

# Water, wind, time and a cow, is all you need to cool your cows in summer.

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During my consultancy activities, I get to visit many dairy farms, especially, those located in "warm regions" of the world. The visits are focused on the efforts to reduce the negative impact of summer heat stress on cow's performance.

Very few of the farms I visit do not have any kind of means to cool their cows in the summer and need to start from the beginning. "Cow cooling" is one of the topics, mostly studied in recent years by researchers from Universities and research institutions in warm countries and published in scientific and popular articles. Based on the information reached, ministries of agriculture and farmers organizations have published books and recommendation bulletins, providing instructions for proper installation and operation of cooling systems for the cows in the summer.

Unfortunately, despite extensive knowledge published on cow cooling topic and farmer's access to the information, only small part of the dairy farms I visited till now, run their cooling system properly and get the expected results. The "summer to winter ratio" index has been running more than a decade in Israel dairy sector. This is a good tool for evaluating the dairy's capability to successfully deal with summer heat stress. The data published in Israel in recent years indicate a wide variation in this index in terms of milk production and conception rate, between different farms. In an average, the Israeli dairy farms produced 4% less milk in summer (July – September) 2013, as compared to the winter (January – March). The extent of the decline was more than 20% in some of the farms, while in others, there was no decline at all. In the same year, national average of summer conception rate reached 26%, ranging between 5% in certain dairy farms and 40% in others.

What makes the difference between the dairy farms regard to cow's performance of the summer?

It is likely that some of the difference lies in the geographical and topographical location of the dairy farms, the type of housing and cow's density inside the buildings, as well as the type of feeding and the frequency it is distributed to the cows. However, to my opinion, the factor that causes the greatest impact on cow's performance in the summer is "cooling quality".

Recently I asked myself, what are the characteristics of what we call "cooling quality", and the answer I give myself consists of the four words appearing in the title of this article, water, wind, time and a cow. In this article I would like to develop each one of these four factors and its contribution to the quality of cooling. In my experience, I have learned that only by complete application and right combination of all of them, allows achieving good cooling of the cows in the summer and achieving the expected productive and reproductive results, as mentioned above.

## **Water.**

In our case this is not only the water for drinking, although this issue is of great importance to the cows in summer. At least 10 cm of water trough per cow with clean and cool water are recommended for cows in warm regions, to allow cow's needs, preferably, dispersed as much as possible along the cowshed. The water in our case is for the cooling process. The combination of wetting with forced ventilation is the best way to cool the cows. Evaporation of water from cow's body allows heat loss which is five times of the heat loss achieved by ventilation or wetting only.

## **But do we wet the cows properly?**

Various factors influence the quality of wetting among them the size of droplets and the strength they cow's surface which depends on the type of sprinklers used and the distance between sprinklers. Too small droplets may not penetrate the cow's fur, which prevent contact between the water and cow's skin and this affects cows cooling. Even natural side winds blow perpendicular to the wetting drops may divert water to the sides and keep the cow dry. The frequency of wetting is also an important factor. Studies show that every 5 minutes wetting combined with forced ventilation give the maximum cooling, when wetting in larger intervals will reduce cooling quality. So, the first condition reach good cooling is to reach good wetting.

## **Wind.**

Proper evaporation of water from cow's surface, especially in humid regions requires ventilation of the cows with high intensity. Here too, the research came to our aid and found that forced ventilation at 3 meters per second, when combined with wetting the cows every 5 minutes, may give the optimum cooling. My recommendation is to every dairy farm to have a wind speed meter and place the fans in the waiting yard, feed line and rest area according to wind speed created by fans. Also, referring to fans operation, the natural side winds may have a major impact on the quality of ventilation. In my experience, these winds may decrease to half the speed of the wind produced by the fans along the feed line, waiting yard or resting area. To avoid the negative impact of the cross natural winds in the summer it is recommended to block them through curtains or walls made of more solid materials, and which can be removed in the winter.

## **Time.**

The time factor is very important in the success of cow cooling. This is the total cumulative hours during the day for the cows being cooled in summer, as well as the intervals between "one cooling session" to another.

The high-yielding cow produces more than 2,000 watts of heat and in order to lose it to the environment through cooling, she needs to be intensively cooled for a long time during the day. A big mistake is to think that by cooling the cows for a few short minutes before each milking session, the cows can be cooled sufficiently. Based on recent studies, we learned that in order to dissipate most of the heat produced by the high yielding cow during the day, there is a need to cool them for between 4 and 6 cumulative hours per day, and for the largest number of times possible.

What is the optimal duration of each cooling session? There is no clear answer for that and it is probably different from one farm to another and it probably depends on the distances the cows need to walk to and from the milking parlor and/or the cooling site. The exposure of cows to direct solar radiation in un shaded walkways, as well as the density of cows in the cooling site can influence cooling quality and therefore, the duration of optimal cooling sessions. Recent studies conducted in Israel showed that under conditions where cows are not required to walk long distances in the in the sun, the optimal duration of each cooling session can be of 25 minutes, combining continuous forced ventilation and wetting the cows for a short period (30-40 seconds), every 5 minutes, when treatment is provided for 8 times a day (every three hours on average, 200 minutes cooling mounting day). Is this true also for dairy farms where cows are required to walk for long distance in order to be milked and/or cooled? It is not yet known and is being learned in these days in large scale dairy farms, located in a warm region of North Mexico.

## **Cow.**

This is of course the most important factor in our story. Everything described so far is intended to allow good cooling of the cows, however, are we certain that there is a cow presented in the right place at the right time to get the treatment, for which we have invested and we worked so much? The presence of the cow in the cooling site is, in my opinion, the most important factor, determining the quality of cooling and the main cause of the differences in the response of the cows to the cooling treatment. This is particularly true for those dairy farms which cool the cows in the feed line, where cooling is given without "locking" the cows and by this, ensuring their presence in the cooling site when it operates. Even when we do lock the cows in the feed line when being cooled, cooling quality can be different between cows,

situated in "areas" with better or inferior cover of cooling, arising from the location of the fan or the sprinkler in relation to the specific cow. The same applies to cooling in the waiting or special cooling yard, where the degree of coverage can differ from one cow to another in the same yard, depending where the cow stands.

Up to this point, one can understand that there are many different factors that can affect the quality of cooling and hence, the way farm deals with heat stress in summer. It is very clear that, only by combining proper operation simultaneously of all the factors above mentioned, may give the expected result and the return to investment in cow cooling.

Recently we started using a new simple and cheap technology for monitoring diurnal changes in cow's body temperature, making use of intra vaginal temperature data loggers inserted to cow's vagina attached to CIDR devices. I highly recommend the use of these thermometers to evaluate the efficacy of farm's cooling system and management. I recommend inserting at least 5 devices in a time for a group of cows (and 10 devices will be even better). The information will teach us if our cows are sufficiently cooled and, in case of large variation between cows, it will be a sign that our treatment is not uniform and there is a room for improvement.

Studying the "cost-effectiveness" of cooling by a special program I developed recently shows that, when giving the expected results, the investment in cow cooling may pay for itself in less than two years, leaving a respected profit to the farmer, after covering all operating and extra feeding expenses required for the increase in milk production in the summer. On the other hand, a dairy farm investing much money to install and operate the cooling means, who does not receive the expected results, may lose money, due to the decline in cow's production and the expensive cooling cost.

In conclusion, it is important to cool the cows in the summer, but there is a need to do this properly in order to get the improvement in milk production and fertility and reach the economic benefits from the process.

## Author/s



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Dr. Flamenbaum started working with dairy cows in the late sixties, as an herd man and then, in charge of the 150 dairy cows herd in Kibbutz Misgav Am, in the north of Israel. Then he joined the State of Israel, Ministry of agriculture, Extension services in 1977. Since 1977 until 2008 - Serving in different positions, starting as a dairy cattle regional extension officer, head of cattle department and lately, as the director of the division of Animal Husbandry. In April 2008, he retired and dedicated professional activity time as private consultant in Israel and worldwide.