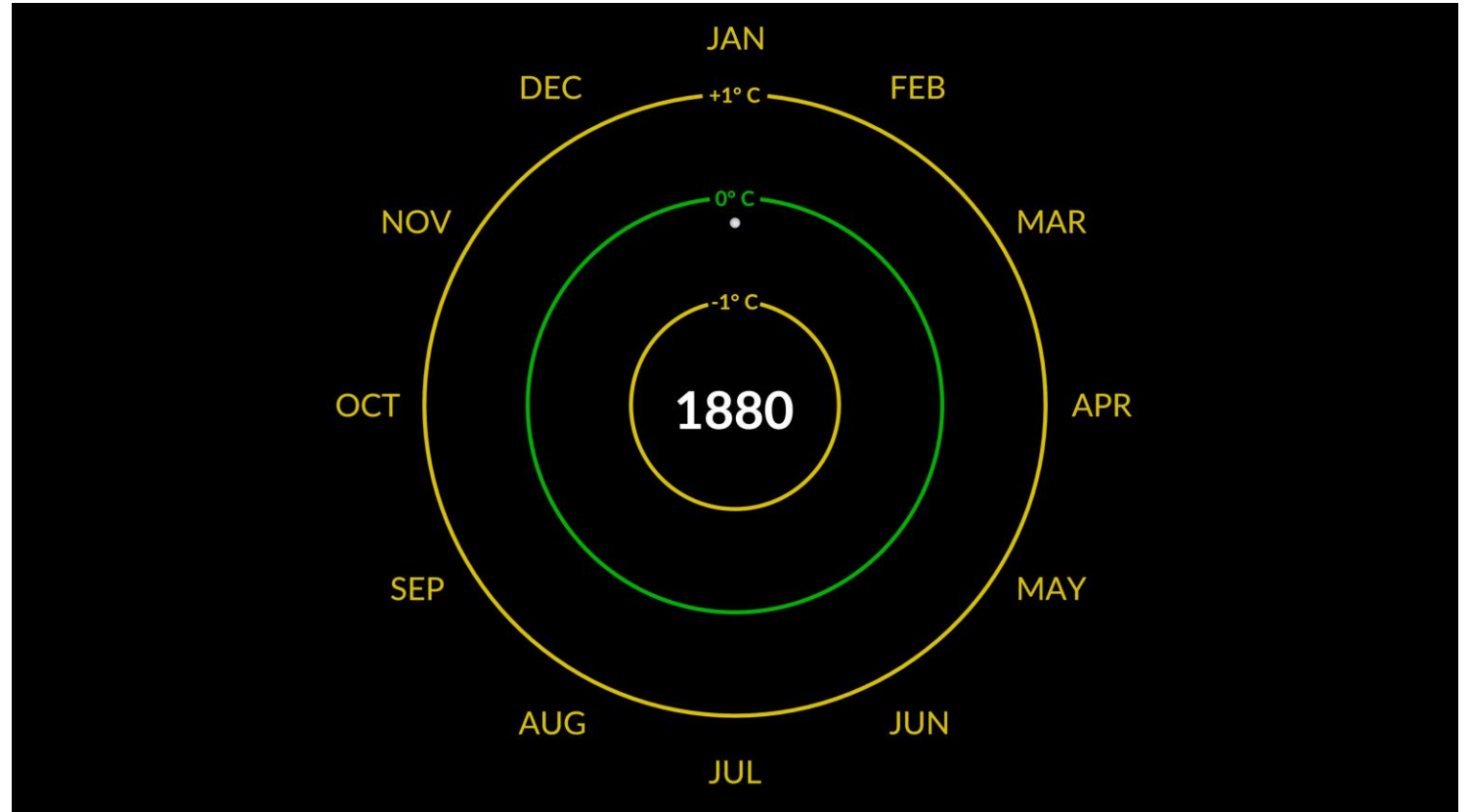
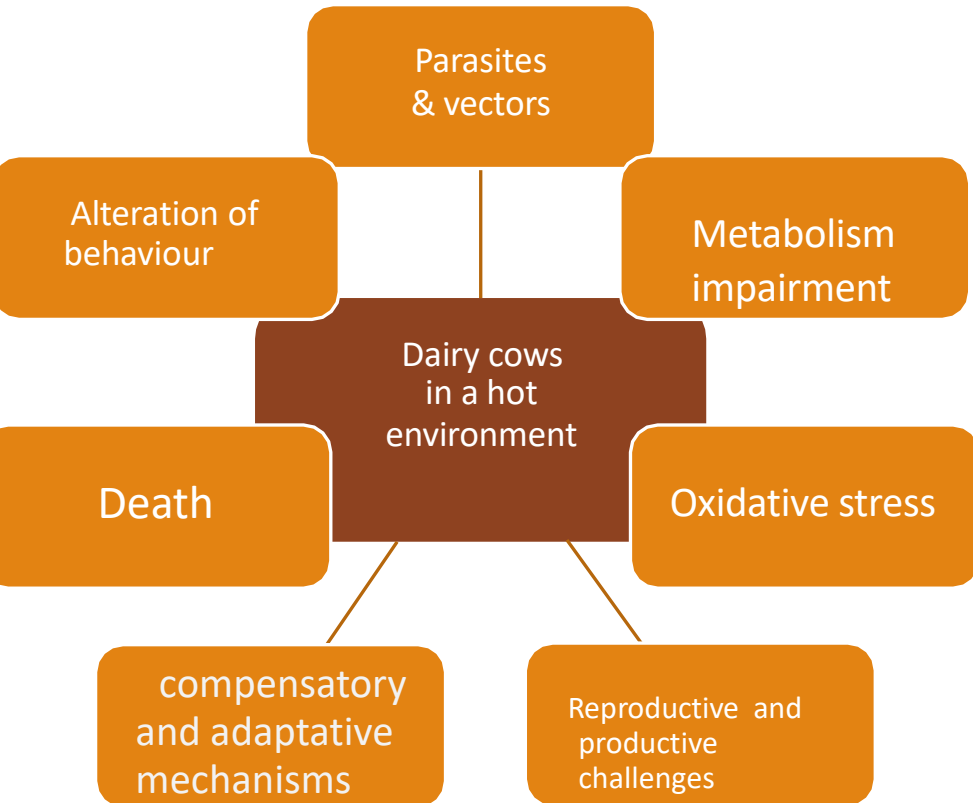










Preventing heat stress in dairy farm

Riccardo Negrini
negrini.r@aia.it

Global warming: more than a perception



ALA: two levels integrated approaches

 OUTDOOR	 CLIMATE THI forecast
	 CLIMATE THI detection
 INDOOR	 MICROCLIMATE THI tracking
	 SUMMER to WINTER report

THI forecast

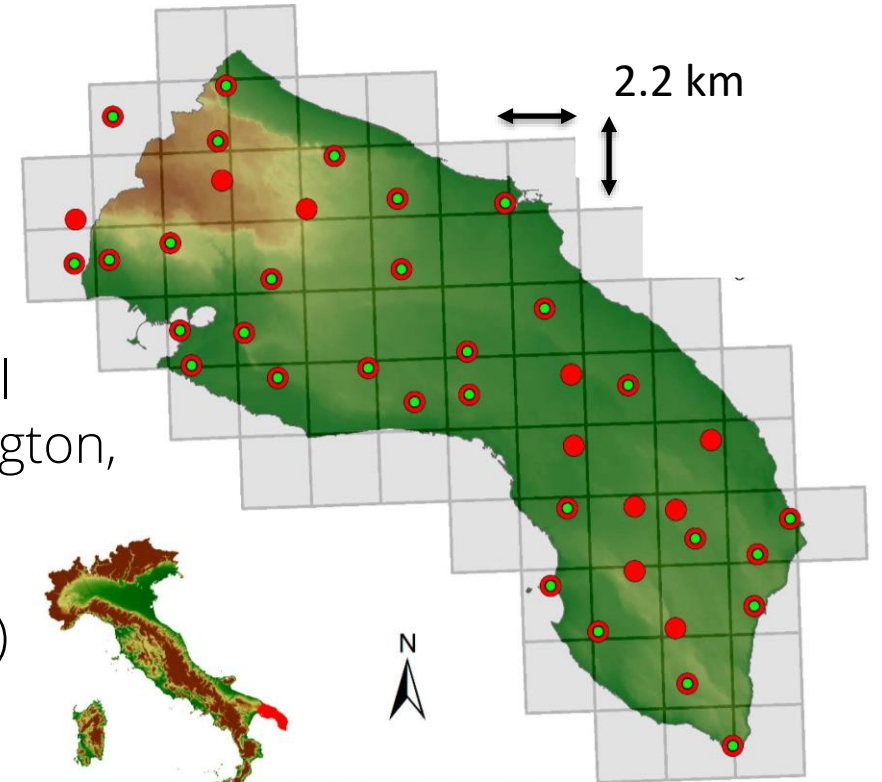
COSMO-IT forecasting model (data from Italian Airforce meteo service)

48h Tm and Hu forecast downloaded twice/day (6.00 AM and 6.00 PM)

Interpolation from grid nodes to exact farm GPS location

48h THI forecast following NRC. 1971. A Guide to Environmental Research on Animals. National Academies of Sciences, Washington, DC.

THI $\left(\left((1.8 * T + 32) - (0.55 - (0.55 * U/100)) * ((1.8 * T + 32) - 58) \right) \right)$

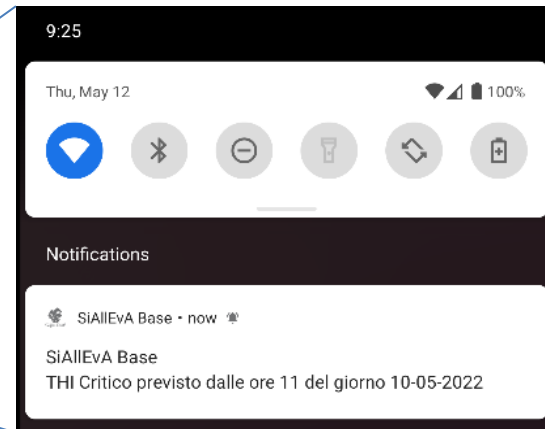


from THI forecast to THI alert

Si@lleVa free App



Mobile



push notification

THI \leq 70



70 < THI \leq 75



THI > 75



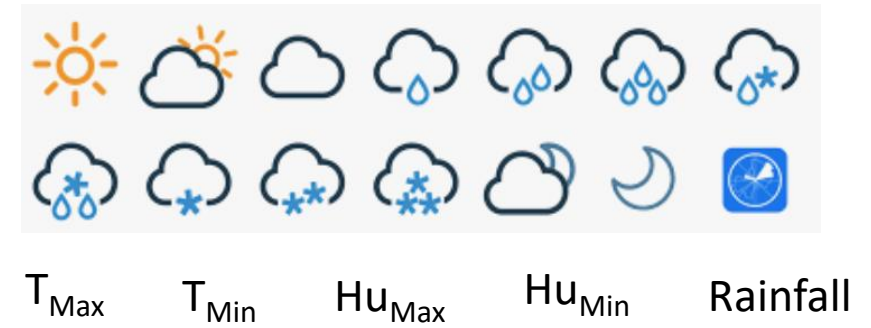
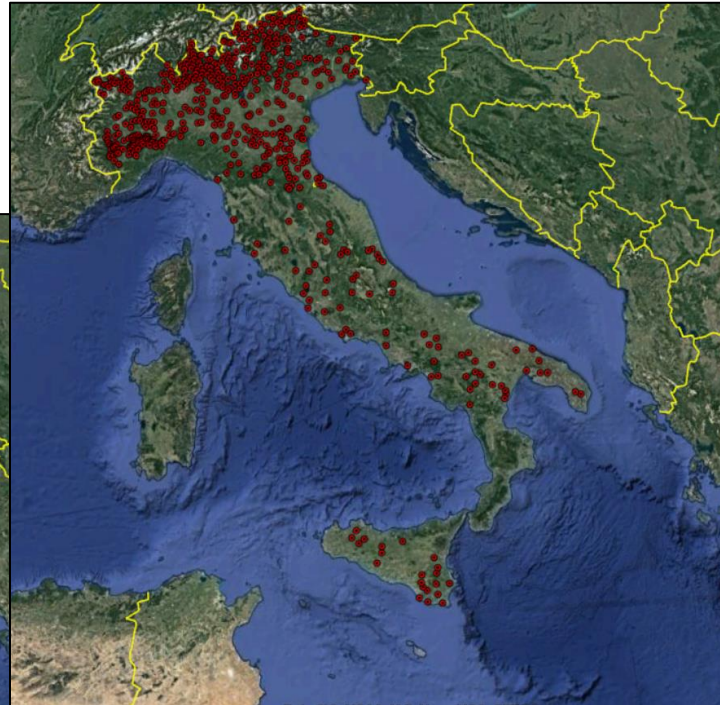
Data e ora	Temp (°C)	Umidità	THI	
10/05/2022				
12:00	20.5	58.8	66	●
13:00	22.7	77.9	70	●
14:00	24.3	85.6	75	●
11/05/2022				
12:00	27.1	94.0	80	● ⚠
13:00	28.1	92.7	81	● ⚠
14:00	28.9	93.1	81	● ⚠
15:00	30.4	92.1	85	● ⚠

THI recording from ground weather stations

Climate data from 695 ground weather stations

Air Force (102)

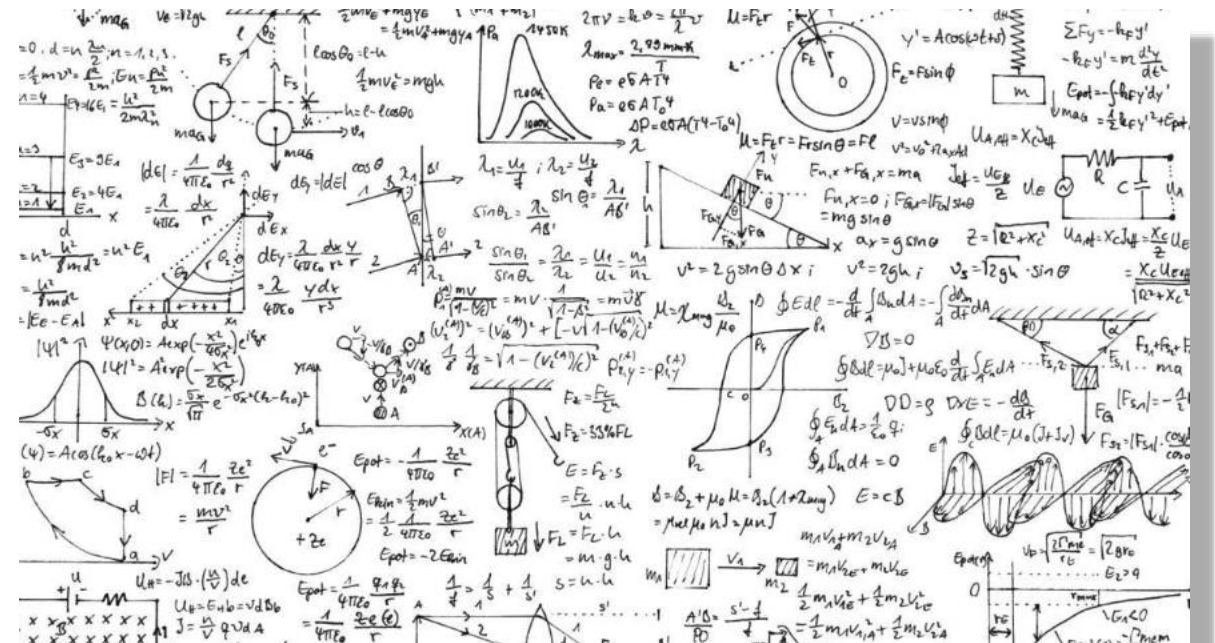
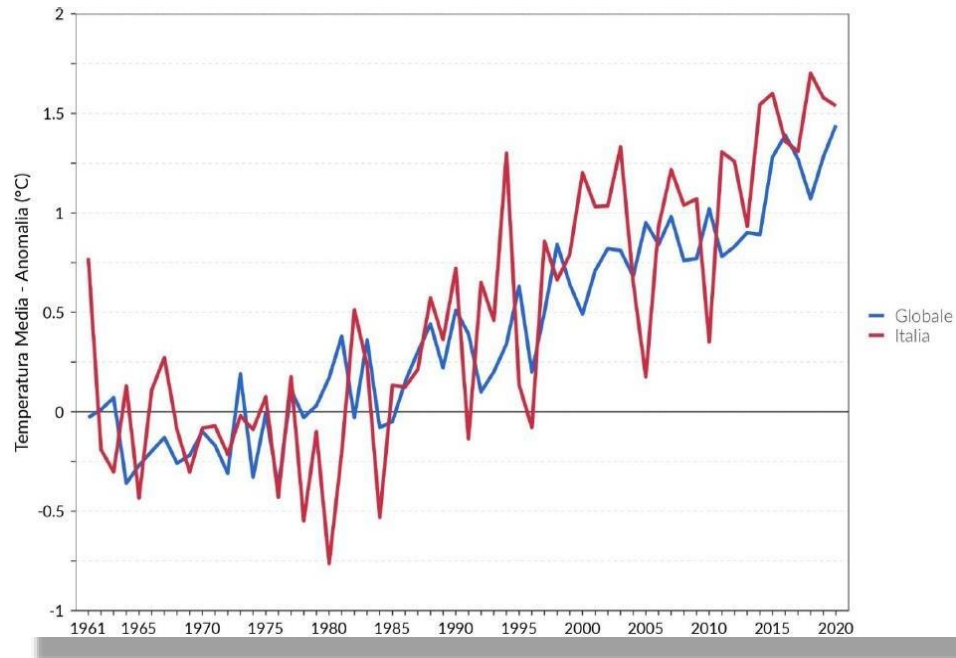
National/Regional (593)



THI recording from weather stations

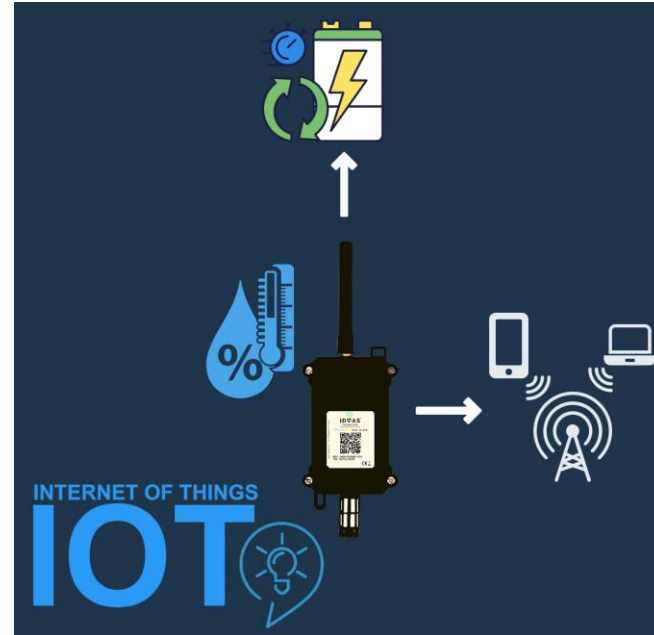
Creation of an open database with historical data (2017-today; more than 6 Million records up to now)

Predictive Modelization of THI



In-barn THI tracking

1000 herds equipped with datalogger



- 3.6V battery powered (~4 years, maintenance free)
- Does not require an internet connection. communicates, at configured intervals, relative humidity and room temperature values to a remote IoT platform via its built-in NB-IoT wireless connection.
- Does not need to be configured (ready-to-use).
- Suitable for any environment (IP66 plastic box dust/water intrusion protection)
- Auto-reset feature to re-establish connection
- Device powered by



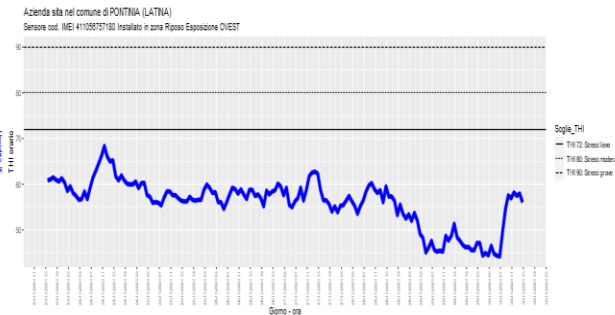
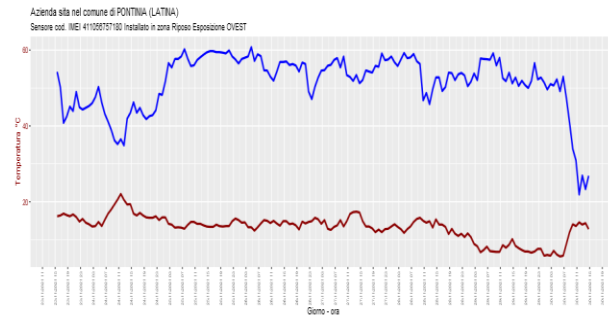
In-barn THI tracking

Visualizzazione dati Centraline del Lazio, progetto LEO



Codice AUA e codice IMEI centraline:
5705589-411056757180

Giorno
23/11/2021 a 30/11/2021



Data dei rilevamenti	Numero letture orarie	Media temperature (°C)	Minimo temperature (°C)	Massimo temperature (°C)	Deviazione Standard temperature (°C)	Media umidità (%)	Minimo umidità (%)	Massimo umidità (%)	Deviazione Standard umidità (%)	Media THI	Minimo THI	Massimo THI	Deviazione Standard THI
23/11/2021	8	16.20	14.80	16.90	0.60	69.50	61.20	81.40	6.70	60.60	58.50	61.50	0.90
24/11/2021	24	16.70	13.50	22.10	2.40	64.00	52.30	75.50	5.90	61.20	56.60	66.40	3.30
25/11/2021	24	14.00	12.90	15.90	0.80	85.80	72.30	90.40	5.00	57.30	55.40	60.30	1.30
26/11/2021	24	14.30	12.40	15.60	0.80	84.20	73.60	91.20	3.70	57.70	54.60	59.90	1.40
27/11/2021	24	14.40	12.00	17.40	1.70	81.70	70.60	88.70	4.20	57.80	53.90	62.70	2.70
28/11/2021	24	13.50	11.00	15.80	1.40	81.10	68.60	88.90	6.00	56.40	52.50	60.20	2.20
29/11/2021	24	8.10	6.60	11.70	1.50	80.70	75.00	88.80	4.40	47.70	45.10	53.70	2.40
30/11/2021	16	9.60	5.60	14.60	3.80	62.10	32.90	79.50	17.80	50.60	44.20	58.20	6.00

- Data recorded quarterly
- Rest Area, Milking Waiting Parlour area
- Cooling/ventilation systems optimization
- Microclimate monitoring
- Animal Welfare
- Temperature /Humidity/THI report daily, weekly and monthly

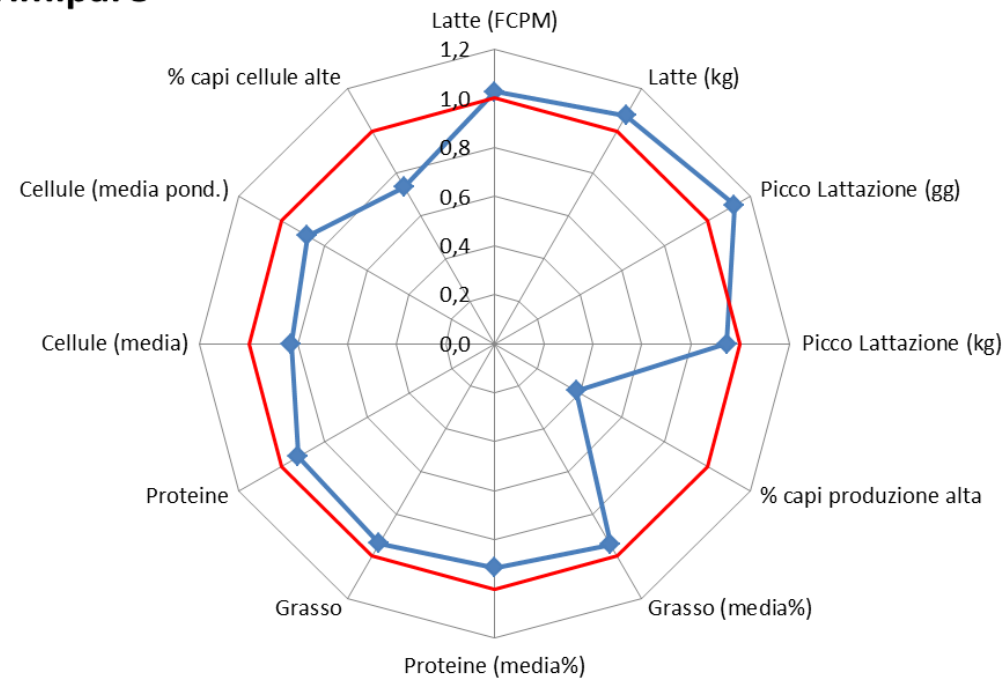
Yearly SUMMER:WINTER report

- Compare winter and summer average performances (WINTER: Jan-Feb-Mar; SUMMER: Jul-Aug-Sep)
 - Winter Performance as reference
 - Parameters considered: Milk, fat, protein, lactation peak, cells and reproduction
 - S:W Ratio: dimensionless
-
- Report issued annually
 - Compares each farm to its “relative group” (sorted by region and production level)
 - Compares each farm to its data in previous 4 years

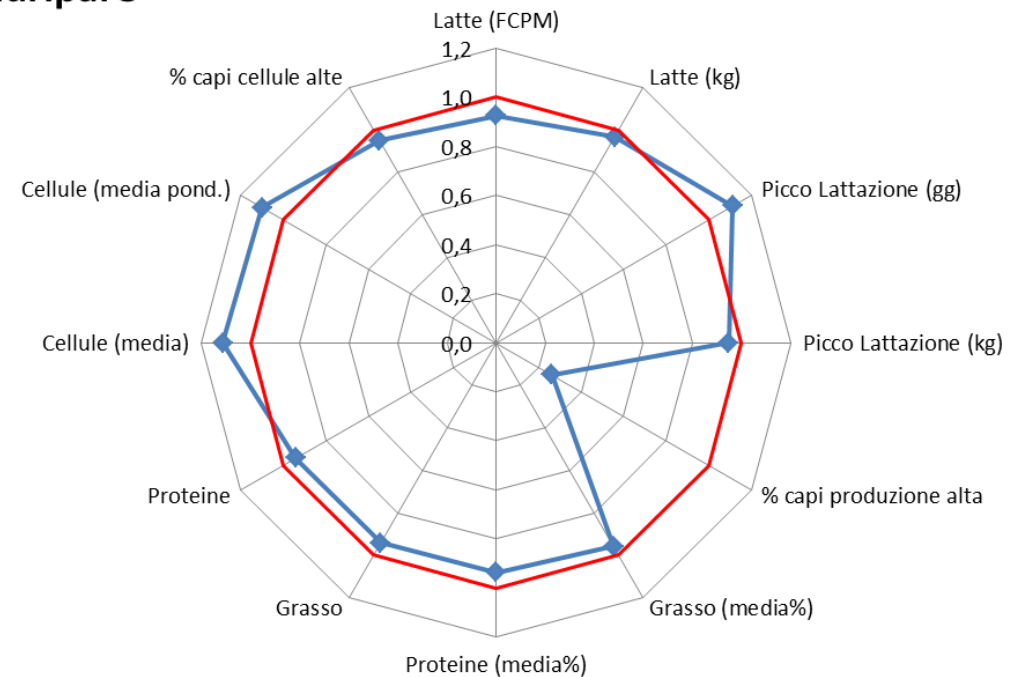
Flamenbaum, I and E. Ezra (2007). "The Summer to Winter performance ratio" as a tool for evaluating heat stress relief efficiency of dairy herds" J. Dairy Sci. Vol. 90, Suppl: abstract 753.

Yearly SUMMER:WINTER net

Primipare

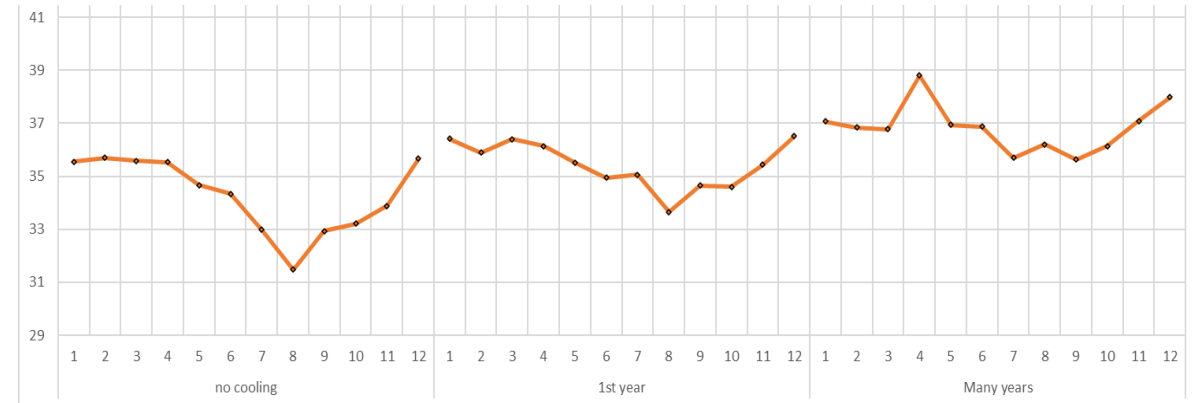
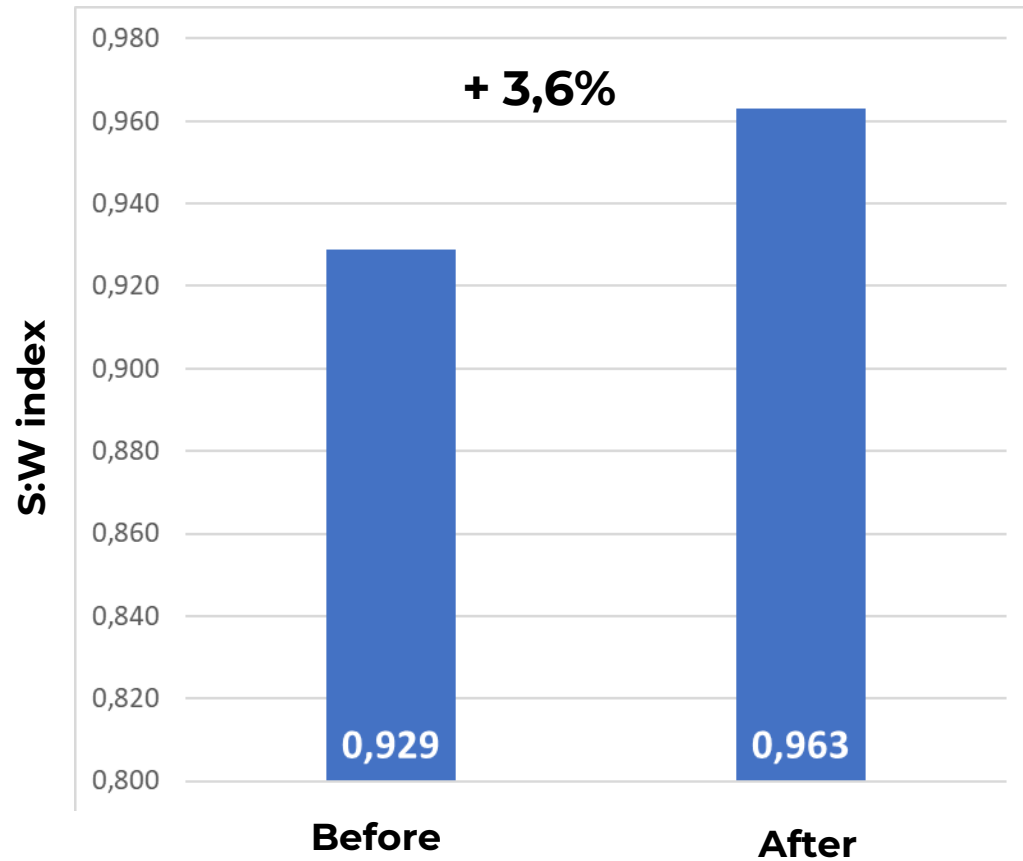


Pluripare

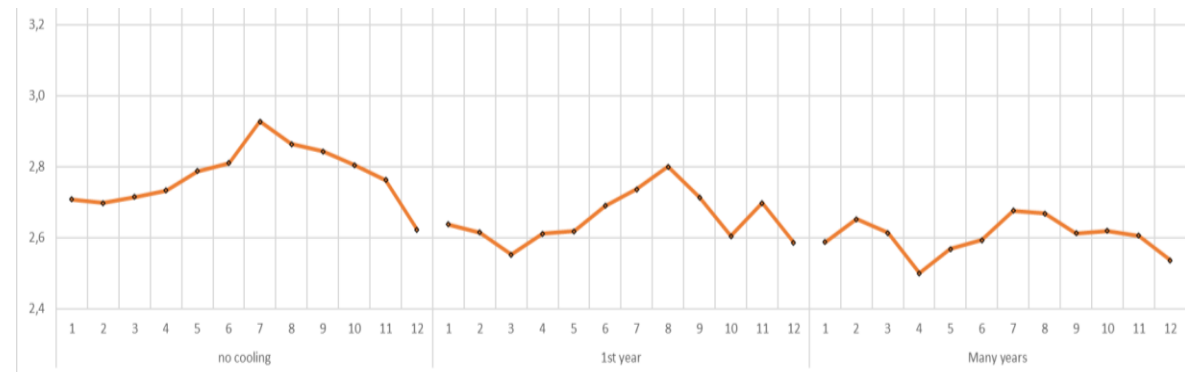


It seems working

Average improvement of 99 FARMS adopting the Heat Management Strategy



FPCM milk yield production



Somatic cell linear score

Thanks for being here

www.leo-italy.eu



Livestock Environment Opendata

La zootecnia diventa digitale



FEASR
Fondo Europeo Agricolo per lo
Sviluppo Rurale
"l'Europa investe nelle zone rurali"

Progetto finanziato nell'ambito
della Sottomisura 16.2 - PSRN 2014/2020



Seminiamo il futuro delle zone rurali

Autorità di gestione:
Direzione Generale dello Sviluppo Rurale
Ministero delle politiche agricole alimentari e forestali

mipaaf

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agricole alimentari e forestali