

APPENDIX

National Cattleman's Beef Association Beef Quality Assurance Guidelines

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 should be designed to eliminate contamination of molds, mycotoxins or chemicals of incoming feed ingredients. Supplier assurance of feed ingredient quality is recommended.
- Suspect feedstuffs should be analyzed prior to use.
- Ruminant-derived protein sources cannot be fed per FDA regulations.
- Feeding by-product ingredients should be supported with sound science.

Feed Additives and Medications:

- Only FDA-approved medicated feed additives will be used in rations.
- Medicated feed additives will be used in accordance with the FDA Good Manufacturing Practices (GMP) regulation.
- Extra-label use of feed additives is illegal and strictly prohibited.
- To avoid violative residues, withdrawal times must be strictly adhered to.
- Where applicable, complete records must be kept when formulating or feeding medicated feed rations.
- Records are to be kept for a minimum of two years.
- Operator will assure that all additives are withdrawn from the feed at the proper time to avoid violative residues.

Processing/Treatment and Records:

- Following all FDA/USDA/EPA guidelines for product(s) utilized.
- All products are to be used per label directions.
- Extra-label drug use shall be kept to a minimum, and used only when prescribed by a veterinarian working under a valid veterinary-client-patient relationship (VCPR).
- A veterinary prescription is needed whenever:
 1. Dosage is different than label dosage
 2. Route of administration is different
 3. Disease/condition to be treated is different than label
 4. Use occurs in a species not specifically listed on the label
 5. Drug is a veterinary legend drug
- The prescription must have a withdrawal time deemed appropriate by the prescribing veterinarian.
- Strict adherence to extended withdrawal periods shall be employed.
- Treatment records will be maintained with the following recorded:
 1. Individual animal or group identification
 2. Date treated
 3. Product administered and manufacturer's lot/serial number
 4. Dose used
 5. Route and location of administration
 6. Earliest date animal will have cleared withdrawal
- When cattle are processed as a group, all cattle within the group shall be identified as such, and the following information recorded:
 1. Group or lot identification
 2. Date treated
 3. Product administered and manufacturer's lot/serial number
 4. Dose used
 5. Route and location of administration
 6. Earliest date group or lot will have cleared withdrawal period
- All cattle (fed and non-fed) shipped to market/slaughter will be checked by appropriate personnel to ensure animals that have been treated meet or exceed label or prescription withdrawal times for all animal health products administered.
- All processing and treatment records should be transferred with the cattle to next production level. Prospective buyers must be informed of any cattle that have not met withdrawal times.

Injectable Animal Health Products:

- All products labeled for subcutaneous (SQ) administration shall be administered SQ ahead of (anterior to) the point of the shoulder.
- All products labeled for intramuscular (IM) use shall be given in the neck region only (no exceptions, regardless of age).
- All products cause tissue damage when injected IM. Therefore, all IM use should be avoided when possible.
- Products cleared for SQ, IV or oral administration are recommended.
- Products with low dosage rates are recommended and proper spacing practiced.
- No more than 10 cc of product is administered per IM injection site.

Care and Animal Husbandry Practices:

- All cattle will be handled/transported in such a fashion to minimize stress, injury and or bruising.
 - Facilities (fences, corrals, load-outs, etc.) should be inspected regularly to ensure proper care and ease of handling.
 - Strive to keep feed and water handling equipment clean.
 - Provide appropriate nutritional and feedstuffs management.
 - Strive to maintain a clean environment appropriate to the production setting.
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Beef Quality Grades

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Making the Grade — Part 1

By Kristen Tribe

You may know the ins and outs of the beef grading system – the numbers, the letters, how it all works. But have you ever considered how the grading system actually applies to your operation? This month, “Rancher’s Management Guide” will kick off a three-part series on U.S. Department of Agriculture beef grades, beginning with quality.

“The quality grade system was developed in the early 1900s for the purpose of segmenting the cattle into more similar groups according to eating satisfaction, which is basically how we use it now,” says Dan Hale, professor and Extension meat specialist,

Texas A&M University.

It has evolved into a voluntary system that is administered by the Agriculture Marketing Service, a branch of USDA. Although the system is voluntary, Hale says many packers are willing to pay for the graders because they’re “demanded to do that by the restaurant or retailer.”

“[Restaurants and retailers] ask themselves, ‘What are the expectations of my customer, No. 1?’ And secondly, ‘What is the probability of serving that customer an undesirable steak?’” says Hale. Quality grade gives them an indicator of the palatability of a particular cut of meat.

USDA graders consider car-

cass maturity, firmness, texture, color of lean and amount and distribution of marbling to determine quality grade.

“A grader stands on the line and looks at that carcass for about six seconds and tries to find something to give them an idea of eating quality,” says Hale. “Really, the best single factor to determine quality grade by just looking at a carcass is marbling, and of course, the age of the animal is really important, too.”

There are actually 10 degrees of marbling ranging from very abundant, abundant, moderately abundant, slightly abundant, moderate, modest, small, slight, traces and practically devoid.

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE*

Degrees of Marbling	Maturity**					Degrees of Marbling
	A***	B	C	D	E	
Abundant						Abundant
Moderately Abundant	Prime					Moderately Abundant
Slightly Abundant			Commercial			Slightly Abundant
Moderate	Choice					Moderate
Modest						Modest
Small						Small
Slight	Select			Utility		Slight
Traces					Cutter	Traces
Practically Devoid	Standard					Practically Devoid

* 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).

USDA (1997) Standards for Grades of Slaughter Cattle and Standards for Grades of Carcass Beef.

Although these degrees are self-explanatory, marbling requirements increase with each grade and with maturity. In other words, a carcass from an older animal would have to have more marbling to grade Choice than a carcass from a younger animal.

The graders determine age by evaluating bones and cartilage “buttons” on the end of the back-bone and the size and shape of the rib bones. As an animal ages, the cartilage turns to bone and the ribs become flat. Therefore, the flatness of the ribs and the percent bone is a good indication of maturity.

The maturity groups and corresponding chronological ages are:

- A 9 to 30 months
- B 30 to 42 months
- C 42 to 72 months
- D 72 to 96 months
- E > 96 months

The color and texture of the lean is also an indication of age. As an animal matures, the muscle color will become a darker red and more coarse, but this is never used as a sole indicator because it is sometimes affected by other factors besides age.

With the exception of the A-maturity group, there are even subdivisions within these general categories. For instance, a man who is in his 40s can be any age from 40 to 49. The same holds true with these maturity groups. A carcass may be in the C category, but it can be anything from a C⁰⁰ to a C⁹⁰.

Based on all of these factors, a carcass is then labeled Prime,

Choice, Select, Standard, Commercial, Utility, Cutter or Canner.

A- or B-maturity carcasses are eligible to be graded Prime, Choice, Select or Standard. The Commercial grade is for carcasses in the C-, D- or E-maturity groups and any carcass can be graded Utility, Cutter or Canner. Most cows fall into the Commercial category or lower.

Hale says the Choice grade is a “wide box” with three degrees of marbling, and it’s basically subdivided by packers into Low Choice, Average Choice and High Choice. These are not actual grades but a distinction many packers make.

“They call it ‘creaming the cooler,’” says Hale, “like you take the cream off the top of the milk. They’ll take the top end of the Choice, the ones that have more marbling, and put them into programs like Certified Angus Beef if they fit the other criteria or they’ll call them Premium Choice or Top Choice programs.”

The management decisions you make will have influence on the quality grade of your cattle, too. Genetics, disposition, days in the feedyard, type of ration fed and for how long and castration can all affect quality grade. Late castration can actually lower marbling scores.

And your cattle don’t have to be black to grade, Hale says. He explains a significant percentage that don’t grade are black, and there’s no reason red cattle or any other color shouldn’t be capable of grading.

“From a rancher’s standpoint, the first thing they need to do is find out what kind of cattle they produce,” suggests Hale. “They may not change anything they do, but knowing how they grade and perform gives them more information in case they do want to make changes or try different marketing strategies.”

He says you need to determine which cattle are “outs” – cattle that don’t fit the packers’ targets. For example, discounts are given to cattle that grade Standard, depending on how they are marketed. If you have a high percentage of “outs” you may consider culling that bull and his progeny. He suggests selecting bulls that have positive traits for feedlot gain and positive carcass traits, adding that “there are bulls within most every breed that can do that.”

“If you put the emphasis on the sire side, over time the rest will follow,” Hale explains. “Producers have the idea that they have to produce all Prime- or Choice-type cattle. But so long as their cattle don’t grade Standard, and they grade Select, there’s probably a place for those kind of cattle. There is some demand for Select and there are parts of the United States that prefer Select beef, particularly the West Coast.

“People from particular production schemes shouldn’t be discouraged,” he says. “They should meet the minimum, which would be Select, and then try to make their profit on the performance of the calf, rather than the

Beef Yield Grades

Reprinted from *The Cattleman*, November, 2000



Making the Grade — Part 2

By Sharla Ishmael

This month, refresh your memory on the basics of Yield Grades.

Pick a number between 1 and 5. Any number. If you're talking about Yield Grades, the smaller the number the better. Yield Grade is one of the two grades (the other is Quality Grade) that a packer can voluntarily pay government graders to evaluate, which largely determines the value of a beef carcass.

Simply put, a Yield Grade is an estimate of the relative amount of lean, edible meat from a carcass, according to *Beef Facts: Meat Science* by Dr. Daryl Tatum of Colorado State University. Quality grade, on the other hand, estimates eating characteristics like flavor, tenderness and juiciness.

A U.S. Department of Agriculture Yield Grade expresses the cutability of a beef carcass, which means the relative percentage of closely trimmed, boneless retail cuts from the round, loin, rib and chuck. Together, these four parts of the carcass account for more than 80 percent of the value of a beef carcass.

There are five USDA Yield

Grades – 1, 2, 3, 4 and 5. A Yield Grade 1 carcass should yield a higher percentage of closely trimmed, boneless retail cuts than a Yield Grade 5 carcass. Carcasses that get stamped with a Yield Grade of 4 or 5 can be severely discounted in today's market.

The reason is simple: too much fat has to be trimmed from the carcass to meet retail/foodservice standards. It costs the feeder money to put the fat on, and it costs the packer money to trim that fat off. Plus, while the packer can merchandise the extra fat to hamburger grinders and such, it's not worth nearly as much as the lean muscle tissue that can be sold as steaks, roasts, etc.

In fact, economists say the majority of beef imported into the United States is lean trim used to mix with the extra fat our industry produces to make the leaner ground beef that consumers want (*Fat of the Land*, July 1998).

Yield Grade is determined by four factors: 1) external fat thickness over the ribeye, 2) ribeye area, 3) estimated kidney, pelvic and heart fat (as a percentage of carcass weight), and 4) hot carcass weight. Measurements for

each of these four factors can either raise or lower the numerical value of the Yield Grade (See example on page 82).

Depending on how you market your cattle – or plan to market them in the future – Yield Grade can add some black ink to your bottom line. Or not.

"We probably don't do as good a job in getting the value of yield transferred back through the system," says Dr. Davey Griffin, associate professor and Extension meat specialist at Texas A&M University. "If you're selling your cattle on the rail, the signal is real clear that we don't want 4s and 5s. Last week, for example, 4s were \$18 (per hundredweight) back and 5s were \$23 back of a Choice, Yield Grade 3 or better carcass.

"But the signals have not been as clear when you look at premiums for 1s and 2s," he adds. "Last week, 2s were only bringing \$1 more. And 1s were only \$2.40 more. We are probably not rewarding those 1s and 2s enough."

He bases those observations on the USDA Market News Reports, but adds there are individual company grids today that put more value on leaner,

high-quality carcasses.

Griffin says, historically, most of the huge spreads in the market in terms of premiums and discounts have been on the Quality Grade side.

“However, there are times of the year, as the Choice/Select spread narrows, when cattle that are superior in Yield Grade will outperform, dollars-wise, fatter cattle that grade Choice,” Griffin says. “And some of that value will get back to the producer. But when the spread is \$10 to \$12 or more, Yield Grade doesn’t have much impact as long as there are no 4s or 5s. You just can’t make up that difference.”

That’s why Griffin says it makes a huge difference when you’re selling cattle on the rail to be aware of how the Choice/Select spread moves throughout the year – especially if you don’t expect a high percentage of your cattle to grade Choice.

“On the Yield Grade side of the equation, cattle producers probably do a better job of selecting for lean, muscular cattle because it’s something you can actually see on a live animal,” Griffin explains.

“However, one of the pitfalls is that as an industry we can go too far and start looking too much at muscling without considering the quality side. We can produce an incredible amount of lean product, but if it’s not palatable we have gone too far,” he says.

How much muscle is too much? Or too little?

“When you talk to restaurants, any ribeye larger than 16 (square) inches is too big,” he says. “It gets back to the old thing about portion size. Also, anything under 11 inches is too small. But that’s still a really wide range.”

What he’s saying is that a 10-ounce serving from an 18-inch ribeye is not the same thing as a 10-ounce serving from a 14-inch ribeye. In order to get 10 ounces from the 18-incher, you have to cut the meat very, very thin. It gets overcooked. The customer is not happy.

There are other common misconceptions about Yield Grade among producers besides the “bigger is better” myth. Griffin says most of the confusion stems from not understanding the entire yield equation.

“We get people that call up and say their cattle do a better job yield-wise and they eat better. They think they’ve got a market for that and want some help getting started (niche marketing),” Griffin explains. “The problem is they don’t understand the whole picture.

“They may have a market for the ribeyes, strip loins, tenderloins and top sirloin, but that’s only 10 to 12 percent of the carcass. Somebody still has to deal with the rest of the carcass at market prices. You can’t make the math work if you don’t understand the whole yield equation,” he adds.

“That’s why the Beef Council is working so hard on the round and chuck. If we can upgrade those cuts just a few pennies...it’s worth a huge amount to the industry.”

There are also lingering false impressions about leanness.

“You’ll hear people say if everything was a 1 or 2 we’d have cattle in the herd that were too lean to reproduce or produce quality beef,” he says. “While we do need that balance between yield and quality, producers should understand that we actually trim 10 percent to 15 percent fat off of a Yield Grade 1 or 2 – and that’s leaving 1/4 inch trim.

“So it’s not true that a Yield Grade 1 has absolutely no fat,” he explains. “The target still needs to be 1s and 2s. We can still have 3s and be okay; we just can’t have those 4s and 5s. I think, on Yield Grade, we’re doing alright as an industry. We just need to send a clearer message about 1s and 2s back to the producer.”■

For more information, you can find the National Carcass Premiums and Discounts for Slaughter Steers and Heifers at http://www.ams.usda.gov/mnreports/nw_ls195.txt. A very good web site for learning more about this topic and locating times and dates of educational seminars like Beef 706 and Beef 808 is <http://meat.tamu.edu/>.

Classification of Drugs

Drugs are classified by the Food and Drug Administration as Over the Counter (OTC) or Prescription Drugs. The OTC drugs can be purchased and used as directed on the label without establishing a relationship with a veterinarian. For example, penicillin G directs 1 cc/cwt be given IM, so a 600-pound calf would get 6cc. You are not allowed to adjust the dose, route of administration, indication or species.

Prescription drugs can be used only by or on the order of a veterinarian, within the context of a valid veterinarian-client-patient relationship (VCPR). Medications used in this fashion must be labeled with an additional label that contains the veterinarian's contact information and instructions given, including the withdrawal time.

Compounding of drugs

Compounding of medications to treat cattle by a veterinarian is strictly regulated by section 530.13, Extra Label Drug Use in Animals and 608.400, Compounding of Drugs for Use in Animals. The FDA's Center for Veterinary Medicine has interpreted the regulations to allow extra-label drug use for treating disease or preventing pending disease.

The compounded medication must meet strict FDA-CVM guidelines, whose policy states, "The veterinarian will need to be able to defend why the compounded drug works where a labeled product or extra-label use of a

NADA or human compound would not."

Extra-label drug usage:

Extra-label drug use is using a drug at a dose, by a route, for a condition or indication, or in a species not on the label. Drug cost is not considered a valid reason for extra-label drug use under the Animal Medicinal Drug Use Clarification Act or the regulations promulgated to implement the act.

FDA-CVM criteria for extra-label drug use:

1. A careful diagnosis is made by an attending veterinarian within the context of a valid veterinarian-client-patient relationship.
2. A determination is made that 1) there is no marketable drug specifically labeled to treat the condition diagnosed, or 2) treatment at the dosage recommended by the labeling was found clinically ineffective.
3. Procedures are instituted to assure that identity of the treated animal is carefully maintained.
4. A significantly extended period is assigned for drug withdrawal prior to marketing the treated animal and steps are taken to assure the assigned time frames are met so that no violative residue occurs. The Food Animal Residue Avoidance Databank (FARAD) can aid the veterinarian in making these estimates.

Veterinarian-client-patient relationships exist when:

1. The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions.
2. The veterinarian has sufficient knowledge of the animal to initiate at least a general or preliminary diagnosis of the medical condition of the animal. This means the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal by virtue of an examination of the animal or the medically appropriate and timely visits to the premises where the animal is kept.

3. The veterinarian is readily available for follow-up evaluation in the event of adverse reactions or failure of the treatment regimen.

Prohibited drugs

- Chloramphenical
- Clenbuterol
- Diethylstilbestrol (DES)
- Nitroimidazoles (Dimetridazole, Iprnidazole, Metronidazole)
- Nitrofurans (Nitrofurazane, Furazolidone,) expect for approved topical use
- Fluoroquinolones (except Enrofloxacin)
- Glycopeptides (Vancomycin)
- Dipyrone

What Are My Responsibilities as an Animal Health Worker?

Consumer Concern –Today's consumer is pressing for changes in the way animal drugs are distributed and used. Consumers are concerned that meat may contain harmful drug residues. In spite of the fact that U.S. food animal products are among the most inspected, wholesome and safest in the world, consumers have the perception (due to media scare stories) that hazardous residues still exist because contaminants are occasionally detected.

Everyone Must Help - Everyone that works in the livestock industry must work to eliminate drug residues. Failure to work as a united group could result in further erosion of public confidence in the wholesomeness of food animal products. This means lost sales, lost markets for beef and lost jobs in the beef industry.

Animal Health Workers - Animal health workers must see that all animals are maintained in a clean, healthy environment whenever possible. Management practices and animal health programs should be developed to keep animals healthy and producing efficiently, so that less drug treatments are needed.

Responsible Drug Use is the Law - Animal health workers must practice responsible drug use. It's the law. Unapproved drugs, special mixes, concoctions, cocktails or products with inadequate labels must not be used. Drugs must not be purchased from uninformed suppliers that don't have the ability to stand behind their products when problems occur.

Drugs Must Be Given at the Dose Recommended by Your Veterinarian – Or, you must use the dose printed on an FDA-approved label or package insert. Giving a higher than recommended dose does not help the animal, and in some cases, may actually cause bad side effects or increased tissue damage.

Higher doses result in increased cost per animal and a longer withholding time. Non-veterinarians may not legally vary the dose or use of a drug from that described on the FDA-approved label or package insert. In a Beef Quality Assurance program, it is twice as important that this law be observed.

Animal Identification and Treatment Records - Animal health workers must make sure that each treated animal is identified with its own special number. Treatment dates, with the drug dose used, must be recorded. The date when the animal no longer needs to be withheld for slaughter is called the "withdrawal date" and must also be recorded for each treated animal.

Drug Withdrawal Dates - The main ranch office must be advised of the pens or groups that contain animals with specific withdrawal dates. The records of each animal must be checked before slaughter to be sure that the withholding period has expired. The shipping crews must be trained to help avoid shipping animals before their withdrawal times have expired.

Animal Welfare - Some members of the public have the perception that animal facilities are insufficient or that farm or feedlot animals are often mistreated. It is just good business to treat animals well, besides being ethically correct. Well-treated animals are better producers. It is up to all animal health workers to provide adequate, comfortable facilities for the animals under their care.

With procedures that cause pain, the animal health worker should consider doing the procedure at a younger age or consider a non-painful alternative to the procedure if possible.

Approved Feed Additives and Medications for Beef Cattle

This a guide to many of the products that are available. This list could change as new products are developed and withdrawal time re-evaluated.

ALWAYS READ THE LABEL for proper withdrawal times.

Trade Name	Generic Name	Category	FDA-1900 required if source concentration is > than	Withdrawal period, days
Albac/Baciferm	Bacitracin Zinc	1		0
Altocid	Methoprene	1	2.5%	0
Amprol/Amprovine	Amprolium	1		1
Aureomycin/CTC	Chlortetracycline (CTC)	1		2-10 (a)
Phenothiazine				
Baymix	Coumaphos	1		0
Bloat Guard	Poloxalene	1		0
BMD/Fortracin	Bacitracin Methylene	1		0
10/25/4F/50	Disalicylate			
Bovatec	Lasalocid	1 (b)		0
Cattlyst	Laidlomycin Propionate	1		0
Deccox	Decoquinatate	1		0
GainPro	Bambermycins	1		0
MGA	Melengestrol Acetate	2 (c)	See below (d)	2
Neomix/Neomycin	Neomycin	2	1.54%	30
Phenothiazine/Bar Fly	Phenothiazine	2	14.60%	0
Rabon	Rabon	1	See below (e)	0
Rumatel Premix	Morantel Tartrate	2 (c)	14.52%	14
Rumensin	Monensin	1		0
SafeGuard	Fenbendazole	2	1.96%	13
TBZ	Thiabendazole	2	10.00%	3
Terramycin/OTC	Oxytetracycline (OTC)	1		5
Tramisol	Levamisole HCl	2 (c)	25.00%	2
Tylan 40/100	Tylosin	1		0
V-max	Virginiamycin	1		0

Approved Feed Additives Combinations

Trade Name	Generic Name	Category	FDA-1900 required if source concentration is > than	Withdrawal period, days
Rumensin + Tylan	Monensin + Tylosin	1		0
Rumensin + MGA	Monensin + MGA	2 (b,c)	See below (d)	2
Bovatec + MGA	Lasalocid + MGA	2 (b,c)	See below (d)	0
Bovatec + Terramycin	Lasalocid + OTC	1		0
Neo + Terramycin	Neomycin + OTC	2 (b,c)	1.54% / 2.20%	7 (g)
Aureo + S-700	CTC + Sulfamethazine	2 (b,c)	2.20% / 2.20%	0
Rumensin, Tylan and MGA	Monesin, Tylosin and Melengestrol Acetate	2 (h)		2

- Withdrawal period is 10 days when more than 1,000 mg per head per day is given; otherwise, 48 hours.
- Requires FDA-1900 under some instances when used in liquid form or free choice formulation for pasture cattle.
- Requires three (3) assays per year if you hold an FDA-1900.
- FDA-1900 is required if the source of MGA contains more than 2.0 g/ton (0.00022%), except when fed as a Type B feed containing not less than 0.125 mg nor more than 1.0 mg MGA per lb. per head per day.
- Rabon is not considered a feed additive and is approved to feed in combination with any additive.
- When fed at less than 2g per head per day, no withdrawal time is required.
- Neo Terra requires 7 days withdrawal if the source contains 1.4 g of Neomycin and 2.0 g of Oxytetracycline fed per head per day. No withdrawal is required at lower levels.
- Only two of the three can be mixed in a single supplement. Must be added to the complete diet in a minimum of two supplements.

Feed Additives: Levels, Withdrawals and Legal Combinations

	NAME	LEVEL (All air dry or 90% DMB)	Withdrawal Days	Legal Combinations* (Match numbers in far left column. These products can be used together.)
1	Rumensin	10-30 g/ton	0	1 (2,3)
2	Tylan	8-10 g/ton	0	2 (1,3)
3	MGA	0.25-0.50 mg/hd/day	0	3 (1,2,4)
4	Bovatec	20-30 g/ton	0	4 (3,10)
5	GainPro	1-4 g/ton	0	
6	Cattlyst	5-10 g/ton	0	
7	V-Max	11-22.5 g/ton	0	
8	Aureomycin	1-10 mg/lb/hd/day	0-10	8 (9)
9	Sulfamethazine	350 mg/hd/day	7	9 (8)
10	Terramycin	1-10 mg/lb/hd/day	0-10	
	Amprolium	2.27 mg/lb/day (21 days)	1	
11	Deccox	0.227 mg/lb/day	0	
12	Safe-Guard	2.27 mg/lb	13	
13	Poloxalene	10-20 mg/lb	0	

Feed Additives And Medications

1. Drug Categories: All drugs are divided into one of two categories.

Category 1 - Drugs that have no required withdrawal time when used at lowest usage level.

Category 2 - Drugs that either (1) have withdrawal times at lowest usage level or (2) are regulated because of a “no residue” tolerance level.

2. Medicated Feed Type: All medicated feeds are divided into one of three types.

Type A - Medicated feed articles that usually consist of highly concentrated forms of the drug in the form of mill premixes, super-concentrates, and fortifiers that have a higher potency than permitted in Type B or Type C feeds. Type A feeds are used to produce Type B and Type C feeds.

Type B - Medicated feeds that usually consist of dilute drug premixes, some feed concentrates, supplements and other mixtures that require further mixing with one or more feed ingredients to achieve final dilution before being fed.

Type C - Medicated feed in its final form that does not require any additional dilution prior to being fed. Usually consisting of top dressings, complete feed or fed as a free-choice supplement. The only regulatory requirements are to follow a relaxed set of CGMP.

3. Registration with the Food and Drug Administration:

a) Who must register with the FDA?

Any establishment that uses one or more Type A sources of a Category 2 drug to manufacture or produce medicated feed articles. Registration requires completion of either Form FD-2656 (for first-time registrants) or 2656e (for annual re-registration), together with a separate Form FDA-1900 for each of the Type A, Category 2 drugs being used. The forms are described in Paragraph 4 below.

b) What about feed mixed on the farm?

All producers of medicated feeds are subject to the same rules. If commercial mills, feedlots, producers, mobile mixers, etc. use only Category 1 products and/or Category 2 Type B drug products, registration with FDA is not required. These products are subject to follow the relaxed set of CGMPs and are not subject to routine inspections by FDA.

If a firm uses one or more Category 2 Type A medicated articles as drug sources, it must register with FDA and comply with the full CGMPs and is subject to FDA inspections for compliance with these CGMPs at least once every two years.

4. Forms used by the FDA:

FD-2656. Registration of Drug Establishment. This form is required for initial registration with the FDA and must be submitted within five working days after commencement of operation of the facility.

FD-2656e. Annual Registration of Drug Establishment. This form is used for annual registration of facilities. The FDA will send this form to your facility on an annual basis.

FDA-1900. Medicated Feed Application. This form is used to obtain FDA approval to manufacture or use any Type A Category 2 feed article at your facility. Purchase of a medicated premix or complete feed does not require an FDA-1900 as the facility that blends and manufactures the feed will have one on file. However, each user is responsible for the correct level of drug contained in the total feed. If your facility does not have an FDA-1900 on file for the proper drugs, your facility must first pass a CGMP inspection conducted by the FDA; then FDA will approve your Medicated Feed Application "1900."

These forms can be obtained by writing to
Department of Health, Education and Welfare
Food and Drug Administration, Bureau of Drugs
Drug Listing Staff (HFD-315)
5600 Fishers Lane
Rockville, MD 20857

Or call or write to: Texas Department of Agriculture
PO Box 12847
Austin, TX 78711
(800) 835-5832
<http://www.agr.state.tx.us>

Ruminant Ban Fact Sheet

Purpose and Scope of Regulation: The Food and Drug Administration (FDA) adopted the "Animal Proteins Prohibited from Ruminant Feed" regulation to prevent the establishment of bovine spongiform encephalopathy (BSE) in the United States through feed and, thereby, minimize any risk to animals and humans.

The regulation prohibits the use of protein derived from mammals in ruminant animal feed. However, there are certain exceptions to the rule including:

1. Pure porcine or pure equine protein
2. Blood and blood by-products
3. Gelatin
4. Inspected meat products which have been cooked and offered for human food and further heat processed for animal feed use
5. Milk products (milk and milk protein)

The regulation has established certain requirements for renderers, protein blenders, feed manufacturers, distributors (including haulers) and individuals and establishments that are responsible for feeding ruminant animals.

The final rule was effective on Aug. 4, 1997. In regards to printed packaging, labels, labeling and finished products manufactured before Aug. 4, 1997, such material and product may continue to be used until such supplies are exhausted, but may not be used after Oct. 3, 1997.

Requirements and Guides for Establishments and Individuals that are Responsible for Feeding Ruminant Animals

This regulation applies to establishments, both large and small feeding operations, and individuals that are responsible for feeding ruminants. Establishments are required to:

- Maintain copies of all purchase invoices for all feeds received that contain animal protein. If a feed intended for ruminants contains animal protein, the protein can consist only of non-prohibited material. The regulation requires maintenance of invoices for all feeds containing animal protein, so that FDA can verify, if necessary, that the animal protein contained in the ruminant feed is from non-prohibited sources.
- Maintain copies of labeling for feeds containing animal protein products that are received. The agency recognizes that bulk shipments of feed are commonplace and that labeling information typically is contained in the invoices for bulk shipments. In those instances, maintenance of the invoice is sufficient. If the only labeling for a bulk product is on a placard, the placard for each shipment should be retained.

Feed may also be received in bags or other containers that have attached labeling. In those instances, the labeling should be removed and retained. However, maintenance of only one such labeling piece from each shipment that represents a different product is necessary.

Finally, if the labeling cannot be removed from the bag or other container, maintenance of a representative bag or a transposed copy of the labeling information from a container that cannot feasibly be stored will suffice.

- Make copies of the invoices and labeling available for inspection and copying by FDA.
- Maintain the records for a minimum of one year. The records should be kept so that they are legible and readily retrievable. The one-year requirement means one year from the date of the receipt of the product.

Requirements For Protein Blenders, Feed Manufacturers and Distributors That Separate Prohibited Material and Non-Prohibited Material.

Distributor is defined as any firm or individual that distributes or transports feeds or feed ingredients intended for animals. Haulers are included in this definition. Haulers who haul both prohibited material and non-prohibited material, including blended animal protein products, are subject to the separation or clean-out procedures described below. Haulers of complete and intermediate feeds

are “distributors.”

FDA suggests that for all equipment, including that used for storing, processing, mixing, conveying and distribution that comes in contact with feeds containing prohibited material and non-prohibited protein, that reasonable and effective procedures to prevent contamination of manufactured feed be followed.

The steps used to prevent contamination of feeds often include one or more of the following, or other equally effective procedures: 1) Physical means (vacuuming, sweeping or flushing and/or sequential production of feeds); 2) If flushing is utilized, FDA recommends that the flush material be properly identified, stored and used in a manner to prevent contamination of other feeds.

The volume of flushed material should be sufficient to equal the operating volume of the shared equipment; 3) If sequential production is utilized, FDA recommends that it be on a predetermined basis designed to prevent unsafe contamination of ruminant feeds. An example of appropriate sequencing would be swine feed containing prohibited material, followed by a swine or poultry feed not using prohibited material, followed by a ruminant feed containing non-prohibited material.

Glossary of Terms

Abscess: A swollen, inflamed area in body tissue in which pus gathers.

Accuracy: A measure of reliability associated with an Expected Progeny Difference (EPD). The measure ranges from 0 to 1, with values closer to 1 indicating greater reliability because of the inclusion of more information.

Active ingredient: The specific drug component part of a chemical compound.

Additive: An ingredient or substance added to a basic feed mix, usually in small quantities for the purpose of fortifying it with certain nutrients, stimulants and/or medications.

Animal unit: Common animal denominator based on feed/forage consumption.

Anthelmintic: A drug or chemical that kills or expels worms.

Antibiotic: A class of drugs, such as penicillin, used to control or cure disease. Antibiotics are used to treat both human and animal disease.

Antiseptic: A substance that reduces or stops growth of organisms in or on living tissue.

Artificial insemination (AI): The technique of placing semen from the male into the reproductive tract of the female by means other than natural service.

Average daily gain: Measurement of an animal's daily body weight change.

Backcross: The mating of a crossbred (F1) animal back to one of its parental breeds (for example, a Hereford-Angus crossbred mated to an Angus bull).

Beef Quality Assurance (BQA): Begun in 1987, the beef industry's BQA program includes training for cattle producers aimed at ensuring beef safety from conception to the consumer's dinner plate. It includes instruction on everything from proper vaccination pro-

cedures and withdrawal times to monitoring feed ingredients for potential chemical contaminants.

Bloat: A digestive disorder of ruminants usually characterized by an abnormal accumulation of gas in the rumen. Usually seen on the animal's upper left side.

Body Condition Score: A score on a scale of 1 to 9, reflecting the amount of fat reserves in a cow's body, where 1 = very thin and 9 = extremely fat.

Bos indicus: These are Zebu (humped) cattle that originated in India. Includes breeds like the Brahman breed in the United States.

Bos taurus: British and European/Continental breeds are derived from this species.

Bovine Spongiform Encephalopathy (BSE): It is an extremely rare, chronic degenerative disease affecting the central nervous system of cattle. It was first identified in Great Britain in 1986. Based upon USDA surveillance efforts, there are no documented cases of BSE in the United States.

Breed: Animals with a common origin and common characteristics that distinguish them from other groups of animals within that same species.

Breeding program goals: The objective or direction of breeders' selection programs. Goals are basic decisions breeders must make to give direction to their breeding programs. Goals should vary among breeders due to relative genetic merit of their cattle, their resources and their markets.

Breeding soundness examination: Inspection of a bull involving evaluation of physical conformation and soundness through genital palpation, scrotal circumference and testing semen for mobility and morphology.

Breed type: The combination of characteristics that makes an animal better suited for a specific purpose.

British breeds: Breeds of cattle originating in Great Britain, such as Angus, Hereford and Shorthorn.

Calving difficulty (Dystocia): Abnormal or difficult labor, causing difficulty in delivering a fetus and/or placenta.

Carcass evaluation: Techniques of measuring components of quality and quantity in carcasses.

Carcass merit: Desirability of a carcass relative to quantity of components (muscle, fat and bone), USDA Quality Grade and potential eating qualities.

Carcass yield: The carcass weight as a percentage of the liveweight.

Carrier: A heterozygous individual having one recessive gene and one dominant gene for a given pair of genes (alleles). For example, an animal with one gene for polledness and one gene for horns will be polled, but can produce horned offspring when mated to another animal carrying the gene for horns.

Clinical disease: Visible signs of poor health due to the presence of invading organisms.

Colostrum: The milk secreted by mammalian females for the first few days before and following parturition, which is high in antibodies and laxative.

Compensatory gain: Gain from cattle that have been nutritionally deprived for part or all of their lives. When fed feedlot rations, they compensate for the earlier restriction of feed by gaining very rapidly.

Composite breed: A breed formed by crossing two or more breeds.

Concentrate: A broad classification of feedstuffs that are high in energy and low in crude fiber (less than 18%).

Conformation: The shape and arrangement of the different body parts of an animal.

Congenital: Acquired during prenatal life. Condition exists at or dates from birth. Often used in the context of congenital (birth) defects.

Contemporary group: A group of cattle that are of the same breed and sex and have been raised in the same management group (same location on the same feed and pasture). Contemporary groups should

include as many cattle as can be accurately compared.

Continental breeds: Breeds that originate from Europe (other than England). Also called European breeds.

Correlation: A measure of how two traits vary together. A correlation of +1.00 means that as one trait increases, the other also increases — a perfect positive relationship. A correlation of -1.00 means that as one trait increases, the other decreases — a perfect negative, or inverse, relationship. A correlation of 0.00 means that as one trait increases, the other may increase or decrease — no consistent relationship. Correlation coefficients may vary between +1.00 to -1.00.

Creutzfeldt-Jakob Disease (CJD): It is a human disease of a class of rare degenerative brain diseases called Transmissible Spongiform Encephalopathies (TSE), some of which affect humans and some of which affect animals. While the agents which cause CJD are poorly understood, CJD occurs at a consistent rate worldwide of one case per million persons per year. (Also see new variant CJD.)

Crossbreeding: The mating of animals of different breeds (or species). Crossbreeding usually results in heterosis (hybrid vigor).

Culling: The process of eliminating less productive or less desirable cattle from a herd.

Cutability: An estimate of the percentage of salable meat (muscle) from the round, rib and chuck vs. percentage of waste fat. Percentage of retail yield of carcass weight can be estimated by a USDA prediction equation that includes hot carcass weight, ribeye area, fat thickness and estimated percent of kidney, pelvic and heart fat.

Dark cutter: Refers to the dark appearance of the lean muscle tissue in a carcass and is usually caused by stress (excitement) of the animal prior to harvest.

Dioxin: An organic compound found throughout the world in air, soil, water and food. It is the by-product of natural events like forest fires and man-made processes, such as manufacturing and vehicle exhaust. Humans are exposed to dioxins through the air they breathe and the water they drink. Humans can also be

exposed to dioxins in the food they eat. Due to the efforts of many industries, including beef, human dioxin levels have declined more than 72% during the past 20 years.

Disinfectant: A chemical capable of destroying disease-causing microorganisms or which inactivates viruses.

Dressing percent: (Hot carcass weight divided by liveweight) x 100.

Dry matter basis: A method of expressing the level of a nutrient contained in a feed on the basis that the material contains no moisture.

Dystocia (calving difficulty): Abnormal or difficult labor causing difficulty in delivering the fetus and/or placenta.

Ear notching: Making slits or perforations in an animal's ears for identification purposes.

***E.coli* 0157:H7:** A class of bacteria commonly found in the environment. *E.coli* 0157:H7 is a virulent strain of this bacteria found in the intestinal tract and feces in animals and humans. While *E.coli* 0157:H7 can cause food poisoning, thorough cooking destroys the bacteria. The beef industry continues to develop new technologies and procedures aimed at reducing the risk of *E.coli* 0157:H7.

Energy feeds: Feeds that are high in energy and low in fiber (less than 18%), and that generally contain less than 20% protein.

Environment: All external (non-genetic) conditions that influence the reproduction, production and carcass merit of cattle.

Established safe level: Concentration of drug metabolite in tissue considered to be without hazard to consumers and below which the FDA normally will not take regulatory action.

Estrus: Regularly recurrent state of sexual excitability during which the female (cow or heifer) will accept the male (bull).

Estrus synchronization: Causing a group of cows or heifers to exhibit estrus together at one time by artificial manipulation of the estrous cycle.

European Hormone Ban: A ban instituted in 1989 by the European Community (now called the EU) on imported meat and meat products treated with hormones. While the EU continues to argue the ban is based on health risk, there is no scientific evidence to support their claims. The United States views the ban as an artificial trade barrier erected by the EU to keep imported meat from competing with EU member countries who had created huge surpluses of domestic meat when the ban was initiated.

Expected Progeny Difference (EPD): The difference in performance to be expected from future progeny of an individual, compared with that expected from future progeny of another individual. An EPD is an estimate based on progeny testing and is equal to one-half the estimate of breeding value obtainable from progeny test records.

Extra label usage: Administering a drug or other substance in a manner not specified on the label.

F1: Offspring resulting from the mating of a purebred (straightbred) bull to purebred (straightbred) females of another breed.

Fat thickness: Depth of fat in tenths of inches over the ribeye muscle between the 12th and 13th rib interface. It consists of a single measurement at a point 3/4 of the lateral length of the ribeye muscle from the split chine bone.

FDA: The Food and Drug Administration is part of the U.S. Department of Health, Education and Human Services. It is charged with the responsibility of safeguarding American consumers against injury, unsanitary food and fraud.

Feed conversion (feed efficiency): Units of feed consumed per unit of weight gained. Also the production (meat, milk) per unit of feed consumed.

Fed cattle: Steers and heifers that have been fed concentrates prior to harvest.

Feeder cattle: Young animals that carry insufficient finish for harvest purposes, but will make good gains if placed on feed.

Frame score: A score based on subjective evaluation of height or actual measurement of hip height. This

score is related to slaughter weights at which cattle should grade choice or have comparable amounts of fat.

Freemartin: Female twin born with a male twin calf. Approximately 9.8 out of 10 of these female twins will not be fertile.

Genes: The basic units of heredity that occur in pairs and have their effect in pairs in the individual, but which are transmitted singly (one or the other gene at random of each pair) from each parent to offspring.

Genetic correlations: Correlations between two traits that arise because some of the same genes affect both traits. When two traits (i.e., weaning and yearling weight) are positively and highly correlated to one another, successful selection for one trait will result in an increase in the other trait. When two traits are negatively and highly correlated (i.e., birth weight and calving ease) to one another, successful selection for one trait will result in a decrease in the other trait.

Genotype: Actual genetic makeup (constitution) of an individual determined by its genes or germ plasm. For example, there are two genotypes for the polled phenotype PP (homozygous dominant) and Pp (heterozygote).

Genotype x environment interaction: Variation in the relative performance of different genotypes from one environment to another. For example, the best cattle (genotypes) for one environment may not be the best for another environment.

Gestation: The period of pregnancy or the period of time from conception until birth.

Hazard Analysis and Critical Control Points (HACCP): A systematic, science-based approach to assuring the production of safe food. The USDA Food Safety and Inspection Service requires all U.S. meat and poultry processing facilities to implement the system.

Heredity: The transmission of genetic or physical traits of parents to their offspring.

Heritability: The proportion of the difference among cattle, measured or observed, that is transmitted to the offspring. Heritability varies from 0 to 1. The higher the heritability of a trait, the more accurately does the

individual performance predict breeding value and the more rapid should be the response due to selection for that trait.

Heritability estimate: An estimate of the proportion of the total phenotypic variation between individuals for a certain trait that is due to heredity. More specifically, hereditary variation due to additive gene action.

Heterosis (hybrid vigor): Amount by which measured traits of the crossbreds exceed the average of the purebreds mated to produce the crossbreds.

Heterozygous: Genes of a specific pair (alleles) are different in an individual.

Homozygous: Genes of a specific pair (alleles) are alike in an individual.

Hormones: Naturally occurring chemical substances in all animals that affect such things as growth and development. Hormones are present naturally in virtually all foods of plant or animal origin. Growth-promoting hormones utilized by the U.S. beef industry to produce leaner beef more efficiently have the same effect as naturally occurring hormones. Neither naturally occurring hormones nor growth-promoting hormones used in beef production pose any sort of health risk to consumers.

Hot carcass weight: Weight of carcass just prior to chilling.

Immunity: The ability of an animal to resist or overcome an infection to which most members of its species are susceptible.

Immunization: The process and procedures involved in creating immunity (resistance to disease) in an animal. Vaccination is a form of immunization.

Implants: All growth-promoting hormone products used in the U.S. beef industry are manufactured as implants, which are placed beneath the skin on the back side of an animal's ear.

Intramuscular fat: Fat within the muscle, or marbling.

Intramammary: Placement of drugs and other substances directly into the udder, usually through the teat opening.

Intramuscular injection (IM): An injection into the muscle.

Intraruminal injection: Injection into the body space surrounding the gastrointestinal tract.

Intrauterine: Placement of drugs and other substances directly into the uterus.

Intravenous injection (IV): Injection of a drug or other substance directly into a vein.

Irradiation: The non-injurious exposure of food to low levels of radiation to eliminate harmful microbes. It destroys fungi, parasites and insects in and on food.

Kidney, pelvic and heart fat (KPH): Internal carcass fat associated with the kidney, pelvic cavity and heart expressed as percentage of chilled carcass weight. The kidney is included in the estimate of kidney fat.

Labeling: Written information detailing the content, intended use, instructions for use, withholding times and other specifics attached to the drug container and/or on a separate sheet accompanying the container.

Lactation: The period following calving during which milk is formed in the udder.

Lesion: The change in the structure or form of an animal's body caused by disease or an injury.

Marbling: The specks of fat (intramuscular fat) distributed in muscular tissue. Marbling is usually evaluated in the ribeye between the 12th and 13th rib.

Maturity: An estimation of the chronological age of an animal or carcass by assessing the physiological stages of maturity of bone and muscle characteristics.

Medicated feed: Any feed which contains drug ingredients intended or represented for the cure, mitigation, treatment or prevention of diseases of animals.

Metritis: Inflammation of the uterus.

Microorganism: A living creature, such as a virus or bacterium, capable of being seen only under a microscope.

Microflora: Microbial life characteristic of a region, such as the bacteria and protozoa populating the rumen.

Morbidity: A state of sickness or the rate of sickness.

Mortality: Death or death rate.

Mycotoxins: Toxic metabolites produced by molds during growth, sometimes present in feed materials.

National Cattle Evaluation: Program of cattle evaluation conducted by breed associations to genetically compare animals. Carefully conducted national cattle evaluation programs give unbiased estimates of expected progeny differences (EPDs). Cattle evaluations are based on field data and rely on information from the individual animal, relatives and progeny to calculate EPDs.

Natural beef: A USDA label used by some beef purveyors. By definition (minimally processed and without food additives), all beef produced in the United States qualifies for the natural label.

New variant CJD (nvCJD): A new form of Creutzfeldt-Jakob Disease (CJD) identified in Great Britain. Some scientists believe it is related to Bovine Spongiform Encephalopathies (BSE), but it is clearly different from normal CJD. There are no documented cases of nvCJD in the United States.

Non-fed cattle: Cull cows and bulls sold for slaughter.

Number of contemporaries: The number of animals of similar breed, sex and age against which an animal is compared in performance tests. The greater the number of contemporaries, the greater the accuracy of comparisons.

Offal: All organs or tissues removed from the carcass.

Optimum level of performance: The most profitable or favorable ranges in levels of performance for the economically important traits in a given environment and management system. For example, although many cows produce too little milk, in every management system there is a point beyond which higher levels of milk production may reduce fertility and decrease profit.

Oral: Placement of a drug or other substance into an animal through its mouth.

OTC: Drugs and other substances that can be bought by anyone over the counter because adequate instructions for layman use can be printed on the label.

Outcrossing: Mating of individuals that are less closely related than the average of the breed. Commercial breeders and some purebred breeders should be outcrossing by periodically adding new sires that are unrelated to their cow herd. This outcrossing should reduce the possibility of loss of vigor due to inbreeding.

Pathogen: A type of bacteria, such as *Salmonella* or *E.coli* 0157:H7, that causes foodborne illnesses.

Palatability: Overall eating satisfaction to be sufficiently agreeable in tenderness, texture and taste.

Parturition: The act of giving birth or calving.

Pedigree: A tabulation of names of ancestors, usually only those of the three to five closest generations.

Percent calf crop: The percentage of calves produced within a herd in a given year relative to the number of cows and heifers exposed to breeding.

Performance data: Records of individual animals for reproduction, production and carcass merit. Traits include things like birth, weaning and yearling weights, calving ease, milk production, etc.

Pesticide: A broad class of crop protection compounds used to combat insects, fungus and rodents.

Phenotype: The visible or measurable expression of a character; for example, weaning weight, post-weaning gain, reproduction, etc. Genotype and environment influence phenotype.

Phenotypic correlations: Correlations between two traits caused by both genetic and environmental factors influencing both traits.

Polled: Naturally hornless cattle.

ppb: Parts per billion.

ppm: Parts per million.

Postpartum: After the birth of an individual.

Preconditioning: A way of preparing the calf to withstand the stress and rigors of leaving its mother, learning to eat new feeds and being shipped off to a stocker or feedyard operation.

Preweaning gain: Weight gained between birth and weaning.

Prion: A protein molecule found in the membrane of brain cells. Prions are hypothesized by some researchers as the responsible agents for rare degenerative neurological diseases called Transmissible Spongiform Encephalopathies.

Progeny: The offspring of the parents.

Progeny records: The average, comparative performance of the progeny of sires and dams.

Progeny testing: Evaluating the genotype of an individual by a study of its progeny records.

Protein supplements: Products that contain more than 20% protein or protein equivalent.

Puberty: The age at which reproductive organs become functionally operating and secondary sex characteristics begin to develop.

Purebred: An animal of known ancestry within a recognized breed that is eligible for registry in the official herd book of that breed.

Qualitative traits: Traits in which there is a sharp distinction between phenotypes, such as black and white or polled and horned. Usually, only one or a few pairs of genes are involved in the expression of qualitative traits.

Quality Grade: An estimate of palatability based primarily on marbling and maturity, and to a lesser extent on color, texture and firmness of lean.

Quantitative traits: Traits in which there is no sharp distinction between phenotypes, with a gradual variation from one phenotype to another, such as

weaning weight. Usually, many gene pairs are involved, as well as environmental influences.

Rate of genetic improvement: Rate of improvement per unit of time (year). The rate of improvement is dependent on: (1) heritability of traits considered, (2) selection differentials, (3) genetic correlations among traits considered, (4) generation interval in the herd and (5) the number of traits for which selections are made.

Recessive gene: Recessive genes affect the phenotype only when present in a homozygous condition. Recessive genes must be received from both parents before the phenotype caused by the recessive genes can be observed.

Replacement females: The top end of the heifer calves selected to replace the older cows that are culled from the herd.

Residues: Remnants of the compounds in drugs and other substances found in fluid, tissues and feeds.

Retained ownership: This commonly refers to cow-calf producers maintaining ownership of their cattle through the feedyard.

Ribeye area (REA): Area of the longissimus muscle measured in square inches at the 12th rib interface on the beef forequarter.

Rotational crossbreeding: A system of crossing two or more breeds where the crossbred females are bred to bulls of the breed contributing the least genes to that female's genotype. Rotation systems maintain relatively high levels of heterosis and produce replacement heifers from within the system. Opportunity to select replacement heifers is greater for rotation systems than for other crossbreeding systems.

Route of administration (ROA): The method by which a drug or other substance is given to an animal (oral, subcutaneous, intramuscular, topical, etc).

Rx (prescription drugs): Drugs that must be prescribed by a licensed veterinarian.

Salmonella: A family of bacteria that includes more than 2,000 strains, 10 of which are responsible for most cases of reported illness associated with the bacteria. *Salmonella* can be found on any raw food of

animal origin. Thorough cooking destroys the bacteria.

Sanitary: Clean. Absence of organisms that can cause disease or ill health.

Scurs: Horny tissue or rudimentary horns attached to the skin rather than the bony parts of the head.

Seedstock: Breeding animals.

Seedstock breeders: Producers of breeding stock for purebred and commercial breeders. Progressive seedstock breeders have comprehensive programs designed to produce an optimum or desirable combination of economical traits (genetic package) that will ultimately increase the profitability of commercial beef production.

Selection: Causing or allowing certain individuals in a population to produce offspring in the next generation.

Sibs: Brothers and sisters of an individual.

Sire summary: Published results of sires from national cattle evaluation programs.

Stockers: Calves and yearlings, both steers and heifers, intended for eventual finishing and harvesting, which are being fed and cared for in such a manner that growth occurs, rather than finishing. Generally younger and thinner than feeder cattle.

Stress: Any physical or emotional factor to which an animal fails to make a satisfactory adaptation. May be caused by excitement, temperament, fatigue, shipping, disease, hot or cold weather, nervous strain, number of animals together, previous nutrition, breed, age or management. The greater the stress, the more exacting the nutritional requirements.

Subcutaneous (SQ): An injection under the skin.

Systems approach: An approach to evaluating alternative individuals, breeding programs and selection schemes that involves assessment of these alternatives in terms of their net impact on all inputs and output in the production system. This approach specifically recognizes that intermediate optimum levels of performance in several traits may be more economically advantageous than maximum performance for any single trait.

Terminal sires: Sires used in a crossbreeding system where all their progeny, both male and female, are marketed. For example, F1 crossbred dams could be bred to sires of a third breed and all calves marketed. Although this system allows maximum heterosis and complementary breeds, replacement females must come from other herds.

Therapy: Treatment of disease or health disorders.

Tolerance: Maximum legally allowable level or concentration of a drug or chemical in a food product at the time the milk is marketed or the animal is slaughtered.

Topical: Application of a drug or other substance to the skin surface or an external membrane, usually concentrated in a small area.

Transmissible Spongiform Encephalopathies (TSE): A class of rare, degenerative brain diseases that affect both animals and humans. Human TSEs include Creutzfeldt-Jakob Disease and Fatal Familial Insomnia. Animal TSEs include Bovine Spongiform Encephalopathy in cattle and scrapie in sheep.

Ultrasonic measurements: Used to estimate carcass and reproductive characteristics. Operates off the principle that sound waves echo differently with different densities of tissue.

Yield Grade: Measurements of carcass cutability categorized into numerical categories with 1 being the leanest and 5 being the fattest. Yield grade and cutability are based on the same four carcass traits.

Vaccination: An injection of vaccine, bacterin, antiserum or antitoxin to produce immunity or tolerance to disease.

Vaccine: A preparation containing microorganisms controlled in such a way as to create a response by the recipient animal's body that results in increased protective immunity.

VCPR: Valid veterinarian/client/patient relationship, generally meaning that the veterinarian knows and regularly sees the animals and the individual responsible for authorizing medical treatment for those animals agrees to follow the veterinarian's instructions.

Variance: Variance is a statistic that describes the variation we see in a trait. Without variation, no genetic progress is possible, since genetically superior animals would not be distinguishable from genetically inferior ones.

Weaning rate: Number of calves weaned divided by number of cows exposed to a bull.

Weight per day of age (WDA): Weight of an individual divided by days of age.

Withdrawal time: The time required between the application or feeding of a drug or additive and the harvest of the animal to prevent any residue of the drug from remaining in the carcass. Withdrawal times are legally specified by the FDA.

Zero-Tolerance: The standard to which U.S. beef processors must adhere when it comes to fecal and ingesta carcass contamination. In layman's terms, no visible contamination is allowed on beef carcasses. (*Executive Summary of the National Non-Fed Beef Quality Audit, 1994. National Cattlemen's Beef Association. Englewood, CO.*)