

Use of antibiotics and feed additives in weaned market pigs by U.S. pork producers

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Introduction

A plethora of benefits and risks are associated with antibiotic use on farms. To offset the risks, principles for prudent use have been identified. As part of the NAHMS Swine 2000 national study, a questionnaire was used to gather antibiotic use data in order to describe the level and pattern of antibiotic use, particularly in weaned market pigs.

A second goal was to estimate the adoption of good production practices regarding appropriate use of antibiotics. This information will assist industry and animal health officials in establishing prudent use campaigns and benefit public health by decreasing the risks from misuse of antibiotics.

The pork industry continues to undergo radical developments in the structure and nature of relationships through out the chain. Of particular concern in relation to antibiotics are changes in suppliers, farm inputs, and the decision making process. A third goal, therefore, was to describe the various decision-making arrangements on swine production sites and determine those with the greatest influence regarding use of drugs and medications.

These goals for the Swine 2000 study regarding antibiotic use were developed by gathering input from pork producers, swine practitioners, the U.S. Food and Drug Administration (FDA), from the Pharmaceutical Issues Task Force (PITF), and others with final input and approval from the National Pork Board's Pork Safety committee. The purpose of this paper is to present the initial findings related to these three goals with special emphasis on the antibiotic use data collected in the NAHMS Swine 2000 study.

Methods

A complete description of the study design can be found in the Methodology section of Part I: Reference of Swine Health and Management in the United States, 2000. This report was published by USDA:APHIS:VS

in August, 2001. Briefly, producers in the top 17 swine States with at least 100 total inventory on March 1, 2000 were randomly selected to participate in the study. A total of 2499 producers completed the first interview, conducted by NASS between June 1 – July 14, 2000. State and Federal VMO's conducted two subsequent interviews on 895 producers between August – October, 2000 and December, 2000 – March, 2001. Estimates from this study are weighted and represent 92% of U.S. hog operations with 100+ total inventory.

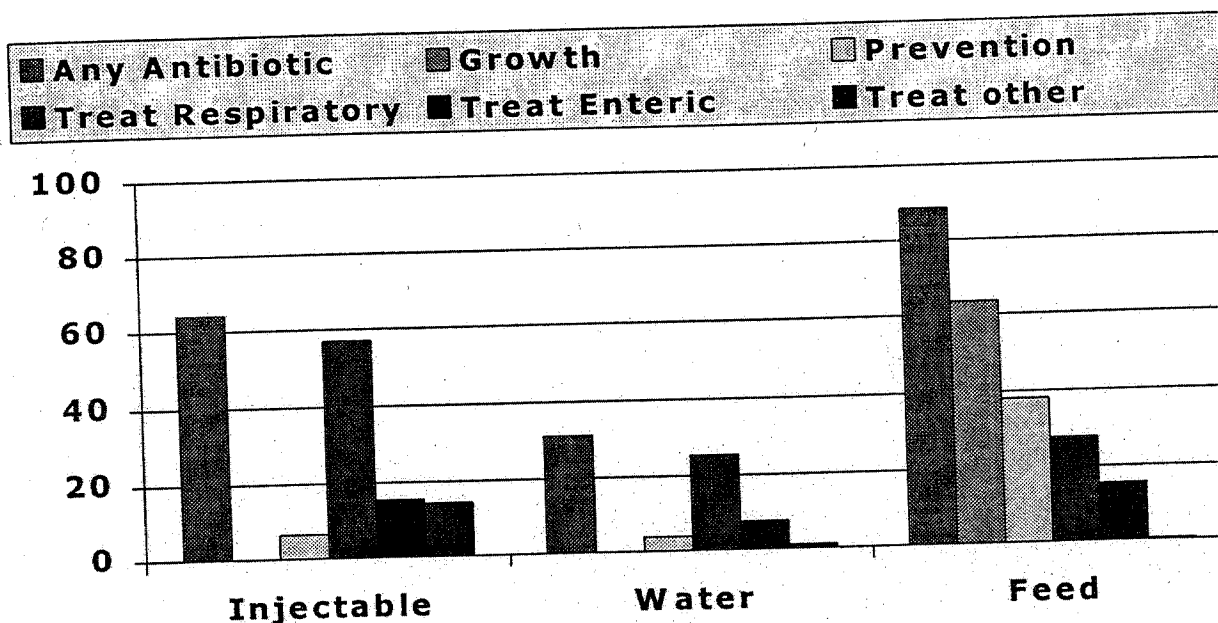
Antibiotic use data for grower/finisher pigs was assessed by route of administration (injectable, water, feed). For each antibiotic used, producers were queried about the primary intent of its use (promotion, prevention, treatment) and for water and feed antibiotics, the number of days administered. Results are summarized in Figure 1.

Results

For sites with nursery age pigs, 82.7% placed antibiotics in the feed for growth promotion or disease prevention. The three most common antibiotics were chlortetracycline (30.1% of sites), tylosin (23.2%), and carbadox (22.9%). These were placed in the feed for an average of 24.4, 26.7, and 23.5 days respectively. On average, pigs are in the nursery 35–45 days, depending on herd size. Other antibiotics were placed in nursery feed for 21–28 days except for tiamulin that was fed for an average of 16.9 days.

About 2/3 of sites administered injectable antibiotics to grower/finisher pigs, primarily to treat respiratory disease. Only 1/3 of sites included antibiotics in water. The main reason for doing so was to treat respiratory disease. No antibiotics are injected or placed in water by producers for growth promotion. Almost all sites included antibiotics in feed, primarily for growth promotion or disease prevention, and to a lesser degree, to treat respiratory or enteric conditions.

Figure 1: Use of antibiotics in grower/finisher pigs by route and reason.



Almost 90% of the sites that use injectable antibiotics in grower/finisher pigs did so to treat respiratory disease (57.2 / 64.5). The most common antibiotic used was procaine-penicillin (30.2% of sites with grower/finishers). Others commonly used were oxytetracycline (16.1%), ceftiofur (14.5%), tylosin (13.8%), and penicillin benzathine (15.5%). The latter is not approved for use in swine. Those used less frequently were ampicillin, lincomycin, and spectinomycin. The latter is for use in swine less than 4 weeks old. Penicillin benzathine is used by a greater number of small farms and spectinomycin is not used on large farms at all. However, use of any injectable antibiotic, as well as use of tylosin, procaine-penicillin, and ceftiofur, are more common on larger sites.

These estimates reflect the percent of sites that administered injectable antibiotics to at least one grower/finisher pigs in the six months prior to the interview. We did not collect the percent of animals that received antibiotics by injection. However, for the most recent outbreak of respiratory disease, we did ask about the treatment strategy employed. For both nursery age pigs and grower/finisher pigs, the most common strategy was to treat all pigs in the room (defined as shared air space with clinically ill pigs). The next most common strategy was to treat only the clinically ill pigs.

Overall, one third of sites with grower/finisher pigs used antibiotics in water. However this varied by herd

size from 23% of small sites to over 75% of large sites. A little over 80% of the sites that included antibiotics in water did so to treat respiratory disease (25.2 / 31.2). The three most common antibiotics used were oxytetracycline (8.3% of sites with grower/finishers), chlortetracycline (6.2%), and sulfamethoxine (5.1%). Neomycin and tylosin were included in the water primarily to treat enteric conditions. However, some small sites indicated they used neomycin, as well as spectinomycin, to treat respiratory disease even though they are not absorbed by the gut and are therefore ineffective in treating respiratory disease. All antibiotics were placed in the water for approximately 5 days on average.

Almost 2/3 of sites with grower/finisher pigs included antibiotics in the feed for growth promotion and more than 1/3 (37.9%) did so for disease prevention. The two antibiotics that accounted for almost all growth promotion use were tylosin (31.3% of sites with grower/finisher pigs) and bacitracin (29.9%). Chlortetracycline was used on about 8% of sites for growth promotion and used on more sites for disease prevention (17.6%) or treatment (22.5%). Tylosin was also used on a lot of sites for disease prevention (13.1%) or treatment (11.9%). Antibiotics included in the feed only for disease prevention or treatment include CSP, tiamulin, and Tylosin/Sulfamethazine.

The number of days antibiotics were included in the feed varied for each antibiotic and also depended on

the primary intent for including that antibiotic in the feed. In general, an antibiotic was in the feed longer for growth promotion and shorter for disease treatment. For example, tylosin was included in the feed an average of 72.5 days for growth promotion, 58.4 days for disease prevention, and 39.1 days when in the feed primarily to treat disease.

Conclusions

There are many ways to measure and describe the use of antibiotics (percent swine, percent sites, total grams sold nationally, etc). The chief reason for wanted to quantitate the level of antibiotics being used is to make an assessment of selection pressure. The concept of selection pressure is that a bacterial population replicating in an environment where antimicrobial substances are present undergo genetic adaptation that allow growth in this environment. However, measurement of this selection pressure at any level (microbe, animal, national) is not possible and so antibiotics use information, such as that presented here, have gross limitations for that purpose.

Antibiotics are an integral part of swine production being used in all production phases, by all size groups, through various routes for various reasons. Some policy makers, particularly those that ascribe to the precautionary principle, recommend a total ban of antibiotics for on-farm use. This extreme view does not recognize the balance between risk and benefits. Such regulatory action would have a horrendous impact on swine production given the widespread use and varied use of antibiotics. The other implication of this fact is that the antibiotic use 'problem' is not relegated to large producers or small producers only but is an issue that involves the industry as a whole.

As a gross generalization, feed is the primary vehicle used for antibiotics intended to promote growth and prevent disease. Injection is the route of choice (of producers) for using antibiotics to treat disease.

