EFFECT OF A NEW ANTIBIOTIC, SPIRAMYCIN, ON YOUNG DAIRY CALVES 1, 2, 3

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SUMMARY

Thirty-six newborn male Holstein and Jersey calves were divided at random into three groups according to breed. Group I served as the control and was fed an unsupplemented calf starter. Group II was fed 250 mg. CTC for the first three days of life, 50 mg. for the next 28 days during the milk feeding period, and also a CTC-supplemented calf starter (18.6 mg. CTC per lb.). Group III was fed 250 mg. spiramycin for the first three days of life, 50 mg. for the next 28 days, and a spiramycin-supplemented calf starter (18.6 mg. per pound). Beginning at four days of age, whole milk was fed to all calves at the rate of 10% of the body weight daily for 28 days. Good-quality alfalfa hay and calf starter were also fed, beginning on the fourth day of life.

At 12 wk. of age, the two antibiotic groups of calves had achieved a significantly (P < .05) larger body weight gain than the control calves, by approximately 22%. A comparison between the gains of the two antibiotic groups showed no statistical difference. Feed conversion data in terms of E.N.E. required per pound of gain in body weight were in favor of the antibiotic-fed groups over the control, but this difference was not statistically significant.

The calves in the two antibiotic-supplemented groups had less severe periods of scour, which were found to be highly significant (P < .01) over the controls.

Spiramycin is of nutritional value for young calves as it promotes growth and reduces scour and compares favorably with CTC.

Since 1950, many research workers have confirmed the beneficial results of chlortetracycline (aureomycin) supplementation in the young dairy calf's ration on increased growth rate, reduced incidence of diarrhea, and general health of the calf (1, 2, 5, 6, 11, 12, 16, 17). Reports of antibiotic research in calf nutrition up to 1955 have been reviewed by Lassiter (6) and Reid et al. (12).

The relative nutritional value of other antibiotics for young calves have also been investigated, but to a lesser degree than chlortetracycline (2, 4, 6-8, 10, 12, 13, 18). A few reports have been concerned with the value of mixtures of certain antibiotics (2-4, 8, 14).

The apparent value of spiramycin supplementation to young dairy calves has not been reported. The purpose of this experiment was to study and compare the effect of spiramycin to chlortetracycline (CTC) on weight gains, feed conversion, incidence and severity of scour, and calfhood fatalities.

Received for publication December 12, 1960.

1 Supported in part by a grant from Rhodia, Inc., New York, New York.
2 The data are from a thesis presented by the senior author to the graduate faculty of Louisiana State University in partial fulfillment of the requirements for the M.S. degree.
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This experiment was conducted at the Louisiana State University Dairy Calf Nutrition barn during the months of September, 1959, to March, 1960. Thirty-six newborn male Jersey and Holstein calves were divided at random and placed into three groups according to breed, at one to three days of age as they became available. The dietary treatments of the three groups were as follows: Group I served as the control and received no antibiotic supplement during the milk feeding or in the basal starter ration. Group II received a 250-mg. capsule of crystalline chlortetracycline (CTC) per calf daily for the first three days of life. For the next 28 days during the milk feeding period, each calf in this group received a 50-mg. capsule of crystalline CTC daily. On the fourth day of life, the calves were offered a CTC-supplemented starter ration containing 18.5 mg. CTC per pound of starter, which was fed for the duration of the experimental period. Group III received a 250-mg. capsule of crystalline spiramycin per calf daily for the first three days, and for the next 28 days each calf received a 50-mg. capsule of crystalline spiramycin per calf daily. A spiramycin-supplemented starter which contained 18.6 mg. crystalline spiramycin per pound of starter was offered the calves in this group on the fourth day of age and fed for the duration of the trial. All calves were kept on sugar cane bagasse bedding, in individual stalls. Each calf was observed three times daily for the possible occurrence of scours, respiratory disease, or physical defects. The calves were weighed weekly up to 12 wk. of age.

All calves on the experiment received colostrum for the first three days of life. Colostrum was fed at the rate of 10% of body weight, and this amount was divided equally into two parts, making up the morning and evening feedings. Whole milk feeding began on the fourth day of life and continued at the 10% rate for the next 28 days. The only time feeding of the milk deviated from the normal rate was when a calf had scours. At these times, the amount of milk at each feeding was reduced 30-50%, depending on the severity of the scours. This was the only manner in which scours was treated.

The calf starters were offered to the calves in each group at a maximum rate of 5 lb. per day for the Holstein calves, and 4 lb. per day for the Jersey calves. The composition of the calf starters and the proximate analysis are shown in Table 1. The forage used in this experiment was good-quality alfalfa hay, which was placed before the calves beginning on the fourth day of age and fed ad libitum throughout the trial. Feed consumption was recorded daily. All data were subjected to statistical analyses, using the method of unweighted means (15).

RESULTS AND DISCUSSION

The average birth weights of the calves in each group and average gains adjusted for initial birth weights at 12 wk. of age are shown in Table 2. Six calves died during the course of the experiment and the data of the surviving calves were used for statistical analyses. Covariance analyses, using birth weight as the independent variable, indicated that the calves in the antibiotic groups (II and III) grew at a faster rate than those of the control group. The percentage increase in weight gain of the antibiotic groups over the control at 12 wk.
TABLE 1
Composition of calf starters

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Control</th>
<th>Chlortetracycline</th>
<th>Spiramycin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled oats</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Cotton seed meal</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Soybean oil meal</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Yellow corn meal</td>
<td>31.5</td>
<td>31.5</td>
<td>31.5</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Steamed bonemeal</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Salt</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Quadrex IV*</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Aurofae A*</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Spiramycin*</td>
<td>0.0</td>
<td>0.0</td>
<td>1.86 g.</td>
</tr>
</tbody>
</table>

| Vitamin A and D supplements—Contents: vitamin A, not less than 4,540,000 U.S.P. Units (1,363 mg.) per pound (10,000 units per gram); vitamin D, not less than 567,500 U.S.P. Units per pound (1,250 units per gram) NOPCO Chemical Co., Harrison, New Jersey. Aurofae A containing 1.86 g. of chlortetracycline per pound was supplied by Lederle Lab. Div., American Cyanamid Co., Pearl River, New York. Spiramycin, 1.86 g. per 100 lb. of starter.

TABLE 2
Average weight gains of calves

<table>
<thead>
<tr>
<th>Group and treatment</th>
<th>Breed and No. of animals</th>
<th>Av. gain at 12 wk. of age adjusted for birth weight</th>
<th>Increase due to antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Holstein</td>
<td>Jerse</td>
<td>(lb.)</td>
</tr>
<tr>
<td>I Control</td>
<td>6</td>
<td>5</td>
<td>68</td>
</tr>
<tr>
<td>II CTC</td>
<td>5</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>III Spiramycin</td>
<td>7</td>
<td>4</td>
<td>78</td>
</tr>
</tbody>
</table>

*Two Holsteins died in Group I, two Holsteins and one Jersey in Group II, and one Holstein in Group III.

* Significant difference at P < .05 over control group. No significant difference between antibiotic groups.
TABLE 3
Average feed consumption and feed conversion of dairy calves at 12 wk. of age

<table>
<thead>
<tr>
<th>Group</th>
<th>Av. consumption per group</th>
<th>Feed conversion</th>
<th>Av. E.N.E. a per pound gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Whole milk</td>
<td>Calf starter</td>
<td>Hay</td>
</tr>
<tr>
<td>I Control</td>
<td>214.32 (lb.)</td>
<td>178.46</td>
<td>31.22</td>
</tr>
<tr>
<td>II CTC</td>
<td>230.68</td>
<td>204.06</td>
<td>55.94</td>
</tr>
<tr>
<td>III Spiramycin</td>
<td>239.57</td>
<td>190.58</td>
<td>32.82</td>
</tr>
</tbody>
</table>

E.N.E. — estimated net energy.

control group, as shown in Table 3. Feed conversion was calculated as therms of estimated net energy (E.N.E.) per pound of gain. The E.N.E. input was calculated for the calves on the three treatments for the period 0-12 wk. Milk was given a value of 20 therms, calf starter a value of 68 therms, and hay a value of 40 therms of net energy per 100 lb. (9). No significant differences in feed conversion among the three groups were obtained. This suggests that the increased weight gains obtained by the antibiotic groups were due to the larger amount of feed consumed and not to the efficiency with which they utilized the feed. This observation is in agreement with previous work reported at this station (5) and at Iowa (1).

At an early age, scours became a major problem in this study. Apparently, an infectious scour organism was introduced into the barn, and normal management practices were unable to clear it. All outbreaks of scours occurred during the calves’ milk feeding period, i.e., the first 31 days of life. The number of calves scouring per treatment and the number of days of scours are shown in Table 4. A Chi-square test for differences indicated that the antibiotic-supplemented groups tended to control the severity and duration of scours which was found to be significant at P < .01, but failed to reduce the incidence of the number of calves scouring. Owen et al. (10) found that whereas several antibiotics under tests increased the rate of body weight gains, they had little or no effect on the incidence and severity of scours. Hogue et al. (4) suggested that the effect of antibiotics on the incidence of scours and growth is, at least in part,
independent. Thomas et al. (16) suggested that the major advantage of feeding antibiotics to dairy calves is the reduction in the incidence and severity of scours and not the temporary growth response.

During the course of the experiment, six calves died. All deaths occurred during the first 9 wk. of age. There were two deaths in the control group, three deaths in the CTC group, and one death in the spiramycin group. Immediately following each death, the carcasses were examined by a member of the University veterinary staff. There was an indication of a Salmonella infection and possibly a virus infection. The carcasses showed dehydrated tissues, gastric congestion, and edema of the lungs. Calves that died showed no noticeable physical symptoms or abnormalities prior to their deaths. No deaths could be attributed to scouring, nor was any calf scouring at the time of death.

From the results obtained in this study, it appears that spiramycin is of nutritional value for young calves as it promotes growth and reduces scours and compares favorably with chlortetracycline.

ACKNOWLEDGMENTS

The authors thank Professor E. J. Stone and Dr. B. R. Farthing for helping with the statistical analyses.

REFERENCES


