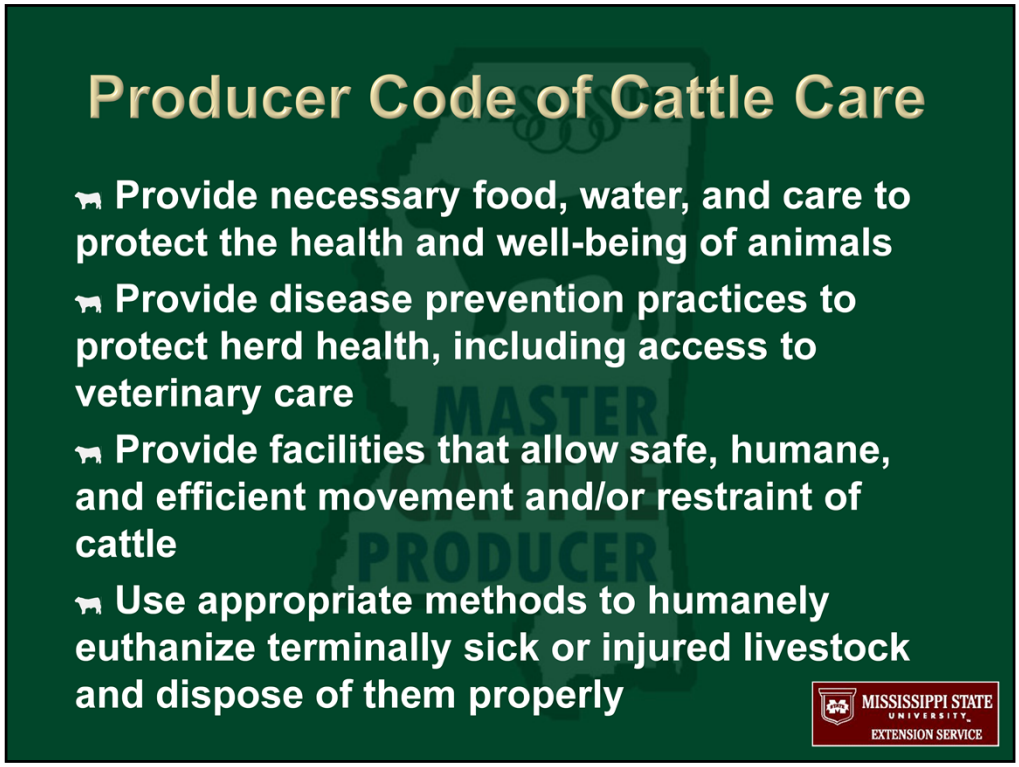
Cows with mild lameness, early eye problems such as cancer eye, mastitis, or loss of body condition should be examined to determine well-being and in some cases promptly marketed. Weaning can be less stressful by castrating and dehorning calves early in life, vaccinating against respiratory diseases prior to weaning, and providing proper pre-weaning nutrition. Diets for all classes of beef cattle should meet the recommendations of the National Research Council (NRC) and/or recommendations of a qualified nutritional consultant. Cattle must have access to an adequate water and feed supplies. Avoid feed and water interruption longer than 24 hours. Feedstuffs should be of satisfactory quality to meet nutritional needs. Use only USDA, FDA, and EPA approved feed products and additives for use in cattle. Use these products in accordance with the approved product use guidelines.

Euthanasia is humane death occurring without pain and suffering. The decision to euthanize an animal should consider the animal's welfare. Reasons for euthanasia include: severe emaciation, weak cattle that are non-ambulatory or at risk of becoming downers; downer cattle that will not sit up, refuse to eat or drink, have not responded to therapy, and have been down for 24 hours or more; rapid deterioration of a medical condition for which therapies have been unsuccessful; severe, debilitating pain; compound (open) fracture; spinal injury; central nervous system disease; and multiple joint infections with chronic weight loss.

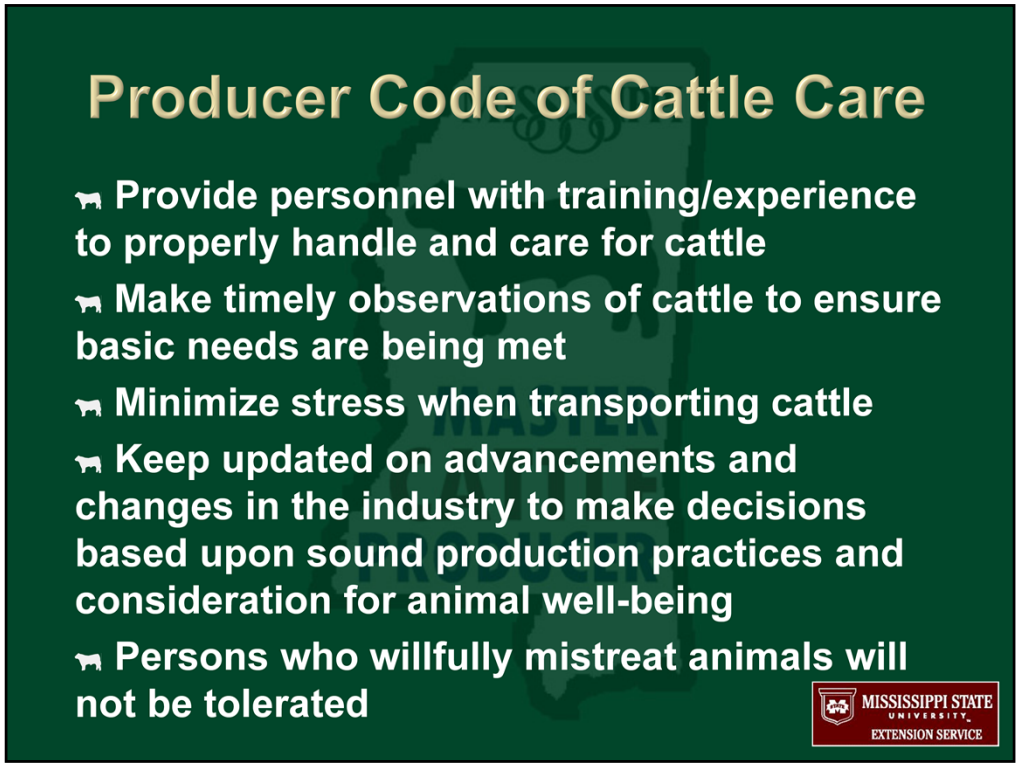


Animal welfare is the basis of sound animal husbandry. Beef cattle ranchers should consider themselves stewards of a valuable resource that provides high quality protein products to many people throughout the world. By engaging in beef cattle production, the producer agrees to an unwritten set of guidelines for ensuring that they provide the basic requirements to the cattle they own or manage. These basic requirements include: allowing daily access to ample feed and clean water, providing the appropriate health care for preventing and/or treating disease or injury, and handling those cattle in a manner that does not exert undue stress or hardship.

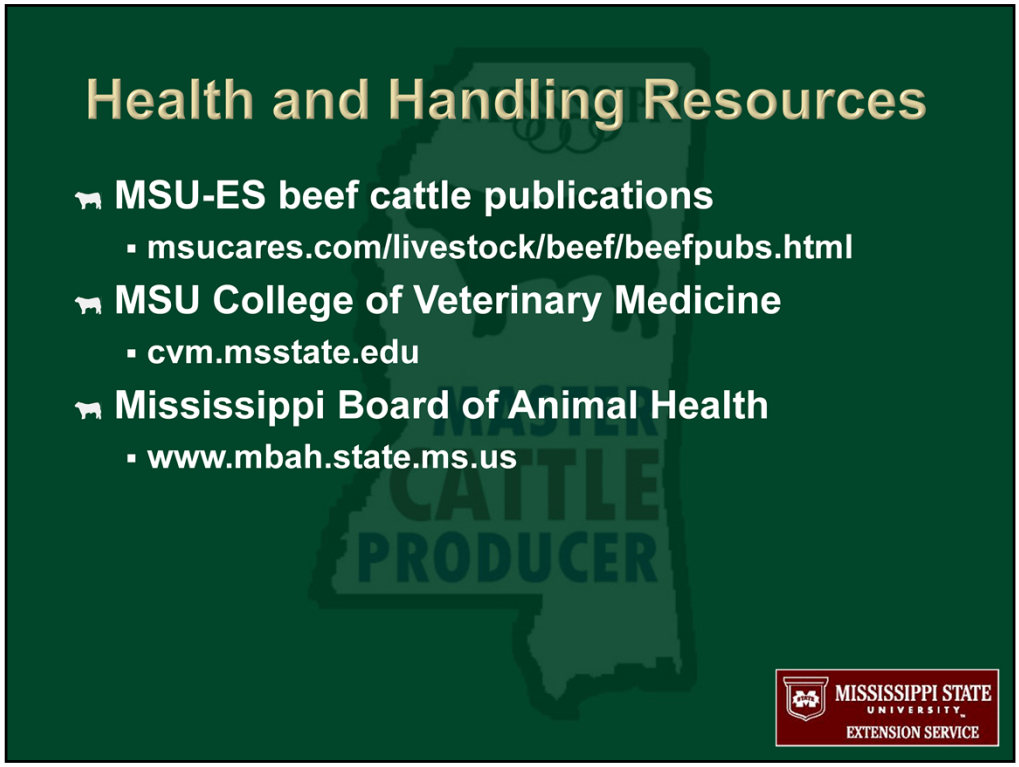
Management programs should be science-based and common sense driven. Management practices should be informally assessed every day to ensure that animal welfare is not compromised. Self-reviews should be periodically conducted by those involved with cattle handling and care. By following these very basic, but extremely important, tenets (as outlined in the National and Mississippi Beef Quality Assurance Programs), reasonable production levels can be maintained and the public perception of beef cattle production should remain favorable.



Beef cattle producers take seriously their responsibilities to provide proper care to cattle. The Code of Cattle Care includes general recommendations for care and handling of cattle.



All cattle handlers and caregivers should follow the Producer Code of Cattle Care. Ensure that employees of the cattle operation receive proper instruction, training, and oversight. Do not tolerate anyone who willfully mistreats cattle.



Mississippi State University Extension Service herd health and handling **beef cattle publications** are available online at http://msucares.com/livestock/beef/beefpubs.html. This includes the publications referenced in this training module.

The Mississippi State University College of Veterinary Medicine provides beef cattle health educational support and veterinary services. The CVM website is http://cvm.msstate.edu.

The Mississippi Board of Animal Health includes the Office of the State Veterinarian. The MBAH website is http://www.mbah.state.ms.us.