

**Entrevista Flamenbaum Enfriamiento de vacas
lecheras Successful implementation of intensive cow cooling
system
in large scale dairy farms in Italy**

Israel Flamenbaum Ph.D
Cow Cooling Solutions Ltd, Israel.

israflam@inter.net.il, www.cool-cows.com

Dairy farmers in warm regions, are familiar with the negative impact of heat stress on their cow's performance. Unfortunately, for the moment, very few farms have the means to quantify the economical losses caused by hot summer, know the potential benefit and properly cool their cows in the warm season.

In an article published recently, the effect of intensive cooling cows by a combination of wetting and forced ventilation, developed in Israel and tested under its summer conditions, as well as those in North Mexico, was described. The study compared complete lactations of cows in high yielding, large scale dairy farms, intensively cooling their cows in the summer, to those with very limited cooling treatment. According to the results of this study and others, carried out in Israel, intensive cooling the cows in the summer have the potential to increase cow's annual milk production by approximately 10% above the production level of farms where cows are not properly and sufficiently cooled.

In the present article, the results of the first year of intensive cooling the cows in two large scale dairy farms in Italy is presented.

In early 2016, I was invited by two farm managers, Maccarese and Cirio dairy farms, belonging to Benetton Co., to consult them on how to improve the operation of cow cooling systems, already existing there for years. After realizing visits to the two farms, they were recommended to make some installations modifications and changes. In parallel, instructions were given on how to properly operate the cooling system in each farm in order to reach proper cooling of the cows in the summer and achieve better professional and economical results. In agreement with farm managers, a working protocol was established for each farm which includes the supply of monthly farm data and periodic visits to the farm, which I realized along the year, in the summer, to supervise cow cooling system operation and at the end of the year, to summarize the results obtained and make necessary changes for further improvement in next summers. The improvements in cow cooling treatment, based on the combination of wetting and force ventilation of the cows in waiting yard and feed line, included providing the cows with required wind speed and wetting quality, as well as sufficient cooling time along the day, during all summer stressful period.

The results are described I separate for each of the two farms.

Maccarese farm – 1200 milking cow's farm, located near Rome, Italy. The farm milks the cows twice daily. Average per cow annual production in 2015, was of 10,000 liters.

The farm was already equipped with Arienti fans in the waiting yard and feed line and Arienti ceiling fans in the barns, above free stalls. Due to my recommendation, more fans were added to both waiting yard and feed line to reach the requested wind speed. In parallel, an operation protocol was given, to achieve proper cow cooling.

The results regarding milk production and fertility are presented in the following figures and tables:

Figure 1- Daily milk production per adult cow (liters), in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

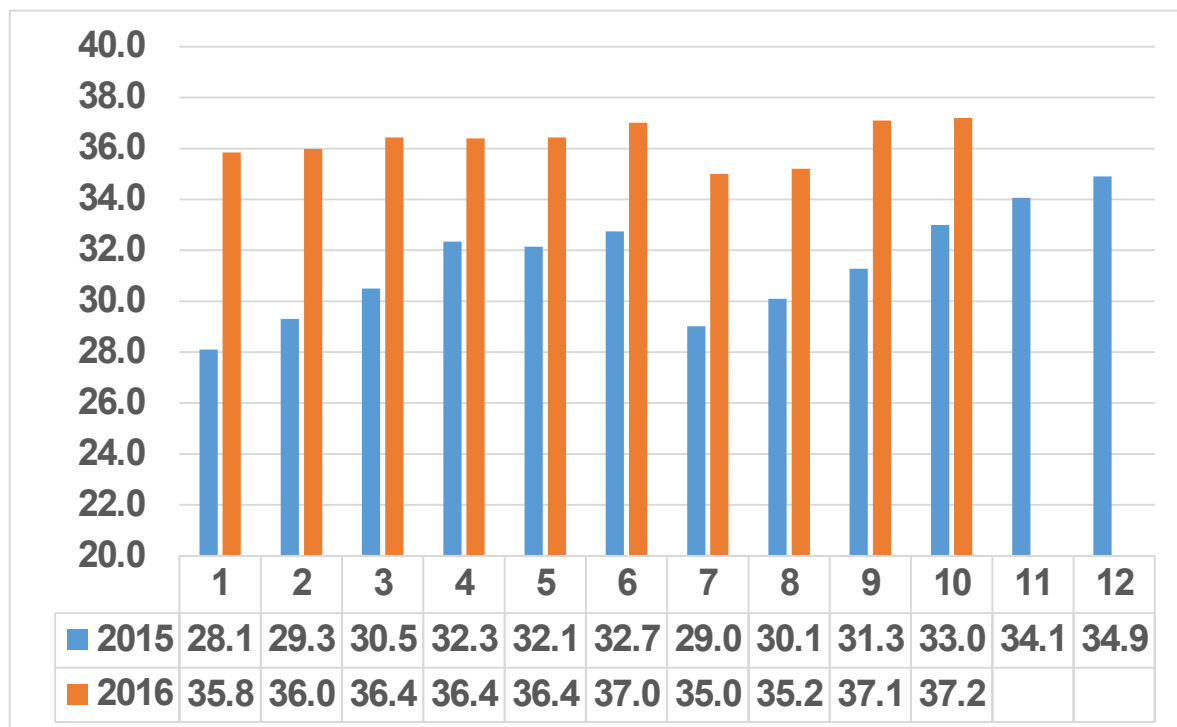


Figure 2 – Monthly conception rate (%), in inseminations given in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

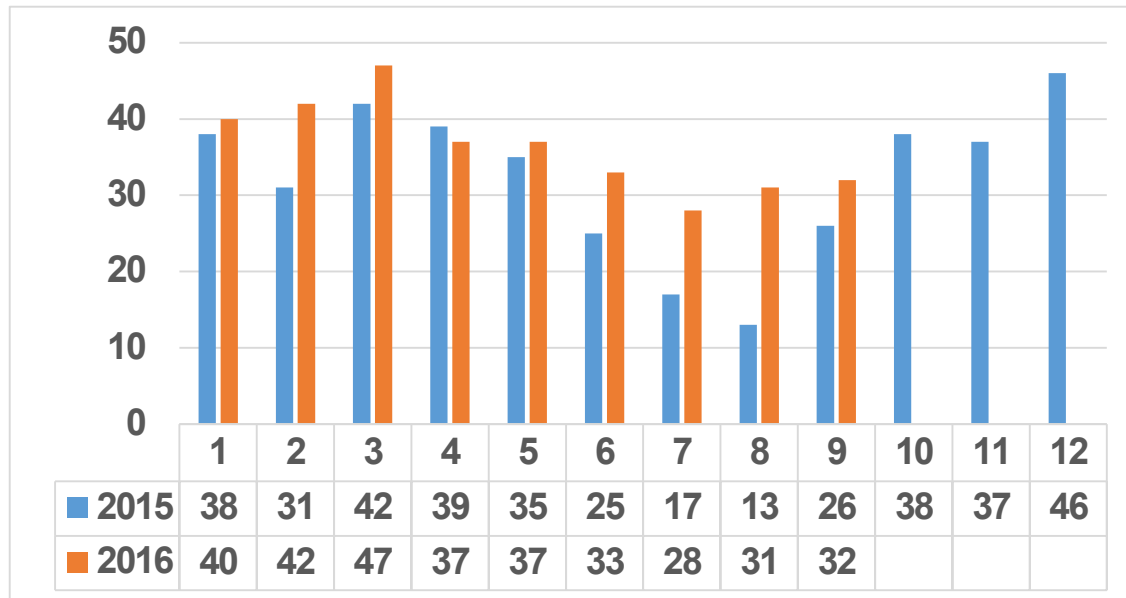


Table 1 – Conception rate (%), in all inseminations given to first lactation and adult cows during summer months in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

	Conception Rate 2015	Conception Rate 2016	Increase 2015 - 2016 Percentage points
Conception Rate First lactation (July – September)	17.0%	34.3%	+ 17.3
Conception Rate Adult cows (July – September)	18.7%	30.3%	+ 11.6

Cirio farm – 1500 milking cow's farm, located near Caserta, Italy. The farm milks the cows 3 times per day. Average per cow annual production in 2015, was of approximately 11,000 liters.

The farm was already equipped with ceiling fans in the waiting yard and resting area and tube fans in the feed line. Due to my recommendation, more fans were added to feed line and ceiling fans were changed to other type fans in the waiting yard, with the aim to reach the requested wind speed. In parallel, an operation protocol was given, to achieve proper cow cooling.

The results regarding milk production and fertility are presented in the following figures and tables:

Figure 3- Daily milk production per adult cow (liters), in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

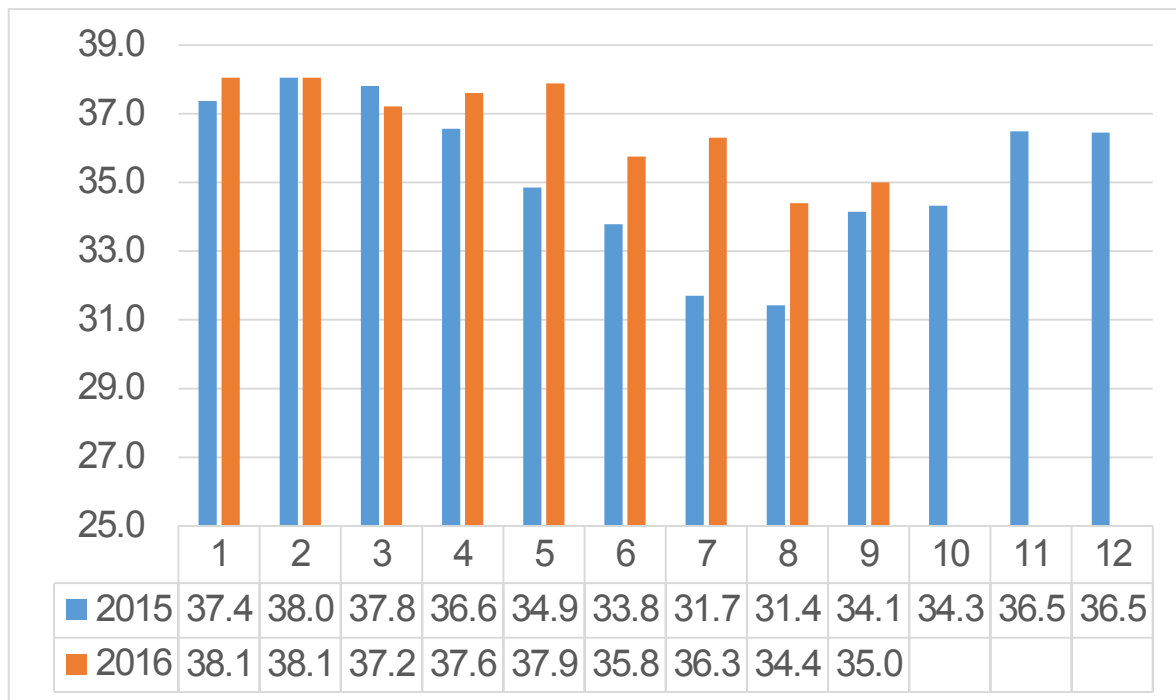


Figure 4 – Monthly conception rate (%), in inseminations given in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

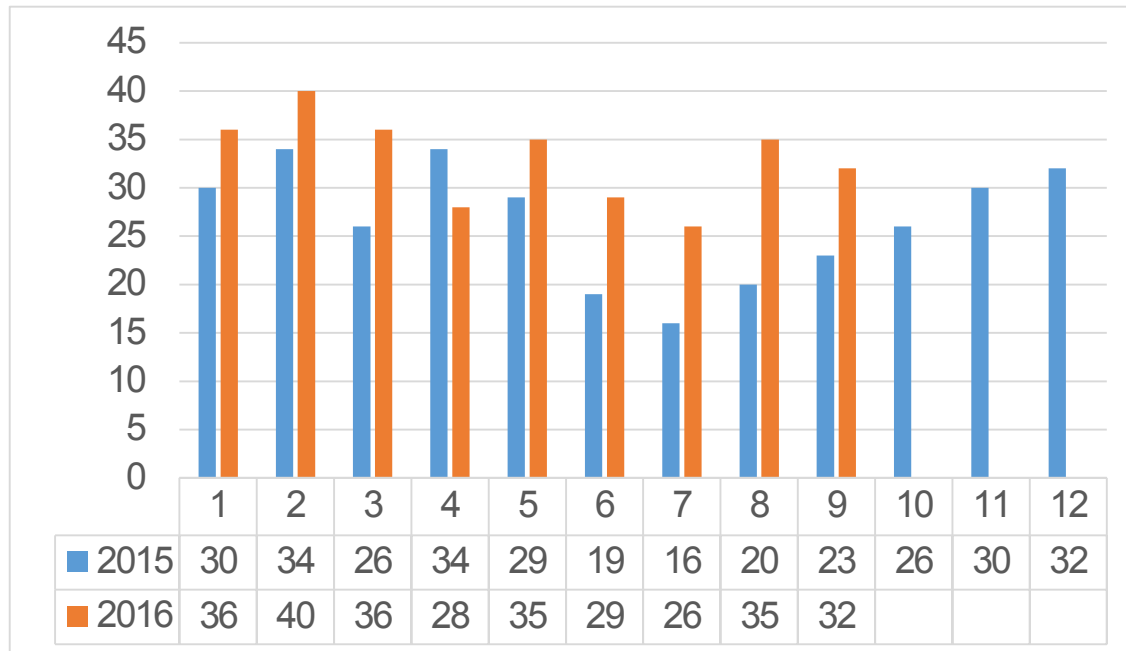


Table 2 – Conception rate (%), in all inseminations given to first lactation and adult cows during summer months in 2015, with limited cow cooling treatment in the summer and in 2016, with intensive cooling in the summer.

	Conception Rate 2015	Conception Rate 2016	Increase 2015 - 2016 Percentage points
Conception Rate First lactation (July – September)	21.3%	35.3%	+ 14.0
Conception Rate Adult cows (July – September)	19.7%	31.0%	+ 11.3

From the presented in figures 1 and 3 we can see a significant improvement in milk production per cow in 2016, as compared to 2015, mostly due to the implementation of intensive cooling treatment in the two farms. Although, milk production in Maccarese farm started increasing in late 2015 (probably, due to improvement in feeding and management changes), milk production in the summer of 2016 persisted better and was significantly higher than the year before, similar to the trend in milk production in Cirio farm. The data presented in

figure 2 and 4 and in tables 1 and 2, describe a significant improvement in conception rate in both farms, for inseminations given in the summer months of 2016, as compared to 2015. Conception rates in 2016, almost doubled those of 2015. These results are much in accordance with results obtained in "good cooling" farms in Israel and recently, also in large scale dairy farms in north Mexico.

Economical evaluation

Based on the results in Maccarese farm I realized a cost effectiveness evaluation of the implementation of cow cooling system in Italian dairy sector conditions for late 2016.

The study calculates the cost effectiveness of investing in cow cooling system installation and operation, based on information given to us by equipment supplier and farm manager.

The total investment required for proper cooling in a farm like Maccarese is 185,000 Euro (145 Euro/cow). The total cost for operation of intensive cooling system in Maccarese farm in the summer reach 25,000 Euro (40 Euro/cow).

Based on farm manager information the following prices were taken to the study:

- Farm gate price is 0.40 Euro/liter.
- Feed cost is 0.25 Euro/kg DM.
- Electricity price is 0.15 Euro/KW.

In the study we assumed

- Increase in per cow annual production of 2, 5, 7 and 10%.
- Improvement in feed efficiency due to cooling the cows in summer months is 5%.
- - In fact, the increase in per cow annual production in Maccarese farm was close to 10%). The results of the study are presented in table 3.

Table 3 – the expected increase in per cow and per farm annual income (Euro) due to the implementation of intensive cow cooling system and its proper operation during summer months.

Increase in annual milk (%)	2%	5%	7%	10%
Increase in milk/cow/year (Lit.)	200	490	685	980
Increase annual income/cow (Euro)	35	125	185	270
Increase annual income/farm (Euro)	45,000	160,000	240,000	350,000

From the presented in table 3 we can see that the investment in cow cooling system can be returned in one year, if an increase in annual milk production due to intensively cooling the cows reaches 5% and above.

It seems that, reaching the good results, as described in this article is one of the most cost effective investments that can be done in the dairy sector in Italy.

Acknowledgment - I want to thank Dr. Matteo Boggain from Maccarese dairy farm, Dr. Paolo Grendene from Cirio dairy farm and Dr. Cristian Rota, consultant in Cirio farm for the good cooperation and data supply.

Maccarese dairy farm – Feed line cooling (after change)



Maccarese dairy farm – Cows barn (Free stall barn)



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Flamenbaum - Cirio workshop 2017, Methods for mitigation heat stress in Italy

Maccarese dairy farm – waiting yard



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Flamenbaum - Cirio workshop 2017, Methods for mitigation heat stress in Italy