Effects of a Corticosteroid and Diuretic Agent on Udder Edema and Milk Yield in Dairy Cows

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ABSTRACT
Treatment of edematous condition of udder with a combination of a diuretic and a corticosteroid administered for three successive days following parturition did not reduce the number of days required to reach peak production. Treatment had no effect on milk production, either adverse or beneficial. Data were from 73 Holstein cows and heifers.

INTRODUCTION
Udder edema is a commonly occurring condition usually associated with parturition in dairy cattle. Morrow and Schmidt (7) defined udder edema as the accumulation of lymph between the secretory tissue and the skin of the udder in the intercellular tissue spaces, which in turn causes swelling. The edematous udder is more prone to trauma, mastitis, and teat-end injury. It becomes difficult to apply the milking machine and to remove normal amounts of milk (8). Espe and Smith (2) found that udders badly congested for some time before freshening seldom returned to normal because of the infiltration of fibrous connective tissue. In cases of edema that persist for a long time, the suspensory apparatus of the udder is damaged to such an extent that eventually the teats point laterally instead of vertically due to relaxation of the elastic medial suspensory ligament (7).

Wise et al. (11) reported that occurrence of the edematous condition was more frequent and more pronounced in first-calf heifers than in older cows. Snider et al. (10), from a study involving 12,000 cows in 434 herds, indicated the incidence of edema was approximately 18%. However, less than 1% of the animals received veterinary treatments. Schmidt and Schultz (9) found no significant differences in edema of cows fed different amounts of grain prior to calving. Fountaine et al. (3) reported no effect on the severity of edema when they compared dry cows fed only roughage with dry cows fed roughage and concentrates. Hathaway et al. (4) and Hemken et al. (5) reported the incidence and degree of udder edema was not related to the plane of nutrition. Ackerman et al. (1) found that there was no beneficial effect from prepartum milking on the reduction of the amount of edema at calving. They suggested that unless colostrum from those cows milked prepartum is frozen for later use, the overall effect is probably detrimental.

Morrow and Schmidt (7) stated that only since the availability of diuretics has the edematous condition received widespread treatment. The most effective form of treatment of edema is the use of a diuretic (8). Diuretics can be administered orally or parenterally and are effective in reducing the amount of edema and duration of the condition. Numerous testimonials have been received by pharmaceutical companies from veterinarians stating diuretic compounds have aided in reducing udder edema. Others have stated that these same compounds cause a reduction in the amount of milk an animal would have produced had she not been administered the compound. However, few if any experiments have been conducted specifically to determine the effect of the administration of a combination of a diuretic and anti-inflammatory agent on edematous cattle and its relationship to productivity.

The objective of our study was to determine whether the administration of a diuretic compound containing an anti-inflammatory agent to postpartum cows resulted in peak milk production at an earlier date than those animals treated with a placebo, whether the peak production was increased, and whether there

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TABLE 1. Edema score, days to peak production, milk at peak production, and production in the first 40 days.

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Animals (no.)</td>
<td>Edema score</td>
</tr>
<tr>
<td><strong>HEIFERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>Mean</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>.3</td>
</tr>
<tr>
<td>Adjusted for edema score</td>
<td>Mean</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>COWS</strong></td>
<td>Unadjusted</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>.2</td>
</tr>
<tr>
<td>Adjusted for edema score</td>
<td>Mean</td>
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<td></td>
<td>SE</td>
<td>1.6</td>
</tr>
<tr>
<td>Adjusted for edema score and &quot;Real Producing Ability&quot;</td>
<td>Mean</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>1.6</td>
</tr>
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</table>
was any difference between treated and control animals in total production for the first 40 days.

**EXPERIMENTAL PROCEDURE**

The study used 51 parous cows and 22 first-calf heifers of the Holstein-Friesian breed. Each group was divided into two subgroups: treatment and control. Animals were assigned randomly to one of two subgroups prior to parturition. Each animal received four boluses: two on the day of parturition and one on each of the 2 days following parturition. Treatment boluses contained 200 mg trichloromethiazide (a diuretic) and 5 mg dexamethason (an anti-inflammatory corticosteroid)\(^3\). Control boluses were placebos. Administration of treatments was without the knowledge of the content of the boluses.

Edema in the udder on the day of parturition was determined and coded: 0, no edema; 1, slight edema; 2, moderate edema; 3, heavy edema; and 4, severe edema. All animals were milked twice daily. Peak production and days to peak were calculated as the mid-day of the highest 3-day average.

All parous animals in the herd were ranked according to their Real Producing Ability as described by Lush (6). This method compares each animal’s individual lactation with her contemporary herdmates and adjusts for varying number of lactations.

Covariance, adjusting for edema score in cows and heifers and adjusting for edema score and Real Producing Ability in cows, was analyzed. Days to peak production, milk per day at peak production (kg), and total milk for the first 40 days (kg) were the response variables. The purpose of adjusting for edema and Real Producing Ability was to ascertain what group means would have been if both groups had been under the same edema condition and if the cows possessed the same Real Producing Ability.

**RESULTS AND DISCUSSION**

Results of the analysis are in Table 1. Seven animals were eliminated from the trial for unavoidable circumstances such as ketosis, pneumonia, and injury. Edema score, days to peak production, milk production at peak (kg), and total milk for the first 40 days (kg) were not significantly different between treated and control cows and between treated and control heifers. This was true for unadjusted means and after adjustment for edema score and Real Producing Ability. Naquasone had no effect on milk production. When milk during the first 40 days and peak milk production were adjusted for Real Producing Ability and edema, treated animals had a slight advantage even though the differences did not approach significance.

The incidence of edema in this herd was large: 52% of the cows and 80% of the first-calf heifers had coded edema scores of 2, 3, or 4. That more first-calf heifers exhibited edema than cows agrees with findings of Wise et al. (11). First-calf heifers also took longer to peak than did parous cows.

There were four cows in the control group that had persistent edema (considerable congestion and swelling between days 10 and 15 postpartum) whereas no cows in the treated group had this persistent edema. Three heifers in the control group also had persistent edema but none in the treated group. Even though edema scores were not recorded after the initial score, since it was not the objective of this study to evaluate edema score, general observations indicated there was a more rapid decrease in edema in treated groups than in control groups.

**ACKNOWLEDGMENT**

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**REFERENCES**


\(^3\) Naquasone\(^\text{®}\), Schering Corporation.