

Cooling Dairy Cows in Hot Season Improves Profitability and Sustainability of Milk Production

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Cooling cows in summer is a common practice used by dairy farmers in Israel for decades and is lately largely adopted by dairy farmers all over the world, especially in hot regions. The increase in the necessity for cows cooling is related to both, global warming and the increase in cow's productivity, leading to an increase in cow's heat production and necessity for its dissipation.

The most common cooling practice in world dairies is based on a combination of wetting and force ventilating the cows, usually provided in the holding pen, before and between milking time, and along the feed line. During summer months, Israeli cows are intensively cooled, provided 30-60 minutes "cooling treatment", almost every 3 hours and a total of 6 consecutive hours during the entire day. A large scale survey, based on "Israel Herdbook" data demonstrated that, high yielding cows, cooled in the summer, reached 98.5% of milk produced by their herd mates in winter, while non cooled cows reached only 90% of winter production (summer averages being 0.6 and 3.6 kg/day less than winter production averages, in cooled and non cooled cows, respectively). While winter conception rates were similar in all farms (~ 45%), summer conception rates of cooled cows were almost double, compared to non cooled ones (34% and 16%, respectively). In general, annual milk production of cooled cows in Israel tended to be 5% to 10% higher, when compared to non cooled cows.

Recently, great attention is paid all over the world to the relationship between the process of milk production and the environment. Milk production process in many countries is examined these days, not only in economical parameters, but also, to its emission of "green house" gases and its contribution to global warming.

In the following article, “green house gases emission balance” is calculated for the use of cows cooling practices in the Israeli dairy farms. We assume that the same data can fit with many other dairy sectors in the world. In our study we relate the increased CO₂ emission to the atmosphere, due to the use of electricity for fans operation in the cooling process, to the expected reduction of CO₂ emission to the atmosphere, due to the reduction in number of cows and their maintenance methane (CH₄), emission.

This study is based on data, published in two international events carried out recently:

1. IDF annual meeting 2006, Shanghai, China. Special conference titled “Reduction of Greenhouse Gas Emission at Farm and Manufacturing Levels” , Bulletin 422/2007.
2. First IDF Dairy Summit – The heat is on? , Edinburgh, Scotland, June 2008. (A lecture presented by Dr. Torsten Hemme from IFCN institute in the summit).

Calculating CO₂ Emission from fan operation in the cooling process:

Basic data:

- The production of 1 KW/h of electricity from coal emits 1.4 kg of CO₂ to the atmosphere.
- Fans used in the cooling process consume 0.6 KW/h.
- For intensive cooling the cows under Israeli climatic conditions, fans should operate for 8 hours per day, 120 days per year.
- For optimal cooling, a fan is required for every 5 cows.

Based on these parameters, our calculation is that operation of cooling system creates an additional emission of 160 kg CO₂ per cow/year.

Calculating the reduction in CO₂ emission by cows, due to the improved production efficiency and reduced cows number, related to cows cooling:

Basic data:

- The production of 1 kg milk is related to the emission of an equivalent to 1.3 kg CO₂.
- Cooling cows in summer increases annual milk production and decreases herd size by 5%.
- Annual CO₂ emission for cow's maintenance is 40% of that emitted by a lactating cow and reaches 6000 kg CO₂.
- CO₂ emitted from manure is 420 kg/cow/year.

Based on these parameters we found that improved production efficiency and the reduction of herd size by 5%, due to cooling cows in summer, reduces CO₂ emission by 320 kg/cow/year, near double of that emitted in the cooling process. In case that increased annual production due to cooling will reach 10% (a common result in many dairy sectors in hot regions), the reduction in CO₂ emission will reach 4 times of that emitted during cooling process.

We can be concluded that cooling cows in summer, in addition to it's beneficial economical effect in increasing production efficiency and reducing seasonal discrepancy in milk supply, is environmental friendly, by reducing dairy sector contribution in greenhouses gases emission and global warming.