Introduction

What is Beef Quality Assurance?

Beef Quality Assurance (BQA) is a producer driven program in which cattle producers, from the cow-calf producer to the feedlot sector, assume responsibility for producing beef that is a healthy, wholesome, quality product and free from defects such as injection-site lesions and bruises. Producers in BQA programs keep detailed records of husbandry practices and treatments performed on their cattle. Further, producers involved in BQA programs assure their management, husbandry, and animal health practices meet regulatory and industry standards for these practices.

History of Beef Quality Assurance

In the 1980s cattlemen began investigating ways to ensure their production practices were safe and would pass the scrutiny of the consumer. Through the leadership of the National Cattlemen's Beef Association (NCBA), the U.S. beef industry started to focus its attention on producing a "quality" product. "Quality" is defined many ways, depending on the person or industry. Current trends in defining "quality" concentrate on harvest and fabrication. The focus is centered on producing products that are free from defects, consistent, compliant with harvest and fabrication specifications, and meet or exceed customer expectations.

The United States Department of Agriculture – Food Safety Inspection Service (USDA–FSIS) began working with the beef industry in 1982 to develop the Pre-harvest Beef Safety Production Program. Involvement with BQA provides cattle producers an important key for avoiding additional governmental regulation. The USDA's Food Safety Inspection Service has commended the National BQA Program, as 47 states are involved in the voluntary program. Producer driven programs have proven very successful and will continue to allow the industry needed flexibility to produce safe and wholesome food in an economical manner.

In the 1980s, the demand for beef in the United States dropped dramatically. The beef industry began investigating reasons for this sharp decrease. One overwhelming conclusion was that consumers were not satisfied with the end product they were receiving. By and large, the public felt they were paying too much for a product that was not meeting their standards.

The U.S beef industry has taken the initiative to look at quality and see how beef meets the specifications set by the end-users of their product with the outcomes of three National Beef Quality Audits. An outgrowth of the quest for quality spawned the first quality audit of the beef industry completed in 1991. The 1991 quality audit was completed as a benchmark study. Improvements are difficult to measure if a benchmark is not available to identify the problems, as well as confirm industry positives. The initial audit in 1991 also allows improvement of deficiencies to be documented.

Goals of the North Dakota Beef Quality Assurance Program

North Dakota Beef Quality Assurance is an educational program to enhance the reputation and promotion of North Dakota beef by assuring the production of a consistently wholesome and healthy product.

Why producers should be involved in NDBQA

Producers should be involved in the BQA program to assure each segment of the beef industry, from the cow-calf producer to the end consumer, that the product they are purchasing is safe, healthy, and wholesome and produced following beef quality assurance guidelines. Producing beef in a manner that follows BQA guidelines can assure the consumer that beef is safe, wholesome, and of high quality.

Economically, there is potential for receiving a premium for calves that are "source verified." Feedlots have a huge interest in verifiable records of the production and husbandry practices that have been performed on the cattle entering their lots. In some areas, producers are currently receiving a $3 to $5 premium for "source verified" calves that were worked once at branding and sold through the local auction market.

Source verification is the ability to continually follow animals through the stages of production (from the cow-calf level to the slaughter level). Source verification is the most useful when records of production, husbandry, and animal health practices performed on these animals are kept in each phase of production and transferred with the animals as they progress through each stage.

Participating in the North Dakota Beef Quality Assurance program will offer producers the advantage of being prepared for the future. In the future, feedlots may require cattle to be source verified or certified, or discounted at the market.

How do I participate?

There are three parts to producer participation in the North Dakota Beef Quality Assurance Program –

1. Attend a training and certification session and obtain a producer or operation identification number.
2. Raise calves according to NDBQA requirements.
3. Market feeder cattle as NDBQA certified.

Producers must first attend a producer training and certification session conducted by NDBQA personnel to participate in the North Dakota Beef Quality Assurance Program. After attending a training and certification session, each producer or operation will be assigned a NDBQA identification number. If calves are produced following NDBQA certification requirements (see Certification Requirements of the North Dakota Beef Quality Assurance Program), and with the appropriate records kept, they may then be marketed as "NDBQA Certified." For the year 2000 calf crop to be certified, producers MUST attend a training session before January 1, 2000. Producers will need to be re-certified every three years.

Partners in NDBQA

- North Dakota State University Extension Service
- North Dakota Beef Commission
- North Dakota Agricultural Products Utilization Commission
- North Dakota Stockmen's Association
- North Dakota Department of Agriculture
- North Dakota Veterinary Medical Association
- Allied Industries
- North Dakota Livestock Marketing Association

Acknowledgments

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1991 National Beef Quality Audit

1991 National Beef Quality Audit

Conclusions:

- Beef carcasses were too fat
- Beef carcasses were too inconsistent
- Beef lacked tenderness

Recommendations to producers:

- Evaluate herd health and genetic management programs
- Eliminate non-conforming cattle from cow herds
- Analyze management practices, transportation and handling systems
- Encourage the flow of information from the packing plant back to the ranch

The 1991 U.S. National Beef Quality Audit, the first quality audit of beef carcasses, detailed areas where beef was falling short of the final customer's expectations. The audit determined that there was nearly $280 in quality defects for the average fed animal marketed. The majority of the loss was due to excess fat, lack of marbling, and other carcass defects. Figure 1 details the average losses due to taste, management, decreased yield, and carcass weight.

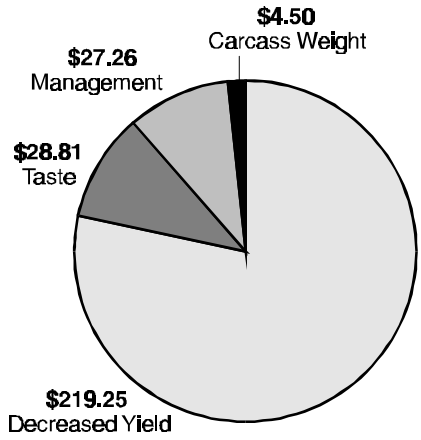

Figure 1. Estimated losses per head of fed cattle marketed.
Source: 1991 NCBA Fed Cattle Quality Audit

■ 1995 National Beef Quality Audit

1995 National Beef Quality Audit

Objectives:

- Conduct a quality audit of carcasses, and dress-off/offal items for the U.S. beef industry

Conclusions:

- $137.82 lost in carcass value per head of fed beef marketed

Recommendations:

To recapture some of the lost value of beef cattle, producers should:

- Increase red meat yield
- Enhance taste and tenderness
- Improve management

The objectives of the 1995 National Beef Quality Audit were to: 1) conduct an audit of the quality of slaughter cattle, including their carcasses and dress-off and offal items; 2) establish baselines for quality shortfalls and identify targets for desired quality levels by the year 2005; 3) assess whether or not progress had been made in correcting deficiencies and reducing quality concerns when compared to the results of the 1991 audit.

The 1995 audit concluded that an average of $137.82 was lost per head of fed beef marketed, as detailed in Figure 2. To recapture some of this loss, the industry needs to increase red meat yield, enhance taste and tenderness, and improve methods of management.

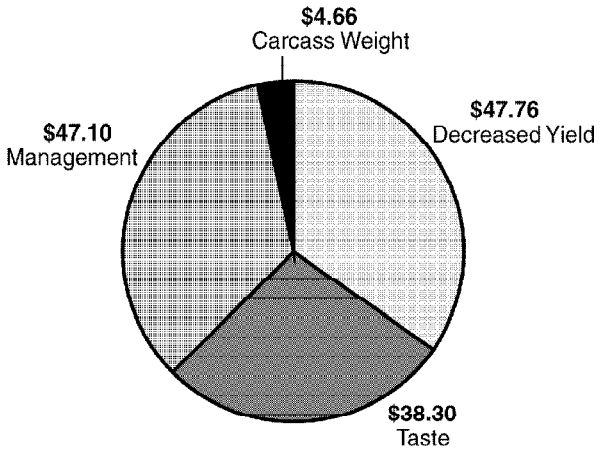

Figure 2. Estimated losses per head of fed cattle marketed.
Source: 1995 NCBA Fed Cattle Audit

Increasing red meat yield could regain about $47.76 of the lost value. The audit suggests this be accomplished by producing carcasses that have less trimmable fat. The audit also suggested improving cutability of carcasses.

To enhance taste and tenderness of the final beef product, the audit suggested beef producers lower the age of cattle by minimizing the number of bullocks and heiferettes. They also suggested that fed cattle have sufficient amounts of marbling before slaughter.

The audit addressed specific management practices that could improve the quality of the final product. These practices included reducing injection site lesions by giving all injections in the neck, decreasing hide problems, dehorning, castration, decreased bruising, and lowering the overall incidence of dark cutters.

Dark cutting beef is believed to be the result of reduced sugar content of the lean muscle at the time of slaughter. The dark color of the lean associated with "dark cutters" is present in varying degrees, from barely evident to lean which is nearly black in color. Although there is little evidence indicating the "dark cutting" condition has any adverse effect on palatability, it is considered in grading because of its effect on acceptability and value. Depending on the degree to which this characteristic is developed, the final grade of carcasses which otherwise would qualify for the prime, choice, or select grades may be reduced as much as one full grade.

■ 1994 National Non-Fed (Cull) Beef Quality Audit

1994 National Non-Fed (Cull) Beef Quality Audit

Objectives:

- To determine baseline information on quality defects associated with non-fed animals
- Identify strategies U.S. beef producers and dairyman could use to reduce these "quality" defects

Conclusions:

- Losses due to quality defects were $70/head marketed
- Top 10 defects were due to management practices

Recommendations for recovering lost value of non-fed or cull animals:

- Manage cattle to minimize defects and quality deficiencies
- Monitor health and condition of non-fed animals often
- Market non-fed cattle in a timely manner

Non-fed animals are extremely valuable economically to the individual operation as well as the beef industry. The sale of cull bulls and cows account for 15 to 20 percent of a typical beef cattle producer's income. Therefore, producers should pay considerable attention to the health and quality of cull animals they market to receive the full profit potential from the sale of these animals.

Non-fed beef is very important to the entire beef industry. Roughly 6.4 billion pounds of non-fed beef was consumed in the United States in 1994. Beef products from non-fed animals included primals, subprimals and ground beef. In the United States, ground beef accounts for between 43 and 44 percent of the beef consumed. Contrary to popular belief, not all beef from non-fed animals is marketed as ground beef. Examples of primal and subprimal usage from non-fed beef carcasses include ribeye rolls that are often shaved and used for philly steak sandwiches, flats (outside rounds) which are often sold in pressed form or cooked and marketed as deli meat, and ribeyes, strips, and tenderloins which are generally sold to "family" steakhouses, casinos, and airlines.

The 1994 Non-Fed (Cull) Beef Quality Audit suggested managing, monitoring, and marketing cull animals properly as methods for regaining some of the value lost in cull animals, as depicted in Figure 3.

The top 10 defects found in non-fed animals were due mainly to management practices. The defects were: 1) excessive bruising, 2) excessive condemnation rate, 3) excessive brands, 4) small ribeyes in cows, 5) inadequate muscling in cows (due to poor condition), 6) excessive external fat, 7) excessively heavy live weights in bulls, 8) low dressing percentages, 9) advanced lameness, and 10) too frequent disease

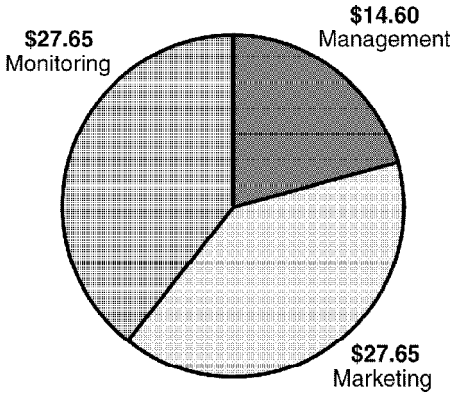

Figure 3. Suggested methods of recovering lost value per head non-fed beef.

Source: 1994 NCBA Non-Fed Beef Quality Audit

(cancer eye, lumpy jaw, arthritis, sheath and udder damage, etc).

Current studies are finding that injection sites contribute to large defects in the rounds of non-fed beef. Injection site lesions were found in 28.7 percent of all beef cows and in 58 percent of carcasses from dairy cows. These rounds from non-fed beef are extremely important economically to the beef industry. These are commonly processed and marketed as whole muscle products and sold as deli roast beef or as fast food sandwiches. Lesions are often located deep in the muscle. They are not found in the normal fabrication process, and may not be discovered except by the end user of the product.

The non-fed audit suggested that producers remember the "Three M's" (Manage, Monitor, and Market) when it relates to cull animals. **Managing** non-fed cattle to minimize defects and quality deficiencies, **monitoring** the health and condition of cull cattle often and in a timely fashion, and **marketing** cattle in a timely manner.

In conclusion, keep the "Three M's" in mind when managing cull animals. Managing cull animals properly, monitoring cull animals correctly, and marketing non-fed animals appropriately could save the industry about $70 per head marketed.

Proper Implant Placement

Implanting cattle with growth implants correctly is imperative to the effectiveness of the product. The correct placement (shown in Figure 4) is on the back-side of the ear, between the skin and cartilage, in the middle third of the ear.

Improper placement of implants potentially decreases the efficacy of the implants, but it may also result in other production concerns. Such concerns include additional trim loss at the packing plant, consumer concern about the safety and wholesomeness of the product, and regulatory liability. **Do not place implants anywhere but the middle third of the ear.** Implants located anywhere other than the middle third of the ear constitute extra-label use and can result in a loss of carcass value. Improper implant placement has the potential for localized cut-out losses or even condemnation, leading to economic loss.

Common errors of implanting include crushing of the implant, depositing the implant into the cartilage, severing a blood vessel, infected or abscessed sites, and improper location. Crushed pellets cause release of active ingredients too quickly. Side effects may appear and the implant will not be effective as long as expected. To avoid crushing, always remember to partially withdraw the needle before inserting the implant. Depositing the implant in the cartilage may decrease the effectiveness of the implant. There is very little blood flow in the cartilage tissue, so there can be no absorption of the active ingredients from implants inserted in the cartilage. Severing a blood vessel gives the opposite effect. When blood vessels are severed, absorption is often too rapid, side effects may appear, and the implant will not be effective as long as expected.

Proper Implant Placement

- Correct placement
- Results of improperly placed implants
- Common implanting errors

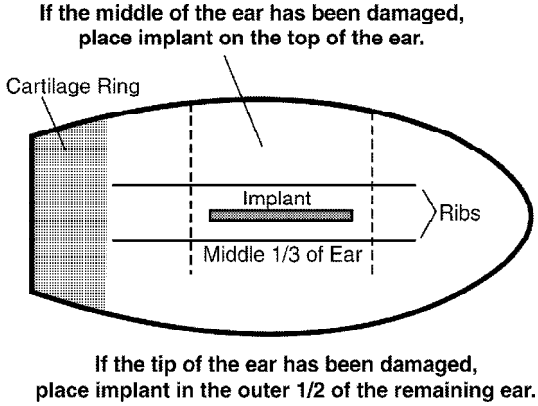

Figure 4. Proper implant placement.

Infections are often caused by poor sanitation and implanting into wet or muddy ears. Good sanitation should always be observed, by not implanting into wet and muddy ears and remembering to disinfect the needle after each use.

Always read the label on the product for proper instructions on approved use.

Feeds and Feed Additives

Quality nutrition is important to the performance and efficiency of cattle. Good beef starts with good feed and nutrition. High quality feedstuffs are free of mycotoxins, molds, and chemicals and meet the nutritional requirements of the animal.

Use only FDA-approved feed additives and medications. Know the withdrawal times, ingredients, and proper method of application of any products used. Extra-label use of feed additives is illegal and strictly prohibited. Strictly adhere to withdrawal times to avoid volative residues. Withdrawal times of many of the feed additives are found in the Withdrawal Time Charts for Beef Cattle in the appendix of the manual.

As a precaution against the transmission and spread of bovine spongiform encephalitis (BSE), ruminant-derived protein sources (meat and bone meal from cattle or sheep) can NOT be fed to cattle. Check with your feed supplier to be sure ruminant meat and bone meal is NOT included in your supplements.

Feeds and Feed Additives

- Feedstuffs and sources
- Feed additives and medications
- Meat and bone meal

Handling Cattle

Bruising costs the beef industry about $22 million annually. The 1995 National Beef Quality Audit found that bruising cost the industry $4.03 for every fed animal marketed, a significant increase over the 1991 quality audit. Bruising is a management issue that can be easily addressed and potentially corrected by those who work with and handle cattle. This includes producers, feeders, truckers, and packers. The 1995 audit suggested some management practices that producers and cattle handlers could change to decrease the incidence of bruising. First is removing horns and dehorning calves. Horns often bruise and damage loins, one of the most valuable cuts of the carcass. Next, because back bruises tend to occur while cattle are entering into or unloading off trucks, truckers and producers should take care when loading and unloading their animals. Low-hanging bars, floors, decks, and endgates on trucks and similar low hanging elements of loading docks should be moved up or removed.

Design of cattle handling facilities needs to be considered. Cattle have panoramic vision and can detect movement from any area except directly behind them, but they have poor depth perception. Their depth perception is limited to a 25 to 50 degree area straight ahead, limiting their ability to locate openings and gates in fencelines.

Use solid fences in loading ramps, crowding pens and chutes so cattle can see only straight ahead and decrease their panoramic vision. To move an animal forward in the chute or alley, move or stand behind the animal's shoulder. To back an animal up, move ahead of the shoulder. The sides of the working chute should be sloped, decreasing the animals ability to turn around.

Handling Cattle

- Bruising of cattle costs the beef industry $22 million per year
- Considerations for handling cattle and handling facilities

To decrease bruising, use a prod only to the extent necessary. Don't beat cattle with canes and sticks.

Holding pens should be designed to hold the maximum number of cattle to be worked at one time in order to eliminate crowding. These holding pens should be one solid color and have solid sides to decrease balking and temptation to escape. These pens should also be free from protrusions and sharp edges.

It is important to remember, handling facilities do not need to be expensive or elaborate but must be functional, economical, and most important, safe.

North Dakota's Beef Quality Assurance Program
It's Every Cattleman's Business

Record Keeping and Record Maintenance

Keeping good management records, whether by hand or with a computer, detailing all aspects of your operation is a critical management function for any operation. These records can show phases of your operation that excel and those that could use improvement.

To gain lost market share, the beef industry must ensure consumer confidence in the safety of its product by documenting use of animal health products. Producers must be able to prove, through documentation, tight control over risk factors that have residue potential, to strengthen consumer confidence and demand and relieve regulatory pressures.

Effective documentation that shows appropriate compliance with training, inventory control, use orders, animal health identification, and withdrawal and disposal compliance is the only way to avoid liability from a residue contamination that could occur from your livestock.

Record Keeping and Record Maintenance

- Keeping good records is a critical management function
- Reasons to document use of animal products
- Effective documentation of animal product use potentially reduces liability

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Maintaining Treatment Records

Maintaining a quality set of records is critical to any operation. Records can show both efficiencies and inefficiencies of the operation and identify where improvements can be made. Treatment records show the illnesses that have occurred within the herd and can remind the producer of withdrawal times. A complete set of treatment records can be an asset to the producer and to the buyers of the animals.

Treatment records should include identification of the animal or animals treated and the date they were treated. Also included should be a list of the products used, including the product, manufacturer, and lot number.

Record the dosage of product used, the route of administration and the method used to administer the product. For example, 5 cc, left neck, IM. Withdrawal times of the product or products used and who administered the treatment should also be noted.

There are sample treatment records on pages 35 through 37 in the appendix section of the manual. Also located in the appendix section are Beef Cattle Withdrawal Charts for most animal health products and feed additives.

Maintaining Treatment Records

Treatment records should include:

- Animal or animals treated
- Date of treatment
- Product(s) used
- Dosage used
- Where administered
- Method administered
- Withdrawal times
- Who gave the treatment

Herd Health Management

A high quality herd health program is essential to any cattle operation. Having a good herd health program will decrease the number of sick cattle in most operations, and generally healthy cattle are better performing cattle.

A good herd health management program will also encourage the production of safe, healthy and wholesome products. A good herd health program reduces the incidence of sickness and reduces treatment costs.

Studies have shown that cattle in the feedlot diagnosed with respiratory illness will produce a carcass with a lower quality grade. Typically sick cattle are less profitable than healthy cattle because of increased treatment costs and the decreased value of their carcass.

Herd Health Management

- A good herd health program is essential to any operation
- Provides for healthier, better performing cattle
- Helps insure you are producing a safe, wholesome product
- Good herd health provides economic savings
- Decreased respiratory illness increases profitability and carcass quality

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Recommended Practices for Improving Herd Health

Good herd health practices include a clean environment. A clean, well-drained calving area with facilities to cope with calving problems is useful. Cattle will perform better and will also be healthier overall if feeding and watering areas are free of mud, excess manure and standing water. Minimizing these stress factors will decrease the spread of disease, infection, and parasites.

Your nutrition program determines the health and the ability of your cattle to perform. Cows and heifers should have access to a good quality diet, particularly when they are lactating. Females should be in good condition (Body Condition Score of 5 or greater), at calving time. In addition, mineral should be supplemented based on nutrient composition of the forages available. Feeders and troughs should be free of moldy and/or stale feed, and feedstuffs should be checked for nitrates, mycotoxins, and nutrient composition. If medicated feed is fed, withdrawal times must be adhered to.

Proper reproductive management is essential to prevent the spread of reproductive diseases and infections. Plastic sleeves should be used when artificially inseminating cows or assisting with calving. Watch cows after calving for retained placentas and treat all uterine, vaginal, and udder infections according to veterinarian recommendations. Retain cull animals long enough to meet withdrawal times of any drugs given.

Maintaining a good set of records is essential to the efficiency of any operation. To keep a good set of records, cows need to individually identified. Tag and record all calving information at birth. Producers need to be able to inform potential buyers when vaccinations and other management practices were performed.

Recommended Practices for Improving Herd Health

Recommended practices for Improving Herd Health include:

- A clean environment
- Adequate nutrition program
- Good reproduction (A.I. and Calving) practices
- Quality vaccination management
- Keeping records

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Your Veterinarian's Role in Herd Health

Your veterinarian plays an important role in preventing, diagnosing, and treating diseases. Selecting the right treatment and prevention plan depends on accurately diagnosing the problem. Work with your local veterinarian to develop a healthcare program designed to fit your operations needs. It is essential to develop a valid veterinarian/client/patient relationship (VCPR).

The American Veterinary Medical Association defines a VCPR as:

> "An appropriate veterinarian/client/patient relationship will exist when (1) the veterinarian has assumed the responsibility for making medical judgments regarding the health of the animal(s) and the need for medical treatment, and the client (owner or caretaker) has agreed to follow the instructions of the veterinarian; and when (2) there is sufficient knowledge of the animal(s) by the veterinarian to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s), and/or by medically appropriate and timely visits to the premises where the animal(s) are kept; and when (3) the practicing veterinarian is readily available for follow-up in case of adverse reactions or failure of regimen of therapy."

Your Veterinarian's Role in Herd Health

- Veterinarians play an important role in preventing, diagnosing, and treating diseases.
- Definition of Valid Veterinary/Client/Patient Relationship (VCPR)

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Extra-Label Drug Use

Exactly what is extra-label or off-label drug use? Extra-label drug use is using animal health products in a manner not specified on the label. Examples include using a product at higher doses or in different species than stated on the label. A veterinarian's prescription is needed for extra-label drug use.

For a drug to be administered in an extra-label manner, the following criteria set by the Food and Drug Administration must be met. The veterinarian must make a careful medical diagnosis within the context of a valid veterinarian-client relationship. The veterinarian takes responsibility for making judgments regarding the health of an animal, and the client agrees to follow his or her instructions. The veterinarian must have sufficient knowledge of the animal, through recent personal visits to the premises, to make a diagnosis, and be readily available for follow-up care or consultation. The veterinarian must determine that there is no marketed drug specifically labeled to treat the condition diagnosed, or that treatment at the recommended dosage would not be effective. A record of any animal given extra-label treatment must be maintained. The withdrawal time prior to marketing an animal that has been treated off-label must be significantly extended, as determined by the veterinarian. Extra-label drug use is not appropriate for production purposes, such as increasing feed efficiency or milk production. Use in animal feeds is prohibited. Finally, the FDA requires the prescribed drug be labeled with the name and address of the veterinarian, name of the drug or its ingredients, directions for use, cautionary statements and specified withdrawal time.

Extra-label or Off-label Drug Use

- What is "extra label" drug use?
- Off-label drug use requires a veterinarian's prescription
- FDA criteria for off-label drug use

Some drugs are not currently approved for use in food-producing animals, even under the extra-label criteria. The Animal Medicinal Drug Usage Clarification Act (AMDUCA) provides that the FDA may prohibit an extra-label drug use in animals if the agency finds that such use presents a risk to the public health. Your veterinarian should be aware of current changes to the list of non-approved products.

The current list of drugs includes:

Chloramphenicol
Clenbuterol
Diethylstilbestrol
Dimetridazole
Ipronidazole
Other nitroimidazoles
Furzolidone (except for topical use)
Nitrofurazone (except for topical use)
Sulfonamide drugs in lactating dairy cattle
Fluroquinolones
Glycopeptides

Understanding Drug Labels

All drugs, whether over the counter (OTC) or prescription (Rx), must contain the following information on the label: name of the drug; active ingredients; instructions for use; withdrawal times; quantity of contents; name of distributor, lot number and expiration date.

Prescription drugs not only must have the name of the drug, active ingredients, instructions for use, withdrawal times, quantity of contents, and name of distributor, but must also include name and address of the dispensing veterinarian, not just the veterinary clinic; the statement "CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian"; directions for use; prescribed withdrawal times, even if zero; and any other cautionary statements.

Drugs to be used in an "extra-label" manner require additional caution. They often have special instructions because they are prescribed for a particular animal or particular herd by a veterinarian who is familiar with the animal or herd. Labels for drugs used in an "extra-label" manner must have these components: name, address, and phone number of the veterinarian who prescribed the drug; active ingredients, indications and directions for use; prescribed withdrawal time before slaughter; any cautionary statements; and exact directions for use.

To reduce the chance of reactions and minimize the risk of residues, check and follow these instructions on each label: dosage; timing; route of administration; warnings or indications (for example, "not for use in pregnant animals"); withdrawal times if any; storage; disposal; and shelf life or expiration date.

Understanding Drug Labels

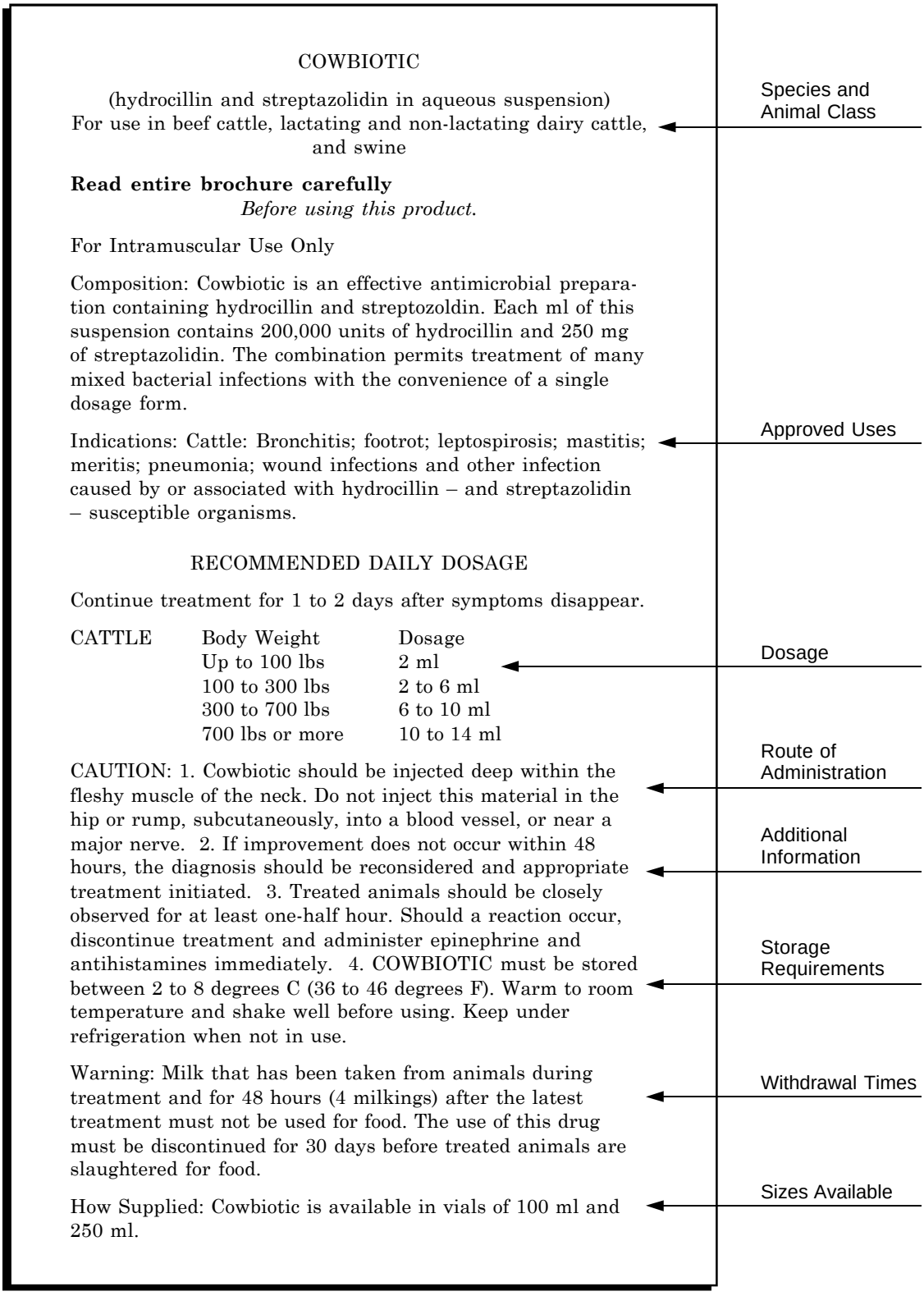
- Information that must be on all drug labels
- Information that must be on prescription (Rx) drug labels
- Drugs used in an "extra-label" manner
- Instructions to look for and follow on each label

Note:

Changing the dosage of a drug or route of administration may greatly affect withdrawal times. All "off-label" or "extra-label" drug use should be done in a veterinarian/client/patient relationship.

Examples of Label Types

Examples of Package Insert Information



COWBIOTIC

(hydrocillin and streptazolidin in aqueous suspension)
For use in beef cattle, lactating and non-lactating dairy cattle, and swine

Species and Animal Class

Read entire brochure carefully
Before using this product.

For Intramuscular Use Only

Composition: Cowbiotic is an effective antimicrobial preparation containing hydrocillin and streptozoldin. Each ml of this suspension contains 200,000 units of hydrocillin and 250 mg of streptazolidin. The combination permits treatment of many mixed bacterial infections with the convenience of a single dosage form.

Indications: Cattle: Bronchitis; footrot; leptospirosis; mastitis; meritis; pneumonia; wound infections and other infection caused by or associated with hydrocillin – and streptazolidin – susceptible organisms.

Approved Uses

RECOMMENDED DAILY DOSAGE

Continue treatment for 1 to 2 days after symptoms disappear.

CATTLE	Body Weight	Dosage
	Up to 100 lbs	2 ml
	100 to 300 lbs	2 to 6 ml
	300 to 700 lbs	6 to 10 ml
	700 lbs or more	10 to 14 ml

Dosage

CAUTION: 1. Cowbiotic should be injected deep within the fleshy muscle of the neck. Do not inject this material in the hip or rump, subcutaneously, into a blood vessel, or near a major nerve. 2. If improvement does not occur within 48 hours, the diagnosis should be reconsidered and appropriate treatment initiated. 3. Treated animals should be closely observed for at least one-half hour. Should a reaction occur, discontinue treatment and administer epinephrine and antihistamines immediately. 4. COWBIOTIC must be stored between 2 to 8 degrees C (36 to 46 degrees F). Warm to room temperature and shake well before using. Keep under refrigeration when not in use.

Route of Administration

Additional Information

Storage Requirements

Warning: Milk that has been taken from animals during treatment and for 48 hours (4 milkings) after the latest treatment must not be used for food. The use of this drug must be discontinued for 30 days before treated animals are slaughtered for food.

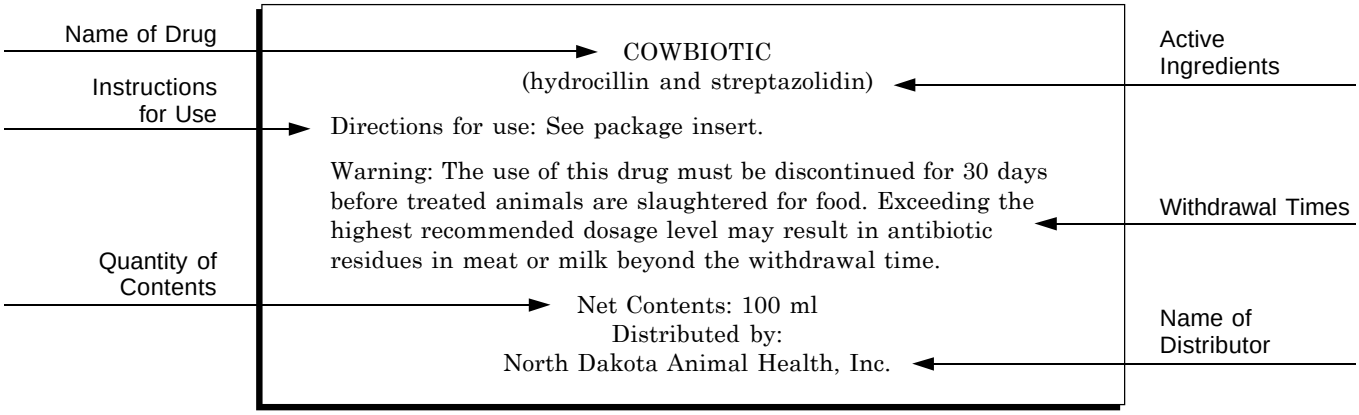
Withdrawal Times

How Supplied: Cowbiotic is available in vials of 100 ml and 250 ml.

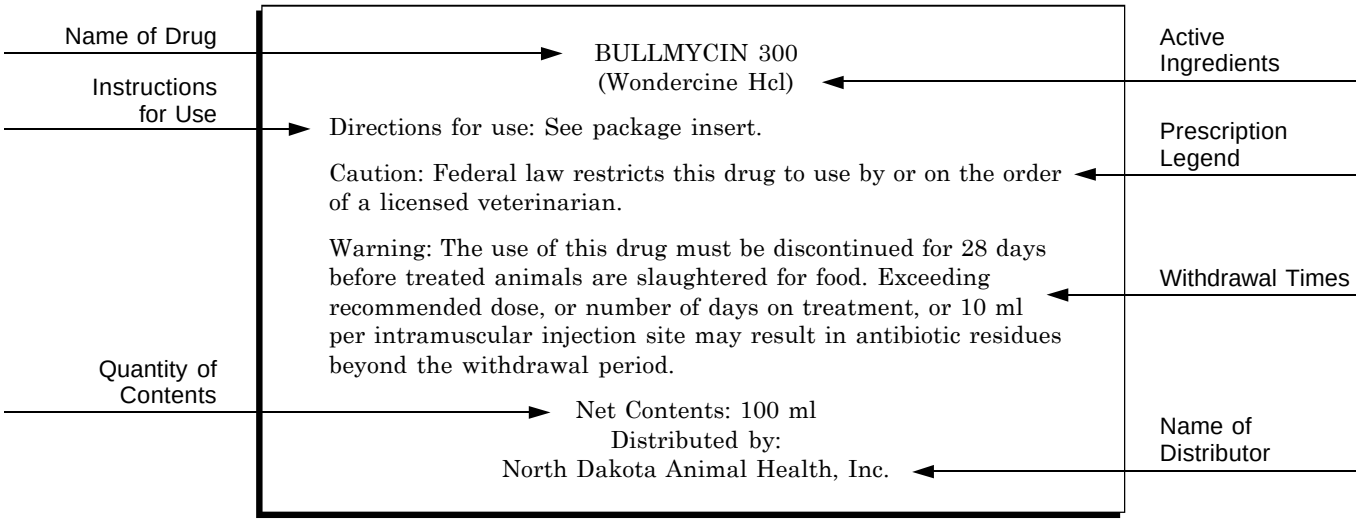
Sizes Available

Examples of Label Types

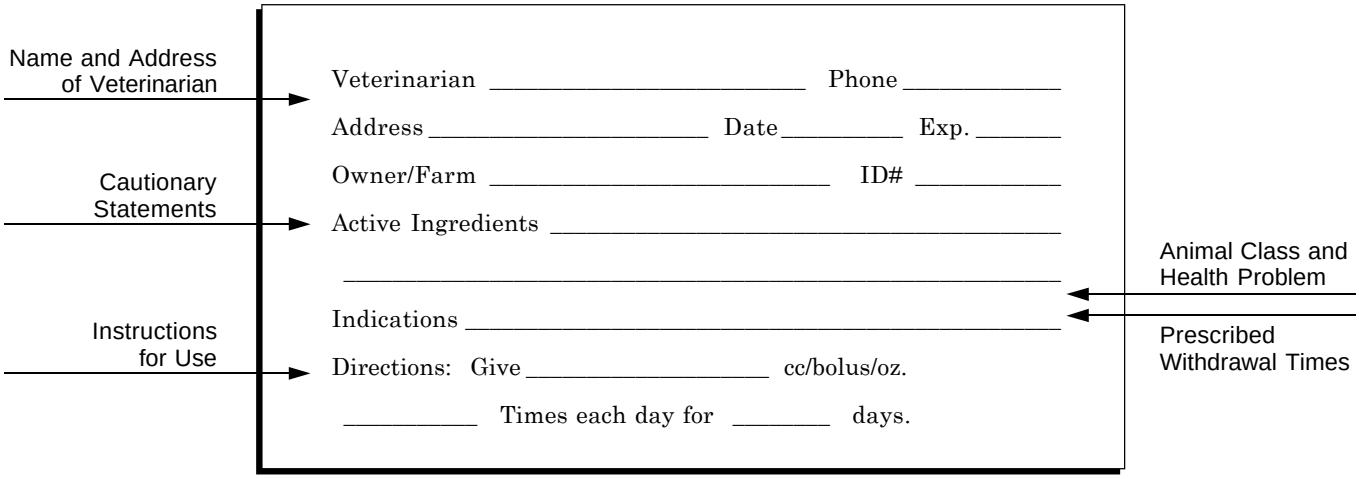
Over the Counter (OTC) Product



Prescription (Rx) Product



Label Provided by Veterinarian for "Extra-Label" Use



North Dakota's Beef Quality Assurance Program
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Biologicals and Pharmaceuticals

Biologicals and pharmaceuticals are NOT the same. Biologicals and pharmaceuticals are two terms often used when referring to products used in the health care of cattle, and often confused with each other.

Biologicals are generally made up of bacterins and vaccines. A vaccine is a suspension of attenuated or killed microorganisms, or the antigenic proteins derived from them. There are two categories of vaccines, killed and modified-live. A killed vaccine is just that, killed. No self-replicating microorganisms are present in the suspension. Modified live vaccines contain microorganisms which have been attenuated (weakened) through culturing and laboratory procedures.

Pharmaceuticals are medicinal drugs. They contain no live or killed microorganisms. Antibiotics are pharmaceuticals. Pharmaceuticals are used to treat a variety of health-related conditions. Virtually every pharmaceutical product has a withdrawal period associated with its use.

Biologicals and Pharmaceuticals

- Are they the same?
- Biologicals are generally made up of bacterins and vaccines
- Pharmaceuticals are medicinals

Diseases

The most common diseases in feeder cattle in North Dakota are clostridial diseases and bacterial and viral respiratory diseases.

Clostridial diseases are caused by gram positive bacteria belonging to the genus Clostridia. These diseases include blackleg, tetanus, gas gangrene, overeating disease, and others. Clostridia **DO NOT** cause respiratory diseases or pneumonia.

Pasteurella multocida, Pasteurella hemolytica, and *Hemophilus somnus* are bacteria that cause respiratory disease. Bacterins for these diseases are available, and antibiotics are effective against these disease-causing bacteria.

IBR, PI3, BVD, and BRSV are viruses that can cause respiratory disease in cattle. Both killed and modified-live vaccines are available for these viruses. Because these disease-causing microorganisms are viruses, antibiotics are **NOT** effective against them.

Diseases

- Clostridial diseases
- Bacterial respiratory diseases
- Viral respiratory diseases

Biosecurity

What is biosecurity?

Biosecurity is a set of management practices that prevent infectious diseases from being carried into a herd. These infectious diseases include: New strains of infectious diseases such as Type II Bovine Viral Diarrhea (BVD) and new diseases such as hairy heal wart and neospora species which cause abortions, and old diseases like Johnes Disease, Leukosis, and Tuberculosis.

The goal of all biosecurity programs is to break the disease transmission cycle!

Why is biosecurity important?

Biosecurity is important for several reasons including decreased disease transmission, prevention of death loss, prevention of production losses (weight gain and milk production), improved cost of production and prevention of premature culling of animals. Further biosecurity is critical to global trade, food safety, and antibiotic resistance.

What should on the farm biosecurity consist of?

On the farm biosecurity should consist of: good sanitation, isolation and acclimation of new animals, disease testing and monitoring, vaccination and good recording keeping. Good sanitation sounds very simple but is often in need of improvement. Practices of good sanitation include cleaning barns and feedlots frequently and cleaning calving barns and lots early in the year. When guests and visitors come to the operation, supply them with clean boots and clothing. Further make use of the natural disinfectants we have. These include sunshine (Ultraviolet light), heat, dryness, low humidity and air. And, clean manure-handling equipment before using it for feed handling equipment.

Biosecurity

- What is biosecurity?
- Why is biosecurity important?
- What should on the farm biosecurity consist of?

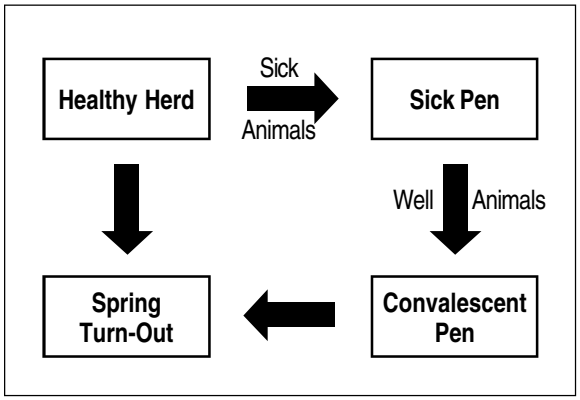
Isolation and acclimation is a crucial biosecurity practice to implement when bringing new animals to your operation. When bringing in new animals, be sure to isolate them for at least 2 weeks. This period of isolation will allow for revaccination and observation for other conditions.

Acclimation is an important practice to use when bringing new animals to the operation. Chances are your animals have a different strain or subtype of many common infections than the animal you are bringing in do, and vice versa.

Be sure to always protect yourself, your operation, and livestock. The easiest way to do this is to ask for health and vaccination records for newly purchased, leased, and borrowed animals.

If the newly introduced animals don't have health records treat them as "naive" and preventatively vaccinate them as you would your own herd.

When dealing with sick animals within the herd, isolate and separate the animals with an infectious agent. Move and separate the sick animals from the "healthy herd" into a "sick pen." When the sick animals are well, move them into a "convalescent pen," not back into the healthy herd. In the case of sickness in calving lots and barns, at "spring turn out" reunite with the "healthy herd." This is especially crucial when keeping livestock in a confinement situation such as a feedlot or calving pens and barns.



Disease testing and monitoring can be useful in decreasing the risk of disease entry into the herd. However, in consultation with your veterinarian, the test utilized needs to be evaluated. Most tests are not 100% accurate. This is because there is usually a percentage of false negatives and positives due to the sensitivity and specificity of the tests. Scientific tests should be used to diagnose the cause of death. As the saying goes, "If you don't look, you don't know!" If is easy to say that animals are free from disease unless they are tested. Many diseases can infect animals sub-clinically, meaning they can be shedding disease, but don't show signs of infection or illness. It is important to reiterate that consultation with your veterinarian is imperative regarding which diseases to test for and which tests to use.

Preventative vaccinations are good "herd protection" tools. Many vaccinations have a high efficacy rate against infectious agents. As stated previously, when introducing new animals that don't have a health record, treat those as naive and preventatively vaccinate as you normally would your current herd. Remember to booster the preventative vaccinations, if so labeled by the product you are using. When considering which preventative vaccinations and treatments to give, consult with your veterinarian about current animal health issues in your area. **It is imperative to remember that vaccinations are only tools, not 100%, and can be overrun by stress, poor nutrition, and overwhelming disease burden by bacteria, viruses, and other agents (known as "antigen-antibody overload").**

Good records are essential to good on the farm biosecurity. Good records should include vaccination history, herd health records, herd inventory, and purchase and sale records. Additionally all animals should be individually identified.

In conclusion, good on the farm biosecurity is a set of management practices that prevent infectious diseases from being carried into a herd. Good biosecurity doesn't have to fancy or expensive to be effective, but most importantly easily and continually implemented and maintained.

(updated 7/2002)

Injection Sites

The 1995 National Beef Quality Audit revealed 11 percent of the carcasses surveyed had at least one injection site blemish. The beef industry loses about $7.05 for each fed heifer or steer marketed due to injection site lesions. Not only can the injection site leave visible lesions, but there are also significant tenderness problems associated with lesion-afflicted lean tissue.

The recommended site for injections is not always the most convenient or easiest site to reach. The best location for an injection is the site where the product is the most beneficial, without the risk of damaging the more expensive cuts of meat (upper rump and upper butt).

The 1995 National Beef Quality Audit suggests management changes to decrease the incidence of injection site lesions and reactions. First, producers should move the location of injection sites from the top butt and round to the neck, as shown in Figure 5, and use subcutaneous administration where the label allows. Producers should also discard burred or bent needles rather than reusing them.

Producers should pay particular attention to preparing their calves' immune systems through vaccinating. Programs that emphasize the importance of calf nutrition and timing of vaccinations can significantly reduce both the incidence of treatment (and usually injection) for respiratory disease and the incidence of excesses of multiple vaccinations, which can increase the incidence of injection site lesions.

To reduce lost value of the expensive cuts of meat, keep all injections in front of the shoulder. **NEVER INJECT INTO THE TOP BUTT OR TOP OF THE RUMP!**

Injection Sites

- 1995 Beef Quality Audit reported 11 percent of carcasses had at least one injection site blemish
- The best site to give an injection isn't always the most convenient
- Keep all injections in front of the shoulder
- Injection technique for both SC and IM injections
- Never inject more than 10cc into one site
- Don't re-inject into injection sites
- Minimize the risk of injection site reactions

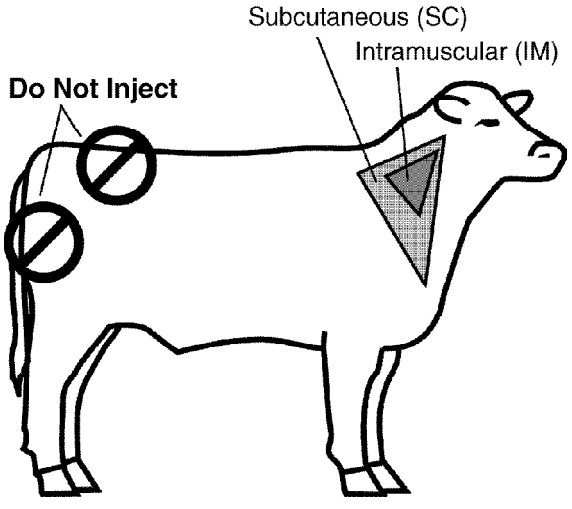


Figure 5. Proper injection location.

For both vaccines and antibiotics, the triangular mass of neck muscle is the preferred site for both IM and SC injections. Be sure to inject straight in, not at an angle, when giving IM injections. Use the tenting method for SC injections.

Never inject more than 10 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 infection and incidence of injection site lesions, avoid injecting into wet or manure covered areas.

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Administering Injections Properly

■ Select the right product

When giving vaccinations, select the correct product for your need. This product should prevent futures infections or aid in stopping the current infection. Once a product is selected, follow the label instructions.

■ Read the label

The label of all health products will include 1) the dosage to be given, 2) the timing of administration, and 3) the route of administration. The most common routes of administration are intramuscular (IM), subcutaneous (SC), intravenous (IV), intranasal (IN), and topical. Other less common methods are intramammary (IM), intrauterine (IA), intrarumenal (IR), and oral. The label will list warnings, indications for use, and withdrawal times if any. The label will also include proper methods of storage and disposal and expiration date.

■ Don't combine vaccines

Mixing unlike vaccines could destroy the effectiveness and value of the individual products. Use only approved combinations.

■ Use transfer needles

Use transfer needles if a product needs to be reconstituted. The use of transfer needles should make the process easier and more sanitary. To use a transfer needle, place one end of the needle into the sterile liquid or dilutant; the other end goes into the freeze-dried cake of vaccine or bacterin. There should be a vacuum in the freeze-dried portion that immediately pulls the dilutent down.

Steps in Administering Injections Properly

1. Select the right product
2. Read the label
3. Don't combine vaccines
4. Use transfer needles
5. Don't mix too many products
6. Keep shaking
7. Mark and separate syringes
8. Don't use disinfectants with modified live vaccines
9. Get air out of syringes
10. Restrain animals properly
11. Select best route of administration
12. Choose best site of administration
13. Choose the right needle
14. Use proper injection technique
15. Practice good sanitation

■ Don't mix too much of a product at once

Modified live vaccines (MLV) begin to degrade, or lose effectiveness, after about an hour. Mixing too much product at one time may decrease effectiveness. For maximum effectiveness, mix enough vaccine for only one hour or less. Direct sunlight and extreme temperatures will also degrade the product, so it is best to keep it in a dark cool place, like a cooler. Don't save leftover vaccine for later use. It won't be effective and could be contaminated. Dispose of all vaccine bottles and equipment properly.

■ Keep shaking

When using large, multi-dose sizes of vaccine, such as a 200-dose bottle, mix thoroughly at first, then stop from time to time and shake the bottle again. If you don't keep mixing, the vaccine may settle, giving an inconsistent amount of antigen in each injection.

■ Mark and separate syringes

Use and mark different syringes for bacterins or killed products. Mark the MLV syringes and keep them separate from the others. If traces of bacterin are left in a syringe that is later used for a modified live product, the bacterin could destroy the modified live vaccine, making it ineffective.

■ Don't use disinfectants with MLV

Don't clean syringes used for MLV with disinfectants. Use hot water to clean these syringes. Disinfectants can destroy MLV that you later put in the same syringe. A mild disinfectant can be used for cleaning bacterin syringes, but be sure to rinse thoroughly.

■ Get air out of syringes

To help get the right dose of vaccine in the animal, remove any air that may be trapped in the syringe by pumping the grip slightly before filling. After filling, pump it enough to move the vaccine up to the needle tip so there is no trapped air that might be injected with the vaccine.

■ Restrain animals properly

Restraining animals properly reduces the potential of hurting the animal or yourself. Proper restraint can reduce the level of bruising to the animal. Bruising alone costs the cattle industry $22 million per year.

■ Select the best route of administration

Selecting the best route of administration is crucial to effective vaccination. The two most common routes of administration are intramuscular (IM), which means injecting into the muscle, and subcutaneous (SC), which means injecting under the skin. Some products offer a choice, while others must be given in a specific way. The label will state the best method of administration. Generally, bacterins or killed products can be given SC. Modified live virus products are usually given intramuscularly, because this allows the virus to reproduce and reach the lymphatic system more easily. **Whenever possible, use the subcutaneous route if allowed on the label.**

■ Choose the best site of administration

Injection site lesions cost the industry about $7 per animal slaughtered. The best injection site is not necessarily the one that's the fastest or the easiest to get to. It is the site where the product will be the most effective, with the least possible risk of damage to valuable cuts of meat. Give all injections in the neck. **Never inject into the top butt or top of the rump.**

■ Use the correct needle

Choosing the correct needle may also lessen injection site lesions. When administering SC injections, use a 16 or 18-gauge needle, ½ to ¾ inch long. For IM injections, use a 16 or 18-gauge needle 1 to 1½ inch long, as shown in the table below. A 14-gauge needle isn't recommended – it is twice the diameter of a 16-gauge, which increases the risk of leakback and tissue damage.

If a needle is bent or broken, discard and replace with a new needle. Bent and broken needles increase the number of injection site lesions and increase the risk of broken needles entering the food supply.

■ Use proper injection technique

When giving SubQ injections, tent the skin to get the product just under the skin and not into the muscle. Pull the skin away from the animal's body and insert the needle into the fold of skin. When giving multiple injections, keep injection sites several inches apart. Don't administer more than 10 cc of product into any one site. If a product must be given several times over a period of a few days, vary the injection site.

■ Proper sanitation is essential

Good sanitation practices reduce the risk of spreading infection from one animal to another, the chance of contaminating the vaccine, and injection site reactions. Some basic steps to good sanitation include not going back into the vaccine bottle with the same needle you use to vaccinate. Change needles frequently, at least every 10 to 15 animals, or every syringe of vaccine. When using killed vaccines, keep a saucer or sponge of alcohol or disinfectant nearby and wipe off the needle after each use. **Do not disinfect needles between injections when using a modified live vaccine, as the disinfectant can destroy the vaccine.** Injecting into a wet or muddy site can increase both the spread of disease and the incidence of injection site lesions. Make sure the injection site is clean. Clean transfer needles regularly to avoid contamination.

Correct Needle Size

	Subcutaneous ½ to ¾ inch needle			**Intramuscular** 1 to 1½ inch needle		
	Cattle Weight			Cattle Weight		
Injectable Viscosity	<300	300-700	>700	<300	300-700	>700
Thin (needle gauge) Ex: Saline	18	18-16	16	20-18	18-16	18-16
Thick (needle gauge) Ex. Oxytetracycline	18-16	18-16	16	18	16	16

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Index of Appendices

Certification Requirements of the North Dakota Beef Quality Assurance Program

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■ General

- Cattle sold as North Dakota Beef Quality Assurance (NDBQA) certified must be processed or treated by NDBQA certified personnel or under the supervision of a person who is NDBQA certified.
- Calves must be uniquely and individually identified, with animal number and operation or ranch identification (ND BQA operation identification number, or ranch brand), at time of treatment or prior to leaving the ranch of origin.
- Individual recertification requirement of 3 years.

■ Injectable Animal Health Products

- All animal health products labeled for subcutaneous (SC) or intramuscular (IM) administration shall be administered in the neck. **NO EXCEPTIONS!**
- If a product is label for both SC and IM routes of administration, SC use is preferable.
- No more than 10 cc of product administered per site, with proper spacing of 3 to 4 inches between sites.

■ Processing and Treatments

- All animals not kept for breeding stock will be dehorned before leaving the ranch of origin.
- All male animals not kept for breeding stock will be castrated before leaving the ranch of origin.
- All animal health products must be used according to label directions.
- Extra-label drug use shall be used only when prescribed by a veterinarian working under a valid Veterinary Client Patient Relationship (VCPR).
- All withdrawal times must be strictly adhered to.

■ Records

Treatment records will be maintained with the following recorded:

- Individual animal or group identification
- Date treated
- Product administered and manufacturer's lot/serial number
- Dosage used
- Route and location of administration
- Withdrawal period and earliest date animal will have cleared the withdrawal period

Medicated or feed additives records will be maintained with the following recorded:

- Individual or group identification
- Date treated
- Manufacturer, ration name, and number
- Additive used
- Withdrawal period and earliest date animal will have cleared the withdrawal period

■ Feedstuffs

- Ruminant-derived protein sources cannot be fed according to FDA regulations.

■ Feed Additives and Medications

- Only FDA approved medicated feed additives will be used in rations.
- Extra-label use of feed additives is illegal and strictly prohibited.
- To avoid violative residues – withdrawal times must be strictly adhered to.
- Complete records must be kept when formulating or feeding medicated feed rations.
- Records are to be kept a minimum of two years.
- Operator will assure that all additives are withdrawn at the proper time to avoid violative residues.

Recommendations of the North Dakota Beef Quality Assurance Program

■ Care and Husbandry Practices

- Cattle will be handled and transported in such a fashion to minimize stress, injury, and/or bruising.
- Strive to keep feed and water handling equipment clean.
- Facilities (fences, corrals, load-outs, etc.) should be inspected regularly to ensure proper care and ease of handling.
- Biosecurity principles should be maintained for the operation and should include:
  - Proper sanitation
  - Isolation and acclimation of new animals
  - Disease testing
  - Vaccination
  - Good record keeping

■ Injectable Animal Health Products

- If possible use less reactive animal health products that will cause less injection site tissue damage.

■ Feedstuffs

- Maintain records of any pesticide/herbicide use on pasture or crops that could potentially lead to violative residues in grazing cattle or feedlot cattle.
- Adequate quality control program(s) are in place for incoming feedstuffs. Program(s) should be designed to eliminate contamination from molds, mycotoxins or chemicals of incoming feed ingredients. Supplier assurance of feed ingredient quality is recommended.
- Suspect feedstuffs should be analyzed prior to use.
- Feeding by-product ingredients should be supported with sound science.

■ Feed Additives and Medications

- Medicated feed additives will be used in accordance with the FDA Good Manufacturing Practices (GMP) regulation.
- Follow Judicious Antibiotic Use Guidelines.

■ Processing/Treatment and Records

- Follow all FDA/USDA/EPA guidelines for product(s) utilized.

Yield Grades of Carcasses

Yield Grades of Carcasses

- USDA yield grading system of carcasses
- How to determine USDA yield grades

The USDA yield grades for beef carcasses predicts the percentage of the carcass that is closely trimmed, mostly boneless, retail product from the round, loin, rib, and chuck. The USDA yield grades are 1, 2, 3, 4, and 5; with yield grade 1 yielding the highest percentage of retail product and yield grade 5 having the lowest percentage of retail product.

The following table shows each yield grade with its coordinating percentage of closely trimmed retail product.

Yield Grade	Percentage of closely trimmed retail product
1	75.5%
2	71.5%
3	67.5%
4	64.9%
5	60.8%

USDA yield grades are calculated using an equation that incorporates adjusted fat thickness, percent of kidney, pelvic, and heart fat, hot carcass weight, and ribeye area. The yield grade equation is as follows:

Yield Grade = 2.50 + (2.5 x adjusted fat thickness, inches) + (.20 x percent kidney, pelvic, and heart fat) + (.0038 x hot carcass weight, pounds) – (.32 x ribeye area, square inches)

For example, a carcass has .40 inch of fat, 2.5 percent KPH, 12.8 square inches of ribeye, and a hot carcass weight of 750 pounds. Substituting these variables into the yield grade equation to calculate a final yield grade of 2.75:

YG = 2.50 + (2.50 x .4 in. fat) + (.2 x 2.5% KPH) + (.0038 x 750 lbs carcass wt.) – (.32 x 12.8 in^2 ribeye)
YG = 2.75

The yield grade is expressed as a whole number; any fraction or decimal part of the number is dropped. For example, if the equation results in a yield grade of 2.75, the final yield grade is 2. It is not rounded to 3.

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Quality Grades of Beef Carcasses

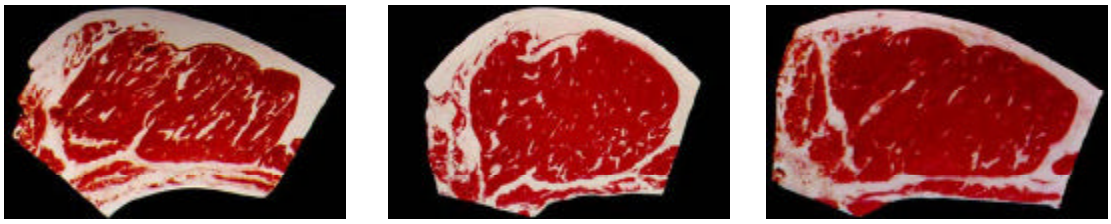
Beef quality grades are one of the main determinants in the value of a beef carcass. Two factors, marbling and maturity or age of the carcass, determine beef quality grades. Marbling is the intramuscular flecks of fat dispersed in the lean tissue. The degree of marbling is measured when a carcass is ribbed or split between the 12th and 13th ribs. There are nine different degrees of marbling (shown in Figure 1): Abundant, moderately abundant, slightly abundant, moderate, modest, small, slight, traces, and practically devoid. Abundant has the highest degree of marbling, while practically devoid has the lowest degree of marbling The second factor, maturity is determined by analyzing the degree of ossification of the bone and cartilage in the thoracic vertebrae region. There are five maturity levels of carcasses, A, B, C, D, and E, with the most youthful carcasses graded maturity A and the oldest appearing carcasses being graded maturity level E. A and B maturity levels are eligible to receive the grades of prime, choice, select, and standard, and are considered youthful carcasses. Older carcasses, with maturity levels of C, D, and E, usually from cows and bulls, receive commercial, utility, and cutter grades.

Once both the marbling score and maturity level have been determined, the USDA quality grade chart (shown in Figure 2) can be used to determine which quality grade the carcass will quality for.

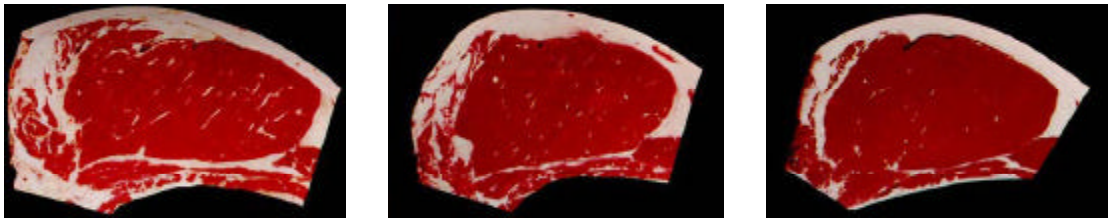
Quality Grades of Beef Carcasses

- How quality grades are determined
- Quality grades of beef carcasses

Figure 1. Degrees of Marbling



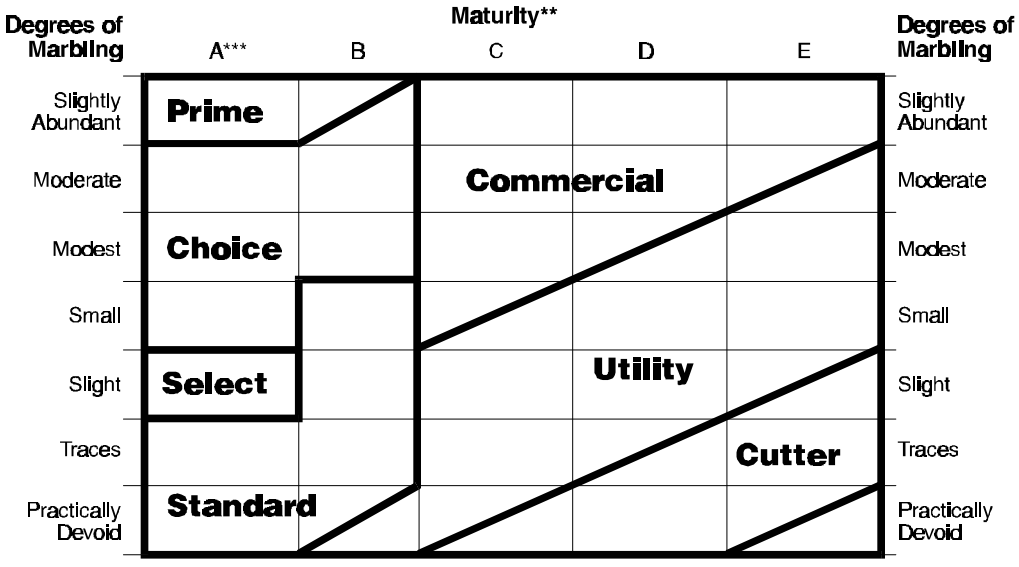
Moderately Abundant | Slightly Abundant | Moderate



Modest | Small | Slight

Figure 2. USDA Quality Grading Chart

Relationship Between Marbling, Maturity, and Carcass Quality Grade*



* Assumes that firmness of lean is comparably developed with the degree of marbling and that the carcass is not a "dark cutter."
** Maturity increases from left to right (A through E).
*** The A maturity portion of the figure is the only portion applicable to bullock carcasses.

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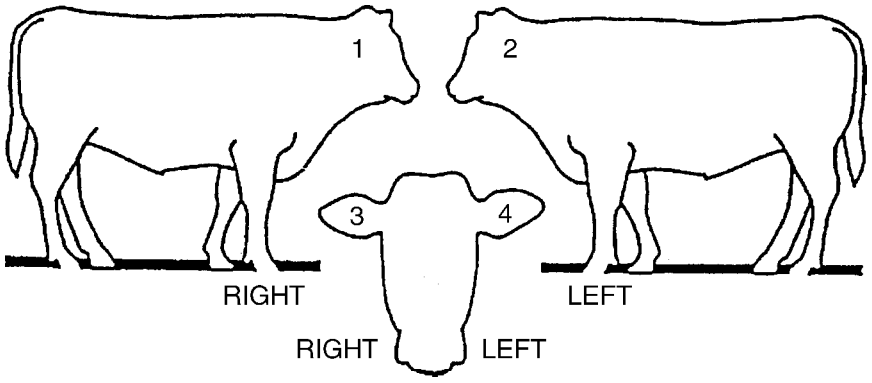
Group Animal Health Records



Date	Number of Head	Sex	Product	Lot #	Company	Dose	Route of Administration	Initials of Processor
5-22-99	55	Heifer	Cowbiotic	0001003	ND Animal Health	5 cc	SC – 2	LML

Comments _____

_____

_____

North Dakota's Beef Quality Assurance Program
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Individual Animal Health Record

Animal I.D. #_____

TREATMENT RECORD

Date	Temp.	Diagnosis	Treatment	Route of Administration	Date of Withdrawal	Initials of Processor

NOTES _____

_____

_____

_____

North Dakota's Beef Quality Assurance Program
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Animal Health Products

Date Received	Supplier/Distributor	Product Name	Quantity	Cost	Lot #	Serial #	Expiration Date
Example 5-15-99	ND Animal Health	Cowbiotic	250 ml	$20.00			

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A Producers Guide for Judicious Use of Antimicrobials in Cattle

1. **Prevent Problems:** Emphasize appropriate husbandry and hygiene, routine health examinations, and vaccinations.
2. **Select and Use Antibiotics Carefully:** Consult with your veterinarian on the selection and use of antibiotics. Have a valid reason to use an antibiotic. Therapeutic alternatives should be considered prior to using antimicrobial therapy.
3. **Avoid Using Antibiotics Important In Human Medicine As First Line Therapy:** Avoid using as the first antibiotic those medications that are important to treating strategic human or animal infections.
4. **Use the Laboratory to Help You Select Antibiotics:** Cultures and susceptibility test results should be used to aid in the selection of antimicrobials, whenever possible.
5. **Avoid Using Broad Spectrum:** Use narrow spectrum antimicrobials, whenever possible. Combination antibiotic therapy is discouraged.
6. **Avoid Inappropriate Antibiotic Use:** Confine therapeutic antimicrobial use to proven clinical indications, avoiding inappropriate uses such as for viral infections without bacterial complication.
7. **Treatment Programs Should Reflect Best Use Principles:** Regimens for therapeutic antimicrobial use should be optimized using current pharmacological information and principles.
8. **Treat the Fewest Number of Animals Possible:** Limit antibiotic use to sick or at risk animals.
9. **Treat for the Recommended Time Period:** To minimize the potential for bacteria to become resistant to antimicrobials.
10. **Avoid Environmental Contamination with Antibiotics:** Steps should be taken to minimize antimicrobials reaching the environment through spillage, contaminated ground run off or aerosolization.
11. **Keep Records of Antibiotic Use:** Accurate records of treatment and outcome should be used to evaluate therapeutic regimens and always follow proper withdrawal times.
12. **Follow Label Directions:** Follow label instructions and never use antibiotics other than as labeled without a valid veterinary prescription.
13. **Extralabel Antibiotic Use Must follow FDA Regulations:** Prescriptions, including extra label use of medications must meet the Animal Medicinal Drug Use Clarification Act (AMDUCA) amendments to the Food, Drug, and Cosmetic Act and its regulations. This includes having a valid Veterinary-Client-Relationship.
14. **Subtherapeutic Antibiotic Use Is Discouraged:** Antibiotic use should be limited to prevent or control disease and should not be used if the principle intent is to improve performance.