



DIGAL VERDE 2024

EXPO • CONFERENCIAS • CENTRO DE NEGOCIOS

Tecnologías Agropecuarias para Maximizar la Productividad.

Ing. Salvador Rivas M.

TDP-DiGiSKY Technologies !

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Torreón, Coah. Mx.

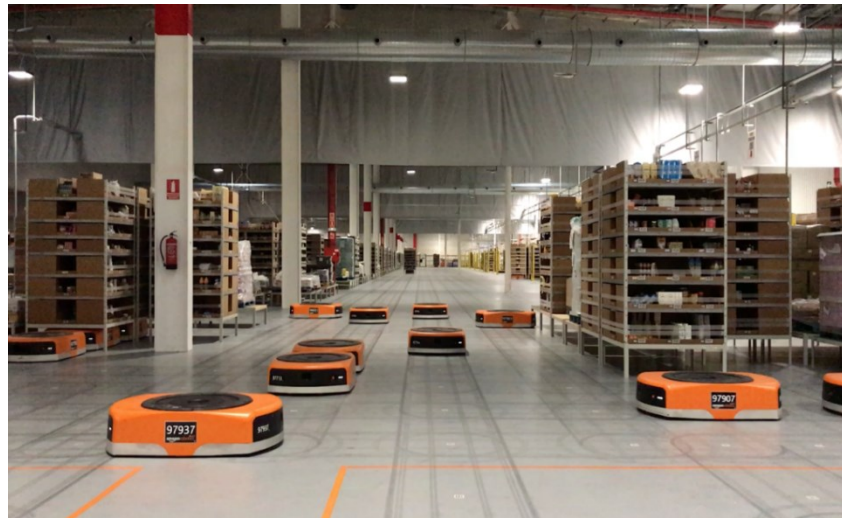
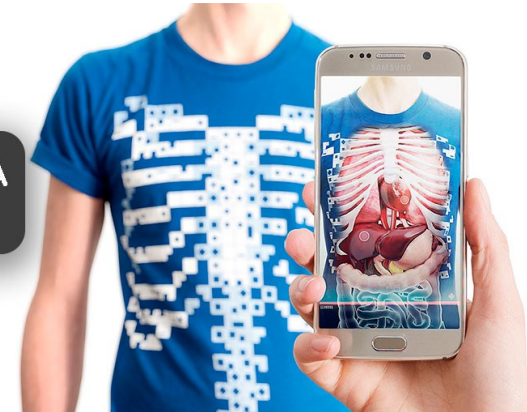


Avances Tecnológicos en la vida Humana !

La lista de nuevas tecnologías crece cada día a medida que ayudan a las personas en una gran variedad de tareas.

- **Robots y Maquinas Autónomas.**
- Realidad Aumentada.
- Algoritmos Bursátiles
- Reconocimiento Facial
- Machine Learning
- **Internet of Things**
- WS Big-Data & Cloud Storage
- Red Starlink Satelital

REALIDAD AUMENTADA
EN LA EDUCACIÓN



Centro Logístico y Almacenamiento Inteligente

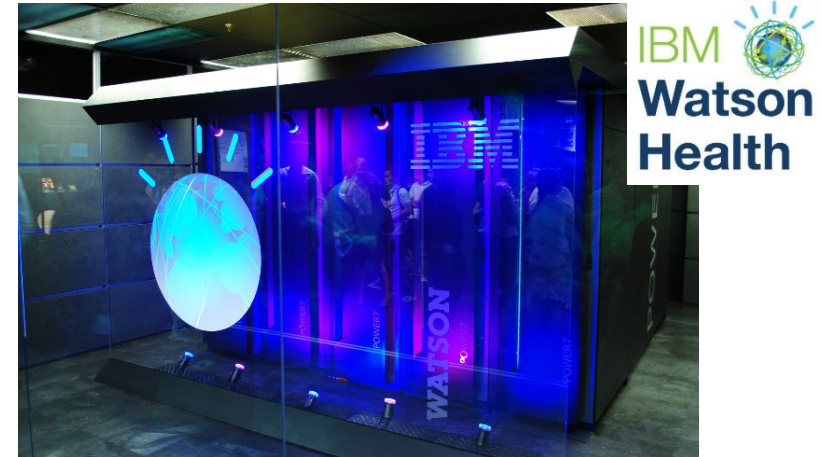


Avances Tecnológicos en la vida Humana !

La lista de nuevas tecnologías crece cada día a medida que ayudan a las personas en una gran variedad de tareas.



- **APPLE SIRI iOS 18** – Asistente Personal Inteligente



- **IBM** – Atención Medica



- **AMAZON** – Distribución Autónoma Inteligente



- **TESLA** – Algoritmos Conducción Autónoma

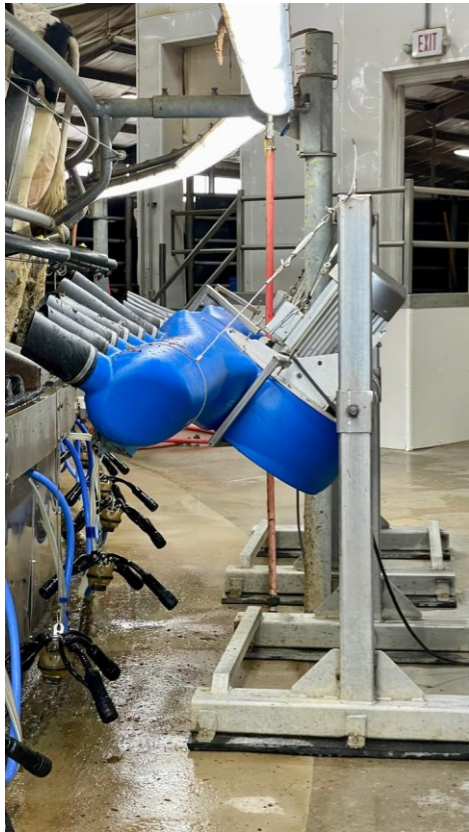
Inteligencia Artificial en la vida Humana !

La inteligencia artificial y el aprendizaje de las máquinas evolucionan a paso veloz. Estos avances mejoran la rapidez, la calidad y los costes de bienes y servicios.

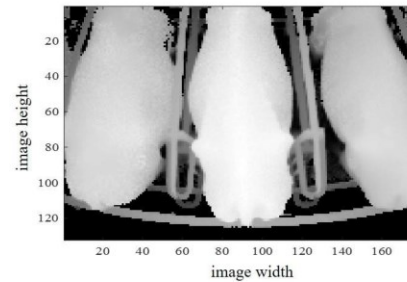
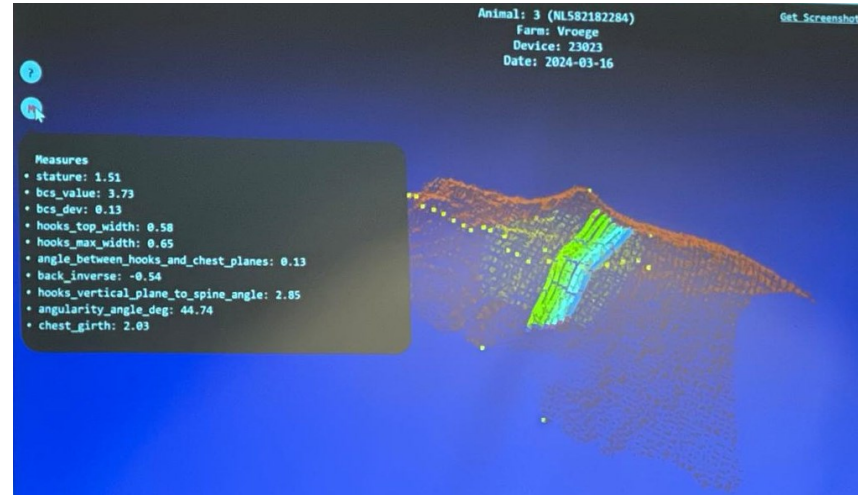


Estas tecnologías son trascendentales por su potencial para transformar las empresas y las vidas humanas, tienen la capacidad de facilitar la vida de los individuos y mejorar sus relaciones personales y laborales.

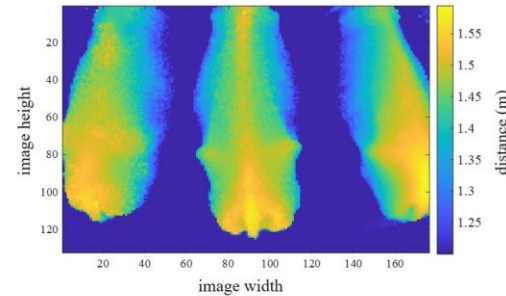
La Tecnología en los Negocios Agropecuarios !



La Tecnología en los Negocios Agropecuarios !



(a)



(b)



ABSTRACTS INTERNATIONAL SYMPOSIUM ON RUMINANT PHYSIOLOGY AUGUST 26–29, 2024 Chicago Marriott Downtown Magnificent Mile



2024 International Symposium on Ruminant Physiology

Session 1: Insights from Precision Technology and Data Science and their Application to Ruminant Physiology and Management

1 Big data and artificial intelligence assisted prediction of physiological outcomes. J. R. R. Dorea*, A. Negreiro, E. Casella, L. Hernandez, and G. J. M. Rosa, Department of Animal and Dairy Sciences, University of Wisconsin–Madison, Madison, WI.

Queensland, Australia, ⁶North Dakota State University, Carrington, ND, ⁷University of Maine, Orono, ME, ⁸University of Alberta, Edmonton, Alberta, Canada.

Session 2: Gastrointestinal Microbial Ecology, the Microbiome, and Gut Physiology Spanning from Microbial–Host Interactions to an Update on Methane Production and Mineral Interactions

3 Overall perspective on rumen microbial ecology to improve fiber digestibility. J. L. Firkins*¹ and P. B. Pope^{2,3}, ¹The Ohio State University, Columbus, OH, ²Queensland University of Technology, Woolloongabba, Queensland, Australia, ³Norwegian University of Life Sciences, Ås, Norway.



Poster Session : Precision Technology and Data Science

P18 A comparison of two remote monitoring technologies to predict feed intake of feedlot cattle. M. M. E. Luke*^{1,2}, J. E. M. Burgess^{1,2}, and L. A. Gonzalez^{1,2}, ¹School of Life and Environmental Science, University of Sydney, Camden, New South Wales, Australia, ²Sydney Institute of Agriculture, University of Sydney, Camden, New South Wales, Australia.

Frisona Española, Madrid, Spain, ⁷Gembloux Agro-Bio Tech, Gembloux, Belgium, ⁸Scotland's Rural College, Edinburgh, UK, ⁹Veterinärmedizinische Universität Wien, Vienna, Austria, ¹⁰International Committee for Animal Recording, Utrecht, the Netherlands, ¹¹Vereinigte Informationssysteme Tierhaltung, Verden, Germany, ¹²Natural Resources Institute Finland, Helsinki, Finland, ¹³McGill University, Montreal, Canada, ¹⁴Cornell University, Ithaca, NY.

“One of the most globally studied is Heat Stress (HS), because it compromises almost every metric of agriculture profitability in the world.”

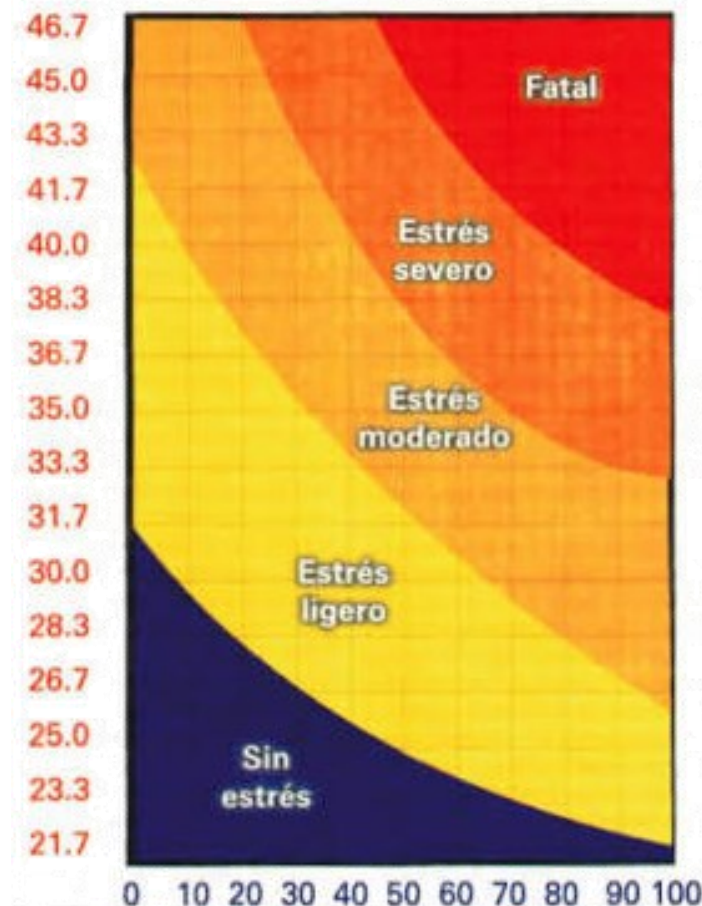
¿Qué es el estrés calórico?

Riesgos y efectos del Estrés Calórico

1. Compromete la producción de leche (10 - 30%).
2. Grasa y Proteína en la leche (-0.2 % a -0.4 %).
3. Incremento en células somáticas en la leche.
4. Baja La fertilidad (10 al 30 %).
5. Disminuye detección de calores (10 a 25%).
6. Aumentara el desecho voluntario (10 - 15 %).
7. Baja la eficiencia conv. nutricional (5 - 15%).
8. Problemas de salud general y de la ubre.
9. La tasa de mortandad de becerros (5 – 10 %).
10. Aumenta la cuenta bacteriológica.

| | | |
|---------|---------------|--|
| ≤ 68 | No Estrés | |
| 69 - 73 | Estrés Ligero | $T^{\circ}F = T^{\circ}C * (9 / 5) + 32$ |
| 74 - 79 | Estrés Medio | $T^{\circ}C = (T^{\circ}F - 32) * (5 / 9)$ |
| 80 - 86 | Estrés Alto | |
| ≥ 87 | Peligro | |

Grafica THI





Israel Flamembaum (2001) lo definió como:

“Situación donde la vaca acumula mas calor del que puede disipar.”.

“Zona termo-neutral (5° a 22°)”, Termorreguladores normales, no hay gasto energía en disipar calor.,

Signos visibles del estrés calórico

- Disminuye la actividad general
- Disminuye la rumia
- Incrementa el consumo de agua
- Disminuye el consumo de MS
- Salivación excesiva
- Competencia por la sombra
- Búsqueda de pisos húmedos
- Las vacas paradas e amontonadas
- Las vacas buscan ventilación natural
- Aumenta la frecuencia respiratoria
- Mala absorción de nutrientes
- Vaso dilatación periférica



Entendiendo el Estrés Calórico & THI

EL THI o **Índice de Temperatura y Humedad**, es un numero que nos ayuda a entender el Impacto o Nivel de Estrés Calórico al que nuestros animales se enfrentan o que los pone en riesgo, se obtiene al relacionar la Temperatura Ambiental y la humedad relativa en una matriz predefinida.

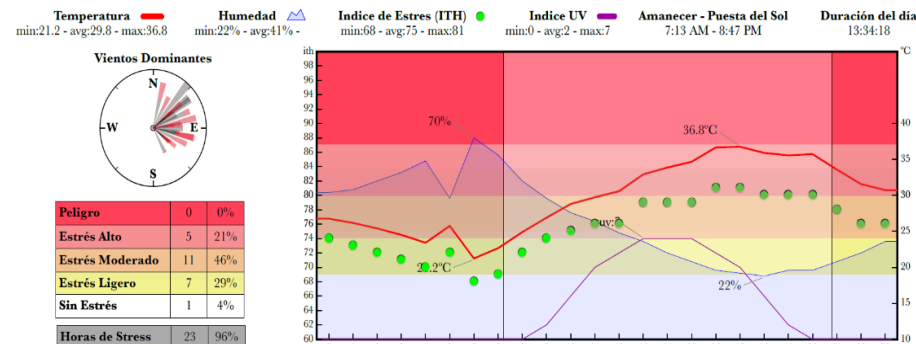
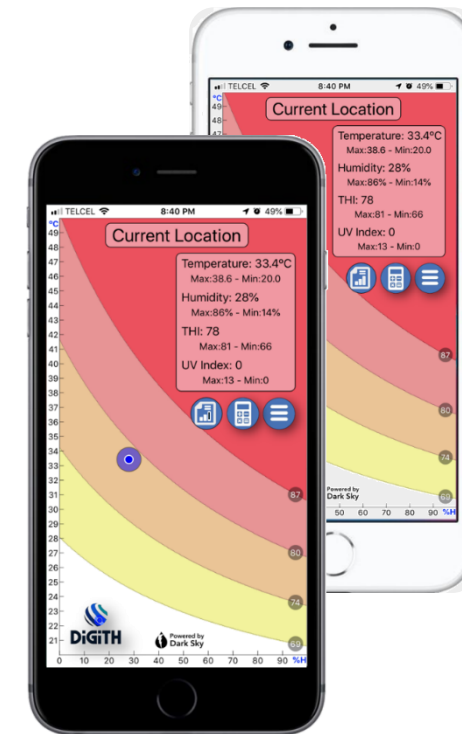
| TEMP | | % HUMEDAD RELATIVA | | | | | | | | | | |
|------|-----|--------------------|----|----|----|----|----|----|----|----|-----|-----|
| ° F | ° C | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 104 | 40 | 78 | 81 | 83 | 86 | 88 | 91 | 93 | 96 | 98 | 101 | 104 |
| 102 | 39 | 77 | 80 | 82 | 85 | 87 | 90 | 92 | 94 | 97 | 99 | 102 |
| 100 | 38 | 77 | 79 | 81 | 84 | 86 | 88 | 91 | 93 | 95 | 98 | 100 |
| 99 | 37 | 76 | 78 | 80 | 82 | 85 | 87 | 89 | 91 | 94 | 96 | 98 |
| 97 | 36 | 75 | 77 | 79 | 81 | 83 | 86 | 88 | 90 | 92 | 94 | 96 |
| 95 | 35 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 95 |
| 93 | 34 | 73 | 75 | 77 | 79 | 81 | 83 | 85 | 87 | 89 | 91 | 93 |
| 91 | 33 | 73 | 74 | 76 | 78 | 80 | 82 | 84 | 85 | 87 | 89 | 91 |
| 90 | 32 | 72 | 73 | 75 | 77 | 79 | 80 | 82 | 84 | 86 | 87 | 89 |
| 88 | 31 | 71 | 73 | 74 | 76 | 77 | 79 | 81 | 82 | 84 | 86 | 87 |
| 86 | 30 | 70 | 72 | 73 | 75 | 76 | 78 | 79 | 81 | 82 | 84 | 86 |
| 84 | 29 | 69 | 71 | 72 | 74 | 75 | 76 | 78 | 79 | 81 | 82 | 84 |
| 82 | 28 | 68 | 70 | 71 | 73 | 74 | 75 | 77 | 78 | 79 | 81 | 82 |
| 81 | 27 | 68 | 69 | 70 | 71 | 73 | 74 | 75 | 76 | 78 | 79 | 80 |
| 79 | 26 | 67 | 68 | 69 | 70 | 71 | 73 | 74 | 75 | 76 | 77 | 78 |
| 77 | 25 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 77 |
| 75 | 24 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| 73 | 23 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 70 | 71 | 72 | 73 |
| 72 | 22 | 64 | 64 | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 70 | 71 |
| 70 | 21 | 63 | 63 | 64 | 65 | 65 | 66 | 67 | 67 | 68 | 69 | 69 |
| 68 | 20 | 62 | 63 | 63 | 64 | 64 | 65 | 65 | 66 | 66 | 67 | 68 |
| 66 | 19 | 61 | 62 | 62 | 63 | 63 | 63 | 64 | 64 | 65 | 65 | 66 |

Los 5 Niveles del Estrés Calórico:

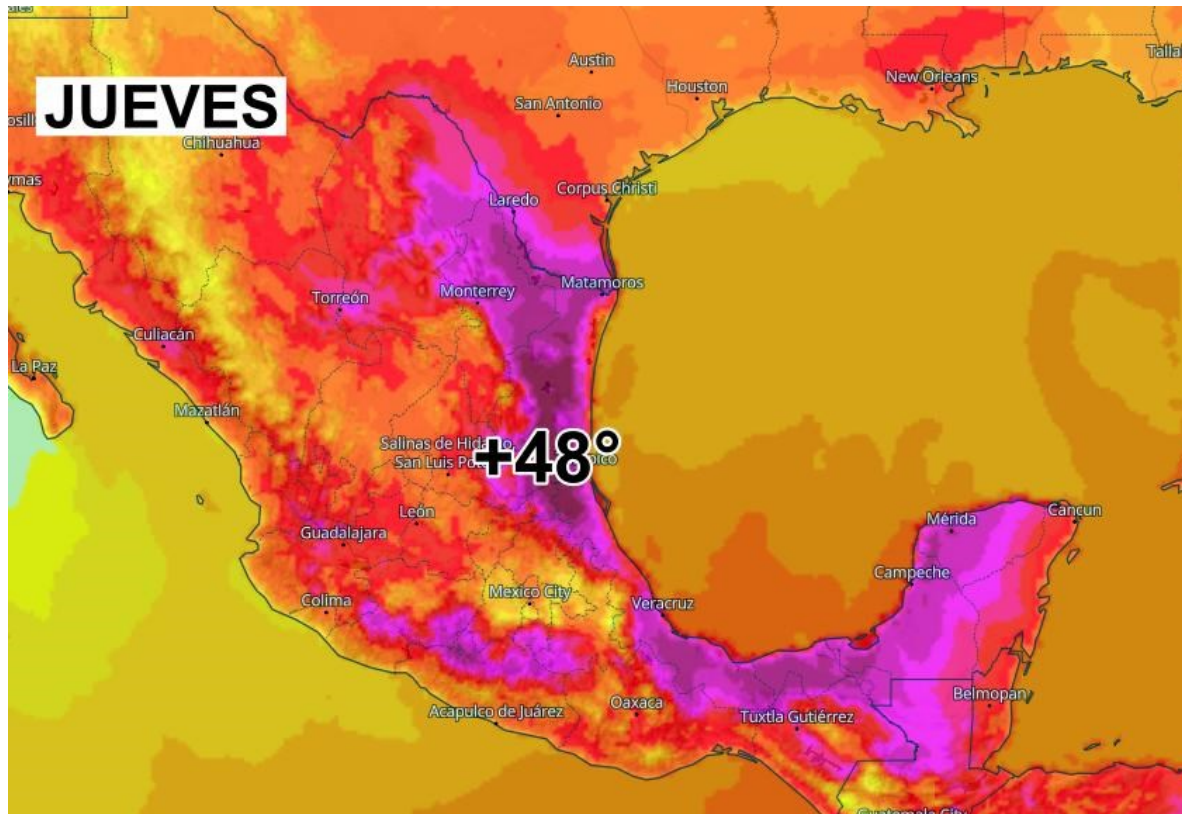
| |
|-----------------|
| Sin Estrés |
| Estrés Ligero |
| Estrés Moderado |
| Estrés Alto |
| Peligro |

≤ 67 THI: Sin Estrés Ambiental
 68 a 73 THI: Estrés ligero
 74 a 77 THI: Estrés Moderado
 78 a 82 THI: Estrés Severo
 ≥ 83 THI: Estrés Peligroso!

De acuerdo al “Riesgo de Estrés Calórico” de cada hato se deberá definir el tipo de sistema de enfriamiento mas adecuado o la combinación de diferentes sistemas y solución que proporcionaran el mejor enfriamiento a los hatos productores y granjas.



Estrés Calórico en Mexico



REGION LAGUNERA:

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 26 | 24 | 26 | 27 | 27 | 26 | 27 |
| 7 | 26 | 23 | 26 | 26 | 26 | 26 | 26 |
| 8 | 28 | 25 | 28 | 28 | 28 | 28 | 28 |
| 9 | 30 | 26 | 30 | 30 | 30 | 30 | 30 |
| 10 | 32 | 28 | 31 | 31 | 32 | 32 | 32 |
| 11 | 37 | 32 | 36 | 36 | 35 | 34 | 35 |
| 12 | 39 | 34 | 37 | 38 | 38 | 37 | 37 |
| 13 | 41 | 36 | 39 | 40 | 40 | 39 | 40 |
| 14 | 42 | 36 | 40 | 41 | 42 | 40 | 41 |
| 15 | 43 | 37 | 41 | 42 | 43 | 42 | 42 |
| 16 | 43 | 38 | 40 | 43 | 44 | 43 | 43 |
| 17 | 43 | 41 | 40 | 43 | 43 | 42 | 42 |
| 18 | 42 | 41 | 40 | 42 | 42 | 41 | 41 |
| 19 | 41 | 40 | 40 | 41 | 41 | 40 | 41 |
| 20 | 34 | 38 | 39 | 39 | 39 | 38 | 38 |
| 21 | 33 | 34 | 36 | 37 | 37 | 36 | 36 |
| 22 | 34 | 32 | 34 | 35 | 35 | 33 | 34 |
| 23 | 33 | 31 | 33 | 34 | 34 | 33 | 34 |
| 0 | 31 | 27 | 30 | 31 | 34 | 33 | 32 |
| 1 | 30 | 26 | 27 | 30 | 33 | 32 | 32 |
| 2 | 29 | 25 | 27 | 30 | 32 | 30 | 30 |
| 3 | 28 | 25 | 27 | 29 | 31 | 29 | 29 |
| 4 | 28 | 25 | 27 | 29 | 31 | 29 | 29 |
| 5 | 27 | 24 | 27 | 27 | 29 | 27 | 27 |

T3 / 6 PM °C 43 39 40 42 43 42 42

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 71 | 70 | 71 | 71 | 71 | 72 | 72 |
| 7 | 71 | 69 | 70 | 71 | 70 | 71 | 71 |
| 8 | 72 | 71 | 73 | 72 | 72 | 73 | 73 |
| 9 | 74 | 72 | 74 | 74 | 74 | 74 | 75 |
| 10 | 76 | 73 | 75 | 75 | 75 | 76 | 76 |
| 11 | 80 | 78 | 80 | 80 | 78 | 78 | 78 |
| 12 | 80 | 80 | 81 | 81 | 80 | 80 | 80 |
| 13 | 81 | 81 | 81 | 82 | 82 | 82 | 82 |
| 14 | 82 | 79 | 82 | 82 | 82 | 83 | 83 |
| 15 | 83 | 80 | 83 | 83 | 83 | 83 | 83 |
| 16 | 83 | 80 | 81 | 83 | 84 | 84 | 84 |
| 17 | 83 | 82 | 81 | 83 | 83 | 83 | 83 |
| 18 | 82 | 81 | 80 | 82 | 82 | 82 | 82 |
| 19 | 81 | 80 | 80 | 81 | 81 | 81 | 81 |
| 20 | 77 | 78 | 79 | 80 | 80 | 80 | 80 |
| 21 | 77 | 76 | 77 | 78 | 78 | 78 | 78 |
| 22 | 77 | 74 | 75 | 77 | 77 | 76 | 77 |
| 23 | 76 | 74 | 74 | 76 | 76 | 76 | 76 |
| 0 | 75 | 73 | 73 | 73 | 76 | 75 | 75 |
| 1 | 74 | 73 | 72 | 73 | 76 | 74 | 74 |
| 2 | 73 | 72 | 72 | 72 | 75 | 74 | 74 |
| 3 | 73 | 71 | 71 | 72 | 74 | 73 | 74 |
| 4 | 72 | 71 | 71 | 72 | 73 | 73 | 73 |
| 5 | 72 | 71 | 71 | 72 | 72 | 72 | 73 |

ITH 2 | 7 PM 83 81 82 83 83 83 83

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **43°/ 44°c** y mínimas de 26°c durante la noche.
- **Humedad Ambiental:** Muy baja humedad Inferior al **< 20%**.
- **Thi / Estrés Calórico:** El pico supera los **82** Índices, ubicándose en la “**Zona de Estrés Peligroso**”, la cual puede causar daños y perdidas considerables en los hatos lecheros, este estrés tiene duración las 24 hrs del día superando los > 68 índices durante la noche, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.

ZONA DELICIAS, CHIHUAHUA

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 25 | 23 | 24 | 27 | 25 | 26 | 25 |
| 7 | 26 | 25 | 25 | 28 | 26 | 27 | 26 |
| 8 | 30 | 27 | 28 | 29 | 28 | 29 | 28 |
| 9 | 32 | 29 | 30 | 31 | 30 | 31 | 30 |
| 10 | 33 | 31 | 32 | 33 | 32 | 33 | 32 |
| 11 | 35 | 35 | 36 | 35 | 37 | 35 | 36 |
| 12 | 36 | 36 | 37 | 38 | 38 | 37 | 37 |
| 13 | 37 | 37 | 38 | 38 | 39 | 39 | 38 |
| 14 | 38 | 37 | 38 | 38 | 39 | 40 | 39 |
| 15 | 38 | 38 | 39 | 38 | 40 | 40 | 39 |
| 16 | 38 | 38 | 37 | 38 | 40 | 40 | 40 |
| 17 | 38 | 38 | 37 | 38 | 39 | 39 | 39 |
| 18 | 38 | 25 | 38 | 37 | 39 | 38 | 38 |
| 19 | 36 | 28 | 32 | 36 | 38 | 35 | 34 |
| 20 | 31 | 25 | 28 | 32 | 34 | 28 | 32 |
| 21 | 30 | 25 | 29 | 28 | 28 | 26 | 32 |
| 22 | 30 | 24 | 29 | 28 | 29 | 25 | 31 |
| 23 | 26 | 25 | 29 | 28 | 29 | 24 | 31 |
| 0 | 30 | 27 | 29 | 31 | 28 | 28 | 25 |
| 1 | 30 | 27 | 28 | 29 | 28 | 28 | 25 |
| 2 | 29 | 26 | 27 | 29 | 27 | 28 | 26 |
| 3 | 27 | 26 | 26 | 28 | 26 | 27 | 26 |
| 4 | 27 | 26 | 26 | 28 | 26 | 27 | 26 |
| 5 | 26 | 24 | 25 | 27 | 25 | 27 | 25 |

T 3 / 6 PM °C 38 35 38 38 39 39 39

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 68 | 69 | 69 | 72 | 70 | 71 | 70 |
| 7 | 69 | 71 | 70 | 72 | 71 | 72 | 71 |
| 8 | 72 | 72 | 73 | 74 | 73 | 74 | 73 |
| 9 | 73 | 74 | 74 | 75 | 75 | 76 | 75 |
| 10 | 74 | 75 | 75 | 76 | 76 | 77 | 76 |
| 11 | 76 | 79 | 78 | 78 | 80 | 79 | 80 |
| 12 | 77 | 79 | 79 | 80 | 80 | 80 | 80 |
| 13 | 77 | 79 | 79 | 80 | 80 | 81 | 81 |
| 14 | 78 | 80 | 80 | 80 | 81 | 82 | 81 |
| 15 | 78 | 80 | 80 | 80 | 81 | 81 | 81 |
| 16 | 79 | 80 | 79 | 80 | 81 | 81 | 81 |
| 17 | 79 | 80 | 79 | 80 | 80 | 80 | 80 |
| 18 | 78 | 75 | 79 | 79 | 80 | 80 | 80 |
| 19 | 77 | 73 | 76 | 78 | 79 | 78 | 77 |
| 20 | 74 | 71 | 73 | 75 | 76 | 73 | 75 |
| 21 | 74 | 71 | 73 | 72 | 74 | 72 | 75 |
| 22 | 73 | 70 | 73 | 73 | 74 | 71 | 75 |
| 23 | 71 | 71 | 74 | 73 | 74 | 70 | 75 |
| 0 | 72 | 72 | 73 | 75 | 73 | 73 | 71 |
| 1 | 72 | 72 | 73 | 73 | 73 | 73 | 71 |
| 2 | 71 | 71 | 72 | 73 | 72 | 73 | 72 |
| 3 | 70 | 71 | 71 | 73 | 71 | 72 | 72 |
| 4 | 69 | 71 | 70 | 72 | 70 | 72 | 71 |
| 5 | 68 | 70 | 70 | 72 | 70 | 72 | 70 |

ITH 2 | 7 PM 79 78 79 80 81 81 80

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **39°/ 40°c** y mínimas de 24°c durante la noche.
- **Humedad Ambiental:** Baja humedad Inferior al < **25%**.
- **THi / Estrés Calórico:** El pico supera los **80** Índices, ubicándose principalmente en la “**Zona de Estrés Severo**” y el aumento de la humedad nocturna llega a “**Estrés Moderado**” en las noches, esto puede causar daños y perdidas considerables en los hatos lecheros, el estrés tiene duración las 24 hrs del día superando los > 68 índices durante la noche, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.



MEXICALI, BAJA CALIFORNIA

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|---------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 21 | 24 | 24 | 22 | 22 | 22 | 21 |
| 7 | 22 | 24 | 24 | 23 | 22 | 22 | 21 |
| 8 | 24 | 26 | 27 | 25 | 24 | 23 | 23 |
| 9 | 26 | 29 | 29 | 28 | 26 | 27 | 26 |
| 10 | 29 | 31 | 31 | 30 | 28 | 30 | 29 |
| 11 | 34 | 36 | 36 | 35 | 33 | 35 | 33 |
| 12 | 35 | 38 | 38 | 38 | 35 | 36 | 35 |
| 13 | 37 | 40 | 40 | 40 | 37 | 38 | 37 |
| 14 | 38 | 41 | 42 | 41 | 38 | 39 | 38 |
| 15 | 39 | 42 | 43 | 42 | 39 | 39 | 39 |
| 16 | 39 | 42 | 43 | 42 | 39 | 39 | 39 |
| 17 | 39 | 41 | 43 | 41 | 39 | 39 | 39 |
| 18 | 39 | 41 | 41 | 40 | 39 | 39 | 39 |
| 19 | 38 | 40 | 39 | 37 | 39 | 38 | 35 |
| 20 | 36 | 37 | 37 | 35 | 36 | 35 | 31 |
| 21 | 31 | 34 | 33 | 31 | 32 | 31 | 28 |
| 22 | 29 | 32 | 31 | 29 | 30 | 28 | 26 |
| 23 | 28 | 30 | 29 | 27 | 29 | 28 | 24 |
| 0 | 26 | 27 | 31 | 26 | 27 | 27 | 26 |
| 1 | 25 | 26 | 29 | 25 | 25 | 26 | 25 |
| 2 | 25 | 26 | 27 | 24 | 24 | 25 | 24 |
| 3 | 24 | 25 | 26 | 23 | 24 | 24 | 23 |
| 4 | 24 | 25 | 26 | 23 | 24 | 24 | 23 |
| 5 | 22 | 24 | 25 | 23 | 23 | 22 | 22 |
| T 3 / 6 PM °C | 39 | 41 | 43 | 41 | 39 | 39 | 39 |

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|--------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 66 | 69 | 69 | 67 | 66 | 65 | 64 |
| 7 | 67 | 69 | 69 | 67 | 66 | 65 | 64 |
| 8 | 69 | 71 | 71 | 69 | 68 | 67 | 66 |
| 9 | 71 | 74 | 73 | 72 | 70 | 69 | 69 |
| 10 | 73 | 75 | 75 | 73 | 72 | 71 | 71 |
| 11 | 78 | 80 | 79 | 78 | 77 | 75 | 75 |
| 12 | 78 | 81 | 80 | 79 | 78 | 76 | 76 |
| 13 | 79 | 82 | 81 | 81 | 80 | 77 | 77 |
| 14 | 79 | 83 | 82 | 82 | 81 | 78 | 78 |
| 15 | 79 | 83 | 82 | 82 | 81 | 78 | 78 |
| 16 | 79 | 82 | 83 | 82 | 81 | 78 | 78 |
| 17 | 79 | 82 | 82 | 81 | 81 | 78 | 79 |
| 18 | 79 | 81 | 80 | 80 | 81 | 78 | 78 |
| 19 | 78 | 80 | 79 | 79 | 80 | 77 | 76 |
| 20 | 77 | 78 | 77 | 77 | 77 | 75 | 73 |
| 21 | 74 | 76 | 75 | 75 | 73 | 72 | 70 |
| 22 | 73 | 75 | 73 | 73 | 71 | 70 | 68 |
| 23 | 72 | 74 | 72 | 71 | 70 | 70 | 67 |
| 0 | 71 | 71 | 72 | 70 | 71 | 69 | 68 |
| 1 | 70 | 71 | 72 | 69 | 70 | 68 | 67 |
| 2 | 70 | 71 | 71 | 68 | 69 | 68 | 67 |
| 3 | 69 | 70 | 71 | 68 | 68 | 67 | 66 |
| 4 | 67 | 69 | 70 | 68 | 68 | 66 | 65 |
| 5 | 67 | 69 | 69 | 67 | 67 | 65 | 65 |
| ITH 2 7 PM | 79 | 82 | 82 | 81 | 81 | 78 | 78 |
| Hrs < 68 | 4 | 0 | 0 | 3 | 3 | 6 | 9 |
| Hrs ≥ 68 | 20 | 24 | 24 | 21 | 21 | 18 | 15 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **43°/ 44°c** y mínimas de **25°c** durante la noche.
- **Humedad Ambiental:** La humedad es “Baja” inferior al **25%**.
- **THi / Estrés Calórico:** El pico supera los **86** Índices, ubicándose en la “**Zona de Estrés Altamente Peligroso**”, la cual puede causar inclusive la muerte del ganado, daños y pérdidas considerables en los hatos lecheros, el aumento de la humedad nocturna hace que se sienta “**Estrés Moderado**” en las noches, el estrés tiene duración las 21 hrs del día, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.



ZONA AGUASCALIENTES

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 18 | 18 | 18 | 19 | 19 | 18 | 18 |
| 7 | 18 | 18 | 18 | 18 | 18 | 18 | 17 |
| 8 | 20 | 19 | 20 | 20 | 20 | 21 | 20 |
| 9 | 22 | 22 | 22 | 23 | 23 | 23 | 23 |
| 10 | 24 | 24 | 24 | 26 | 26 | 26 | 26 |
| 11 | 30 | 29 | 29 | 31 | 31 | 31 | 31 |
| 12 | 32 | 31 | 31 | 33 | 33 | 33 | 33 |
| 13 | 33 | 33 | 33 | 35 | 34 | 35 | 34 |
| 14 | 35 | 34 | 34 | 34 | 34 | 34 | 36 |
| 15 | 36 | 35 | 36 | 38 | 38 | 35 | 35 |
| 16 | 37 | 36 | 36 | 38 | 38 | 36 | 35 |
| 17 | 37 | 34 | 36 | 38 | 38 | 37 | 35 |
| 18 | 36 | 34 | 34 | 36 | 36 | 35 | 34 |
| 19 | 34 | 33 | 34 | 34 | 34 | 33 | 33 |
| 20 | 32 | 31 | 32 | 31 | 31 | 31 | 31 |
| 21 | 29 | 28 | 29 | 28 | 28 | 28 | 28 |
| 22 | 27 | 26 | 27 | 27 | 26 | 26 | 26 |
| 23 | 25 | 24 | 25 | 25 | 25 | 25 | 25 |
| 0 | 24 | 23 | 22 | 24 | 23 | 23 | 23 |
| 1 | 22 | 21 | 21 | 23 | 22 | 22 | 22 |
| 2 | 21 | 21 | 20 | 22 | 21 | 21 | 22 |
| 3 | 20 | 20 | 20 | 21 | 19 | 20 | 20 |
| 4 | 20 | 20 | 20 | 21 | 19 | 20 | 20 |
| 5 | 19 | 19 | 19 | 20 | 19 | 18 | 18 |

T3 / 6 PM °C 37 35 36 37 37 36 35

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 62 | 63 | 63 | 63 | 63 | 62 | 61 |
| 7 | 62 | 62 | 62 | 62 | 62 | 61 | 61 |
| 8 | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| 9 | 67 | 67 | 67 | 67 | 67 | 67 | 67 |
| 10 | 69 | 69 | 69 | 70 | 69 | 69 | 69 |
| 11 | 74 | 74 | 74 | 74 | 74 | 74 | 73 |
| 12 | 76 | 76 | 76 | 75 | 75 | 75 | 75 |
| 13 | 77 | 76 | 77 | 76 | 75 | 76 | 76 |
| 14 | 78 | 77 | 77 | 75 | 75 | 76 | 77 |
| 15 | 78 | 78 | 78 | 78 | 78 | 76 | 76 |
| 16 | 78 | 78 | 78 | 78 | 78 | 77 | 76 |
| 17 | 78 | 76 | 78 | 78 | 78 | 78 | 76 |
| 18 | 76 | 76 | 76 | 77 | 77 | 77 | 75 |
| 19 | 75 | 75 | 76 | 75 | 75 | 74 | 74 |
| 20 | 73 | 73 | 75 | 73 | 73 | 73 | 73 |
| 21 | 71 | 71 | 72 | 71 | 71 | 71 | 70 |
| 22 | 70 | 69 | 71 | 70 | 69 | 70 | 69 |
| 23 | 69 | 68 | 69 | 68 | 68 | 69 | 68 |
| 0 | 68 | 67 | 67 | 68 | 67 | 67 | 67 |
| 1 | 66 | 65 | 66 | 66 | 66 | 66 | 66 |
| 2 | 65 | 65 | 65 | 66 | 65 | 65 | 65 |
| 3 | 64 | 65 | 64 | 65 | 63 | 64 | 64 |
| 4 | 63 | 64 | 64 | 65 | 63 | 63 | 62 |
| 5 | 63 | 63 | 63 | 64 | 63 | 62 | 61 |

ITH 2 | 7 PM 78 77 78 77 77 77 76

Hrs < 68 9 10 10 9 10 10 10
Hrs ≥ 68 15 14 14 15 14 14 14

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Altas 12hrs, el pico supera los **38°C** y mínimas de **18°C** durante la noche.
- **Humedad Ambiental:** Baja humedad Inferior al **< 25%**.
- **Thi / Estrés Calórico:** El pico llega a los **78** Índices, ubicándose el limite de la “**Zona de Estrés Moderado**”, la cual puede causar perdidas moderadas de produccion y reproducción en los hatos lecheros, la disminución de la humedad en la noche hace que no se tenga ningún estrés en las noches y tiene duración de 16 hrs al día, las necesidades del enfriamiento se requieren durante esas 16 hrs y no es necesario enfriamiento durante las noches.

ZONA CD OBREGON, SONORA

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 25 | 25 | 25 | 27 | 30 | 31 | 28 |
| 7 | 26 | 26 | 26 | 28 | 31 | 32 | 30 |
| 8 | 28 | 27 | 28 | 29 | 34 | 34 | 33 |
| 9 | 30 | 29 | 30 | 31 | 36 | 36 | 35 |
| 10 | 33 | 32 | 32 | 33 | 39 | 38 | 37 |
| 11 | 37 | 37 | 38 | 38 | 44 | 43 | 41 |
| 12 | 37 | 39 | 40 | 40 | 43 | 43 | 43 |
| 13 | 38 | 41 | 41 | 41 | 45 | 44 | 44 |
| 14 | 40 | 42 | 42 | 42 | 45 | 45 | 45 |
| 15 | 41 | 42 | 41 | 43 | 45 | 45 | 44 |
| 16 | 40 | 40 | 40 | 43 | 46 | 46 | 44 |
| 17 | 37 | 38 | 37 | 41 | 46 | 45 | 43 |
| 18 | 35 | 36 | 36 | 39 | 43 | 43 | 41 |
| 19 | 33 | 34 | 35 | 38 | 42 | 41 | 39 |
| 20 | 30 | 32 | 33 | 35 | 39 | 39 | 36 |
| 21 | 29 | 31 | 31 | 33 | 38 | 36 | 32 |
| 22 | 29 | 30 | 30 | 32 | 36 | 35 | 31 |
| 23 | 29 | 29 | 30 | 31 | 35 | 34 | 30 |
| 0 | 30 | 28 | 27 | 29 | 30 | 34 | 33 |
| 1 | 30 | 28 | 27 | 29 | 30 | 34 | 33 |
| 2 | 30 | 27 | 26 | 28 | 30 | 33 | 32 |
| 3 | 29 | 26 | 26 | 28 | 30 | 33 | 31 |
| 4 | 29 | 26 | 26 | 28 | 30 | 33 | 31 |
| 5 | 27 | 25 | 25 | 27 | 30 | 32 | 29 |

T3 / 6 PM °C 38 39 38 41 45 45 43

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 70 | 74 | 74 | 74 | 73 | 73 | 72 |
| 7 | 72 | 75 | 75 | 76 | 74 | 74 | 73 |
| 8 | 76 | 77 | 77 | 77 | 76 | 76 | 75 |
| 9 | 77 | 78 | 78 | 78 | 78 | 78 | 77 |
| 10 | 79 | 80 | 80 | 79 | 80 | 80 | 79 |
| 11 | 83 | 85 | 85 | 84 | 84 | 84 | 83 |
| 12 | 82 | 86 | 85 | 85 | 84 | 83 | 84 |
| 13 | 82 | 86 | 86 | 85 | 85 | 84 | 85 |
| 14 | 83 | 87 | 86 | 85 | 86 | 85 | 86 |
| 15 | 83 | 87 | 84 | 86 | 86 | 85 | 86 |
| 16 | 83 | 86 | 84 | 85 | 86 | 86 | 85 |
| 17 | 82 | 85 | 83 | 84 | 86 | 85 | 83 |
| 18 | 81 | 83 | 81 | 82 | 84 | 84 | 82 |
| 19 | 79 | 81 | 80 | 81 | 83 | 82 | 80 |
| 20 | 77 | 79 | 79 | 79 | 81 | 80 | 77 |
| 21 | 77 | 78 | 77 | 77 | 79 | 78 | 75 |
| 22 | 77 | 77 | 77 | 77 | 78 | 77 | 74 |
| 23 | 77 | 77 | 77 | 76 | 77 | 77 | 74 |
| 0 | 74 | 76 | 76 | 76 | 76 | 77 | 76 |
| 1 | 73 | 76 | 76 | 76 | 76 | 76 | 75 |
| 2 | 73 | 75 | 75 | 76 | 76 | 75 | 74 |
| 3 | 72 | 75 | 75 | 75 | 75 | 75 | 73 |
| 4 | 71 | 75 | 75 | 75 | 75 | 74 | 73 |
| 5 | 71 | 74 | 74 | 75 | 74 | 74 | 72 |

ITH 2 | 7 PM 82 85 83 84 86 85 84

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **45°/ 46°c** y mínimas de **25°c** durante la noche.
- **Humedad Ambiental:** La humedad es “**Moderada**” entre **25% y 40%**.
- **Thi / Estrés Calórico:** El pico supera los **86** Índices, ubicándose en la “**Zona de Estrés Altamente Peligroso**”, la cual puede causar inclusive la muerte del ganado, daños y pérdidas considerables en los hatos lecheros, el aumento de la humedad nocturna hace que se sienta “**Estrés Moderado**” en las noches, el estrés tiene duración las 24 hrs del día superando durante la noche, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.



ZONA BAJIO, JALISCO:

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|---------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 20 | 21 | 20 | 21 | 21 | 21 | 21 |
| 7 | 20 | 20 | 19 | 20 | 21 | 20 | 20 |
| 8 | 21 | 21 | 20 | 21 | 21 | 21 | 21 |
| 9 | 23 | 23 | 22 | 24 | 24 | 24 | 23 |
| 10 | 25 | 26 | 25 | 26 | 26 | 26 | 26 |
| 11 | 29 | 30 | 30 | 31 | 31 | 31 | 31 |
| 12 | 31 | 31 | 31 | 31 | 32 | 33 | 32 |
| 13 | 31 | 32 | 32 | 32 | 32 | 33 | 32 |
| 14 | 32 | 32 | 33 | 33 | 33 | 34 | 33 |
| 15 | 32 | 32 | 33 | 33 | 33 | 35 | 34 |
| 16 | 32 | 34 | 33 | 34 | 34 | 34 | 35 |
| 17 | 33 | 34 | 34 | 34 | 34 | 34 | 34 |
| 18 | 33 | 28 | 32 | 33 | 34 | 34 | 34 |
| 19 | 32 | 26 | 31 | 33 | 33 | 33 | 34 |
| 20 | 30 | 25 | 30 | 31 | 30 | 31 | 31 |
| 21 | 28 | 24 | 27 | 28 | 28 | 29 | 28 |
| 22 | 26 | 24 | 26 | 27 | 26 | 27 | 26 |
| 23 | 24 | 23 | 25 | 26 | 24 | 25 | 25 |
| 0 | 24 | 23 | 22 | 23 | 25 | 24 | 24 |
| 1 | 23 | 23 | 21 | 22 | 24 | 24 | 24 |
| 2 | 23 | 23 | 21 | 23 | 23 | 24 | 23 |
| 3 | 22 | 22 | 21 | 22 | 23 | 23 | 23 |
| 4 | 22 | 22 | 21 | 22 | 23 | 23 | 23 |
| 5 | 21 | 21 | 20 | 21 | 22 | 22 | 21 |
| T 3 / 6 PM °C | 32 | 32 | 33 | 34 | 34 | 34 | 34 |

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|--------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 66 | 66 | 65 | 67 | 67 | 67 | 67 |
| 7 | 65 | 66 | 65 | 66 | 66 | 66 | 66 |
| 8 | 66 | 67 | 66 | 67 | 67 | 67 | 67 |
| 9 | 69 | 69 | 68 | 70 | 70 | 70 | 70 |
| 10 | 71 | 71 | 71 | 72 | 72 | 73 | 72 |
| 11 | 76 | 77 | 76 | 77 | 78 | 78 | 77 |
| 12 | 77 | 78 | 78 | 77 | 78 | 79 | 78 |
| 13 | 78 | 79 | 79 | 78 | 79 | 79 | 79 |
| 14 | 78 | 79 | 79 | 78 | 79 | 79 | 79 |
| 15 | 78 | 79 | 79 | 79 | 79 | 79 | 79 |
| 16 | 78 | 79 | 78 | 79 | 79 | 78 | 79 |
| 17 | 78 | 79 | 78 | 79 | 78 | 77 | 78 |
| 18 | 77 | 74 | 76 | 77 | 78 | 77 | 78 |
| 19 | 77 | 72 | 76 | 77 | 77 | 77 | 78 |
| 20 | 75 | 71 | 75 | 76 | 75 | 75 | 76 |
| 21 | 73 | 70 | 73 | 74 | 74 | 74 | 74 |
| 22 | 72 | 70 | 72 | 73 | 72 | 73 | 72 |
| 23 | 70 | 69 | 71 | 72 | 71 | 71 | 71 |
| 0 | 70 | 69 | 67 | 69 | 71 | 70 | 70 |
| 1 | 69 | 69 | 67 | 69 | 70 | 70 | 70 |
| 2 | 68 | 69 | 67 | 69 | 70 | 70 | 70 |
| 3 | 68 | 68 | 66 | 69 | 69 | 69 | 69 |
| 4 | 67 | 67 | 66 | 68 | 68 | 68 | 68 |
| 5 | 66 | 67 | 66 | 67 | 68 | 68 | 67 |
| ITH 2 7 PM | 78 | 77 | 78 | 79 | 79 | 78 | 79 |
| Hrs < 68 | 5 | 5 | 9 | 4 | 3 | 3 | 4 |
| Hrs ≥ 68 | 19 | 19 | 15 | 20 | 21 | 21 | 20 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Moderadas 10hrs, el pico supera los **35°C** y mínimas de **21°C** durante la noche.
- **Humedad Ambiental:** Baja humedad moderada de 30 a 45%.
- **THi / Estrés Calórico:** El pico llega a los **79** Índices, ubicándose en la “**Zona de Estrés Severo**”, la cual puede causar altas perdidas de producción y reproducción en los hatos lecheros, la humedad se incrementa durante la noche generando un estrés ligero, El Estrés diario tiene duración de 20 hrs al día, las necesidades del enfriamiento se requieren durante las 16 hrs mas intensas y no es necesario enfriamiento durante las noches.



ZONA QUERETARO:

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 15 | 15 | 15 | 14 | 13 | 14 | 14 |
| 7 | 19 | 19 | 19 | 18 | 18 | 17 | 18 |
| 8 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 9 | 24 | 24 | 24 | 25 | 25 | 25 | 25 |
| 10 | 26 | 26 | 26 | 28 | 27 | 27 | 27 |
| 11 | 31 | 31 | 31 | 33 | 33 | 32 | 32 |
| 12 | 33 | 34 | 33 | 35 | 35 | 34 | 34 |
| 13 | 35 | 35 | 35 | 36 | 36 | 35 | 35 |
| 14 | 36 | 36 | 36 | 37 | 36 | 36 | 36 |
| 15 | 36 | 36 | 36 | 37 | 36 | 36 | 36 |
| 16 | 36 | 36 | 36 | 36 | 36 | 35 | 35 |
| 17 | 34 | 34 | 33 | 34 | 34 | 34 | 34 |
| 18 | 32 | 30 | 32 | 32 | 32 | 31 | 31 |
| 19 | 28 | 28 | 28 | 28 | 28 | 28 | 27 |
| 20 | 22 | 22 | 22 | 22 | 22 | 22 | 21 |
| 21 | 20 | 20 | 20 | 20 | 20 | 19 | 19 |
| 22 | 19 | 20 | 18 | 18 | 18 | 18 | 18 |
| 23 | 18 | 18 | 17 | 18 | 17 | 17 | 17 |
| 0 | 18 | 18 | 17 | 17 | 17 | 16 | 16 |
| 1 | 17 | 17 | 17 | 17 | 16 | 16 | 16 |
| 2 | 17 | 17 | 16 | 16 | 16 | 15 | 15 |
| 3 | 16 | 16 | 16 | 16 | 15 | 15 | 15 |
| 4 | 16 | 16 | 16 | 16 | 15 | 15 | 15 |
| 5 | 16 | 15 | 15 | 15 | 14 | 14 | 14 |

T 3 / 6 PM °C 35 34 34 35 35 34 34

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 59 | 58 | 58 | 57 | 56 | 57 | 56 |
| 7 | 64 | 64 | 64 | 63 | 62 | 61 | 62 |
| 8 | 66 | 67 | 67 | 67 | 66 | 66 | 67 |
| 9 | 69 | 70 | 69 | 69 | 69 | 69 | 69 |
| 10 | 71 | 72 | 72 | 71 | 71 | 70 | 71 |
| 11 | 76 | 77 | 76 | 75 | 75 | 75 | 75 |
| 12 | 77 | 77 | 78 | 77 | 76 | 77 | 76 |
| 13 | 77 | 78 | 78 | 77 | 77 | 77 | 77 |
| 14 | 78 | 78 | 78 | 78 | 78 | 78 | 77 |
| 15 | 78 | 78 | 78 | 78 | 78 | 78 | 77 |
| 16 | 77 | 78 | 78 | 77 | 78 | 77 | 77 |
| 17 | 76 | 77 | 75 | 76 | 76 | 76 | 75 |
| 18 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| 19 | 72 | 72 | 71 | 71 | 71 | 71 | 70 |
| 20 | 65 | 67 | 65 | 66 | 65 | 66 | 65 |
| 21 | 64 | 65 | 64 | 64 | 63 | 63 | 63 |
| 22 | 63 | 64 | 62 | 62 | 62 | 62 | 62 |
| 23 | 62 | 62 | 61 | 61 | 61 | 61 | 60 |
| 0 | 62 | 62 | 61 | 61 | 60 | 60 | 60 |
| 1 | 61 | 61 | 61 | 60 | 60 | 59 | 59 |
| 2 | 60 | 60 | 60 | 59 | 59 | 58 | 59 |
| 3 | 60 | 60 | 60 | 59 | 58 | 58 | 58 |
| 4 | 59 | 59 | 59 | 58 | 57 | 57 | 57 |
| 5 | 59 | 58 | 59 | 58 | 57 | 57 | 57 |

ITH 2 | 7 PM 76 76 76 76 76 76 75

Hrs < 68 13 13 13 13 13 13 13
Hrs ≥ 68 11 11 11 11 11 11 11

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Moderadas y 4hrs de Altas, el pico supera los **37°C** y mínimas de **15°C** durante la noche.
- **Humedad Ambiental:** Baja, inferior al **25%**.
- **Thi / Estrés Calórico:** El pico llega a los **78** índices, ubicándose en el limite de la “**Zona de Estrés Severo**”, la cual puede causar perdidas moderadas de producción y reproducción en los hatos lecheros, la humedad se incrementa durante la noche pero la baja temperatura hace que no se genere estrés. El Estrés diario tiene duración máxima de 12 hrs, las necesidades del enfriamiento se requieren en ese horario y no es necesario enfriamiento durante las noches.



ZONA CD. JUAREZ, CHIHUAHUA:

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 27 | 27 | 26 | 27 | 27 | 28 | 28 |
| 7 | 26 | 27 | 26 | 26 | 26 | 28 | 27 |
| 8 | 27 | 27 | 27 | 27 | 28 | 29 | 29 |
| 9 | 28 | 29 | 29 | 29 | 29 | 30 | 30 |
| 10 | 29 | 30 | 30 | 30 | 32 | 32 | 32 |
| 11 | 31 | 33 | 34 | 33 | 34 | 34 | 34 |
| 12 | 33 | 34 | 36 | 36 | 37 | 37 | 37 |
| 13 | 34 | 35 | 38 | 39 | 40 | 40 | 40 |
| 14 | 35 | 37 | 39 | 39 | 40 | 41 | 41 |
| 15 | 39 | 38 | 40 | 39 | 41 | 42 | 41 |
| 16 | 39 | 39 | 41 | 39 | 41 | 42 | 42 |
| 17 | 39 | 40 | 40 | 39 | 41 | 42 | 41 |
| 18 | 38 | 39 | 40 | 39 | 40 | 41 | 41 |
| 19 | 38 | 38 | 39 | 39 | 40 | 41 | 40 |
| 20 | 36 | 30 | 37 | 38 | 38 | 39 | 38 |
| 21 | 34 | 30 | 36 | 36 | 37 | 37 | 37 |
| 22 | 33 | 31 | 35 | 35 | 36 | 35 | 35 |
| 23 | 31 | 30 | 34 | 34 | 35 | 34 | 34 |
| 0 | 32 | 31 | 30 | 29 | 32 | 33 | 34 |
| 1 | 31 | 30 | 30 | 29 | 31 | 33 | 33 |
| 2 | 31 | 29 | 29 | 29 | 30 | 31 | 32 |
| 3 | 30 | 28 | 29 | 28 | 29 | 30 | 31 |
| 4 | 30 | 28 | 29 | 28 | 29 | 30 | 31 |
| 5 | 28 | 28 | 27 | 27 | 28 | 29 | 29 |

T3 / 6 PM °C 39 39 40 39 41 42 41

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 69 | 70 | 72 | 71 | 71 | 69 | 70 |
| 7 | 69 | 69 | 72 | 71 | 70 | 68 | 70 |
| 8 | 70 | 70 | 72 | 71 | 70 | 70 | 71 |
| 9 | 71 | 71 | 73 | 72 | 71 | 71 | 72 |
| 10 | 72 | 72 | 74 | 73 | 72 | 72 | 73 |
| 11 | 74 | 76 | 75 | 75 | 76 | 74 | 75 |
| 12 | 77 | 75 | 76 | 76 | 77 | 76 | 77 |
| 13 | 76 | 76 | 77 | 77 | 78 | 79 | 80 |
| 14 | 77 | 76 | 78 | 78 | 79 | 79 | 80 |
| 15 | 78 | 77 | 81 | 79 | 80 | 79 | 81 |
| 16 | 78 | 77 | 81 | 80 | 80 | 79 | 81 |
| 17 | 80 | 78 | 81 | 81 | 80 | 79 | 81 |
| 18 | 79 | 78 | 79 | 80 | 80 | 79 | 80 |
| 19 | 78 | 78 | 79 | 79 | 79 | 79 | 80 |
| 20 | 77 | 77 | 78 | 74 | 78 | 78 | 79 |
| 21 | 77 | 76 | 77 | 74 | 77 | 77 | 78 |
| 22 | 76 | 75 | 76 | 75 | 76 | 76 | 77 |
| 23 | 76 | 75 | 74 | 74 | 75 | 75 | 76 |
| 0 | 73 | 75 | 74 | 74 | 73 | 74 | 75 |
| 1 | 72 | 74 | 74 | 74 | 73 | 73 | 74 |
| 2 | 71 | 73 | 73 | 74 | 73 | 72 | 73 |
| 3 | 71 | 72 | 73 | 73 | 72 | 71 | 72 |
| 4 | 70 | 71 | 73 | 73 | 72 | 70 | 71 |
| 5 | 70 | 71 | 72 | 72 | 72 | 70 | 71 |

iTH 2 | 7 PM 79 78 80 80 80 79 81

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

“La ola de calor o Verano 2023 - 2024”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **40°/ 41°c** y mínimas de **27°c** durante la noche.
- **Humedad Ambiental:** Muy baja humedad Inferior al **< 15%**.
- **THi / Estrés Calórico:** El pico supera los **80** Índices, ubicándose principalmente en la “**Zona de Estrés Severo**” y el aumento de la humedad nocturna llega a “**Estrés moderado**” en las noches, esto puede causar daños y perdidas considerables en los hatos lecheros, el estrés tiene duración las 24 hrs del día superando los > 68 índices durante la noche, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.

ZONA TABASCO & CHIAPAS:

| Temperatura | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 27 | 27 | 27 | 27 | 27 | 26 | 25 |
| 7 | 29 | 29 | 29 | 29 | 27 | 25 | 25 |
| 8 | 32 | 31 | 31 | 31 | 28 | 28 | 27 |
| 9 | 34 | 34 | 34 | 34 | 31 | 30 | 30 |
| 10 | 36 | 36 | 37 | 37 | 33 | 33 | 33 |
| 11 | 42 | 41 | 43 | 43 | 38 | 39 | 39 |
| 12 | 42 | 44 | 44 | 44 | 41 | 40 | 41 |
| 13 | 45 | 46 | 46 | 45 | 41 | 42 | 43 |
| 14 | 44 | 46 | 46 | 46 | 44 | 43 | 42 |
| 15 | 44 | 44 | 47 | 46 | 43 | 43 | 43 |
| 16 | 43 | 44 | 46 | 45 | 43 | 44 | 43 |
| 17 | 43 | 43 | 44 | 43 | 41 | 43 | 44 |
| 18 | 38 | 41 | 42 | 41 | 38 | 41 | 42 |
| 19 | 33 | 38 | 38 | 38 | 36 | 38 | 39 |
| 20 | 34 | 36 | 34 | 35 | 32 | 32 | 34 |
| 21 | 34 | 33 | 33 | 32 | 30 | 29 | 33 |
| 22 | 32 | 31 | 32 | 31 | 30 | 30 | 32 |
| 23 | 31 | 31 | 32 | 31 | 30 | 30 | 31 |
| 0 | 32 | 30 | 33 | 33 | 31 | 29 | 31 |
| 1 | 32 | 30 | 32 | 32 | 31 | 29 | 29 |
| 2 | 31 | 30 | 31 | 30 | 30 | 28 | 28 |
| 3 | 30 | 29 | 30 | 29 | 29 | 28 | 27 |
| 4 | 30 | 29 | 30 | 29 | 29 | 28 | 27 |
| 5 | 28 | 27 | 27 | 27 | 28 | 26 | 25 |

T 3 / 6 PM °C 42 43 44 44 41 43 43

| ITH | 16-06-23 | 17-06-23 | 18-06-23 | 19-06-23 | 20-06-23 | 21-06-23 | 22-06-23 |
|-----|----------|----------|----------|----------|----------|----------|----------|
| 6 | 77 | 76 | 76 | 75 | 76 | 75 | 72 |
| 7 | 79 | 78 | 78 | 77 | 75 | 75 | 72 |
| 8 | 81 | 80 | 79 | 79 | 77 | 77 | 75 |
| 9 | 83 | 83 | 81 | 81 | 79 | 79 | 78 |
| 10 | 84 | 84 | 83 | 82 | 81 | 81 | 81 |
| 11 | 89 | 88 | 87 | 86 | 86 | 87 | 86 |
| 12 | 87 | 89 | 88 | 87 | 88 | 86 | 87 |
| 13 | 90 | 89 | 88 | 87 | 86 | 86 | 87 |
| 14 | 87 | 90 | 88 | 87 | 89 | 86 | 85 |
| 15 | 88 | 87 | 88 | 87 | 87 | 86 | 86 |
| 16 | 87 | 87 | 87 | 86 | 87 | 87 | 86 |
| 17 | 88 | 86 | 86 | 85 | 86 | 88 | 87 |
| 18 | 86 | 85 | 85 | 84 | 85 | 86 | 86 |
| 19 | 82 | 83 | 82 | 81 | 84 | 83 | 83 |
| 20 | 82 | 82 | 79 | 79 | 82 | 80 | 82 |
| 21 | 82 | 81 | 80 | 78 | 80 | 79 | 81 |
| 22 | 81 | 80 | 79 | 78 | 81 | 79 | 81 |
| 23 | 81 | 81 | 79 | 79 | 81 | 78 | 80 |
| 0 | 80 | 80 | 80 | 79 | 79 | 80 | 79 |
| 1 | 80 | 79 | 80 | 78 | 79 | 79 | 78 |
| 2 | 80 | 78 | 79 | 77 | 78 | 78 | 76 |
| 3 | 79 | 78 | 78 | 77 | 77 | 78 | 75 |
| 4 | 78 | 77 | 77 | 76 | 77 | 77 | 74 |
| 5 | 77 | 76 | 76 | 76 | 76 | 76 | 73 |

ITH 2 | 7 PM 87 87 86 85 87 86 86

| | | | | | | | |
|----------|----|----|----|----|----|----|----|
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

“La ola de calor o Verano 2023”, nos muestra el clima que se puede esperar para los próximos años:

- **Temperatura:** Muy Altas las 24hrs, el pico supera los **47°/ 48°c** y mínimas de **27°c** durante la noche.
- **Humedad Ambiental:** La humedad es “**Moderadamente Alta**” entre **45% y 60%**.
- **THi / Estrés Calórico:** El pico supera los **90** Índices, ubicándose en la “**Zona de Estrés Altamente Peligroso**”, la cual puede causar inclusive la muerte del ganado, daños y perdidas considerables en los hatos lecheros, el aumento de la humedad nocturna hace que se sienta “**Estrés Severo**” en las noches, el estrés tiene duración las 24 hrs del día superando durante la noche, por lo que las necesidades del enfriamiento se requieren durante las 24 hrs.

BIN RIAZ DAIRY, PAKISTAN:

SISTEMA METEOROLÓGICO & PREDICCIÓN CLIMÁTICA E. BIN RIAZ DAIRY, VIA GPS



| | Sáb. | Dom. | Lun. | Mar. | Mié. | Jue. | Vie. | Sáb. 🗓️ | Dom. | Lun. | Mar. | Mié. | Jue. | Vie. | Sáb. | Dom. |
|---------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Temperatura | 13/07/2024 | 14/07/2024 | 15/07/2024 | 16/07/2024 | 17/07/2024 | 18/07/2024 | 19/07/2024 | 20/07/2024 | 21/07/2024 | 22/07/2024 | 23/07/2024 | 24/07/2024 | 25/07/2024 | 26/07/2024 | 27/07/2024 | 28/07/2024 |
| 6 | 28 | 30 | 32 | 36 | 36 | 36 | 34 | 36 | 38 | 35 | 32 | 29 | 32 | 35 | 34 | 29 |
| 7 | 29 | 32 | 33 | 37 | 38 | 37 | 36 | 38 | 39 | 35 | 32 | 30 | 33 | 35 | 35 | 30 |
| 8 | 31 | 33 | 35 | 39 | 40 | 38 | 37 | 39 | 40 | 37 | 33 | 31 | 33 | 36 | 36 | 31 |
| 9 | 32 | 34 | 37 | 41 | 41 | 39 | 39 | 41 | 42 | 38 | 34 | 33 | 35 | 37 | 37 | 33 |
| 10 | 34 | 36 | 38 | 42 | 42 | 40 | 41 | 43 | 44 | 40 | 36 | 35 | 36 | 39 | 38 | 34 |
| 11 | 35 | 38 | 40 | 43 | 43 | 41 | 42 | 44 | 45 | 41 | 37 | 37 | 38 | 40 | 39 | 36 |
| 12 | 37 | 39 | 41 | 44 | 44 | 42 | 43 | 45 | 46 | 43 | 38 | 37 | 39 | 41 | 40 | 37 |
| 13 | 38 | 40 | 42 | 45 | 46 | 43 | 44 | 46 | 47 | 44 | 39 | 37 | 40 | 42 | 40 | 38 |
| 14 | 39 | 40 | 43 | 45 | 46 | 44 | 44 | 47 | 48 | 45 | 40 | 38 | 41 | 43 | 40 | 39 |
| 15 | 40 | 41 | 43 | 45 | 46 | 44 | 45 | 47 | 48 | 46 | 39 | 38 | 42 | 43 | 39 | 39 |
| 16 | 40 | 41 | 43 | 45 | 45 | 42 | 45 | 46 | 48 | 46 | 38 | 38 | 42 | 42 | 37 | 39 |
| 17 | 37 | 41 | 43 | 45 | 44 | 40 | 45 | 45 | 47 | 45 | 37 | 38 | 42 | 42 | 36 | 39 |
| 18 | 34 | 41 | 42 | 44 | 42 | 39 | 44 | 45 | 46 | 45 | 35 | 37 | 41 | 40 | 35 | 38 |
| 19 | 33 | 39 | 41 | 43 | 41 | 39 | 42 | 44 | 43 | 41 | 33 | 36 | 39 | 39 | 33 | 37 |
| 20 | 33 | 38 | 40 | 42 | 40 | 38 | 40 | 44 | 42 | 38 | 31 | 36 | 38 | 38 | 32 | 36 |
| 21 | 33 | 38 | 39 | 41 | 39 | 37 | 39 | 43 | 40 | 37 | 31 | 35 | 38 | 37 | 31 | 36 |
| 22 | 32 | 37 | 38 | 40 | 38 | 37 | 39 | 43 | 39 | 37 | 30 | 35 | 38 | 37 | 30 | 35 |
| 23 | 32 | 37 | 37 | 39 | 38 | 36 | 38 | 42 | 39 | 36 | 30 | 35 | 37 | 37 | 30 | 35 |
| 0 | 28 | 30 | 33 | 38 | 39 | 38 | 36 | 38 | 41 | 38 | 36 | 29 | 34 | 37 | 35 | 30 |
| 1 | 28 | 30 | 32 | 37 | 38 | 38 | 36 | 38 | 40 | 37 | 36 | 29 | 33 | 36 | 34 | 30 |
| 2 | 28 | 30 | 32 | 37 | 37 | 37 | 35 | 37 | 39 | 36 | 35 | 29 | 32 | 35 | 33 | 29 |
| 3 | 28 | 30 | 32 | 37 | 37 | 37 | 35 | 37 | 38 | 35 | 35 | 28 | 32 | 35 | 33 | 29 |
| 4 | 28 | 30 | 31 | 36 | 36 | 36 | 35 | 36 | 38 | 35 | 34 | 28 | 32 | 34 | 33 | 28 |
| 5 | 27 | 30 | 31 | 35 | 36 | 36 | 34 | 36 | 38 | 35 | 34 | 28 | 31 | 34 | 33 | 27 |
| T 3 / 6 PM °C | 38 | 41 | 43 | 45 | 44 | 41 | 44 | 46 | 47 | 45 | 37 | 38 | 42 | 42 | 37 | 39 |

BIN RIAZ DAIRY, PAKISTAN:

| ITH | 13-07-24 | 14-07-24 | 15-07-24 | 16-07-24 | 17-07-24 | 18-07-24 | 19-07-24 | 20-07-24 | 21-07-24 | 22-07-24 | 23-07-24 | 24-07-24 | 25-07-24 | 26-07-24 | 27-07-24 | 28-07-24 |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 6 | 77 | 80 | 80 | 82 | 84 | 84 | 83 | 83 | 84 | 84 | 83 | 81 | 82 | 83 | 84 | 80 |
| 7 | 78 | 81 | 81 | 83 | 85 | 85 | 84 | 84 | 85 | 85 | 83 | 82 | 83 | 84 | 84 | 81 |
| 8 | 80 | 82 | 82 | 84 | 86 | 85 | 85 | 86 | 86 | 86 | 84 | 83 | 83 | 84 | 85 | 82 |
| 9 | 81 | 82 | 83 | 85 | 87 | 86 | 86 | 87 | 88 | 87 | 85 | 84 | 84 | 85 | 86 | 84 |
| 10 | 83 | 83 | 84 | 86 | 88 | 87 | 87 | 88 | 88 | 87 | 86 | 85 | 85 | 86 | 86 | 85 |
| 11 | 84 | 84 | 85 | 87 | 88 | 87 | 88 | 88 | 89 | 88 | 87 | 86 | 86 | 87 | 87 | 86 |
| 12 | 85 | 85 | 86 | 87 | 89 | 88 | 88 | 89 | 90 | 89 | 87 | 86 | 87 | 88 | 87 | 86 |
| 13 | 86 | 86 | 86 | 87 | 89 | 88 | 88 | 89 | 90 | 90 | 88 | 87 | 87 | 88 | 87 | 87 |
| 14 | 86 | 86 | 87 | 88 | 89 | 88 | 89 | 89 | 90 | 90 | 88 | 87 | 88 | 89 | 87 | 87 |
| 15 | 86 | 86 | 87 | 88 | 89 | 88 | 88 | 89 | 90 | 90 | 88 | 87 | 88 | 88 | 87 | 87 |
| 16 | 86 | 86 | 86 | 88 | 88 | 87 | 88 | 89 | 90 | 90 | 87 | 87 | 88 | 88 | 87 | 87 |
| 17 | 85 | 86 | 86 | 87 | 87 | 88 | 88 | 88 | 89 | 90 | 87 | 87 | 88 | 88 | 86 | 87 |
| 18 | 81 | 85 | 86 | 87 | 87 | 86 | 88 | 88 | 89 | 89 | 85 | 86 | 87 | 87 | 85 | 87 |
| 19 | 79 | 85 | 85 | 86 | 87 | 86 | 87 | 88 | 88 | 88 | 84 | 86 | 87 | 86 | 84 | 86 |
| 20 | 80 | 84 | 85 | 85 | 86 | 86 | 86 | 87 | 86 | 85 | 83 | 85 | 86 | 86 | 83 | 86 |
| 21 | 79 | 84 | 84 | 85 | 86 | 85 | 85 | 87 | 86 | 85 | 82 | 85 | 86 | 85 | 83 | 86 |
| 22 | 80 | 83 | 84 | 84 | 85 | 85 | 85 | 87 | 85 | 85 | 81 | 85 | 86 | 85 | 82 | 85 |
| 23 | 80 | 83 | 84 | 85 | 85 | 84 | 85 | 86 | 85 | 85 | 81 | 85 | 85 | 85 | 81 | 85 |
| 0 | 77 | 79 | 81 | 83 | 84 | 85 | 84 | 85 | 85 | 85 | 85 | 81 | 84 | 85 | 84 | 81 |
| 1 | 77 | 79 | 80 | 83 | 84 | 85 | 84 | 85 | 85 | 84 | 85 | 80 | 83 | 84 | 84 | 81 |
| 2 | 77 | 80 | 80 | 83 | 84 | 84 | 83 | 84 | 84 | 84 | 85 | 80 | 82 | 84 | 83 | 81 |
| 3 | 77 | 80 | 80 | 82 | 84 | 84 | 82 | 84 | 84 | 84 | 85 | 80 | 82 | 83 | 83 | 80 |
| 4 | 77 | 80 | 79 | 82 | 84 | 84 | 82 | 83 | 84 | 84 | 85 | 80 | 82 | 83 | 83 | 80 |
| 5 | 77 | 80 | 79 | 82 | 84 | 84 | 82 | 83 | 84 | 84 | 84 | 79 | 81 | 83 | 83 | 79 |
| ITH 2 7 PM | 84 | 86 | 87 | 88 | 88 | 88 | 88 | 89 | 90 | 90 | 87 | 87 | 88 | 88 | 86 | 87 |
| Hrs < 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hrs ≥ 68 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Datos Metereologicos Registrados: 13 al 19 Julio 2024 Fecha Reporte: 20 Julio 2024 Prediccion Climatica: 13 al 28 Julio 2024 DIGISKY | CONSULTORIA & TECNOLOGIAS DE PRESICION AGROPECUARIAS

Predicciones Laguna 2025 THi / Humedad / Temperatura



| | Espectativa | | | | |
|-----|-------------|---------|---------|--------|--------|
| | TmpD'21 | TmpD'22 | TmpD'23 | iTH'24 | iTH'25 |
| En | 20 | 24 | 25 | 24 | 25 |
| Fb | 25 | 27 | 28 | 27 | 28 |
| Mr | 27 | 31 | 32 | 31 | 32 |
| Ab | 31 | 35 | 33 | 34 | 35 |
| My | 34 | 37 | 35 | 36 | 37 |
| Jn | 36 | 36 | 40 | 38 | 40 |
| JL | 33 | 36 | 38 | 36 | 38 |
| Ag | 32 | 34 | 36 | 35 | 36 |
| Sp | 33 | 31 | 35 | 34 | 35 |
| Oc | 30 | 28 | 29 | 30 | 30 |
| Nv | 26 | 31 | 25 | 28 | 31 |
| Dc | 24 | 25 | 21 | 24 | 25 |
| PrA | 29 | 31 | 31 | 31 | 33 |
| PrV | 34 | 35 | 37 | 36 | 37 |

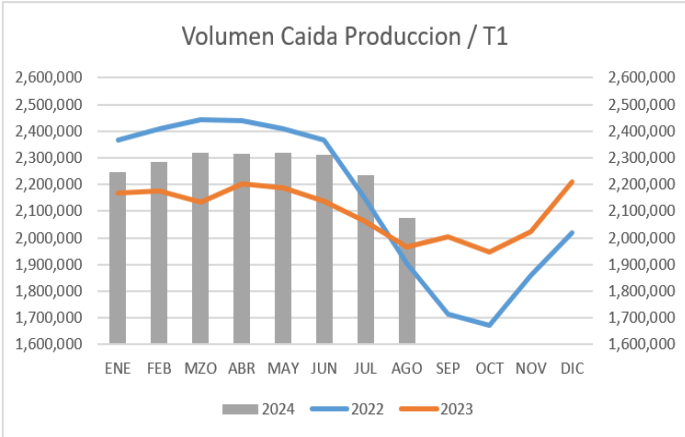
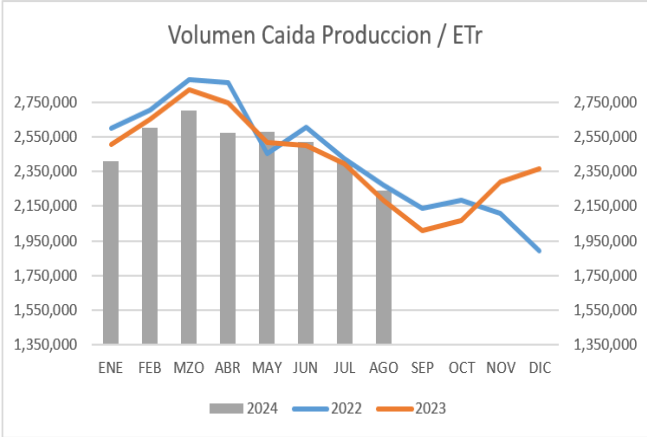
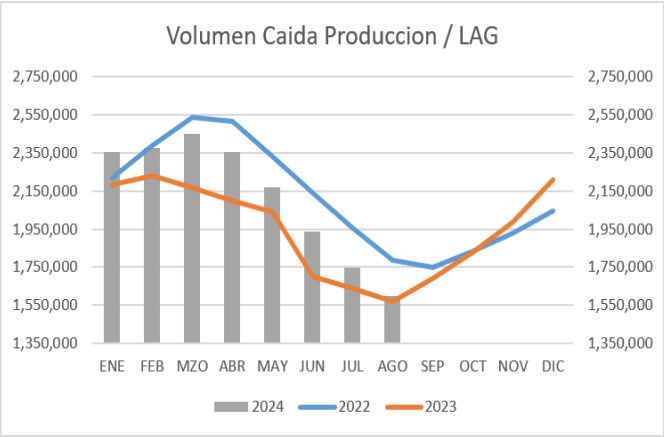
| | Espectativa | | | | |
|-----|-------------|--------|--------|--------|--------|
| | iTH'21 | iTH'22 | iTH'23 | iTH'24 | iTH'25 |
| En | 63 | 66 | 67 | 66 | 67 |
| Fb | 67 | 69 | 69 | 69 | 69 |
| Mr | 69 | 72 | 73 | 72 | 73 |
| Ab | 72 | 76 | 74 | 75 | 76 |
| My | 76 | 78 | 77 | 78 | 78 |
| Jn | 78 | 79 | 81 | 80 | 81 |
| JL | 77 | 79 | 81 | 80 | 81 |
| Ag | 77 | 79 | 79 | 79 | 79 |
| Sp | 76 | 77 | 78 | 78 | 78 |
| Oc | 74 | 73 | 74 | 74 | 74 |
| Nv | 69 | 69 | 69 | 69 | 69 |
| Dc | 67 | 68 | 65 | 67 | 68 |
| PrA | 72 | 74 | 74 | 74 | 75 |
| PrV | 77 | 79 | 79 | 79 | 80 |

| | Espectativa | | | | |
|-----|-------------|---------|---------|--------|--------|
| | HumD'21 | HumD'22 | HumD'23 | iTH'24 | iTH'25 |
| En | 36 | 35 | 30 | 35 | 36 |
| Fb | 26 | 31 | 23 | 28 | 31 |
| Mr | 19 | 16 | 25 | 22 | 25 |
| Ab | 20 | 24 | 21 | 22 | 24 |
| My | 26 | 18 | 33 | 28 | 33 |
| Jn | 30 | 32 | 22 | 30 | 32 |
| JL | 36 | 35 | 35 | 35 | 36 |
| Ag | 44 | 50 | 32 | 46 | 50 |
| Sp | 36 | 60 | 32 | 49 | 60 |
| Oc | 29 | 56 | 59 | 55 | 59 |
| Nv | 35 | 44 | 57 | 50 | 57 |
| Dc | 36 | 36 | 45 | 41 | 45 |
| PrA | 31 | 36 | 34 | 37 | 41 |
| PrV | 34 | 39 | 31 | 38 | 42 |

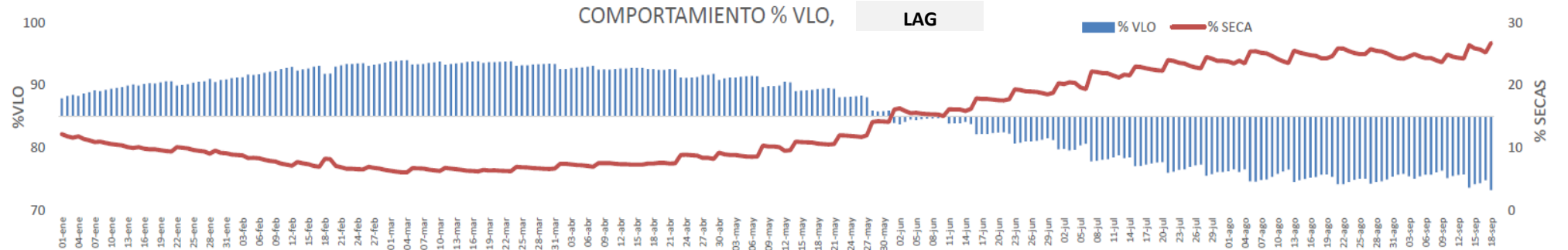
| | Espectativa | | | | |
|-----|-------------|-----------|-----------|--------|--------|
| | Hrs<68'21 | Hrs<68'22 | Hrs<68'23 | iTH'24 | iTH'25 |
| En | 24 | 24 | 24 | 24 | 24 |
| Fb | 23 | 23 | 22 | 23 | 22 |
| Mr | 22 | 20 | 18 | 20 | 18 |
| Ab | 18 | 12 | 15 | 16 | 12 |
| My | 10 | 8 | 11 | 10 | 8 |
| Jn | 5 | 3 | 2 | 4 | 2 |
| JL | 2 | 2 | 2 | 2 | 2 |
| Ag | 1 | 3 | 3 | 3 | 1 |
| Sp | 8 | 10 | 7 | 9 | 7 |
| Oc | 15 | 18 | 16 | 17 | 15 |
| Nv | 22 | 22 | 22 | 22 | 22 |
| Dc | 23 | 23 | 24 | 24 | 23 |
| PrA | 14 | 14 | 14 | 15 | 13 |
| PrV | 5 | 5 | 5 | 6 | 4 |



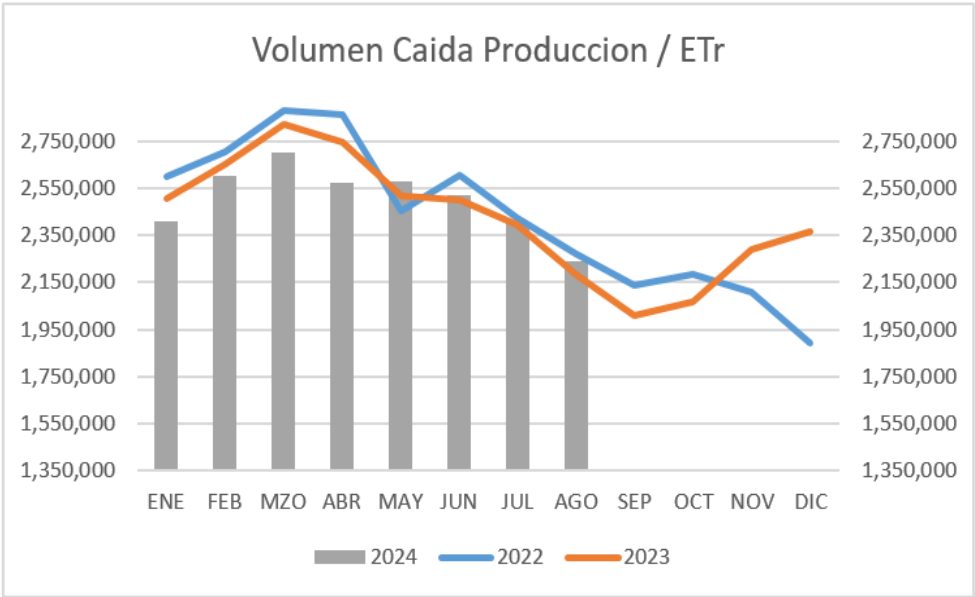
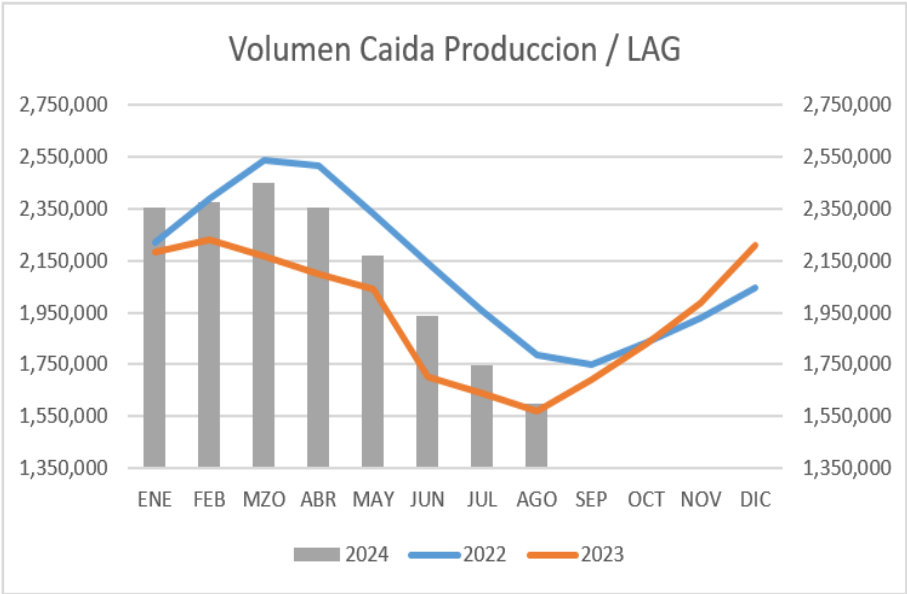
Impacto Productivo del Estrés Calórico



| | | | | | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Vol Prom | 2,119,581 | 1,945,307 | 2,122,899 | 2,426,510 | 2,421,263 | 2,504,837 | 2,145,488 | 2,101,586 | 2,263,690 |
| Max-Min | 791,621 | 660,798 | 850,087 | 988,767 | 812,916 | 461,920 | 770,491 | 263,120 | 244,476 |
| % Caida | - 37.35 | - 33.97 | - 40.04 | - 40.75 | - 33.57 | - 18.44 | - 35.91 | - 12.52 | - 10.80 |

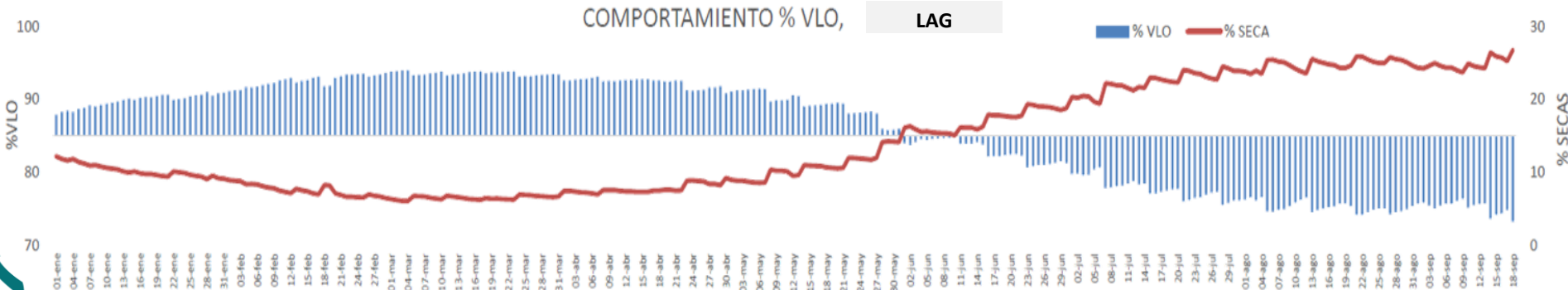


Impacto Productivo del Estrés Calórico



| | | | |
|----------|-----------|-----------|-----------|
| Vol Prom | 2,119,581 | 1,945,307 | 2,122,899 |
| Max-Min | 791,621 | 660,798 | 850,087 |
| % Caida | - 37.35 | - 33.97 | - 40.04 |

| | | | |
|----------|-----------|-----------|-----------|
| Vol Prom | 2,426,510 | 2,421,263 | 2,504,837 |
| Max-Min | 988,767 | 812,916 | 461,920 |
| % Caida | - 40.75 | - 33.57 | - 18.44 |





J. Dairy Sci. 104:5021–5033

<https://doi.org/10.3168/jds.2020-19146>

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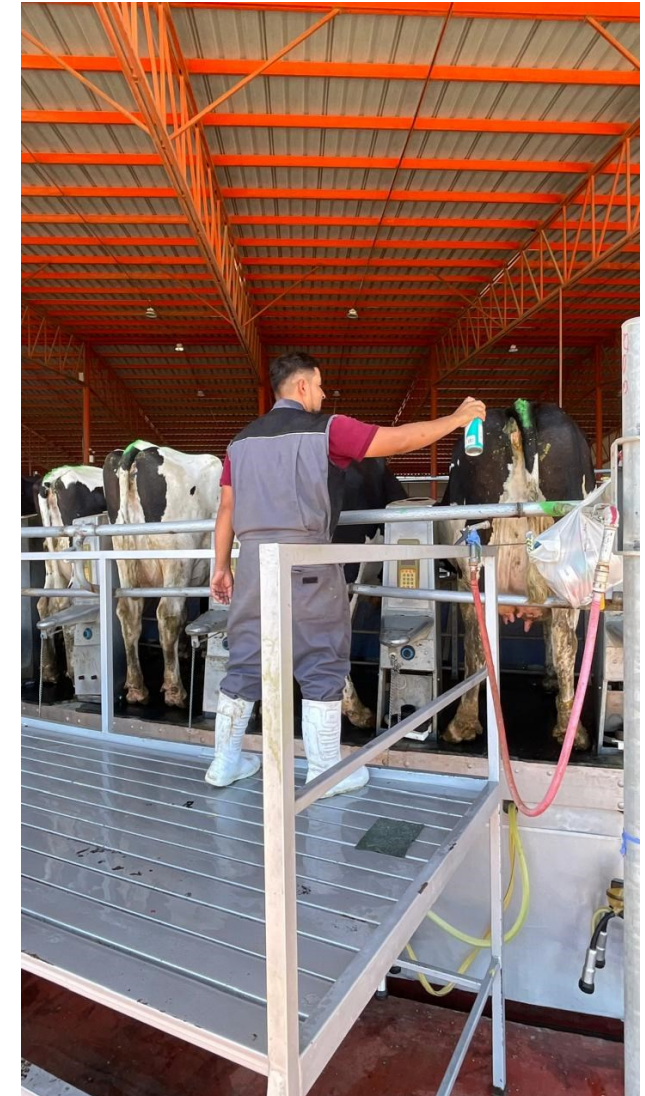
Effects of evaporative cooling and dietary zinc source on heat shock responses and mammary gland development in lactating dairy cows during summer

R. M. Orellana Rivas,¹ T. N. Marins,¹ X. Weng,¹ A. P. A. Monteiro,¹ J. Guo,¹ J. Gao,¹ Y.-C. Chen,¹ M. W. Woldemeskel,² J. K. Bernard,¹ D. J. Tomlinson,³ J. M. DeFrain,³ and S. Tao^{1*}

¹Department of Animal and Dairy Science, University of Georgia, Tifton 31793

²Department of Veterinary Pathology, Veterinary Diagnostic and Investigational Laboratory, University of Georgia, Tifton 31793

³Zinpro Corporation, Eden Prairie, MN 55344





Journal of Functional Foods



Volume 108, September 2023, 105749



Capsaicin alleviates the intestinal oxidative stress via activation of TRPV1/PKA/UCP2 and Keap1/Nrf2 pathways in heat-stressed mice



Zhihua Li, Jingfei Zhang, Kang Cheng, Lili Zhang, Tian Wang  

Chromium yeast alleviates heat stress by improving antioxidant and immune function in Holstein mid-lactation dairy COWS

Q. Shan, F.T. Ma, Y.H. Jin, D. Gao, H.Y. Li, P. Sun  

Review

Potential use of chromium to combat thermal stress in animals: A review

May Bin-Jumah ^a, Mohamed E. Abd El-Hack ^b, Sameh A. Abdelnour ^c, Yasmeen A. Hendy ^d, Hager A. Ghanem ^d, Sara A. Alsafy ^d, Asmaa F. Khafaga ^e, Ahmed E. Noreldin ^f, Hazem Shaheen ^g, Dalia Samak ^h, Maha A. Momenah ^a, Ahmed A. Allam ⁱ, Abdullah A. AlKahtane ^j, Saad Alkahtani ^j, Mohamed M. Abdel-Daim ^j, Lotfi Aleaya ^k  

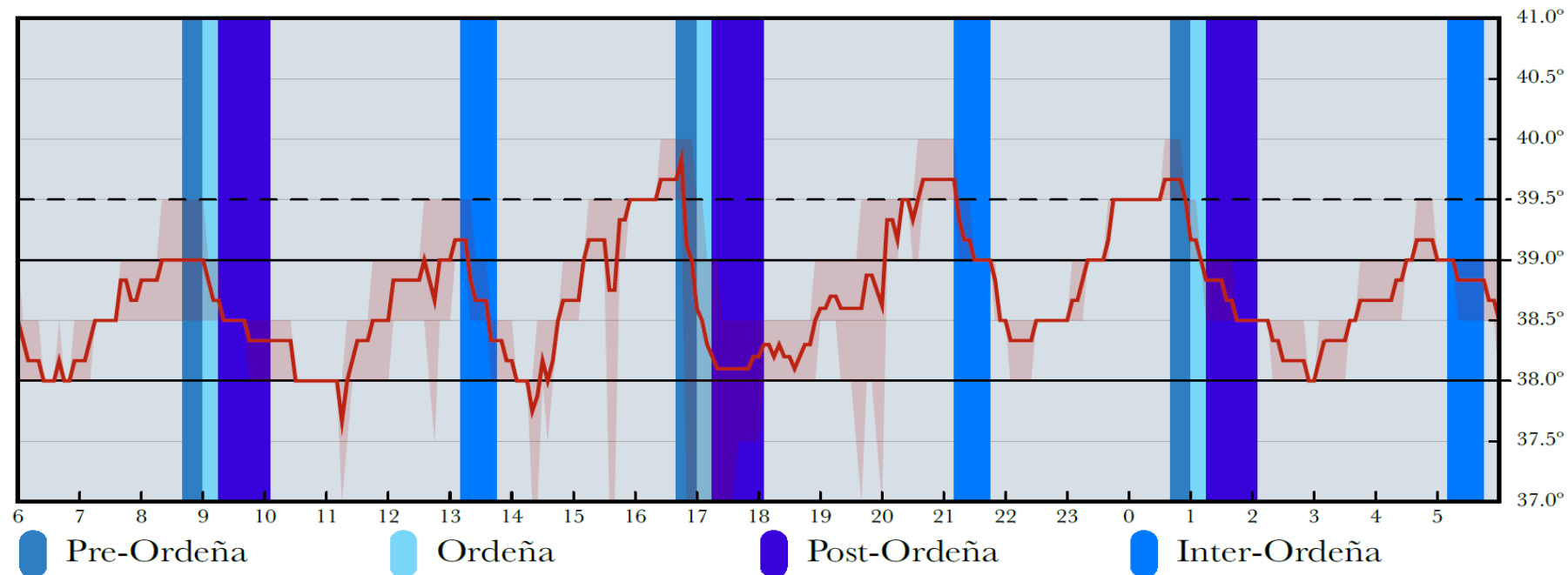


Robots/Maquinas Autónomas para Enfriamiento !

Sistema de Enfriamiento de Precisión
Inter-baños / Sistema Semi-Túnel de Enfriamiento de Ganado

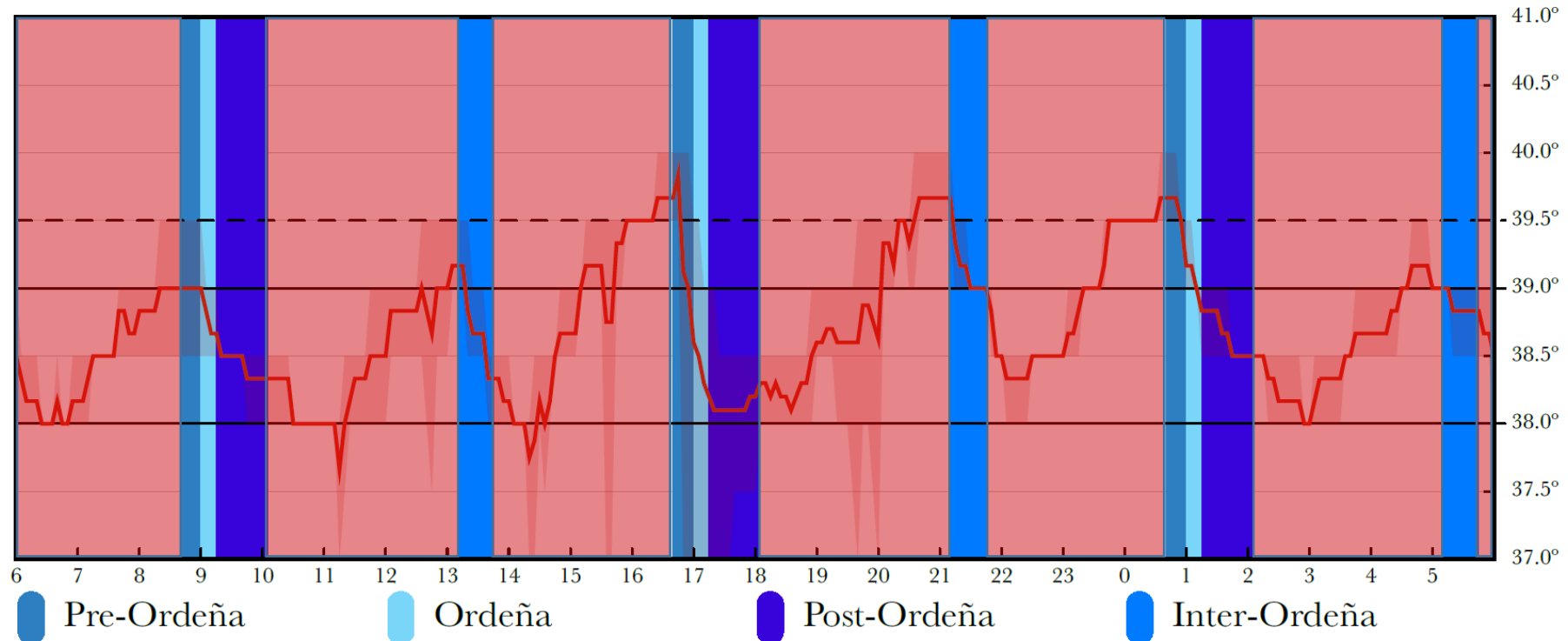


Sistema de Enfriamiento de Precisión Inter-baños / Sistema Semi-Tunel de Enfriamiento de Ganado



La receta actual: Dar 6 baños diarios (3 ordeña + 3 Inter-Ordeña), Enfriar 6 hrs al dia, ciclos de 1 min + 4 min

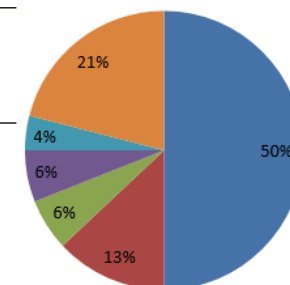
Sistema de Enfriamiento de Precisión Inter-baños / Sistema Semi-Tunel de Enfriamiento de Ganado



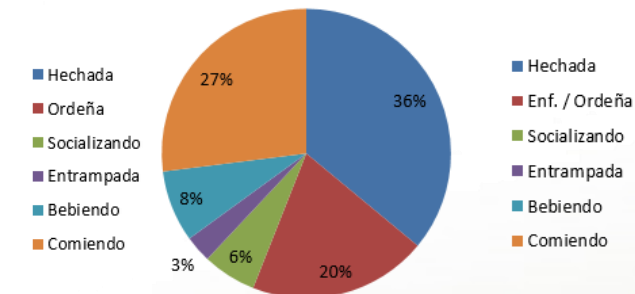
Horas Riesgo Acumular Estrés Calórico: 1,020 hrs (70%)

| | ACT | OBJ | | ACT | OBJ |
|-----------|-------------|-------------|----------|-------------|-------------|
| Ord | 90 | 90 | Ingesta | 270 | 270 |
| Log + I+R | 180 | 90 | Agua | 30 | 30 |
| Enf | 330 | 0 | Entrampe | 45 | 45 |
| | 495 | 180 | | 345 | 345 |
| | 34.4 | 12.5 | | 24.0 | 24.0 |

Grant, 1996



Descanso en el Verano







J. Dairy Sci. 104:20–46

<https://doi.org/10.3168/jds.2019-18074>

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Invited review: Lying time and the welfare of dairy cows

Cassandra B. Tucker,^{1*}  Margit Bak Jensen,²  Anne Marie de Passillé,³  Laura Hänninen,⁴ 
and Jeffrey Rushen³ 

¹Center for Animal Welfare, Department of Animal Science, University of California, Davis 95616

²Department of Animal Science, Aarhus University, Foulum, 8830 Tjele, Denmark

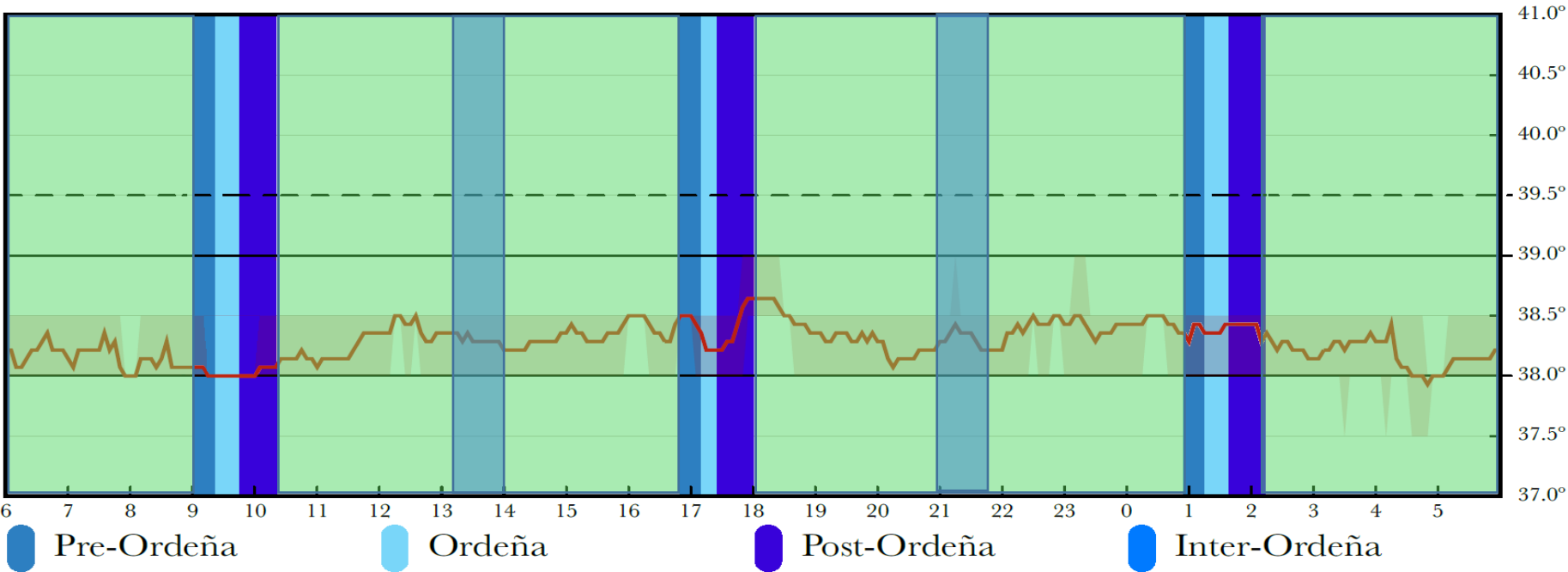
³Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada, V6T 1Z4

⁴Research Centre for Animal Welfare and Department of Production Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki, 00014 Finland



18/JUN/2024
Temp: 40°C /
Hum: 20 %
Estrés Calórico: 82
iTH

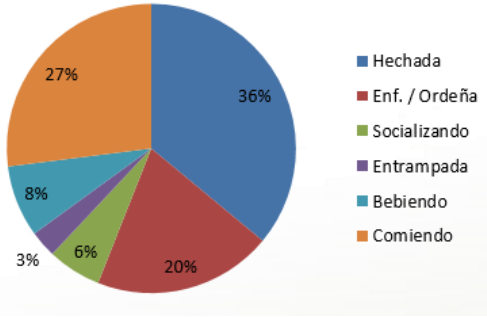




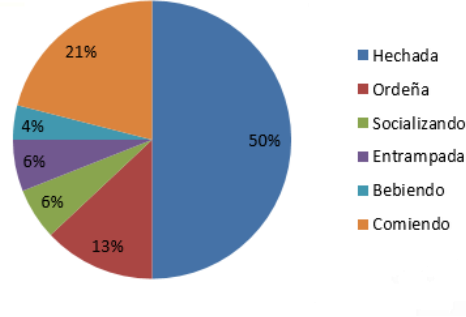
| | ACT | OBJ | DiGiTH |
|---------|------|------|--------|
| Ord | 90 | 90 | 90 |
| Log I+R | 180 | 90 | 150 |
| Enf | 330 | 0 | 180 |
| | 495 | 180 | 310 |
| | 34.4 | 12.5 | 21.5 |

| | ACT | OBJ | DiGiTH |
|----------|------|------|--------|
| Ingesta | 270 | 270 | 270 |
| Agua | 30 | 30 | 30 |
| Entrampe | 45 | 45 | 25 |
| | 345 | 345 | 325 |
| | 24.0 | 24.0 | 22.5 |

Descanso en el Verano



Grant, 1996



| | ACT | OBJ | OBJ |
|----------|------|------|------|
| Descanso | 550 | 740 | 895 |
| | 9.2 | 12.0 | 14.9 |
| | 38.2 | 50.0 | 62.2 |

Sistema de Enfriamiento de Autónomo !



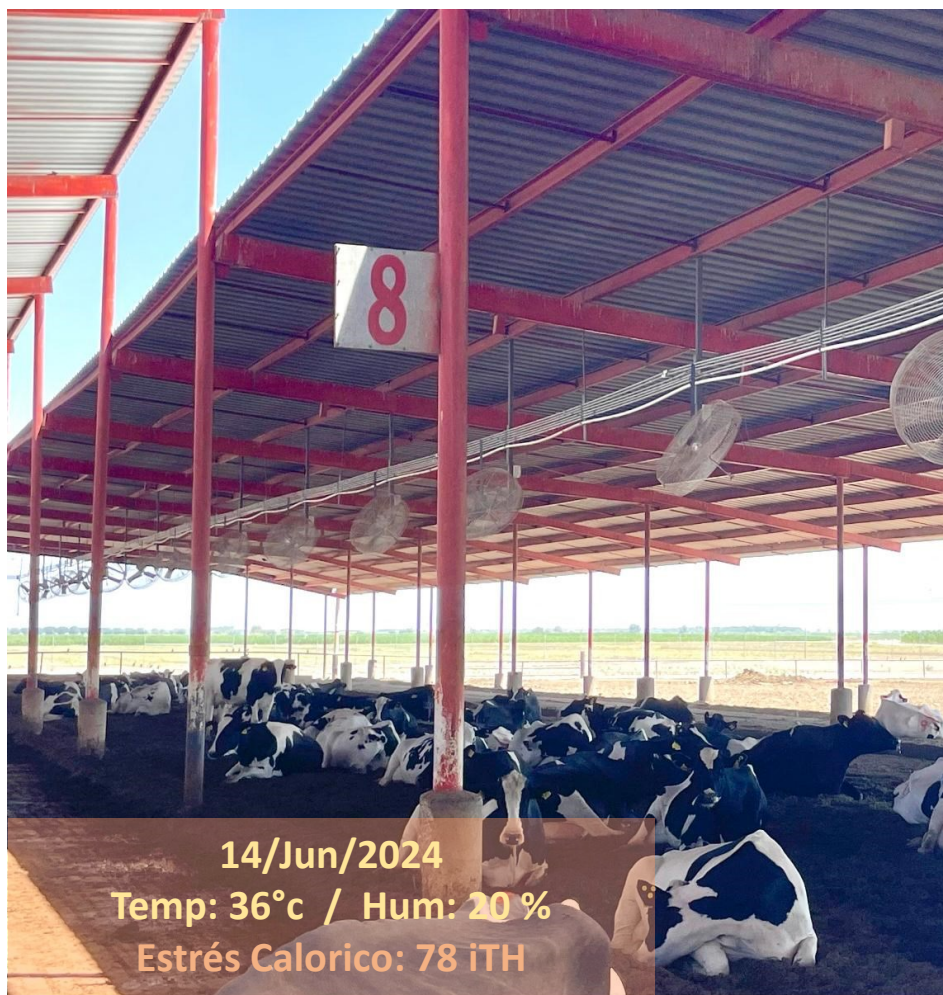
1/MAY/2024
Temp: 36°C / Hum: 20 %
Estrés Calórico: 80 iTH



Sistema de Enfriamiento de Autónomo !



Sistema de Enfriamiento de Autónomo !



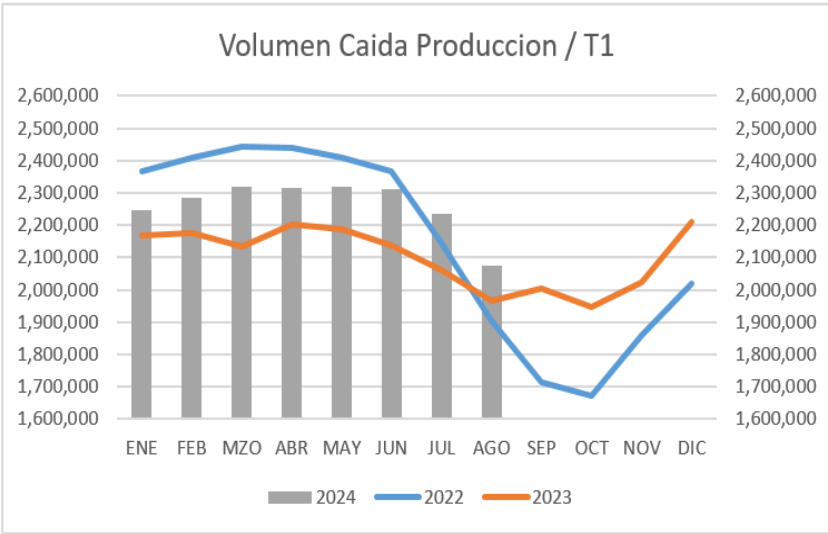
Sistema de Enfriamiento de Autónomo !



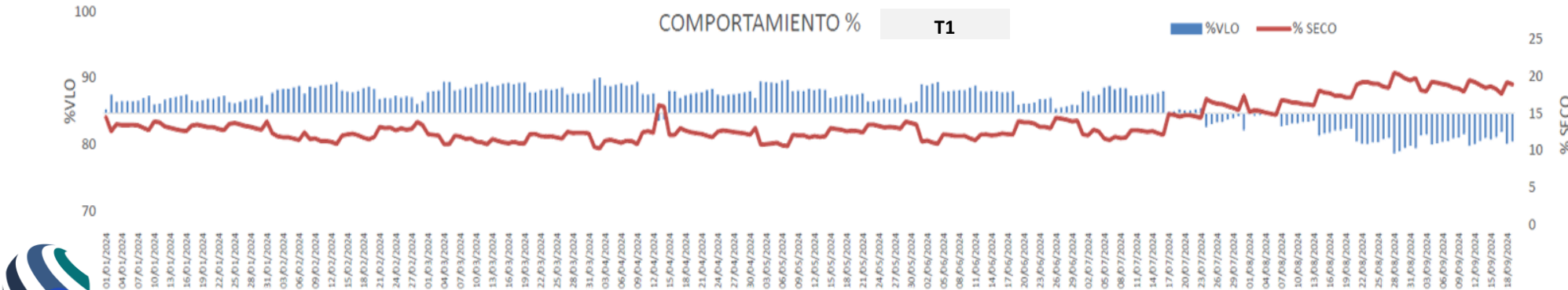
CASOS DE ÉXITO / ESTABLOS LAGUNA

| Parámetro | Objetivo | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---------------|----------|-------|-------|-------|-------|-------|-------|
| FERTILIDAD | 30% | 27.8 | 29.4 | 30.5 | 31.0 | 33.0 | 38.0 |
| No. VACAS | | 2457 | 2457 | 2386 | 2273 | 2213 | 2311 |
| No VACAS OK | | 1117 | 1137 | 1180 | 1136 | 1036 | 1135 |
| % GANDO OK | 50% /H | 45.6 | 46.3 | 49.5 | 50.0 | 46.8 | 49.1 |
| DEL | 170 | 210 | 195 | 172 | 176 | 166 | 168 |
| PROM. LECHE | 40 | 33.97 | 35.42 | 36.89 | 37.16 | 37.23 | 38.11 |
| ABORTOS | 1.5% /H | 2.0 | 2.2 | 1.8 | 1.8 | 1.7 | 1.7 |
| PARTO. VACAS | 5.5% | 4.7 | 4.9 | 5.9 | 6.4 | 5.2 | 4.8 |
| PARTO VAQ | 2.5% | 3.5 | 3.2 | 3.6 | 3.0 | 4.5 | 3.4 |
| % PARTOS | 10% | 8.2 | 8.2 | 9.5 | 9.4 | 9.7 | 8.2 |
| DÍAS ABIERTOS | < 120 | 154 | 140 | 124 | 121 | 115 | 115 |
| SERV.* CONCEP | 2.5 | 3.8 | 3.5 | 3.3 | 3.3 | 3.1 | 2.6 |
| % NUEVAS*MES | 8% /H | 7.1 | 7.7 | 7.4 | 7.2 | 7.6 | 8.1 |

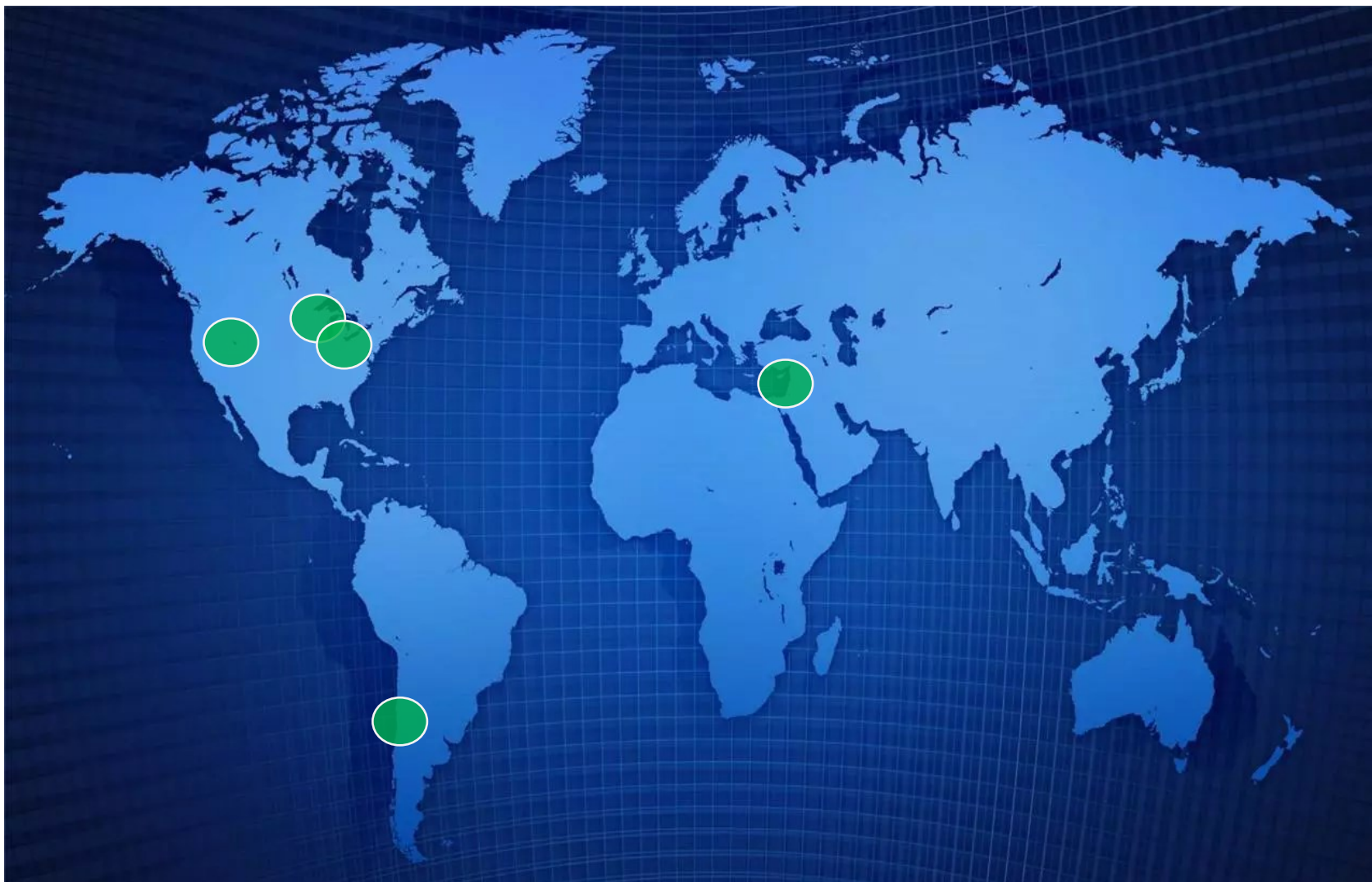
| | | | | | | | |
|---------------|-------|-----|-----|-----|-----|-----|-----|
| Dif. Pico I-V | < 3.0 | 4.1 | 3.8 | 5.1 | 4.1 | 3.8 | 1.9 |
|---------------|-------|-----|-----|-----|-----|-----|-----|



| | | | |
|----------|-----------|-----------|-----------|
| Vol Prom | 2,145,488 | 2,101,586 | 2,263,690 |
| Max-Min | 770,491 | 263,120 | 244,476 |
| % Caida | -35.91 | -12.52 | -10.80 |



Rumbo a los 50L de Promedio en el mundo !

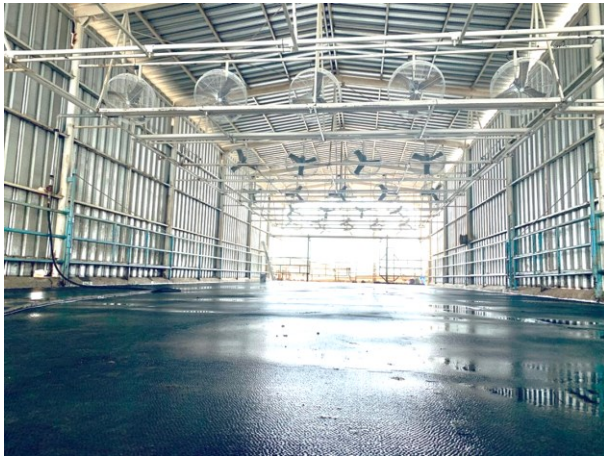


“La barrera de los 40 Litros !



Entendiendo el Estrés Calórico & THI

Los Sistemas de Enfriamiento representan una de las **Inversiones mas rentables** para los hatos lecheros, ya que les permite combatir de manera eficiente los efectos del **Estrés Calórico** y lograr grandes resultados durante todo el Verano !.



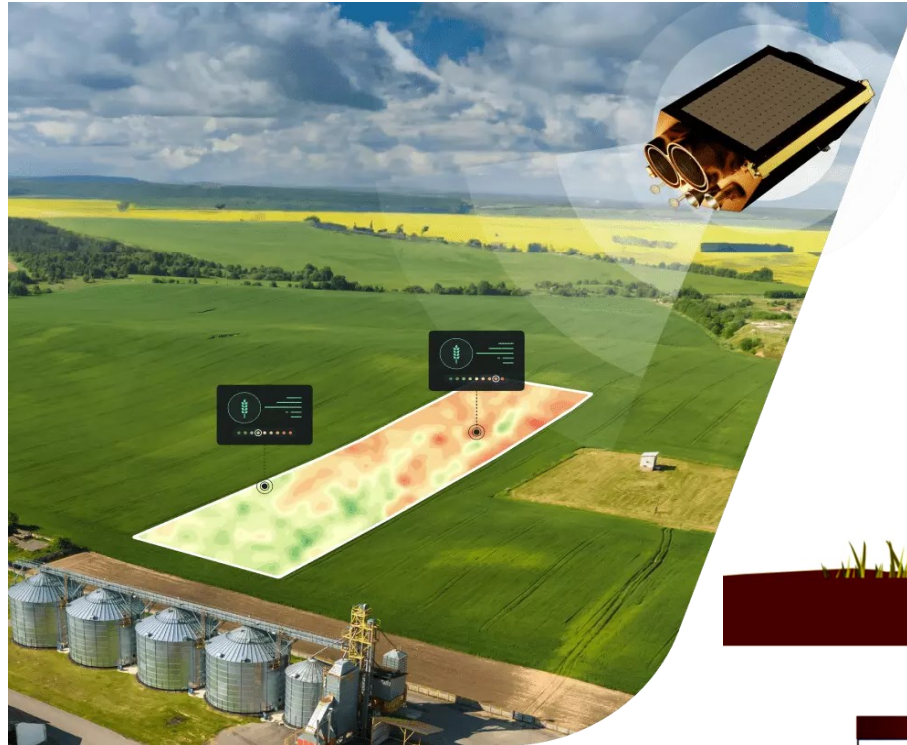
Beneficios del “Buen Enfriamiento en Verano !”

- Incremento considerable de **Producción**,
- Incremento en todos los **Picos de Lactancias**,
- Aumento en la **Inmunidad del Ganado**,
- Incremento en la **Eficiencia Alimenticia**
- Disminución en Casos de **Mastitis**.
- Incremento en la **Longevidad del Ganado**.
- Disminución del Desecho por **Infertilidad**.
- Mejoría en la **Reproducción y Tasa de Preñez**,
- Disminución de **Abortos**, muerte embrionaria,
- Mejora en la **Calidad y Sólidos de Leche**,
- Disminuyen problemas **Acidosis y Diarreas**.
- Incrementa el **Tiempo de Rumia e Ingesta**.
- Disminuyen problemas **Patas y Locomoción**.
- Incrementa el **Tiempo de Descanso y Confort**.
- Disminuyen los **Retiros Manuales y Bimodales**.
- Mejora considerablemente la **Rutina Ordeño**.

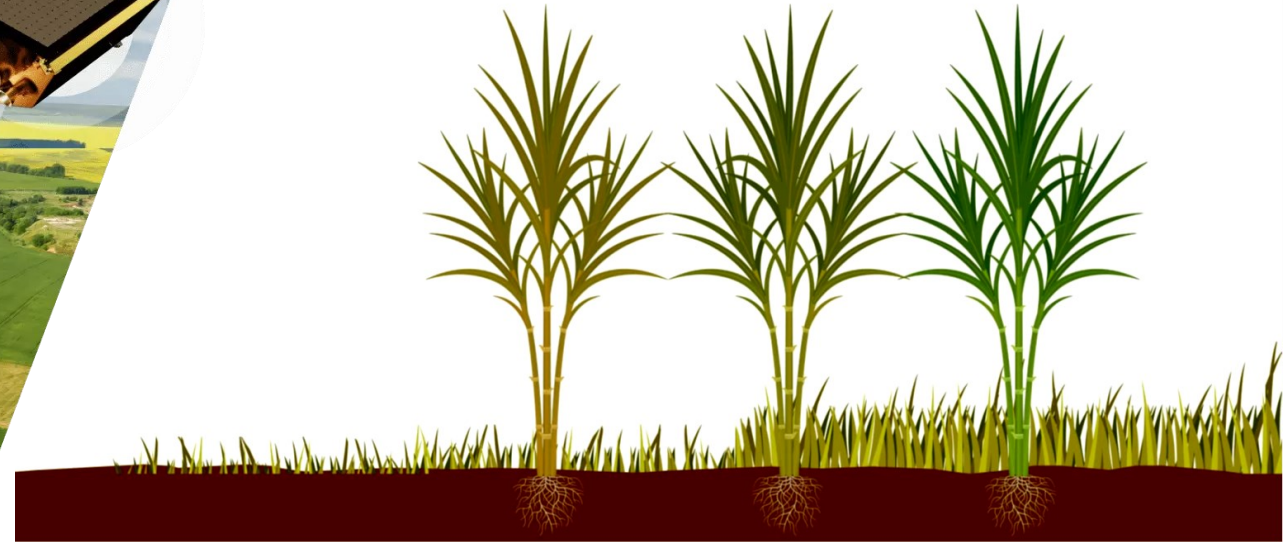


“El Enfriamiento de Calidad y el Bienestar Integral permiten lograr la Máxima Rentabilidad y Productividad”





NDVI



Sin concentración de clorofila
 Baja concentración de clorofila
 Media concentración de clorofila
 Alta concentración de clorofila

-1.0 (Nubosidad edificaciones o tierra sin vegetación) 0 (Planta que requiere seguimiento) (Estado bueno) (Estado óptimo) 1.0

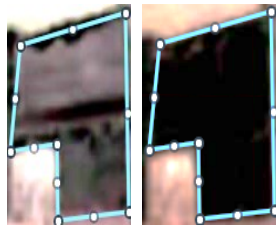
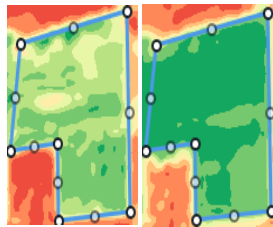
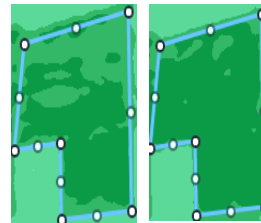


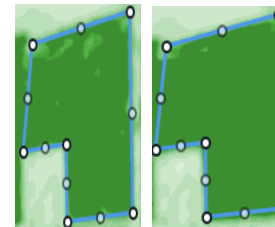
IMAGEN SATELITAL
NATURAL



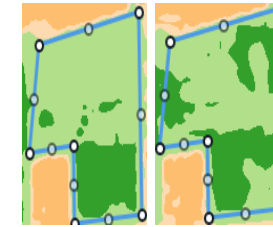
SALUD VEGETAL



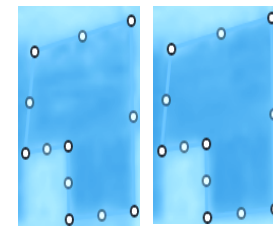
NITRÓGENO



CLOROFÍLA



DESARROLLO
DE LA PLANTA



HUMEDAD EN
VEGETACIÓN



Imágenes Satelitales: Sentinel 2A y 2B, (Resolución a 10m)



0 days 00 hours 00 minutes
Sentinel-2 constellation:
summer solstice

Agricultura Inteligente: Casos de Éxito !

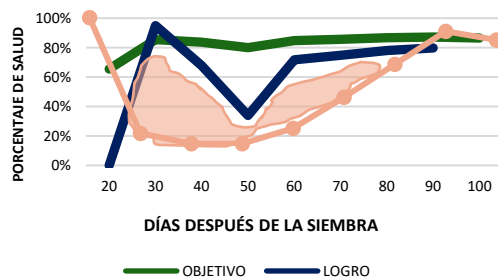
| Idx | PREDIO | SUP / HA | RENDIMIENTO / HA (MAIZ), PRIMAVERA | | |
|-----|--------|-------------|---|-------------|-------------|
| | | | 2022 | 2023 | 2024 |
| 1 | GP1 | 19.0 | 29.5 | 37.47 | 39.04 |
| 2 | GP3 | 18.0 | 23.7 | 48.65 | 52.32 |
| 3 | GP4 | 18.9 | 21.0 | 29.89 | 37.92 |
| 4 | SV4 | 4.9 | 46.9 | 40.57 | 46.19 |
| 5 | RA1 | 8.0 | 30.7 | 32.04 | 42.14 |
| 6 | JUR | 3.0 | 37.7 | 49.51 | 51.09 |
| | | 71.8 | 27.5 | 38.4 | 43.4 |

Ton / Ciclo

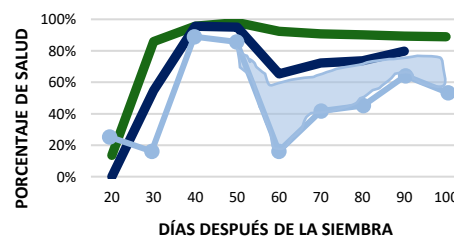
1,971.66 2,756.01 3,116.90



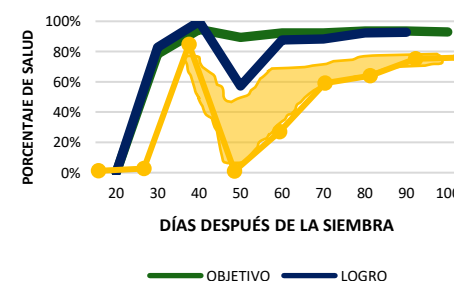
NDVI | INDICE DE SALUD VEGETATIVA



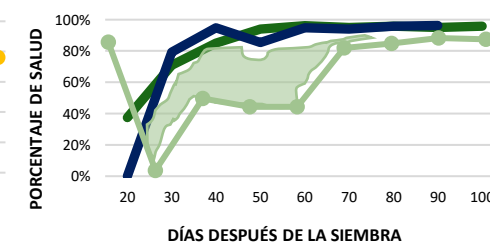
HIDRATACION DE LA PLANTA



NITRÓGENO vs FERTILIZACIÓN



CLOROFÍLA vs PLAGAS



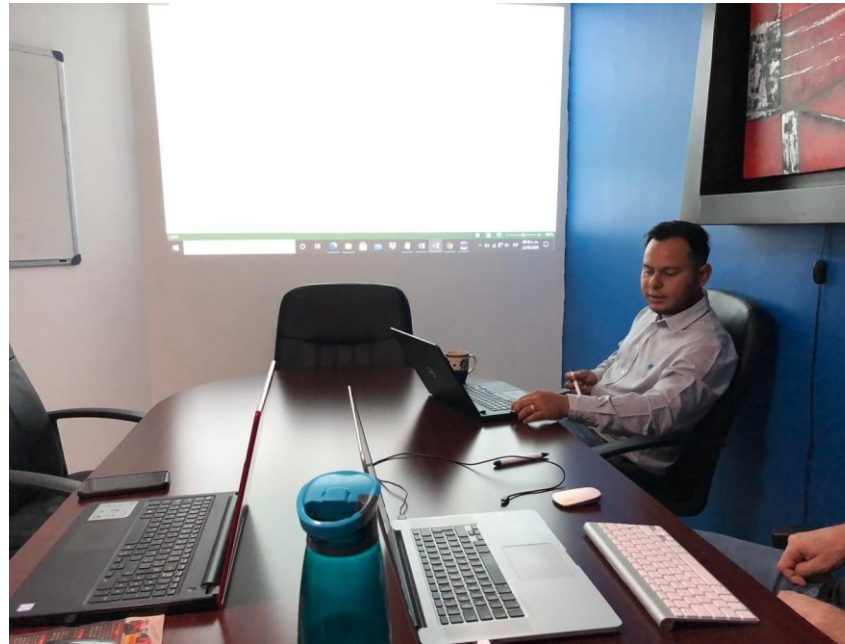
1. El Cambio Climático Mundial e **Incremento del Estrés Calórico**
2. Proporcionar **Enfriamiento de calidad** permanente.
3. Incrementar el “**Tiempo de Descanso Efectivo**” a nuestros Hatos.
4. Tomar en cuenta las Herramientas Digitales para **Toma de Decisiones**.
5. Cual **Sistema de Enfriamiento** usar Inter-Ordeña, Híbrido, CrossVent ?
6. Debemos Incluir “**Tecnologías Nutricionales y Suplementos**”.
7. Medir las “**Caídas de volumen**” de producción y caídas del pico V-I.
8. Mejorar la “**Calidad de forrajes**” ayudándonos de tecnología.
9. Considerar el “**Uso del Agua**” y el ahorro en el enfriamiento.
10. “**Invertir en Tecnología**” siempre dará los mejores Retornos Inversión.

Gracias !

DIGAL VERDE 2024



Gracias !



DiGiSKY

Ing. Salvador Rivas Madero.

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DiGiSKY Technologies !

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MONITOREO SATELITAL AGROPECUARIO
SISTEMAS DE ENFRIAMIENTO INTELIGENTES
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de Precisión



HEATSKY
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Estrés Calórico



NUTRISKY
SUPLEMENTO ALIMENTICIO

Nutrición

INNOVACION EN TECNOLOGIAS AGROPECUARIAS,
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