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## RESIDUE AVOIDANCE PROGRAM-INJECTION TECHNIQUES FOR SWINE

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REVISED:

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Modern health practices in swine production require numerous injections or "shots." These injections provide pigs with iron compounds, antibiotics, vaccines, bacterins, hormones, anti-inflammatory drugs, vitamins, anesthetics, and replacement fluid products.

### Routes of Administration

Every product has a specific and approved route[s] of administration that gives maximum results with minimum problems. Recommended routes are specified on the label. Read the label carefully if you have any questions about the route of administration, amounts to be used, or other precautions.

There are four routes of administration: **[1]** subcutaneous [SQ], just below or beneath the skin; **[2]** intramuscular [IM], into a muscle; **[3]** intraperitoneal [IP], within the abdominal cavity; and **[4]** intravenous [IV].

#### Subcutaneous.

This route of administration is often used in baby pigs still nursing the sow. A readily available site with loose skin is just inside the flank along the abdominal wall [figures 1-4].

Restraining the pig is easy. When held up by its back leg, the injection site will be exposed inside the rear leg. Using this site avoids damage to muscles and nerves. To avoid leakage from the injection site, slide the needle under the skin away from the site of skin puncture before depositing the drug. A major advantage of SQ administration is that relatively large quantities of drug, fluids, etc., can be given under the skin without fear of causing pressure damage.

#### Intramuscular.

This is the most commonly recommended injection site. Drugs given IM are generally absorbed into the blood faster than with SQ administration. To avoid leakage from the injection site, pull the skin forward slightly before inserting the needle. After the needle is inserted, release the skin, give the injection, and remove the needle. The skin will spring back into place, covering the hole in the muscle and sealing the injected material in the animal.

In young pigs, much damage can occur if injections are not done properly. Depositing irritating drugs near the sciatic nerve which runs next to the bone in the rear leg may result in lameness and, in some cases, loss of the leg. Selecting clean sites for injections will reduce chances of abscesses. If abscesses form when injections are given into the ham or other muscles, they may destroy a valuable cut of meat. Therefore, the neck area is the preferred site of injection in all pigs [figures 5-7]. Injections should be given directly behind the ear on the side of the neck. Care must be taken not to inject the drug into fat because then the drugs will be poorly absorbed.

Needle length is dictated by the age of the animal. Although a 1/2-inch needle is appropriate for IM injection in baby pigs, it is totally unsatisfactory for heavy sows. The amount of fluid that can be safely

given in a muscle is also dictated by size. In baby pigs, 1 to 2 cc/site is enough. In sows, volumes of 5 to 10 cc/site may be given. If more must be given, divide the dosage into several locations. High dosages at one site can cause pressure damage to the muscles and retard drug absorption.

When giving IM injections, it is a good idea to draw back on the syringe after the needle is in the animal to make sure that the needle is not in a blood vessel. Some drugs, such as Procaine Penicillin G, can be fatal if injected directly into a blood vessel instead of a muscle.

#### Intraperitoneal.

This route of administration is generally avoided because several complications may occur. Abdominal organs may be punctured by the needle and injection of irritating drugs may cause peritonitis. Also, adhesions of organs to the abdominal wall or to each other may lead to reproductive problems later in life. IP injections should be given only with veterinary guidance and instruction.

#### Intravenous.

There are not many superficial veins that can be found easily in swine. Ear veins are the preferred site, but are difficult to hit. Therefore, this method is not used routinely. It is the most common route for anesthetic agent administration because the drug is rapidly transported to the sites of action.

#### Factors Affecting the Injection Technique

Several factors affect the particular method used for giving injections. These include: [1] age and size of pig, [2] restraint method, [3] product to be injected, [4] volume of the product to be injected, [5] viscosity or flow characteristics of the product, and [6] required administration route.

Small pigs are easily restrained and good restraint makes any injection easier. Because the muscles are smaller in young pigs, care must be taken to ensure proper IM injections. Larger pigs [greater than 50 pounds] and adult sows and boars are more difficult to restrain, but the potential injection sites are also larger.

The approved route of administration must be followed to avoid illegal residues. The volume and viscosity of the product influence the injection site and the selection of needle length and gauge [diameter]. Needle size is designated by its gauge and its length the higher the gauge number, the smaller the diameter of the needle. IM injections will usually require longer needles than SQ injections. When a product is very viscous or thick, common sense dictates choosing a large-diameter needle. However, select the smallest diameter practical [the largest gauge possible] which will allow rapid administration. This will minimize damage to the pig and cause less stress. Also, a smaller hole will reduce drug leakage from the injection site.

#### Injection Needle Selection

Many injection needle gauges (diameters) and lengths are available. In general, use the needle having the shortest shaft and the largest gauge [the smallest diameter] possible. As length increases, decrease the gauge to give added shaft strength which will reduce bent or broken needles.

Two general types of injection needles are available--reusable stainless steel [figure 8] and disposable nonironbased [figure 9]. Stainless steel needles are stronger than disposable needles, but are initially more expensive. With care, they can be reused many times. When the needle point becomes dull, it may be resharpened. Reusable needles may be more economical per injection than disposable needles. Disposable needles are cheaper initially, but break more easily and cannot be resharpened. Very few

pork producers change needles between each pig, so the advantage of being disposable is minimal except when there is a chance of spreading disease, For example, in herds where eperythrozoonosis is a known problem, it is important to change needles between each pig to prevent the spread of this blood-borne disease.

**Table 1. Millimeter Equivalentents for Inches.**

<b>Inches</b>	<b>Millimeters</b>
0.5	12.5
0.75	18.8
1.0	25.0
1.5	37.5
2.0	50.0
3.0	75.0
4.0	100.0
5.0	125.0

Needle lengths are still measured in inches, but with the impending change to the metric system, table 1 shows the metric equivalentents.

### Syringe Selection and Care

Several different types of syringes are available. Selecting the proper syringe will ensure a proper injection technique and minimize injection problems.

#### Disposable [plastic] syringes.

There are many sources of disposable syringes available, but with few exceptions, these syringes are similar in construction. The main differences are in the type of tip where the needle attaches. A tip located off center is intended primarily for IV injections. The two main types of tips are Leur slip and Leur lock [figure 10]. The slip type is designed so that the needle hub may be slipped onto the tip. Except for use in piglets, the lock-type syringe hub is preferred because it has the strongest attachment [figure 11]. The slip tip is easily bent and broken if animal movement occurs at the time of the injection [figure 12].

#### Nondisposable (reusable) syringes.

These syringes usually are made of combinations of glass, metal, plastic, and ceramic parts. The so-called automatic, or pistol grip multiple-dose syringe is the most popular style [figure 13]. Even though several different types of automatic syringes are available they are similar in action. These syringes have a dose adjusting mechanism that may be set for a 1- to 5-cc delivery with every squeeze of the trigger. This type of syringe requires constant maintenance because of its many moving parts, but offers the advantages of quick dose delivery and a preset volume adjustment. It is very convenient and time saving to have the dose volume preset, particularly when injecting large numbers of similar age pigs.

### Syringe Care.

Plastic disposable syringes may be cleaned and reused several times. Take particular care in cleaning and disinfecting automatic syringes. The best way to clean these is to disassemble the barrel and plunger and to wash them in warm, soapy water. After thorough cleaning, disinfect the parts and then rinse several times with clear, clean water to remove any traces of the disinfectant. This is particularly important if modified-live vaccines are used in the syringe because residual disinfectants could kill the vaccine components and render them ineffective. Boiling the syringe parts in water is another good way to disinfect. Take care not to overheat the plastic and rubber parts.

Store the cleaned syringe disassembled or assembled. If stored assembled, apply a small amount of light oil or glycerine to the rubber plunger to keep it lubricated and prevent it from sticking to the glass barrel. Provide a clean, dust-free storage place. Do not store a clean and disinfected syringe on a dirty shelf in the hog barn.

### Needle Placement

Most producers will give injections with the needle already attached to the syringe. However, certain situations may require placing the needle into the animal and then attaching the syringe. To do this more easily, use the slip type of syringe tip.

When using an automatic syringe with the needle attached, follow these steps:

1. Restrain the animal securely.
2. Select proper dosage on the syringe.
3. Locate the injection site, clean the site, and disinfect with alcohol, iodine, or other suitable disinfectant.
4. Make sure no air bubbles are present in the syringe.
5. Quickly and firmly insert needle into the animal.
6. Quickly deliver material (squeeze the trigger).
7. Keep the trigger depressed while removing the syringe and needle.
8. Release the syringe trigger and prepare for next injection.

Occasionally inspect the syringe and dose-setting to ensure that nothing is broken or has changed.

### Problems Associated with Injections

Failure to deliver the proper dose.

This may result because of animal movement (improper restraint]. Very few injectable materials work when applied on the pig; they must be injected into the pig! If the syringe is broken or not adjusted properly, too little or too much product may be injected. Also, be very careful not to inject yourself or your assistant. Serious injuries and infections have resulted from misdirected injections into the hands, arms, and legs of people.

### Drug reaction.

Just like people, individual pigs may be very sensitive to certain drugs. Read the product label, be aware of the potential problems, and be prepared to deal with them. Epinephrine, antihistamines, and cortisones should be a part of the medicine supply maintained by pork producers for their animals. Check with your veterinarian for information about how, when, and in what manner to use them.

Swelling and/or abscessation at the injection site.

Certain injectable products are more likely than others to cause swelling and/or abscesses at the injection site. Minimize these problems by cleaning the injection site. Do not inject areas that are wet and dirty. When using multiple-dose bottles, leave a needle in the vial and use another needle for administration. This reduces potential for contamination of the vial with a dirty needle and is particularly important for injectable iron preparations. If there is a choice, use products that are the least irritating.

Broken needle shafts.

Several pork processors have had products returned by irate customers who have found broken needle shafts in the meat. Most of these shafts were from disposable-type needles. You can avoid most of these problems by using proper stainless steel needles and good restraint. Broken needle parts in the sausage, bologna, or lunch meat do nothing for the excellent image of pork products.

Withdrawal times.

The injection of concentrated drug solutions results in high drug levels at the entry site. Absorption may be affected by the total amount of drug injected at one site or by the tissue rejection that results. Take care to follow the label instructions for quantities injected in one site and for site selection. Failure to follow these directions can lead to prolonged drug levels in the tissues and drug residues. In addition, mark pigs and keep records to avoid marketing pigs before proper withdrawal periods have expired. Read the label to obtain the proper information.