Herd Health

Health Management

For efficient use of time, labor, money, and other resources, cattle herds should have a comprehensive herd health management program that involves, but is not limited to:

- herd immunization (vaccination)
- parasite control (internal and external)
- proper culling guidelines
- biological risk management (biosecurity)
- nutrition
- reproductive management
- Beef Quality Assurance (BQA)

Contact your local veterinarian, extension agent, state extension specialists (e.g., nutritionists, geneticists, reproductive physiologists, environmental experts), and others to gather the information you need to develop an effective herd health management program that meets the specific needs of your operation.

Bovine Immunization Guidelines

A successful herd health program involves proper herd immunization (vaccination) to prevent and control a variety of infectious diseases. However, selecting the proper vaccines for your herd can be a difficult task, considering the large number of vaccines that are available. Some things to consider when developing a vaccination program for your herd are:

- Determine the goals of your vaccination program. What diseases do you want to prevent and control, and in what type/age animal? Different herds will have different goals and vaccination protocols.
- Discuss these goals with your herd health veterinarian and extension agent.
- Understand a vaccine’s expected level of protection.
Vaccines are generally categorized as killed vaccines (KV), toxoids, modified live vaccines (MLV), or chemically altered vaccines. Each category has its advantages and disadvantages.

**Table 1. Killed Vaccines (KV) and Toxoids**

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Available for many diseases.</td>
<td>• More likely to cause allergic reactions and post-vaccination lumps.</td>
</tr>
<tr>
<td>• No risk of the vaccine organism spreading between animals.</td>
<td>• Two initial doses required.</td>
</tr>
<tr>
<td>• Minimal risk of causing abortion.</td>
<td>• Slower onset of immunity.</td>
</tr>
<tr>
<td>• No on-farm mixing required.</td>
<td>• Immunity is usually not as strong or long-lasting when compared to MLV products.</td>
</tr>
<tr>
<td></td>
<td>• Usually more expensive than MLV products.</td>
</tr>
</tbody>
</table>

**Table 2. Modified Live Vaccines (MLV)**

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One initial dose may be sufficient, but boosters are sometimes required.</td>
<td>• Risk of causing abortion or transient infertility, therefore they should generally be administered 6 to 8 weeks prior to the breeding season.</td>
</tr>
<tr>
<td>• Stimulate more rapid, stronger, and longer-lasting immunity than KV products.</td>
<td>• Must be mixed on-farm and used within about 30 minutes.</td>
</tr>
<tr>
<td>• Less likely to cause allergic reactions and postvaccination lumps.</td>
<td></td>
</tr>
<tr>
<td>• Usually less expensive than KV products.</td>
<td></td>
</tr>
</tbody>
</table>
Vaccines are available for many diseases. However, not all diseases are a routine threat to many beef herds, and some vaccines are not sufficiently effective to justify their use. Therefore, every cattle operation will have unique vaccination requirements based on individual herd goals. The following guidelines for vaccinating cattle may not be applicable in all situations. The best use of these guidelines is as a starting point to develop an effective vaccination protocol with your herd health veterinarian or extension agent. When appropriate, ensure products are safe for pregnant animals and for calves nursing pregnant cows. Properly store and administer vaccines according to label directions, adhere to designated meat withdrawal times, and follow all other BQA guidelines.

**Table 3. Chemically Altered Vaccines**

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Share many of the advantages of MLV products.</td>
<td>• Two initial doses required.</td>
</tr>
<tr>
<td>• Safety is similar to KV products.</td>
<td>• Slower onset of immunity than MLV product.</td>
</tr>
<tr>
<td>• Minimal risk of causing abortion.</td>
<td>• Immunity is usually not as strong or long-lasting when compared to MLV products.</td>
</tr>
<tr>
<td></td>
<td>• Usually more expensive than MLV products.</td>
</tr>
<tr>
<td></td>
<td>• Must be mixed on-farm and used within about 30 minutes.</td>
</tr>
</tbody>
</table>

**Nursing Calves**

- 7-way clostridial (blackleg)
- IBR/BVD/PI3/BRSV
  - IBR = infectious bovine rhinotracheitis
  - BVD = bovine viral diarrhea
  - PI3 = parainfluenza3
  - BRSV = bovine respiratory syncytial virus
- Calfhood vaccination for brucellosis if recommended by herd veterinarian
- Leptospirosis 5-way vaccine for future replacement heifers and bulls (Leptospirosis 5-way vaccination may not be necessary for future feeder calves, depending on location.)
Preconditioned Feeder Calves

- IBR/BVD/PI3/BRSV
- 7-way clostridal (blackleg)
- *Mannheimia haemolytica*
- *Pasteurella multocida*

Breeding Animals

Replacement heifers, cows, and bulls should generally be vaccinated 6 to 8 weeks prior to the breeding season so immunity is high during the breeding season.

- IBR/BVD/PI3/BRSV
- Leptospirosis 5-way
- Vibriosis (*Campylobacter fetus*)

Understanding Protection Claims on Vaccine Labels

The Center for Veterinary Biologics (CVB), which is part of the Animal and Plant Health Inspection Service (APHIS) of the USDA, is the agency that grants the appropriate protection claims for vaccines based on a thorough analysis of supporting efficacy and safety data. Protection claims are available on all vaccine labels or product inserts. Understanding label claims is therefore one way to evaluate the expected efficacy of a vaccine. Remember, these claims only apply when products are administered according to label directions. The USDA can grant one of five possible levels of protection statements:

1. Prevention of infection  
2. Prevention of disease  
3. Aid in disease prevention  
4. Aid in disease control  
5. Other claims  

Highest level of protection  
Lowest level of protection
What do these label claims mean?

**Prevention of infection.** Prevents all colonization or replication of the challenge organism. A label statement such as “for the prevention of infection with [specific microorganism]” may be used. This claim is rarely granted.

**Prevention of disease.** Highly effective in preventing clinical disease. A label statement such as “for the prevention of disease due to [specific microorganism]” may be used.

**Aid in disease prevention.** Aids in preventing disease by a clinically significant amount. A label statement such as “as an aid in the prevention of disease due to [specific microorganism]” may be used.

**Aid in disease control.** Aids in the reduction of disease severity, duration, or onset. A label statement such as “as an aid in the control of disease due to [specific microorganism]” or a similar one stating the product’s particular action may be used.

**Other claims.** Products with beneficial effects other than direct disease control.

These protection statements are outlined by the USDA, APHIS, Veterinary Services Memorandum No. 800.202, June 14, 2002.

Cattle Parasites

Effectively controlling internal and external cattle parasites is an economically important management practice.

**Common Internal Parasites**

- The brown stomach worm (*Ostertagia ostertagi*) is the most common internal cattle parasite.
- A variety of other gastrointestinal worms and lungworms also affect cattle.

**Consequences of Internal Parasitism**

- Reduced appetite
- Protein loss from damaged tissues
- Anemia (in some cases)
- Impaired immune function
- Decreased weight gain
- Decreased milk production
- Decreased reproductive performance
- Less beef per acre produced
Controlling Stomach, Lung, and Intestinal Worms

- Many dewormers (anthelmintics) are available for controlling stomach, lung, and intestinal worms in cattle. Consult your herd health veterinarian or extension agent for product recommendations and treatment schedules specific to your operation.
- Always read product labels carefully for storage, dosage, route of administration, and withdrawal guidelines. Following label directions ensures product efficacy, safety, and promotes the production of safe, wholesome food.
- When applicable, always make sure the product used is safe for pregnant animals.
- The long-acting dewormers listed in table 4 protect against reinfection for a prolonged period of time after administration. The duration of this persistent activity depends on the product and the parasite, so consult individual product labels for specific information.
- The trade names listed in table 4 are used to give specific examples. This list is not all inclusive. The Alabama Cooperative Extension System does not endorse or guarantee any product.

Table 4. Common Dewormers Used to Control Stomach, Lung, and Intestinal Worms in Cattle

<table>
<thead>
<tr>
<th>Drug Ingredient</th>
<th>Trade Name Examples</th>
<th>Long-acting</th>
<th>Short-acting</th>
<th>Pour-on</th>
<th>Injectable</th>
<th>Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albendazole$^1$</td>
<td>Valbazen$^1$</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Doramectin</td>
<td>Dectomax$^6$</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eprinomectin</td>
<td>Eprinex$^6$</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>Panacur$^6$ Safe-Guard$^6$</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ivermectin</td>
<td>Ivomec$^6$</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Levamisole</td>
<td>Levasole$^6$</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Moxidectin</td>
<td>Cydectin$^6$</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Oxfendazole</td>
<td>Synanthic$^6$</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

$^1$ Do not use in early pregnancy.
Common External Parasites

- Horn flies
- Stable flies
- Face flies
- Horse flies
- Lice
- Ticks
- A variety of other biting insects

Consequences of External Parasitism

- Anemia (in some cases)
- Decreased weight gain
- Decreased milk production
- Decreased reproductive performance
- Less beef per acre produced
- Damaged hides
- Many external parasites also transmit diseases

Controlling External Parasites

- External parasites are a nuisance that cattle must spend time and energy warding off. The more time and energy devoted to fighting external parasites means less time and energy is devoted to being productive.

- Many sprays, back-rubs, dusts, feed additives, and ear tags are available for controlling external parasites. Some dewormers used for controlling internal parasites also control external parasites (endectocides). Consult individual product labels for specific information.

- Horn fly resistance to insecticides is a serious problem, but it can be managed with appropriate rotation between classes of insecticides. Do not just rotate product names as different product names may actually be in the same chemical class. Consult table 5 for help differentiating product ingredients by chemical class. In general, do not use different chemical classes of insecticides in the same year. For example, do not use a pyrethroid ear tag with an organophosphate spray in the same year. When used together during the same year, flies develop resistance to both classes of insecticides simultaneously. However, it is appropriate to use endectocides (e.g., Ivomec®, Cydectin®, Dectomax®) along with another chemical class of insecticide.
The products used and the treatment protocol depend on a number of factors such as:
- What products have been used in the past?
- Has resistance become a problem on your operation?
- How close are neighboring herds, and what products are they using?

With so many factors to consider, it is very important to consult your herd health veterinarian or extension agent for product recommendations and treatment protocols specific to your operation.

Table 5. Categories of Insecticide Chemical Classes and Active Ingredients

<table>
<thead>
<tr>
<th>Insecticide Chemical Class</th>
<th>Representative Active Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endectocides</td>
<td>milbemycin</td>
</tr>
<tr>
<td></td>
<td>avermectin</td>
</tr>
<tr>
<td>Endosulphan</td>
<td>endosulfan</td>
</tr>
<tr>
<td>Organophosphates</td>
<td>chlorpyrifos</td>
</tr>
<tr>
<td></td>
<td>coumaphos</td>
</tr>
<tr>
<td></td>
<td>diazinon</td>
</tr>
<tr>
<td></td>
<td>dichlorvos</td>
</tr>
<tr>
<td></td>
<td>fenthion</td>
</tr>
<tr>
<td></td>
<td>phosmet</td>
</tr>
<tr>
<td></td>
<td>pirimiphos-methyl</td>
</tr>
<tr>
<td></td>
<td>tetrachlorvinphos</td>
</tr>
<tr>
<td></td>
<td>trichlorfon</td>
</tr>
<tr>
<td>Pyrethroids</td>
<td>cyfluthrin</td>
</tr>
<tr>
<td></td>
<td>cypermethrin</td>
</tr>
<tr>
<td></td>
<td>fenvalerate</td>
</tr>
<tr>
<td></td>
<td>lambda-cy-halothrin</td>
</tr>
<tr>
<td></td>
<td>permethrin</td>
</tr>
<tr>
<td></td>
<td>zetacypermethrin</td>
</tr>
<tr>
<td>Pyrethrins</td>
<td>pyrethrins</td>
</tr>
</tbody>
</table>
Growth-Stimulating Implants

When used correctly, growth-stimulating implants offer the commercial cattle producer a fast, easy-to-use method of increasing the weaning weights of calves. If producers adhere to label directions, beef from cattle properly treated with implants is just as safe as beef from nonimplanted cattle. Follow all label directions to maximize the safety and effectiveness of implants. Generally, male calves should be implanted when they are castrated. Do not implant replacement heifers or bull calves that are intended for breeding. Implanting replacement heifers and bulls can retard the development of the reproductive organs, resulting in sub-fertility.

Correctly Administering Implants
(See product labels for specific instructions.)

1. Properly restrain the animal.
2. Determine which ear to implant. Implant all calves in the same ear to minimize confusion.
3. Clean the implant gun needle and implant site with a disinfectant to reduce contamination of the needle wound. (Disinfect the implant gun needle between animals.)
4. Once the ear is clean, proceed with the implantation process. Do not implant a dirty ear as this greatly increases the chances for implant site infections.
5. Select the proper implant site on the back of the ear (Figure 1).
6. Grasp the ear with one hand while using your other hand to position the implant gun parallel to and nearly flush with the ear.
7. Put the point of the needle against the ear with the beveled part facing outward.
8. Use the tip of the needle to prick the skin. Then, lift slightly to completely insert the needle under the skin. Place the implant needle between the skin and cartilage in the middle third of the ear.
9. Depress the plunger of the implant gun, and withdraw the needle.
10. Feel the ear for the implant under the skin to ensure proper placement.
**Precautions to Take When Implanting Cattle**

- The animal may throw its head when you grasp its ear and insert the needle. To prevent this, use a nose lead, halter, or a head gate equipped with a head and nose bar.
- Avoid piercing or cutting ear veins with the needle.
- Do not allow the needle to gouge or pierce through the cartilage. If resistance is felt when inserting the needle, it is quite probable that the cartilage has been gouged. Pellets may be covered with scar tissue and walled off, resulting in poor drug absorption and decreased gain.
- Never sacrifice a careful implantation technique for speed.

*Figure 1. Proper implant site*
Annual Cow Evaluation: “Seven Quality Checks”

Performing an annual cow evaluation allows producers to treat or cull less productive or undesirable cows. The seven quality checks listed below are a starting point for evaluating a cow’s reproductive performance, as well as detecting physical abnormalities that may hamper its production. The performance of a cow’s progeny should also be evaluated.

- **Pregnancy**—Perform a pregnancy check every year, and cull open cows before spending extra money on feed.
- **Eyes**—*Bovine Ocular Neoplasia* or “cancer eye” is a common cause of cow carcass condemnation. Cancer eye can rapidly become severe (resulting in blindness) and spread to other parts of the body (resulting in carcass condemnation) if not detected early.
- **Mouth**—Cows must have adequate teeth to harvest forage for body condition maintenance and milk production to support calf growth.
- **Feet and legs**—Lame cows have a difficult time grazing, as well as walking to feed bunks or water. As a result, they lose body condition, wean poor calves, and do not rebreed. Some causes of lameness are treatable.
- **Udder**—It takes a good udder to produce sufficient milk to raise a good calf. Look for “blind quarters” (quarters that are not producing milk) and “bottle teats” (teats that are large and difficult to nurse).
- **Body condition**—Thin cows lack energy reserves and usually do not rebreed.
- **Disposition**—Cows with bad dispositions often produce excitable calves that do not gain as well in the feedyard and may produce undesirable “dark cutting” meat. They can also make working the herd difficult and dangerous.

Determining the Age of Cattle

A common method for determining the age of cattle is by examining the teeth, as illustrated in figure 2. Some things to consider when aging cattle by their teeth:

- **Mature cattle** have thirty-two teeth, eight of which are incisors in the front of the mouth on the lower jaw. (There are no upper incisors.)
- **Aging cattle** by their teeth requires evaluating the time of appearance (eruption) and the degree of wear of the temporary and permanent incisors (Table 6).
Temporary teeth (milk teeth) are easily distinguished from permanent teeth by their whiter color and smaller size.

The degree of wear is affected by the type of feed the animal consumes. Under rough feed conditions, teeth are worn at a much faster rate.

Several years after a tooth erupts, the neck of the tooth begins showing above the gum line (Table 6). The neck is a narrow area seen at the base of the tooth.

Table 6. Guidelines for Aging Cattle

<table>
<thead>
<tr>
<th>Teeth (Permanent)</th>
<th>Eruption</th>
<th>In Wear (Typically 6 Months After Eruption)</th>
<th>Neck of Tooth Visible Above Gum Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>First incisors (I₁) (two central incisors)</td>
<td>1 ½ to 2 years</td>
<td>2 to 2 ½ years</td>
<td>6 years</td>
</tr>
<tr>
<td>Second incisors (I₂)</td>
<td>2 to 2 ½ years</td>
<td>2 ½ to 3 years</td>
<td>7 years</td>
</tr>
<tr>
<td>Third incisors (I₃)</td>
<td>3 years</td>
<td>3 ½ years</td>
<td>8 years</td>
</tr>
<tr>
<td>Fourth incisors (I₄) (two outer incisors)</td>
<td>3 ½ to 4 years</td>
<td>4 ½ years</td>
<td>9 years</td>
</tr>
</tbody>
</table>

1 Based on when permanent incisors erupt, are “in wear,” and when the neck of the tooth is visible above the gum line.
Biosecurity (Biological Risk Management)

A biosecurity plan is an innovative approach to managing the risk of disease introduction and spread on your livestock operation. A biosecurity plan is designed to help livestock producers identify disease risks and manage them through practical measures for common, everyday infectious diseases, as well as new or unexpected diseases. An effective biosecurity plan manages disease by evaluating and addressing the primary routes of disease transmission, therefore controlling several diseases at one time. There are five primary routes of disease transmission: aerosol, direct contact, fomite or traffic, oral, and vector transmission.

- **Aerosol transmission** occurs when disease agents contained in droplets pass through the air from one animal to another. Close proximity of infected and susceptible animals is typically required for aerosol transmission.
- **Direct contact transmission** of disease agents occurs when a susceptible animal directly touches an infected animal or its open wounds, mucous membranes, blood, saliva, nose-to-nose contact, rubbing, or biting.
- **Fomite transmission** occurs when a disease pathogen is carried or spread from one animal to another by an inanimate object such as boots, buckets, and milking or grooming equipment. Vehicles, trailers, and even humans can also be considered fomites and can spread disease through traffic transmission.
- **Oral transmission** occurs when an animal licks or chews on contaminated environmental objects or consumes contaminated feed or water.
- **Vector-borne transmission** involves the spread of disease through an insect. Ticks and mosquitoes are biological vectors. These insects commonly become infected from a diseased animal, and then spread the disease by injecting the disease agent into another animal. Flies are a common mechanical vector, simply carrying the disease agent on their body and passing it from animal to animal.

A biosecurity plan involves multiple components and results in practical measures for implementation. The first step involves assessing the risk areas on a livestock facility based on a “routes of disease transmission” approach. After identifying risk areas, determine disease management measures, prioritize, and start them.
The following are examples of biosecurity practices that will greatly minimize the risk of disease transmission:

• Do not intentionally commingle animals from different herds.
• Provide a buffer between adjoining herds so no fence-line contact is available.
• Isolate new herd additions for 4 to 6 weeks and test for appropriate diseases before allowing new animals to commingle with your herd. Identify isolation areas prior to purchase.
• Isolate animals returning from livestock shows.
• Post signs indicating that a biosecurity plan is in effect.
• Educate all visitors about the biosecurity plan in effect.
• Ensure that all visitors are dressed appropriately. Provide coveralls and boots, or make sure visitors are wearing clothing free from contact with other cattle.
• Recognize that you are also a source of contamination for your herd. If you are around other cattle, shower and change clothes before working with your livestock.
• Clean and disinfect your truck and trailer after hauling cattle. Anyone hauling cattle for you should do the same.
• Clean and disinfect other equipment as necessary.
• Apply appropriate insect control.

Your Veterinarian’s Role in Herd Health

Your veterinarian plays an important role in preventing, diagnosing, and treating disease. Selecting the right treatment depends on accurately diagnosing the problem. Work with your local veterinarian to develop a health care program designed to fit your specific needs. Establish a valid veterinarian-client-patient relationship (VCPR).

Veterinarian-Client-Patient Relationship

• Your veterinarian is responsible for the health care of your herd.
• You follow your veterinarian’s treatment and drug withdrawal instructions.
• Your veterinarian is familiar with the animals on your farm.
• Your veterinarian is available for follow-up visits.
The Decision to Treat

Even with superior herd management, some animals will become sick. The decision to treat them should be based on specific criteria. Answering questions such as the following could be helpful as you make your decision:

- Will the animal return to a healthy, productive state without treatment?
- Will treatment return the animal to a healthy, productive state?
- What treatment best fits the disease and herd management?
- Should the animal be sold?
- Should the animal be euthanized?

Understanding, Storing, and Administering Drugs

Understanding Drug Labels

All products, including antibiotics, hormones, vaccines, dewormers, pain medications, and feed additives, should be used according to label directions to achieve maximum product efficacy.

Following label directions includes proper product storage, route of administration, reason for administration (indication), and dose administered. Any deviation from label directions will result in decreased product efficacy and is illegal in many situations.

You are ultimately responsible for any drug residues in your animals. Therefore, it is crucial that you become familiar with drug labels. All drugs, whether over-the-counter (OTC) or prescription (Rx), contain the following basic information on the label:

- Name of drug
- Active ingredients
- Instructions for use
- Withdrawal times
- Quantity of contents
- Name of distributor
- Any other cautionary statements
Types of Drugs

Over-the-Counter (OTC)
- Can be administered by a producer without the order of a veterinarian.
- Can only be used according to the label directions. It is illegal for a producer to use an OTC product in any manner other than what is prescribed on the label. A veterinarian can prescribe “extra-label” use of an OTC product when necessary.

Prescription (Rx)
- Cannot be administered by producers unless prescribed by a veterinarian.
- Label contains the statement “Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian.”

To reduce the chance of adverse reactions and to minimize the risk of residues, read and follow all instructions on product labels. Instructions include:
- Dosage—example: “4 ml or cc”
- Timing (how often and how many times given)—example: “two doses, 3 days apart”
- Route of administration—example: “intramuscular”
- Warnings or indications—example: “Not for use in pregnant animals.”
- Withdrawal times, if any—example: “Do not use within 28 days of slaughter.”
- Storage—example: “Store at 2 degrees – 7 degrees C.”
- Disposal—“Burn container and all unused contents.”
- Shelf life—expiration date

Failure to understand a product label is not a defense if meat from one of your animals is found to contain drug residues. Contact your local veterinarian or extension agent if you have questions.
Extra-Label Drug Use

• Extra-label drug use can only be prescribed by a veterinarian.
• A cattle producer cannot use drugs (including OTC drugs) in an extra-label manner without a veterinarian’s prescription. This is off-label and illegal.
• Administering products according to label directions includes dosage, route of administration, reason for administration, and adhering to proper withdrawal times.
• A VCPR must exist for extra-label drug use:
  o The veterinarian knows the producer, is familiar with the farm or ranch and its practices, and is involved in the herd health practices on the operation.
  o The veterinarian and producer must make sure the animal is properly identified, assign meat and milk withdrawal times, and abide by these withdrawal times to ensure no illegal residues occur.
• Veterinarians are prohibited from using some antibiotics in an extra-label manner.
• Extra-label use of feed medications is prohibited.
• Extra-label use of hormones is prohibited.
• Use of any estrogenic compound in a food animal is prohibited.

Off-label use of vaccines is not illegal, but such use may reduce the efficacy of the vaccine, as well as release the manufacturer from any product liability. In other words, if a vaccine is stored and administered according to all label directions and supported by proper documentation, then in the case of an adverse event related to the product, the manufacturer might be liable. If, however, vaccines are used in an off-label manner, manufacturers are released from all product liability. Therefore, to maintain maximum product efficacy and product liability, it is strongly recommended to use all vaccines according to label directions.

Storing Drugs Correctly

Drug performance declines if the expiration date has passed, the storage temperature is too hot or too cold, or the drugs have been exposed to air or light. All the information you need to meet these requirements should be on the label of the drug container.
• Check the expiration date on the label.
• Do not save vaccines. They will not be effective for later use and may be contaminated.
• Some drugs, and most vaccines, need to be refrigerated at 40 to 50 degrees Fahrenheit and must not be frozen. Keep an accurate thermometer in your refrigerator to monitor the temperature.
Use disposable syringes. Use clean needles to draw contents from multidose bottles. Change needles every ten to fifteen animals to minimize disease spread and drug contamination. Do not store medication in syringes. They cannot be labeled easily.

Avoid exposing vaccines and other medicines to direct sunlight. This may degrade the product. Use an insulated cooler for storing syringes and drugs while working on cattle to avoid sunlight and to maintain the proper temperature.

Collect used needles in a rigid plastic container. Return used needles to your veterinarian for disposal. Destroy disposable syringes so they cannot be reused or misused. Read labels. Some drugs and vaccine containers require incineration before disposal. Used needles and scalpels are considered medical waste and must be handled and disposed of in accordance with laws which govern them.

Consult your local veterinarian with questions on proper use of medications.

Administering Drugs Properly

Administering drugs properly is important for the proper action of the drug and for the prevention of injection site lesions and violative drug residues. The best way to avoid problems is to simply follow label instructions, identify each animal that receives the drug at the time it is administered, and administer the drugs correctly. Proper administration includes selecting the route of administration, choosing the correct needle, choosing the injection site, practicing good sanitation, handling drugs correctly, and applying proper restraint.

Select the best route of administration. Drugs can be administered many different ways, including:

- Oral
- Intravenous
- Topical
- Subcutaneous (SubQ = under the skin)
- Intramammary
- Intramuscular (IM = in the muscle)
- Intranasal
Most injections are administered either subcutaneously (under the skin) or intramuscularly (into a muscle) as illustrated in figures 3 and 4. The product label provides an acceptable route of administration. In some cases, the label may specify more than one route of administration. If the label allows for either subcutaneous or intramuscular administration, give the drug subcutaneously to reduce the chances of violative residues and lesions in the muscle.

Choose the best location for the injection (Figure 5). The best location for an injection is not necessarily the most convenient one. It is the site where the product will be most beneficial without damaging expensive cuts of meat.

- Keep all injections in front of the shoulder.
- **Never inject into the buttock or top of the rump.**
- For both vaccines and antibiotics, the triangular mass of neck muscle is the only acceptable site for IM and SubQ injections (Figure 5).
- Never inject more than 10 ml (cc) into one site.
- When making multiple injections, keep injection sites at least 5 inches apart, being careful not to reuse injection sites.
- To minimize the risk of an injection site lesion, avoid injecting in wet or manure-covered areas.
Choose the correct needle. The correct needle size and length is important to ensure that the entire dose of the drug gets into the animal properly with the least amount of tissue damage. Selecting the proper needle size will also reduce the chances of needle breakage. See table 7 for proper needle size selection.

Table 7. Needle Selection Guide

<table>
<thead>
<tr>
<th>Weight</th>
<th>Intramuscular (IM)</th>
<th>Subcutaneous (SubQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300 pounds</td>
<td>18 ¾ to 1</td>
<td>18 to 20 ½ to ⅝</td>
</tr>
<tr>
<td>300 to 700 pounds</td>
<td>16 to 18 ¾ to 1</td>
<td>16 to 18 ½ to ⅝</td>
</tr>
<tr>
<td>Over 700 pounds</td>
<td>16 ¾ to 1</td>
<td>16 to 18 ½ to ⅝</td>
</tr>
</tbody>
</table>

**Figure 5.** Acceptable injection sites for cattle

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**Table 7. Needle Selection Guide**

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</table>
Livestock Carcass Disposal

An unfortunate consequence of raising livestock is the inevitable death of some animals, despite even the best animal husbandry and veterinary care. Livestock owners must therefore understand responsible carcass disposal to protect their herds from various infectious diseases, protect the environment, and maintain the reputation of the livestock industry. Proper carcass disposal first and foremost ensures the safety of your herd by potentially removing the source of a variety of infectious diseases, as well as protecting wildlife from the same diseases. Proper carcass disposal also helps avoid environmental problems and the bad publicity the livestock industry receives when carcasses are found in inappropriate places such as creeks, ponds, and along the side of the road.

Alabama law requires carcass disposal within 24 hours by one of the following approved methods:

- Burial
  - Animals must be buried at least 2 feet below the surface of the ground.
  - Burial is not an option in those parts of Alabama with a high water table.
  - The Natural Resources Conservation Service (NRCS) is available to help identify appropriate livestock burial sites that meet Alabama Department of Environmental Management (ADEM) regulations.

- Burning/incineration
  - If you use an incinerator to burn mortalities, use one approved by the ADEM Air Division.

- Dispose of the carcass in an approved landfill. Contact your local landfill for more information.

- Four Alabama Department of Agriculture Veterinary Diagnostic Laboratories are available to perform an examination into the cause of death (necropsy), and then dispose of the carcass. See Appendix B for locations and contact information. Alabama Veterinary Diagnostic Laboratories should only be used when the cause of death needs to be determined.

Failure to properly dispose of a carcass is against the law, not responsible, and potentially detrimental to herd health and the environment. Care must be taken not to contaminate the water table, creeks, ponds, rivers, and watersheds when disposing of a carcass. If you need assistance, contact ADEM at (334) 394-4309, your local NRCS district office, or the Alabama Cooperative Extension System.