THE discovery of penicillin by Fleming in 1929 and its comparative lack of irritation when administered to human beings were followed by the early reports of Kakavas and Bryan, Huffman and Horwood concerning its usefulness in the treatment of infectious mastitis. The therapeutic value of penicillin was greatly enhanced by the low degree of irritation resulting to the udder following udder fusion. Enhanced by the low degree of irritation resulting to the udder following udder fusion, the penicillin finds its way into the milk from the treated quarters. Dairymen must understand that this penicillin or any other antibiotic presents a problem to the milk plant operator, since pasteurization temperatures do not destroy the penicillin. When the milk from one treated quarter resulted in a restriction of acid production for from 4 to 6 milkings after treatment. Sulfanilamide, sulfamerazine and aureomycin were slightly less restrictive in action. When the milk from one treated quarter (75,000 units of penicillin) was mixed with the milk from 20 untreated cows, starter cultures were greatly inhibited. The inhibition of starter cultures seriously affects the production of cottage, cheddar and other cheese, buttermilk, and butter made from ripened cream. To produce products of high quality, the milk from recently treated quarters must be withheld from the herd milk. A minimum 3-day withholding period is suggested as adequate in most cases.

Penicillin milk levels following the use of penicillin in the udder.

Since penicillin has become the product of choice for the treatment of many forms of infections, in mastitis, it is not surprising to find that a number of new medication forms have appeared on the market. The data of Table 1, by Jackson and Bryan, present the penicillin milk levels obtained by the use of some of these products. To keep penicillin out of market milk, every dairymen should be advised to discard the milk from the treated quarters for 3 days following treatment when crystalline penicillin or penicillin in oil is used for udder infusion.

Penicillin levels of herd milk.

During the past several months 27 samples of herd milk have been collected at random from several milk plants and checked for penicillin levels. The presence of the drug was suspected in only one case where the milk of a penicillin-treated cow was included in the herd milk, but surprisingly, varying levels were present in 26 of the samples. These data are presented in Table 2; they indicate an apparent promiscuous use of penicillin and the lack of withholding milk from the treated quarters. Dairyman must understand that this penicillin or any other antibiotic presents a problem to the milk plant operator, since pasteurization temperatures do not destroy the penicillin.

**TABLE 1**

<table>
<thead>
<tr>
<th>Medication forms</th>
<th>Units of penicillin used</th>
<th>Units of penicillin per cc. of milk*; days after the administration of penicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin in 10 cc. of water</td>
<td>25,000</td>
<td>1 0.06 -0.06</td>
</tr>
<tr>
<td></td>
<td>50,000</td>
<td>1 0.25 0.06 -0.06</td>
</tr>
<tr>
<td></td>
<td>100,000</td>
<td>1 0.50 -0.06</td>
</tr>
<tr>
<td>Penicillin in bougie</td>
<td>25,000</td>
<td>1 0.06 -0.06</td>
</tr>
<tr>
<td></td>
<td>50,000</td>
<td>1 0.12 0.03 0.03</td>
</tr>
<tr>
<td></td>
<td>100,000</td>
<td>2 0.5 0.3 0.03</td>
</tr>
<tr>
<td>Penicillin in ointment</td>
<td>50,000</td>
<td>2 1 1 0.5 0.06 0.06</td>
</tr>
<tr>
<td></td>
<td>100,000</td>
<td>2 1 0.5 0.06 0.06</td>
</tr>
<tr>
<td>Penicillin in oil</td>
<td>300,000</td>
<td>49 4 4</td>
</tr>
</tbody>
</table>

*—before a value means less than that amount of penicillin present.
† Deceased. See this Journal, July-August, page 141.
Does the Presence of Antibiotics in Milk Have Any Effect Upon the Consumer?

At present no specific answer can be given to this question. Felsenfeld indicates that when penicillin first became available for human use physicians found that about 3 per cent of their patients reacted unfavorably to penicillin. Today he reveals that approximately 10 to 12 per cent of children—not previously given penicillin by injection—are sensitive to penicillin. Yet it can be said that penicillin in the milk consumed by these children may play a part in this reaction.

Antibiotics Are an Aid in a Mastitis Control Program

The following five items must be considered and applied, in the order given, in a successful mastitis prevention and control program:

A. Good, sanitary milking procedures.
   1. Arrange and/or milk cows in following order: healthy, suspicious and infected.
   2. Discard the foremilk into a strip cup, exclude from supply all abnormal milk.
   3. Wipe the udder of each cow with a warm (120° F) disinfectant 1 minute before milking.
   4. Exclude infected humans from milking cows.
   5. Dip test cups of milker in disinfectant before udder infusion treatments.

B. Good, sanitary herd management procedures.
   1. Proper stalls for cows.
   2. Prompt treatment of udder and teat injuries.
   3. Clean and disinfect stalls upon removal of infected cows.

4. Keep barn and barnyard clean and dry.
5. Raise heifers as disease-free replacements.

C. Early and accurate diagnosis.
   1. Physical examination of each cow's udder.
   2. Bacteriologic test to determine if infection is present or absent.
   3. Elimination of infection by slaughter or complete segregation of infected cows with badly damaged udders.
   4. Such cows usually do not respond to antibiotic treatments.
   5. This eliminates or confines the source of infection.

D. Elimination of infection by antibiotic treatments: the use of only when improvement is made in the management procedures; if such changes are not made, the treatments are relatively ineffective.

Mastitis treatments are of value only when infection is present or absent.

Summary

The promising use of antibiotics in the treatment of mastitis, without withholding the milk from the treated quarters, results in trouble for the dairy manufacturing industry. The milk from treated quarters should be withheld from the main supply for at least 3 days. Pasteurization of milk does not destroy the antibiotics commonly used in the treatment of infectious mastitis.

Observations suggest that the ingestion of penicillin in the milk may play a part in the increased number of human beings who are sensitive to penicillin injections.

Antibiotics are an aid to a mastitis prevention and control program. Good sanitary milking and herd management procedures are basic to udder health.

Literature Cited

3. Felsenfeld, O. Personal communication, 1950.