Final report

Market research – Feedlot cattle heat load forecasting

Project code:	B.FLT.4019
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Abstract

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. MLA has funded the development of the Cattle Heat Load Toolbox (a service to help Feedlots proactively manage the risk of heat load at their feedlots), and its provision free of charge to the feedlot industry to date. The aim of this project was to undertake market research with Australia lot feeders to understand how the cattle heat load forecasting service is currently perceived, valued and used to manage heat stress and the opportunity for the service to operate as a subscription based service.

The market research supports the understanding that management of heat load is a high priority to the Australian feedlot industry. The industry is generally satisfied with the tools and measures they have available to manage and mitigate the negative impacts of heat load in feedlot cattle. A significant component of their strategy relies on early warning of events to allow proactive risk mitigation (via the Cattle Heat Load toolbox).

The study also highlighted two risks to industry: complacency around proactive management of heat load and a lack of detailed knowledge and optimal use of the tools currently available.

The heat load forecast service supports the Australian lot feeding industry to proactively manage heat load. The return on investment for the development of tools and initiatives to manage heat load (particularly in the lead up to excessive heat load events) is significant and supports ongoing investment by commercial companies and industry to develop tools that improve over time in line with best available heat load forecasting technologies.

Executive summary

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. Monitoring heat load of feedlot cattle is a critical element of Australia's National Feedlot Accreditation Scheme (NFAS).

Currently, 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). The aim of this project was to undertake market research with Australian lot feeders to understand how the current heat load service offerings could be transitioned to a premium subscription-based service.

Objectives

1. Deliver results from market research to understand if a viable model could underpin operation of a subscription service including:

    a. Engagement with a variety of users to develop an understanding of the users and how the product is currently perceived, valued and used to manage heat stress.
    b. An understanding on the need for 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.

Methodology

Firstly, an online survey was sent to over 700 registered users of the CHLT service. Secondly, an interview-based survey was conducted by the project team where a number of feedlot operators were asked a set of prescribed questions (approved by MLA) and their answers recorded in writing.

The results from the online survey were not analysed as the response rate was too low to be representative of the industry views.

The data collected as part of the interviews were processed to gain useful statistics of the frequency and distribution of different responses.

Results/key findings

The results of this survey support the understanding that management of heat load is a high priority to the Australian feedlot industry. The industry is generally satisfied with the tools and measures they use to manage and mitigate the negative impacts of heat load (although suggestions for improvements have been provided). A significant component of the feedlot surveyed have a strategy that relies heavily on early warning of potential events to allow proactive risk mitigation. This is currently provided by the CHLT.

The return on investment to lot feeders for the CHLT is significant. It provides insurance for as low as 9 cents per animal turned off. It is a world leading tool for proactive management of heat in beef cattle feedlots.

Benefits to industry

The industry benefits from this project include:

- increased understanding of how feedlots manage heat load events,
- value they place on the use of proactive management in dealing with excessive heat load events.

The risk of complacency (time between significant events, intermittent low-level heat load events over the past few years, increasing adoption of shade, a shift to more heat tolerant breeds such as Wagyu) and a lack of detailed knowledge (inexperience, lack of training) or proper use of the tools (lack of understanding of full range of capabilities) was also highlighted.

The benefits of feedlots having access to a heat load management service supports the industry initiative to proactively manage for heat load in cattle and provides insurance for a major risk to individual feedlot operators. The return on investment for the development of tools and initiatives to manage heat load (particularly in the lead up to excessive heat load events) is significant.

Future research and recommendations

A number of areas for potential future research and development include:

- Improvement in forecasting
- Development of a mobile Application for greater adoption of the service by industry
- Development of a comprehensive training and engagement plan to address the knowledge gaps for feedlot operators in not only the use of available tools but also sharing stories of success

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1. 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. Monitoring heat load of feedlot cattle is a critical element of Australia's National Feedlot Accreditation Scheme.

Weather conditions that are conducive to excessive heat load in feedlot animals are a significant concern for lot fed cattle in Australia. They occur where ambient conditions are above a certain threshold for a number of successive days (typically 3-5) or with rapid onset of extreme temperature/humidity and light winds. The ability to forecast these 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.

Currently, 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 352 feedlots registered for the service (and over 1000 users), 74 feedlots have the facility to uploading data to the HLDN with 10 feedlots uploading more than one weather station.

MLA has funded the development of the Cattle Heat Load Toolbox, and its provision free of charge to the feedlot industry for over 15 years through utilisation of grain-fed levies and federal government matching R&D contributions. The aim of this project is to undertake market research to underpin operation of a 'Premium' subscription service including access to the heat load data network and other possible improvements. Currently the service is funded by MLA until the end of FY2023 under B.FLT.4016. The current provision of the service is $23,000 per month. There is a need to undertake market research to understand if the service or parts of the service can be commercialised.

2. Objectives

Delivered to MLA by agreed date;

1. Deliver 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 how the product is currently perceived, valued and used to manage heat stress
        i. Focus on Value and Benefits
        ii. Ensure survey population has representative sample of small, medium and large Feedlots throughout each state

b. An understanding on the need for improvements for current product
c. Develop a thorough understanding on how to keep users engaged during season and out of season.
d. Develop ROI and value proposition for a premium service for customers.

The market research will be achieved with:

i) User engagement survey circulated to all users with tailored questions for the objectives outlined above
ii) User interviews conducted by independent feedlot industry consultants

The objectives of this study were achieved and are discussed in detail in Section 4.

3. Methodology

3.1 Data acquisition

This investigation attempted to collect data from the industry via two methods. Firstly, an online survey was sent to over 700 registered users of the CHLT service and secondly, an interview-based survey whereby a series of interviewers asked interviewees a set of prescribed questions and recorded their answers in writing.

The response to the online survey was extremely poor. An end of season survey has been sent to all users in recent years. A summary of the engagement is presented in the table below. The response to the most recent survey was well below the average response rate in previous years. This is most likely due to the very late delivery of the survey. The low response rate renders the results from the survey unusable.

Table 1 Historical online Survey response rate

Year	Date sent	Number of surveys sent	Number of responses	% response rate
2016-17	20/03/2017	576	73	13%
2017-18	28/03/2018	538	75	14%
2018-19	22/03/2019	568	75	13%
2019-20	20/03/2020	677	118	17%
2020-21	12/03/2021	699	110	16%
2021-22	17/05/2022	725	15	2%
2022-23	22/03/2023	790	111	14%

The second form of data collection was an interview-based survey. The interviews were conducted by a selected panel of feedlot industry experts (see detail in Section 3.1.2). The interviewees were selected from the CHLT database as well as ALFA's Australian Feedlot Directory (4th edition). The interviews were generally conducted over the phone with some in person meetings. The pairing of interviewer with interviewee was based on the availability of interviewer, location of site and relationship with the interviewee.

This format was effective since it allowed the interviewees to answer in as much or as little detail as they desired, providing additional context and the ability for further insight.

The results presented in this report are based on the information collected as part of the interview surveys.

3.1.1 Questions

The survey questions are presented in Table 5 (see Appendix). They consist of a combination of open-ended, multiple choice and yes/no questions, with the ability for interviewees to provide more detail in all of their responses.

The questions were developed in consultation with MLA and the interviewers and were designed to provide information to meet the objectives of the study.

3.1.2 Interviewers

Three interviewers were selected to undertake the survey interviews with the feedlots. The interviewers were selected based on their connections with feedlots, industry standing and knowledge of management of heat at feedlots. The interviewers are listed below:

- Jim Cudmore has been involved in the Australian feedlot industry for over 33 years. He has a practical understanding of grain fed beef production, has been involved in a large number of industry and company specific research projects and initiatives and has been instrumental as a strong advocate for the adoption of many sound solutions developed for the feedlot sector through the investment of grain fed levies. He has also been involved on a voluntary basis with FLIAC, AUS-MEAT, ALFA, ISC and the Beef Sustainability Framework.
- Dr Tony Batterham is a veterinarian and advisor to the Australian Feedlot industry for over 20 years. His practice manages over 700,000 head of cattle on feed.
- Dr Enoch Bergman received his Doctorate of Veterinary Medicine in May of 2001 from Colorado State University, he has predominately worked with cattle since graduating.

3.1.3 Interviewees

Feedlot staffs responsible for heat load management of 51 feedlots across Australia were interviewed as part of this investigation - 25 of the feedlots located in Queensland, 11 in New South Wales, 13 in Western Australia and one each in Victoria and South Australia. The feedlots range in capacity from small family owned and operated facilities to large multi yard companies. Also, the feedlots interviewed fed cattle for a variety of different market categories and end-points.

3.2 Data processing

Survey responses from the different interviewers were collated for analysis. Categorical data (e.g. the "usefulness rankings" from Question 33 or the yes/no responses from Question 29) was left largely unchanged except for superficial data cleaning. Useful statistics regarding the distribution and frequency of different responses were then extracted.

Where possible, detailed textual responses were classified into useful categories to allow for a similar generation of statistics. For example, the responses to the question "Have you experienced any extreme heat load events?" were classified into the categories (1) have experienced an extreme heat load event; (2) have experience with heat load events, but not extreme and (3) have no experience with heat load events.

Where this classification was not possible and where important context was lost through the classification process, comprehensive lists of responses were compiled and analysed for common elements. For example, the responses to the question "What other weather-related challenges/risks do you face when managing your site?" were too complex to usefully categorise – instead, a list of each individually mentioned challenge/risk was compiled.

Numerical data was also classified into categories where appropriate (e.g. feedlot capacity was categorised into different size brackets). This process of categorising and listing the response data was effective at extracting useful statistics and additional context, but was not particularly efficient.

4. Results

A summary of the responses to each of the survey questions (with relevant representative statistics) is presented in Section 8.1, as well as lists of survey responses to selected questions.

This section mainly focuses on the key objectives of the study. Each objective is answered based on information extracted from the survey. Additional commentary is provided by the interviewers and research team.

4.1 Objective 1a

Engagement with a variety of users to develop an understanding of the users and how the product is currently perceived, valued and used to manage heat stress.

- **Focus on value and benefits.**
- **Ensure the survey population has a representative sample of small, medium and large feedlots throughout each state.**

4.1.1 Summary of survey responses

- 51 feedlots engaged in interviews ranging from small family owned feedlots to large multi-feedlot companies across the nation with a mix of market categories and breed types on feed.
- 86% of survey respondents have a good understanding of heat load – their opinion.
- 57% of survey respondents have previous experience with excessive heat load events.
- 22% of survey respondents have never experienced a heat load event – their opinion.
- Significant number of survey respondents (43%) quote shade as part of their strategy for managing heat load.
- 29% of survey respondents feed wagyu and wagyu cross cattle as the main market category.
- 85% of survey respondents rated early warning tools as good or great – 15% did not use the early warning features in CHLT because they did not experience many/any heat load events.
- 86% of survey respondents stated early warnings play an important role in helping to proactively manage heat load.
- 98% of survey respondents have a feel for the commercial impact of not proactively managing for heat load (but could not quantify it).

- Of the 40 CHLT users who access the HLDN (and completed the EOS Survey 2023), 70% said their ability to access the HLDN would affect their ability to effectively manage cattle heat load during the summer season.

The table below presents a summary of the feedlots across each state and the number of surveys undertaken in each. The total capacity of the feedlots surveyed is almost 80% of the operating capacity of the Australian feedlot industry. Feedlots from South Australia and Victoria are under-represented by capacity and by the number of surveys conducted the contribution from the Western Australian feedlots is over-represented.

Table 2 Breakdown of survey responses by state

State	Operating Capacity[1]	Number of feedlots[2]	Number of surveys conducted	Capacity surveyed	% of feedlots surveyed (by capacity)	% of feedlots surveyed (by number)
NSW	318,905	78	11	261,832	82%	14%
QLD	675,872	203	25	546,232	81%	12%
SA	41,812	16	1	16,000	38%	6%
Tas	N/A	1	0	0	N/A	N/A
Vic	49,404	16	1	18,000	36%	6%
WA	59,235	37	13	35,400	60%	35%
Total	1,145,228	351	51	877,464	77%	15%

Notes: [1] Capacity for December 2022 quarter as reported in ALFA/MLA Lot Feeding Brief, February 2023
[2] National Feedlot Accreditation Scheme (Draft) Annual Report 2022

4.1.2 Commentary

- CHLT is well perceived and is a sound tool for demonstrating compliance during the annual NFAS audit – RAP, calculation of HLI and AHLU.
- CHLT is highly valued as part of a broader strategy to manage heat load during summer months.
- CHLT is an important tool for industry to demonstrate that animal welfare is focused on during periods of excessive hot weather.
- Many users are reliant on external consultants to provide oversight of heat load management, such as heat load management plans, training, early warnings and alerts and management of specific heat events. And therefore, may be found lacking with little knowledge of what to do or what they need to look at to understand and properly manage an excessive heat load event.
- Complacency may be creeping in with relation to heat load management as shade is more widely adopted across industry.

- Increased inclusion of wagyu cattle in the broader feedlot population may also be increasing complacency in heat load management.
- The timeframe between significant events means many operators have not experienced an excessive heat load event and therefore heat load management is all theory and not lived experience (particularly in observing cattle as heat load builds prior to or during an event).
- Personnel associated with previous significant heat load events have largely exited the industry (or have a less hands on role in the feedlot), nonetheless the vast majority of interviewed individuals robustly supported the CHLT as being the key instrument for managing future events.
- The CHLT is well regarded, but some operators are not using it to its full potential regarding the forecasting of AHLU in coming day, the associated preset alerts (thereby operating as key element in the site's heat load plan), and the extension material that is currently available. Some operators are still using air temperature as their main indicator of heat load.
- The incorrect use of CHLT tools (e.g. using HLI as an indicator rather than AHLU set with a proper HLI threshold relevant to the animals and feedlot environment) may be partly responsible for perceived poor forecasting performance.

4.2 Objective 1b

Develop an understanding of the need for improvement to the current product.

4.2.1 Summary of survey responses

- There is a strong desire to receive accurate weather forecasts of potential heat load conditions in summer and particularly in relation to wet weather
- 60% of survey respondents specifically indicated the development of a mobile app for mobile telephones and tablets would be beneficial and provide additional user capability
- 88% of survey respondents confirm that the calculated HLI and AHLU provide an accurate representation of heat load in cattle prior, during and after a heat load event and correlate with visual observations (note: 5% users thought cattle dissipated heat faster than the model predicted following an event)
- 97% of respondents to the online survey said they were well prepared for a heat event this summer (2022-23)
- 75% of respondents to the online survey said that CHLT provided them with adequate warning of the heat events this summer (2022-23)
- Of the 25% who said CHLT did not provide adequate pre-warning, almost half had no events this summer (2022-23). Those sites that did have an event, more than half did not have their highest risk animals set for alerts. A few of sites also had local rain events prior to the event that may have resulted in localised higher humidity in the pens (and not captured in the forecast)
- 60% of survey respondents require additional training and resources to use the forecast service as intended.

4.2.2 Commentary

- Although survey respondents are satisfied with the service provided by CHLT they have also asked for improved accuracy in the forecasts, wet weather forecasting and wanting a more site-specific forecast.
- Additional training and increasing the general understanding of how the HLI and AHLU system works as well as what is provided as part of the CHLT service would be beneficial and improve the system through improved use.

4.3 Objective 1c

Develop a thorough understanding of how to keep users engaged during the season and out of season.

4.3.1 Summary of survey responses

- 100% of survey respondents stated wet weather events provided challenges throughout the year, such as pen maintenance, planning, road access.
- 55% of survey respondents require additional training and resources.
- 25% of survey respondents rely on external consultants, such as vets and nutritionists, to provide training, support and early warning guidance.
- 96% of survey respondents access additional resources for weather forecasts. All of the additional resources are free to access (some confusion in some respondents was noted with Weathermation as an external source versus onsite weather station function).
- 76% of survey respondents said access to a site specific forecasts all year around would be beneficial to manage their feedlot activities.
- survey respondents prefer training to be provided via webinars and youtube videos (ability to access training in their own time).

4.3.2 Commentary

- Increased focus on the provision of webinars and learning videos is recommended. However, work is needed to determine how to connect with the users. CHLT already provides access to many training materials (tools, reports, help, web tour and videos). A series of webinars were run in November 2022 on a range of topics. They were promoted directly to CHLT registered users via e-mail, via the ALFA newsletter and also a banner across the top of the CHLT website. However, engagement to date has been poor. The recorded webinars were made available on the WI youtube channel with only 100 views in total across the four 20-minute videos.
- Improved training on heat load in cattle and understanding how the tools currently work (in a co-ordinated functional setting) would result in more adoption of the tools. Note that apart from the training mentioned above, the majority of feedlots asked for a site specific forecast to be available all year around. CHLT is a site specific forecast and it is already available all year round. It also has a rainfall forecast and forecast of wind (specific items survey respondents asked for).

- Understanding of how the users access their weather forecasts is also important (radio, tv, various apps or websites). Ease of access (e.g. APP) and presentation of the data in a form similar to other platforms may result in improved understanding and execution of CHLT.
- Inclusion of excessive heat load stories – real life experiences. Interview feedlots about how they successfully manage excessive heat load in their feedlot. How do they use the CHLT tools to make decisions and keep their cattle and people safe and healthy.
- Emailed newsletters to all subscribers throughout the year would assist engagement and would also address complacency. The newsletter could include instructions on where extension material is available and a link to an instructional webinar on conducting RAPs, setting alerts and understanding AHLU forecasting.
- The impact of shade on heat load has been conducted with previous MLA studies (B.FLT.4009, B.FLT.0345, B.FLT.0387 & B.FLT.4006) and depending on the gaps, additional research should be conducted.
- There was a mixed response to adding new features to keep feedlots engaged outside of the heat season. Some wanted CHLT to be focused on heat load management only and did not want it to get complicated, while others could see an advantage in having all their weather information in one location. Most feedlot operators had a system of cross checking weather forecasts from multiple platforms to provide a “best guess” of any impending weather.

4.4 Objective 1d

Develop ROI and value proposition for a premium service for customers

4.4.1 Summary of survey responses

- 56% of survey respondents have lost cattle during and after a heat event.
- 96% of survey respondents use additional resources for weather related information. These are mostly free to access, some subscriptions services are used in combination with associated farming enterprises. They are used to cross-reference with CHLT in summer and to monitor wet weather forecasts all year round.
- 100% of survey respondents believe proactive management is key in heat load management. Being proactive assists in minimising cattle losses, improves cattle health, mitigates against production losses, allows operators to maintain feed intake (for those feedlots who do not purposefully restrict dietary intake prior to or during an event)
- 100% of survey respondents use the heat load forecast service for planning feedlot activities during summer such as pen cleaning, drafting, trucking and staff rosters in advance. The forecast service will also influence any future cattle handling decisions during the summer period.
- The general consensus is that the current strategies/resources are good but could be improved if the forecast accuracy was improved. A number of survey respondents noted that the timing of the daily forecast update could be improved (earlier in the day to allow for more strategic planning)
- 100% of survey respondents said the proactive management capability from the current heat load forecast warnings assisted in:
    - The prevention of cattle losses

- Mitigating potential negative performance outcomes
- Providing the opportunity to take steps in maintaining good cattle health
- Enabling the execution of proactive strategies to maintain feed intake
- Planning feedlot activities in advance

4.4.2 Commentary

- Historical expenditure of grain fed levies developing and refining CHLT was worthwhile and beneficial to industry.
- Respondents are satisfied that grain fed levies have been allocated for the development of an industry tool that helps prevent cattle losses in summer months. Provides feedlots with a validated tool for heat load management.
- There is a good argument for further R&D to refine capability of CHLT. From an operational point of view improvements could include developing an APP and better communication and training.
- CHLT is cheap insurance (9 cents per animal turned off or a premium of 0.005% of the asset value for the current service assuming all feedlot are paying for the service) for the proactive protection of grain fed cattle.
- CHLT is world leading and is the premier tool available to feedlot operators for heat load management.

4.4.3 Return on investment

CHLT currently provides:

- CHLT website available all year with some features available to the public (Forecasts for about 250 towns and access to the RAP).
- Fully maintained and supported 7 days per week during the heat load season (5 days per week out of season) to ensure forecast is running, alerts are sent out, data is available and processing new requests, changes or adding new weather stations to the service.
- Free access to become a registered user for any NFAS accredited feedlot with the following features:
  - Access to RAP (ability to store past configurations)
  - Access to training webinars
  - Access to HLI calculator
  - Access to HLI threshold calculator
  - Access to AHLU calculations
  - Access to other helpful documents (eg. Pant score chart, RAP log, presummer check list, Managing Summer Heat workbook)
  - Pre-season newsletter to all users
  - Pre-season Webinar training
  - User support

CHLT has been noted by almost all feedlots surveyed to be an essential tool to help them manage heat load in the summer months. The table below steps out the return on investment for operating

the CHLT service for a single year. The significant return on investment would suggest that the industry is receiving good value by utilising the current service.

Table 3 ROI calculations for industry

Annual cost of CHLT service	$276,000	For service as outlined above and currently used by over 350 feedlots
Annual turnoff for the Australian feedlots	3,098,000	Averaged over the past 3 years (source: MLA Lot Feeding Brief, February 2023)
Cost of CHLT per animal turned off	$0.09	Based on annual turnoff
Cost per animal per day	$0.0002	Based on annual turnoff and cost annualised
Current value of Australian Feedlot industry	$5.313 Billion	MLA State of the Industry Report, The Australian red meat and livestock industry 2022. (Table 1) 3 year average turnover for feedlot industry
Estimate of 0.05% of cattle saved by operators using CHLT	1550 animals or $2.6 Million	Note: This is a very conservative estimate as a single unmanaged event can result in significantly higher cattle losses
Annual ROI for industry	862%	Note this does not include dark cutter's, production loss or reputational loss

Calculating a ROI for a single feedlot is more difficult to determine as it depends on the size of the feedlot, cost of a user pays system and features required. The table below presents a summary of the ROI for a range of size feedlots assuming that by using the service 0.05% of cattle in the feedlot are saved. A return on investment of over 100% is a cost for the user pays system equivalent to the feedlot capacity.

Table 4 ROI calculations for feedlots

Feedlot Capacity	500	1,000	5,000	10,000	20,000	40,000
Assumed annual turnoff	1,500	3,000	15,000	30,000	60,000	120,000
Value of asset	$2,572,466	$5,144,932	$25,724,661	$51,449,322	$102,898,644	$205,797,289
Value of asset	$1,286	$2,572	$12,862	$25,725	$51,449	$102,899

potentially saved by using CHLT						
Current CHLT Cost at 9c per head	$135	$270	$1,350	$2,700	$5,400	$10,800
ROI for feedlot for a range of annual service charge rates for a user pays system						
$250	414%	2057873%	10289764%	20579629%	41159358%	82318815%
$500	157%	414%	2472%	5045%	10190%	20480%
$1,000	29%	157%	1186%	2472%	5045%	10190%
$5,000	-74%	-49%	157%	414%	929%	1958%
$10,000	-87%	-74%	29%	157%	414%	929%
$20,000	-94%	-87%	-36%	29%	157%	414%
$40,000	-97%	-94%	-68%	-36%	29%	157%

4.4.4 Value proposition for a premium service

The key attributes and features of a premium version of CHLT are presented below. It will need to include all that is currently provided plus additional features.

Key attributes

- Accurate forecast (by far the most important)
- Easy use and access (Mobile App)
- Easy to understand (simplified communication of key messages)
- Additional education and training
- Online user management and payment options

Features (noted as very useful by the majority in the survey)

- Ability to view your site-specific weather station data and use it to get an accurate understanding of the forecast AHLU
- 7 day forecast (current CHLT parameters)
- Probabilistic Rain forecast
- Ability to set your own alerts (e-mail or sms)
- Daily summary report (via e-mail)
- Rain radar
- Severe weather (storm) warnings

5. Conclusion

The Australian feedlot industry has identified management of heat load in cattle as a significant need for the industry. As such major investment has been made over 20 years to understand the risk and develop a world class system to help feedlot manage and mitigate the risks. The use of these systems allows feedlots to demonstrate a depth of understanding of heat load management in the feedlot production system during the summer months and address the applicable standard(s) within the NFAS. Compliance with the NFAS standards not only ensures that grain fed beef customers have some surety that cattle are being cared for in an appropriate manner, but the Australian and global community can be satisfied that the Australian feedlot sector is using well researched and validated tools in the prevention of poor animal welfare outcomes to ensure the risk is managed.

The aim of this project has been to undertake 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.

There are two major shifts globally that will result in more pressure on the management of heat load risk in beef cattle feedlots:

- Future increases in temperature and more frequent climate extremes as a result of climate change, and
- Community expectations for animal welfare including a social licence to operate

The results of this survey support the understanding that management of heat load in cattle is high a priority for the Australian feedlot industry. The industry is generally satisfied with the tools and measures they use to proactively manage and mitigate the negative impacts of heat load in cattle (although suggestions for improvements have been provided).

A significant component of all feedlot operator strategy relies on early warning of events to allow proactive risk mitigation. This is currently provided by the industry funded service called the Cattle Heat Load Toolbox (or CHLT). Access to the service is currently free to NFAS accredited feedlots, funded through the MLA feedlot R&D program.

The key findings are presented in the following section.

5.1 Key findings

- The survey results are representative of the views of the Australian Feedlot community based on the number and mix of feedlots responding to the survey.
- The current CHLT service is well perceived by Australian lot feeders and highly valued as part of a broader strategy to manage heat load. However, there are a significant number of users that are not using the current tools correctly which could lead to greater risk of not responding proactively to a forecast event.
- All users said the proactive management capability from the current heat load forecast warnings assisted in:
    - The prevention of cattle losses
    - Mitigating potential negative performance outcomes
    - Providing the opportunity to take steps in maintaining good cattle health
    - Enabling the execution of proactive strategies to maintain feed intake
    - Planning feedlot activities in advance

- The consensus is that the current strategies/resources are good but could be improved if their accuracy and timeliness was improved.
- Most users confirmed that the HLI and AHLU model provides an accurate representation of heat load in cattle prior, during and after a heat load event and correlate with visual observations.
- Animal welfare (not just preventing death but minimising any stress, short or long term) is noted as very important for industry to maintain its social licence to operate.
- Management complacency may be increasing with relation to the management of heat events due to factors identified in this study; Increased use of shade; increased proportion of wagyu breed cattle (generally known to have a higher heat tolerance through higher roughage diets) and a lack of personnel with lived experience of dealing with an excessive heat load event.
- More engaging training for users was seen as critical to greater adoption of the tools, better use of the tools and resulting lower risk to industry.
- There was a mixed response to adding new features to keep feedlots engaged outside of the summer season. Some wanted CHLT to be focused on heat load management only and did not want it to get complicated, while others could see an advantage to having all their weather information in one location (especially in relation to timely and accurate wet weather and storm forecasts).
- The survey identified that although all users agreed that there was a commercial cost due to excessive heat load they could not quantify the amounts or extent. It is acknowledged that no two heat load events are the same, and therefore the outcomes can vary.
- The CHLT is viewed as part of an overall strategy, and provides a degree of insurance against significant production and cattle loss through proactive responses and pre-eminent risk mitigation behaviours.
- CHLT is a world leading tool for management of heat in feedlots, it is good value in the service provider market and has a significant return on investment for individual feedlots.

5.2 Benefits to industry

The industry benefits from this project include increased understanding of the following:

- Feedlot experience with excessive heat load and current lack of experience idnetified in some feedlots.
- Importance of proactive management in dealing with excessive heat load events
- Increase in complacency wihtin the industry with respect to heat load management
- Feedlots access many different weather forecasts all free to access
- All feedlots see forecasts are important tool for planning feedlot activities and proactively managing heat load risk in cattle
- What is required to get greater adoption of a forecast service such as CHLT

The benefits to the Australian Feedlot industry having access to a proactive heat load management service include:

- Supports the industry initiative to proactively manage for heat load in cattle
- Provides insurance for a major risk to industry – animal welfare activists, animal welfare organisations, regulators and consumers

- The return on investment for the development of tools and initiatives to manage heat load (particularly in the lead up to excessive heat load events) is large and supports ongoing investment by industry.

6. Future research and recommendations

Future research and development include:

- Improvement in forecasting (this can be achieved by utilising the site weather station data to downscale and train the forecast)
- Development of a mobile Application for greater adoption of the service by industry
- Development of a comprehensive training and engagement plan to educate feedlot operators in not only the use of available tools but also by sharing stories of success in managing heat load events.

7. References

MLA (2023) Lot Feedling Brief – Results for the December Quarter 2022 feedlot survey, February 2023

NFAS (2022) National Feedlot Accreditation Scheme Annual Report, 2021

8. Appendix

8.1 Survey responses

Table 5 Survey questions

ID	Question	Representative statistic/summary of responses
Q1	What is your understanding and experience with heat load in feedlot cattle, excessive heat load events and the commercial impacts?	Most have good knowledge (86 % (44 out of 51))
Q2	Have you experienced any extreme heat load events? Tell me more about the experience?	Most have experience with heat wave or heat load events, but many have not experienced extreme heat load events (Yes - extreme: 57% (29), Yes - not extreme: 22% (11); No experience: 22% (11))
Q3	Tell me about how you proactively manage for heat load events in your feedlot?	36 feedlots (71%) list CHLT as a resource for proactive management of EHL in answer to this question
Q4	Tell me about the resources that you currently have in place to manage excessive heat load or distress in cattle?	22 Feedlots (43%) quote shade as part of their strategy for managing EHL
Q5	Do you feel like these are adequate to properly address this phenomenon?	General consensus is that the current strategies/resources are good but could be improved if their accuracy was improved (92% Yes (47); 8% No (4))
Q6	What else could have helped you better manage that risk?	There are some suggestions for improvements to the CHLT, but many responses seem to indicate that the infrastructure/procedures at the feedlot could be improved. 5 feedlots (10%) explicitly state that their current resources are adequate due to the implementation of shade or that they have noticed a significant improvement since implementing shade (Q5). 12 feedlots (24%) in addition to these 5 state that they are considering adding more shade or think that shade would have helped them in their previous EHLEs (Q5 and Q6). 19 of the feedlots (37%) explicitly state that they currently use shade (including emergency shade) to manage excessive heat load in cattle (Q4) and all 19 of these feedlots feel like their current resources are adequate to properly address the phenomenon (Q5). 38 feedlots (75%) state that their feedlots are either part or fully shaded (Q9) and 36 of these feedlots feel like their current resources are adequate to properly address the phenomenon of excessive heat load or distress in cattle (Q5).

Q7	What is the annual turnoff from your feedlot - number of head and the feedlot capacity?	There is a range of capacities, but mostly between 1,000-5,000 or 10,000-25,000 scu: (3 feedlots < 1000 (6%); 17 feedlots between 1000-5000 (33%); 4 feedlots between 5000-10000 (8%); 16 feedlots between 10000-250000 (31%), 11 feedlots > 25000 (22%))
Q8	What is your main market category?	Varies. Includes Wagyu, Angus, Brahman, Shortfed GF, trade cattle etc.
		12% (6/51 responses) of feedlots feed only Wagyu; 18% (9/51 responses) of feedlots feed Wagyu and some other breed(s)
Q9	What capacity of your feedlot is currently under shade?	There is large variation in the shaded percentage. 16 feedlots (31%) have 100% shade; 22 feedlots (43%) have part shade; 13 feedlots (25%) have no shade.
Q10	How do you define an excessive heat load event at your feedlot?	Many use the CHLT combined with observations of the animals and thresholds on the weather. Some define an EHLE by cattle loss.
Q11	How many days/events would you experience per year?	80% (41 out of 51) have more than 1 event per year. 29% (15 out of 51) have > 3 events per year.
Q12	How do you feel about early warning tools such Cattle Heat Loat Toolbox (CHLT)?	85% of responses (41 out of 48) were good/great; the other 15% (7/48) mostly did not use the tool because they do not experience many/any heat load events (e.g. five were from WA feedlots; some of these said the CHLT was good/useful but they don't use it)
Q13	Do you think that early warnings play an important role in helping you proactively manage heat load events at your feedlot?	86% (44) yes, 4% (2) no, 10% (5) responses were mixed/unclear
Q14	Do you have a feel for the commercial impact of not proactively managing cattle prior to and during an excessive heat load event?	98% of respondents (49 out of 50) said they had a feel for the commercial impact, one respondent (2%) said they did not.
Q15	What other challenges do you face at your site? [staff turnover, training, knowledge transfer, availability of skilled resources etc.]	
Q16	What other weather-related challenges/risks do you face when managing your feedlot?	Wet weather and weather causing damage to infrastructure seem to be the biggest weather risks apart from heat.
Q17	Would you consider additional information that would allow you to better manage these risks?	Most seem interested in wet weather forecasting being incorporated into the CHLT
Q18	Could any training aspects of the Cattle Heat Load Toolbox be enhanced to create a more supportive	Many feedlots are requesting training resources which are already available (e.g. YouTube videos)

	approach for feedlot awareness and execution during summer months?	13 feedlots (25%) state that external consultants are a key part of their training. Approximately 28 feedlots (55%) want additional training in some form: some want more training for beginners (a more basic introduction than is currently available), some want more detailed/specific training, some want a different delivery mode for training (e.g. more face-to-face training on feedlot, YouTube training videos accessible all year round, an online training platform, seminars, interactive webinars), some want refresher courses for people who have already undertaken some training.
Q19	Do you currently use any other weather services from different suppliers such as BOM?	Two feedlots (4%) just use the CHLT; Five (10%) use the CHLT + BOM forecasts; 36 feedlots (71%) use 3-5 services; 8 feedlots (16%) use > 5 services.
Q20	How do you use these? What areas are you trying to manage?	59% (30 out of 51 responses) of feedlots explicitly mention that they are trying to manage rainfall/wet weather/storms.
Q21	Do you find these useful? If yes can you tell me about them?	100% of responses say "Yes", many have specified "if accurate" (48 yes responses, 3 did not respond/does not apply)
Q22	Are they paid services or free to access?	Most services are free, several feedlots may have a single subscription service or a maintenance cost for an on-site weather station (78% (36/46) responded that all the services are free; 22% (10/46) responded that at least one service was paid; 5 did not respond/did not apply)
Q23	Would all year round site specific weather forecasts be beneficial in managing your feedlot operations?	76% (39 out of 51) have said "yes" or "yes - but happy with current sources". 6% (3 feedlots) have said they want site-specific forecasts for part of the year only, and 18% (9 feedlots) have said "No"
Q24	What weather services would you find useful outside the summer months?	Most would find wet weather/wind/storm/frost/hail warnings, info and forecasts most useful
Q25	Have you lost cattle due to heat stress? If yes, how many over what period of time?	56% (28) have said yes, 44% (22) have said no (either in the answer to this question or in the answer to question 2)
Q26	If you had an event in the past, did you change your management practices to mitigate the risk of future events? What changes did you make?	91% (39/43) said they made changes after an EHL event, 9% (4/43) said they did not make changes. 8 did not response/did not apply
Q27	Have you been able to assess the commercial impact of any excessive heat load events? In relation to meat quality (marbling, dark cutting) or carcase downgrading?	General consensus is that there is definitely a commercial impact but they do not know how to measure/quantify that impact. Some have provided examples of impacts e.g. cattle loss, increased dark cutting, etc.

Q28	Have you observed a reduction in feed intake during periods of heat stress? Can you estimate the level of feed intake reduced during periods of heat stress?	94% (48/51) said they had observed a reduction. Mostly between 10 and 30% reduction. 6% (3/51) said they had not observed a reduction.
Q29a	Do you believe the proactive management capability from the current heat load forecast warnings assist in the prevention of cattle losses?	All responses said yes
Q29b	Do you believe the proactive management capability from the current heat load forecast warnings assist in mitigating potential negative performance outcomes?	All responses said yes
Q29c	Do you believe the proactive management capability from the current heat load forecast warnings assist in providing the opportunity to take steps in maintaining good cattle health?	All responses said yes
Q29d	Do you believe the proactive management capability from the current heat load forecast warnings assist in enabling the execution of proactive strategies to maintain feed intake at your feedlot?	All responses said yes
Q30	Does heat load forecasting play a role in planning feedlot activities in advance?	All responses said yes
Q31	Are there any value adds to the current weather forecast service you would like in your region?	Most comments seem to be around improving forecast accuracy, wet weather forecasting and being more site-specific
Q32	What platforms/communications would improve your experience with a heat load forecast provider?	57% (29/51) of responses explicitly mentioned wanting a mobile app. 25% (13/51) of responses said they were happy with the current platforms/communications. 18% (9/51) of responses did not mention a mobile app but had other suggestions.
Q33a	Usefulness rating (1-4): Ability to view your site specific weather station data and use it to get an accurate understanding of the forecast AHLU	Very useful (Most frequent response: 4)
Q33b	Usefulness rating (1-4): 7 day forecast (current CHLT parameters)	Very useful (Most frequent response: 4)

Q33c	Usefulness rating (1-4): 14 day forecast (current CHLT parameters)	Mixed response (Most frequent response: 3; others split between 2 and 4)
Q33d	Usefulness rating (1-4): Seasonal forecast	Mixed response (Most frequent responses: 2 and 3)
Q33e	Usefulness rating (1-4): Probabilistic Rain forecast	Very useful (Most frequent response: 4)
Q33f	Usefulness rating (1-4): UV rating or sun intensity rating forecast	Mixed response but generally useful (2, 3 and 4 all relatively equal)
Q33g	Usefulness rating (1-4): Growing Degree Days forecast	Mixed response (1, 2 and 3 all relatively equal - some responses not know what this was)
Q33h	Usefulness rating (1-4): Soil moisture forecast	Not very useful (Most frequent responses: 1 and 2; some 3s and 4s)
Q33i	Usefulness rating (1-4): Dust risk forecast	Mixed response (Most frequent responses: 2 and 3)
Q33j	Usefulness rating (1-4): Odour risk forecast	Not very useful (Most frequent responses: 1 and 2; some 3s and 4s)
Q33k	Usefulness rating (1-4): Ability to set your own alerts (e-mail or sms)	Very useful (Most frequent response: 4)
Q33l	Usefulness rating (1-4): Daily summary report (via e-mail)	Very useful (Most frequent response: 4)
Q33m	Usefulness rating (1-4): Rain radar	Very useful (Most frequent response: 4)
Q33n	Usefulness rating (1-4): Lightning alerts	Useful (Most frequent responses: 3 and 4; some 1s and 2s)
Q33o	Usefulness rating (1-4): Severe weather (storm) warnings	Very useful (Most frequent response: 4)
Q34	Do you see value in having all the information on the one platform rather than having to change to many different website/Apps?	Majority say yes. Some have concerns about too much complexity in the site and/or accuracy. Some discuss the wish to compare information from different sources and draw their own conclusions.
Q35	Do you have anything else you would like to add?	
Q36	Does the HLI/AHLU (calculated from the onsite or offsite weather station) provide an accurate representation of heat load in the cattle? (correlate with visual observations – discomfort, panting score)	22 out of 25 responses say yes/mostly/if the forecast is accurate. 3 said no.

8.1.1 List of strategies used to proactively manage for HLEs (Q3)

- Clean pens
- Service equipment
- Develop HLMP w/ V&N
- Assess cattle categories
- Formulate HL rations
- Pre-purchase additional molasses
- Water tubs
- Monitor forecasts
- Betaine in rations
- Adapt feed regime
- Monitor feed intake
- Monitor weather
- Shade
- Additional water points
- Reduce stock work to a minimum
- Check water points are functional
- Review vulnerable cattle
- Manage manure load
- Water trucks to refill troughs
- Daily pen rider checklist
- Schedule for cleaning water troughs
- Pen-by-pen analysis program for identifying vulnerable animals
- Move vulnerable animals to shade
- Backgrounding
- Lower stocking rate
- Change water before events
- Provide hay as feed
- Bedding in pens
- Dump pens into shaded paddocks
- Consistent breed type
- Consistent DOF at turnoff
- Change trucking out times
- Reduce morning/afternoon cattle movements
- Weather station maintenance prior to November
- Additional supplies of roughage on hand
- Training of staff
- High intensity monitoring

8.1.2 List of resources currently in place to manage excessive heat load or distress in cattle (Q4)

- Katestone/CHLT
- Shade
- RAP
- Heat Load Management Plan (HLMP)
- Weatherzone
- BOM
- Oceanic
- Additional water troughs
- Observations
- Heat load rations
- Onsite weather station
- Backup water supply
- Tankers
- Deep trenched waterline
- Senior management input
- Consulting vets and nutritionists
- Pen map software
- Proactive pen surface management

8.1.3 List of improvements that could have helped better manage risk of HLE (Q6)

- Ability to change cattle delivery times during and after EHLE
- Industrial strength fans
- Forecast from site-specific weather data
- Better accounting for cattle recovery
- Accuracy of forecasts
- Feed heat-resistant breeds only
- Don't feed custom cattle from unknown background
- Acclimate cattle through backgrounding
- Actively monitor water supply
- Validate calculations between onsite weather station and Katestone
- Better water truck
- Have people experienced with EHL
- Forecast update by about 5-6 a.m. and then every six hours to enhance decision making
- Improved training around EHLM
- Improved training around CHLT
- Better understanding of what other feedlots are doing to prepare for EHL
- Move cattle to shade
- Develop shade
- Adding bedding to pens

- Redesign feedlot to improve airflow and water access
- Increase flexibility in ration modification
- Use Betaine rations
- Decrease pen density
- Introduce heat load rations
- Cancel trucks/shift handling jobs during/in preparation for EHLE
- Being able to change the alert level in CHLT
- Better triangulating of heat status
- Improve "definition of status"
- Cyclone warnings
- Wider knowledge and "buy in" in the supply chain around feedlot heat load and how we manage it best
- Observation of cattle

8.1.4 List of defining features of an EHLE (Q10)

- Prolonged periods of increased day time temperatures with little to no relief overnight + high humidity + little to no wind
- Periods where cattle struggle to cope with the weather conditions
- Hot weather and no wind
- Observed panting
- Panting in acclimatised cattle
- Trigger levels in EHLMP
- Threshold on panting score
- Consecutive days of increasing heat and relative humidity
- Reduction in feed intake
- Days when cattle cannot expel heat and accumulate heat load
- Threshold on HLI
- Threshold on number of days of stressful conditions
- Thresholds on max/min temp
- Sudden changes in conditions
- Start losing cattle
- Threshold on AHLU
- Threshold on drop in feed intake
- Threshold on midday wind speed
- Threshold on humidity
- Observe cattle gathering under shade
- Heat does not dissipate at night
- Cattle crowding water troughs
- When CHLT indicates heat load risk combined with observations of cattle behaviour
- Any healthy cattle mortality
- When heat conditions begin to impact on normal behaviour
- Death loss

8.1.5 List of weather risks other than EHL (Q16)

- High winds (damage to infrastructure incl. shade and shade structures)
- Excessive wet weather
- Limited acclimation for cattle going into summer when spring/summer are wet
- Wet winters
- Bunk calling during hot weather
- High relative humidity
- Sudden changes in weather (dust storms, unseasonal wet, cold wither, prolonged wet weather)
- Lightning strikes
- Flooding
- Lack of wind
- Dust
- Hot/cold weather
- Excessive dry
- Storms
- Rainfall events
- Cyclones
- Drought
- Wet and muddy conditions
- Extreme high temperatures
- Hail and wind (breaks shade)

8.1.6 List of additional information that would allow better management of other weather risks (Q17)

- Improve quality/accuracy of forecasts
- Better/accurate rain forecasting
- Warning of sudden changes in the weather
- Wet weather forecasts
- Wind alerts
- More in depth information - particularly in relation to particular pen areas
- More timely forecasts/more frequent
- Dust alerts from on site weather station; incl. relevance of wind speed and humidity
- Information on wind chill
- Hail alerts
- Information on river heights
- Information on local flooding
- Two weather stations to triangulate

8.1.7 List of weather services used other than CHLT (Q19)

- Goanna

- Elders
- Weatherzone
- BoM
- Oceanic
- Weathermation
- YR.no
- Windy Weather
- Accuweather
- WX Images
- Meti
- Wire
- GFS
- Johns Weather Channel
- Higgins Storm Chasing
- Onsite weather station(s)
- Alternative (unnamed) weather station(s)
- Willy Weather
- Nations weather (US)
- Long term weather forecast (paid subscription service)
- Sierratech
- DAFWA
- OZ Forecast
- Kestrel
- Apple Weather
- OCF
- Lightning alert
- Sea Breeze
- DPIRD
- Wunderground
- Phone apps
- CDI mistEO

8.1.8 List of weather risks being managed by weather services other than CHLT (Q20)

- Soil
- Rainfall
- Wind
- Rainfall events
- Humidity
- Temperature
- Hour-by-hour forecast rainfall
- Collate information for decision making
- Wind speed and direction

- Rain radar
- Weather changes
- Day and night temperatures
- Comparison of different forecasts
- Preparation for storm events
- River heights
- Longer range forecasts
- Cyclone monitoring
- Forecast weather events
- Real time data via websites

8.1.9 List of weather services which would be useful outside of the summer months (Q24)

- Accurate rainfall forecasts
- Impact of rain and wind
- Monitor frost, heat and changes in weather
- The basics
- Accurate 10-14 day forecasts
- Diurnal temperature range predictions
- Temperature
- Relative humidity
- Severe weather or storms
- Wet weather events
- Storm warnings
- Wind chill factor
- BOM data
- Hail
- Lightning
- Rain radar
- Wind speed and direction

8.1.10List of changes made in response to an EHLE/HLE (Q26)

- Only truck or load cattle in the early AM
- Evolved pen cleaning program
- Prioritise higher risk cattle for the shaded pens
- Early adoption of heat load rations
- More proactive around pen manure depth management
- Adopted shade
- Additional water troughs
- Use predictive forecasts to determine feeding strategy
- Use cattle observations to determine handling
- Change feeding times during HLE

- Improve communication in the feedlot
- use alerts in decision making
- Nutritionist trains employees
- Portable water troughs
- Spread cattle out on hot days
- Pen cleaning
- Started/Improved use of CHLT
- Revised EHLM plan
- Improved staff training
- Change class of cattle during the summer months
- Monitor daily feed consumption more closely
- Use weather forecasts
- Increased onsite water storage
- Focus on pens that have access to wind for high risk cattle
- Changed time of loading/working cattle
- Included Betaine in rations
- Increased pen size
- Introduced heat load rations
- Ensure every pen has its own water trough
- Ensure fresh intakes have more room, better airflow, good water supply
- Place cattle in pens based on risk and microclimate
- Develop a HLMP
- Weather station calibration
- RAPs
- Increased daily observations
- Increased activity associated with EHL forecasts
- Pen depth management
- Focus on when to handle cattle

8.1.11 List of potential value adds to the current weather forecast services (Q31)

- More timely forecasts
- Ability for the program to update and be more accurate throughout the day
- Want to cross reference CHLT data with onsite weather station
- Want to improve support for weather station maintenance
- Increase forecast accuracy
- Want a mobile app
- Want 6-12 km grids in forecast
- Site specific weather
- Want 6-12 hourly updates instead of daily updates
- Want 3am prediction in the summer since work starts before 6 am
- Want to incorporate a different reference weather station
- Additional alerts

- Improved wet weather forecasting
- Longer term wet weather/rainfall forecasting
- Dust predictions
- Wind alerts
- rain
- lightning
- More site-specific
- Linked to their own weather station
- prompts to go to CHLT
- Weighting between wet and dry heat
- Difference between acclimated and non-acclimated cattle

8.1.12List of platforms/communications that would improve the experience with a heat load forecast provider (Q32)

- Internet connectivity
- 1, 3 and 5 day alerts or early warnings
- Timeliness of CHLT forecasts for early morning decision making
- Application for mobile/tablet
- Accuracy of forecasts
- Link with observations and cattle on different stages of feeding program
- Load HLMP into app with CHLT so all people on the feedlot can have access
- Text message early warning
- Password protected mobile app
- Instant alerts or notifications via app
- Record daily observations directly to app
- Access to CHLT when out of service range; auto update facility when back in range
- Resources for training purposes, incorporate training elements within Feedlot Tech
- Include trend lines
- Fortnightly/monthly forecasts
- Improved accounting for cattle expelling heat
- Explain what HLI/AHLU mean