EFFECT OF PARA AMINO SALICYLIC ACID AND CHLORTETRACYCLINE ALONE AND IN COMBINATION ON DAIRY CALVES

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A ccelerated growth frequently has been observed in dairy calves fed chlortetracycline (Aureomycin). The mode of action is not clear, but it seems likely that inhibition of infectious bacteria is involved (Lassiter, 1955). The effect of chlortetracycline on various organisms *in vitro* was increased tenfold (Sirsi and Kale, 1951) by the simultaneous use of para amino salicylic acid (PAS). The purpose of the present work was to determine whether this synergism applies also to calf nutrition, and if PAS alone might be a desirable feed additive.

**Experimental**

Twenty-five young calves were assigned to 5 dietary groups consisting of one Guernsey and four Jerseys which were comparable with respect to sex, body weight, and height at withers. The calves were removed from their dams the day they were born and were confined to individual pens for the duration of the 60-day experimental period.

The calves were fed colostrum through the first 4 days, whole milk through 21 days of age, and thereafter reconstituted skim milk was used. All milks were fed by nipple pail at the daily rate of 9% of body weight divided into two equal feedings. Chopped alfalfa hay and dry mixed concentrates were offered free choice. The concentrate feed contained 50 parts ground oats, 60 parts ground shelled corn, 40 parts wheat bran, 20 parts dried skim milk, 26 parts cottonseed meal (41% crude protein), 2 parts salt, and 2 parts bone meal.

Chlortetracycline and PAS were dispersed in the milk. The amounts allowed per hundred pounds body weight per head daily were as follows:

- A. None, Control;
- B. PAS, 90 mg.;
- C. Chlortetracycline, 45 mg.;
- D. Chlortetracycline, 45 mg., and PAS, 90 mg.;
- E. Chlortetracycline, 4.5 mg., and PAS, 90 mg.

All calves were observed for evidence of scours or other abnormalities and feed consumption was recorded daily. Body weights and heights at withers were determined initially and at subsequent weekly intervals.

The initial group-mean body weights were lacking in uniformity. These differences were not significant, however, as shown by an analysis of variance technique. The same procedure was used to analyse the experimental results (Snedecor, 1946).

1. Florida Agricultural Experiment Station Journal Series No. 603.
2. Supplied by Lederle Laboratories, Pearl River, New York.
3. Purchased from Nutritional Biochemicals, Inc., Cleveland, Ohio.

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Results

*General health.* No scouring was observed in any calf. The calves which received either PAS or chlortetracycline alone seemed especially alert. Their hair coats were glossier in appearance than those of the other calves.

Although the differences in appetite were slight, the use of PAS appeared to stimulate the consumption of hay. The calves in Group C, receiving only chlortetracycline as an additive, excelled in consumption of the mixed concentrates. The observations were insufficient to determine whether the slight differences were caused by the supplements or were due to chance. However, the calves receiving the combined supplements appeared not to differ from the controls in either appetite or general thriftiness.

![Graph](image)

**Figure 1. Effect of chlortetracycline and PAS on body weight.**

*Changes in body weight.* Groups D and E, which received both supplements, gained at an almost equal rate; and hence the growth data of these groups were combined for presentation in figure 1.

The control group gained an average of 41 lb. (figure 1). Feeding of PAS as the only supplement to Group B resulted in an average gain of 51 lb., a difference which was significant at $P=0.01$. The mean gain for Group C, which was supplemented with chlortetracycline alone, was 53 lb. This gain likewise was significantly different at the 1% level from that of the control group. The small difference between the groups which received each supplement separately, however, was not significant.

Results observed in Groups D and E from the combined use of PAS
### Table 1. Relation of Chlortetracycline and PAS to Growth and Efficiency of Feed Conversion

<table>
<thead>
<tr>
<th></th>
<th>Mean gain in</th>
<th>Feed intake per pound gain in body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Body weight</td>
<td>Height at withers</td>
</tr>
<tr>
<td>Control</td>
<td>lb.</td>
<td>%</td>
</tr>
<tr>
<td>PAS</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>Chlortetracycline</td>
<td>51</td>
<td>10</td>
</tr>
<tr>
<td>PAS + chlortetracycline (45 mg. level)</td>
<td>53</td>
<td>11</td>
</tr>
<tr>
<td>PAS + chlortetracycline (4.5 mg. level)</td>
<td>43</td>
<td>10</td>
</tr>
</tbody>
</table>

\( ^a \) C = Coefficient of variation.

\( ^b \) Morrison, F. B., Feeds and Feeding. 21st ed. 1948.
with chlortetracycline were unexpected. It appeared that the 4.5 and the 45 mg. levels of chlortetracycline were ineffective in the presence of PAS. The average gains were 43 and 42 lb. respectively as compared with 41 lb. for the control group.

*Effect on height at withers.* The gain in height at withers was greatest in Group C, which averaged 10.7 cm. This was followed in order by Group B, 8.6; Group A, 7.8; Group E, 7.8; and Group D, 7.4 cm. Because individuals within groups varied considerably, none of these observations were statistically significant.

*Effect on feed conversion.* The average nutrient intake per pound of gain was lowest in Group B for which PAS was the only supplement (table 1). This difference, however, was not statistically significant.

**Discussion**

Under the conditions of this experiment, chlortetracycline and PAS were almost equal as growth factors. The two combinations studied were not compatible. However, further work with other combinations would seem desirable.

The fact that PAS alone stimulated growth lends support to the postulation that the growth-stimulating properties of antibiotics are due in part to their effect on bacteria (Lassiter, 1955). It seems likely that the antagonism between PAS and chlortetracycline occurred as the result of an adverse effect of the combinations on important symbiotic organisms.

**Summary**

Growth in young calves was stimulated by PAS and chlortetracycline when fed separately. Combinations of the two, however, resulted in growth which was not significantly different from that of comparable controls.

**Literature Cited**

