

Food Safety at Work



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Producer Manual



A. Background to the Program's Development

The Canadian Quality Assurance (CQA[®]) program for pig producers arose as the result of a Canada-wide effort when, late in 1995, a technical team was established to look at the potential for the development of a quality assurance program. Marketers recognized that today's customers needed more than general statements about pork production; they needed to equal or better the assurances other countries were willing to provide to ensure pork's safety. In order to remain competitive, Canadian hog producers had to have a way to provide the assurances that their markets demanded.

Early on, the committee determined that the program would be developed on the concept of HACCP, an acronym that stands for Hazard Analysis Critical Control Point — an internationally recognized approach to food safety. The focus of HACCP is on prevention.

Quality assurance programs, based on HACCP principles, can be put in place on any type of agricultural operation. The key objectives are to:

- 1. Understand problem areas or hazards on the farm;
- 2. Understand practices that will minimize or eliminate these hazards; and

3. Develop an effective plan.

The first step is to understand problem areas or hazards on the farm. The CQA[®] committee looked at three different types of hazards that could affect food safety: physical, chemical and biological. Physical hazards include things such as broken needles. This particular problem can easily be controlled through the proper use of needles and syringes, while adequately restraining the animal. Chemical hazards could include such things as unacceptable levels of medications or pesticides. These, too, can be easily controlled through careful use. Biological hazards include pathogens such as Salmonella, E. coli and Yersinia, which are the most significant hazards in terms of potential impact on human health. Not enough is known about how to control them, particularly at the farm level.

The second step is to understand the practices that will minimize or eliminate these hazards. Basically, there are two types of hazards: those that can be controlled during the production phase, at specific times and places, and those that can be controlled before production. The first type would include things such as broken needles. The second type can be thought of as prerequisites to good production. These include good sanitation and appropriate purchasing programs. Both types are covered in the CQA^{*} program.

The third step is the plan. At this point, let's stop talking generalities and start talking about the plan as it applies to your farm. The plan provides documentation to show what you intend to do on your farm. Records then provide proof that you are doing what you said you would do.

CQA[®] provides you with the skeleton of the plan. If you can answer all the questions in the Assessment Form, you will have effectively built your own personalized plan. If you can't, you will need to refer to this Producer Manual for more guidance. You may find that the guidelines provided do not match your operation's specific needs. However, as long as you can demonstrate that you understand and control the hazards in your operation to the satisfaction of an accredited program validator, then you are following the program.



The World Health Organization (WHO) has set out seven principles to be followed when developing a HACCP plan:

- Conduct a hazard analysis. Let's look at broken needles — a rare but possible event — as an example.
- 2. Identify the Critical Control Points (CCPs). These are points or places in the production process where steps can be taken to prevent or eliminate hazards. With the broken needle example, the critical control point is when injecting.
- 3. Establish limits that must be met to ensure that each CCP is under control. In the broken needle example, the limit is zero. You want no broken needles.
- 4. Establish regularly scheduled observations or tests to monitor each CCP. Continuing on with the broken needle example, the first step is simply to

check for bent or broken needles as injections are given. You might review records to determine the number of pigs injected per pack of needles. You might find that changing needles after injecting a specific number of pigs reduces struggle. Establishing that bent needles, straightened for reuse, break more easily, may prompt a policy against straightening bent needles.

- 5. Establish what corrective action will be done if monitoring indicates a problem. In this example, corrective action would be to identify the pig and work with the processor in the event that a broken needle is not removable on the farm.
- 6. Verify that all CCPs in the system in other words the HACCP program work correctly. In our example, the needle CCP is only one component of

a larger plan. In addition to the needle CCP, your plan may have CCPs for medicated feed, medicated water and staff training.

7. Establish effective record keeping procedures that document the HACCP system. This is what CQA[®] is all about. By the time you finish answering and working through the questions, you will be able to say what you plan to do and prove that you are doing it well enough to be recognized.

The Canadian Pork Council wishes to take this opportunity to thank the members of the technical team — without their dedication and enthusiasm, this program would not have been realized.



B. How to Make Use of This Producer Manual

This manual, and the information contained in its Appendices, should supply information that will help you to complete the On-Farm Quality Assessment Form. It discusses what are considered to be good production practices (GPPs). You may find that some of the information will not specifically apply to your farm.

Attempts have been made to provide background that is meaningful to both producers and consumers. General information, as well as specific points dealing with considerations for on-farm practices and requirements for the CQA[®] program, is presented. The major emphasis of CQA[®] is food safety. Food safety hazards are divided into physical, chemical and biological categories.

Physical hazards are foreign objects found in meat. Needles broken accidentally, or because of improper usage, are rare, but they cause concern at the farm level. Eliminating this hazard is a major focus of this program.

Surveillance in processing plants has proven to local and international consumers how expertly Canadian producers manage chemical hazards due to heavy metals, pesticides and veterinary products. However, ninety-nine percent freedom from drug residues isn't adequate for today's market. A major focus of CQA[®] is to further reduce the remaining half-percentage point or less that arises because of improper dosage, handling error and too-short-withdrawal times.

Biological hazards refer to bacteria (and the toxins that some of them produce), viruses and parasites that can cause disease in humans. Follow-up studies of food contamination cases show that most problems occur after the food leaves the farm and the processor. Parasites like *Trichinella spiralis*, and bacteria like *Salmonella*, however, are biological hazards which can arise on the farm.

The objective of this manual and the CQA[®] program is to promote the production of safe food.



C. The Main Food Hazards

C1 Introduction

Today's food supply is probably safer than it has ever been. Two factors, however, have led to increased pressure on food producers to certify that "safe" production practices are being used to produce food. The first is centralization of our food supply. Food production and processing facilities have become larger; thus, food contaminated anywhere during production or processing has the potential to affect a much larger number of people than ever. The second factor is our specialized urban society. The majority of buyers and consumers today never see the farm, perhaps not even the region, where their food is produced. Without first-hand knowledge, they need other assurances of food safety.

Food safety hazards must be kept in perspective. Most risks cannot be totally eliminated; rather, they can only be kept to a minimum. We must remember that despite the fact we face these hazards every day, most of us remain healthy.

C2 Hazards C2.1 Pathogenic Bacteria

Salmonella, for example, live in the gut of many species of livestock, wildlife and pets. Not all

pigs carry this organism, and some carry it without showing any signs of disease. That makes it difficult to determine whether or not a pig is a carrier. Contamination of utensils or meat with a small amount of intestinal content from an animal that carries the organism can spread it at the processor stage. If the consumer then fails to cook the contaminated meat sufficiently, or neglects to clean up utensils and hands after working with it, the bacteria can lead to diarrhoea, vomiting and fever. In the very young, the elderly, and the immunosuppressed AIDS or cancer patient, these bacteria can cause severe disease.

To reduce the risk of illness from foodborne bacteria, three things can be done:

- The levels of organisms in the pigs' farm environment can be reduced;
- Processing techniques to reduce contamination in the slaughter plant can be improved; and
- 3. Consumers and institutions can be educated to handle raw meat properly during preparation and cooking.

Presently, it is impractical to expect to completely eradicate pathogenic bacteria from all farms, since they are found virtually everywhere in the environment. Research has proven that basic sanitation practices used on the farm can reduce the number of Salmonella carrier pigs going to slaughter. Farms with inadequate rodent control programs, for example, often have higher levels of Salmonella. We have learned that control measures for Salmonella seem to be equally effective against other bacterial pathogens. But we don't have all the answers. There is a need for further research in this area to better understand how pathogenic bacteria can be controlled on the farm.

C2.2 Broken Needles

Broken needles are uncommon, but they do occur. When a needle breaks and remains in a pig's muscle, it is usually detected during processing. If, however, the needle is buried in a large cut such as the ham, it could escape detection and make it to the consumer's kitchen. Although rare, this hazard is an important one. It need only happen once to damage consumer confidence in the pork industry. Fortunately, this is an easy hazard to control.



C2.3 Antibacterial Drug Residues

Drug residues in pork are rare. They occur only in one-tenth of one percent of carcasses tested. The two main drug residue concerns in meat are reactions by consumers allergic to certain drugs and the development of drug-resistant bacteria. Drug residue in pork is one hazard we can realistically expect to completely eliminate on farms.

C2.4 Development of Drug Resistant Bacteria

The use of antibiotics in livestock operations has led to concern that strains of drugresistant bacteria could be transferred to humans, and drug resistance is increasing in both humans and animals. Until we fully understand what role growth-promoting drugs play in resistance, it is important to keep the use of antibacterial drugs in livestock to a minimum.

C2.5 Parasites

C2.5.1 Trichinella

This parasite is the reason why past generations have tended to overcook pork. *Trichinellosis* has historically been associated with garbage feeding and poor hygiene. Production methods used by today's modern swine operations, combined with a ban on the feeding of uncooked garbage and rigorous testing at slaughter, have virtually eliminated *Trichinella* in Canada.

C2.5.2 Toxoplasmosis

Cats are the main carriers of this parasite. Many humans have developed immunity because of exposure to cat feces in their own home. This parasite presents a risk when pregnant women are exposed to *Toxoplasma* for the first time. Birth defects may occur as a result.

This parasite has a two-stage life cycle. Kittens and newlyinfected cats shed the organism in their feces. Pigs that eat cat feces may develop cysts in the meat. The cysts, if consumed in undercooked meat, can cause human disease. Humans can also contract the disease by handling cat feces. To reduce the on-farm risk, cats — especially kittens and nursing queens — should be kept out of the barn and away from feed bins and pig feed.

C2.5.3 Other Parasites

Other parasites, such as tapeworms, can be passed to humans in pork; however, these parasites are virtually unknown in Canada. Our cold climate, good hygiene, and the fact that we rear pigs indoors, make this risk negligible.

C2.6 Metals (e.g. cadmium, lead, mercury, selenium, zinc)

Metals may accumulate in meat when animals are exposed to high concentrations of them. Fortunately, many heavy metals tend to concentrate in bone and non-edible tissue first. Without due care, however, it is possible for medicating feed ingredients such as arsenilic acid to reach toxic levels in meat. A federal testing program in Canada routinely monitors all meats and contamination rates are extremely low.

C2.7 Other Drug Residues

No hormones are licensed for use in growing pigs in Canada. In addition to this legislative safeguard, a federal testing program is in place to routinely monitor pork for hormone presence.

C2.8 Mycotoxins

Molds produce toxins in grains under certain conditions of moisture and temperature. Pigs are more sensitive than other livestock to mycotoxins and cannot tolerate high levels. Concern that some toxins may accumulate in the meat and produce adverse effects on people has never been substantiated for any of the mycotoxins that occur in Canada.



D. Good Production Practices

Most producers already follow good production practices. Few, however, have taken the time to document their daily activities. Documentation indicates that the producer understands the process, and demonstrates his/her responsibility to it — a necessity in a HACCP program.

Good production practices minimize potential problems. Each farm is unique, which makes blanket statements unworkable. This manual is intended as a general reference, to provide guidelines and general approaches. Hopefully, the information provided will help you to recognize the things you already do. At the same time, we hope it provides new ideas which you can include in your farm management program.

Good production practices are discussed in this manual under the following main headings:

- 1. Purchasing
- 2. Animal Handling
- 3. Sanitation and Building Design
- 4. Medical Supplies: Use and Storage
- 5. Feed Handling
- 6. Biosecurity
- 7. Water
- 8. Shipping, Marketing and Transport
- 9. Personnel Training
- 10. Deviation and Notification

Critical Control Points and "Level B" Good Production Practices

A critical control point (CCP) is a specific point, step or procedure in the production process where a control can be applied to manage a hazard. "Level B" good production practices (GPPs) control the hazard (within acceptable limits) that has been identified at any production step. The generic HACCP plan for the CQA[®] program has three critical control points and fourteen "Level B" GPPs. These areas require procedures which are categorized under the headings Monitoring, Deviation and Verification. Monitoring procedures are the day-to-day or routine activities conducted by your staff to ensure that a protocol is being followed. Deviation procedures are steps that are followed when something goes wrong. Verification procedures are carried out by someone other than the person responsible for the day-to-day procedures and monitoring. Verification is conducted periodically, to ensure that monitoring and deviation procedures are being carried out correctly.

When CQA[®] translated identified hazards into the program materials, it was necessary to have questions in the On-Farm Quality Assessment Form and additional information in the Good Production Practices section of the Producer Manual that would assist producers in recording or creating their protocols to describe how things are done, and how monitoring and deviation procedures are carried out.

In some cases, the protocols and the monitoring procedures are found within the same question. For example, if you look at the question about avoiding injection site abscesses, the answer requires that you provide a description of the way in which injections are given in order to minimize the risk of creating abcesses. As well, part of controlling abscesses is daily monitoring of animals for visible signs. Therefore, if an abscess is treated, any treatment and deviation will be recorded, since that treatment record requires documentation of the reason why it was used.

In other cases, specific questions about monitoring and deviation will be asked. Monitoring



questions, and the answers you provide, form part of your protocol. They describe what records you keep and how they are reviewed to catch any problems that may arise. Deviation questions ask what you would do if something went wrong. In other words, deviation questions enable you to develop a plan of action that can be followed if you find that a mistake has been made.

Verification is addressed by questions and answers that detail how you ensure that procedures are followed. Verification is an additional step that ensures your protocols are working. They are conducted by someone other than the person who completes the day-to-day tasks. Producers are strongly encouraged to ask their herd veterinarian (if that person is different from the validator), feed or equipment salespeople/ technicians, family or staff members to verify procedures and records from time to time. In the event that none of these people are available, it is acceptable to ask the program validator to conduct this verification activity. Your verifier must have access to the written protocols and monitoring and deviation procedures. Armed with that information, the verifier can review records and ask questions that will help him/her to confirm whether tasks are being conducted as per the written protocol. If you have someone available to verify your protocols

other than your CQA[®] validator, consider making verification a routine part of your protocol. Verifiers provide an extra checkpoint, to make sure that things are running smoothly.

In the Producer Manual, some information has been presented in text that has been highlighted in a blue box. These points relate to things that you must do as part of your protocol for critical control points and "Level B" GPPs. The exception to this rule is section D10 Deviation and Notification, which deals specifically with how you write deviation procedures for your protocols. Section D10 applies to all "What would you do if something went wrong?" questions which are part of critical control points and Level B GPPs.

Other text has been presented in blue font. These bullets are also "must do" points. They refer to other program requirements in the shaded questions.

You will also notice that other bullets have been worded in such a way that they indicate that you must perform a certain task. These items may not be evaluated during your validation but are good production practices that minimize food safety hazards and contribute to the strength of your operation.



D1. PURCHASING

D1.1 Introduction

A good purchasing program ensures that acceptable materials and animals enter the swine production facility. Just as processors specify certain quality standards for raw materials, swine producers need to specify what standards they want all incoming materials to meet.

The CQA[®] system offers producers the opportunity to demonstrate that they have implemented practices on their farm that control or minimize the risk of food safety hazards being introduced to the meat that will come from their animals. Question #2b of the On-Farm Quality Assessment Form indicates the program requirement that any farm wishing to be recognized by the CQA® program receives all incoming animals from CQA[®] registered source farms. This creates a CQA[®] continuum from birth to slaughter and ensures that producers are notified of animals with suspect broken needles or drug residues that must be appropriately handled. The CQA® program also encourages greater awareness of source farm herd health status and positive discussion between producers and members of related industries who supply Canadian hog farms with feed, medical supplies and other inputs.

The following headings will be used to identify the purchased inputs needed by most pig farms.

- Animals, Semen and Embryos
- Feedstuffs
- Medical Supplies
- Bedding
- Other Materials

D1.2 Animals, Semen and Embryos

D1.2.1 Biological Hazards

Most herd health and biosecurity programs developed by producers and their veterinarians focus on keeping swine diseases out. The same protocols used to reduce the risk of pneumonia caused by bacteria, such as *Mycoplasma* and *Actinobacillus* will also be effective in reducing the incidence of biological hazards which could be transmitted to pork.

- It is recommended that you limit replacement animal sources to those where you and your veterinarian know the health status is compatible with your herd. Research has shown the risk of introducing *Salmonella* increases in barns that gather pigs from many sources. Other microbes that pose a food safety risk such as *E. coli* and *Yersinia* may also be introduced through new stock. (On-Farm Quality Assessment Form question #2)
- Artificial insemination can be an alternative to introducing live animals. Be aware that semen may be contaminated with pathogenic bacteria. No known food pathogen is transmitted through semen from federally inspected facilities.
- Embryo transfer is another alternative to introducing live animals, though this is generally not used in commercial production. Embryos may be contaminated with pathogenic bacteria.
- Any bacterial contaminants that may be introduced to your farm through the introduction of new stock may be resistant to antibiotics. Be aware of this risk and be prepared to work with your veterinarian in the event that antibiotic treatment is not successful.
- It is highly recommended that cats, dogs, rodents and birds be kept out of the production unit. These animals can all act as vectors



for viruses and bacteria that may have a negative impact on your herd's health or that may be a food safety hazard. Cat feces, for example, could be responsible for introducing *Toxoplasma* to pork. (On-Farm Quality Assessment Form question #29)

• It is highly recommended that you establish guidelines for people who enter the production unit. Visitors and personnel may be unwittingly carrying pathogenic organisms that could be transmitted to the animals. Pigs exposed to human feces harbouring the tapeworm *Taenia solium*, for example, could develop cysticerci. (On-Farm Quality Assessment Form question # 26a)

D1.2.2 Chemical Hazards

Incoming animals may have chemical residues in their tissues that should not escape attention just because they have a new owner. The person receiving incoming pigs needs to know whether the person who shipped them administered medication to the animals that requires a withdrawal time. The conscientious seller needs to advise buyers that animals have been recently treated.

- An "Outgoing Pig Treatment Record", or a similar record indicating treatment history relating to any withdrawal times not yet cleared by the animals, must be received with all incoming animals. (Question #2d of the On-Farm Quality Assessment Form)
- Check what withdrawal periods are required for incoming stock. Make a record of these and ensure that animals are properly identified so that they or their excretions will not cause problems. Identification of animals may be done by individual, pen, room or lot.
- Even if you will not be shipping any animals prior to the end of the withdrawal time, you must make a record of the treatment.

- Consider how you would handle the disposal of an animal if your renderer will not accept animals with residues. It is recommended that you contact your provincial government or hog board for information on regulations and acceptable methods for carcass disposal.
- Remember that urine and feces from treated pigs may cause violative levels in untreated pigs. (On-Farm Quality Assessment Form questions #4, 11c, 20b, 20c, 24, 25d)
- Develop open lines of communication with your suppliers. Be aware of their treatment practices. (On-Farm Quality Assessment Form question #2)

D1.2.3 Physical Hazards

Incoming animals may have needle fragments or other bits of material embedded in them, which may cause a food safety hazard.

- An "Outgoing Pig Treatment Record" or similar record indicating any animals with confirmed or suspect broken needle fragments must be provided with incoming stock. (On-Farm Quality Assessment Form question #2d)
- Identify any incoming animals suspected of having a broken needle fragment in them. Make a record of this in your treatment record or other defined location so that you will be aware of this animal when it comes time to ship.
- Develop open lines of communication with your suppliers. Be aware of their barn operating practices. Do they use environmental enrichment devices that may introduce foreign materials into the pigs themselves? Steel belted tires, for example, may have been used as "toys". If the steel has been exposed, pieces may have broken off and become embedded in an animal. (On-Farm Quality Assessment Form question #2)



D1.2.4 General

- The source farms for all incoming live animals must be registered CQA[®] farms. (On-Farm Quality Assessment Form question #2b)
- All incoming animals must be identified well enough to prevent you from unwittingly sending an animal to slaughter with either chemical or physical hazard. (On-Farm Quality Assessment Form question #2e)

D1.3 Feedstuffs

D1.3.1 Biological Hazards

By feedstuffs, we mean whole grains, supplements, complete feeds, premixes and edible residual materials (ERM). Ideally, a purchasing program should specify how the product coming to the farm has been handled and stored. This is not always possible. Care should be taken to ensure trucks and equipment used to handle livestock and feed have been thoroughly cleaned. Care should also be taken to prevent contamination with droppings from birds, rodents or other animals that harbour harmful pathogens. Only approved meat and bone meal product should be used in swine feed.

Edible residual materials are waste products from the food processing industry, food service industry, grocery stores and wholesalers. Food waste containing meat or meat products may not be fed as ERM, due to the risk of disease. Product that may have come into contact with meat or meat products may not be fed. Waste from bakeries, dairies and food processing plants is allowed. Producers who wish to feed ERM must have a permit to do so. These permits are issued by the Canadian Food Inspection Agency (CFIA). Further information on how to obtain a permit can be obtained through your regional CFIA Veterinarian.

• Discuss with suppliers how they handle feedstuffs to prevent contamination with the feces of birds, rodents and other animals, and determine whether or not they have a quality control program in place. This type of program may have been developed in-house or may be HACCP or ISO certified. (On-Farm Quality Assessment Form question #6)

- Do not purchase feedstuffs from sources where you have any doubts about their storage and handling procedures. Poor storage or handling of feedstuffs may result in contamination by pathogenic organisms through cross-contamination or by the feces of birds and rodents. (On-Farm Quality Assessment Form question #6b)
- If considering feeding ERM, remember that the law requires a permit to do so. Information on these regulations and permits can be obtained from the Canadian Food Inspection Agency. (On-Farm Quality Assessment Form question #8)

D1.3.2 Chemical Hazards

When the growing, harvest or storage conditions favour mold growth, it is good policy to analyze incoming grain supplies for known mycotoxins. This is a precaution against impaired performance by animals rather than a food safety issue. The special care exercised by commercial feed mills should ensure processed feedstuffs contain minimal or no mycotoxins, as long as they are stored properly after processing.

- Where the possibility of mycotoxins in the feed exists, consider testing for their presence in incoming feedstuffs.
- Consult with a veterinarian or nutritional advisor for more details on handling of mycotoxins in feed.
- If possible, collect samples of incoming feed, in case they are needed for future analysis. A sample size of 1 kg, stored for a period of not less than 6 months, is recommended, if you decide to keep feed samples. (On-Farm Quality Assessment Form question #6c)



Trace minerals such as copper, iron, iodine, manganese, selenium and zinc are routinely added to balance swine diets. Occasionally, toxicity occurs, due to accidental overdosing. Non-essential minerals can also be found at low levels in incoming feeds. They include antimony, arsenic, cadmium, fluorine and lead. High levels usually signal that the ration has been accidentally contaminated.

Insecticides, fungicides and herbicides used in crop production can pose a risk, if improperly stored and handled. It is good practice to store these products away from feed processing or storage areas or any areas accessible by pigs. Care should be taken whenever the same equipment is used to handle both crop production products and swine feeds.

Chlorinated hydrocarbon insecticides such as toxaphene, chlordane, aldrin and lindane persist for long periods in the environment. They can concentrate in fat deposits and can be passed on to humans. Laws now restrict chlorinated hydrocarbon usage. Producers should require that incoming feed supplies are completely free of these agents.

- Where there is suspicion of toxic chemicals in incoming feeds, they should be analyzed. If toxic chemicals are detected: remove any affected feed from feeders; remove affected feed from bins; contact your veterinarian to discuss a course of action; contact your CQA[®] coordinator for assistance; contact your feed supplier to notify them of the test results. (On-Farm Quality Assessment Form questions #6, 7)
- Discuss with suppliers how they handle complete feed and feed ingredients to prevent contamination by pathogenic organisms, hazardous chemicals, medications and foreign materials. Determine whether they have a quality control program in place. This type of program may have been developed in-house or may be HACCP or ISO certification. (On-Farm Quality Assessment Form question #6)

Medicated complete feeds, medicated supplements and medicated premixes refer to products manufactured by feed manufacturers where a feed-grade medication is included. These products may be sold in bulk or bagged form. Premixes will contain the most concentrated amount of medication; complete feeds will have the lowest.

Both medicated complete feeds and medicated supplements contain premix. The difference in terminology describes how fully diluted with other feed components the premix is. Precautions to prevent contamination are necessary when handling any medicated product, but special care must be taken with more highly concentrated products.

When dealing with feed-grade medications, mixing errors or cross-contamination may result in the presence of medicated feed ingredients where there should be none. The wrong medication may be present or the correct medication may be present at an incorrect level. Any of these situations are considered to be chemical hazards.

- Discuss with suppliers how they handle complete feed and feed ingredients to prevent contamination by medicated feed ingredients and determine whether or not they have a quality control program in place. This type of program may have been developed in-house or may be HACCP or ISO certification. (On-Farm Quality Assessment Form question #6)
- If possible, collect samples of incoming feed in case they are needed for future analysis. A sample size of 1 kg, stored for a period of not less than 6 months, is recommended, if you decide to keep feed samples. (On-Farm Quality Assessment Form question #6c)
- Purchase medicated feeds, supplements and premixes as feed-grade medication from a reputable manufacturer. (On-Farm Quality Assessment Form question #6)
- Purchase bagged feed, supplements and premixes in original unopened bags that are



tagged. Save the tags for your reference and for a record of lot information if there are any problems with the product. (On-Farm Quality Assessment Form questions #6, 11)

• Be aware of the concentration of drug that exists in medicated feeds, supplements and premixes. It is highly recommended that you check the tags to ensure that the levels of medication reported in the product you received are what you requested and expected. (On-Farm Quality Assessment Form question #11)

D1.3.3 Physical Hazards

Producer concern about foreign objects in feed has prompted them to install screens and magnets to prevent damage to feed preparation equipment. The foreign objects originate during routine harvest and transport. Scalping equipment installed in mills shows that the foreign objects can be made of metal, plastic or wood. Swine are quite fastidious in their feeding habits, so the chances of them picking up a foreign object that will eventually reach the consumer are remote. Occasionally, however, bits of wire or discarded needles may be found embedded in tongues.

- Producers should discuss with suppliers how they handle feedstuffs to prevent contamination of feed and feed ingredients by physical hazards and determine whether or not they have a quality control program in place. This type of program may have been developed in-house or may be HACCP or ISO certification. (On-Farm Quality Assessment Form question #6)
- When purchasing feedstuffs, especially grain, producers should consider passing it over a magnet or through a screen to remove possible foreign objects.

D1.4 Medical Supplies

D1.4.1 General

• When transporting medications, ensure that they are protected from temperature extremes, according to label directions. For example, if a product requires refrigeration, consider bringing along a cooler on hot days to protect it from high temperatures. Protect all products from freezing.

D1.4.2 Biological Hazards

Biological hazards are minimized when all syringes, needles and surgical equipment enter the production facility intact and in original containers. Antibacterial drugs, vaccines and other medications run little risk of contamination when received in their original, unopened containers.

- Inspect all incoming materials to ensure that they are received in their original, unbroken containers. (On-Farm Quality Assessment Form question # 26c)
- Consider how you will handle any equipment that arrives in damaged or open packaging. Will you return it to the seller? Will you accept it and ensure that it is thoroughly cleaned and disinfected prior to use? (On-Farm Quality Assessment Form question #26c)
- Buy medical supplies and medications produced by a reputable manufacturer and sold by a licensed dealer.

D1.4.3 Chemical Hazards

Chemical and medication use is common in swine production. The list includes things like antibacterial drugs, vaccines, anthelmintics, vitamins, minerals and pesticides. Purchase of these products does not ordinarily cause a concern, because manufacturing methods are well monitored.



- Buy medical supplies and medications produced by a reputable manufacturer and sold by a licensed dealer.
- Medical supplies and medications should be handled, stored and sold by a reputable retailer.
- Medical supplies and medications should arrive at the production unit in unopened/ unbroken containers.
- There *must* be appropriate labelling on the product to identify it, its strength or concentration, suitable dosage instructions and source manufacturer.

D1.5 Bedding

D1.5.1 Biological Hazards

Materials such as straw, sawdust and wood shavings are frequently used as bedding in production units and in transport vehicles. Pigs will chew and consume bedding, especially straw. Whether or not it contains pathogenic bacteria and parasites depends on how the bedding has been handled and stored. It is important to prevent bedding from becoming contaminated with animal or bird feces. Straw, sawdust and wood shavings are frequently used when transporting swine. Every effort should be made to ensure that they have not become contaminated during storage and handling.

• You must consult straw and bedding suppliers to ensure the materials were produced and stored in an acceptable manner, in order to minimize the risk of contamination by animal feces, molds, fungi and other pathogenic organisms. (On-Farm Quality Assessment Form question #9a)

D1.5.2 Chemical Hazards

Wood shavings, when used as bedding, must be scrutinized for pentachlorophenol (PCP) and chromated copper arsenate, wood preservatives, which, if consumed by pigs, can accumulate in tissues and be passed along to people. Lumber that has been treated with PCP must be kept out of places where the pigs could chew on it.

In general, the incoming requirements for bedding are the same as for grains and other feedstuffs.

• You must consult with suppliers of wood product bedding about the possible presence of PCP or other wood preservatives in the material. You should make a note of the date you contacted the supplier and the name of the person with whom you spoke. Ask if they would supply a letter for your records stating that their product is free of wood preservative chemicals. (On-Farm Quality Assessment Form question #9b)

D1.6 Other Materials

D1.6.1 Tattoo Equipment and Other Identification Devices

D1.6.1.1 Biological Hazards

As with other incoming equipment, there is minimal risk of biological contamination of tattoo equipment, unless its packaging is damaged upon receipt.

- Inspect incoming tattoo equipment, to ensure that it is received in an acceptable sanitary condition.
- Consider how you will handle any equipment that arrives in damaged or open packaging. Will you return it to the seller? Will you accept it and ensure that it is thoroughly cleaned and disinfected prior to use?
- Buy supplies produced by a reputable manufacturer.

D1.6.1.2 Chemical Hazards

Tattoo ink may introduce a chemical hazard, if it arrives mislabelled or if the wrong product is provided.



- Inspect ink prior to use to ensure that it is the same product that you routinely use. Any differences in the appearance of the product should be reported.
- Ensure that the ink you are using is approved for use in livestock.
- Buy supplies produced by a reputable manufacturer.

D1.6.2 Farm Chemicals

D1.6.2.1 Chemical Hazards

In most situations, herbicides, insecticides, fertilizers and other farm chemicals will not come into the pig production unit. Free-ranging pigs could conceivably gain access to improperly stored product, and mix-ups in the handling and storage of bulk products are possible, if proper care is not exercised.

- Ensure that farm chemical products are properly labelled upon receipt. Store these products away from medications, production tools and feed and feed ingredients. (On-Farm Quality Assessment Form question #5b)
- Store chemical according to any applicable provincial regulations.
- Buy supplies and medications produced by a reputable manufacturer.

D1.6.3 Environmental Enrichment Devices

D1.6.3.1 Physical Hazards

Environmental enrichment devices are basically "pig toys". Ropes, chains, tires and other items may be introduced to a pen to provide an outlet for pig curiosity. These products may prevent vices such as tail-biting and belly-nosing. However, these products may also introduce physical hazards to the production facility.

- Inspect environmental enrichment devices for any small pieces that may break off and become embedded in the animals.
- Do not use steel-belted radial tires. The steel in these tires may become exposed, break off in small pieces, and become embedded in the animals.



D2. Animal Handling

The way in which animals are handled can have a significant impact on production, and productivity and meat quality can both be affected. The most important consideration is stress, which refers to physical or psychological discomfort. Stressful situations such as transportation, for example — cannot be totally avoided in swine production. However, good working knowledge of the causes and consequences of stress will aid workers in reducing stress in the pigs they handle.

Guidelines are available in Publication 1898/E, *Recommended Code of Practice for the Care and Handling of Farm Animals* **Pigs.** It provides stockmanship recommendations as well as recommendations for housing, nutrition and transportation. It also contains emergency plans, guidelines for the humane killing of pigs on the farm, wind chill factors during winter transit and a list of reportable diseases in its appendices.

Studies have shown that stressful conditions result in poorer feed conversions, lower pregnancy rates, higher excretion, transmission of food-borne pathogens and decreased immunity. Tail biting, for example, can cause abscesses that may require treatment at the farm and that may cause trim demerits and carcass contamination at the processing plant. Since these factors impact profit as well as food safety, pig producers must make sure that everyone on their staff knows what measures are being taken to minimize stress on their pigs.

- Keep a copy of the *Recommended Code of Practice* on your farm and make it accessible to everyone who works in the barn.
- Consider the use of environmental enrichment devices to minimize stress. However, recognize the risk that introducing these foreign objects pose as regards food safety. Inspect any devices that you are considering using for environmental enrichment, to ensure that there are no parts that may injure your pigs and become embedded in them, thereby causing a food safety hazard.
- Make sure no penned animal is underfed. Provide fresh drinking water at all times. Avoid extremes in temperature and ensure that all animals have enough space to lay down at the same time.
- Check regularly for sick or injured animals and initiate appropriate treatment. Isolate them, if competition is causing undue stress.
- When moving pigs, avoid the use of pipes, canes, tattoo equipment and sharp objects. These implements cause bruising and unnecessary injury. Rather, we recommend using plastic chase boards and pliable canvas slappers.
- When moving pigs, ensure that they will not have access to medicated feeds in alley-ways, holding areas or pens.
- Minimize stress on pregnant and farrowing sows, to minimize shedding of pathogenic organisms.
- Immediately after determining a pig is not salvageable, because of injury or disease, destroy it in a humane manner.
- Limit mixing of animals. Mixing increases stress and, as a result, increases the shedding of pathogenic bacteria. Mixing may also expose untreated animals to chemical residues in the feces and urine of treated animals.



- Ensure that any bedding used during shipping is free of wood preservatives, agricultural chemicals and the feces and urine of treated animals.
- Work with your marketing agency or processor to determine how things such as transport, withholding of feed and resting periods affect carcass quality and the risk of contamination at the processing plant. (On-Farm Quality Assessment Form question #32)
- Remove dead stock promptly to minimize the risk of contamination of live animals and facilities with biological and chemical residues. Dispose of the carcasses according to provincial regulations and guidelines. Animals with chemical residues need to be handled appropriately. Contact your veterinarian and renderer for more information.



D3. Sanitation and Building Design

D3.1 Introduction

D3.1.1 Sanitation

Disease can either cause death or hinder normal development. Good sanitation helps to reduce disease and decreases the need for the use of antibacterial agents.

An understanding of how the microbes responsible for illness survive and multiply helps us define strategies that will also reduce food-borne diseases and the risk of antibiotic residues. **Direct contact** with diseased or carrier pigs or their nasal secretions, saliva, urine and manure is the most common method of pig-to-pig disease spread. Humidity is essential for microbial survival. Therefore, water leaks and the practice of housing more animals than your building's ventilation system can cope with also readily increase humidity and the risk of disease.

Mixing pigs from different areas or sources spreads microbes. An environment such as a pen or transport vehicle, contaminated with secretions left behind by previous pigs, permits transmission by **indirect contact**. *Salmonella*, for example, can survive nine months at 22°C in stored manure.

Inadequate drainage leads to flooding of pens and feeding areas with backed-up manure and also increases bacterial contamination. Manure could also contain violative levels of antibiotics from earlier production stages, if manure pits overflow.

Mechanical vectors, such as boots, dust and tools may carry enough microbes from a pigcontaminated area to infect pigs in another area. Rodents, cats, dogs and flies can be mechanical *and* **biological vectors.** As well as being able to carry microbes the way a pair of boots would, they are capable of multiplying microbes in their bodies. Grain litter and unswept alleyways may feed disease-spreading mice or rats. Cats that freely move in and out of the barn and throughout production areas have the potential to transmit food-borne diseases like *Toxoplasmosis*. Employees are another important mechanical vector. They must be made aware of how they can transmit organisms from one area to another, and must be provided with adequate hygiene facilities.

The simplest sanitation calls for removal of microbes and the conditions that support them.

The choice of disinfectant will vary according to the type of organism targeted and the kind of surface area to be disinfected. Some disinfectants are more costly than others; some shorten the life expectancy of barn equipment and some can be toxic to pigs if not properly rinsed away. The decision about whether to use a phenol-, hypochlorite-, quaternary ammonium or chlorhexidine-based disinfectant depends on the targeted organism.

D3.1.2 Building Design

Building integrity is essential to any production unit. Falling ceilings and other extreme forms of building deterioration do not meet the prerequisite for HACCP-based production.

Building materials must be free of chemicals that could introduce residues to the pig and remain in the pork. Pressure treated lumber should not be used in penning for the same reason that you must not use shavings from pressure treated wood as bedding. The chemicals used to preserve the wood, when ingested, remain in the fat and will result in residues.



Other construction materials used should be sturdy, easily cleaned and free from foreign objects that could become physical hazards to the pork.

A well-designed ventilation system allows for proper control of gases and humidity. Control of humidity is particularly important for food safety in order to remove moisture, the most important item for the survival of microorganisms. Proper control of gases from carbon dioxide, ammonia and hydrogen sulfide provides a healthier environment for growth and maintenance of breeding stock.

D3.2 General

(On-Farm Quality Assessment Form question #25)

- The simplest sanitation program calls for removal of microbes and the conditions that support them. Microbes require humidity to survive. Dust and cobwebs offer a place for bacteria and viruses to grow and survive. The most basic elements of your sanitation program will relate to the removal of these elements through ventilation, sweeping and routine cleaning.
- It is not necessary to apply your sanitation program to each area of the barn at the same time. The CQA[®] program does require, however, that your sanitation program be applied in each area of the barn at least once per year and that you have a plan for routine maintenance such as sweeping and removal of dust and cobwebs. These maintenance tasks can readily be incorporated into routines.
- All-in-all-out operations should be thoroughly cleaned following each batch of pigs.
- Continuous-flow operations should be cleaned when weather conditions permit adequate drying conditions within the barn.
- Straw-based systems, including barns, polebarns, hoop structures or any other straw-

based system held within a structure must have all bedding materials removed at least once per year. It is recommended that bedding be removed more frequently, if possible.

- A thorough cleaning program must address clean-up of spillage of feed, feed ingredients, medications and agricultural chemicals.
- Feeders and feeding areas must be included in your barn sanitation protocol.
- Consider routine scraping of pens to remove excess pig waste while the animals are in the pens.
- Liquid manure pits must be managed to avoid overflow into the pen areas.

D3.3 Cleaning and Disinfection

(On-Farm Quality Assessment Form questions 25a, 25b)

- It is recommended that detergents be used in the sanitation program. Detergents help to remove biofilm, the film of organic matter that sticks to pen floors and walls. This biofilm helps to protect bacteria and viruses from removal and disinfection.
- Consider the use of a garden hose and backpack sprayer, to focus on specific pens, when cleaning in a continuous flow operation.
- Power washing or pressure washing is recommended for rooms that have no pigs in them, are made of impervious surfaces that can withstand the high pressure and which have electrical systems designed with specifications that allow it.
- Consider the use of foaming applicators to permit more visible application of cleaning and disinfecting agents. This application method helps to ensure that you have covered all surfaces and may help increase contact time with surface materials.
- Ensure that you allow surfaces to dry sufficiently. It is recommended that surfaces be allowed to dry for 24-48 hours. A minimum of 12 hours is absolutely necessary.



D3.4 Selection of disinfectants

- Disinfectant activity is improved when organic matter is thoroughly removed from the area.
- Disinfectants should:
 - Work well in the presence of organic matter;
 - Be compatible with soaps or detergents;
 - Be harmless to building materials; and
 - Be relatively non-toxic.
- Carefully read label directions to ensure proper dilution rates and exposure times.
- The various categories of disinfectants include:
 - Phenols
 - Chlorine-based
 - Iodine-based
 - Quaternary ammoniums
 - Aldehydes
 - Peroxygen formulations
 - Alcohols
 - Lime (For more information on lime, talk to your veterinarian, validator or provincial coordinator.)

Consult with your veterinarian to determine an appropriate disinfection routine for your operation.

D3.5 Boots

(On-Farm Quality Assessment Form questions #25, 26, and 27)

- Clean boots can be more effectively disinfected than dirty ones. Research has shown that, for removal of bacteria, scrubbing visible manure off boots using water is as effective as scrubbing visible manure off boots using disinfectants. It is recommended that you provide facilities to pre-clean footwear.
- Be aware that every disinfectant requires a different exposure time. Read the label care-fully to ensure that you know how long your boots must be in contact with the disinfectant

for effective use. In other words, simply walking through a boot bath will not disinfect boots.

- Boot baths should be long and wide enough so people are forced to walk through them and should be a minimum of 10 cm (4") in depth
- The design of the bath should facilitate easy drainage.
- Boot baths should be protected from the weather.
- Disinfectant should be replaced regularly following the manufacturer's directions. Dirty boot baths are not effective.
- If you have a multi-commodity farm, be aware that you may wear your boots in different areas around your farm and in transit, but that boots can act as a vector for foodborne pathogens and disease organisms. You should not wear the boots you wear on your farm when you go off your farm. (On-Farm Quality Assessment Form question #27)
- Rather than using a boot bath, you may want to consider using different boots for different areas of your production unit. Systems for changing boots range from simply limiting the use of boots to the barn to using different boots in each room and hallway. You may also want to consider having an area to wash boots.

D3.6 Equipment

- Be aware that equipment can also act as a vector for food-borne pathogens. It is recommended that incoming equipment should be cleaned and disinfected when coming from another agricultural operation (On-Farm Quality Assessment Form question #26c)
- Equipment used for storage, mixing and distribution of feedstuffs must be properly cleaned and maintained to minimize the risk of cross-contamination by medicated feeds or feed ingredients, as well as pathogenic organisms, moulds and fungi.



D3.7 Transport

(On-Farm Quality Assessment Form question #4)

- It is recommended that you avoid using the same vehicles for transporting pigs and transporting other commodities.
- If you must use the same vehicles to haul both live hogs and other products, be aware of the order in which these commodities are being hauled. Take steps to ensure that there is no cross-contamination.
- If you must use the same vehicles for transporting pigs and other commodities, it is recommended that trucks be swept clean, and where necessary and weather permitting, washed between the transport of different commodities. Medicated feed ingredients or farm chemicals may have spilled or left a residue in the truck that could cause a residue in pigs.

• It is recommended that, weather permitting, trucks be washed between shipments of live hogs. Manure can be the source of both biological (e.g. *Salmonella*) and chemical (e.g. drug residues) contaminants.

Becker, H.N., G.W. Meyerholz, J.M. Gaskin. 1990. Selection and use of disinfectants in disease prevention. Pork Industry Handbook #80. Purdue University, West Lafayette, Indiana.

Hurnik, D. 2000. Barn Wash/Disinfection Trials. Island Pork, December 2000. PEI Hog Commodity and Marketing Board.

Lange, A. and Kennedy, B. 1999. Personal Communication.

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D4 Medical Supplies: Use and Storage

D4.1 Introduction

Canada has earned a reputation for having the highest quality and safest pork in the world. During 1997-98, random testing in processing plants across Canada showed that 99.6% of the hogs tested were residue free. While this is impressive, it remains that some hogs are being marketed each year with detectable drug residues. This has the potential to destroy consumer confidence and markets.

Drug residues can be caused by human error, lack of knowledge or intentional misuse. Human error might result if someone treated the wrong animals, if they used the wrong dosages or if they failed to identify treated pigs. An uninformed farm worker, not knowledgeable about withdrawal times and proper drug use, could ship too soon. Intentional misuse occurs when pigs are deliberately shipped before the appropriate withdrawal period is over or when drugs are used in a way that is known to be inappropriate.

Needles broken off during treatment can sometimes make it through to the consumer in primal cuts, such as the ham. Each year, at least one broken needle is found in Canadian pork. Injection site damage and abscesses due to poor injection technique is a much bigger problem. This results in extra trim that is often marked on producer settlement statements as an abscess. The producer may never know that it was injection related.

D4.2 Needles and Injections

The likelihood of breaking a needle is reduced when the needle is sharp and the animal is adequately restrained. Dull and burred needles cause more pain, which makes it more likely for pigs to resist. A bent needle must not be straightened for reuse after it has been bent. Bending weakens it, making the needle more likely to break. Removing a broken needle from a live pig on the farm is not always possible since the needle fragment can move, making it difficult to find. If it cannot be done, the pig should be permanently identified so it can be handled appropriately at the processing plant.

The CQA[®] program requires the use of detectable needles. These needles have been designed to be detectable by current metal detectors in our slaughter plants. These needles have also been designed specifically for use in livestock and are less likely to bend and break than other disposable needles. Proper care still needs to be taken in their use, however, as they can still break and small fragments may not always be detectable. They are designed to be stronger, but caution and prevention are still needed. A needle in the food chain is an unacceptable result of inappropriate on-farm protocols or failure to contact the necessary people for proper handling of a hog with a suspected needle fragment.

Contact your packer or marketing agency to determine how animals should be identified and reported (different packing plants may have different requirements for identification and reporting of suspect animals) and to report suspect animals that are being shipped.

Proper injection technique is important. It ensures adequate absorption of the drug and minimizes risk of complications like broken needles, abscesses or scar tissue. The size of the animal determines what gauge and length of needle is appropriate. Size will also determine the maximum amount that can be injected at any one site, if large dosages are to be given.



For intramuscular injections:

Animal	Gauge	Length
Sows	16	1 1/2"
Grower/finisher	16 or 18	1"
Weaners	18	3/4" or 5/8"
Baby pigs	20	5/8" or 1/2"

- Only detectable needles may be used. These needles will be identified as detectable on their packaging. If you are uncertain whether your brand of needles is detectable, check with your supplier or provincial delivery agent. (On Farm Quality Assessment Form question #13c)
- Intramuscular injections may only be administered in the neck muscles or, for breeding stock, in the neck or at the hip injection site. (On-Farm Quality Assessment Form question #12)
- Ensure that injections administered at the neck location occur well ahead of the shoulder and close behind the ear. Hitting the shoulder bone can break or bend needles. (On-Farm Quality Assessment Form question #12b)
- The protocol for administering intramuscular injections in the hip is provided in detail on page D4-14. Remember that this injection site may only be used in animals committed to the breeding herd and that injection volumes may not exceed 5 cc. (On-Farm Quality Assessment Form question #12a)
- Reproductive hormones only may be administered via injection into the perineal injection site. Producers should consult with their veterinarians to ensure that they are using the appropriate technique to inject at this site and that they are observing the appropriate withdrawal times
- Use sharp needles. It is recommended that you change them after every 10 pigs or after each litter. (On-Farm Quality Assessment Form question #13)
- Administer intramuscular injections at right angles to the skin. Injecting on an angle may place the drug in the fat under the skin, rather than deep in the muscle. Many vaccines and drugs are not effective if they are placed in

the fat. If the needle is on an angle, it may also hit the shoulder bone and break, or hit the jugular vein and kill the pig if it is small.

- Always discard bent needles into a "sharps" container rather than try to straighten them. These containers can be purchased, but an old plastic bleach or milk jug will make a ready and inexpensive substitute. (On-Farm Quality Assessment Form question #13a)
- Consider "needle counts". What goes in, must come out. In this case, all needles going into the barn must come back to the office and be counted before disposal.
- It is recommended that you carry extra needles. When your only needle bends and it is a long walk back to the office, it is tempting to use it anyway. Make sure that extra needles are close by when treating animals.
- Always inspect needles for damage following each injection.
- Set a farm target of zero broken needles in all production areas, even sows. When needles break frequently, it is a warning that something is wrong. Review injection technique, staff training and choice of needles (length and gauge).
- Consider the use of slap shot or similar attachments which use a flexible hose that connects to the syringe. This allows your hand to move more easily if the animal moves, reducing stress on needles and hubs.
- Consider the use of stronger needles and hubs. Many needles break at the hubs. Stainless steel hubs are stronger than aluminum hub, which are stronger than plastic hubs. Plastic hub needles should only be used in baby pigs, never in larger animals.
- Some needles are only made for single use



and are not strong enough to be used multiple times.

- It is recommended that you do not use 18 gauge 1.5 inch needles. These needles are weak due to their length and small gauge. It is recommended that you use 16 gauge 1.5 inch in sows and 18 gauge 1 inch needles in growing pigs.
- Consider a no needle policy in your grower/ finisher areas. High health pigs rarely become ill and many who do will recover without antibiotics, especially if the animal is placed in a separate pen to rest and recover. Some drugs can be given through the water. Consult your veterinarian about reducing or eliminating needle use.
- If you break a needle, determine if the fragment can be retrieved.
- Permanently identify all hogs with broken needles or suspect broken needles. Record the incident including, if possible, the location of the broken needle. (On-Farm Quality Assessment Form question #14)
- Notify your marketing agency and/or packer prior to shipping an animal with a broken needle or suspect broken needle. Be aware that different packers and different provinces may have different requirements for identification and for notification. Familiarize yourself with the procedures for your province and packers.
- Ensure that staff members understand that it is important to record and report a broken needle incident. (On-Farm Quality Assessment Form question #14)
- Detectable needles still must be reported prior to shipping hogs. The metal used in these needles can be detected by a metal detector. Most processors use a metal detector on all finished cuts of pork to check for broken needles or other metal fragments in the meat. A detectable needle could still be missed in the plant, so your processor must be notified.
- Inject small amounts at each site. No more than 10cc per site in adults in the neck, no more than 5cc in the hip (this option is only available for breeding animals), and no more

than 2 cc in baby pigs. (On-Farm Quality Assessment form question #13b)

- Store drugs at proper temperatures and in correct locations. Product labels will indicate temperature ranges and whether the product should be protected from light. Protect all medications from freezing. Always follow the manufacturer's instructions for storage.
- Transport medications at proper temperatures. Avoid transporting or leaving products requiring refrigeration sitting in hot vehicles. Similarly, protect products that should be stored at room temperature from freezing.
- Dust from barns may contain enough bacteria to contaminate unwashed syringe barrels and partial bottles of stored product. Be aware of this risk when injecting air to make withdrawal from bottles easier. For the same reason, you should never store needles in the caps of injectable medication bottles.
- Always visually inspect medications prior to use. Bacteria can colonize a bottle of antibiotic. Any change in colour, clarity or consistency may indicate a problem with the medication, in which case it must be discarded or returned to the supplier. (On-Farm Quality Assessment Form question #13b)
- Needles and syringes should be washed in very hot water and, if possible, sterilized. Be sure to thoroughly rinse needles and syringes prior to next use. Some detergents and disinfectants can neutralize the effects of some medications. Similarly, residual medications may result in an adverse reaction when one syringe is used to administer more than one medication. (On-Farm Quality Assessment Form question #13b)
- If equipment is designed to withstand high temperatures or boiling, injection equipment can be boiled in water for thirty minutes to sterilize it. This is the safest method to use in order to avoid affecting medications and vaccines with disinfectant residues. (On-Farm Quality Assessment Form question #13b)
- Discuss disinfectant options with your veterinarian. A closed container of "cold" sterilizing



solution may be an option for your farm.

- Avoid giving injections through skin that is obviously wet and dirty. (On-Farm Quality Assessment Form question #13b)
- Discard partial vials of vaccine, if not used within the restricted time period defined by your veterinarian.
- It is recommended that you use transfer needles. Needles that have been used in an animal should never be returned to a medication bottle. Following this procedure eliminates the transfer of microorganisms from an injection site back into a bottle of medication. (On-Farm Quality Assessment Form question #13b)
- Animals must be inspected at least weekly for any occurrences of abscesses requiring treatment. (On-Farm Quality Assessment Form questions #20e, #20f)
- Review injection procedures and medication handling with your staff and your veterinarian annually at the very least, and any time an increase in the incidence of injection site abscesses occurs. (On-Farm Quality Assessment Form question #20e)
- Treatment records must be reviewed at least once annually(verification), but more frequently if possible, and must be reviewed by someone other than the person normally responsible for keeping treatment records. The records must be signed and dated, to indicate that they have been reviewed. (On-Farm Quality Assessment Form question #20e)

D4.3 Establishing a Medication Usage Plan

The purchase of healthy stock, modified pig flow, biosecurity and vaccination programs have reduced the need for antibiotics. Reduced drug use reduces the likelihood of residue problems and also reduces the cost of production. Many producers sit down with their veterinarians at least once per year to critically review the protocols they have in place. Establishing protocols and keeping records takes time. But because the process jogs memories and establishes a means of ensuring effectiveness, it is a necessary part of any quality assurance program.

Pig production is full of change — new employees, new disease diagnosis by the herd's veterinarian and new products. Protocols tell any new employee why a medication is used, the type of pig it is used on, the dosage to be used, the way it is administered and how to make sure the pig does not get sent to slaughter before it is time. Records should show when the vet made his/her diagnosis and when the protocol was changed. Written communications allow someone who is not familiar with the operation to take over during the absence of the person who normally does that job.

- Establish a Medication and Vaccine Usage Plan with your veterinarian. Review the plan at least once annually. Also review the plan with your staff and ensure that it is being followed. (On-Farm Quality Assessment Form question #18)
- Create a plan to identify what will be done in case an error occurs in the use of medications, including feed medications. This plan must include:
 - a description of how affected animals will be identified;
 - what records will be kept concerning the incident and how it was corrected; and
 - who will be contacted (management, veterinarian, processor).
 - (On-Farm Quality Assessment Form question #11e, 17d, 20f)
- The use of antimicrobials, whether administered by injection, in the water or in the feed, could lead to antimicrobial resistance. To minimize the impact of this, review your Medication and Vaccine usage plan to ensure that all antimicrobials are being used appropriately.
- All prescription medications are marked with a Pr symbol on the label. These products



may only be purchased from veterinarians with whom you have a veterinary-clientpatient relationship.

- Over-the-counter (OTC) medications will not bear the Pr symbol but will be marked "For Veterinary Use Only". These medications may be purchased from veterinary offices or other livestock medicine outlets.
- Repackaged product (repackaged by your veterinarian) must be appropriately labelled and must only be provided under a valid veterinary-client-patient relationship. Be aware that when materials are repackaged, that there is a risk of contamination, and they must be handled with care.
- If your veterinarian supplies you with a generalized drug use plan that has been developed for all of his/her clients, highlight the products that you use or transfer the information on the products you use to your own personalized drug use plan. (On-Farm Quality Assessment Form question #18)
- Familiarize yourself with the type of information contained on package labels and inserts.
- Make label reading a habit. Pharmaceutical companies periodically make changes to dosage rates or withdrawal times. Comparing the label to your drug use plan will allow you to identify when these changes have been made.
- Establish identification procedures for animals that receive treatment by any treatment route (e.g. in the feed, in the water, injection, topical, etc.). Firstly, you must be able to identify individuals, because many drugs require treatment to be repeated over several days. Once treatment is complete, you may either continue to identify the individual or extend the withdrawal hold time to the entire pen, room or lot. The decision is yours, and will depend on the production stage of the animal being treated as well as your normal shipping practices. (On-Farm Quality Assessment Form questions #20b, 20c)
- Maintain treatment records for all pigs over 25 kg bodyweight. These records must include the date of treatment, identification of the

animal, product and dosage used and withdrawal time information. If a needle has been broken, that information should also be noted in the record. However, there is no need to complete that particular column of the treatment record if no needle has been broken. All treatments, whether by injection, through the water, or via a topical or oral medication must be recorded. If animals less than 25 kg bodyweight are being sold or transferred from the production unit, the outgoing pig treatment record may reflect any treatments that the lot of animals has received and does not necessarily need to reflect individual treatments. (On-Farm Quality Assessment Form question #20d)

- Establish protocols to ensure that water medication is delivered at the correct dosage and to targeted animals only. (On-Farm Quality Assessment Form question # 17)
- Plan who makes the decisions, calibrates medicators, places and sets valves, flushes water lines, assesses the risk of non-medicated swine eating feces or drinking from gutters of treated pigs, listing those responsible for staff training, the chain of command and testing. (On-Farm Quality Assessment form question #17).
- Create a plan that describes what you will do if something goes wrong during the use of water medications. The plan must include:
 - who will be notified of the error and/or contacted for consultation;
 - how equipment will be handled (drained, flushed);
 - how animals will be identified and handled; and
 - what records of the incident will be kept and where they will be stored.

(On-Farm Quality Assessment Form question #17d)

• If you do not normally ship pigs prior to commercial market weight, you may want to consider a strict protocol that prohibits the sale of animals for slaughter prior to a defined size/weight. This will assist you in planning your



pig identification system. (On-Farm Quality Assessment Form questions #11c, 20, 22)

• Consider introducing a policy of not treating any animal (though feed, water or by injection) during the finishing phase.

D4.4 Dosages and Withdrawal Periods

Drugs manufactured and sold in Canada are required by law to include specific information on their labels. Most manufacturers also include a product insert which provides information that does not fit on the label. Labels can become soiled and stained. Consider keeping a file of package inserts that describe how the product is to be properly used.

Extra-label (or off-label) drug usage exists anytime you differ from the directions the label gives for the following parameters:

- Dosage
- Route of Administration
- Duration or frequency of treatment
- Species of animal
- Purpose of treatment

When extra-label drug use happens, the withdrawal time for the product will be different. Be sure to handle treated animals appropriately, and pay careful attention to the directions provided by your veterinarian.

Using either prescription or over-the-counter medications other than as described on the label constitutes extra-label usage of the product.

- Another form of extra-label drug use is the use of drugs in the form of bulk active pharma-ceutical ingredients or compounded products.
- An Active Pharmaceutical Ingredient (API) is a substance that is intended to be used in the manufacture of a medicinal product, and, when used to manufacture a drug, becomes an active ingredient in that drug. API may not be used in bulk form on the CQA[®] program.

Compounded API that meet the criteria of the CQA[®] Drug Use Policy may be used. See page D4-13 of the Producer Manual for the Policy.

- Compounding is the combining of two or more ingredients, at least one of which is a drug or active ingredient to create a product in a form appropriate for dosing. Compounding is an activity regulated at the provincial level and, generally, only pharmacists and other practitioners (doctors, dentists, veterinarians) are permitted to compound products. Mixing two or more medications in syringe for delivery to animals is a form of compounding and is not permitted.
- Compounding differs from the manufacture of drugs in that it is intended for a specific patient or diagnosed disease condition while the manufacture of drugs is the large scale production carried out by pharmaceutical companies.

The CQA[®] Program Does Not Permit Extra-Label Drug Use unless:

- There is written veterinary direction, including recommended withdrawal time ;
- No approved products exist for a particular use; and
- A valid veterinary-client relationship exists.

A valid veterinarian-client-patient relationship must meet certain criteria. The registered veterinarian must assume responsibility for making medical judgements regarding the health of a person's animal or animals and the need for treatment. The client must agree to follow the veterinarian's instructions. The veterinarian must have sufficient knowledge of the person's animal or animals to initiate a general or preliminary diagnosis at the very least. This can be done either by examination or by timely visits to the premises. The registered veterinarian must be readily available for follow-up care, in case of adverse reactions or failure of the treatment regime. Each province's Acts, Regulations or *



Veterinary Association by-laws specifically define the nature of veterinary-client relationships for that province.

Cutting a withdrawal time short, even by a day, puts the producer at risk of putting a residuecontaining pig into the marketplace. Doubling a dosage does not necessarily mean that doubling the withdrawal period will be adequate. The higher dosage may, in fact, triple it. Producers and stockpersons must not initiate any form of extra-label usage, unless acting under the direction of the veterinarian who sold the product.

- Develop a veterinary-client-patient relationship if there is not one already in place. (On-Farm Quality Assessment Form questions #11a, 17a, 18, 20a)
- Delay shipping and/or have the pigs tested before sending them to slaughter, if someone inadvertently gives an excessive dosage or loses track of when the withdrawal period should be adequate. (On-Farm Quality Assessment Form question #20f)
- Ensure that extra-label directions are available for the validation review (On-Farm Quality Assessment Form question # 19)
- Pay particular attention to withdrawal periods and drug usage in pigs that are to be processed young for barbecue or ethnic markets. (On-Farm Quality Assessment Form question #22).
- Dosages require that you know the recommended or prescribed dose of drug (how much), the route of administration, the weight of the animal, how often the animal needs to be treated and for how long. You should periodically weigh at least one animal on a scale to get an estimated body weight for a group of pigs. If you guess an animal's weight when determining the amount of medication to be administered, you will likely under- or overdose that animal. This is an important part of staff training, and managers should ensure that their staff understands how to properly calculate dosages and determine pig weights.

D4.5 Water Medication

(On-Farm Quality Assessment Form question #17)

- The use of water medication is a convenient way to deliver medication to a large group of animals. When animals are already sick, water consumption is also more likely to occur than feed consumption.
- Water medication must be included on your Medication and Vaccine Usage plan. (Sample form provided in the On-Farm Quality Assessment Form or use a similar form of your own or provided by your veterinarian) (On-Farm Quality Assessment Form question #18a)
- Read the manufacturer's directions for use of your water medicator and ensure that it is properly set up.
- Carefully read water medication labels for dosage rate as well as any product contraindications.
- When reading water medication labels, take note of whether there is any indication that the product is not suitable for use with a water medicator. Some products are not intended for use with a medicator and may either state this on the label or will offer no direction for use with a medicator.
- When calculating dosages for water medication, keep in mind that pigs consume a volume of water equal to approximately 6-10% of their body weight per day or from two to four times dry matter consumption. If necessary, weigh a sample of the pigs to be treated to estimate body weight.
- Water medicators must be calibrated on a regular basis. Calibration must be done according to the manufacturer's specifications and include collection of solution from the medicator to make sure it is delivering the volume it is set to deliver. Make any necessary adjustments. Keep a record of each time that medicators are calibrated. This record may be kept on your treatment record or another record of your own design. Be sure to indicate in your protocol where you write the record and the location where records are kept.



- If you are using a water meter, keep in mind that water disappearance, on average, exceeds consumption by 35% but the difference may be as great as 100%.
- Keep in mind that consumption will increase 15-50% when barn temperatures exceed the upper limit for the pigs' comfort level.
- Expect water intake to increase if pigs are experiencing diarrhea.
- Consider restricting access to water prior to providing medicated water. Do not restrict water access to dehydrated animals.
- It is recommended to mix only enough product for one day and to dose it over 8 hours.
- Remember to turn off the regular water supply, if necessary, when supplying medicated water and to turn the regular water supply back on when done.
- Stock solution is the first dilution of a concentrated water medication. It is made by mixing a concentrated drug product in water. Stock solutions help to ensure that medication is properly mixed. They are added to the water that pigs will drink to deliver the medication.
- Visually inspect the mixed stock solution to ensure that the product has dissolved properly and that disappearance is as expected.
- Inspect flow rate settings prior to providing medicated water to ensure proper settings for size of pig and medication being used.
- Be sure to check valves prior to delivery of medicated water to ensure delivery to correct animals.
- Record treatment with medicated water in your Pen or Individual Treatment Records. (A sample form is provided in the On-Farm Quality Assessment Form)
- Treatment records must be reviewed at least once annually(verification), but more frequently if possible, and must be reviewed by someone other than the person normally responsible for keeping treatment records. The records must be signed and dated, to indicate that they have been reviewed. (On-Farm Quality Assessment Form question #17c)

- Review water medication protocols on a routine basis (at least once per year) and observe staff responsible for mixing and delivering medicated water while performing their tasks for these protocols.
- If something goes wrong with the use of water medication (deviation), make a record of the error and how it was corrected in the Corrective Action Form or a similar form of your own design (On-Farm Quality Assessment Form #17d).
- It is not necessary to use a water medicator to distribute water medication. You may mix and deliver medicated water by hand to a trough. If you choose to deliver medicated water in this way, be sure to carefully read the label directions and keep in mind that you may not need a stock solution for this type of delivery. Calculate your dosages carefully.

Estimated Water Intake (adapted from Prairie Swine Centre Pork Production Reference Guide 2000)

Phase	Weight (kg)	Intake (L/day)
Gestation		Variable
Lactation		12 to 20
Piglets		Variable
Weanling	5	1.0 to 2.0
Weanling	7	1.5 to 2.5
Growout	15	2.5 to 3.5
Growout	20	3 to 4
Growout	25	3 to 4
Growout	50	5 to 7



D4.6 Other Herd Health Management Equipment

- If you use needle teeth nippers, ensure that they are kept sharp. Teeth nippers should shear the tooth off parallel to the gum line and not shatter the teeth. Shattering the teeth may allow the introduction of infection-causing bacteria resulting in swollen joins or abscesses later on. (On-Farm Quality Assessment Form question #15)
- Baby pig processing equipment, including ear notchers, tail clippers, teeth clippers and tattooers should all be kept clean and sharp. They should be sterilized using alcohol or iodine. You may discuss other options with your veterinarian. Sharp cutting instruments will reduce the amount of damage done to tissue at the sites where they are used. Inspect these pieces of equipment regularly to ensure that they are sharp and clean. (On-Farm Quality Assessment Form question #16)
- Ensure that livestock markers, spray markers and tattoo ink have all been approved for use in livestock intended to go to slaughter for food consumption.
- Ensure that tattooers are kept clean. After each use, they should be cleaned with soap and water to remove ink and dirt. Dry as thoroughly as possible.
- Ensure that tags and tagging guns arrive in intact packaging. Keep tagging guns clean.
- If you are using any other types of identification devices, such as microchips, ensure that these arrive in intact packaging and handle them appropriately.

Felsman, R.J. 2000. Needles for Swine Injections: Selection, Use and Care. Cooperative Extension Program. University of Arkansas at Pine Bluff, Arkansas, USA.

LeBlanc, D. 2002. Reading Medication Labels. Western Hog Journal. Summer 2002. Alberta, Canada.

Ontario Pork Producers' Marketing Board. 2000. Swine Medicines Manual. Ontario, Canada.

Pairie Swine Centre. 2000. Pork Production Reference Guide 2000. Prairie Swine Centre, Saskatoon, Saskatchewan, Canada.

Canadian Veterinary Medical Association. 2005. Canadian Veterinary Medical Association Guidelines for the Legitimate Use of Compounded Drugs in Veterinary Practice



Sample Dosage Calculation Table

The following table is presented to provide you with a guideline for calculating dosages. The doses presented are for 1ml/10kg and 1 ml/15 kg. Weights have been included both in pounds and in kilograms. This is a guideline only, and is intended to assist you in the calculation of dosage amounts for your animals. Medications are administered at various dosage rates. You must refer to label directions or, if applicable, veterinary instructions for the administration of medications.

		Dos	ages			Dosages	
Weight (kg)	Weight (lbs)	1ml/10 kg	3ml/45 kg (1ml/15 kg)	Weight (kg)	Weight (lbs)	1ml/10 kg	3ml/45 kg (1ml/15 kg)
5	11.3	0.5	0.3	120	270.0	12.0	8.0
10	22.5	1.0	0.7	125	281.3	12.5	8.3
15	33.8	1.5	1.0	160	360.0	16.0	10.7
20	45.0	2.0	1.3	165	371.3	16.5	11.0
25	56.3	2.5	1.7	170	382.5	17.0	11.3
30	67.5	3.0	2.0	175	393.8	17.5	11.7
35	78.8	3.5	2.3	180	405.0	18.0	12.0
40	90.0	4.0	2.7	185	416.3	18.5	12.3
45	101.3	4.5	3.0	190	427.5	19.0	12.7
50	112.5	5.0	3.3	195	438.8	19.5	13.0
55	123.8	5.5	3.7	200	450.0	20.0	13.3
60	135.0	6.0	4.0	205	461.3	20.5	13.7
65	146.3	6.5	4.3	210	472.5	21.0	14.0
70	157.5	7.0	4.7	215	483.8	21.5	14.3
75	168.8	7.5	5.0	220	495.0	22.0	14.7
80	180.0	8.0	5.3	225	506.3	22.5	15.0
85	191.3	8.5	5.7	230	517.5	23.0	15.3
90	202.5	9.0	6.0	235	528.8	23.5	15.7
95	213.8	9.5	6.3	240	540.0	24.0	16.0
100	225.0	10.0	6.7	245	551.3	24.5	16.3
105	236.3	10.5	7.0	250	562.5	25.0	16.7
110	247.5	11.0	7.3	255	573.8	25.5	17.0
115	258.8	11.5	7.7	260	585.0	26.0	17.3



Sample Water Medication Calculations (from the Ontario Pork Producers' Marketing Board Swine Medicines Manual, 2000)

Example 1

Bacterial Pneumonia in Pigs

The directions for treating respiratory disease with a brand of oxytetracycline, HCl, and neomycin that comes in 100-g pouches are:

200 g (2 pouches) per 225 L of drinking water for 4 or 5 days.

The precautions state:

Prepare fresh solutions each day.

The 100 pigs in the pen average 20 kg and each should drink between 1.2 and 2 L a day (6-10% of its body weight). If we use 10% as our estimate, the whole group would require about 200 L of water a day.

Calculate the amount of product required for 200 L of water:

225 L should contain 200 g of product (according to label directions).

At that rate, 200 L should contain (200/225)*200 = 180 g of product.

If the product is very expensive, it might be worthwhile weighing the exact amount of product needed for 200 L of water; but the volume of water intake is only an estimate and some water may be wasted, especially when water nipples are used. The cost of most drugs does not warrant the extra time and trouble to sue a different method than that given in the directions.

As the proportioner is set for 1:100, calculate how much stock solution is needed for that setting.

With the proportioner set for 1:100, 1% of the 200 L of water the pigs will drink comes from the stock solution, which must contain all of the tetracycline and neomycin.

One per cent of 200 L is 2.00 L. However, to avoid having to weigh out 180 grams of powder, make the stock solution for 225 L with 2 pouches of medication, as directed. This requires 2.25 L of stock solution (1% of 225 L). This extra medication (200 g versus 180 g of product) may result in preparation of slightly over 24 hours' worth of medicated water at one time, provided no water is wasted by the pigs.

Add water to two 100 g pouches of drug, up to the 2.25 L mark of a graduated pail, to make the right concentration.

The medicated water contains 200 g of powder in every 225 L of water. This is the same dose suggested for medicating tank water.



Example 2

Treating Strep. suis in nursery pigs

You have 100 nursery pigs. Several of them are showing signs of Strep. suis meningitis. Your veterinarian writes a prescription for penicillin to put in the drinking water. The directions on the prescription say to add 0.6 L of water to one-fifth of the contents of a pouch of penicillin G potassium powder to make up the stock solution, and to set the proportioner for 1:100.

Calculations:

Each pig weighs approximately 17 pounds or 17/2.2 = 7.7 kg (round off to 8 kg), and would drink about 640 mL of water a day (8% of the 8 kg body weight).

The whole group of pigs would drink $100 * 640 \text{ mL} = 64\ 000 \text{ mL}$ or 64 L of water a day. All of the penicillin must be in that 64 L of water.

Penicillin comes as 100 000 000 IU per pouch, meant to be dissolved in 336 L of water.

It has to be made up fresh daily because penicillin loses potency quickly when mixed with water and exposed to air, so the pouch should be divided.

The pouch treats 336 L of water, and you only need enough for 64 L per day, which is about one-fifth as much as the directions call for.

64/336 = 0.19 or about one-fifth.

You need about one-fifth as much penicillin as is in the pouch in order to medicate enough water for 100 pigs.

One-fifth of the pouch contains about 20 000 000 IU of penicillin. If the pigs drink all of the 64 L of water, each pig will get:

20 000 000/100 pigs = 200 000 IU/pig or 200 000/8 kg = 25 000 IU/kg body weight.

25 000 IU/kg is a safe and effective dose of penicillin for pigs

You can measure one-fifth of the pouch if you put the contents of a whole pouch into a clear [straight-sided] glass or plastic container, measure the height, and divide it into fifths. Remove the top fifth and put it into a smaller container. Put a mark on the smaller container to make a measure that you can use every time you need to mix this amount of penicillin. Seal the opened pouch well, or put it inside a container with a tight-fitting lid, and store it in a dry, cool place out of the light.



CQA[®] Drug Use Policy

Effective January 1, 2007 Accepted by the CPC Board of Directors, July 6, 2006-08-09

The following products only may be used on CQA[®] registered farms:

- Medication licensed for use in food producing animals in Canada
- Active Pharmaceutical Ingredients provided that they are the active ingredient in a product approved for food animal use in Canada and have been compounded and are being used under the direction and supervision of a veterinarian with whom the producer has a valid veterinary-client-patient-relationship.
 - All Active Pharmaceutical Ingredients compounded for use on CQA[®] registered farms must be tested for identity according to the protocol outlined by the Canadian Association of Swine Veterinarians.
 - The use of bulk Active Pharmaceutical Ingredients that have not been further compounded is strictly prohibited on the CQA[®] program.
- Products approved for use by a veterinary practitioner under the Emergency Drug Release (EDR) program
- Products approved for use by a veterinarian under an Investigational New Drug (IND) certificate

Products that may not be used on CQA[®] registered farms include:

- Products obtained under the Own-Use Provision of the Food and Drugs Act (drug products imported from another country)
- Feed medications that have not been approved for use in Canada. It is illegal to use any medication in livestock feed that has not been approved for use in Canada. All approved products will bear a Drug Identification Number (DIN), assigned by Health Canada, and will appear in the Compendium of Medicating Ingredients Brochure (available through the Canadian Food Inspection Agency and on their web site, www.inspection.gc.ca)



Approved Hip Injection Protocol for the CQA[®] Program

- 1. The use of the hip injection site is strictly limited to use in breeding herd animals, defined as boars that have been entered into the breeding herd and those animals that are in their first gestation. The producer's deviation protocols (What would you do if something went wrong?) must reflect how those animals receiving intramuscular injections at this site will be handled if they are removed from the breeding herd.
- 2. Due to concerns related to broken needles and a potential negative impact to meat quality, all sows and boars that have received IM injections at the hip site must only be sold for processing at cull animal processing facilities.

- 3. Only intramuscular injections may be administered at this site.
- 4. Only **vaccines** and **reproductive hormones** requiring a single injection of 5 cc or less may be administered at this site.
- 5. Injections may be made with an 18 or 16 gauge needle, 1.5 inches in length. It is recommended, though not required, that a flexible hose extension device such as a Slap Shot[®] be used. Needles must be inserted at a 90 degree angle to the surface of the skin.
- 6. Detectable needles must be used.
- All staff members responsible for the administration of medication using this injection site/technique must be properly trained.



Diagram courtesy of the Puratone Corporation, as developed by Dr. Claude Mason



D5. Feed Handling

D5.1 Medicated Feed

The Canadian Food Inspection Agency (CFIA) routinely tests livestock products at processing. During the 1997-98 testing period, 99.6% of hogs tested in processing plants across Canada were found to be residue free. This record is commendable. Despite this excellent record, it still means that there are a small number of hogs marketed each year with a detectable drug residue. Often it is found that when a residue does occur in pork, it is related to feed medication. Residues arise because of feed mixing errors, accidental contamination and being unaware of the presence of feed medications. The importance of the problem makes it a major focus of this program.

Medications allowed in Canadian livestock feeds must be approved by Health Canada and bear a Canadian DIN (drug identification number). Label uses are listed in the *Compendium of Medicating Ingredients Brochure* (MIB), published by the Canadian Food Inspection Agency. This document lists the permitted levels of medication and describes the conditions the drug can be used to treat.

- All feed medications used in Canada must be approved by the Veterinary Drug Directorate of Health Canada.
- These approved products will bear a Drug Identification Number (DIN) and will appear in the MIB.

Feed medications include growth-promoting drugs, such as tylosin. Claims may also show that they promote feed efficiency and prevent or treat disease. Nutritional additives, such as biotin or selenium, and additives for odour control, however, are not considered to be medications; they are not listed in the MIB and do not fall under the same regulations. If you are unsure whether a product is a medication or a nutritional supplement, check with your veterinarian or provincial delivery agent.

Medications used as outlined in the MIB present no problem as they relate to drug residues. To receive approval, they were thoroughly researched to show they did not produce drug residues when an appropriate withdrawal time is applied. Regulations require feed mills to properly tag bagged feeds with a label that shows what type of animal it is to be fed to and what the withdrawal period is. Bulk feeds must be accompanied by a label.

In provinces other than Québec, there are three classifications of medicated feeds. These are: customer or producer formulas, consultant formulas and veterinary prescription feeds. Customer and consultant formulations may only include feed medications as described in the MIB. Feed medication use may differ from the directions in the MIB only with a veterinary prescription. In Québec, provincial regulation requires that all feed medication use must be prescribed by a veterinarian.



D5.2 Prescription Feeds

(On-Farm Quality Assessment Form question #10d)

Canadian laws require a veterinary feed prescription whenever:

- The dosage differs from the dose listed in the MIB
- The medication is used at a different stage of production than specified or used in a different species than that for which it is listed in the MIB
- The product is used for a different purpose than listed in the MIB
- The medication is used in combination with another medication not listed in the MIB
- Feed medications are used in Québec
- Prescription feeds must be manufactured according to the directions of the prescribing veterinarian.
- Prescription feeds are for a limited time period, a specific number of animals and a diagnosed condition.
- Feed mills must have a copy of the prescription on hand prior to delivery of the prescription feed.
- Feed mills must not accept a prescription for a greater amount of feed than the animals would normally consume in the time period defined by the prescription.
- Feed mill operators must ensure that all medications used, whether in a prescription feed or not, have a Canadian DIN.

The written prescriptions for prescription feeds must contain the following information:

- Date prescription written
- Name & address of client
- Name and level of medication
- Name and amount of medicated feed
- Special manufacturing instructions

- Feeding directions including the number and type of animals to receive the medication
- Caution and Warning statements if applicable
- Signature of veterinarian
- Client signature indicating an understanding of prescription (optional)

Feed mills must keep copies of customer formulas for at least six months following the last time that the feed is manufactured.

Feed mills must keep copies of veterinary formulas (requiring a prescription) for at least one year following the last time that the feed is manufactured.

It is also recommended that producers keep copies of medicated feed prescriptions on their farm. Producers are responsible for checking the tags and bills for every load delivered to ensure that medication and the level at which it is included are correct. To avoid mix-ups, a staff member must ensure feed-truck drivers delivering medicated feed in bulk form know which bin to put it in, that delivery slips are kept and that staff watches for places where errors could arise.

Prescription feeds must be tagged with the following information:

- Name and address of manufacturer
- Name of person for whom feed was made
- Name of veterinarian issuing prescription
- Name of feed and name and amount of medicating ingredients
- Directions for use
- Warning and Caution statements if applicable
- Weight of feed

D5.3 Feed Mixing and Delivery

Ensuring proper dosages are delivered to the targeted pigs takes planning and equipment that functions properly. Mill calibration is the first step to ensure the desired amount of each feed ingredient is in the finished feed. The order that ingredients are added and the

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amount of mixing time used affects how uniformly ingredients are distributed throughout the finished feed. Checklists, proper staff training, and electronic or manual safeguards that protect against inadvertently sending medicated feed to the wrong bin or feed delivery system help guard against human error. Periodic feed tests assure that proper levels are being delivered.

Most decisions about whether or not to add a particular type of feed medication will be made through consultation with the herd's veterinarian. It is good management to sit down once or more each year to discuss the rationale for using feed medication of any kind. When discussing medication use, consider things like pulse medicating and the pros and cons of using non-granulated and granulated feed medications.

Concerns related to feed mixing and delivery extend beyond cross-contamination by medications. Producers must remember that improperly stored feeds and feed ingredients may become contaminated by feces from animals and birds that may introduce pathogenic organisms or may become a prime area for the growth of molds and fungi. Storage areas must be maintained to ensure that feedstuffs do not become contaminated with these hazards. Likewise, feed mixing and distribution equipment must be properly maintained and routinely inspected to avoid cross-contamination by medicated feeds as well as by biological hazards.

D5.3.1 On-Farm Mixing

On-farm mixing presents a special challenge. It demands careful attention to develop special protocols to prevent contamination. Safeguards include procedures like sequencing so that non-medicated finishing feeds are made first. Following medicated feeds with the mixing of feed for the sows and growers is essential. These animals are less likely to go to a processing plant in the near future. It is recommended to flush the system following the mixing of a medicated ration. The grain used to flush the mill should be sent to a separate bin and used later in a ration containing the same medication or in a sow or grower ration. If the feed mill is not flushed, rations must be properly sequenced to avoid crosscontamination concerns for rations fed to pigs going to market.

Clearly marked bins and augers make mistakes less likely. Written records must show: the type and amount of feed made, the type of medication added, the dosage at which the medication is added and who mixed the feed. If the same person mixes feed using the same mixing and sequencing protocol each time feed is made, the protocol should be clearly written out and all that needs to be recorded is the date. That situation changes as soon as there is a change in protocol.

The person who comes to validate your operation will review your protocols and records. Protocols will be recognized as the record of events unless a change occurs. All changes to regular protocol must be recorded.

- Keep records of feed mixing, sequencing and calibration of equipment. If feed mixing follows a fixed protocol, that protocol must be clearly documented. Indicate in your protocol the location where records are kept. (On-Farm Quality Assessment Form question #11)
- Staff responsible for mixing feed must be properly trained and understand the farm's protocols for handling, mixing, storing and delivery of feed and feed ingredients (On-Farm Quality Assessment Form question #11)
- Feed mills must be calibrated at least once per year according to manufacturer's directions. Record calibration either on the Feed Mixing and Sequencing Record or on a record of your own design. (On-Farm Quality Assessment Form question #11)
- Be certain to follow all applicable provincial regulations if you are mixing feed on your farm.



- It is recommended that proportioner or volumetric mills be calibrated once per month or whenever a new grain shipment is being used. These mills operate on the assumption that every ingredient has a constant bulk density. If there is a change in grain being used or a new shipment of grain is being used, that bulk density may be different but the mill will still be set to add the same volume of ingredient. That same volume will not have the same weight if the bulk density has changed. (On-Farm Quality Assessment Form question #11)
- Feed mill scales must be tested for accuracy upon installation and at least once per year after that (On-Farm Quality Assessment Form question #11)
- Your mill equipment supplier or feed mill representative may be able to calibrate your mill for you or may be able to verify your calibration records. Check with them to see if this is among their services.
- Proper maintenance of equipment, including visual inspection and cleaning where possible will minimize the risk of cross-contamination by pathogenic organisms or medications.
- If adding ingredients by hand, consider making a list of ingredients for each ration and checking off each ingredient as it is added to help avoid adding the same ingredient twice or forgetting to add an ingredient (On-Farm Quality Assessment Form question #11)
- If adding ingredients by hand, you must have a system in place to accurately determine the weight or volume of each ingredient being added to the ration (On-Farm Quality Assessment Form question #11)
- Producers must visually inspect processing equipment and processed feed to verify that equipment is operating as required. (On-Farm Quality Assessment Form question #11)
- Proper sequencing of batches minimizes the risk of contaminating non-medicated feeds with medications from other rations. (On-Farm Quality Assessment Form question #11)

- One source of cross-contamination is electrostatic charge which causes medication to cling to the inside of the mill
- Medicated feed remaining in the mill or in auger or blower pipes may also contaminate non-medicated feeds. For example, a vertical screw mixer may contain 20 kg of residual feed following discharge of feed
- You must sequence your feed to avoid mixing non-medicated finisher rations immediately following a medicated ration. If you do not have a set protocol for mixing feed on your farm, ensure that you check the Feed Mixing and Sequencing record prior to the beginning of mixing. If the last ration that was mixed was medicated and a finisher ration must be made, you must first either flush the mill or mix another ration.
- If you must mix a finisher ration following a medicated feed, flush your mill with grain first. If you choose to do this, be prepared to store the grain in an identified bin.
- If you mix rations for more than one species, don't forget to consider crosscontamination from other species. For example, you will risk contaminating layer or lactating dairy cow rations if you mix these following a medicated swine ration.
- Feed mixing and sequencing records must be reviewed at least annually by someone other than the personnel responsible for mixing feed on-farm (verification). Record this verification on the record sheet or a verification record of your own design. (On-Farm Quality Assessment Form question #11d)
- Written procedures for the processing and distribution of feedstuffs must be reviewed annually or at any time that equipment or management changes. (On-Farm Quality Assessment Form question #11d)
- Observe staff members with responsibilities related to handling feedstuffs at least once per year to ensure that they are carrying out tasks as described in the protocols. Make

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note of this observation as part of your verification record.

- In your protocols, identify the location where records are kept.
- Don't forget to record that these verification procedures have been carried out either by signing and dating the records themselves and indicating that the verification has been completed or, you may choose to create a separate verification record. If you create a separate record, remember that it must identify what was reviewed (i.e. a list of the records, observation of staff, etc.)
- Ensure that medicated feed ingredients are delivered to the proper location; inspect tags and delivery manifests upon receipt or within 48 hours and initial these documents to ensure that the correct product has been received.
- Create a plan to address any errors that may occur. This plan must include:
 - the identification of affected animals
 - how the feed in question should be handled
 - who this situation should be reported to and who should be contacted for consultation, if necessary
 - identification of the source of the error
 - a flush of the system, if necessary
 - a record of the incident and how it was corrected

(On-Farm Quality Assessment Form question #11d)

D5.3.2 Purchased Feeds

The purchase of complete feeds, premixes, supplements or other feed ingredients from commercial feed mills offers a different set of risks to be considered.

• Discuss with suppliers how they handle complete feed and feed ingredients to prevent contamination by pathogenic organisms, hazardous chemicals, medications and foreign materials. Determine whether they have a quality control program in place. This type of program may have been developed in-house or may be HACCP or ISO certification (On-Farm Quality Assessment Form question #6)

- It is highly recommended that you inspect a sample of delivered feed to ensure that you have received the correct feed (On-Farm Quality Assessment Form question #11)
- Be sure that all feed bins are clearly identified and provide that bin identifier to your feed mill (On-Farm Quality Assessment Form questions #7, 11)
- Producers must carefully check feed delivery slips and feed tags and initial within 48 hours of feed delivery (On-Farm Quality Assessment Form question #11)
- Confirm that feed has been delivered to the correct storage bin (On-Farm Quality Assessment Form question #11)
- It is recommended that you refuse to accept any bulk or bagged complete feed that comes without proper documentation
- Feed delivery slips must be maintained for at least one year (On-Farm Quality Assessment Form question #11)
- It is recommended that you draw a diagram of your facilities showing where your feed bins are located. Identify the bins on the diagram and provide it to your feed mill (On-Farm Quality Assessment Form questions #7, 11)
- Written procedures for the distribution of feedstuffs must be reviewed annually or at any time that equipment or management changes. (On-Farm Quality Assessment Form question #11)

D5.4 General

- If you are mixing medicated feed on your farm, you must be aware of the requirements set in place by the Canadian Food Inspection Agency related to this. These include, but are not limited to:
 - Master formulas (recipes) for rations must be kept for a period of two years from the last date of manufacture of a feed



- Daily production logs must be kept for a minimum of two years (Feed Mixing and Sequencing Record)
- Prescriptions for veterinary prescription feeds must be kept for one year
- You must have a current version of the Medicated Ingredients Brochure on your farm (<u>http://www.inspection.gc.ca/</u> <u>english/anima/feebet/mib/cmibe.shtml</u> for information on how to order)
- You must have a current version of the Feeds Act and Regulations (<u>http://laws.justice.gc.ca./en/F-9/</u> <u>index.html</u> for an online version)
- You must have a copy of the SOR 97-362 Regulations amending the Health of Animals regulations (<u>http://laws.justice.gc.ca./en/H-3.3/</u> <u>C.R.C.-c.296/129395.html#rid-129494</u>)
- Material Safety Data Sheets (MSDS) for medications must be available on the site
- All incoming medicating ingredients must have an approved DIN or are covered by an Emergency Drug Release and/or an authorization of Sale for Experimental Purpose
- The farm must have written procedures for the cleaning of equipment
- Create a list of rations that are used on your farm. For each medicated ration, you must indicate the name of the medication used, the number of kilograms of medication per 1000 kg of feed and the grams of active ingredient per tonne of feed and the with-drawal time. Ensure that all medications are being used according to label directions or, if applicable, according to prescription directions. (On-Farm Quality Assessment Form question #10)
 - If you are pulse medicating, be sure to identify those rations you are pulsing with medication as two different rations — one contains the medication and the other does not. You may identify the rations with different names or with number or letter

designations (e.g. grower ration A and grower ration B).

- If you are unsure of when a medicated feed was first fed or if you are suspicious the wrong animals were exposed to the wrong feed, withhold them from slaughter pending the advice of your veterinarian (On-Farm Quality Assessment Form question #11)
- Whether mixing feed on farm or having complete rations delivered from a commercial feed mill, ensure that your delivery system is set up to deliver the correct ration to the correct animals. If your delivery system needs to be adjusted to ensure that the correct feed is directed to the correct animals, write out the protocols for doing this and ensure that pipes, switches, attachments, etc. are properly identified (On-Farm Quality Assessment Form question #7)
- It is recommended that you keep samples of incoming feeds and ingredients. If you choose to do this, it is recommended that you keep samples for a period of at least 6 months. (On-Farm Quality Assessment Form question #6)
- Store bagged medicated premixes separately from non-medicated premixes
- Do not store any chemicals such as fertilizers or insecticides in the feed storage area (On-Farm Quality Assessment Form question #5b)
- It is strongly recommended that feed bins and carts are covered to minimize the risk that cats, birds or rodents can access these (On-Farm Quality Assessment Form questions #5a, 30)

D5.5 Edible Residual Materials

Feed represents a significant input cost for hog producers. To defray some of these costs, producers may chose to feed edible residual materials (ERM).

Edible residual materials are those products that remain after, or are not used during the



processing, manufacturing, preparing, serving or sale of food. This refers to bakery waste, certain restaurant waste (not including meat or products that may have come into contact with raw meat products), cull french fries, potato chips or potatoes from a processing plant, dairy waste or any other waste edible material left over from any type of food processing. Tallow from a licensed rendering plant does not fall into this category as it has been processed according to strict guidelines.

Meat, meat products or any material that may have come into contact with raw meat may not be fed as edible residual material in Canada due to disease risk concerns.

Be aware that although *Trichinella*, the main biological hazard associated with ERM has been eliminated as a concern through the elimination of feeding waste meat products, biological hazards such as *Salmonella* may still be a concern. If you choose to feed ERM, ensure that you obtain it from a reputable supplier and follow handling procedures appropriate to the product. For more information on the proper handling of ERM, contact your regional CFIA veterinarian.

Producers who wish to feed ERM must have a permit from the Canadian Food Inspection Agency (CFIA) to do so. These permits are issued by the CFIA Regional Veterinarians. They are issued annually and must be in place if you are feeding ERM. Farms being validated for the CQA[®] program that are feeding ERM will be asked to produce this permit (CQA On-Farm Quality Assessment Form question #8).

D5.6 Feed Storage and Distribution

• Feedstuffs should be stored in such a way as to protect them from moisture and contamination from animals and birds or their feces.

- Feedstuffs must be stored separately from farm chemicals.
- Feed storage bins, blower pipes, augers and connectors must be regularly maintained to minimize the risk of cross-contamination from previously stored or distributed feeds or feed ingredients.
- Written protocols for the distribution of feedstuffs must be reviewed annually by an individual other than the person normally responsible for feed distribution (On-Farm Quality Assessment Form question #11d)
- Create a plan to follow in the event that something goes wrong in the distribution of feedstuffs. This plan must include:
 - the people who need to be notified of the error (management, consultants)
 - how the affected feed will be handled
 - how the affected animals will be identified and handled
 - where the error and steps taken to correct it must be recorded

Animal Nutrition Association of Canada. 1997. Good Manufacturing Practices for the Canadian Feed Industry. Animal Nutrition Association of Canada, Ottawa.

Canadian Food Inspection Agency. 2001. On Farm Feed Mill Inspection. Canadian Food Inspection Agency, Ottawa.

Cromwell, G., J. McKean. 1996. Feed Management to Prevent Drug Residue Problems in Pork. Pork Industry Handbook #86. Pork Industry Handbook, Purdue University Cooperative Extension Service, West Lafayette, Indiana.

Johnston, L., M. Hogberg, D. Mahan. 1994. Feed Processing for Swine. Pork Industry Handbook #71. Pork Industry Handbook, Purdue University Cooperative Extension Service, West Lafayette, Indiana.



D6. Biosecurity

D6.1 Introduction

In the pig industry, biosecurity has become a comprehensive term that encompasses such things as isolation, use of protective clothing, decontamination and restrictions placed on the movement of personnel and equipment.

More generally, biosecurity refers to measures used to protect a herd against the introduction or spread of disease. From a food safety viewpoint, producers can use the same protocols they used in the past to reduce the risk of introducing diseases like Swine Dysentery.

Disease can be spread by carriers such as vehicles, boots, tools and farm equipment. This is referred to as mechanical transfer. We know that one gram (1/30 of an ounce) of feces can be enough to infect thousands of pigs with Swine Dysentery.

Incoming pigs pose the greatest risk to pig populations. Entry precautions help to minimize this risk. In pig operations that purchase animals from an outside source, health status compatibility should be determined. Where the compatibility of health status is unknown, quarantine of new arrivals with sentinel pigs is recommended as a safeguard.

Dogs, cats, rodents, birds, flies and people may be either actively infected carriers and/or mechanical carriers.

We know that rodents can actively shed Salmonellosis, Erysipelas and Collibacillosis. Cats may also introduce *Salmonella* into your herd. Dogs have been shown to carry the Transmissible Gastroenteritis (TGE) virus. Cats present a Toxoplasmosis risk because they shed the eggs of this parasite for several weeks after first exposure. Starlings have been identified as carriers of TGE and Swine Dysentery. Visitors and barn workers have the potential to carry the parainfluenza virus and the pneumonia-causing bacteria, *Pasteurella multocida*, in their nasal passages. The mite that causes Swine Mange can survive up to three weeks in humans suffering from Pig Handler's Itch. Feces from tapeworm-carrying humans contains an infective life stage belonging to this parasite that causes infective cysts to develop in the muscle of pigs that ingest them.

Most biosecurity programs recommend a single entrance to the main barn, that is equipped with a locked door and a doorbell, to protect against risks posed by uninvited visitors.

Humans can be mechanical vectors, spreading diseases by failing to wash their hands after handling dead or dying pigs. They can also track disease-causing microbes from one area to another on their boots, if they don't use boot baths.

Certain viruses can remain airborne over several kilometres. Not much can be done about that, but some risks can be eliminated. Flies can travel up to one and a half kilometres between farms. Rats tend to move between farms more readily than mice. Knowing the proximity to neighbours and what protocols they follow may prompt some pig producers to develop more diligent safeguards. Perimeter fences, signs, weed-free margins around buildings and screening on windows and eaves are some of the things biosecurity experts recommend.

• It is recommended that you wear barn boots only in the barn. If you must wear your barn boots outside of the barn, it is recommended that you make every attempt to not wear them off of your farm. Be aware, though, that even by wearing your barn boots around your own



farm, you may risk cross-contamination and the introduction of microbes to your swine herd. (On-Farm Quality Assessment Form question 27)

- It is recommended that you supply visitors with clean boots and coveralls to wear during their visit and require them to wash their hands before entry. You may also want to consider providing masks for visitors. (On-Farm Quality Assessment Form question 26)
- It is recommended that you require all personnel to use properly maintained boot baths, or to change their boots as they move from one area to another within the barn. (See also Sanitation and Building Design Section)
- It is recommended that vehicles that go from farm to farm should not get too near your barn. Use signs, perimeter fences and barriers to re-direct them
- Be aware of quality control programs that may be used by feed suppliers. Ensure that suppliers have protocols in place for the proper storage and handling of complete feed and feed ingredients, to avoid contamination of feedstuffs by pathogenic organisms or the feces of animals.
- Be aware of the health status of incoming animals and plan entry protocols accordingly. (On-Farm Quality Assessment Form question #26) (See also Purchasing Section)
- Remove dead stock promptly, to minimize the risk of contamination of live animals and facilities with biological and chemical residues that may be present in the carcass. Dispose of the carcasses according to provincial regulations and guidelines. Animals with chemical residues need to be handled appropriately. Contact your veterinarian, renderer, or your provincial department of agriculture or environment for more information.
- It is recommended that cats be kept out of the barn, especially feed bins and feed carts. Cats, especially kittens, can carry and shed microorganisms such as *Toxoplasma* that pose food safety concerns. If you use cats as part of

your rodent control program, you are encouraged to keep them in the barn, have them neutered and limit their access to feed storage areas, bins and feeders and pig pens. If cats are kept outside of the barn, make sure that they stay out of the barn, through proper maintenance of the facilities. Likewise, dogs should be kept out of production facilities. (On-Farm Quality Assessment Form question #29).

- Screens are an option to consider to prevent birds from accessing the production area and feed bins. Covering feed bins for animals housed in hoop structures, pole barns or similar facilities will also help to deter the presence of birds.
- Initiate and continue intensive rodent control measures. (On-Farm Quality Assessment Form question #28)

D6.2 Rodent Control

(On-Farm Quality Assessment Form question #28)

- Don't wait until you see signs of rodents to initiate a rodent control program. By the time that you see droppings, tracks or rodents, you already have a problem.
- Evaluate your facilities to identify sources of entry and food for rodents. Rats can squeeze through holes as small as 1.5 cm and mice through openings of 0.6 cm or less. Steel wool, packed tightly into openings, can act as a good temporary plug.
- Close off openings around augers, pipes and wires where they enter structures. Mortar, masonry or metal collars are effective options for this purpose.
- Check outside walls, doors and windows for space that rodents might use to enter your barn.
- Eliminate any trash, equipment, hay, straw or other objects that may be found around the outside of your barn and near the walls.



These provide an attractive area for rodents to hide in and gain access to barns.

- Consider using a gravel perimeter around the barn. Perimeters of at least 90 cm are recommended.
- Keep grass and weeds trimmed around the barn. It is recommended that you never allow grass to grow higher than 20 cm.
- Sweep up any spilled feed around mills and storage bins.
- Use several locations for placement of traps or bait stations. Place these in areas where rodents or signs of rodents have been seen.
- Traps are effective in controlling small rodent populations. They also offer the advantage of not requiring poisons, allowing an evaluation of their effectiveness and the removal of dead animals.
- You may wish to bait traps, but not set them, until the bait has been taken at least once. This will reduce the chance of creating "trap-shy" rodents.
- Check traps and bait stations regularly, refill bait and remove any dead rodents. Dispose of the rodents outside of your production facilities. The frequency of these inspections will depend on the manufacturer's recommendations for your baits and the severity of rodent infestation.
- Mice and rats prefer to travel along walls and edges. Baits and traps should be positioned accordingly. While mice are very curious and will investigate new objects quickly, rats are less adventurous and it may be several days after placement of a trap or bait station before there is evidence of activity.
- Question #28 of the On-Farm Quality Assessment Form requires that you describe your rodent control program. Include all of the steps that you have taken to help reduce or eliminate the rodent population at your facilities. Remember to include a description of trap and bait station locations, types of baits/ poisons being used and frequency of inspection. If a pest control company is used, indi-

cate the name and contact information, as well as the name(s) of the product(s) used.

- Keep rodenticides out of the reach of pigs. If accidental exposure does occur, producers must record the exposure and seek guidance from their veterinarian or other qualified consultant to address withdrawal times and any other potential health concerns.
- Producers should monitor bait consumption. Increased bait consumption may indicate an increased or increasing rodent population.

D6.3 Bird Control

- Birds can be physically separated from production and feed storage areas with plastic or nylon netting, hardware cloth or other building materials. Holes in these materials should be no larger than 2 cm.
- Roosting and nesting areas can be eliminated, or made less appealing, by placing a wooden, plastic or plexiglass covering over ledges at a 45° angle, or by making the area unappealing with rough (e.g. wires, staples, nails), sticky or other uncomfortable surfaces.
- Open feeders, bins and carts should be covered.
- Spilled feed should be cleaned up immediately.
- Reduce access to water for birds. Where standing water is maintained in a trough, make sure that it is deep enough that birds cannot stand in it.
- Avoid the use of noise-making devices, as these may disturb your livestock.

D6.4 Fly Control

- The first step in the control of flies and other insects is proper sanitation. Places that can be used for fly reproduction include wet areas, manure, old bedding and areas where feed has been spilled and not cleaned up.
- Keep insecticides out of the access of pigs. If accidental exposure does occur, producers



must record the exposure and seek guidance from their veterinarian or other qualified consultant to address withdrawal times and any potential health concerns.

- Old bales that have been stacked may be wet at the bottom and may provide a breeding ground for flies.
- If manure lagoons are not agitated, a crust will form and flies may breed in that crust.
- Piles of solid manure may be covered with a black tarp to raise temperatures high enough to kill eggs and larvae.
- If possible, set fly traps where insecticide or fly paper is placed inside of an old bleach-style bottle that has had a hole cut in the side, or a similar type of trap. Flies that die in this trap should be disposed of in a trash bin. Female flies may still contain viable eggs, even after death. If flies are swept into the manure pit, these eggs may have an opportunity to hatch. Talk to a pest control company or an entomologist at your provincial department of agriculture for more information.
- Always read pesticide labels carefully, and use only as directed.

Campbell, J., R. Williams, R. Moon. 1989. A Guide for Fly Control Around Swine Facilities. Pork Industry Handbook. Purdue University Cooperative Extension Service, West Lafayette, Indiana.

Du, W. 2002. Controlling Rats and Mice Around Swine Barns. Ontario Ministry of Agriculture and Food. Guelph, Canada

Glahn, J.F., R.J. Johnson, L.E. Germer. 1995. Bird Management at Swine Facilities. Pork Industry Handbook. Purdue University Cooperative Extension Service, West Lafayette, Indiana.

Quessy, S. 2001. L'ABC d'un programme de lutte aux rongeurs. Porc Québec Vol 12, No. 2, juin 2001. Fédération des producteurs de porcs de Québec.

Timm, R.M., R.E. Marsh, S.E. Hygnstrom, R.M. Corrigan. 1997. Controlling Rats and Mice in Swine Facilities. Pork Industry Handbook. Purdue University Cooperative Extension Service, West Lafayette, Indiana.



D7. Water

Water is involved in virtually every physiological process in swine production. It helps move food along the intestinal tract, transports digested nutrients and is a carrier in waste elimination.

When it comes to water, both quality and quantity matter. Recommended quantities are given in the *Recommended Code of Practice for the Care and Handling of Farm Animals Pigs*. Water quality is determined from analysis. Bacterial analysis can provide measures like coliform counts. Experience has shown that counts over 1/100 ml are capable of causing scours in young pigs. Water chlorination will effectively reduce coliform counts, but finding an elevated count or high nitrate level may indicate a problem with surface drainage, which may, in turn require a change in management practices.

A chemical analysis can be used to determine the levels of various minerals present in a water sample. The Canadian Task Force on Water Quality established the water quality guidelines that are shown in the table below.

Total dissolved solids (TDS) or the filterable residue, is the main indicator of water quality. Water with a TDS of less than 1000 mg/L is acceptable for all ages of pig. Water with a TDS over 7000 mg/L can cause serious health problems and promote water refusal. Levels over 10000 mg/L are unfit for animal consumption.

Nitrates can act as an indicator for bacterial contamination of water. If nitrate levels in your water are elevated, you may want to consider sending a water sample for bacterial testing. Pigs are more resistant to nitrates than other animals, however, and levels must exceed 750 mg/L to cause decreases in average daily gain in growing pigs.

Canadian Water Quality Guidelines for Livestock

Item	Maximum Recommended Limit (mg/L)		
Major lons			
Calcium	1000.0		
Nitrate and Nitrite	100.0		
Nitrite alone	10.0		
Sulphate	1000.0		
Total Dissolved Solids	3000.0		



Canadian Water Quality Guidelines for Livestock

Item	Maximum Recommended Limit (mg/L)		
Heavy Metals and Trace Ions			
Aluminum	5.0		
Arsenic	0.5*		
Beryllium	0.1**		
Boron	5.0		
Cadmium	0.02		
Chromium	1.0		
Cobalt	1.0		
Copper	5.0		
Fluoride	2.0***		
Lead	0.1		
Mercury	0.003		
Molybdenum	0.5		
Nickel	1.0		
Selenium	0.05		
Uranium	0.01		
Zinc	50.0		

Source: Task Source on Water Quality Guidelines, 1987

- * 5.0 if not added to feed
- ** Tentative Guidelines
- *** 1.0 if fluoride present in feed
- Producers are encouraged to test their water annually, but this is not currently a requirement of the CQA[®] program (On-Farm Quality Assessment Form question #3)
- If Total Dissolved Solids or nitrate levels are elevated, producers are encouraged to have follow-up tests conducted, to check for bacterial contamination.
- Remember that pesticides and heavy metals can also be a concern in water.

Dupchak, Karen. 1999. Evaluating Water Quality for Livestock. Manitoba Agriculture and Food, Winnipeg, Manitoba.



D8. Shipping, Marketing and Transport

Three issues are important in this area. Firstly, studies have shown that urine and feces from treated pigs can contain enough antibiotic residue that, if ingested, can cause a violative level of residue in market hogs. Secondly, research has shown that there is a relationship between gut fill and risk of spillage leading to contamination of carcasses at the processing plant. Thirdly, handling, mixing and transport of pigs causes stress that may cause the animals to shed bacteria, including *Salmonella*. Noncontaminated animals may become contaminated through exposure to other animals, their feces or contaminated vehicles.

- Remember that transportation concerns apply to movement of animals during production as well as transport from the finishing barn to the assembly yard and processor.
- When sorting and selecting animals to be shipped, whether for further production at another site or to slaughter, review all pertinent treatment records and verify animal identification. Where animals are being shipped for further production, send an Outgoing Pig Treatment record with the shipment that details outstanding withdrawal times and any physical hazards such as broken needle fragments. Include any individual animal identification information, if applicable. Where animals are being shipped to slaughter, withhold any animals with outstanding withdrawal times and notify your packer and/or delivery agent that an animal with a suspected broken needle fragment is in the lot. Ensure that suspect animals are identified according to the requirements in your province or for your specific packer and provide that animal identification information when you report these animals prior to shipping. (On-Farm Quality Assessment Form questions #11c, 14, 20b, 20c, 22b)

- It is strongly recommended that you notify your marketing board and/or packer prior to shipping suspect broken needle animals from your farm. This step will decrease the chance of complications or confusion as each packer may have different requirements for identification and notification.
- Avoid using the same trucks to transport hogs and other commodities. Pigs may be exposed to fertilizers, pesticides, medicated feeds or other chemicals that could cause residues. Likewise, manure may contaminate other products that may be transported when you use a truck for transporting varying commodities. (On-Farm Quality Assessment Form question #4)
- Be aware of the possibility of cross-contamination when you use the same truck to transport hogs as well as other commodities. Spilled medicated feed or premix, pesticides or fertilizers should be swept up immediately. Also keep in mind that any manure left in a truck could contaminate feed, feed ingredients or bedding transported in the same truck as animals.
- Trucks should be washed and disinfected, weather permitting, following each shipment of pigs. Bacteria, including *Salmonella*, may have been shed by animals previously transported in these vehicles. The bacterial contamination could contaminate the next animals to be transported.
- Limit the mixing of pigs prior to shipping. Mixing increases stress as well as the potential for shedding bacteria such as *Salmonella*.
- It is recommended that you work with your marketing agency or processor to determine the most appropriate pre-slaughter management practices (transport, testing time, feed withdrawal).

*



- A commonly recommended time period for feed withdrawal is 12-18 hours. This time period begins at the time the feed is removed and ends at the time of slaughter. Discuss with your marketing agency or processor representative what their recommendations are for your farm, based on distance from the abattoir and the expected lairage time after the arrival of the pigs.
- Refer to the *Recommended Code of Practice for the Care and Handling of Farm Animals* **Pigs** for more information on this topic.



D9. Personnel Training

D9.1 Introduction

The four primary staff motivators are achievement, growth, recognition and responsibility. The quality assurance program provides equal opportunity for owners/operators and employees to document what they really do. For many individuals, this may represent the first time they actually have something in writing that outlines their particular responsibility.

The monitoring and records that go along with this program should make it easier to recognize achievement. Given that learning is part of growth, this program will encourage the industry — producers, feed manufacturers, researchers and processors alike — to work together to accumulate new knowledge and techniques that ensure the safety of pork products.

The first question on the Assessment Form asks that each person and their responsibility be listed. When delegating responsibility, most producers will assess the skills that are needed, the amount of training and experience necessary and the amount of authority each employee will have. During the training process, it is important that all barn personnel fully understand the importance and responsibility that goes with their job. Delegating an important activity does not relieve the producer of responsibility if the employee is not adequately trained.

A well designed training program will help to ensure that all your employees understand basic barn policies that contribute to safe production of pork, and will provide extra training for those employees whose responsibilities include critical areas of production (ie: medications, needle usage, sanitation). Training programs should include the types of hazards that may be found in the unit, how they affect food safety, critical limits for each hazard, monitoring procedures in the unit, deviation procedures and records related to each hazard. Your employees should also be made aware of the consequences should a hazard fall out of control.

How employees are trained will vary from unit to unit as well as between employees. It is important to keep in mind that everyone learns differently, and at a different pace. Not all employees may be able to read, for example. A trainer that understands and appreciates diverse approaches to learning will be prepared to cross learning gaps and provide more complete training. Therefore, a flexible training program that allows your employees to learn at their own pace is most desirable.

It is recommended that a checklist be used to help trainers ensure that all responsibilities of each new employee are covered thoroughly. To that end, a sample checklist has been supplied at the end of this section. It is also recommended that both the trainer and the employee sign off on the checklist at the completion of each task. The manager should review the checklist routinely to ensure tasks are being completed. Depending on the task required, employees may be considered to have completed adequate training when able to describe and/or demonstrate the steps as defined in the On Farm Assessment Form to the satisfaction of the manger or staff trainer.

It is strongly recommended that managers set aside time for each new employee to discuss unit policies, protocols as well as the importance of the CQA[®] program at the beginning of employment. As well, managers or an appointed senior



staff member should spend time in the unit with new staff members, directly supervising them through their training period. Care should be taken to ensure that each new employee is able to complete designated tasks according to policy or protocol before allowing them to work unsupervised.

• For employees responsible for tasks identified as food safety risk areas (CCPs), management must ensure that employees are thoroughly trained in all aspects of the task before they are allowed to work unsupervised.

D9.1.2 General

- It is strongly recommended that producers consult with a swine veterinarian or swine specialist to help develop a plan or training program for all employees, especially where medications or other farm chemicals are used.
- All personnel must know what chemicals and medications are used in their production area and where, when and how they are used. More information is available in the sections entitled: Medicated Feed Mixing, Medical Supplies: Use and Storage and Sanitation and Building Design.
- All personnel must be made aware of potential hazards posed by foreign objects in feedstuffs and bedding materials.
- It is strongly recommended that major areas related to animal welfare and the environment be incorporated, where possible, into employee training programs.

D9.2 Areas of Coverage

Training programs should be developed to fit each unit. However, there are some common aspects that will appear in any training program:

D9.2.1 General Hygiene Training:

- Trainers should ensure that all new employees understand the importance of good personal hygiene as it impacts food safety. For example, employees may carry germs or disease into the unit.
- Trainers should ensure that new employees understand that they are not only handling an animal, they are handling a food product. Care should be taken to maintain cleanliness of the animal and its environment.
- Personnel responsible for sanitation will need to be appropriately trained to understand the principles and methods required for effective cleaning and sanitizing.
- Training programs should also include additional training concerning specific unit protocols that may affect food safety.

D9.2.2 Technical Training:

Training programs should be appropriate for the complexity of the processes or tasks that each employee is responsible for. In some cases, having a new employee read and answer questions about barn protocols may be appropriate. In other cases, a "show and tell" type of demonstration may be more effective.

Training programs should be designed to address all aspects of a set task. While the steps involved in completing the task are essential, a good training program will also include critical limits, how the task will be monitored and what action will be taken if critical limits are not met. As well, they should be made aware of any necessary records associated with the task.

Personnel involved in maintenance and/or calibration of equipment that will affect food safety (for example, a mill used in the mixing



of medicated feed) must be appropriately trained to perform these functions. Part of their specific training program must include how to identify deficiencies that could affect food safety and the appropriate corrective actions to take.

D9.2.3 General

- Allow employees to read material and ask questions related to a task.
- Discuss with each new employee all tasks they will be responsible for. Asking questions will help ensure they understand what is expected of them.
- Use "show and tell" to demonstrate specific tasks.
- Allow your employees to attempt technical tasks under trainer supervision. Correct where necessary.
- It is recommended that employees be allowed to voluntarily undertake a "quiz" to demonstrate their understanding.
- It is strongly recommended that completion of training be recognized in writing. The use of certificates or letters of completion help reinforce learning.

D9.3 Training Specifics

In some units, certain personnel will be responsible for critical tasks. In these cases, it is important that the unit manager provides a more detailed training program. Depending on the time constraints of your trainer and the capabilities of a particular employee, training may consist of a reading component and a "showing" component, where the trainer will demonstrate the task for the new employee.

D9.3.1 Areas to Consider In Detail

D9.3.1.1 Feed Handling

- Training programs for personnel responsible for receiving, mixing or distributing feed must include the reading of the Feed Handling module in the CQA[®] Producer Manual, as well as a review of the rations fed on farm and their medications.
- Detailed demonstrations on the operation of the mill and any equipment for the measurement of feed medications must be included.
- New employees responsible for feed mixing must operate the mill under supervision during their training period and be corrected when necessary.
- Ensure that staff responsible for the mixing or distribution of medicated feed demonstrate their ability to read medication labels and/or prescriptions regarding the mixing of medicated feed.
- Staff responsible for the mixing of medicated feed must be able to legibly fill out Feed Mixing and Sequencing Records and to recognize when an error has been made. They must also be trained in, or have access to, protocols that deal with errors.
- All staff involved in the mixing or distribution of medicated feed must be adequately trained in the use of medications. This training program must ensure that staff understand their responsibility, as well as the risks of not using medications properly.

D9.3.1.2 Administering Medications

• Training programs for personnel responsible for recognizing and treating ill or injured animals will include reading the Medical Supplies: Use and Storage module in the CQA[®] Producer Manual, as well as a review of the Medication and Vaccine Usage Plan, associated treatment protocols and veterinary instruction.



- Detailed demonstrations on correct injection technique, preferably by the herd veterinarian, must be included. Your new employee should be observed by your veterinarian or trainer, to ensure correct technique.
- Ensure that staff responsible for the administration of medication have demonstrated the ability to read medication labels and/or written directions regarding the administration of medications.
- Staff responsible for the administration of medications must be adequately trained to weigh, if possible, livestock receiving an injection, and should be able to accurately calculate doses in order to avoid medication residues.
- All staff involved in the administration of medications must be adequately trained in the use of medications. Your training program must ensure that staff understand their responsibility and the risks of not using medications properly.
- Staff responsible for the administration of injectable medications must be made aware of the unit policy regarding the avoidance of broken needles and abscesses. This can be accomplished either by having new staff read the section of the On Farm Assessment Form dealing with injections and/or by discussion with and demonstration by your unit manager or trainer.
- Staff responsible for the mixing and administration of water medications must be trained to properly operate and calibrate water medicators, to ensure correct dosages. Supervised operation of the medicator, correcting the employee where necessary, is strongly recommended on the first attempt.
- Staff responsible for the administration of medications must be able to legibly fill out treatment records and to recognize when an error has been made. They should be trained in, or have access to, protocols to deal with errors.

D9.3.1.3 Shipping

- Training programs for personnel responsible for the shipping and marketing of animals should include reading of the Animal Handling and Medical Supplies: Use and Storage modules in the CQA® Producer Manual, as well as a review of the Medication and Vaccine Usage and associated treatment protocols and veterinary instruction.
- Training for shipping staff must include how to identify treated animals and read treatment records, to ensure that no animals with residue are marketed for food.

D9.3.1.4 Sanitation

- Training programs for personnel responsible for pen and barn sanitation should include reading of the Sanitation and Building Design module in the CQA[®] Producer Manual, as well as the sanitation protocol for the unit.
- Personnel responsible for unit sanitation should be adequately trained in the use of sanitation equipment (ie: pressure washers, backpack sprayers, etc.) as well as proper handling and use of chemicals used in disinfection.

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Big Sky Farms. 2000. Big Sky Farms Inc. Canadian Quality Assurance Training Manual.

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Task Number	Description	Completed (Initials)
1.	Employee has read and/or discussed unit policy on hygiene	
2.	Employee has read and/or discussed unit sanitation protocol	
3.	Employee responsible for mixing of medicated feed has read and/or discussed Medicated Feed Mixing module of Producer Manual.	
4.	Employee responsible for mixing of medicated feed has read and/or discussed sequencing protocol for the unit.	
5.	Employee responsible for mixing of medicated feed has read and/or discussed Rations Used on Farm form.	
6.	Employee responsible for mixing of medicated feed has demonstrated ability to correctly read labels/prescriptions for medications.	
7.	Employee responsible for mixing of medicated feed has demonstrated correct operation of the milling equipment.	
8.	Employee responsible for mixing of medicated feed has demonstrated ability to fill out associated records.	
9.	Employee responsible for administering of medications has read and/or discussed Medical Supplies: Use and Storage module of the Producer Manual.	
10.	Employee responsible for administering of medications has demon- strated ability to read labels/veterinary instructions regarding medica- tion use.	
11.	Employee responsible for administering of medications has demon- strated ability weigh animals and accurately calculate dosages.	
12.	Employee responsible for administering of medications has demon- strated proper injection technique.	
13.	Employee responsible for administering of medications has read and/or discussed unit policy for broken needles.	
14.	Employee responsible for administering of water medications has demonstrated ability to calibrate and/or set water medicating equipment.	
15.	Employee responsible for administering of medications has demon- strated ability to fill out associated records.	
16.	Employee responsible for shipping or market hogs/cull breeding stock has read and/or discussed Medical Supplies: Use and Storage module of Producer Manual.	



Task Number	Description	Completed (Initials)
17.	Employee responsible for shipping or market hogs/cull breeding stock has demonstrated ability to identify animals that have been treated.	
18.	Employee responsible for shipping of market hogs/cull breeding stock has demonstrated ability to review records and identify animals requir- ing additional withdrawal times.	
19.	Employee responsible for sanitation has read and/or discussed Sanitation and Building Design module of Producer Manual.	
20.	Employee responsible for sanitation has read and/or discussed unit sanitation protocol	
21.	Employee responsible for sanitation has demonstrated ability to oper- ate and/or calibrate equipment used in unit sanitation.	
22.	Employee responsible for sanitation has demonstrated safe handling of chemicals associated with unit sanitation.	



D10. Deviation and Notification

What would you do if something went wrong?

Some producers may go a lifetime without needing to address a drug residue or a broken needle. Part of the design of the CQA[®] program, however, asks producers to think about what they would do if something did go wrong in their production unit. Throughout the On-Farm Quality Assessment Form, you will find the question "What would you do if something went wrong?" repeated.

To answer this question, producers must consider how they would address any of the identified hazards, if their protocols fail to prevent them. In HACCP plans, this is referred to as a *deviation*. The CQA[®] program also refers to actions that you take when something goes wrong as a deviation procedure. Though protocols are put in place to minimize the risk of the occurrence of a hazard, there is no guarantee that the hazard will never occur.

When developing your protocols, bear in mind that you are required to keep a record of any deviations. Whatever you do to address this thing that has gone wrong is referred to as a corrective action. No matter what words are used to describe it, the answer to "What would you do if something went wrong?" provides your farm with a plan to quickly address an issue (deviation) that could impact food safety and fix it (corrective action). Both deviations and corrective actions can be recorded in the record that relates to the deviation (Pen or Individual Treatment Record for deviations related to treatments, including broken needles; Feed Mixing and Sequencing Record for feed related deviations, etc.) or you may record them in a separate form that you have created specifically for deviations and corrective actions.

When considering how you will answer the question, "What would you do if something went wrong?", you must first consider your deviation procedure. What steps will you take to determine what it was that went wrong? How will you correct it? You must be prepared to address these issues before any affected animals leave your farm. You must also be prepared to address mistakes in the event that animals have already been shipped.

The CQA[®] program, and all other on-farm food safety programs in Canada, are based on the Food Safety Enhancement Program (FSEP) used by the Canadian Food Inspection Agency. FSEP is the program used by CFIA to assist food processing plants in the development of their own HACCP plans. Under FSEP, this section is referred to as "Recalls". In our industry, we refer to *notification* because it will probably not be possible to "recall" hogs once they have left the farm. As part of your corrective action, you must consider who you will talk to in order to solve a problem as well as who you will call to notify that animals may have been shipped with a violative residue or a broken needle.

In each case where this question appears, producers must first consider what could go wrong and then develop a contingency plan if that situation actually happened. Presented below are various points to consider when working on your contingency plans. This is not a comprehensive list, but is provided to assist in developing your protocols.

- What records would you keep?
 - Deviation records?
 - Corrective action records?
 - Communication records?



- What could go wrong in this situation?
 - Wrong feed to wrong animals?
 - Wrong medication to wrong animals? Incorrect dose?
 - Broken needle?
 - Loss of identification of treated pig?
 - Positive sulfamethazine test?
 - Shipment of a treated animal?
- What records would you examine?
 - Feed mixing and sequencing records?
 - Individual or Pen Treatment Records?
 - Incoming Treatment Records?
- How could you correct the situation?
 - Withdraw feed?
 - Identify animals? How?
- How would you determine the length of time that animals may need to be held back?

- How would you identify the affected animals?
 - Identify individuals? Pens? Rooms?
 - Tags? Livestock marker?
- Who would you call?
 - Provincial coordinator?
 - Veterinarian?
 - Feed mill?
 - Consultant?
 - Hog assembler?
 - Slaughter plant?
- Whenever you address a deviation, make a record of the error and how it was corrected in the Corrective Action Form or a similar form of your own design. Indicate in your protocols the location where this record is kept.

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