Marker dyes in antibiotics

K Needham
N. Ingleton

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MARKER DYES IN ANTIBIOTICS

By K. NEEDHAM, B.Sc. Agric.), and N. INGLETON, M.DD. (Hons.)

When cows are treated for mastitis with antibiotics some residue finds its way into the milk. Unless the milk from treated cows is withheld for at least 72 hours after treatment this residue enters the bulk milk supply.

For some years the presence of penicillin in milk has been a serious problem for the dairy industry.

First, it is a threat to public health. Even minute quantities of penicillin in milk can cause allergic reactions in certain people, or cause them to become sensitive to the drug.

The second major problem is that penicillin in milk is a common cause of failure in cheese making. Because of its effects on the cheese starter cultures it prolongs the manufacturing time and lowers the quality of the final product.

Export markets are no longer available for low quality dairy products or products containing traces of antibiotic.

These problems and their implications were discussed by Ingleton in the Journal of Agriculture, November, 1961.

Keeping Penicillin out of Milk

Milk from cows treated with antibiotic during the previous 72 hours must not be included in the bulk supply. This is the farmers’ responsibility: if this milk were withheld from sale the problem of residual antibiotics in milk would be eliminated.

However, the problem continues, despite an active campaign to discourage the supply of milk containing antibiotic residues. Some of the measures adopted have been:

- Veterinary preparations are labelled with warnings against the improper use of contaminated milk.
- The strength of the antibiotics in preparations for the treatment of mastitis has been limited.
- The dangers of antibiotics in the milk supply have been stressed by educational campaigns.
- Penalties against, or rejection of milk containing antibiotics have been threatened.
- Marker dyes have been tested for future incorporation in antibiotic preparations so that contaminated milk can be detected by its colour. In Victoria dyes are included in veterinary preparations of penicillin by law.

MARKER DYES

As a result of research in Australia and overseas it has been found possible to incorporate “marker” dyes in veterinary preparations containing antibiotics for treatment of mastitis.

These discolour the milk from treated cows as long as the milk contains antibiotic residues. The colour becomes paler as the concentration of antibiotic falls, and disappears altogether when the milk no longer contains measurable traces of antibiotic.

A commercial product based on this research has been successfully tested by
In the interests of quality and public health hold back for 72 hours all milk from cows treated with antibiotic by any means for any complaint.

**THIS CARD IS GREEN AND ALERTS YOU TO THE DANGERS**

AD 530

Department of Agriculture

**DAIRYING DIVISION**

Milk containing undesirable levels of ANTIBIOTICS (Penicillin, etc.) can be harmful to both human health and the quality of Dairy products. Please co-operate by refraining from sending milk to Dairy Produce Factories from cows treated with Antibiotics for any reason UNTIL AT LEAST 72 HOURS HAVE ELAPSED FROM THE LAST ADMINISTRATION.

54865/1/62—6m.

**THIS CARD IS RED AND WARNS YOU THAT UNDESIRABLE LEVELS OF ANTIBIOTIC OR OTHER INHIBITING SUBSTANCES HAVE BEEN FOUND IN YOUR MILK SUPPLY**

AD 531

Department of Agriculture

**DAIRYING DIVISION**

Antibiotic (Penicillin, etc.) was detected in your milk. Please do not send milk from treated cows UNTIL AT LEAST 72 HOURS HAVE ELAPSED FROM THE LAST ADMINISTRATION. It can be harmful to human health and the quality of the manufactured product.

54866/1/62—3m.

These cards are distributed by courtesy of dairy produce factories on behalf of the Department of Agriculture.
the West Australian Department of Agriculture. The product is "Dispen," made available for the tests by ICANZ Ltd.

Each dose of 1.3 grams contains 120 mgm. of edicol supra blue (brilliant blue F.C.F.), per 100,000 units of penicillin procaine G.

THE TRIAL

Three cows were milked and examined by a veterinary surgeon, and each quarter injected with one tube of "Dispen." Subsequent milkings were by hand into buckets.

The colour of the milk at each milking after injection was noted (samples are shown in the colour plate) and a sample of milk from each cow at each milking was assayed for penicillin loading until zero readings were reached.

Persistence of Penicillin in Milk

The persistence of visible dye in the milk of each cow, and the levels of penicillin remaining as a detectable residue are shown in Table 1. Although the bulk of both penicillin and dye was excreted by the fourth milking detectable levels were present for much longer (Table 2). In the case of one cow (No. 111) the dye was still visible at the ninth milking—108 hours after injection.

The intensity of discoloration of the milk varied with the volume. The colour was most vivid in small volumes.

Transfer of Antibiotics from one Quarter to Another

During the trial it was shown that antibiotic injected into one quarter could be transferred in detectable quantities to untreated quarters. The use of devices for separately marking treated quarters is therefore not recommended.

Marker Dyes—An Aid to the Dairy Farmer

Although the marker dye technique may have some application at the factory platform level, its main use will be as a guide to the dairy farmer.

When marker dyes are used with antibiotics there will be no doubt about when

### TABLE 1

<table>
<thead>
<tr>
<th>Cow No.</th>
<th>Average Daily Poundage Milk</th>
<th>Last Milking to show Visible Dye</th>
<th>Time</th>
<th>Antibiotic Level at this time</th>
<th>Zero Level of Antibiotic Attained</th>
<th>Recovery of Penicillin</th>
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<tr>
<td>111</td>
<td>24</td>
<td>7th</td>
<td>84</td>
<td>0-09 i.u./ml.</td>
<td>13th Milking—162 hrs.</td>
<td>%</td>
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<td>51</td>
<td>29</td>
<td>6th</td>
<td>72</td>
<td>0-01 i.u./ml.</td>
<td>7th Milking—84 hrs.</td>
<td>62</td>
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<td>23</td>
<td>4</td>
<td>7th</td>
<td>84</td>
<td>-002 i.u./ml.</td>
<td>8th Milking—96 hrs.</td>
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326
it is safe to include milk from treated cows in the bulk milk supply. Milk from these cows will be coloured until it no longer contains measurable traces of antibiotic.

The farmer who includes blue milk in his bulk supply to the dairy factory will do so in the knowledge that it contains antibiotic residue—and that it is therefore a threat to the health of consumers and to the prosperity of the dairy industry.

In short, the main use of marker dyes will be to remind dairy farmers to withhold milk from treated cows for at least 72 hours after the last injection of antibiotic.

Various forms of legislation are now under consideration to control the problem of antibiotic residues in milk supplies. The dairy farmer can make the greatest contribution by not supplying contaminated milk.

MARKER DYES IN ANTIBIOTICS

Milking machine sight glasses with milk from successive milkings of a cow treated with antibiotic containing marker dye

1st milking 2nd milking 3rd milking
4th milking 5th milking 6th milking