

## Webinar summary: Heat stress – Part 1

This webinar examines heat stress in dairy cows, focusing on its causes, impacts, and strategies for prediction and management. It covers environmental factors, rumen function, liver health, monitoring tools, and practical on-farm solutions.

### In this webinar:

#### 1. Overview of heat stress

- Heat stress occurs when temperature, humidity (THI), or pasture toxins induce physical stress.
- Common symptoms: panting, increased respiration rate, reduced appetite, milk production decline, and weight loss.
- In New Zealand, heat stress can start at 20°C with 50% humidity but varies based on location and wind conditions.
- Cows struggle to cool themselves efficiently, particularly in hot, humid, and still conditions.

#### 2. Key factors contributing to heat stress

- **Environmental conditions:** Temperature, humidity, solar radiation, and wind speed all impact how cows handle heat.
- **Pasture toxins:** Heat and moisture stress increase the production of ergovaline and other toxins, which can cause vasoconstriction, reducing the cow's ability to dissipate heat.
- **Cattle colour:** Darker cows (e.g. Friesians) absorb more solar radiation than lighter cows (e.g. Jerseys), making them more prone to heat stress.

#### 3. Physiological effect of heat stress

- **In the rumen:**
  - Reduced rumination and saliva production affect buffering capacity.
  - Increased lactic acid reduces rumen pH, leading to digestive upset.
  - Disruption of microbial balance increases harmful bacteria and reduces fibre digestion efficiency.
  - Heat stress changes fatty acid metabolism, altering milk composition.
- **In the liver:**
  - Increased toxin load from stressed rumen microbes and pasture toxins.
  - Reduced glucose production, affecting milk yield and energy balance.
  - Higher risk of fatty liver and ketosis due to energy imbalances.

- Increased inflammation and oxidative stress further compromise liver function.

#### 4. Monitoring and predicting heat stress

- **Temperature-Humidity Index (THI):** A key tool for predicting heat stress events.
- **Wearable technology:** Cow collars and boluses can track breathing rates, body temperature, rumination, and movement.
- **Blood and milk testing:**
  - **Milk indicators:** Fat and protein percentages, milk urea nitrogen (MUN).
  - **Blood indicators:** Glucose, non-esterified fatty acids (NEFA), liver enzymes (GGT), and urea nitrogen.
- **Cow behaviour as an indicator:**
  - Increased panting and drooling.
  - More time standing and seeking shade.
  - Reduced movement and increased water intake.

#### 5. Managing heat stress in dairy herds

- **Environmental management:**
  - Provide adequate shade and cooling solutions like sprinklers or misting systems.
  - Reduce walking distances in hot weather to prevent excess energy loss.
- **Diet and supplementation:**
  - Use toxin binders to counteract pasture toxins.
  - Increase fibre digestibility to reduce rumen heating.
  - Supplement with betaine, seaweed, and trace minerals to support liver and metabolic function.
  - Adjust feeding times to avoid heat-stressed periods.
- **Water availability:**
  - Clean, easily accessible water is critical for hydration and cooling.
  - Encourage higher water intake to compensate for moisture loss due to panting.

#### 6. Economic and performance impacts

- Heat stress can cause a **13% reduction in milk yield** and **13% decrease in dry matter intake**.
- Prolonged heat exposure leads to **reproductive issues, higher somatic cell counts, and immune suppression**.

- A study in Waikato recorded a **six-kilogram loss in milk solids per cow** over summer, equating to **\$34,000 in losses for a 600-cow herd**.

## 7. Future research and next steps

- Exploring genetic selection for heat tolerance in dairy herds.
- Newer pasture varieties with lower toxin levels showing promise in reducing heat stress impacts.
- Upcoming Part 2 webinar will cover **wearable tech, more in-depth data analysis, and advanced heat stress mitigation strategies**.

For more details, watch the webinar or download the slide deck.