

For the Record

Straight talk about antibiotic use in food-animal production
Volume 4, Issue 1

Sponsored by ALPHARMA Inc. Animal Health
February 2005

INSIGHTS ON THE ISSUE

Are antibiotics really worth fighting about?

One of many emerging themes in the past decade's public debate over livestock producers' access to antibiotics — particularly when the use is for enhancing productivity — is that antibiotics are of questionable necessity. Even if the risk to human health due to antibiotic resistance is minimal, they contend, livestock antibiotics are expendable because their economic value is equally minimal. Some examples:

■ "We don't need to use these enormous quantities of drugs to produce affordable, safe meat. All we need to do is persuade our...producers to throw away their drug crutches and move on to new, better-managed systems that don't depend on the use of excessive antibiotics."

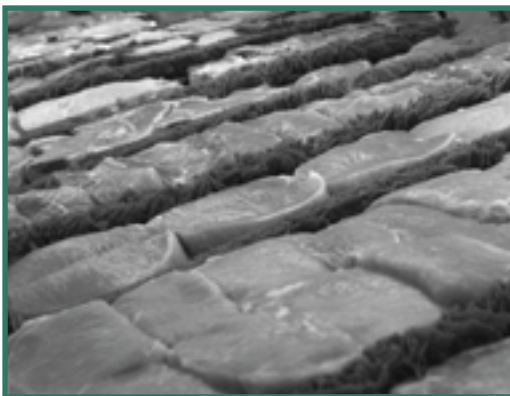
—Margaret Mellon, director of the Union of Concerned Scientists Food and Environment Program

■ "The reality is that if you keep animals in good conditions, you don't need the routine use of drugs."

—Richard Young, campaigns advisor for the Soil Association, England's leading organic food and farming advocacy organization

Yet, USDA survey data from 2000 — the latest avail-

able — showed over 88 percent of swine finishers invest in feeding an antibiotic at some point in production. Farmers, notorious for quickly separating the technological wheat from the chaff by how they spend their dollars, continue to vote their confidence in the value of this production tool for efficiently feeding consumers. They apparently believe antibiotics are worth the fight.



Antibiotics not only return pork producers from 3-to-1 up to 15-to-1 on their investment, their use also helps reduce the number of disease organisms that might enter the food chain.

Also in this issue:

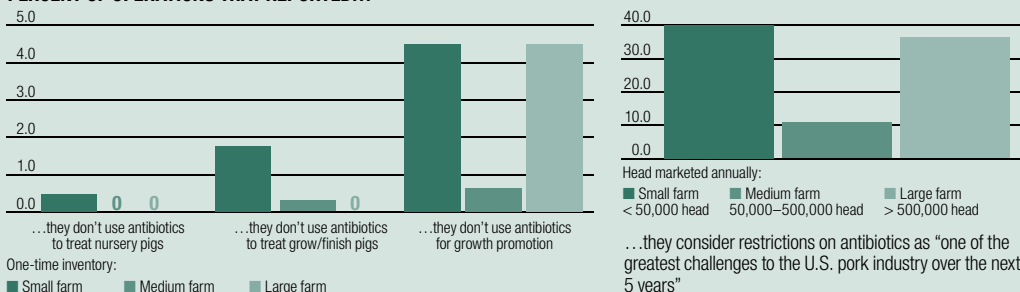
- Decades of studies demonstrate the dollar value antibiotics bring to efficiently producing meat.
- Don't expect many 'silver-bullet' cost-effective alternatives to antibiotics as growth promotants.

MYTH-BUSTER AMMUNITION TO FIGHT BACK

Little usage difference between large and small farms

Opponents of antibiotic use contend large modern "factory farms" can't wean themselves from antibiotics. They need them to keep animals alive and growing in huge, allegedly filthy barns and complexes. Yet surveys comparing practices of larger and smaller operations show little difference in the percent using antibiotics. Granted, large farms are more likely to treat complete rooms instead of individual animals or pens, which critics believe contributes to antibiotic resistance. At the same time, though, they're significantly more likely to put antibiotic decisions in the hands of a licensed veterinarian, a control practice those same critics favor.

PERCENT OF OPERATIONS THAT REPORTED...



Source: USDA-APHIS-VS-NAHMS 2002. "Swine 2000: Part II: Reference of Swine Health and Management in the United States, 2000." No. N338.0801. Fort Collins, Colo.:USDA. Boessen C, Lawrence JD, Grimes G 2004. "Production and Marketing Characteristics of U.S. Pork Producers - 2003." Agricultural Economics Working Paper 2004-4. Columbia, Mo.: University of Missouri.

For the record

Attempting to justify banning antibiotics by trivializing their financial value, opponents of animal antibiotic use ignore some economic realities.

For the record

A half century of research and usage demonstrates antibiotics remain cost effective in most phases of meat, milk and egg production.

Antibiotics' long history of effectiveness

Shortly after they were first introduced to a post-WWII farm economy under pressure to boost productivity and meet soaring consumer demand for meat, antibiotics performed so impressively they made front-page news in the *New York Times*. Since then, they have seen uninterrupted use to improve the growth and overall health of livestock.

Studies show the economic benefits associated with low-level antibiotic use in swine production include improvements in average daily gain, feed conversion ratio, farrowing rate, baby pig survival and mortality rate.

One of the seminal reviews, a summary of 1,194 experiments involving 32,555 pigs, found antimicrobials improved growth rate by an average 16.4 percent in weaning pigs, by 10.6 percent in growing pigs, and by 4.2 percent in growing/finishing pigs. Improvements in feed efficiency were 6.9, 4.5, and 2.2 percent for the groups, respectively.

Another summary of 67 field trials with young pigs indicated that feeding antimicrobials cut death loss by more than half—from 4.3 to 2.0 percent. Better still, it made a five-fold improvement when disease or stress levels were high.

A summary of nine experiments on just under 2,000 sows showed medicating them via feed at breeding improved their farrowing rate from an average 75.4 percent to 82.1 percent. The number of live pigs born increased from 10 to 10.4. And in another 11 experiments comprising 2,105 sows, including antimicrobials in lactation diets increased piglet survival to weaning from 84.9 to 87.1 percent. Weaning weights increased about 1 percent.

All told, using conservative calculations based on today's production practices and figures, University of Kentucky animal scientist Gary Cromwell estimates the net economic benefit of low-level antibiotic use in a farrow-to-finish operation totals:

- Nursery: \$1.51 per hog sold
- Grower and finisher: \$1.48 per hog sold
- Sow breeding ration: 69 cents per hog sold
- Sow lactation ration: 30 cents hog sold

That \$3.98 per pig total difference in profit attributable to antibiotics—roughly \$388 million for the industry as a whole applied across the board to current inventories—represents a return on investment of from 3-to-1 up to 15-to-1, depending on the production phase, Cromwell estimates.

A ban with a billion-dollar price tag

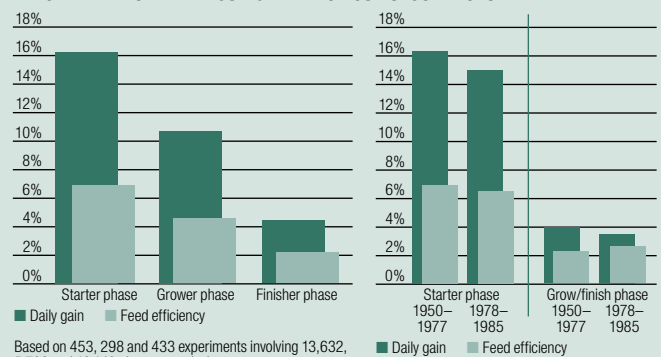
Considering that history of proven performance, it should be obvious antibiotics are not luxuries. Banning them would carry a cost.

Iowa State economist Dermot Hayes applied the production losses Sweden and Denmark experienced when those countries banned growth promotants to the U.S. market to quantify those costs here.

Effective then; effective now

Some of the antibiotics pork producers use today are the same ones first introduced more than 50 years ago, notes University of Kentucky's Gary Cromwell, a longtime authority on antibiotic use. He recently reviewed the effectiveness data for antibiotics in general, and also compared effectiveness data from the first 28 years of antibiotic usage—1950 through 1977—to the following eight years—1978 to 1985. Overall effectiveness did not diminish.

PERCENT IMPROVEMENT USING ANTIBIOTICS VS. CONTROLS



Source: Cromwell GL. "Why and how antibiotics are used in swine production." *Animal Biotechnology* 2002 13(1):7-27.

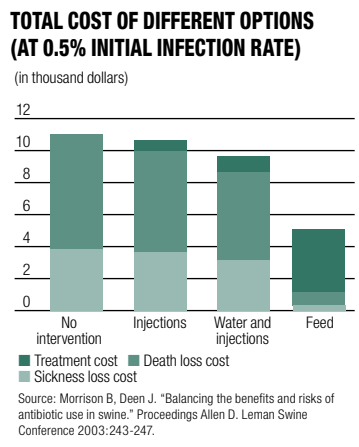
Assuming a ban in swine only, his modeling for the most-likely scenario predicts producers' costs would increase substantially higher than Cromwell's estimates predict, due to higher death loss after weaning, slightly slower growth in all stages, the extra cost of holding piglets an additional week before weaning and construction costs to add sows to account for lower reproductive efficiency. In total, he predicts the ban would cost producers \$6.05 per head immediately. That figure would eventually drop to \$5.24 per head after a decade without antibiotics, as producers adjusted and began to recapture some of the \$6.05 worth of lost efficiencies the loss of antibiotics would introduce into the system.

Once the market inevitably weeded out individual producers who couldn't suffer those losses and still compete, consumers would bid up the price for the smaller pool of remaining hogs, and average market prices would be expected to rise. For those producers remaining, those higher prices would then give back much of those losses, he says. Therefore, for the industry as a whole, net profit caused by an antibiotic ban

Mass antibiotic treatment — opposed by some critics as unnecessary — isn't merely a labor-saver. It also improves the disease outcome of members of the group not apparently sick.

The value of mass treatment

When critics demand an end to producers' ability to use antibiotics "non-therapeutically," they neglect some important realities of disease control in today's herds, note University of Minnesota's Bob Morrison and John Deen. In pigs, chickens and—to a smaller degree—fed cattle, antibiotic use is seldom limited to treating a single, sick animal. Therefore, the cost/benefit analysis can't be limited to single animals. Medicating nursery pigs that aren't obviously sick alongside those that are benefits the non-apparent pigs, either by preventing the disease from advancing in those animals, slowing down the spread of the disease through the group, or a combination of the two. Morrison and Deen recently estimated the cost consequences of four treatment choices for *Haemophilus parasuis* clinical cases based on that model.



would likely decline by 79 cents per head, meaning the lost profit would total just over \$1 billion.

University of Illinois veterinary epidemiologist and economist Gay Miller and a team of researchers likewise compiled data from the USDA NAHMS surveys of U.S. pork operations to predict the effects of a ban.

Based on typical management factors in an independent farrow-to-finish Midwest operation raising from 1,600 to 6,000 head yearly, Miller estimates that losing the use of antibiotics at low levels in the grow/finish phase would reduce daily gain by 0.5 percent and feed efficiency by 1.1 percent. Death loss would also increase.

All told, for that typical producer after accounting for

the saved cost of the antibiotic, that totals \$1,612, or 59 cents per pig marketed. That 59 cents represents about 9 percent of the net return Illinois hog finishers showed in year 2000, according to Illinois' Farm Business Farm Management Association records.

It's important to remember, economists note, that studies like these are deceptively static; it's probably not safe to assume the real value of feeding antibiotics to the producer can be measured simply by changes in productivity to be expected after the fact. For one, they ignore any value producers place on them as risk-management tools. Numerous studies show that even when used at levels considered "subtherapeutic," antibiotics create a disease-control effect.

What about antibiotic alternatives?

Long before it banned antibiotic growth promoters, Denmark — the critics' favorite example of a "successful" world without ag antibiotics — began investing in research towards producing pigs and chickens using antibiotic alternatives. The U.S. Pork Board has similarly stepped up its encouragement of research into alternatives here. Some highlights:

- Zinc oxide and copper sulfate. High levels of both are already used in early nursery diets to control scours and improve growth, often with an additive effect atop antibiotics. Unfortunately, environmental

pressures may limit their usability in the future.

- Probiotics. Available for years and thoroughly researched, direct-fed microbials still show contradictory results.

- Diet acidification. Additives to alter the environment of the gut to make it less hospitable to pathogens have found some use in Europe, but little success here. They appear to be less valuable in diets containing the typical U.S. starter milk proteins.

- Herbs, spices and other plant extracts. "Natural" products like garlic and oregano appear to have some antimicrobial action. But their practicality remains

questionable. "With a lot of these plant-based treatments, there's a lot of circumstantial evidence and not a lot of science to back it up," Leeds University animal nutritional biochemist Henry Greathead told Reuters news service.

As University of Illinois animal scientist James Pettigrew writes, while there likely will be some products that can help the gut process nutrients and resist disease — with or without concurrent antibiotics — chances we'll discover a "silver bullet" product that does what antibiotics do without actually being an antibiotic are slim.

For the record

Numerous indirect benefits of antibiotic usage by livestock producers benefit society.

A real-world example of the issue's complexity

In a long-term study beginning in 1972, antibiotics were completely eliminated from one of our University of Kentucky swine



Photo by Stephen Patton

Gary Cromwell
Professor, Swine Nutrition
University of Kentucky

herds, after being routinely used for years. Antimicrobials have not been used since in feed or for treatment.

The herd is a closed, SPF herd with new

genetics introduced only by artificial insemination.

Following withdrawal of antibiotics, conception rate decreased from 91 percent to 83 percent. Sows farrowed and weaned fewer pigs per litter, and the pigs weighed comparably less at weaning. Pre-weaning survival was reduced from 90 percent to 81 percent after antibiotics were discontinued.

During the first few years following antibiotic withdrawal, the percentage of fecal coliforms resistant

to tetracycline decreased from over 90 percent initially to about 50 percent. But since that time, 30 to 70 percent have remained resistant to tetracycline — even minus antibiotic use since 1972. We have found that age, housing and moving stress had as much (or more) of an effect on the shedding of resistant bacteria than the presence of antibiotics. Clearly, even a total ban of antibiotics from animals would not completely eliminate antibiotic resistance.

For the Record

For the Record, sponsored by a grant from ALPHARMA, is designed to help unite the industry and provide a unified, rational message on behalf of producers whose freedom to use safe, effective, economical production methods is at stake. Working together, we can set the record straight on antibiotics. Questions or comments? Contact Steve Kopperud, at skopperud@poldir.com. Want to read past issues or link to more information on this issue? Visit us online at www.alpharma.com/ahd/For_The_Record

INSIGHTS ON THE ISSUE

Economic benefit to consumers

Iowa State economist Dermot Hayes estimates banning low-level antibiotics in swine would raise the retail price of pork by 5 cents per pound, costing consumers \$748 million per year. A National Research Council study estimates the extra weekly cost per family without the benefit of low-level antibiotics in all meat production would be from 34 to 75 cents, depending on whether or not alternatives were available. It may be easy for wealthy activists to scoff at the pennies they believe it would add to the cost of food to remove antibiotics. However, food cost remains a real issue with many consumers:

- USDA data show that in contrast to the wealthiest households, which spend only 7 to 8 percent of their income to buy food, the poorest households spend over 33 percent. Meanwhile, USDA figures released in mid-December predict food prices—led by 11 percent higher beef and 8 percent higher milk, egg and dairy product prices—will this year post their highest annual inflation in more than a decade.
- Additional USDA survey data released in late 2004 showed that just over 11 percent of all households experienced some “food insecurity” during the year—meaning they didn’t know where their next meal would come from. About a third of those, or 3.5 percent of all households, had members who went hungry at some point because they couldn’t afford food.
- Although the amount consumers spend for food during the last decade fell for all income groups, it fell relatively faster for the poorest. That suggests poor households—as food consumption and expenditure surveys reveal—continue to economize by spending less per pound for nearly all food groups than do all households, by purchasing lower cost items.

Indirect benefits

In addition to cheaper food, several hidden benefits of antibiotic use also accrue to society:

- Because antibiotics can increase feed efficiency, decrease death loss and improve the utilization of nutrients like nitrogen and phosphorus, their use lowers the load on the environment of manure, carcasses, and excess nutrients, as well as reducing the number of crop acres and resources needed to feed the same number of animals.
- Almost everybody grants that eliminating antibiotic use would put some portion of farmers out of business. Keeping those farms and the business that support them working, hiring, paying taxes and not draining public assistance benefits society, University of Illinois’ Miller notes.
- Many experiments show antibiotics fed at low rates reduce the level of disease in those animals, and thus its spread—both to other animals and up the food chain. In that sense, they make the food supply safer from contamination. A new risk/benefit analysis just reported in November by University of Minnesota veterinarian Randall Singer predicts society enjoys a net gain by chicken producers’ use of the antibiotic tylosin, because it reduces the cost of foodborne disease far more than any cost of associated antibiotic resistant disease.