5-1-1985

Avoiding Sulfa Residues in Swine

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Sulfa Residue Prevention Checklist

- Read and follow label instructions.
- Use proper dosage.
- Follow established withdrawal times.
- Keep complete records of where and when medications are used (write it down; don't rely on memory).
- Premix concentrated medications into soybean meal or supplement to insure uniform dispersement.
- Weigh ingredients accurately.
- Calibrate scales and volumetric mills regularly.
- Make one person responsible for adding medicated premixes.
- Establish a sequencing pattern. After making all medicated feeds, mix and grind non-medicated flush feeds that are to be fed to non-marketable animals. Make withdrawal feeds last.
- Flush at least 5 percent of the mixer capacity with ground feed or cracked grain to purge the system.
- Clean mixing equipment and rooms by vacuum or remove as much dust and feed residue as possible on a routine basis.
- Make sure you are getting uncontaminated feed ingredients from your feed supplier. Insist on clean delivery trucks.
- Avoid delivery errors by clearly marking or color-coding medicated and non-medicated bins and feeders.
- Clean out and/or totally flush conveying equipment, augers, holding bins, delivery wagons, portable grinder-mixers, and trucks before non-medicated feed is put into them.
- Avoid using feeders for both medicated and non-medicated feed whenever possible. Just one mouthful of crusted, medicated feed residue from the lip of a feeder can cause violative tissue levels.

- Use separate waterlines for medicated and non-medicated water, if possible. If the same line is to be used, flush the system completely before market animals drink from it. Install cut-off valves to prevent back flush into partially used medicators.
- Do not mix hogs receiving sulfa with market animals. If possible, keep market animals in a separate building.
- Prevent urine and manure recycling. After sulfa withdrawal, move pigs to a clean pen. Clean pen daily for the next 3 to 4 days.
- Do not ship hogs to market in trucks containing waste from other hogs. Insist that your hogs are not mixed with others and are placed in clean pens at the stockyards and/or slaughter plant if they are to be held over for 1 or 2 days.

NEW 5/85 (5M) .

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AS-437

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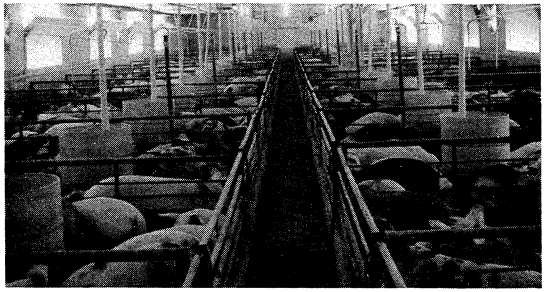

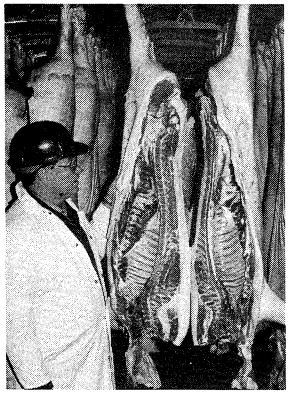

Animal Sciences Department
and
Cooperative Extension Service
Purdue University
in cooperation with
United States Department of Agriculture

Magnitude of Problem

A continuing concern to the pork industry and governmental agencies is the number of hogs going to market with violative levels of sulfa in their tissues. Violation rates decreased from an unacceptable 15 percent in the mid 1970's to a low of approximately 4 percent in 1981, but a disturbing trend toward a higher violation rate has occurred since that time. According to the USDA's Food Safety Inspection Service, the present violation rate is over 6 percent. If this upward trend continues, the FSIS will probably step up monitoring of residues, and/or the use of sulfonamides will be restricted by law.

Sulfonamides are effective as growth promotants, and their therapeutic effect in herds with atrophic rhinitis, pneumonia, influenza, or scours is well documented. An estimated 75 percent of all hogs marketed have been fed sulfa at some time during their lifetimes so it is evident that a ban on sulfa or heavy monitoring of its use would increase production costs for the many producers that depend on it.

Reports of violative sulfa residues in pork, however, lower consumer confidence in its safety and wholesomeness. Whether the health concern is real or perceived, it reduces demand for retail pork.

Sulfa Products and Withdrawal

Granulated sulfamethazine and sulfathiazole are to be fed in combination with a chlortetracycline plus penicillin mixture at the rate of 100 grams of sulfa per ton of feed. Granulated sulfamethazine may also be fed in combination with tylosin at the same rate. These products are available commercially by the tradenames Aureo SP-250 (sulfamethazine), Pfichlor-250 (sulfamethazine), Tylan Sulfa G (sulfamethazine), and CSP-250 (sulfathiazole). Feeding a level of sulfa higher than 100 grams/ton is illegal unless prescribed by the veterinarian for on-the-farm mixing in a bona fide veterinarian-client-patient relationship. Any sulfa medicated product should be used according to the label directions and only in legal drug combinations. Due to its widespread use and slower excretion rate, sulfamethazine is the sulfonamide most often found in the tissues above the regulatory tolerance level of 0.1 ppm. The withdrawal time needed to be sure that tissue (liver, kidney, and muscle) levels will be lower than 0.1 ppm is 15 days for sulfamethazine and 7 days for sulfathiazole. Sulfonamides are also commonly given as water medicants, especially to young pigs with flu or atrophic rhinitis.

Compliance and Enforcement

The USDA's Food Safety and Inspection Service, which inspects meat for safety and wholesomeness, condemns meat with violative drug residues; and the Food and Drug Administration, the agency in the U.S. Department of Health and Human Services which regulates drug use, can prosecute those who misuse sulfas or other medications. USDA meat inspectors randomly sample a specified number of pork carcasses in each slaughtering plant for sulfa as well as other drug and chemical residues. If violative levels of sulfa are found, the producer is notified and a marketing embargo is placed on that farm until a sample lot of five hogs is tested and found to be free of sulfa residues. Producers in violation can expect a minimum of two to three weeks' delay in marketing while laboratory analyses on samples are being completed. In 1982, a new analysis procedure was approved for sulfamethazine and sulfathiazole, called gas-liquid chromatography/electron capture. This new methodology is superior to the previously used colorimetric method in precision and recovery, giving the regulatory program a more conclusive sulfa test. In addition, the USDA is developing screening tests for use on the farm, at buying stations, or in the plant. Using such technology, producers or buyers could test live hogs before processing, and slaughter inspectors could test hogs and have proof of violative sulfa residues in a hog before the carcass is cut up into wholesale parts.

Health Concerns

The present tolerance level, set by the Food & Drug Administration's Center for Veterinary Medicine, is based on short-term toxicological studies with rats and dogs fed high levels of sulfonamides. Some of the animals in these studies developed thyroid toxicosis that in one study progressed to thyroid carcinomas. The 0.1 ppm tolerance level provides at least a 2000-fold safety margin for humans. Another concern is for the small percentage of the human population hypersensitive to sulfa drugs who could have an allergic reaction to sulfa even in small amounts like those found in residue-containing meat. Sulfa also poses potential risks to those people who continuously handle and mix medicated feed.

Causes of Residues

There are several known causes of sulfa residues in pork. These include failure to observe withdrawal times, manure or lagoon water recycling, contaminated manure packs, delivery errors or mix-ups, and obtaining contaminated ingredients or feed from the feed supplier.

However, a recent study and survey completed at Purdue University indicates that the vast majority of sulfamethazine problems on the 80 Indiana test farms was caused by one thing—crosscontamination of non-medicated withdrawal feed from on-farm mixing and handling. The feed generally contained less than 5 ppm sulfamethazine but enough (more than 1 ppm) to cause violative tissue samples from the hogs consuming it. The findings pointed to four factors that were strongly associated with crosscontamination:

1. Use of powdered sulfamethazine instead of the new granular form
2. Level of sulfa fed
3. Percentage of the total feed that was sulfa-medicated
4. Sequencing, flushing, and cleaning methods.

The survey found that, because of the price advantage of bulk sulfamethazine powder, some producers illegally continue to use it instead of the approved granulated products. However, the powder is extremely electrostatic and dusty, and the results showed that it is practically impossible to use without a risk of carryover.

The use of higher than approved levels, which is illegal, contributes greatly to carryover.

The more medicated feeds that go through the mixing and delivery systems, the greater the chances of mixing medicated feed with "clean" feed. This also reduces the number of flush feeds available. Just twenty pounds of medicated feed (100 grams of sulfamethazine/ton), mixed with one ton of non-medicated finishing feed, can cause violative tissue levels.

Essential to the overall crosscontamination picture of a given farm is the pattern of sequencing and flushing of the feeding system. Cleaning the delivery and mixing equipment following the use of sulfa is also important. Producers who keep good records and have a definite sequencing, flushing, and clean-out plan have far less sulfa carryover into the finishing feed than those without the plan.

Generally, if the producer uses granular products at the approved level and has a conscientious sequencing, flushing, and cleaning program, crosscontamination is not a problem. However, if feeds containing powdered sulfamethazine at higher than recommended levels are used, even an excellent sequencing and flushing routine is no guarantee that crosscontamination does not exist.