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Is cooling cows worth the cost?

by Israel Flamenbaum

Dairy farmers around the world, mostly in warm regions, are familiar with the negative impact of heat stress on cows' performance. Only few of them, though, have the means to quantify how much a hot summer is actually costing them.

In an article we published last year (August 10, 2009, page 503), the effect of intensive cooling cows by a combination of wetting and forced ventilation developed in Israel and tested under its summer conditions was described. The study compared the lactations of cows in high-yielding, large-scale dairy farms that intensively cooled their cows in the warm summer months to those almost doing nothing to relieve summer's heat.

According to the results of this study and others carried out in Israel, we found that intensive cooling the dry and lactating cows in the summertime has the potential to boost cows' annual milk production by 8 percent above normal levels reached when cows are not cooled.

In our new research, we calculated the cost effectiveness of intensive cooling cows during the summer when implemented in a typical large-scale dairy farm, located in the southern United States. These locations have 120 stressful summer days per year—almost identical to the climate and productive conditions in Israel. We assumed, according to the experience gained in Israel, that the improvement in milk production due to intensive cooling the cows will range between 5 and 10 percent annually. We also assumed the improvement in feed efficiency for maintenance and milk production to range between 5 and 10 percent.

The following prices were used to calculate the results (actualized for August 2009):

- Farm gate milk price — $12, $14, and $16 per cwt.
- Feed cost — $0.09 per pound of dry matter (DM).
- Cooling costs per cow — $36 per year which takes into account $60 per cow return for cooling equipment (payback in 10 years) and $30 per year for expenses as electric, pure water, and manpower.

When calculating cost effectiveness of intensive cooling under U.S. production conditions, the increase in a farm's annual profit reflects the difference between the increase in a farm's income from extra milk produced and the extra expenses required for its production (additional feed and cooling system installation and operation).

In our study, we make use of a 1,000-cow dairy farm located in a warm region of the southern U.S. Without using any cooling means in the summer, a farm's per-cow annual production is expected to be 22,000 pounds. Intensive cooling in summertime is expected to boost a farm's annual production by 5 or 10 percent (average per-cow annual production ranging between 23,100 and 24,200 pounds). According to recent experience gained in the U.S. and Israel, we expect intensive cooling the cows in summer to also improve cows' feed efficiency for maintenance and milk production. In our calculation, we assumed feed efficiency improvements of 5 and 10 percent for all the cows in the herd.

Here's how they did

The increase in per-cow annual profit, due to the greater income from extra milk produced (in different price paid), after deducting the expenses for extra feeding and intensively cooling the cows, is presented in the table.

From the data presented in the table, we learn that the overall improvement in farm's annual profit due to intensive cooling the cows in summer can range between $80,000 to $280,000 per year ($80 to $280 per cow), depending on the price paid for the extra milk produced, rate of increase in cows' annual production, and rate of improvement in their feed efficiency due to intensive cooling them in summer.

Even when we doubled the cost of cooling in our calculation (from $36 to $70 per cow per year), herd profit was reduced slightly, ranging between $45,000 to $245,000 ($45 and $245 per cow per year). This indicates that, in case we obtain 5 to 10 percent increase in cows' milk production and in feed efficiency, cost of cooling has a relatively small influence on the profitability of intensively cooled cows in the especially warm summer months.

It is very important to clarify that the present study took in account only the economical benefits, raised from the effect of intensive cooling cows in the summer on herd's total feed expenses and feed efficiency. Other potential economical benefits such as the increase in milkfat and protein content, the reduction in milk SCC, and expected improved fertility are not taken into account in the present study and have the potential to further increase the total benefit from intensive cooling the cows in summer.

It seems that the implementation of intensive cooling systems in dairy farms in the southern U.S can be an attractive investment for the farm. For many farms today, implementation of intensive and efficient cooling methods (as it is already done in most dairy farms in Israel) can be the difference between losing or gaining money at the end of the year.

<table>
<thead>
<tr>
<th>Benefit from cooling cows (U.S. dollars)</th>
<th>12</th>
<th>14</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm gate price for extra milk produced due to cooling ($/cwt.)</td>
<td>$90</td>
<td>$170</td>
<td>$300</td>
</tr>
<tr>
<td>Expected increase in annual milk production</td>
<td>5%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Expected improvement from cooling</td>
<td>8%</td>
<td>170</td>
<td>120</td>
</tr>
<tr>
<td>Feed efficiency</td>
<td>10%</td>
<td>200</td>
<td>290</td>
</tr>
</tbody>
</table>

The author was formerly with the State of Israel, Ministry of Agriculture, Extension Service and now is a consultant.