

Food Safety Is Your Business:

Washington Food Safety & Quality Assurance Program



Livestock Producers are Food Producers



Meat Quality Defects



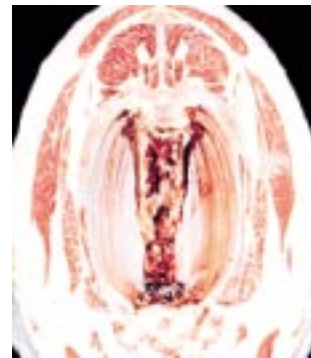
Abscess from vaccine.



Bruised carcass.



Injection lesion in raw (top) and cooked muscle (bottom).



Fat beef carcass.



Pork Quality Standards; PSE, pale soft and exudative (watery) (left); Good pork color (center); DFD, dark firm dry (right).

Food Safety and Quality Is Your Business

By

Jan R. Busboom, Jean Smith, Jerry A. Newman, and Darla J. Marks, Washington State University, Cooperative Extension, and Dan Jemelka, Washington State Department of Agriculture

Quality assurance is an integral part of most successful businesses. Livestock producers are also implementing quality assurance programs. Quality assurance refers to steps producers take to ensure safe, wholesome, and high quality products that always meet or exceed consumer expectations.

Five reasons you should implement a food safety and quality assurance program:

1. **Consumers will not buy your product if they think it is unsafe.** Food poisonings and violative residues occur too frequently and alarm the public.

A 1989 news story on Alar residues on apples caused the price of an apple to drop from 14 cents to 7 cents, the Mad Cow Disease (BSE) outbreak in England devastated the British beef industry, and *E. coli* O157:H7 outbreaks in Japan dramatically decreased imports of U.S. beef in 1998.

Our meat supply is generally safe, but it is not perfect, as evidenced by periodic outbreaks of food poisoning from pathogens such as *E. coli* O157:H7. Moreover, many consumers believe meat is “contaminated” with chemical compounds such as hormones, antibiotics, or pesticides. The United States Department of Agriculture (USDA), Food Safety Inspection Service (FSIS) conducts thousands of analyses for residues each year. Less than 1% of these tests show illegal residues and the violation rate has been declining. In show animals and cull cows, however, the national incidence of violative residues is still unacceptably high. In Washington, over 1.5% of cull beef and dairy cows tested in 1999 contained violative residues. The incidence of violative residues in show animals is low in the Pacific Northwest and we would like to keep it that way. Because of consumer concerns and the poor management practices of a few individuals, livestock producers may face stricter regulations and testing procedures in the future.

2. **Carcass and hide defects, such as injection site lesions, excess fat, and ranch brands, cost you money.**

A 2000 audit reported quality losses totaled \$100.10 per market steer or heifer.



Abscess from vaccine

“

In 1999, over 1.5% of cull beef and dairy cows tested in Washington contained violative residues.

”

Handle Livestock Feeds and Additives Properly

Feeds

A basic part of producing a market animal is selecting the proper feed ingredients. Properly balanced rations containing high quality feedstuffs will determine, to a large extent, your success in raising an efficient, properly finished food animal.

Most purchased feeds do not present quality problems. However, you should inspect feed and feed ingredients for unusual color and odor, high temperature, excess moisture, and foreign matter. Grains or roughages harvested and stored with too much moisture can quickly develop mold problems. Mold can ruin feed quality, and if fed to animals, can make them extremely sick. Aflatoxin poisoning is a relatively common type of mold-induced poisoning that can cause abortions and sudden death in animals. Alkaloids in feedstuffs can reduce growth rate and high levels can even cause death. Alkaloids are sometimes found in some endophyte-infected grasses and ergot-infested grains. Alkaloids are also found in lupines and many poisonous plants. Endophytes are funguses that live within a plant, particularly in some tall fescue and perennial ryegrass varieties. Ergot is a fungal disease found in some small grains, particularly rye, triticale, and barley, and grasses in the temperate regions of the world.

If not used according to label directions, several types of pesticides such as insecticides and herbicides used in crop production can cause residue problems in livestock. If applying a pesticide to any forage or crop used as feed, follow the label directions carefully and adhere strictly to the interval between last pesticide application and harvest date. As an example, alfalfa hay sprayed for aphids must not be cut for the interval indicated on the label. If you purchase feed from others ask: Were pesticides used? If so, when in the growing season and how close to harvest were they applied? It is the livestock producer's responsibility to make sure the feeds are high quality and residue free.

Once high quality feed is harvested or purchased, proper storage is essential to maintain quality. Feed should be stored in a building or containers that prevent moisture, bird, or rodent damage. Birds and rodents not only consume your feed, their droppings can cause disease. Do not store feed supplies near chemicals or petroleum products, or in old oil, solvent, or pesticide containers. A leak or residues from used containers could contaminate your feed, which in turn could cause residues in meat. Cover feed stored outside, such as hay, to minimize sun and moisture damage.

Feed Additives

Feed additives may be used to prevent or treat diseases or parasites, and in some cases, to promote growth. You must use medicated feeds carefully and according to label directions. Most medicated feeds have withdrawal times that you must follow strictly. Store all medicated feeds separately. Thoroughly clean feed mixers, handling equipment, and containers after each use. Empty and thoroughly clean feeders and feed bunks used for medicated feed before using them for non-medicated feed. Pigs withdrawn from a feed additive called sulfamethazine (a sulfonamide) sometimes have been contaminated through contact with manure-contain-



Mold can ruin feed quality. It is your responsibility to make sure feeds are high quality and residue free.



“
The most
important
thing a
producer can
do to prevent
drug residues
in food
animals is to
carefully read
and follow
animal health
product label
directions.
”

ing residues of the drug. Following sulfonamide withdrawal, either move animals to a new pen, or thoroughly clean the pen and clean it again in 3 to 7 days. Do not allow pigs withdrawn from sulfonamides to come in contact with manure from treated animals.

Consult a nutritionist or veterinarian for recommendations on appropriate use of feed additives. It is your responsibility to ensure that no residues remain in the meat.

Remember to:

- Check feed for color, temperature, odor, moisture, and foreign matter.
- Protect feed from moisture, rodents, and birds.
- Apply pesticides according to label directions.
- Use clean, residue free containers to store feed.
- Follow withdrawal times for medicated feed.
- Store medicated feeds separately; clean feed equipment thoroughly after use.
- Prevent fecal contamination of feed.

Use of Animal Health Products Properly

Use a preventive program to ensure good animal health. Preventing problems is usually less costly than treating a disease or parasite infestation. Moreover, residues and carcass damage are most likely to occur when drugs or pesticides are used to treat a disease or parasite problem. However, the best preventive program cannot eliminate the need for occasional treatment when disease or parasite infestations strike unexpectedly.

Pesticides

Internal and external parasites are constant economic threats. Internal parasites can reduce animal growth and efficiency as well as damage the animal's internal organs. Biting and sucking parasites such as lice, mites, ticks, and grubs can cause significant damage to the animal's pelt, skin, or hide. Proper use of pesticides can control parasites, which in turn can improve animal performance, reduce disease transmission, and increase hide value. Improper pesticide use, however, can cause feed contamination, environmental damage, and residues in meat and milk products. To prevent contamination of milk, meat, and by-products, follow label directions for all pesticides, including pour-ons, injectables, dusts, sprays, and pesticide ear tags.

Labeled Drug Usage

Proper use of legal animal health products can more than pay for themselves. Vaccines are normally used to help prevent diseases. Antibiotics are given prophylactically to prevent or therapeutically treat diseases. Antibiotics are also sometimes given subtherapeutically to increase growth rate and improve feed efficiency, especially in young pigs. Subtherapeutic doses are of limited value to cattle and sheep, so their use is minimal. Misuse of vaccines and antibiotics can be very costly and render the meat worthless if illegal residues remain at slaughter.

The most important thing a producer can do to prevent drug residues in food animals is to carefully read and follow animal health product label directions.

The label lists approved species, dosages, routes of administration, withdrawal time, and product disposal information. If you have any questions about using a particular drug, always consult a veterinarian before you use it.

Extra Label Drug Use

“Extra Label Drug Use” refers to using a medication in a manner different from label directions. This includes use in a species, for a condition, at a different dosage level, or with a different withdrawal time than indicated on the label. This is where many violative drug residue problems occur. Any deviation from label directions requires a veterinarian’s prescription. Even with a veterinarian, “extra label drug” use is only permitted under the following conditions:

1. Veterinarian performs a careful diagnosis within the context of a valid “*veterinarian-client-patient relationship*.” (See below)
2. Veterinarian determines there is no labeled drug available to treat the condition or a dosage higher than the labeled dose is necessary.
3. Identity of all animals given “extra label” treatment is maintained.
4. The veterinarian assigns a significantly extended withdrawal time, based on his or her best judgment.

A valid “*veterinarian-client-patient relationship*” exists if:

1. The veterinarian is responsible for clinical judgments regarding the animal’s health and the client agrees to follow those instructions.
2. The veterinarian has seen and is well acquainted with the management and care of the animal by virtue of examination and timely site visits.
3. The veterinarian is readily available for follow-up evaluation in the event of adverse reactions or failure of the prescribed treatment.

Remember:

- “Extra Label Drug Use” requires a prescription from a veterinarian within the context of a valid “*veterinarian-client-patient relationship*.”
- You may **NOT** use a treatment on your animals prescribed for your neighbor’s animals that display the same symptoms.

Proper Medication Administration Techniques

Using the correct administration technique is an important part of the proper use of animal health products. The label will describe exactly how the medication is to be administered and the proper dosage level.

There are four routes of administering medications:

1. *Oral Route*. Administering drugs through the mouth. Tablets, pills, capsules, and liquid medications generally are easily administered orally. A drenching tube, balling gun, or oral dosage syringe is usually used to place the liquid or pill at the base of the tongue so the animal swallows it. Care should be taken so the medication does not go down the trachea (windpipe). Oral medications may also be administered in the animal’s feed or water.
2. *Topical Route*. Applying the medication to the skin or to mucous membranes. Such medications are available as ointments, aqueous solutions, powders, and aerosols. Do not allow these products to come in contact with the animal’s eyes, nose, reproductive tract, or mouth unless they are specifically formulated for use in that area.
3. *Intranasal Route*. Applying the medication in the nasal passages. The product is usually removed from the bottle with a needle, but be sure to remove the

“
Restrain the
animal to
prevent
animal and
human injury.
”

needle from the syringe and replace it with the recommended application tip for administering the product in the nasal passages. Keep the animal's head tilted upward during and immediately following the administration to help the product reach the deep nasal passages.

4. *Injectable Route.* Administering the drug into an animal with a syringe and needle. The label will specify which of the following injection methods to use.

Intramuscular (IM) are given deep in the muscle mass in the neck. Avoid IM injections for all products that have other “labeled” routes of administration.

Subcutaneous (SQ) injections are placed under the skin or hide; if possible, using the tented technique in the loose fitting skin of the neck, flank, elbow or back of the ear.



Subcutaneous injection using the tented technique.

Do not attempt the following two injection methods unless the animal is appropriately restrained and you have proper training because serious injury to the animal can occur.

Intravenous (IV) injections are given directly into the vein. Normally the jugular vein in the animal's neck is the best site. Proper IV injections require skill because the vein must be located. Penetration depth is also critical so that the medication is directed into the bloodstream.

Intraperitoneal (IP) injections are given into the abdominal cavity.

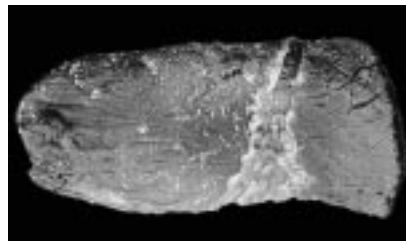
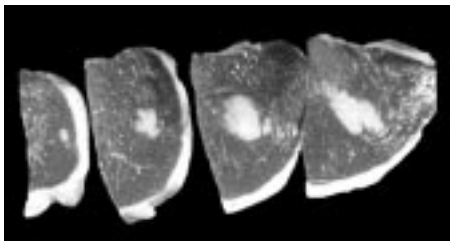
Injections done improperly can cause many problems. Guidelines for giving injections correctly include:

1. Restrain the animal to prevent animal injury and needle damage. If the animal can move during the injection, the needle is often jerked out, damaged, or broken resulting in improper dosage, tissue damage, or a portion of the needle remaining in the carcass.
2. Never inject a substance intended for oral or external use only.
3. Use needles that are no larger than necessary to adequately complete the injection. For most routine injections, use a 16-gauge or smaller needle. Adjust needle length for injection method and size of animal. For IM injections, use a 1-inch or shorter needle for small animals and a 1½-inch needle for larger animals. Use a needle less than 1 inch for SQ injections. Using needles larger than necessary may cause abscess problems and leakage of the medication from the injection site when the needle is removed.
4. Change needles often; for example, after every 10 to 15 animals or at syringe refills. Dull, bent, and barbed needles cause more abscesses and tissue damage. **Do not** straighten bent needles.
5. Give injections under dry and sanitary conditions. Use a nurse needle to fill the syringe and another needle for injecting the animal. Injections given in wet conditions without proper sanitation can cause abscesses at the injection site and transfer disease organisms from one animal to another. Use clean equipment and disinfect needles between animals. **Do not** use disinfectants with modified live vaccines; they will decrease the vaccine's efficacy.

6. Do not mix vaccines. Use only commercially prepared combination vaccines. The effectiveness of some vaccines will be decreased if mixed with other vaccines.
7. Select the injection site carefully. Even using sterile techniques, some pharmacological agents can cause injection site lesions, such as scar tissue and abscesses. Surface lesions can be trimmed at the processing plant, but abscesses or scar tissue hidden deep in the muscle can cause more serious problems. These abscesses can be cut open during fabrication at the packing plant, or local meat distributor, and may cause contamination of other portions of the carcass. Even worse, an abscess hidden in a large meat cut might go undetected during meat processing and a consumer might cut into it at home. Lesions also cause extreme muscle toughness up to 3 inches away from the visible tissue damage. This toughness persists even if the injection is given over a year before the animal is processed. Select an injection site in the neck (a low value cut) and avoid IM injections if possible.
8. Volume injected per site influences the amount of tissue damage. If there is no specific label recommendation, limit volume to no more than 10 cc per IM site and 20 cc per SQ site in larger animals. Alternate the injection site on multiple day treatments.
9. Growth promoting implants can provide an economic advantage in producing safe and wholesome beef. Implanted beef is also leaner than non-implanted beef with only minute differences in hormone level. If you use implants, you must follow label directions concerning proper location and application. Implants are small pellets inserted between the skin and ear cartilage in the back of the ear. Proper location of various implants differs slightly among types used. Sanitary conditions are also necessary for proper retention and absorption of implants. Always use sharp needles, and clean the needle between animals by wiping the needle across a sponge with an antiseptic. After administering an injection, pinch off the injection hole to close the hole and prevent contaminants from entering. Check the implant for proper placement.

Remember:

- The benefits of properly using legal animal health products far outweigh their cost in a sound food animal production program. Misuse of drugs can have disastrous effects.
- The product label is your guide to the proper route of administration, dosage level, and withdrawal time.
 - ~ Extra label drug usage has the greatest potential for causing residue problems in meat.
 - ~ A valid veterinarian-client-patient relationship is required for extra label drug usage.



Injection lesions in raw (left) and cooked muscle (right).



**Lesions also
cause extreme
muscle
toughness up
to 3 inches
away from the
visible tissue
damage.**



- Properly administering medications is critical to producing the most desirable carcass possible. Use proper restraint, the correct route of administration, proper needle size, correct injection site, and maintain sanitary conditions.
- When in doubt, your veterinarian is an excellent source of information and should be consulted.

Responsibilities and Obligations of Food Animal Producers

The moral responsibility of each livestock producer cannot be stressed enough. You can read about how to use drugs and medications. Your veterinarian can instruct you how to treat a specific animal. But, the final responsibility for ensuring a safe food product lies with you and depends on your willingness to be morally responsible. No one can legislate morality, but there are rules and regulations that help people do the right thing.

Meat processors and USDA meat inspectors are well aware of the circumstances that will most likely result in illegal residues in food animals. Livestock show animals fit into this residue “suspect” category along with cull dairy cows, breeding stock, and downed or crippled animals.

If you deliver an animal to a federally inspected processing plant for slaughter and an illegal residue is detected, the following rules apply:

1. USDA/FSIS assigns case and identification numbers to the producer or owner of the problem animal and asks for details pertaining to the detected residue.
2. The producer must notify the USDA/FSIS the next time they deliver animals for slaughter.
3. USDA also reports the residue violation to the Food and Drug Administration (FDA). The FDA decides on the type of follow-up procedures to pursue. These can include civil, or even criminal, prosecution of the producer for non-compliance with FDA regulations. This may pertain to the use of illegal drugs or the misuse of legal animal health products.

Other Management Considerations

Hide, Pelts, and Skins

Hide devaluation caused by hot iron brands, parasite damage, excessive mud and manure, scratches, cuts, and scars cause a significant loss to the livestock industry. According to the 1995 NCBA Beef Audit, these hide defects result in losses of \$24.30 per head. Rib brands result in the greatest amount of hide devaluation. Mud, manure, and damage from biting and sucking insects also cause considerable devaluation of the hide or pelt. These result in pits in the hide making it unusable for high value leather products. Producers should avoid excess water and mud in the finishing phase, use preventive treatments for insects and parasites, and avoid hot iron brands in high value portions of the hide.



Select an injection site in the neck (a low value cut) and avoid IM injections if possible.



Bruises

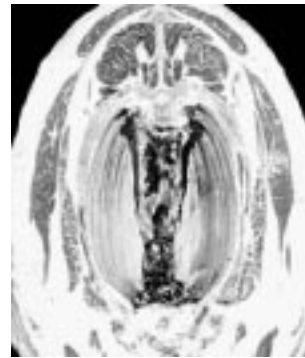
The 1995 NCBA Beef Audit showed that bruises cost the industry \$4.03 for every fed steer and heifer. Old bruises may cause intramuscular scar tissue that decreases tenderness, and fresh surface bruises result in carcass trim that costs the meat industry millions of dollars annually. Bruises may result from protruding sharp objects and edges, improper restraint, horns, or rough handling during transport.



Bruised carcass

Meat Cutability, Quality, and Palatability

- Excess fat is a major problem. It costs a lot of money to put the excess fat on the animal and even though some of the outside fat can be trimmed off, the fat between the muscles cannot be trimmed and appears in retail cuts purchased by consumers. Most consumers avoid fatty chuck and shoulder roasts and fatty strips of bacon. Both the pork and beef industries need to continue efforts to produce meat cuts with enough marbling for adequate palatability with a minimum of external and seam fat.
- * Up to 20% of beef is unacceptably tough. Breed associations are beginning to report Expected Progeny Differences (EPD's) for tenderness. Consider using bulls that excel in tenderness or at least avoiding bulls that are inferior in tenderness.
- If you direct market your animals, beef should be aged for 14 days and lamb for 7 days. Pork benefits little from aging and if the product is going to be ground, aging time should be minimized.
- Dark cutting beef; pale, soft and watery pork or dark pork can be caused by stress on an animal. Minimize stress during production, loading, transportation, and processing.
- Genetics and carcass chilling also influence the quality of meat products. One important and preventable genetic problem is the Porcine Stress Syndrome (PSS) gene. Homozygous pigs (two copies of the gene) sometimes die from the PSS condition and although heterozygous pigs (one copy of the gene) grow well and tend to be leaner and more muscular than pigs without the gene, they have a very high incidence of pale, soft, and exudative (PSE) pork. A genetic test is available for the PSS gene, so do not purchase or use boars with the PSS gene.



Fat beef carcass



PSE pork

Environmental Concerns

Even relatively small livestock operations will produce substantial amounts of manure, feed, and bedding wastes. These wastes need to be handled correctly. If they are not, the nitrates, phosphorus, pathogens, and fecal coliform bacteria may threaten animal health and water quality.

Disposing of dead animals in a timely manner is necessary to reduce the spread of disease and minimize the chance of environmental contamination. Certain parasites such as trichina in swine can be spread by cannibalism among pigs. A trichina infection can then be passed to humans or other animals by the ingestion of uncooked or improperly cooked pork products. Dead animals can be disposed of in several ways: incineration, rendering, burial, or composting. Currently, poultry and swine composting plans are the only ones approved for use. There are laws regarding dead stock disposal. Check local ordinances on burying, burning, or other disposal.

Special Considerations for Youth Show Exhibitors

Livestock show animals, along with cull breeding stock and downed or crippled animals, are more likely to contain illegal residues than other food animals. The following are examples of drug misuse that could result in residues, make you legally liable, cloud the image of livestock shows, and definitely erode consumer confidence.

- Using injectable anabolic steroid substances to enhance muscle development in the animal. This is not an acceptable use for steroids. There are no withdrawal times established and their effect on consumer health is not known.
- Using diuretics to reduce the water content, and thus the weight, of show animals before they are weighed for classification. Their use is not allowed without a veterinarian's prescription. Withdrawal time is also a problem because they are usually used within a few days of slaughter.
- Using pour-on insecticides as a "hair set" for beef cattle at shows. This practice is very hazardous because a 30- to 45-day withdrawal period is required for most of these products.
- Using tranquilizers and/or anesthetics to calm animals. Tranquilizers can only be used with a veterinarian's prescription. No tranquilizers or anesthetics are labeled for meat animal use.
- Illegal use of Clenbuterol and related compounds is a public health concern. Clenbuterol is a growth-promoting drug that can induce weight gain and a greater proportion of muscle to fat in beef, sheep, and swine.
- Using bovine somatotropin (BST) and porcine somatotropin (PST) on market animals is illegal.
- Feeding a *medicated* high protein grower diet throughout the finishing period may result in illegal residues.

These examples would constitute "extra label" or illegal drug use since they do not conform to label directions. Your legal liability increases tremendously if these types of misuse occur.

There are also quality considerations associated with show animals that need to be addressed:

- Packers do not like the extreme weight variation often associated with show animals. Shows may need to narrow their acceptable weight ranges or arrange for lightweight animals to be fed before selling them to the packer.

- There are more colored pigs in shows than in the general population of market hogs. Packers who dehair do not like colored pigs because the hair is very difficult to remove. Many commercial producers use colored boars, but they mate them with white sows resulting in market hogs that are primarily white with gray or blue rumps. These pigs are not difficult to dehair.
- Putting oil on pigs and total body clipping also make the hair more difficult to remove; therefore, these practices should be discouraged or prohibited.
- Lambs with very short tail docks are susceptible to rectal prolapses. We recommend that shows require the tail be left at least long enough so it can be lifted.
- The pelt value of shorn lambs is reduced.
- The incidence of dark cutting beef is high in show animals. Minimize the stress associated with mixing, loading, and transporting animals.
- Boars carrying the stress gene are used much more frequently to produce show pigs than in commercial operations. Don't use boars or purchase pigs carrying the stress gene. Virtually all boars used for artificial insemination have been tested for the stress gene.

The misuse of drugs, vaccines, pesticides, and various other medications in meat animal production can have serious consequences. We hope this publication will increase your awareness of the moral and legal obligations associated with meat animal production.

Can you guarantee a wholesome, safe product? Quite possibly you, your family, a computer programmer in Seattle, and fifty other people will consume the meat from your animal(s).

Glossary

- Aflatoxin.** A toxin produced by certain molds, especially in corn or oilseed meals.
- Aging.** Post-mortem aging refers to the tenderization by natural muscle enzymes that occurs when meat is held at refrigeration temperatures.
- Anabolic Steroids.** Compounds, structurally related to testosterone, possessing protein building activity with minimal masculinizing side effects.
- Antibiotic.** A substance produced by a microorganism able to inhibit or kill another microorganism.
- Antimicrobial.** A substance that inhibits or kills microbes.
- Bovine Somatotropin (BST).** Bovine growth hormone. A hormone produced naturally by cattle and required for normal growth. Through biotechnology, bacteria can produce BST in large quantities. When cattle receive injections of BST, muscle growth is enhanced while fat deposition is decreased. Milk production is also greatly increased in cows.
- Carcinogenic.** Cancer causing.
- Cc (cubic centimeter).** A common unit of measure for injectable animal health products that is equivalent to one milliliter. 1 cc=1 ml.
- Condemned.** Determined to be unfit for human consumption.
- Contaminant.** A substance that does not belong in a product.
- De-wormer.** A product containing an anthelmintic administered to control internal parasites.
- Disinfectant.** A chemical agent used on non-living objects to kill microorganisms. Its high toxicity precludes its use on live animals.
- Diuretics.** Pharmacological agent used to increase the flow of urine.
- Efficacy.** The power of a drug to produce the intended effects.
- Fabrication.** The breakdown of carcasses into wholesale or retail cuts of meat.
- Feed Efficiency.** The pounds of animal feed required to produce a pound of gain. When feed efficiency is improved, less feed is required to produce a pound of gain.
- Hazard.** Something that can cause harm to someone.
- Herbicide.** A chemical used to kill or inhibit plant growth.
- Hormone.** A chemical substance produced by living cells that is secreted into the blood and carried to other cells where it produces specific effects. Estrogen, progesterone and testosterone are hormones required for reproduction. Growth hormone, or somatotropin, is a hormone that increases muscle growth and decreases fat deposition.
- Insecticide.** A chemical used to kill insects.
- Microbe or Microorganism.** A very small form of life, such as yeasts, molds, bacteria, and viruses.
- Nanogram.** One billionth of a gram.
- Parasites.** Organisms that are usually harmful and live on other organisms.
- Pathogen.** An organism that causes sickness.
- Pesticides.** Chemicals used to kill pests on plants or animals; includes fungicides, herbicides, insecticides, parasiticides, and rodenticides.
- Pharmacological Agent.** A drug; includes antimicrobials, antibiotics, and hormones.
- Porcine Somatotropin (PST).** Swine growth hormone. A hormone, produced naturally by pigs and required for normal growth. Through biotechnology, bacteria can be made to

produce PST in large quantities. When pigs receive injections of PST, muscle growth is greatly enhanced while fat deposition is decreased.

Prepubertal. Before becoming sexually mature and able to reproduce. Production of sex hormones, such as estrogen, progesterone and testosterone, is much lower in mammals before reaching puberty.

Prophylactic. Guarding from or preventing disease.

Residues. Extraneous compounds such as pesticides, chemicals, and drugs, that remain in a food after processing.

Synthetic. Human-made.

Therapeutic. Relates to treating disease with drugs or pharmacological agents.

Toxin. A poisonous substance.

Vaccine. Any biological agent which produces active immunity when properly administered to an animal.

Withdrawal Time. The waiting period required between the use of a drug, pesticide, or feed additive and the slaughter of the animal to prevent residues from remaining in the carcass.

References

Quality Assurance and Animal Care: A Youth Education Program, Ohio Agricultural Education Curriculum Materials Service, The Ohio State University, Columbus, OH 43210

Pork Quality Assurance (Levels 1-3), National Pork Producers Council, Des Moines, IA 50306

Pork Quality Assurance Youth Program, National Pork Producers Council, Des Moines, IA 50306

National Non-Fed Beef Quality Audit Executive Summary 1995, National Cattlemen's Beef Association, Englewood, CO 80155

Improving the Quality, Consistency, Competitiveness and Market Share of Beef Executive Summary 1995, National Cattlemen's Beef Association, Englewood, CO 80155

Producing High Quality Consumer Products from Sheep, The American Sheep Industry Association, Englewood, CO 80112

Producer Quality Assurance Programs

We encourage you to become a part of the State and National Quality Assurance programs. For information on National Quality Assurance Programs contact:

National Pork Producers Council
Phone: (515) 223-2600
Website: <http://www.nppc.org/>

American Sheep Industry Association
Phone: (303) 771-3500
Website: <http://www.sheepusa.org/>

National Cattlemen's Beef Association
Phone: (303) 694-0305
Website: <http://www.beef.org/>



Jan Busboom, Jean Smith, Jerry Newman, and Darla Marks, Washington State University, Cooperative Extension, and Dan Jemelka, Washington State Department of Agriculture prepared this bulletin. The United States Department of Agriculture, Washington Cattlemen's Association, Washington Pork Producers, Washington Sheep Producers and the Washington Dairy Federation provided funding and support. WSU and WSDA thank Dr. Donald Hansen at Oregon State University for some of the photographs.

College of Agriculture and Home Economics

Copyright 2002 Washington State University

WSU Cooperative Extension bulletins contain material written and produced for public distribution. You may reprint written material, provided you do not use it to endorse a commercial product. Alternate formats of our educational materials are available upon request for persons with disabilities. Please contact the Information Department, College of Agriculture and Home Economics, Washington State University for more information.

You may order copies of this and other publications from the WSU Bulletin office, 1-800-723-1763, or online <http://pubs.wsu.edu>

Issued by Washington State University Cooperative Extension and the U.S. Department of Agriculture in furtherance of the Acts of May 8 and June 30, 1914. Cooperative Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, sex, religion, age, color, creed, national or ethnic origin; physical, mental or sensory disability; marital status, sexual orientation, and status as a Vietnam-era or disabled veteran. Evidence of noncompliance may be reported through your local Cooperative Extension office. Trade names have been used to simplify information; no endorsement is intended. Reprinted October 2002. Subject code 666. C. EB1676