August 2015

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Available at: http://lib.dr.iastate.edu/iowaagreview/vol6/iss3/4

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What Would Happen if Over-the-Counter Antibiotics Were Banned in Swine Rations?

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Editor's note: This executive summary from the CARD Staff Report, “The Economic Impact of a Ban on the Use of Over-the-Counter Antibiotics in U.S. Swine Rations,” introduces research on the likely effects of a ban on antibiotics in livestock feed. The report, #99-SR 90, is available online at www.card.iastate.edu.

A ban on over-the-counter feed antibiotics was implemented in Sweden in 1986. Similar bans were enacted in Norway in 1992, in Finland in 1996 (for grower-finishing hogs), in Denmark in 1998, and in Poland and Switzerland in 1999. In a study we conducted in 1999, we explored what would happen if a ban on the use of over-the-counter antibiotics in swine rations were to be implemented in the United States. Specifically, our purpose was to estimate the likely economic effects of such a ban on the U.S. pork industry and pork market.

Why has the use of antibiotics in livestock feeds come under scrutiny here and abroad? The concern, raised by scientists and the general public is whether antibiotic resistance developed in food animals might be transferred to humans.

The literature suggests a tendency for scientists in Europe to favor a ban and for scientists in the United States to oppose such a measure. However, there are also strongly opposing opinions on both sides of the Atlantic, which demonstrates a continued intense debate about the antibiotics issue. Current European Union (EU) regulations state that antimicrobials used in either human or in veterinary therapeutic medicine are prohibited from use as feed-additive growth promoters in livestock.

In the United States, antibiotic drugs are currently used in 90 percent of starter feeds, 75 percent of grower feeds, more than 50 percent of finishing feeds, and at least 20 percent of sow feeds, according to the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (USDA/APHIS). A ban on the use of feed-grade antibiotics would lead to changes in processes and practices in the production of pork, and hence is likely to have an economic impact on the U.S. pork industry and pork market. On average, the cost of feed-grade antibiotic use for all animal producers has been estimated to be about 3.75 percent of total ration costs, or about 50 percent of the value of the compounds to animal producers.

To anticipate the potential effect of a ban on antibiotics in feed on U.S. pork production, our study uses a set of technical impacts that are based in large part on a historical analysis of how the ban in Sweden affected the Swedish pork industry. The economic model upon which the results are based incorporates both biological and economic processes that govern production and consumption. The processes include:

- binding biological limits (e.g., weight gain rates, length of gestation),
- lags of variables to capture time periods required in production, and accounting identities to ensure consistency in the stock (e.g., animal inventory), and
- flow variables (e.g., number of animals slaughtered, pig crop, and mortality).

The model also includes technical parameters such as feed efficiency, weight and weight gain, mortality, and sow efficiency. Economic data include information on fixed costs (buildings), veterinary costs, and any new investments required for buildings.

The analysis of the impacts of a ban on feed-grade antibiotics was conducted by comparing the results obtained using baseline values and assumptions to results obtained by using assumptions about the changes that would be required to raise hogs under conditions implied by the ban. Technological changes are introduced by specifying some of the biological and technical parameters of the model to reflect changes in the new production technology. Simulations were conducted by using the revised technical parameters in the model. To account for increased weight variability due to the ban, alternative distributions of weights were characterized and then applied to a price grid with penalties for “sort loss.”

Based on information that we gathered during a visit to Sweden and Denmark, and from other sources, the technical assumptions for the most-likely case scenario (one of three cases studied) are summarized as follows: age at weaning would increase by one week; days from weaning to reach 25 kg would increase by 5 days; feed efficiency (from 50 pounds to 250 pounds) would decrease by 1.5 percent; piglet mortality would increase 1.5 percentage points; mortality at the fattening-finish stage would increase by 0.49 percent; piglets per sow per year would decrease by 4.82 percent and veterinary and therapeutic costs per pig (net of costs for feed grade antibiotics) would increase by $.25.

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In addition to the technical assumptions, additional space would be required for the nursery and finishing periods if restricted feeding and longer time in the nursery become necessary. This new construction would cost $115 per head of nursery space and $165 per head of finishing space, or an estimated cost of additional space required of about $1.42 billion. Additional farrowing space for sows, required under two of the other scenarios, would also add costs. The most-likely case implements these changes. (Refer to the full report for a discussion of the best-case and worst-case scenarios).

With reservations for all uncertainties about the assumptions made, the estimated effect of a ban on the use of over-the-counter antibiotics on production costs would increase costs per head by $6.05 initially, and by $5.24 at the end of the 10-year period considered. However, with the higher prices, net profit would decline by $0.79 per head by the end of the period. The figure shows change in cost and net profit. The net present value of foregone profit to the industry over 10 years would be $1.039 billion (with a range over the alternative cases from $1.135 to $0.429 billion). These estimates include the costs of adding troughs and space to allow restricted feeding, costs totaling $960 million, or $1.20 per hog, about 20 percent of the increased costs. If the assumption on the need for restricted feeding capacity is incorrect, then the estimated values overstate the impact estimate. This is obviously an area where additional research is needed.

On the consumer side, retail prices would increase by $0.05 per pound. The effect of the change in retail price on cost per U.S. family (of four) would be approximately $11 per year in additional costs, or $748 million per year in total. This estimate considers only the change in pork, with no change in other meats.

While certain general patterns stand out, the Swedish experience must be regarded very cautiously as an exact indicator of what might happen in the United States (please see the full report). First, if the lactation period has to be increased, more farrowing space will be needed and pigs per sow per year will decrease. Also, if restricted feeding is necessary, almost all U.S. producers will be forced to make some adjustments. All these assumptions will have to be researched under U.S. conditions before final cost conclusions can be made.

The estimated impact of a ban on an “average” or “representative” farm masks very wide differences across farms. The Swedish experience suggests that those who follow good hygienic and health practices will see the smallest impact. The greatest impact may be on densely populated farms in areas with large numbers of hog farms who have older buildings and who do not follow sound management practices. The social impacts of the changes may be very different than the economic impacts.

In the assumptions for the different cases, consumers respond only to changes in the price of pork. We have not altered the prices of poultry or beef, which are likely to be affected similarly by a ban. Nor have we factored in any positive effect of such a ban on consumer willingness to pay for pork produced without the use of feed-grade antibiotics. Consumer pressure and responses have been shown to be important in the Swedish and other European experiences, but they are difficult to estimate with the lack of reliable data in the United States. However, one very important consumer response should be mentioned, and that is the one that may occur on export markets. So far there is very little evidence to suggest that these export customers are concerned about the use of antibiotics among suppliers. However, once the European Union (EU) or Danish industry can guarantee reliable supplies of antibiotic-free pork, this situation may change. Losses to the U.S. pork industry associated with a loss of an important export customer, such as Japan, would dwarf the losses associated with the ban described above.