Final Report

AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

# Ice Hide Processing Innovation (Stage 1)


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# 1.0 Executive Summary

M C Herd is a mid-tier red meat processor capable of operating at up to 80 hd/hr beef and 9 carcase/min sheep and is a leading example of a medium throughput processor that is constantly on the forefront of innovation within the Australian red meat industry, with developments applicable to all processing plants whether small or large.

In 2017 the value of beef hides per carcass started to steadily decline reaching prices as low as $10 per hide by mid-2020, prices not seen since the global financial crisis in 2007. Per an article published by Beef Central titled “Hide Market Spirals to Unprecedented Depts” on 28/07/2019, the dramatic fall in prices reflected between a 70-90% fall since the price peaked as high as $110 per hide in 2014 depending on the location and type of cattle being processed. The decline in prices could be attributed to many macro-economic factors such as declining international relations with China, improvements in synthetic and substitute products driven by a push towards more sustainable products by large consumers of leather such as fashion and vehicle customers. More industry specific, demand for Australian hides declined during the back end of the drought due to the poorer quality hides being processed with customers favouring sourcing hides from North and South America over Australia.

M C Herd identified that an opportunity may exist to implement a point of difference from other red meat processors and potentially achieve a premium hide price if the business could design and implement a process to increase the quality of hides to a higher tier grading rather than mid to low tier gradings that end consumers were not demanding.

Management in conjunction with the engineering team designed a solution that would allow beef hides to be iced immediately once removed from the carcase. The concept of cooling the hides to preserve their integrity is not the novel component of this project rather how to implement an icing process immediately after the hides are pulled from the carcass. The key focus of innovation in this project is whether there is a benefit in cooling the hide straight away rather than how they have historically been cooled at a 3$^{rd}$ party prior to being transported to the tannery.

The purpose of the icing process is to reduce the potential damage caused by blood vessels and capillaries swelling and bursting when the hide is removed ultimately lowering the quality of the hide. By successfully implementing the ice hide processing project, it's hypothesised the hide quality will be better preserved resulting in an increase in quality and in turn improved prices and profitability.

Based on the data collected, a material improvement in hide temperatures recorded on arrival at the processing facility was achieved. The quality of hides recorded also improved which is evidenced in more detail throughout this report. Most significantly, hides previously rated a D improved to C grading with icing with other more minor improvements in B and A grade hides observed over the period.

It should be noted that the results evidenced in this report do not account for types of cattle and or the location they're sourced from. Neither M C Herd or the hide processor had the capability to link specific hide gradings on a per head basis and thus a general disclaimer needs to be considered when reviewing the results obtained. Variations in hide grading can be put down to seasonal factors where generally summer hides tend to be better in quality than winter hides. This general assumption is based on Victorian cattle (which is where majority of M C Herd's livestock is sourced from) is in shorter supply during winter and thus cattle is sourced from northern states to maintain throughput. It's generally accepted in the industry that the further north cattle are sourced, the lower the quality of the hide given the conditions cattle is farmed in.

# 2.0 Introduction

This project was commissioned in late 2019 after two years of the hide market having retracted significantly due to factors such as lack of demand driven by substitute products and declining international relations in countries such as China that it is possible there is a risk that hide processors will not be willing to pay a premium for higher quality hides meaning red meat processors like M C Herd will lose what has historically been a valuable co-product provided by the industry.

The impact of not being able to generate a return by recovering hides would likely have a negative impact on the industry by reducing the price processors could purchase livestock or leading to upward pressure on meat prices to the end consumer in order to cover the cost of processing which was contributed to by hide recoveries. At an extreme end, if demand for lower quality hides reduced to a point where the cost to process was higher than return, the hides would be thrown out or put through render.

To minimise the risk of demand and supply side price impacts management in conjunction with AMPC agreed to investigate whether placing hides directly onto ice and bringing forward the chilling process will help to maintain the integrity of the hide limiting damage caused to blood vessels which can swell and burst causing the hide to deteriorate in quality.

M C Herd believes other benefits from the project such as improving hide quality & hygiene regardless of financial return still justify the project going ahead.

Through discussions with M C Herd's hide processor, the hypothesis was made with management that if hide temperatures could be delivered to the processing facility at less than 10 degrees Celsius, a material improvement in hide quality would be achieved. Temperatures prior to icing varied between 16 & 20 degrees Celsius depending on other variables such as weather, transport time and density of hides in the hide bin. The hypothesis of achieving below 10 degrees was based on the hide processor's experience with other hide suppliers and overseas operations who report that hides received to the tannery at this temperature usually perform better in grading. Others achieve this result by manually icing the hides, paying third parties to ice

and or are closer in proximity to the tannery reducing travel time and time the hide spends in the elements.

Prior to M C Herd introducing its own icing, its hide processor would ice the hides themselves offsite at a 3rd party location prior to transporting them again to be further processed at the tannery. This icing would often happen at the end of the days production and by then the degradation in quality had usually already occurred.

The initial project scope was for the installation of one ice machine to sit above the hide bin however upon commissioning it was quickly observed that a better result could be achieved by installing two ice machines. It was observed that an insufficient layer of ice was being applied to the hides at the top of the hide bin due to the limited time available to leave the bin there before needing to replace it with an empty bin to keep up with production. Without even looking at the data, management could tell immediately that hides in the top 3rd of the bin would not be cooled at the same rate as the bottom 2/3rds of the bin. M C Herd's engineers designed a concept that would allow for a second ice machine to be installed with a seesaw like hide chute. In theory, once the first hide bin had reached capacity of hides, the chute would swing to a second hide bin, allowing the first to continue filling with ice and thus providing a sufficient coverage of ice on top of the bin before needing to be replaced with an empty bin.

The first machine went live in November 2020 with the second machine being commissioned in September 2021 due to significant delays incurred as a result of Covid and its impact on supply of materials and available resources.

Whilst the hide market has somewhat recovered over the duration of this project, given the concerns around the hide market when this project was commissioned M C Herd firmly believes the project contributed positively to achieving an above average premium for hides when compared to other suppliers. Additionally, the project will, to an extent, protect M C Herd against future deteriorations in the market by providing the business with the ability to continue to provide a premium product to hide processors and to this extent M C Herd deems this project to have been a success.

# 3.0 Project Objectives

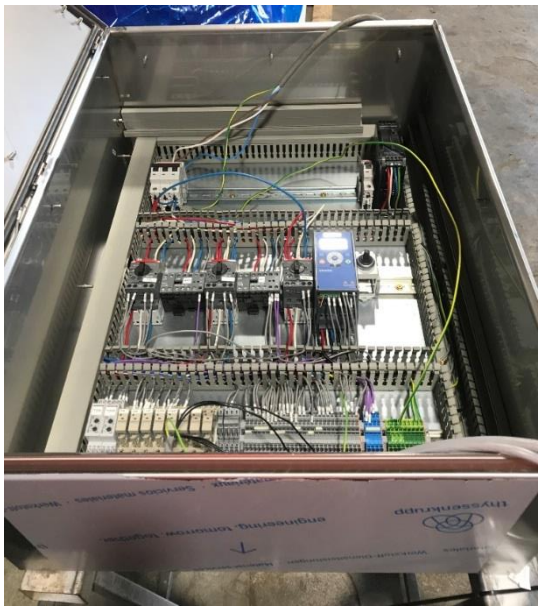
- Develop a prototype system that is capable of disbursing ice over 25-30 hide bins a day
- Test the hypothesis that cooling beef hides by applying ice immediately after being removed from the beast will reduce the hide temperature more quickly, in turn preserving their quality and improving their value.

# 4.0 Methodology

- Step 1 – Required plant modifications, purchase of equipment and supplies (i.e. refrigeration piping and electricals) required and integrate purchase components into an operational system for evaluation.
- Step 2 – Design and construction of the required area to process the hides under ice conditions.
- Step 3 – Trial and error of preferred process operations, including a supporting standard operating procedure with relevant quality assurance program.
- Step 4 – Final report of Stage 1 and recommended next steps (including possible Stage 2 R&D submission to AMPC).

## Concept and design

This picture shows the hide chute from outside the production floor. In the top left corner is the ice machine. The ice machine will generate ice and deposit the ice on top of the hide bin. It's initially expected the ice machine will operate for the whole of production continuously depositing ice. (ice machine installed but not yet operating in this image)



This picture shows the control panel box constructed to operate the ice machine. This was designed and built by M C Herd engineers. This box will be installed next to ice machine.

The control panel is in place to manage “bin in place”, “bin out of place” and “bin full” signals. The control panel also powers the swivelling chute which was installed along with the second machine later in the project.

Both ice machines are capable of producing 8 tonnes of ice a day and run for the length of production which is approx. 8hrs. There is a 15-minute warm up phase required before production so ice is ready for the first hides.

This photo shows how the chute was redesigned compared to the first photo where the chute came straight down. The hides now come down on an angle into the bin. This will allow for a second ice machine to be installed on the right-hand side.

(ice machine now in operation)

This photo depicts a full hide bin. As can be seen, once the bin has only just been pulled out from under the chute and place aside for truck loading and visually you can observe that the ice on top is not sufficient enough to cool the top hides. Random temperature checks taken have indicated hides in the middle and bottom of the bins are reaching target temperature of 10 degrees however hides on the top are not quite achieving this target.

This photo shows the curtains which were installed around the bins to prevent the wind blowing the ice away when falling from the ice machine above. The hides are heavy enough that they fall through the curtains into the bin. As the ice is flaky is nature it didn't take long to notice that on days with even a slight breeze a large amount of ice was going to waste as it was blown onto the ground.

This photo shows the second ice machine in position. Modifications have also been made to the hide chute to allow it to swivel between the two hide bins like a seesaw. A laser has been installed on each ice machine that is triggered when the corresponding hide bin reaches its capacity which will trigger the chute to swivel to the other hide bin to begin filling. The chute can also be manually switched if necessary.

This photo shows the ice coverage achieved with the dual icing machines. As opposed to the first photo which shows the hides barely covered when being removed from under the chute, the second machine allows the hide bin to keep filling with ice before being replaced. The forklift driver has more time between swapping out full bins for empty ones also which has reduced the risk of a hide bin over filling should the fork driver be held up elsewhere on the plant. Forklift traffic in this area has also reduced, which whilst it's not a high traffic area allows the forklift resource to be better utilised in other areas of the plant.

# 5.0 Project Outcomes

M C Herd's innovation manager tracked the weekly hide grading results for the period of the project. The hide gradings are completed independently by M C Herd's hide processor. Below are the general criteria that is considered when completing the grading process.

A – premium quality with no defects (no scars, no open scratches, no brands, no mite damage)
B – prime area can have some minimal defects such as light single healed scars, some healed & odd open scar allowed outside of the prime area, no mite damage
C – hide can show clusters of healed scars and some light open scars, mite damage may be visible only in patches, may include odd small butt brand, odd low point caused by knife flays in prime area, some veininess
D – hide will have extensive areas of healed and open scars, visible mite damage, brands, low points caused by knife flays, veininess
R – heavily compromised grain with excessive open scratches, bacterial damage, poor shape, holes, deep knife flays

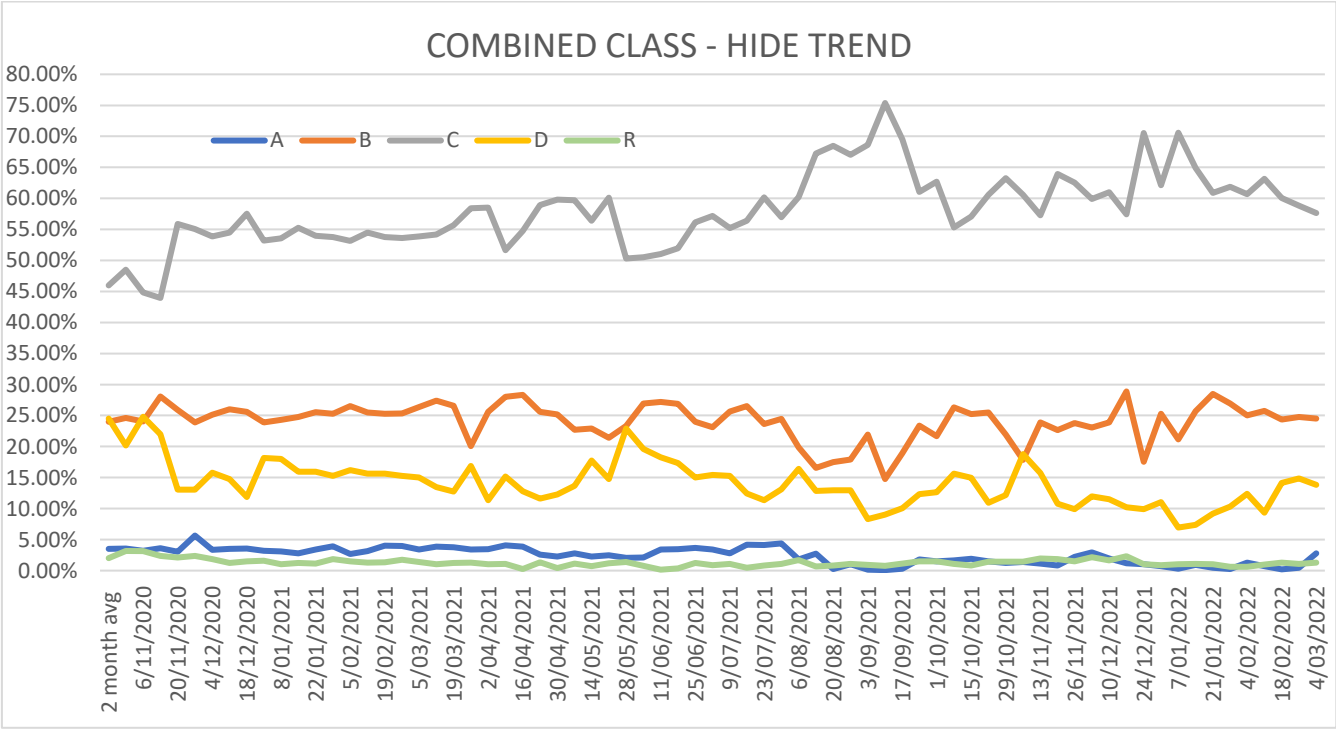
The hide processor also provided the following anecdotes in relation to their classing. "*Our classing criteria is very strict, probably stricter than others as we are selling to Italian tanners that supply leather to the major brands. All classes of hides have a leather use whether it is for top label shoes & bags – high end, automotive leather – can be top to medium end, furniture leather – usually medium to low end, workman gloves – bottom end etc".*

This considered, it's important to note that hide gradings are quite subjective and dependent on the processors customer base and experience in assessing hides.

Below is a condensed graph of weekly hide gradings obtained from the tannery. Two important dates to note are 6/11/2020 when the first ice machine was commissioned. The second machine was commissioned on 10/09/2021.
When compared to the two-month average prior to commissioning the first machine in November 2020 there is a material increase in hide gradings from D to C. This range is where M C Herd has noticed the biggest improvement in gradings which on average equates to a $17.80 per sq ft better outcome. (based on market conditions at time of writing this report).

The second machine provided a marginal decline in D grade hides over the summer months where typically D grade hide ratings increased due to warmer temperatures and the old practise of depositing hides into hot bins and leaving them outside until the end of production to be transported off-site and iced. The icing processing with two machines ensured the hides were kept cool preserving their B/C grading rather than degrading.

Based on the evidence obtained, non-material movements were observed in A grade or rejected hides. This is largely due inherently to the gradings being based on the presentation of the animal itself (premium cattle / poorly looked after / malnourished cattle) rather than the processing technique.



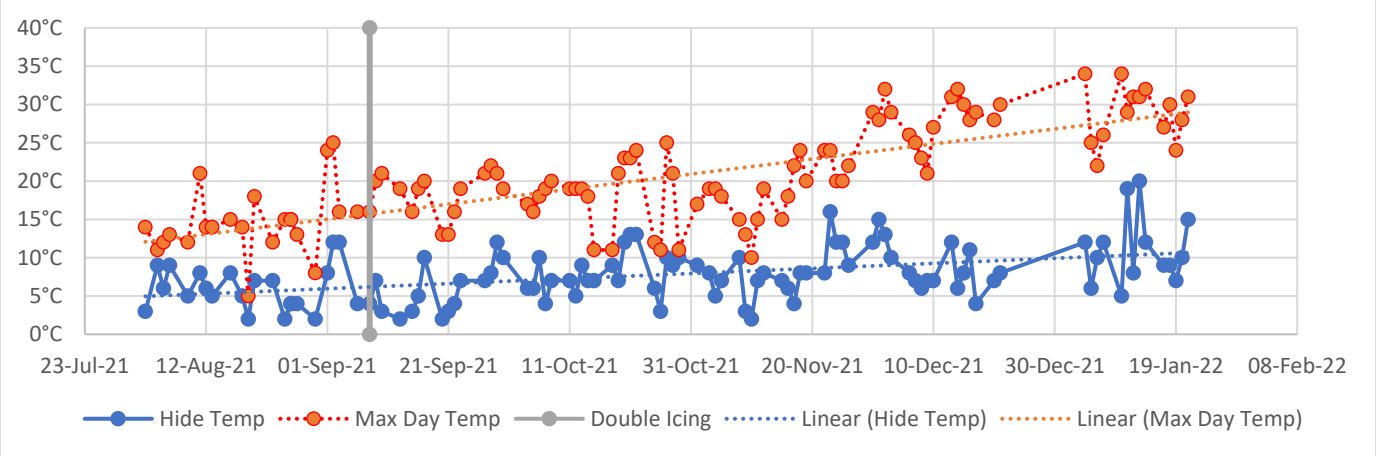

Statistics aside, given the subjective nature of the hide grading process, M C Herd requested the hide processor provide their observations upon commencing the dual icing in September 2021.

- On the first inspection, it was positive with hides feeling cold and sitting in cold water – the ice had mainly melted
- We found each bin contained fewer hides and more water.
- Normally we would receive 7 bins on the first delivery however 9 bins were received for approx. the same quantity of hides.
- We measure the hide temperatures of all deliveries at the tannery and we can report yesterday's hides arrived at 4°C which is excellent.
- With today a bit warmer, we shall see if the hides hold their cooler temperature.
- One side of the bin was warmer compared to the other 3 sides – we put it down the warmer side was facing the sun.

Based on the above comments, M C Herd management were satisfied that the dual icing process was moving towards achieving the project objectives.

The following graph compares the daily temperature against that of the hide temperatures upon arriving at the tannery. What can be observed in this graph when looking at the trend lines is that the hide temperatures do not move linear to daily temperature. Rather the hide temperatures stay largely consistent with only a marginal increase in temperature in the warmer months as opposed to the max daily temps.

Management's interpretation of these results, as mentioned earlier, is that whilst the second ice machine did not provide a similar uplift in hide gradings as the first did, the second machine protected against downside risk of less favourable gradings, particularly during the warmer months of the year.



# 6.0 Conclusions / Recommendations

The project has been an overall success. Since the ice machine went live in November 2020 there has been a material improvement in hide gradings. The second machine did not provide the same level of improvement in hide gradings in comparison to the first machine however given the timing of the second machine being installed in September 2021, both management and tannery believe the second machine protected the hide gradings from declining over the Summer months as one machine would not have been capable of providing enough ice coverage to keep up with the Summer's productions and harsher external elements.

The idea of constructing a drive-in chiller near the hide chute has been discussed in conjunction with management and the tannery that would allow chilling of bins prior to use as well as a place to store the hide bins once filled prior to being transported to processor. An opportunity exists to further improve the cooling process however the capital cost to do so does not provide a sufficient payback to warrant the investment based on preliminary calculations given M C Herd is not a mass producer of hides nor is the business processing a enough premium quality hides to see a material uplift in hide gradings to premium levels.

bin.