



Managing cows in hot, humid weather

In hot, humid conditions, cows eat less, resulting in reduced milk production, loss of bodyweight and more health, reproductive and welfare challenges.

Australian dairy farmers use a range of [strategies to manage their herds](#) in this weather. These include fans, sprinklers and management adjustments to diet, mating and daily routine.

Dairy UP research

This project investigated how heat load and diet interact to influence milk production in intensive dairy systems.

The research examined how milk yield changed over time in response to changes in total mixed ration (TMR) diet composition and hot weather as measured by temperature humidity index (THI).

A time-series analysis was undertaken, using data from eight commercial dairy farms and local weather data. The analysis was used to identify both the immediate and delayed effects of dietary and environmental changes on milk production.

Unlocking the potential of cows

Dairy UP's P2 project aimed to unlock the potential of dairy cows to achieve their genetic potential under NSW conditions.

P2 was a suite of seven projects that collectively explore ways to profitably increase both productivity and wellbeing in commercial settings.

P2a: Cattle Longevity

P2b: Early Alerts

P2c: Milk as a Diagnostic Tool

P2d: Diet and Heat Load

P2e: Calf Husbandry

P2f: Infectious Diseases ('Infectome')

P2g: Heifers Early Calving

This document provides an update on P2d: Diet and Heat Load.

Key findings

Changes in diet can affect milk production for up to four weeks. Increased heat load affects milk production for up to two weeks after the heat event, reinforcing the value of forward planning during hot conditions.

The research also highlighted the importance of balancing starch and fibre in total mixed rations to maintain milk production and reduce the risk of rumen dysfunction.

Benefits

The findings provide a clearer understanding of the acute and long-term effects of diet and heat load on milk production over time.

The information can better equip farmers to manage and plan for hot weather events, including the days following.

Better heat load management can improve dairy cow health, reproduction, production, and welfare. This contributes to the profitability of NSW dairy businesses and reinforces NSW dairy farmers' social license to operate.

Research approach

Weekly diet samples, milk production records and weather data were analysed from eight commercial dairy farms over an average of 58 weeks. All herds were fed a total mixed ration, with average milk production ranging from 31 to 52 L/cow/day.

The study examined how changes in nutritional components including starch, non-fibre carbohydrates (NFC), crude fat and protein were associated with changes in milk production, and whether these effects occurred immediately or after a delay.

Time series analysis

Time-series analysis was used to investigate how milk production was influenced over time by dietary changes and weather conditions, measured using temperature humidity index (THI).

This approach analysed data collected at consecutive points in time, allowing researchers to identify both immediate and delayed responses in milk production following changes in diet composition or THI.

Results

Delayed effects of diet changes

The study showed that diet changes can affect milk production for up to four weeks after the change. The lag effect depended on dietary components. Carbohydrate-related changes had their greatest effects on milk yield around four

weeks later, while crude fat and neutral detergent insoluble crude protein (NDICP) had more immediate effects within one week.

Heat load and milk production

Increases in temperature humidity index (THI) were negatively associated with milk production, confirming the impact of heat load under Australian conditions.

Starch levels and milk yield

Farms feeding higher-starch diets – averaging more than 24% starch – generally had higher milk yields than farms feeding lower-starch diets. However, these diets were more likely to have been sampled from the cows earlier in lactation.

However, within these higher-starch diets, further increases in starch concentration were associated with reduced milk yield, suggesting higher starch levels were leading to rumen dysfunction or subclinical acidosis.

Time-series analysis

The study demonstrated the value of time-series analysis for understanding how nutrition and heat load interact to influence milk production over time.

PhD

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Journal articles

Lean, A.K.G., et al. 2026 *Effects of changes in total mixed ration nutrition and maximum temperature humidity index (THI) on dairy cow milk yield* (to be submitted to Journal of Dairy Science)

Collaboration

Thank you to the farmers and farm staff who contributed to this research by collecting samples for more than a year.

More info

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[P2 final report](#)



Delivery organisations



Partner organisations



Additional program supporters, collaborations or partnerships

Charles Sturt University | DairyBio | DataGene | Eagle Direct | Entegra
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