



Expressions of Interest – Terms of Reference

Feedlot cattle heat load forecasting service – Funding Options

Summary:

Meat & Livestock Australia (MLA) is seeking expressions of interest from organizations with the capability to provide a feedlot cattle heat load forecast service.

Background:

Meat & Livestock Australia is committed to progressive research and development to enable Australian feedlot producers to manage excessive heat load. Heat load is known to negatively impact cattle health, welfare and productivity. Managing the impact of hot weather is of increasing importance due to the changing global environment and consumer expectations. It is a critical element of Australia's National Feedlot Accreditation Scheme.

Heat waves are a significant concern for lot fed cattle in Australia. They occur where maximum ambient conditions are above a certain threshold for a number of successive days (typically 3-5) or with rapid onset of extreme temperature/humidity. The ability to forecast heat wave events has enabled livestock producers to implement mitigation strategies to prepare for adverse heat load events. Heat load is the cumulative effect of animal factors (such as genotype, coat type, coat colour, diet type, diet composition, body condition) and environmental conditions that affect the thermal comfort of animals. Cattle may accumulate heat during the day (rise in body temperature) and dissipate that heat at night. If there is insufficient cooling at night cattle enter the following day with accumulated heat load.

The Heat Load Index (HLI) model and the Accumulated Heat Load Unit (AHLU) were developed by monitoring panting scores of commercial feedlot cattle across a range of sites in Australia and the United States and have been utilised by the Australian feedlot industry since 2008 to forecast and manage heat load. Calculation of the Heat Load Index (HLI) requires ambient temperature (T_A ; °C), relative humidity (RH; %), wind speed (WS; m/s) and black globe temperature (BGT; °C). Of these, T_A , RH and WS are routinely measured by the majority of weather stations. Although sensors for measuring BGT exist, these are not normally included as part of the standard weather station and must be ordered from a suitable supplier. In the absence of a BGT sensor, the BGT can be inferred from measurements of T_A and solar radiation (SR; W/m^2). The methods for calculating the HLI are all publicly available.

The Accumulated Heat Load Unit (AHLU) represents the amount of heat accumulated in cattle over a period of time. The rate of accumulation depends on the current HLI value and the thresholds used.

Large HLI values result in a more rapid increase in AHLU, conversely, low HLI values result in a decrease of the AHLU (i.e. the cattle cool down and recover). The **base threshold** occurs at a HLI value of 86 (base AHL). This threshold is based on a healthy Black Angus steer, 80 days on feed without access to shade. The threshold is adjusted on the basis of breed type, access to shade, and days on feed (see Gaughan et al. 2008 for details). Whether cattle recover or become heat stressed depends on the value of the thresholds.

The Cattle Heat Load Toolbox (CHLT) provides a forecast service for feedlots across Australia, with alerts and tools for managing excessive heat load in feedlot cattle, through an online system (chlt.katestone.com.au). This service provides site specific weather forecasts and heat load indicators for a forward-looking seven day window with the option for feedlots to upload their onsite weather data through the Heat Load Data Network (HLDN). There are currently over 328 feedlots and 3 processors accessing the CHLT, representing more than 85% of the cattle on feed. In addition, 46 feedlots are uploading data to the HLDN.

Project objectives:

1. Determine a quote for MLA for based model operation of the heat load forecast service in FY 23 (with and without the heat load data network)
2. Determine alternative funding sources external to MLA for the heat load forecast service.
3. Results from market research to understand if a viable model could underpin operation of a 'Premium' subscription service including access to the heat load data network or other possible improvements.
 - a. Engagement with a variety of users to develop an understanding of the users and the product is currently perceived, valued and used to manage heat stress
 - b. An understanding on the improvements for current product
 - c. Develop a thorough understanding on how to keep users engaged during season and out of season for a premium service
 - d. Develop ROI and value proposition for a premium service for customers
 - e. Determine the willingness to pay for elements of the proposed premium service.

Process:

Expressions of interest: Applicants submit a preliminary application, utilizing the MLA Preliminary Application form (see below), addressing the Terms of Reference. Proposals will be scored against the selection criterion set out in this Terms of Reference. Preliminary applications must not exceed four (4) pages. MLA will acknowledge receipt of each application. Applicants will be advised in writing of the success or failure of their preliminary application.

Brief project design and methods:

As part of the quote provided in objective 1, it is expected that a daily forecast of heat load (HLI and AHLU) will be provided free of charge to the Australian feedlot sector to satisfy the requirements of the National Feedlot Accreditation Standards LM6: Excessive heat load.

The NFAS LM6 element – Excessive Heat Load describes the requirements of feedlots in Australia

The HLI and AHLU is to be based on equations developed by:

- J. B. Gaughan, T. L. Mader, S. M. Holt, A. Lisle, A new heat load index for feedlot cattle, Journal of Animal Science, Volume 86, Issue 1, January 2008, Pages 226–234,

The system proposed as part of this project must be able to:

1. calculate and monitor the Heat Load Index (HLI) and Accumulated Heat Load Units (AHLU) using available meteorological data with a multi day forecast (MLA will provide the successful applicant all IP related to the HLI and AHLU).
2. facilitate a *Risk Assessment Program* (RAP) for the various classes of cattle in the feedlot (MLA will offer the successful applicant a royalty free non-exclusive licence to this program to incorporate into a web based interface).

The Forecast service must be able to provide predictions of HLI, and AHLU to user specified GPS coordinates. Users must have the ability to save their site's location through a specific login.

The forecast service must predict up to a 7 day window of upcoming weather, and be updated on a daily basis.

The heat load data network in its current format integrates with automated weather stations on stations 'on-feedlot' to re-adjust forecasts of accumulated heat load on a daily basis.

Phase 2 of the project will determine if the heat load data network service could be commercialized, in combination with other weather forecasting tools that could be made available to the industry.

Timing:

The forecasting service will need to be online and operational from 01 July 2022. Delivery timeline is a selection criterion at both stages of application assessment and speed to delivery outcomes for commercial industry will be viewed positively.

Budget:

There is no set budget. Value for money is a selection criterion at application assessment.

Confidentiality:

By submitting an expression of interest, the applicant will disclose information in the preliminary application form to MLA's employees, agents, contractors and advisors, for the purposes of this tender process and any legal or MLA policy requirement. Applicants must identify any information that they consider should be protected as confidential information and provide reasons for this.

Conflict of interest:

Applicants, research teams or subcontractors with any potential conflicts of interest, should thoroughly outline these in this application, including how they propose to manage them, if applicable.

Selection criteria:

Stage 1 - Expressions of Interest applications will be reviewed by Meat & Livestock Australia, and selection will be based on assessment against the following criteria:

1. Background of proposed work
2. Outputs, outcomes and impacts of the project
3. Quality of brief project design and methods to achieve project objectives
4. Quality of preliminary budget

5. Value for money of preliminary budget
6. Delivery timeline

Project proposal submissions:

To access the MLA Preliminary application templates (Grain-Fed, Live Export & Goats), go to <https://www.mla.com.au/research-and-development/funding-opportunities/industry-researchers/>, then navigate to the preliminary application form.

MLA applications must be lodged electronically as Word document to: mvandersaag@mla.com.au

Stage 1 MLA Preliminary Applications must be received by COB, 16th February, 2022.

Strict adherence to the time deadline for applications will occur. Applications received past the deadline will not be assessed. Applications not received in the standard MLA application template will not be assessed.

Further information:

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