final report

Project code: P.PIP.0767

Prepared by: Bill Kelsall
Partners in Performance

Date published: 18 November 2019

PUBLISHED BY
Meat and Livestock Australia Limited
PO Box 1961
NORTH SYDNEY NSW 2059

Processor supply chain diagnostics to improve efficiency and effectiveness of lamb and beef processing

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

Abstract

A 'MeatCo' [1] company asked Partners in Performance (PIP) to support identification of improvement potential at its processing facilities that included bovine, ovine, and value-added lines. Improvements, the company wished to focus on, were around levers within direct control of plant's operations and within current operational assets. Focus of the diagnostic was on Throughput, Yield and Cost.

The novel diagnostic approach included a combination of analytical (e.g. OEE data analysis, yield data analysis), quantitative (e.g. on-the-floor performance observations, yield experiments, Day In the Life Of) and qualitative (e.g. interviews, wiring survey) tools.

The joint PIP and 'MeatCo' team conducted a number of idea generation and prioritisation sessions, ensuring that;

a) the diagnostic team was focused on the highest value / highest ease areas;

b) ideas and identified potential has full buy in of the operations.

At the end of the diagnostic the team aligned on:

I. The size of the prize;
II. Sources of the improvement
III. What will be required to deliver sustainable results.

Although each operation differs, and opportunities for focus will differ between plants, this approach can be adapted and applied widely in the industry, to determine the highest priority areas for profit improvement and to generate broad buy-in. (For example, the "MeatCo' has delivered approximately 1/3 of the identified potential after 2 months, and 2/3 within 4 months).

[1] Deidentified processing plant

Executive summary

Client 'MeatCo' [2] made a decision to undertake a Diagnostic with Partners in Performance to identify the gap to full potential and ensure the management team had a credible, specific plan to deliver improvements that are sustainable.

The Diagnostic approach centred on driving total value for a meat slaughter floor operation whereby, in our experience, there are 3 drivers; Overall Equipment Efficiency (OEE), Cost, and Strategy (see value driver tree below). For this diagnostic, strategic, (including; Sales and Marketing, future robotics, etc.) were considered out of scope, so it was agreed to ring fence the collaborative diagnostic effort to OEE and Cost (i.e. operational levers). Focus was therefore on Throughput/Line utilisation, Yield (with focus on meat weight yield) and Cost, employing current operational assets.

Characteristics of the approach used included; Prepare – analysis by team, being 80/20 – enough analysis to make a decision, worked with team – through the line – cooperation and skill building, and client presents – they are the hero, not the consultants.

Diagnostic elements covered a combination of analytical, quantitative and qualitative tools to determined what was driving current performance and identified improvement potential. These Diagnostic elements included; Overall Equipment Effectiveness (OEE), Bottleneck Analysis, understanding of core processes, Interviews with key leaders/team members, Interviews feedback and themes, Hands-on shift observations, Wiring assessment, Experiments to inform hypotheses, and idea generation sessions.

Additionally, the diagnostic enabled client 'MeatCo' to build a prioritised and quantified Ideas Pipeline. Improvement ideas held management set new targets, implementation plans and a roadmap.

The diagnostic achieved four outcomes:

I. The size of the prize – how much improvement is possible?
II. Source of the improvement come from – source of the biggest opportunities and the priorities?
III. What will be required – the approach, resources, timing and wiring to achieve the improvement
IV. Now that the Diagnostic is completed implementation can proceed to unleash the identified potential and have lasting impact. After 2 months from the diagnostic MeatCo has realised app. 1/3 of the identified potential (run rate), delivering app. 2/3 of the identified potential after 4 months (run rate).

At an industry level, the diagnostic approach undertaken by client 'MeatCo' could be replicated in a similar yet suitable tailored undertaking by all willing industry participants. The

[2] Deidentified processing plant

benefit would be to rapidly raise the overall industry performance within existing operational assets as well as set up for future prioritised investment, e.g. robotics and robotics in product handling, decision support tools based on objective measurement, artificial intelligence algorithms for allocation of livestock, augmented vision for operator decision support, etc.

It is important to mention that scope of the diagnostic did not include some of the areas, which meat processors can investigate for additional improvement opportunities:

Downgrading – how to reduce level of downgrades on slaughter floor with better livestock quality control. This covers improvements along overall livestock value chain from farmer to slaughter floor and may include technology solution e.g. early scanning of carcasses or even livestock.

Cut to value (value yield) – how to ensure that current cutting/boning lines are maximising high-value add meat to customers. This covers understanding of how Standard Operating Procedures (SOPs) are designed (Do we know how to maximise the value?) and adhered to (Are shop floor personnel trained on the SOPs and following them?). Value yield analysis has to be done as part of an overall value driver tree review, taking into account possible trade-offs on chain speed reduction (more accurate cutting may require the trade-off of lower chain speed).

Analysis could include assessment of automation solutions. Automation may be an economically attractive option which could maximise value yield by identifying best cutting options for individual carcasses (variable in size) to various customer cut specifications.

Carcass allocation (to chillers) – how to plan and sort carcasses to chillers and reduce variability losses when cutting to a particular cut specification. This includes the understanding of key loss drivers related to carcass variability and the S&OP process.

These improvement areas can be categorised into 2 groups:

- Which improvements can be implemented now (within existing operating assets and technology); and,
- What are the technological step changes that exist that can redefine manufacturing process efficiency in next 3-5 years?

Taking this approach, meat processors will ensure that behavioural change to maximise operational efficiency are established and sustained, and that a path for future automation is built on new culture.

Table of Contents

1 The purpose of a diagnostic

Many meat processors miss targets or fail to unleash their full potential. This document outlines the approach that we took to quantifying opportunities for improvement at 'MeatCo' meat processor, to deliver lasting impact.

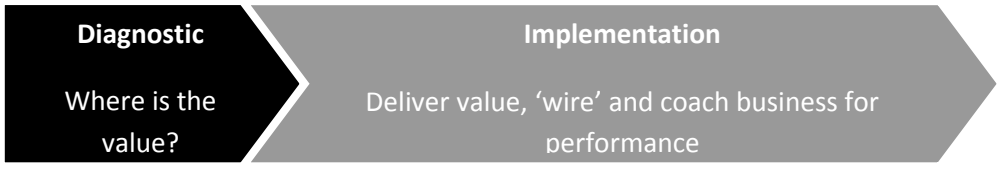
The first step we took towards achieving this was to identify the gap to full potential and ensure the management team had a credible, specific plan to deliver improvements that are sustainable.

This helped to determine the improvement potential – the 'dollar size of the prize'; what levers to pull in order to deliver that improvement; the order in which these levers should be pulled (prioritisation); the approach to use for each and the resources required in order to deliver them in a particular timeframe.

Our team made sure that the diagnostic was completed with management involvement. Our plan had managers making the final presentation and presenting targets and a process that they are aligned with and own. This is the measure of a diagnostic that is both owned and understood.

Specifically, the purpose of the diagnostic was to create consensus and alignment among the management team and Partners in Performance regarding:

I. The size of the prize – how much improvement is possible?
II. Where will the improvement come from – where are the biggest opportunities and what are the priorities?
III. What will be required – the approach, resources, timing and wiring to achieve the improvement?



Now that the Diagnostic is completed implementation can proceed to unleash the identified potential and have lasting impact.

2 In our experience there are 3 key operational levers to increase meat plant profitability

Driving total value for a meat slaughter floor operation are 3 drivers; Overall Equipment Efficiency (OEE), Cost, and Strategy (see value driver tree below). For this piece Strategic, (including; Sales and Marketing, future robotics, etc.) were considered out of scope, so it was agreed to ring fence the collaborative diagnostic effort to OEE and Cost (i.e. operational levers). Focus was therefore on Throughput, Yield and Cost

2.1 Value Driver Tree

Illustrative Example

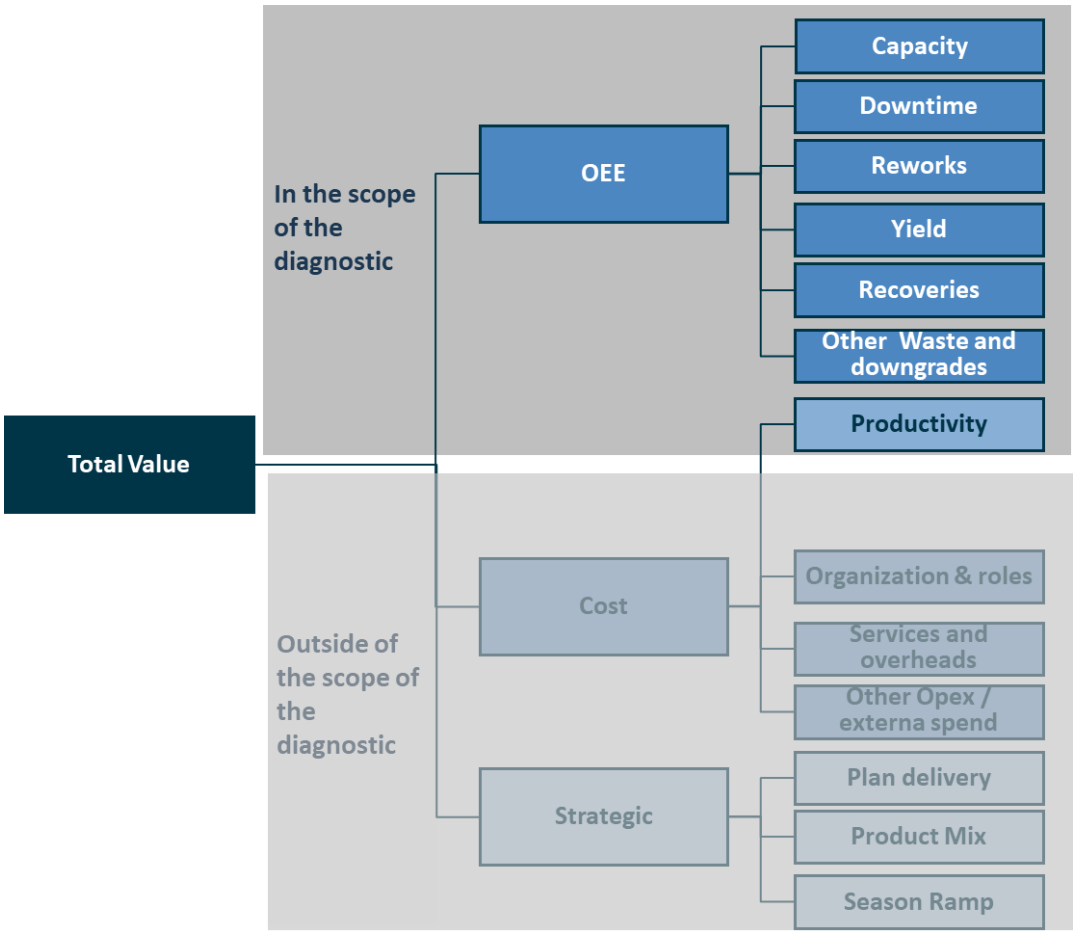
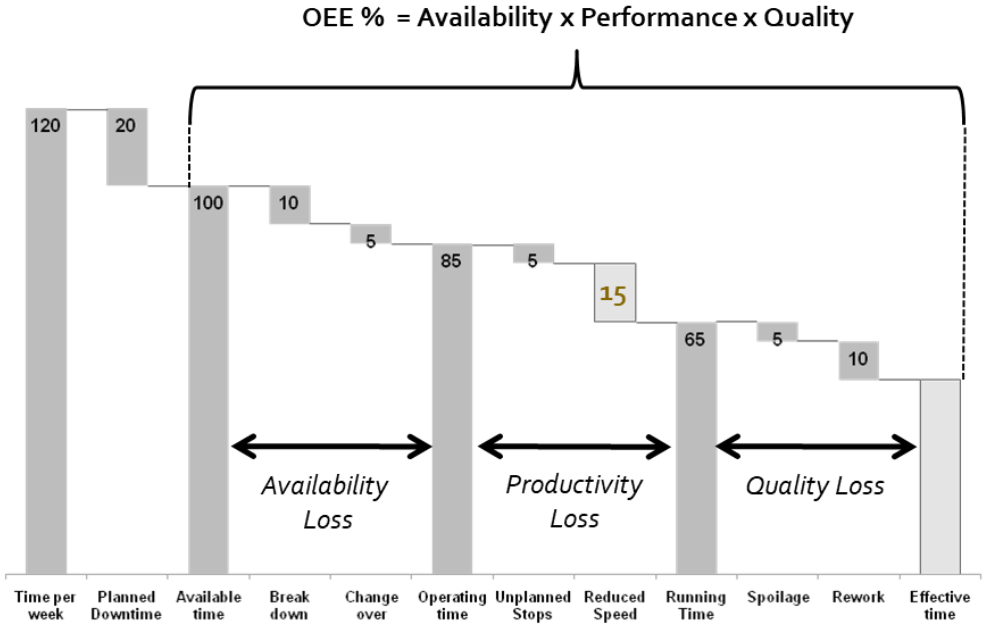


Figure 1: Value Driver Tree

2.2 Overall Equipment Efficiency (OEE)

OEE addresses all efficiency losses but typically excludes planned down time. **OEE (Overall Equipment Effectiveness) is expressed as a % and identifies the full range of efficiency improvements that can be achieved:**



Simple calculation for a sample time period:

OEE = Real Production at full quality / Total Potential Production = 700 units / 1000 units
= **70%**

Figure 2: OEE breakdown

2.2.1 Notes:

- Start with total time per week and typically take out planned downtime (i.e. weekends, non-operating time)
- Availability losses cover, e.g.:
  - In shift scheduled maintenance, Breakdowns, Changeovers, Potentially labour breaks
- Performance losses cover, e.g.:
  - Short stops, Slow running, etc.
- Quality losses cover, e.g.:
  - Scrap / spoilage, Rework, etc.
- OEE typically lower than expected, consistency of definitions is key

2.3 In our experience, dependent on operating environment we can use OEE to optimise differently

2.3.1 Typical levers:

- Breakdowns
- Cleaning and in-shift downtime
- Changeovers (number of and duration)
- Unplanned stops
- Speed losses
- Reduce spoilage
- Quality defects

2.3.2 Plus:

- Target rate limiters (i.e., lift overall line speed with machine speed improvements or additional labour)
- Increase total operating hrs (increased shift capacity / externalise all maintenance and cleaning)

In our experience, OEE Optimisation Examples include:

Capacity constrained environment:

- *Drive OEE levers to maximise outputs from existing plant before capital expansion / avoid capital expansion*

High product count / high inventory environment:

- *Drive OEE levers to free line capacity and reinvest into more changeovers, shorter time between runs for SKUs*

Raw material or sales constrained environment:

- *Drive OEE levers to deliver current outputs from least level of total capacity paid for*

Network optimisation:

- *Build transparency on all hidden capacity to optimise network at improved OEE values not current values*

OEE of Meat Plant

Disguised Example

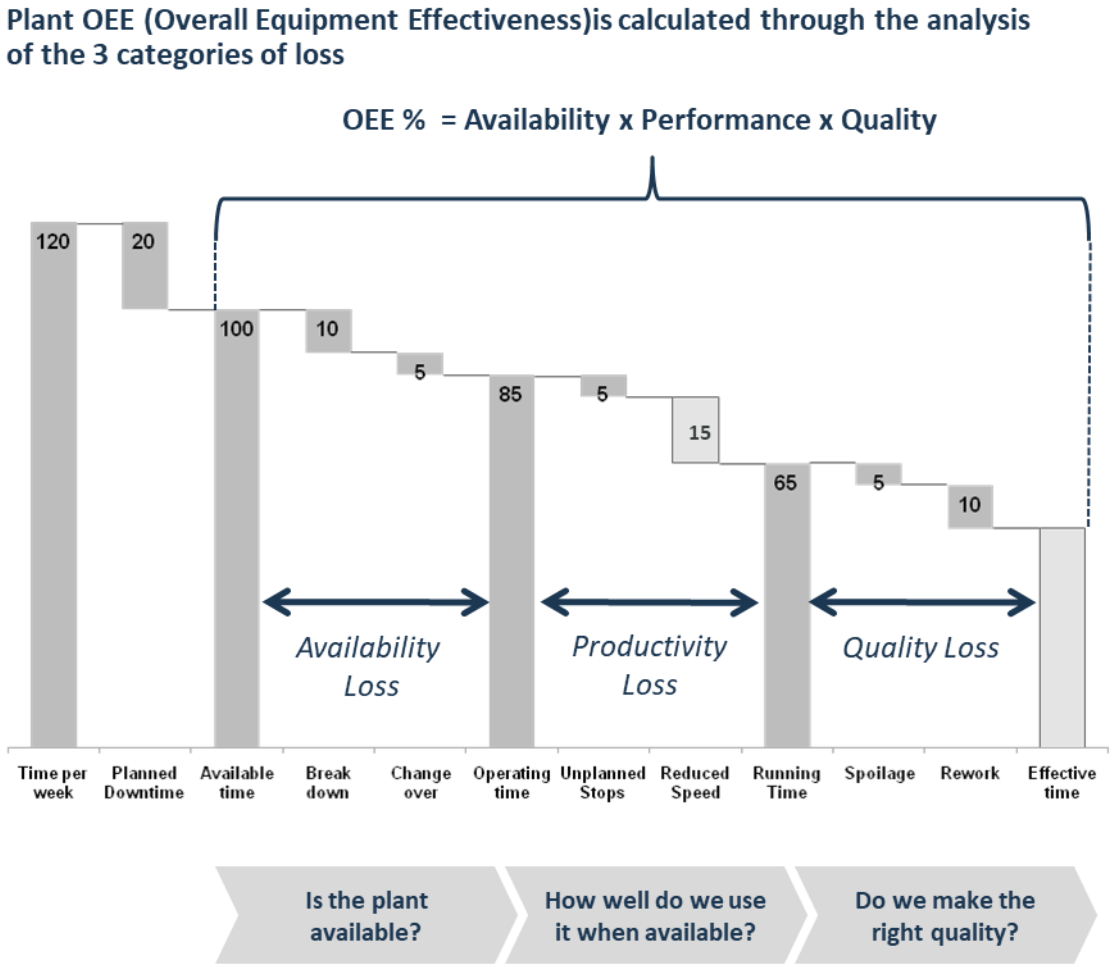


Figure 3: OEE breakdown

For 'MeatCo' the OEE focus was on throughput and yield. For Throughput we looked at; plant/equipment availability, utilisation of available time, and rate of production. On yield we looked at; lost opportunities, waste, shrinkage, and cleanliness.

2.4 Throughput

As in most manufacturing facilities, throughput is typically a major lever. Given meat slaughter floor is heavily labour-intensive, the ability to increase throughput on existing levels of labour is especially profitable. Specifically, the profit impact is very high due to the zero or low marginal labour cost of the resulting increased revenues.

We analysed the three components of throughput – availability, utilisation and rate, which are the most addressable elements of Overall Equipment Efficiency (OEE).

Availability: Firstly, we analysed the time that the plant and staff were available to do work. We assessed plant downtime (maintenance, repairs and cleaning) and staff rosters and shift changeovers to see if there were any opportunities to increase available hours. Weekend and out-of-hours opportunities were also assessed.

Utilisation: Secondly, we calculated and made observations about the time that the plant and equipment in operation as opposed to idle (e.g. stoppages). We worked with the operations team to determine the root causes and identify potential opportunities to improve performance.

Rate: Lastly, we looked at the operating rate – how many carcasses per hour (kgs per hour) were processed and observed and assessed, analysed where there were bottlenecks or slow running process steps (yards, slaughter floor, chillers, boning room, chillers and freezers) and inefficient processes and practices. We worked with the operating teams to develop ideas to increase the operating rate and therefore improve throughput.

2.5 Yield

The second operational lever we looked at is increasing yield from each carcass. Yield is a critical lever to focus on as it impacts the entire operation, slaughter floor to cold store, and there is only one chance per carcass to maximise yield. As such, the opportunities we explored included:

- Meat on bone - removing more meat from bones
- Carcass trim - decreasing HSCW by abiding by Australia's minimum carcass trim
- Trim fat - by trimming to Australian standard on process floor
- Drop meat - reducing the amount of drop meat on the plant floor
- Conveyor to render - reducing the amount of meat accidentally sent on conveyer to render
- Machine cleanliness (was part of 'conveyor to render' assessment) - capturing waste at end of shift that is stuck to machinery that is good meat
- Chill shrink - increasing spray chilling efficiency
- Pre-trim - reducing the over cutting in pre-trim
- Giveaway – reduce amount of finished product giveaways by narrowing down tolerances and track with higher frequency and precision volume of given away to customers

Example Yield Improvement Area Explored: Reducing Over-Trimming at Pre-Trim

Disguised Example

Figure 4: Yield breakdown

2.6 Costs

The third key element that was assessed was cost – direct cost and capital.

The largest direct cost element is, of course, labour – and therefore, the team's approach was to work out the amount and skill level of labour needed and then to assess how closely rosters, and overtime matched these requirements. This also involved assessing the skill levels needed and delivered. Our approach also assessed (through our wiring assessment) how effective the active supervision and accountability mechanisms were.

Labour productivity was also addressed by applying Lean principles to the slaughter floor lines, assessing line balance and other elements of Lean 'waste'.

Capital investments to support identified initiatives were assessed on agreed criteria relating to payback periods.

3 Characteristics of the approach used

3.1 Prepare – analysis by team

The diagnostic was a very intense and fast-paced exercise. To maximise the limited time available of 2 weeks, we prepared as much as possible prior to our site visit to ensure that we could be productive from day one.

There were two key things we did, which required 'MeatCo's assistance:

1. Gathered operational and cost data beforehand to enable initial analysis to be prepared to guide the first few days of activity. We prepared a customised data request in the week beforehand.

2. Set up initial kick off meetings with key staff and set up one-on-one interviews for the first few days to ensure that key insights were fed into the process early on. We also gave guidance as to the typical time allocation that key line managers would need to devote to the diagnostic.

We used advanced analytical tools to rapidly gain an understanding about the operations and costs, and to generate early insights that were tested early in the diagnostic.

Benchmarks were assembled from our internal global database and from other sources (see later section for more details).

The emphasis of our approach in this diagnostic was on quality, speed and delivering value for 'MeatCo' – done quickly, methodically and efficiently.

3.2 80/20 – enough analysis to make a decision

"Perfection is the enemy of the good/practical" – this is a maxim that the team lived by in our approach to this diagnostic. Our approach was not to do the perfect analysis and come up with a gold-plated solution. We aimed to do enough work / analysis so that good ideas could be brought forward for implementation. We did not ignore risk, however. We simply adopted a pragmatic approach, as it is seldom worth analysing things beyond the point at which enough evidence exists to make a decision. For every $12m of value identified, a month's delay is worth $1m

This also aligned with our ideas pipeline approach (detailed later) where each idea was 'staged' through a process. Therefore, the analysis and level of detail required at the early stages was that of feasibility or pre-feasibility not a full-blown business case.

3.3 Types of analysis performed

The team's analyses were driven by the layout of the high-level value driver tree shown below. In this section, we outline the types of analysis which were performed to address each component of the tree. In all instances, completed analysis was used to drive decision-making and provide context during the idea generation sessions which we conducted together with the client. The results of the idea generation sessions can be found later in the document.

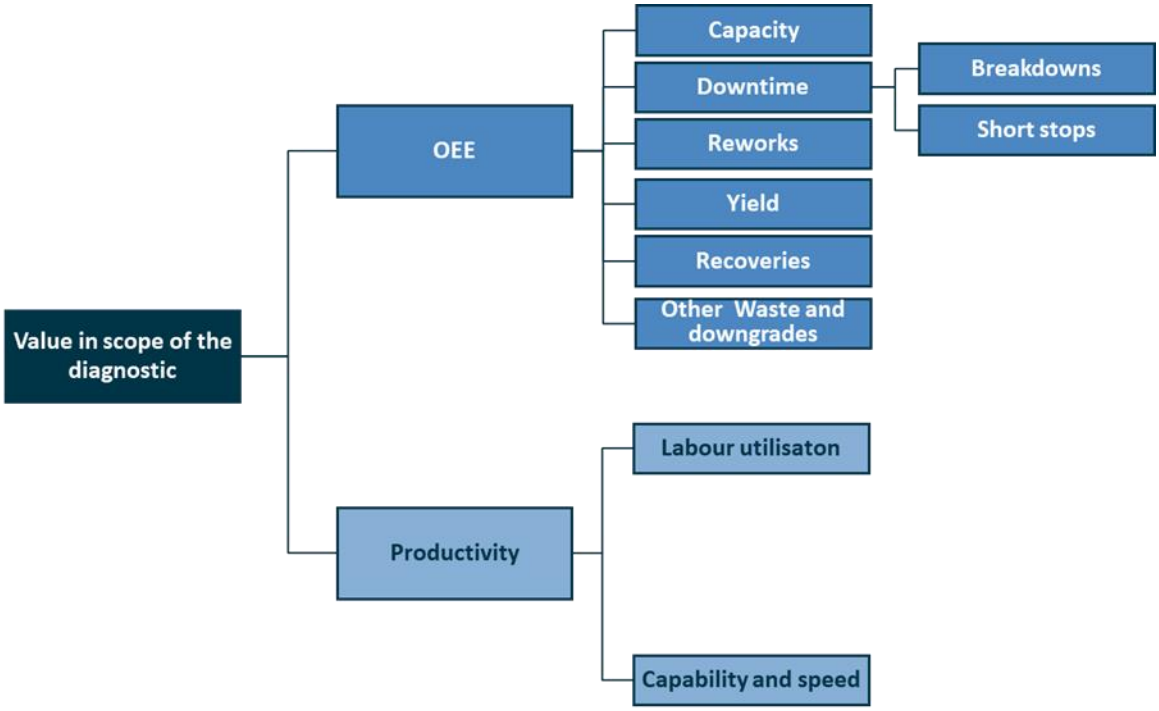


Figure 5: Value driver tree

3.3.1 Capacity

The purpose of the analysis is to have a first understanding of drivers affecting capacity and prioritise further deep dives focusing on the largest sources of losses. The two outcomes are following:

- Identified bottlenecks to support increase of production volume along full value chain (i.e. which value stream step will be first, second etc.)
- First understanding of maximum potential capacity and key drivers that affect it

During our diagnostic we have observed number of root causes affecting production capacity (in addition to analysis covered later in this section), that were consistent with other projects we were part of and guided our deep dives at various production steps:

a) Daily production plans are not levelled to bottlenecks capacity, creating product build up and slowdowns at bottlenecks, thereby reducing overall plant production capacity. Key bottlenecks identified during the diagnostic were at cold storage, slaughter and boning lines. The team has identified deep dives for these departments with focus on identification of labour or equipment related losses depending on the first interviews: e.g. in CCL we focused on material flow and equipment capacity; at slaughter floor we analysed capacity of each station and labour utilisation; in boning we analysed specific stations as well as robots. Utilities and supporting infrastructure were outside of the scope of the diagnostic as they were not considered bottlenecks, though should be considered for analysis at other plants

b) Labour and machine utilisation differed between different shifts due different level of supervisors' presence. Supervisors' presence is essential to ensure that lines run smoothly. Based on initial floor walk and interviews, we planned Day In Life Of (DILO) observation and analysis for key departments (with focus on bottlenecks. DILOS, allowed us to understand supervisors' time allocation when on the shopfloor and the aspects of performance that are falling behind when supervisors are not visibly present: e.g. management of cross station labour mobility; reallocation of the flow to stations with lower load; fast identification of breakdowns and communication to maintenance for resolution

c) Variability of finished product mix: Production capacity planning at the client was based largely on 'first come first served' principle without data-based decision making logic that would maximise capacity utilisation and profit. While the product mix variability may drive significant production capacity losses and profit dilution, the subject was not part of the diagnostic due to relevant data (full activity-based costing by cut plan and SKU) being unavailable and (according to financial staff) requiring several months to resolve. The team has recommended the client to develop activity-based costing at the cut plan and SKU level and then to undertake trade-off analyses to determine optimal mix planning that would be linked to true profit per product SKU

d) Variability of the stock entering slaughter floor: the losses identified at the client were related to:

- livestock entering the line was not sequenced by weight/size to ensure highest possible speed
- livestock is not of the quality originally expected.

Livestock management was outside of the scope of the diagnostic, though we have recommended that client would improve livestock sequencing to slaughter floor and establish fast (e.g. same day) communication to farmers in case of non-compliance, supported by consequential management for repetitive failures to deliver against specifications

e) Seasonal stock variability: variability is affects both, stock availability, weight and quality. Because the diagnostic was conducted at a point in time and because the client was in the process of developing an adaptive strategy this was excluded by the client from the scope of the diagnostic

Plant capacity was estimated at number of carcasses per hour through the site's four main production stations: yards, slaughter floor, chillers and boning room. Cold storage was known to run at or above name plate capacity prior to the diagnostic and required deep dive analysis on how to de-bottleneck it as a priority (this was confirmed by observations during first 2 days on the ground). Stock availability and constraints on utilities (e.g. water, power) were not included in the analysis as they were not considered bottlenecks. Capacity was estimated based on production data provided prior to the diagnostic, first day production floor observations and confirmatory interviews. Capacity was adjusted for the typical product mix, taking into account anticipated seasonal variations. As the client was not constrained by sales, and it was felt supply would be available for moderate levels of increase, the throughput increase levers were considered a high priority, due to potential upside of selling more meat at marginal contribution rate. As such this became a focus for ongoing work.

Initial analysis reveals which areas of the value chain are bottlenecks (Example of analysis from the diagnostic. Figures are disguised)

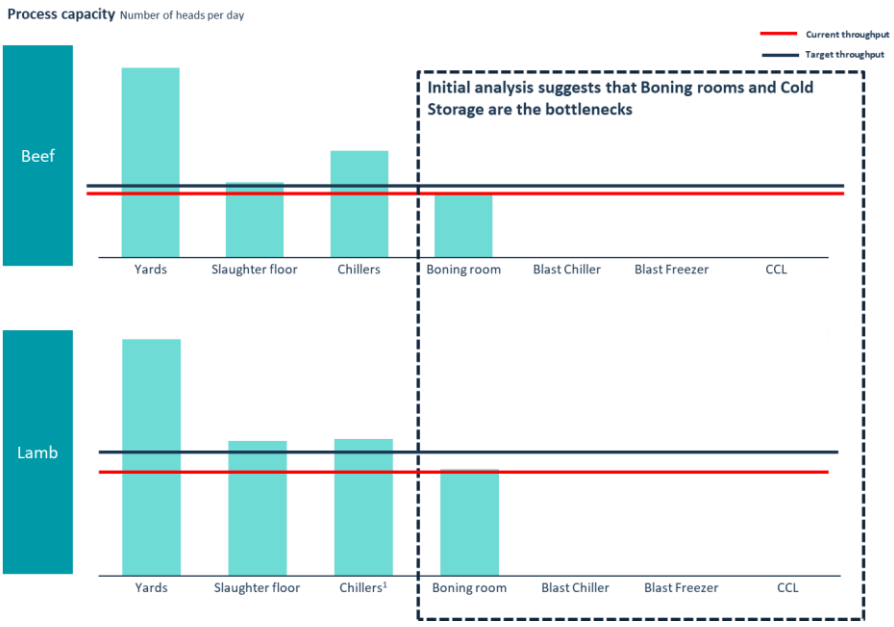


Figure 6: Process capacity

Further analysis revealed that some of the value chain steps can actually be run at higher run-rate.

Example of CCL machine productivity suggesting that deep dive was required to undersatnd drivers of high and low performance (Example of analysis from the diagnostic. Figures are disguised)

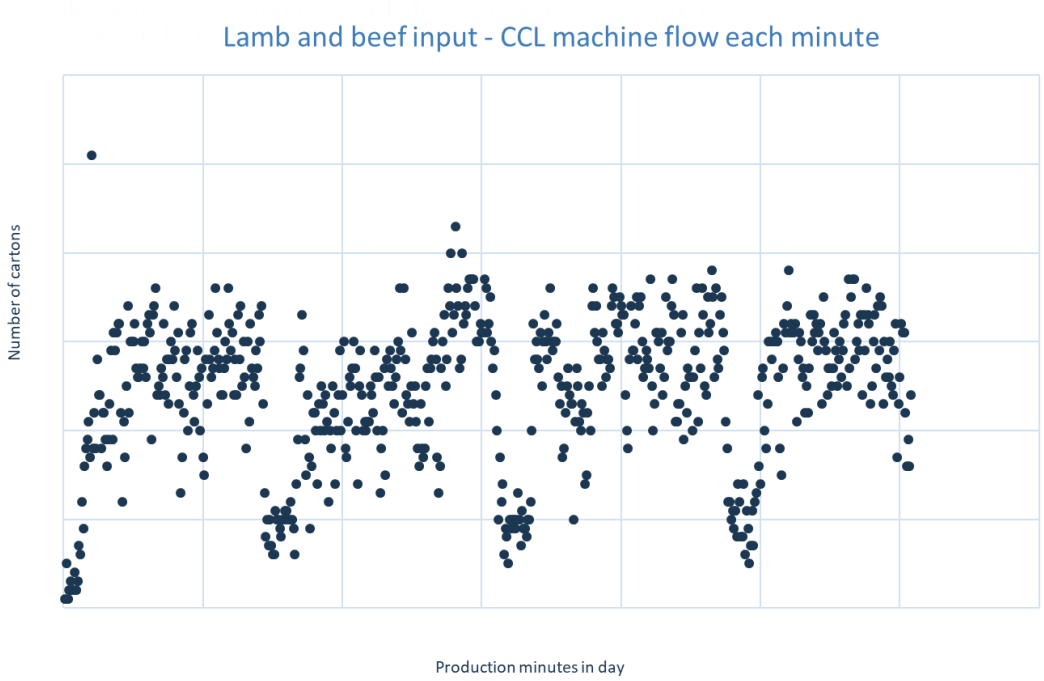


Figure 7: Production performance

3.3.2 Downtime – Breakdowns & Stoppages

The first set of analysis was designed to determine lines' idle time caused either by breakdowns or short stoppages. Only breakdowns or stoppages that lead to material slow down or full stop of production had to be taken into consideration.

The breakdowns analysis was a number of deep dives to the bottlenecks (defined during the capacity analysis) and was focused on identification of key drivers affecting breakdown stoppage time (along two axes - frequency and duration). The deliverables were:

a) Understanding of key components/equipment causing breakdown stoppages and 'bad actors' leading to equipment failure (frequency)
b) Understanding of time losses of managing breakdown between equipment stop and start times (duration)

Breakdown analysis was often challenging as breakdown records were not necessarily well documented: e.g. not all events are recorded, records are kept at different departments (part in production, part in maintenance; duration and root causes of breakdown might not be correctly recorded; causes were inaccurately recorded and short breakdowns and stops either were not recorded or data is retained by vendor (e.g. robot provider) and not shared with the client. In our experience, insufficient data is not unusual for meat processing industry, but inadequate records

should not be a showstopper in identification of key breakdown drivers during the diagnostic: identifying of bad actors and sizing of opportunities can be done by consolidating existing data, interviews and workshopping with key stakeholders.

Frequency of breakdowns: The team has run number of interviews, and observations in parallel with data collection, covering the full spectrum of data sources: from handwritten records to equipment control data logs and sized losses related to major area causing stoppages. Further deep dives into root causes of the breakdowns' frequency were done via interviews and observations, and used as an input to workshops to identify and address 'bad actors'. Cryovacs, Sasteks and robot(s) were largest sources of time losses. The team organised workshops to identify 'bad actor's causing breakdowns at each equipment and to prepare idea generation session on how to reduce failure frequency.

Due to sensitivity of the data we cannot share more detailed analysis, though key conclusions of the diagnostic were around making equipment providers (who also were responsible for maintenance) accountable for overall equipment performance (OEE); introduction of a more active contractor management process; improvement of breakdown data recording and establishment of OEE KPIs (for maintenance and operations) to permanently drive process of 'bad actors' by maintenance and operations

Duration of breakdowns: the team members shadowed (=attended DILOs) maintenance technicians and ran number of interviews in order to identify process improvements that would speed up repair time. The observed time losses were not material and list of improvements shared with the client was endorsed by them. Proposed improvements were not prioritised and included into overall idea pipeline due to low level of expected impact. Nevertheless, our experience suggests that other manufacturers can benefit materially from the proposed actions. Typical list of improvements would include: placement of dedicated maintenance technicians closer to equipment with highest breakdown losses (using profit loss/minute of stoppage); introduction of OEE as key KPI for production and maintenance; improvement of radio communication to inform technicians about breakdowns faster; better formalised process of work prioritisation between maintenance and ops supervisors (driven by supervisors); better quality work orders and data recording.

Breakdown analysis by area and key reasons Pareto (Examples of analysis from the diagnostic. Figures are disguised)

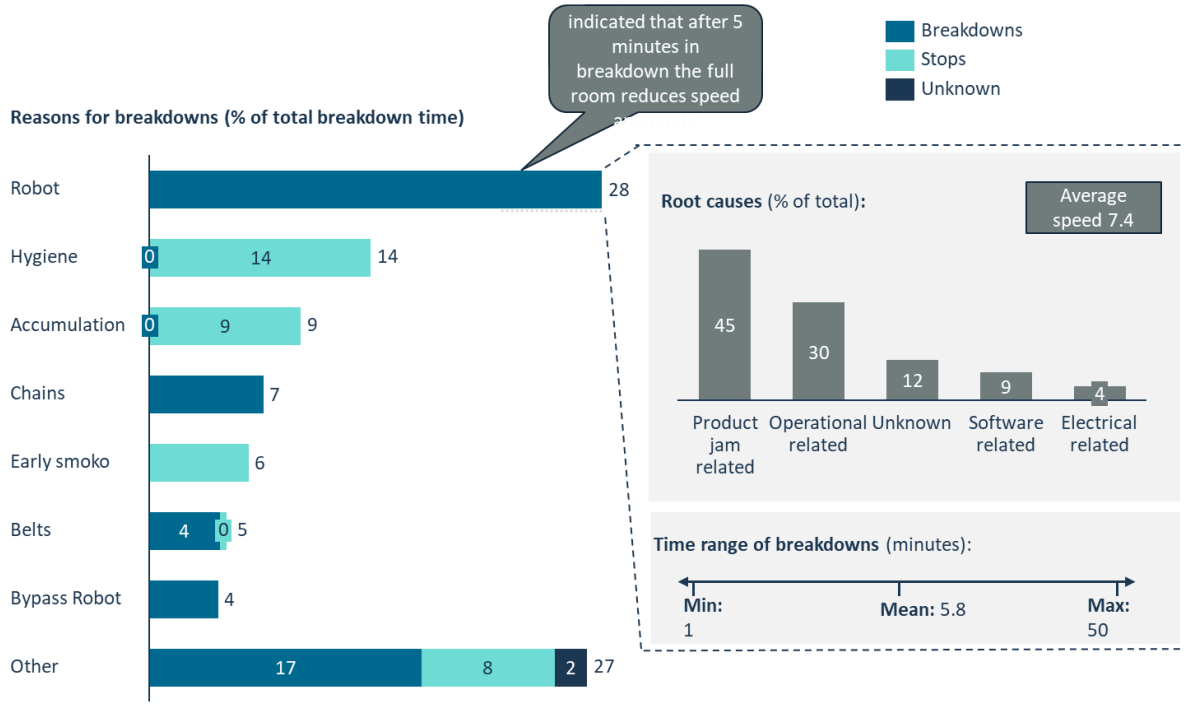


Figure 8: Machine breakdown root cause

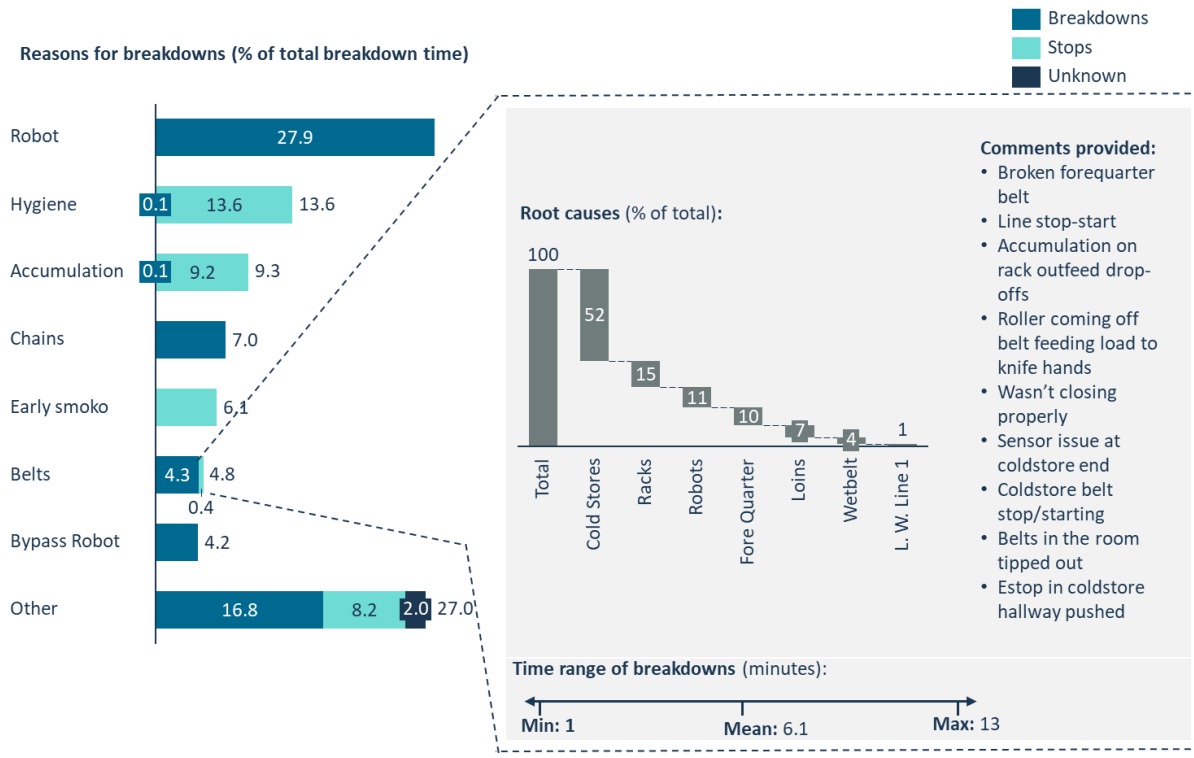


Figure 9: Plant downtime root cause analysis

3.3.3 Downtime - Short Stops

Short stops analysis includes analysis of idle time that is not related to the equipment breakdowns. These stoppages, while leading to material time losses, are even harder to size than breakdowns, as often operations are not recording / reporting them. The deep-dive analyses were defined during the first day 'shop floor walk' and interviews. Typically, analysis is split between 2 major sources of losses:

a) 'Administrative' – time losses created by supervisors and management decisions not to run line
b) 'Operations triggered' – caused by events outside of analysed perimeter while line is running

The team did not formally used this split during the diagnostic to report losses or improvement ideas, though the split is useful to consider as analysis of losses for each category required different approach. Each time losses contributing to the stops required a tailored analysis, that heavily relied on observations and interviews as no comprehensive data logs were available.

'Administrative' time losses: during the diagnostic we focused on 2 major areas for improvement – changeover duration and reduction of time spent on smoko breaks. The main improvement potential for changeover time reduction would come from production planning process redesign and SKU optimisation that were outside of scope of the diagnostic. Losses related to speed of changeover were material but would require significant investment redesigning shopfloor, and thus there were no prioritised improvement actions associated with them. Observations of smoko breaks revealed materials losses mainly arising from the layout of washrooms and how people flow was organised before and after the break. The team performed number of observations at each step of smoko breaks and identified key root causes of delays that were taken to the idea generation workshops.

During the diagnostic the time losses associated with the shift changeover were not material and therefore there were no prioritised improvement ideas associated with it. Typically, at other plants, we would observe rather material losses associated with start / end of the shift as well as improvement potential driven by better planning and execution of shifts start and end (especially when plant operates more than one shift). Improvement levers would be around better workflow optimisation e.g.:

- Better staggering of work-stations start and end of shift timing,
- Standardisation of start / end of the shift process for supervisors so shift change-over takes as little time as possible, while ensuring that workforce is fully accounted for and allocated to stations with clear production schedule and performance targets.

'Operations triggered' stoppages were mainly driven by the unbalanced (between stations / departments) workflow. Uneven speed of production among different stations created stoppages upstream due to blockages, and downstream due to insufficient materials to process. These stoppages not only reduce overall line capacity they often increase yield losses (esp. dropped meat) at blockage points.

Based on initial sizing of losses the diagnostic team organised further deep dives into root causes for each step of the value chain (e.g. Cold Store) in order to collect data for idea generation to resolve them. The deep dives were largely based on in-field observations, interviews as often no reliable data records are kept at meat processing facilities.

It is important to highlight that one of the key findings from the diagnostic was urgent need to introduce and measure OEE and specifically line availability for production lines and critical equipment supported by daily reviews of the stoppage root cause analysis and prompt resolution.

Downtime analysis by stoppage type and area where it occurred (Examples of analysis from the diagnostic. Figures are disguised)

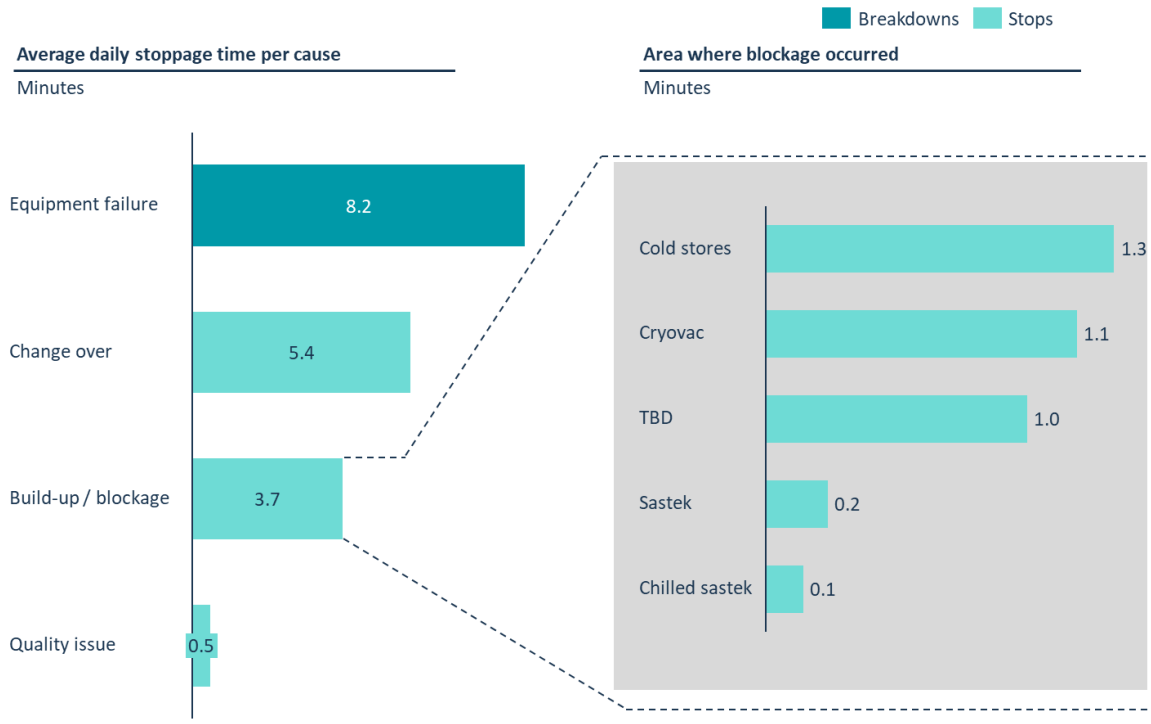


Figure 10: Downtime analysis

3.3.4 Rework

Rework typically falls under quality losses and has double impact: rework takes capacity (i.e. reducing throughput) and accumulates processing costs from the source of non-quality till the point when non-quality has been identified and rectified. Rework data are often not fully recorded with cost assessments of 'non-quality' production being even more rarely available. Level of rework and associated costs varies from producer to producer and it is important to estimate materiality of associated losses relatively quickly before deep diving into detailed analysis, which may not deliver sizable reduction potential.

Main sources of insight for rework (in absence of good quality data) are line observation and interviews. The team identified key focus areas during the initial interviews and spent time on the shop floor measuring rework and identifying its sources. While a few areas were initially assessed

for rework reduction, improvement potential for some of them was not material enough for further deep dives e.g.:

- Idea on fast feedback loop to address chemical lean non-compliance or bone chips in boxes (recommendation for improvement was endorsed but no in-depth analysis and valuation were done);
- Losses elimination was included to other actions (e.g. retrimming of dropped meat was part of yield improvement initiatives).

Highest improvement potential was related to reduction of leakers at ovine line.

One of the key findings from this and other diagnostics, PIP has run, is that full value chain cost of quality (or better phrased 'cost of non-quality') is often not measured and thus not addressed. Although during this diagnostic observed quality losses were not large, findings from other projects our firm was part of, suggest that meat processing industry should ensure it measures and manages quality related losses, both to track frequency and cost and to allow for the impact of implemented initiatives to be objectively assessed.

Rework analysis (Examples of analysis from the diagnostic. (Figures are disguised)

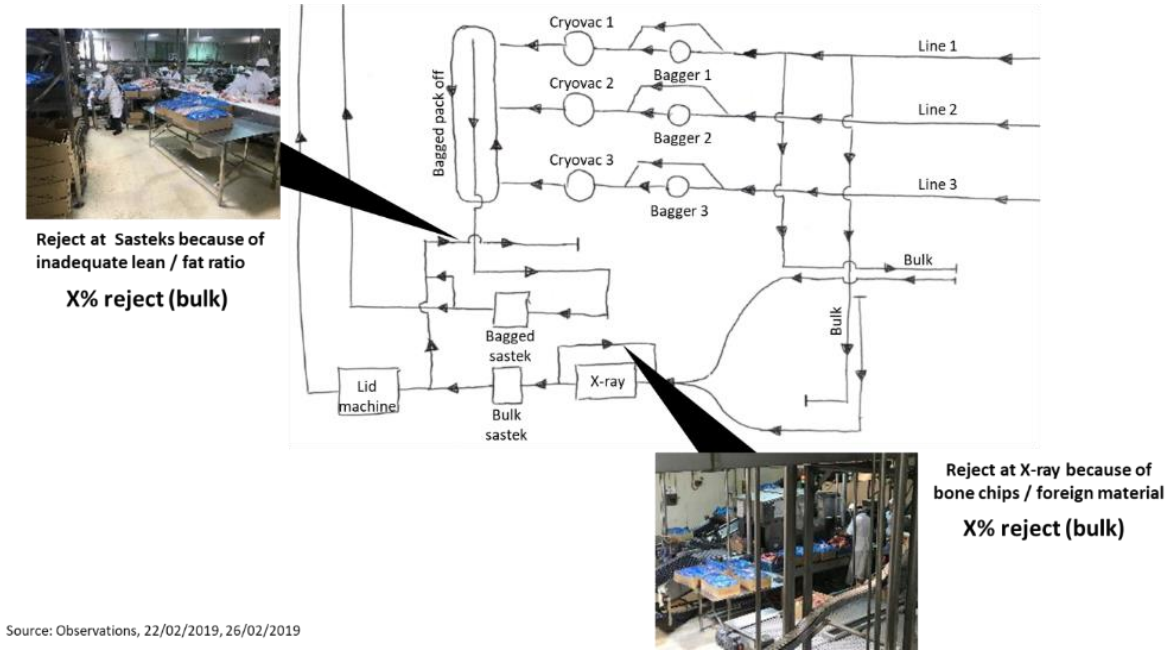


Figure 11: Re-work analysis

3.3.5 Yield

Yield improvement is often one of the largest levers meat producers can pull relatively fast, as yield (and its improvements) is largely driven by behaviour of shopfloor personnel. Sizing yield losses is always tricky as overall yield is often only partly tracked (either only for selected customers / cuts, or it is only calculated for bone-in yield, with no tracking of boneless yield). The situation is further complicated by the fact that overall yield losses are sum of few loss drivers. Contribution of the

drivers to overall yield losses differ significantly between different producers, and the fact that a majority of those drivers are not formally tracked with sufficient granularity. As result, sizing of the yield losses, in order to prioritise further deep dives, always requires set of trials for each driver.

During first 2-3 days, the team typically runs set of experiments (described later in the document) identifying key sources of yield losses (prioritised based on first day 'shop floor walk', interviews and preliminary yield data analysis):

a) Meat on bone: randomly collect 10 – 20 of bones by type (e.g. aitch, femur for ovine, hindquarter and forequarter for bovine) and trim them to the standard used. Weight excessive meat
b) Dropped meat: collect all drop meat during a shift (or a 2-3 hrs run between major changeovers and line clean ups) sort by category and weight high value meat. Despite prevailing wisdom in the industry being that "drop meat was an issue in the '70s" our experience has been otherwise. We have found drop meat to be material at every meat plant we have worked.
c) Standard carcass trim: select randomly 10-20 carcasses and trim them as per company standard. Weight excessive meat
d) For chiller shrinkage it is important to have data at carcass level to measure weight before/after chiller overlayed with time each carcass spent in the chiller. This data granularity will allow to identify outliers that spent too much time in the chiller. As chiller loading and temperature management practices materially affect shrinkage the team needs to spend time observing them when shrinkage losses are high
e) Pre-trim meat: collect pretrimmed meat for a shift (or a 2-3 hrs run between major changeovers and line clean ups) sort by category and weight high value meat. Can be combined with dropped meat experiment
f) Conveyor to render meat: collect meat stuck on conveyor for a shift (or a 2-3 hrs run between major changeovers and line clean ups) sort by category and weight high value meat. Can be combined with dropped meat experiment

As mentioned above losses size for each driver differ from one producer to another and often are not measured. Lack of factual measurements may create a perception that yield losses are not material and managed tightly. Therefore, it is important to run experiments on representative product mix early in the diagnostic and have a fact based, prioritised problem solving. As per our experience there are typically yield related opportunities in excess of 0.5% improvement. In the absence of robust data collection and analysis we further recommend that experiments are repeated routinely both to size the problem and to remind the workforce that it is being watched.

Sometimes, experiments are run twice to cover two both shifts (in a two shift operation) as losses may differ between them. Typically, there are two major drivers for the yield difference: different shifts will have different behaviour, quite often linked to particular supervisors; different shifts may have different product mix.

Results of yield experiments and available yield data were benchmarked in PIP internally (using our experts and data from other engagements), in order to size improvement potential and prioritise further analysis and idea generation workshops.

As mentioned above, yield performance is largely driven by shopfloor personnel behaviour, therefore the team spent time observing how yield is 'wired' to day to day performance management of the plant. Assessment is built around yield KPIs and performance review cycle between plant manager and shopfloor. Critically, in this case, no real-time or timely data was provided to floor staff therefore they had no basis of understanding their performance at any given time. Based on the observations behavioural part of yield improvement initiatives were rolled up into overall yield management idea.

Yield potential by lever (Examples of outout from the diagnostic, more detailed view is presented later in the document. Figures are disguised)

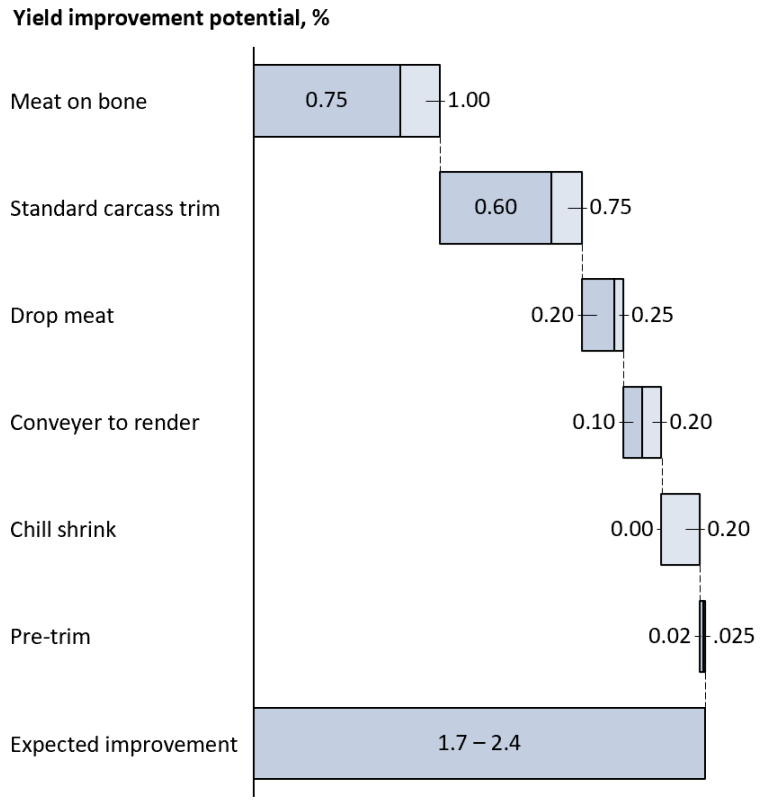


Figure 12: Yield loss breakdown

3.3.6 Recoveries

A large part of recoveries was included in the yield diagnostic. Additional analysis was done for giveaway at value-added line. For the analysis the team selected number of typical production days (volume and product mix) and analysed individual weight of packaged for high price products. As per our experience giveaway losses and improvements are driven by behaviour (as in yield), which was confirmed by analysis and observations on the line – product for which giveaway was tracked daily was within tolerances, products that were not part of daily giveaway tracking were losing approximately 7% of the value.

Giveaway analysis (Examples of analysis from the diagnostic. Figures are disguised)

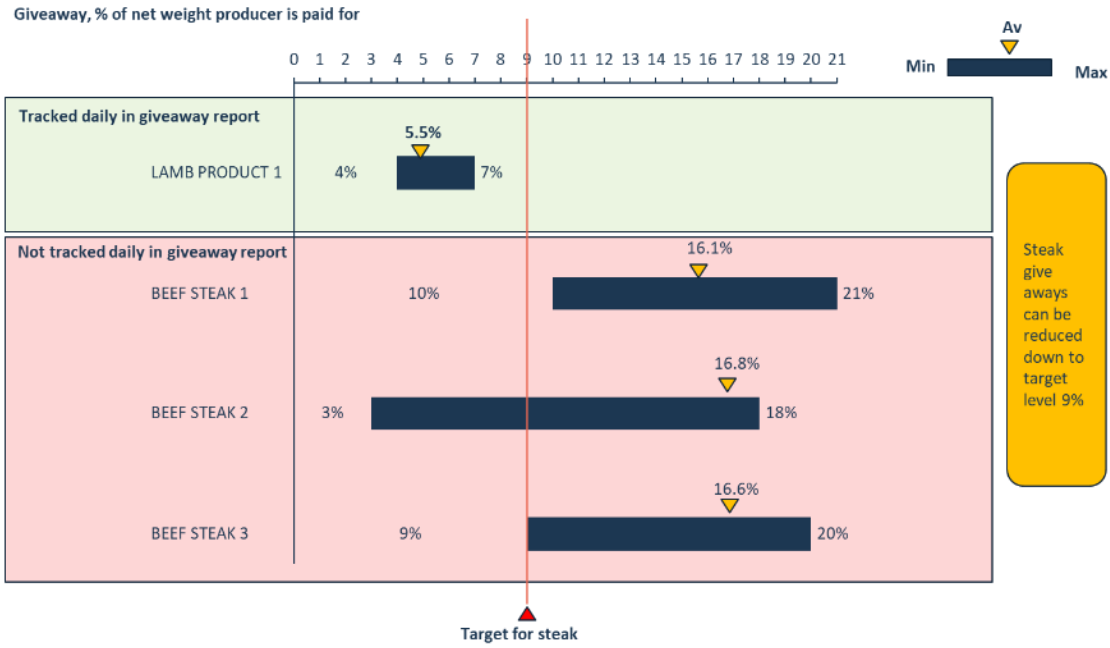


Figure 12: Yield loss give-away analysis

3.3.7 Other waste and downgrades

The team performed fast assessment of losses related to quality claims, internal downgrades, utilities management, waste of packaging. Identified losses were not material and were not prioritised for further work

3.3.8 Labour utilisation

Objective of the labour utilisation assessment is to understand how much idle time both individual stations and workers have when the line is running. The output of the analysis is:

- Bottlenecks related to labour productivity within particular lines
- Average observed utilisation of the individual stations with rough estimates of time allocation to tasks

Analysis of labour utilisation was done first, by analysing staffing levels at each station based on data provided upfront, and then by detailed observations of stations during typical production day. Scope of analysis is focused on idle time of individual operators or stations and includes micro stoppages not covered by short stoppages analysis (e.g. chain stops is part of the analysis). Observations should be done for bottlenecks identified during interviews and initial shop floor walk. It also should be done for different shifts in order to compare performance of operators and supervisors. Difference in performance will inform improvements related to behaviour and supervisors' presence.

Depending on the shopfloor configuration and observation area the team employed one of 2 (or sometimes combination of both) techniques:

- Day In the Life Of technique (DILO see later in the document) – when observer records tasks and their duration at the particular station for a representative period of time (this technique is appropriate when stations are sequenced one after another)
- Snapshot technique: observer counts number of people at the shopfloor area who are performing a specific task, who is idle, and who is missing vs. staffing level for this shift. This technique is typically employed when stations are performing work in parallel and there is a cross-flow of work or labour between stations

During observations team typically identifies opportunities to improve utilisation of the stations and test hypothesis on root causes and possible solutions with shopfloor personnel and supervisors. During these discussions team identifies potential participants for idea generation sessions.

During the diagnostic the team could identify 15%+ capacity underutilisation at most lines, though some of the stations were running at full capacity and required changes in order to support capacity increase (required changes were part of improvement ideas)

The analysis informed idea generation sessions and their focus as there might be two objectives: either to support volume growth without reduction in labour cost (in case plant is not constrained by livestock supply or ability to sale finish product); or to identify roaster optimisation opportunities to flex labour to production volume (e.g. reduce number of shifts especially during low season).

During our diagnostic our client was unconstrained by livestock or sales volume therefore focus of the improvements was on production growth. In other projects our clients would not look for volume growth and rather focus on labour flexing in order to reduce labour unit cost.

As per our observations during this and other projects combination of robust workforce management and scheduling with strong supervisors' presence are key to increase labour utilisation. Cross skilling and strong wiring of individual performance to compensations are additional levers that keep utilisation at high level.

Examples of labour utilisation assesment using snapshot technique (Examples of analysis from the diagnostic. (Figures are disguised)

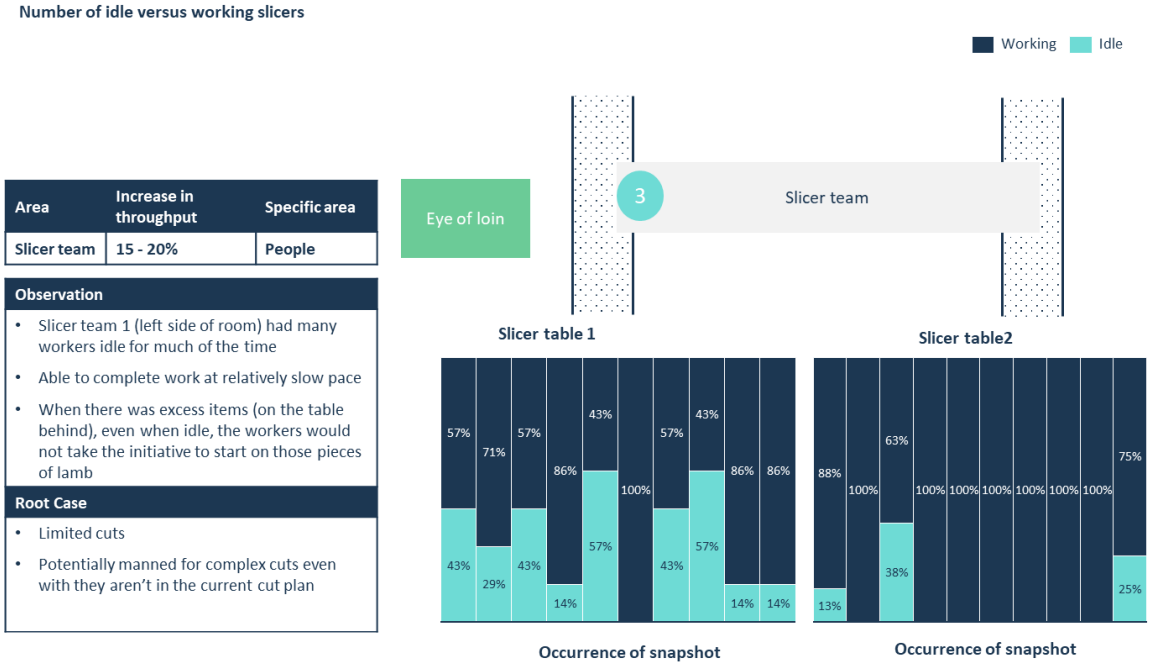


Figure 13: Labour utilisation analysis – slicer team

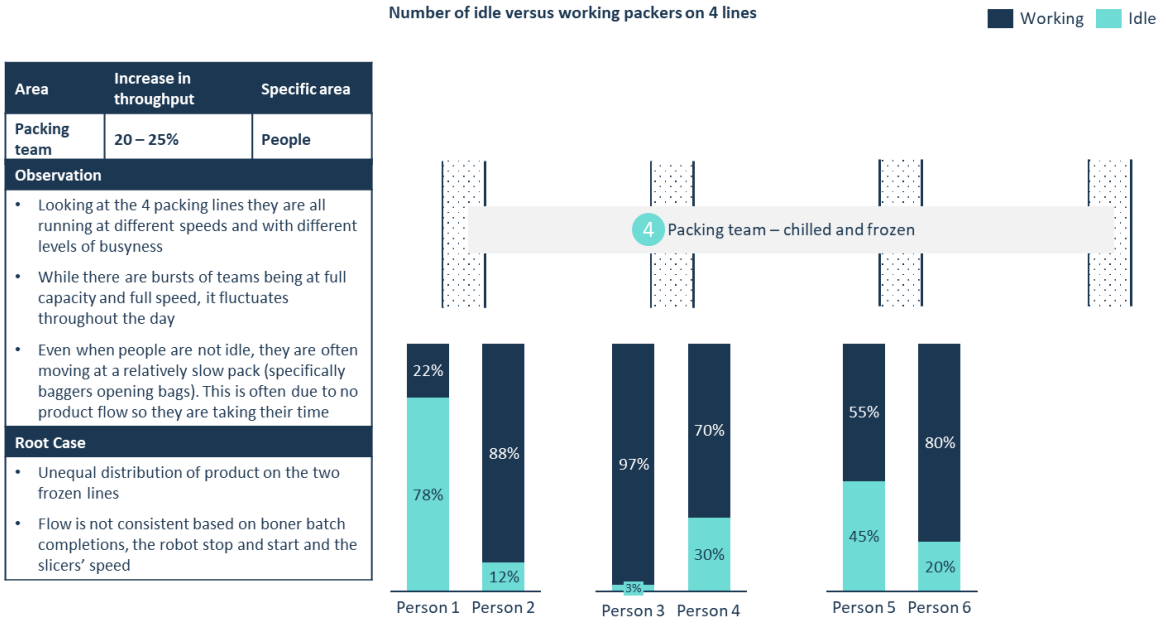


Figure 14: Labour utilisation analysis – packing team

Examples of labour utilisation assesment using DILO technique (Examples of analysis from the diagnostic. Figures are disguised)

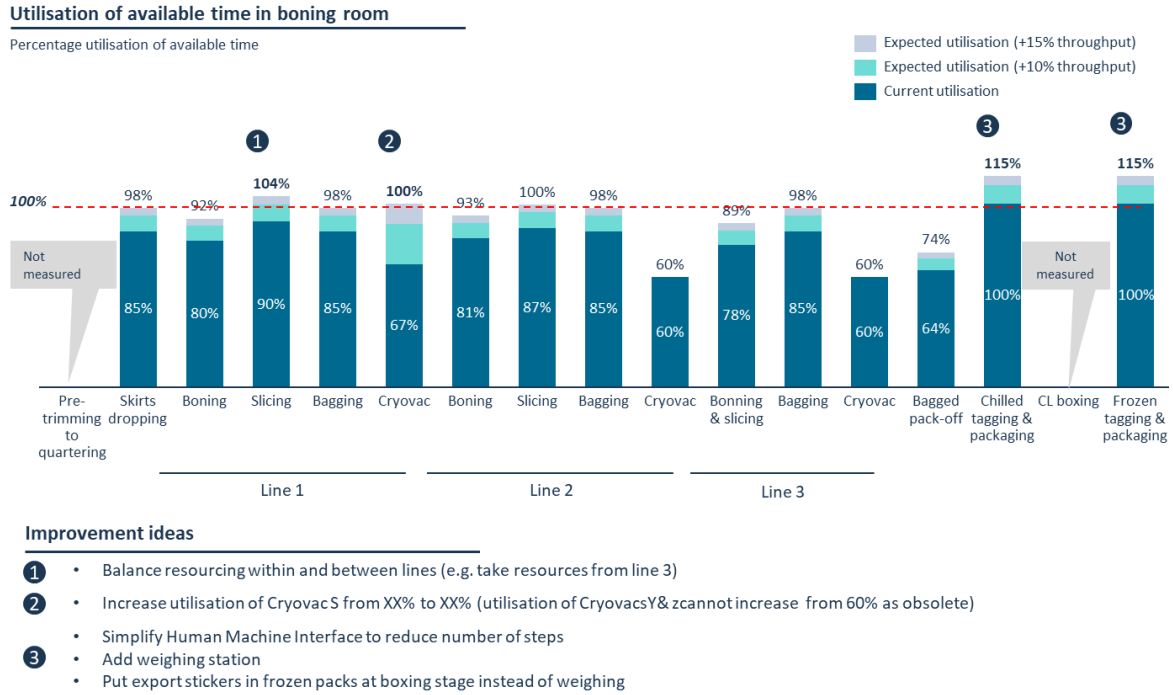


Figure 13: Labour utilisation analysis – boning room

3.3.9 Capability and speed

Labour utilisation analysis is typically done in parallel with personnel efficiency assessment (i.e. speed of task performance). Due to the nature of the production process at the client there were no records of individual performance at majority of the stations, and speed / capability related data could be only obtained through observations. These observations in meat processing are tricky to perform for two reasons:

- Chain speed is constant, and operators pace their movement to 'fill up' time between their tasks (e.g. by additional knife sharpening, or extra time for knife sterilisation)
- Different operators have different skills and each operator should be individually clocked with their output somehow normalised for quality losses (e.g. fastest operators may have higher % of dropped meat or higher % of pre-trim losses)

During the observations the team used combination of 2 techniques described in the previous section. The analysis informed whether speed difference was skill or 'will' related and helped to identify root causes for idea generation sessions. During observations team members discussed differences in performance with supervisors and identified possible improvement levers and their potential to prioritise further analysis and observations.

Typical improvement levers to increase personnel work speed are: upskilling of individual with off-line and on-the-job coaching (which we observed during the diagnostic); staffing of the stations with similar skill level operators and setting up higher speed for higher skilled operators; cross station

labour mobility to support lagging stations. The team has incorporated some of the capability increase ideas as enablers to increase throughput with benefits captured in other ideas.

As skill and 'will' are different for each operator, this analysis will always be powerful tool to identify improvement ideas based on different performances. As in the previous section delivery of the improvements and their sustainability require strong wiring of individuals' performance and supervisors' presence on the shopfloor.

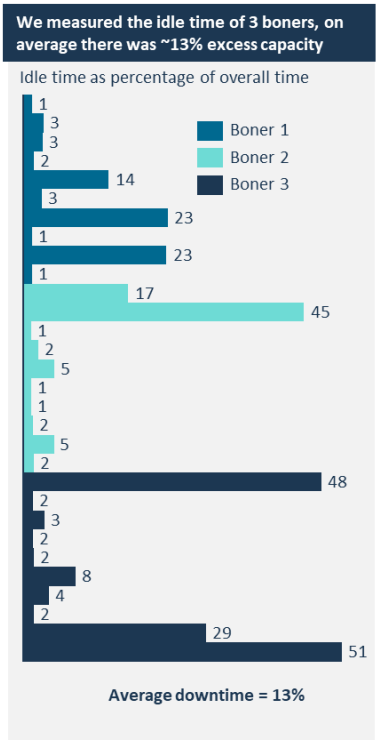
Area	Increase in throughput	Specific area
Boning team	10-15%	Equipment

Observation

- Each member of the boning team has high variability on when they start and end each de-boning (cycle time)
- They have idle time when they are not deboning
- Different members of the team have very different speeds, indicating different levels of skill
- Everyone starts in the same 10-15 seconds which doesn't allow for good flow to the packing area

Root Case

- The rail is restricting the flow of carcasses – no one can start on their carcass before the full 8-9 are available for all (no half groups)
- The person moving the carcasses fluctuates on speed and consistency
- You are always waiting for the slowest member of the team to remove the lamb from the rail



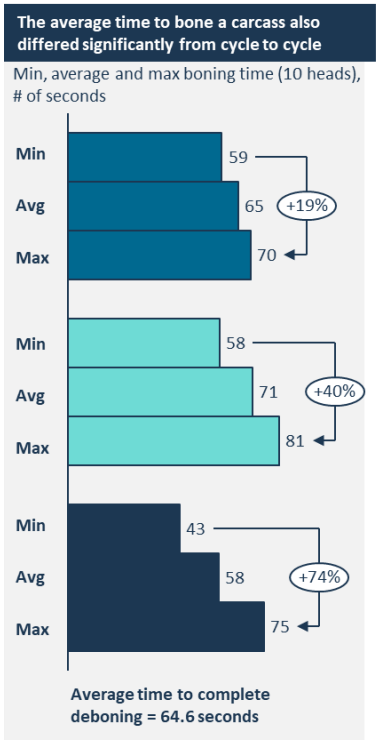


Figure 14: Labour utilisation analysis – boning room team

As discussed above, strong supervisors' presence is important to drive performance. The team observed multiple occasions when supervisor's intervention materially increased productivity and

speed. Anecdotally, following boners noticing the team sampling bones, meat on bone decreased materially for the remainder of the shift.

Example of speed improvement as result of supervisor's intervention (Examples of analysis from the diagnostic. Figures are disguised)

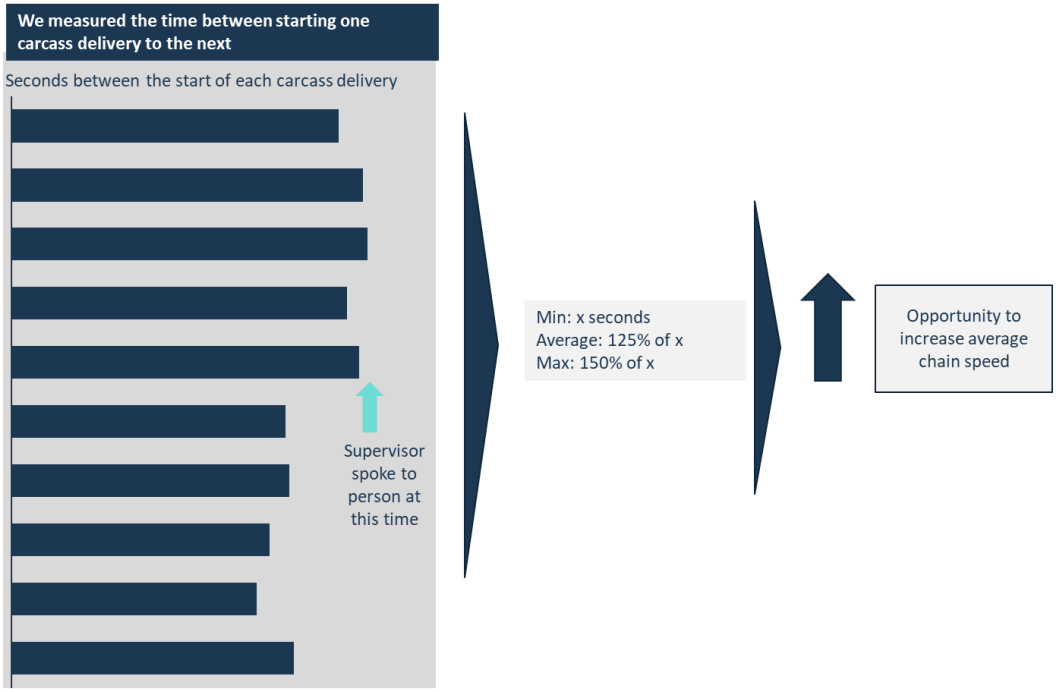


Figure 15: Labour performance analysis

3.4 Work with team – through the line – cooperation and skill building

We worked with 'MeatCo' to achieve the best result from the diagnostic. That meant that the management team was involved throughout the two-week process and that operational managers were a part of the analysis, idea generation and definition. They fully understood the ideas and agreed with them. They were therefore the ones who presented the ideas.

With this approach, we reinforced management's role and accountability for change and improvement. The line managers were seen to be part of the solution and were actively involved. We as consultants were coaching and building their skills in business improvement.

We shared experiences from other businesses we have supported. This assisted management to visualise how they might deliver on the identified potential and gave them real examples around levers of relevance to them.

3.4.1 Understanding

We introduced management and staff to key methodologies (e.g. value driver trees, wiring, bottleneck analysis, idea generation sessions) that underpinned their understanding of, and participation in, the diagnostic.

3.4.2 Ensure practicality

This cooperative working ensured that ideas generated and defined were practical and implementable. After all, unless an idea can be implemented it is not worth anything to an organisation. The line managers and work force were involved at all stages throughout the diagnostic, so there was constant dialogue and interaction occurring where the practicalities were continually addressed, not just at the end of the process.

We found that the front line were the best source of knowledge and practicality regarding operations and constraints – they live and breathe it every day.

3.4.3 Build ownership

Because line managers and the front-line workforce were involved in developing the solutions, this built their understanding and ownership of the ideas and built commitment to implementing and the delivering the end results and outcomes.

3.5 Client presents – they are the hero, not the consultants

As aforementioned, a key element of our approach was to get the line managers to present the improvement ideas for their areas to the management team. It demonstrated that the managers understood and supported the ideas and that they were prepared to own the results and will be committed to implementation.

It was significantly more credible for the line managers to present the results of the diagnostic and confirmed that there had been good involvement and cooperation among their team and Partners in Performance. It made them the hero – not us.

We also integrated and acknowledged improvement ideas already identified and underway.

4 Diagnostic elements

4.1 We determined what was driving current performance and identified improvement potential

4.1.1 Gathered and analysed data

We took a fact-based approach with this diagnostic. We extensively used operational and cost data to generate analyses to understand and identify where the opportunities were and the magnitude of those opportunities.

A data request was sent to 'MeatCo' two weeks prior to the work commencing to ensure that relevant available data was gathered prior to the team hitting the ground

Data Request

Simplified Example

#	Item	Period	Frequency	Desired type/form
1	Yield by species (e.g. Bovine – prime steer, prime heifer, bull, cow; Ovine – lamb, mutton)	FY17, FY18, FY19YTD	Daily	Excel
2	Yield by cut	FY17, FY18, FY19YTD	Daily	Excel
3	Production by slaughter chain by species – volume, speed, downtime, quality, contamination, changeovers	FY17, FY18, FY19YTD	Daily	Excel
4	Plant layout and product flows	Current & planned	-	Process flow and maps
5	Production line manning - Actual man hours and labour costs - Planned man hours and labour costs	FY17, FY18, FY19YTD and planned	Daily, weekly, monthly	Excel
6	Existing list of improvements (capital and non-capital) including timeline, costs and expected impact	Current & planned	-	Word or excel
7	Plant capacities – yards, slaughter, chilling (and time required in chiller), boning, blast chiller/freezer (and time required in blast) cold and frozen stores, hides/pelts, offal, render, load-out	Nameplate & current	-	Excel
8	Plant costs by department	FY17, FY18, FY19YTD	Weekly, monthly	Excel
9	P&L statements	FY17, FY18, FY19YTD	Weekly, monthly	Excel
10	Product mix details (meat and bi-products) - Volumes of each product - Average selling price of each product (HSCW and per production kg) - Cost from farmer	FY17, FY18, FY19YTD	Weekly, monthly	Excel
11	Quality details by species (reworks, downgrades, rejects)	FY17, FY18, FY19YTD	Daily, weekly, monthly	Excel
12	Confirm key assumptions: - Number of working days per year (assuming 250) - Average weight per head (by species and overall bovine and ovine)	Current	Now	Excel

Figure 16: data request example

We undertook several standard analyses that apply to the meat industry:

4.1.2 Value driver trees

A Value Driver Tree (VDT) was used to highlight the critical levers for the organisation – linking 'MeatCo's financial performance to its underlying operational levers. It was also used to calculate the value of improvement ideas – we calculated the impact of a change in a lever on 'MeatCo's EBIT, and to answer a range of important questions for 'MeatCo', for example:

- What is driving the economics (revenue, cost, funds employed)?
- What drives safety and environmental performance?

To build the VDT, we worked with 'MeatCo's operational teams to understand the physical and logic flows and to generate the data that feeds them.

Example VDT

Numbers hidden for client confidentiality

Figure 17: Value driver tree

4.1.3 Determined the technical limit or full potential for the main levers

Once the VDT was developed and agreed with line managers, the next step we took was to determine how much each lever on the VDT could be improved.

The value of each idea generated depended on the degree to which each lever could be improved. Ideas were prioritised accordingly. We used interrelated and complimentary methods to identify this:

- Past experience (internal benchmarks) – using the best month, best week, best day or best hour to set the expected target. Hard to argue with the fact that you have done it before (maybe not just for such an interrupted period)
- Technical specs – what rate was this piece of equipment designed to operate at
- External benchmarks

For this diagnostic we applied the value driver tree to the specific plant as it is today. This helped us focus on the levers that are in play in that plant and to focus in on those for performance improvement. We recognise that there are technological changes happening in this (and, in fact, most) industry, however with plenty of immediate potential we want to know what we can do to improve profitability next month – the VDT lets us quickly assess the impact of such changes. Subsequently, client 'MeatCo' ought to leverage the same VDT to identify and 'value versus ease' prioritise the next wave of improvements which may, but not necessarily, include technological changes such as; robotics and robotics in product handling, decision support tools based on objective measurement, artificial intelligence algorithms for allocation of livestock, augmented vision for operator decision support, etc.

4.2 Overall Equipment Effectiveness (OEE):

OEE is an analytic tool we used to measure 'MeatCo's performance against its limit and identify sources of loss within the plant. The three categories of loss assessed were:

- Availability
- Productivity
- Quality

Availability loss = unscheduled shutdowns, planned maintenance, trips, etc.

Productivity loss = production rate slower than maximum, changeovers, inefficient process or productivity

Quality loss = trim, dropped meat, shrink, product returned from the customer, etc.

OEE of Meat Plant

Disguised Example

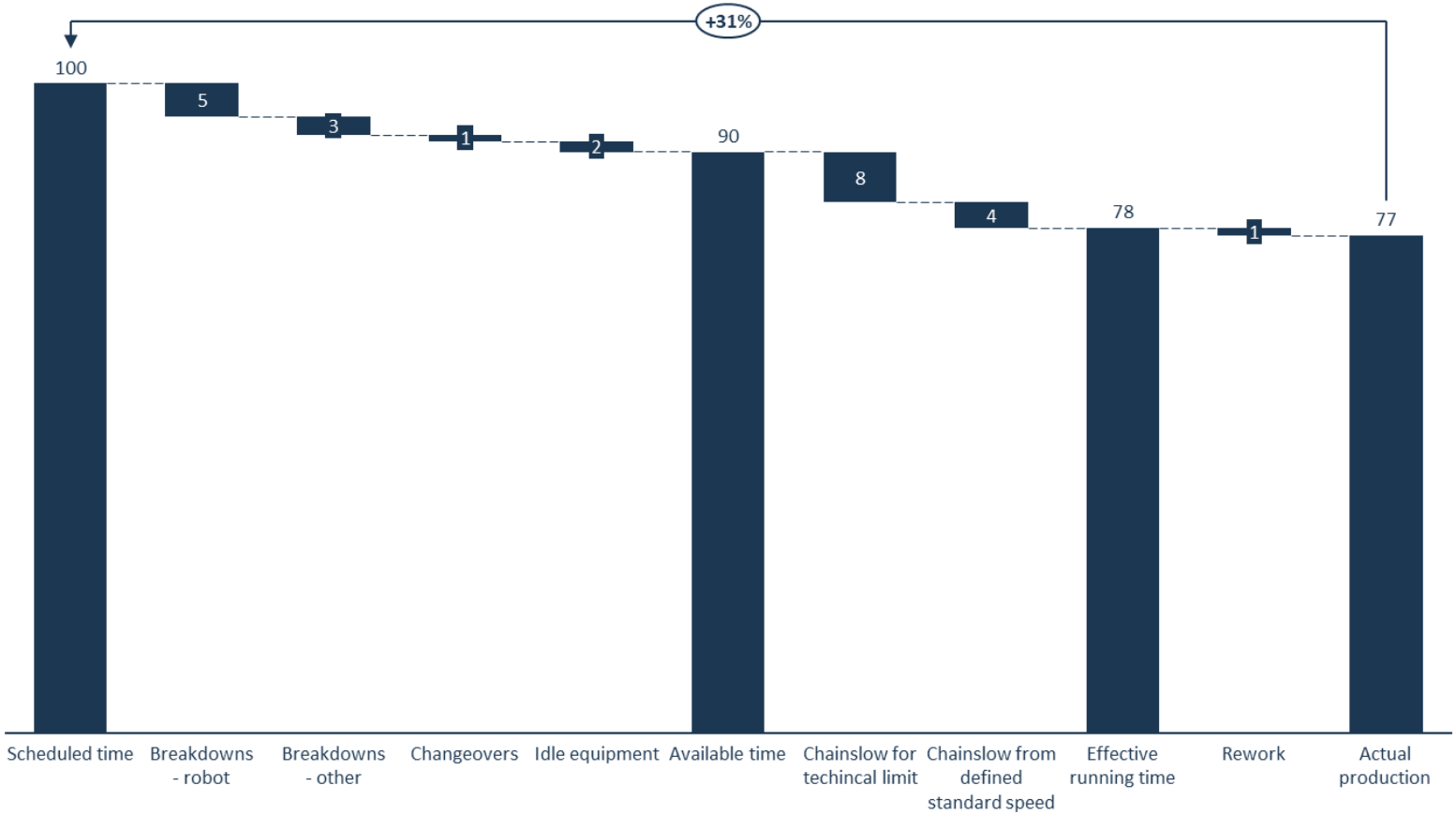


Figure 18: OEE meat processing plant

4.3 Bottleneck Analysis

Bottleneck analyses were conducted which showed where the current and probable future constraints were in the plant. They were used to ensure that ideas to increase throughput were focussed on the areas that were constraining throughput.

This analysis revealed in Lamb that the boning room was the bottleneck; this was our focus for increased throughput.

Lamb Process Capacity, number of heads per day, Disguised Example

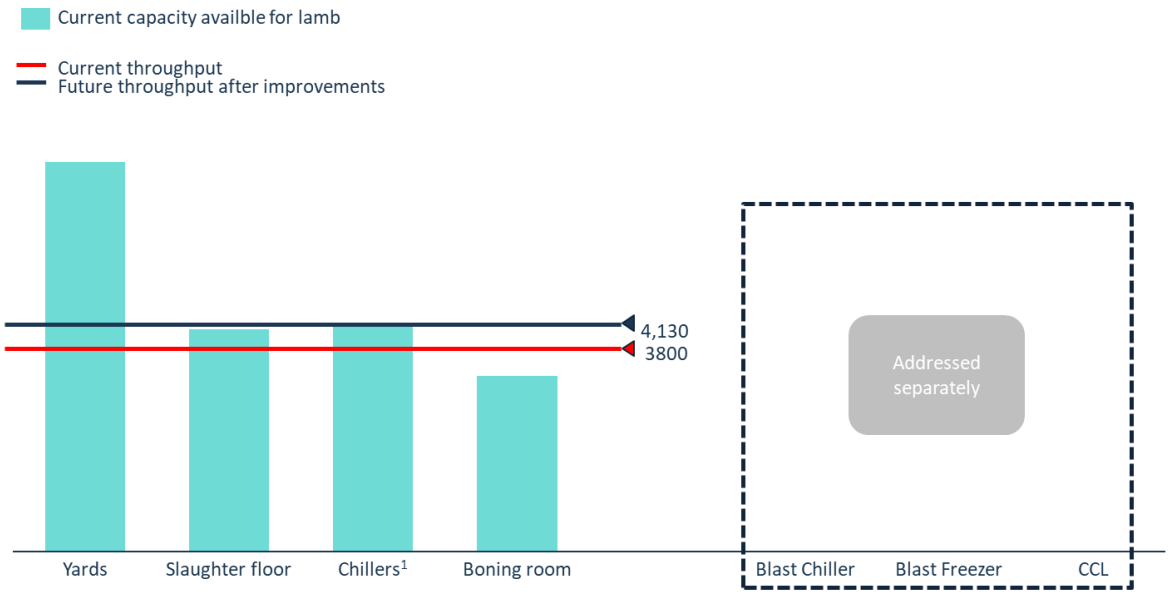


Figure 19: Capacity analysis – lamb process

Similarly, the beef analysis showed that the boning room was the bottleneck

Beef Process Capacity, number of heads per day

Disguised Example

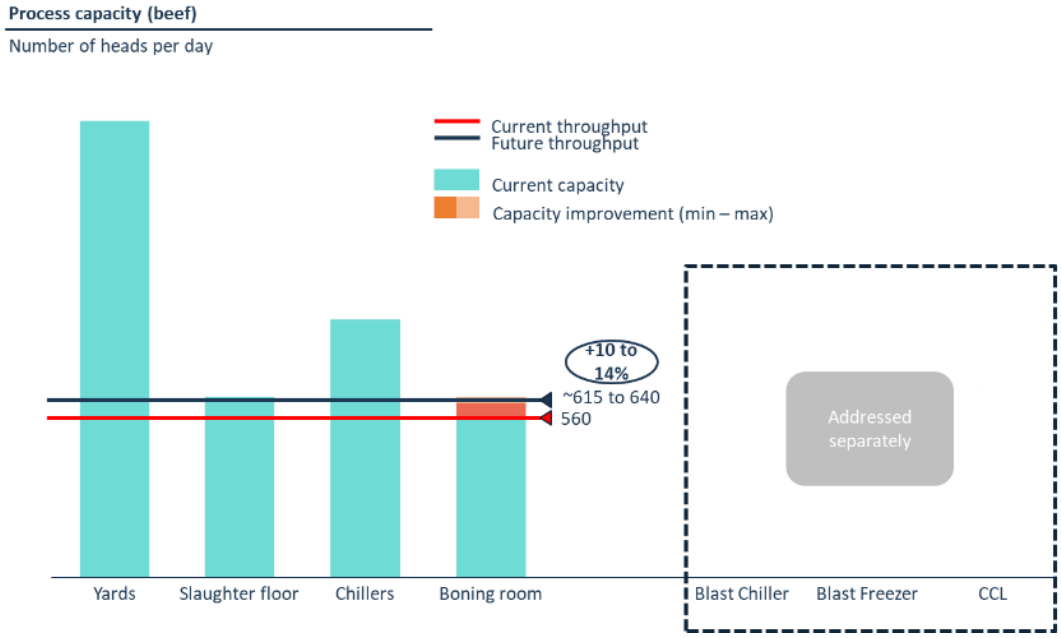


Figure 20: Capacity analysis – beef process

Current OEE performance was established and likely future improvements applied to show current and possible future throughput at each stage in the meat production process.

We found that the throughput of the lamb boning room could be improved by 13% to 19%.

Lamb Boning room, % of total time

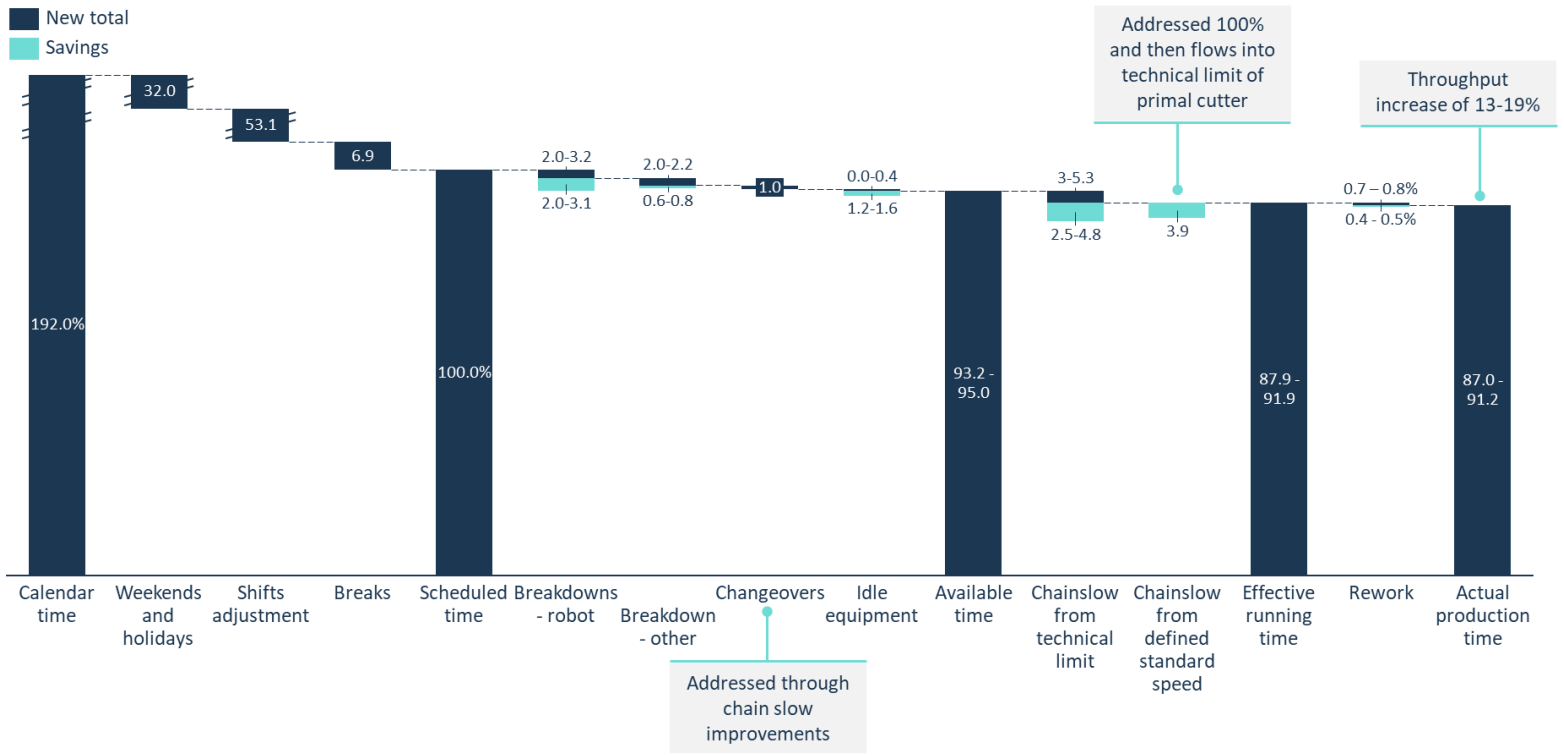


Figure 21: Process timing analysis – lamb boning

We found that the throughput of the Beef boning room can be improved by ~18%.

Beef Boning room, % of total time

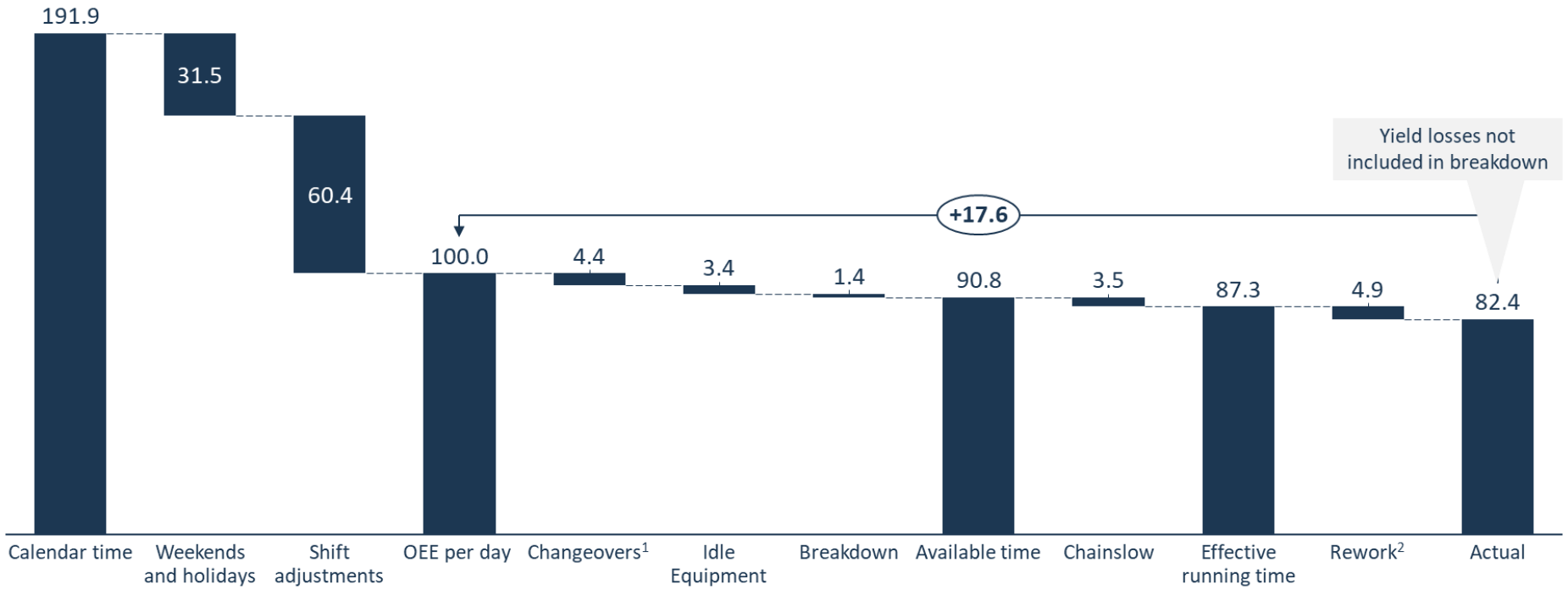


Figure 21: Process timing analysis – beef boning

The throughput improvement potential is 14% to 19% in Lamb and 10% to 14% in Beef and is expected to be delivered over a period of 12 months.

Lamb Throughput Improvement Potential (areas disguised), %

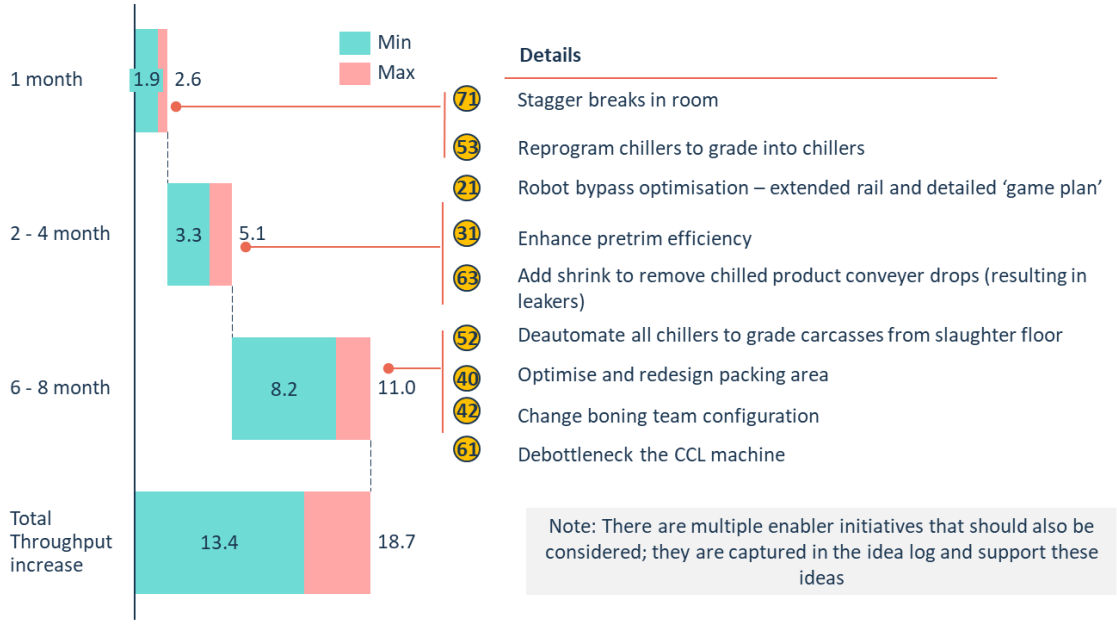


Figure 22: Throughput analysis - lamb

Beef Throughput Improvement Potential (areas disguised), %

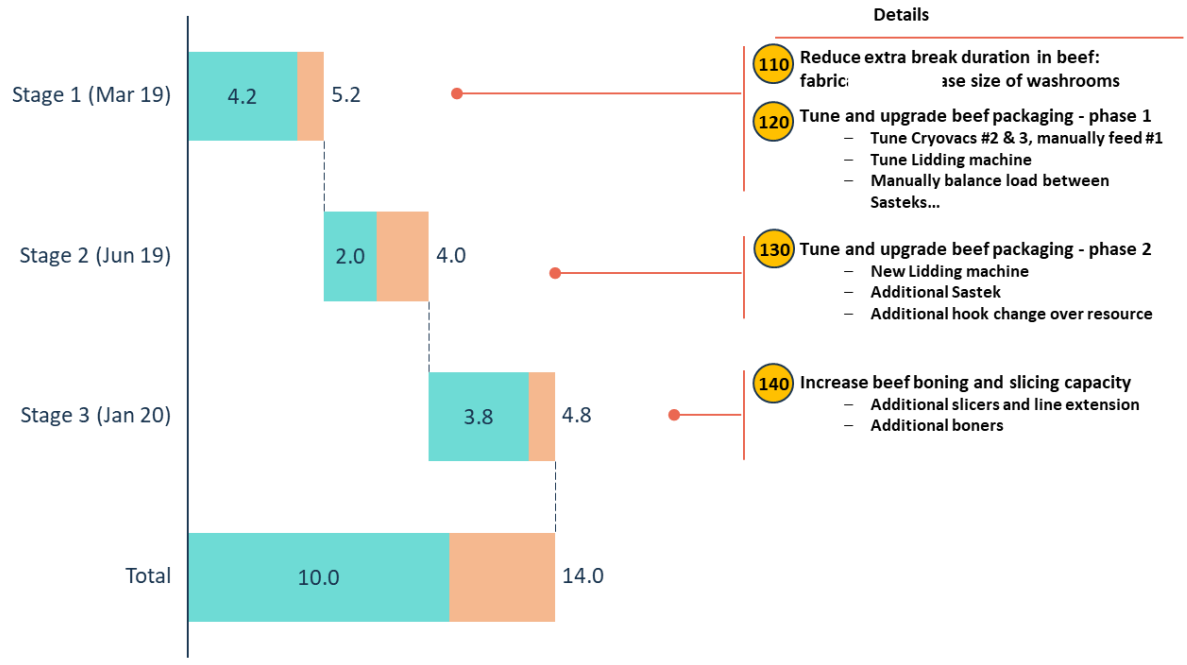


Figure 22: Throughput analysis - beef

Throughput initiatives were prioritised and phased for implementation.

4.4 Understanding of core processes

The next step we took in understanding the business was to map core processes. This highlighted improvement opportunities, including the identification of areas where digital tools could be leveraged. We reviewed key processes with the 'MeatCo' teams using brown papers to map processes and capture input from all levels of the organisation. Once underlying processes and pain points were understood, improvement opportunities were able to be identified and prioritised by "Value / Ease".

Plant Management Operating System Critique

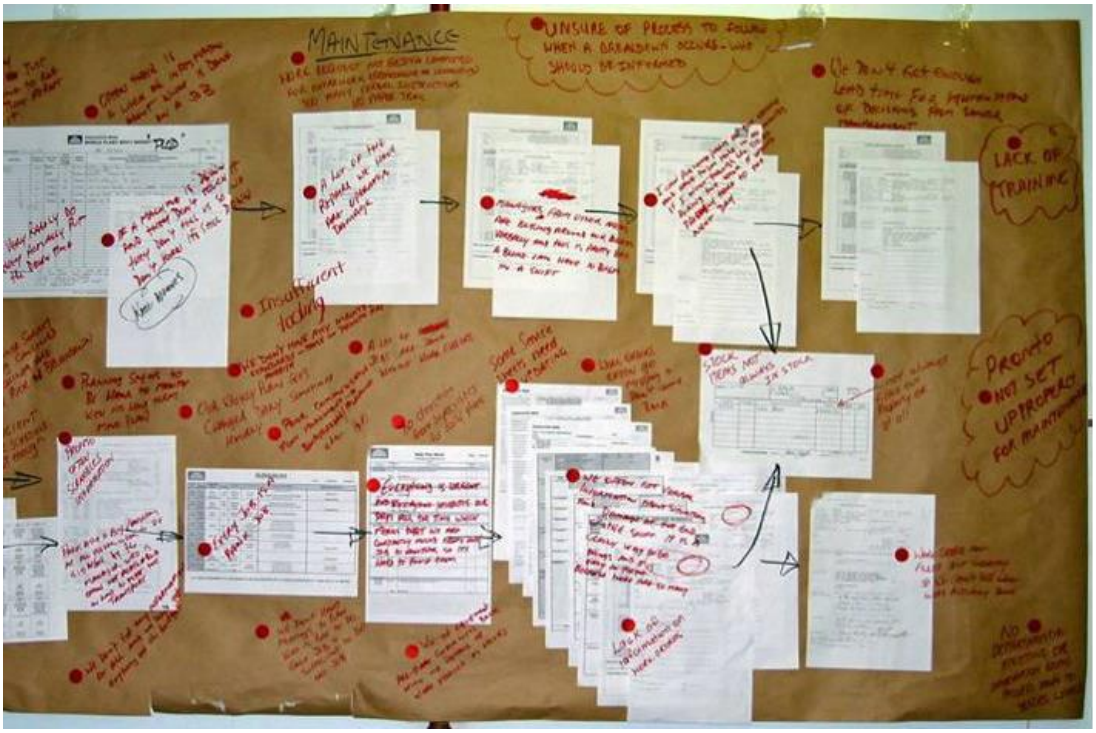


Figure 23: Plant floor feedback

In line with our wider industry experience, at client 'MeatCo' it was identified that there was a significant opportunity to obtain, set up and utilise digital tools wherever record keeping and data gathering is core to safe, compliant and efficient operations. It was identified that leveraging digital tools such as tablets and e-forms would enhance record keeping and data gathering on the shop floor, and subsequently enable data to feed into performance metric tracking. Client 'MeatCo' has already started on this journey, but spotted opportunities to move faster to drive performance and capture value, e.g. freeing up supervisor time, and speeding up data validation for compliance purposes.

4.5 Interviews with key leaders/team members

One of our first priorities in this diagnostic was to gather background information and insights from senior people within 'MeatCo'.

There were several reasons for this

- It quickly got us up to speed on 'MeatCo' and quickly built our understanding of the plant and its particulars.
- It helped build cooperation and a shared sense of urgency with the management team.
- It helped us calibrate findings and see where people agreed or disagreed on priorities and approaches.
- It was also critical to understand the context and immediate past history of 'MeatCo' and its people.

Most importantly it helped inform us on where to start first – so we didn't waste time.

Interviews were face-to-face and generally run for half an hour to forty-five minutes.

Input was obtained from the following stakeholders:

Position/room	Position/room
Regional Ops Manager	Lamb Bone Area Leaders
General Manager	Boning Room AM Supervisor
State HR Manager	Lamb PCP Coordinator
Plant Manager	Value Add line Supervisor
Engineering Manager	Food Safety Manager
Industrial Engineer	Regional Head of Food Safety
Business Analyst	Food Safety Officer in Charge
Financial Controller	Maintenance Technician
Management Accountant	Labour Co-Ordinator
Yield Champion	Regional Head of Value Add
Beef Bone Area Leaders	Training Coordinator
Beef Bone Supervisor	Cold Stores Manager
Beef Kill Supervisor	Beef PCP Coordinator PM
Beef Line Manager	Beef PCP Coordinator
Lamb Shift Manager	

4.6 Interviews feedback and themes

As stated above, one of our first priorities in this diagnostic was to gather background information and insights from senior people within 'MeatCo'.

Coming out of these initial interviews there was a clear pattern in feedback about shortcomings and future aspirations, as well as a clear suite of themes on potential to improve.

Feedback about shortcomings and future aspirations, included:

- Yet to make the best out of new technology, e.g. primal cutter, moving from paper to electronic records, etc.
- New management team keen to establish/revise KPIs and achieve performance improvement throughout the facility
- Supervision yet to be enabled to drive performance through their respective area, i.e. more going through the motions, rather than defining and striving for "what good looks like"

Suite of themes on potential to improve, included:

- Desire to create greater clarity on performance metrics from shop floor to site management
- Identified many opportunities to de-bottleneck/release potential for major pieces of equipment, e.g. CCL machine, primal cutter, packing lines, etc.
- Boning room supervisors expressed desire to lift yield performance, especially on high value cuts. This included supervisors expressing commitment to coach/role model "what good looks like"

"When I was supervising at my last factory we wouldn't accept this quality" – Quote from a Boning room supervisor

These interviews also built a dialog with client stakeholders for subsequent iterations of diagnostic outputs.

4.7 Hands-on shift observations

As much as data analysis and interviews helped us to understand 'MeatCo', the best and most productive element of the Diagnostic was to actually get out onto the shop floor and observe the operations firsthand.

Often the best ideas come from the shop floor, so we quickly looked to establish trust and rapport with the supervisors and operators so that they felt comfortable with our presence and were willing to openly share their ideas and concerns with the team.

We worked to ensure that the work force was informed about our presence and what to expect and what not to expect. Sometimes direct observations of work can be seen to be a bit threatening, so we took extra care to ensure all involved were comfortable with the scope of our activity and the reasons why we were doing it.

One of the key analyses we did was a 'Day in The Life Of' (DILO). This took the form of an extended observation of a supervisor or group of workers and gave us great insight into the things that impeded and prevented productive work.

Figure 24: Example DILO Output

Disguised Example

4.8 Wiring assessment

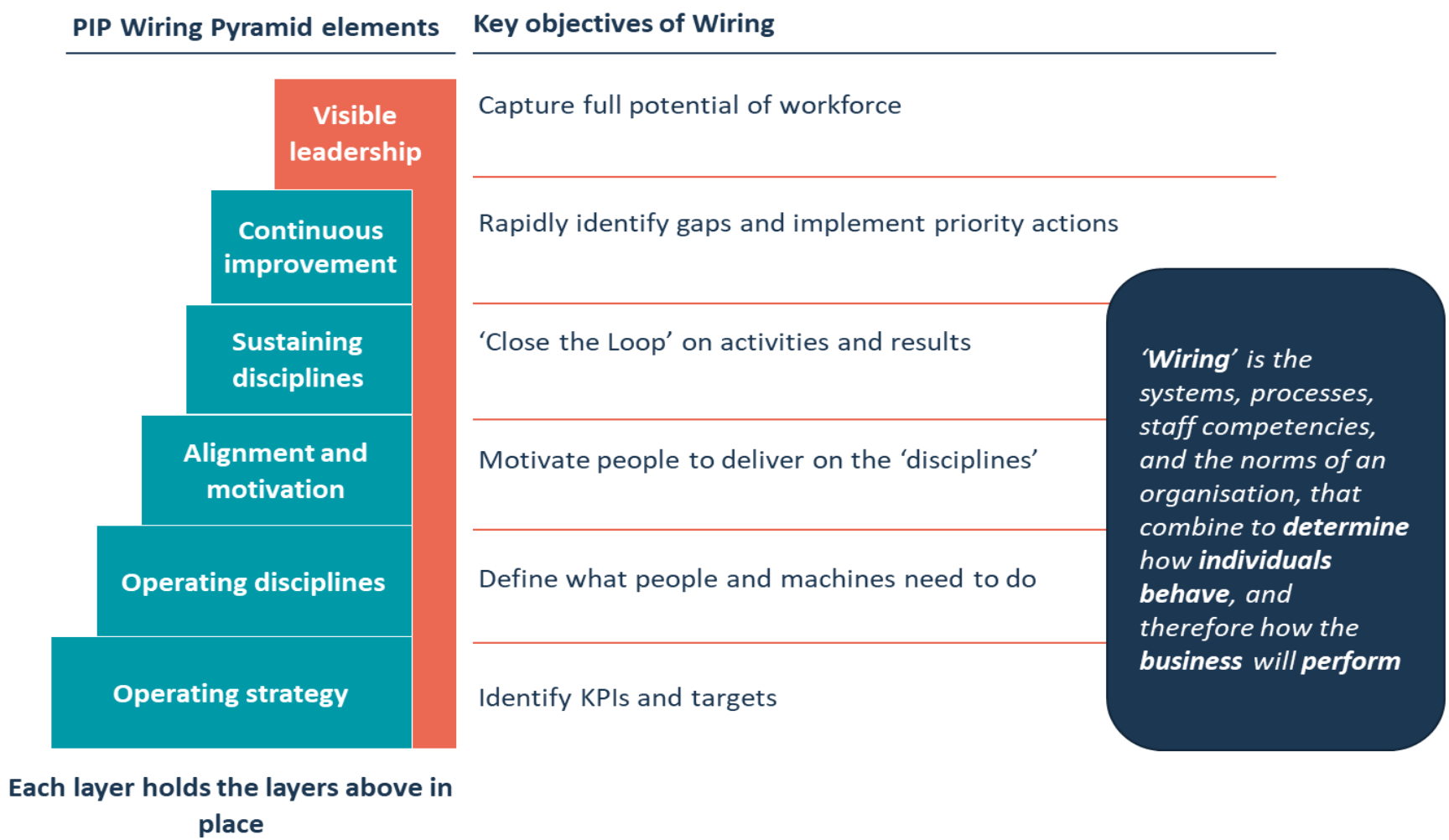
How an organisation is 'wired' through its systems, procedures, skills, strategies, and the behaviours it does and does not accept, will drive its performance relative to its competitors, as well as its ability to continuously improve that performance. It will also affect the pace at which the organisation can capture any benefits identified in the diagnostic.

Completing the wiring assessment helped to determine the organisation's wiring priorities, while also raising awareness of its importance:

- Do you understand and focus on the right input and output measures and objectives that drive improved results?
- Do you have the basic disciplines that enable you to consistently deliver on your Measures and Objectives?
- Are individual accountabilities NONG (No Overlaps and No Gaps) and are they linked to KPIs? Are they known and understood throughout the organisation?
- Do you have the disciplines to 'close the loop', address key variances effectively and sustain performance?
- Do you have a process to quickly and transparently target, report and prioritise continuous improvements?
- Is visible leadership formalised to sustain performance and drive improvements?

Figure 25: PIP Wiring Pyramid

.



We assess 'MeatCo''s 'wiring' and its ability to deliver and sustain the identified improvements through:

- Interviews
- Attendance at meetings
- 'Day-in-the-Life-Of' (DILO) studies of key roles
- Reviews of existing systems and documentation

A number of observations were made as part of the wiring assessment. We found that wiring across the organisation could be enhanced to ensure identified potential is delivered rapidly. Examples are outlined below

Figure 26: Example wiring observations

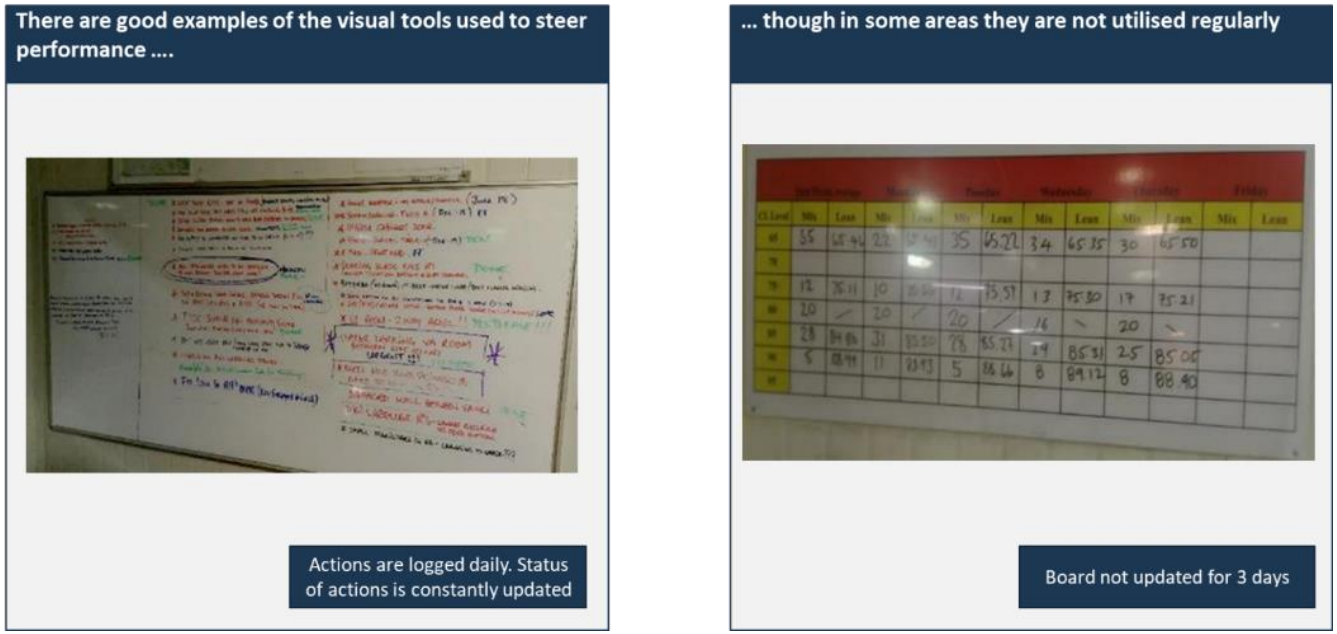


Figure 27: Example wiring observations

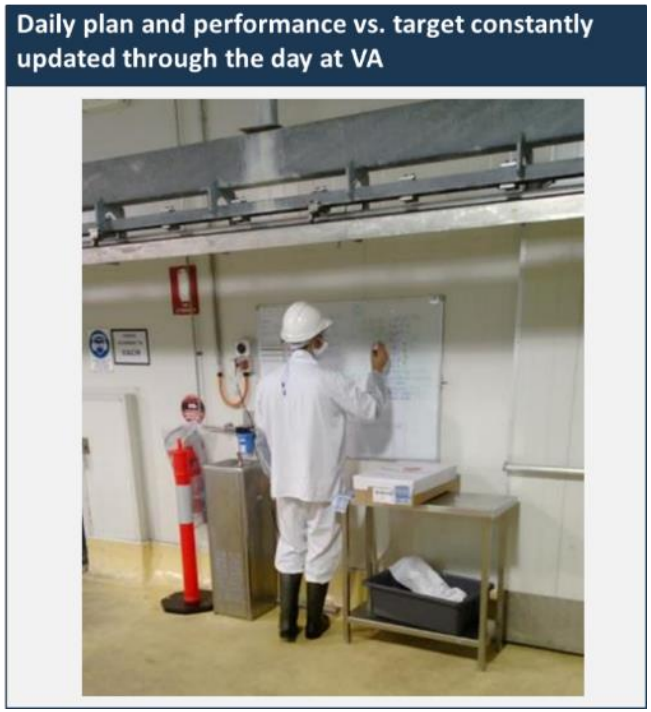
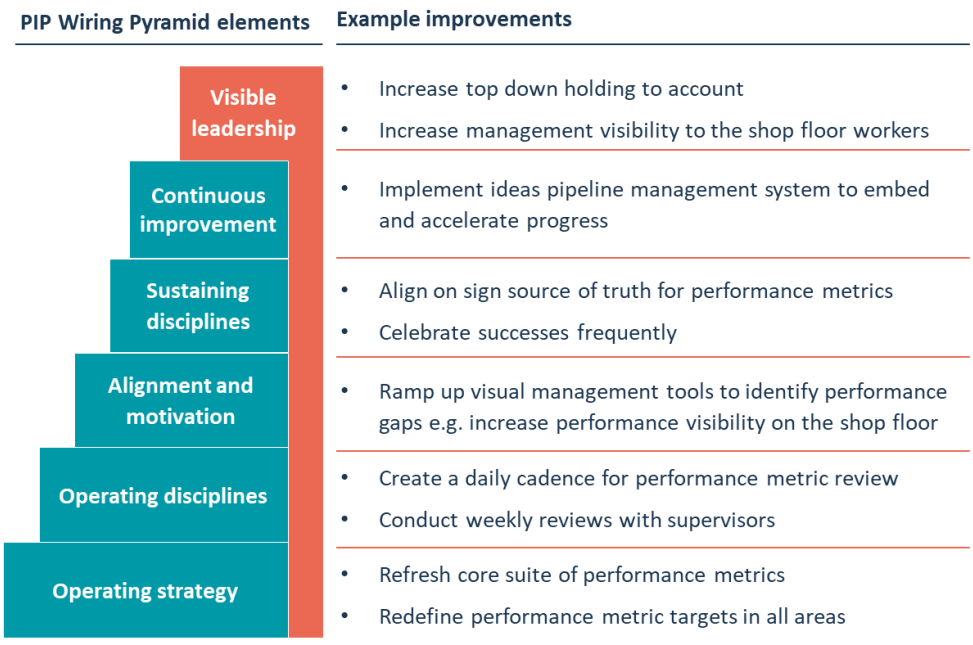


Figure 28: Example wiring improvement opportunities identified

Reinforced alignment through the line	Reinforce **alignment** from shopfloor to the top on key **metrics** for measuring **performance** and how to **track** them
Data driven decision making	Align on one **source of truth** to measure the **performance** at each level, and enable **data driven decisions** making
Performance visible to all	Ramp up **visual management** tools to identify **performance gaps** fast and steer **improvement**
Fast performance review cycle	Streamline cadence of **performance dialogues** ensuring root causes of performance gaps are identified, **accountability to close gap** established, and implementation tracked. **Celebrate successes**
Sufficient supervision on the shopfloor	Ensure there are **no supervision gaps**: define mitigation plans for absences; establish a **cadence** of regular **performance checks** in all areas to identify and **resolve issues** quickly
Managed idea pipeline	Implement **ideas** pipeline **management system** to embed and **accelerate progress**

Figure 29: Example wiring improvement opportunities identified by layer



4.9 Experiments to test behavioural yield recovery hypotheses

Meat slaughter floor facilities are fast-moving multiple touch environments. As such, hypotheses relating to behavioural causes of loss (i.e. yield reduction) are difficult to quantify and agree with line management. To navigate any alignment issue and to generate a shared view on proposed hypotheses and potential improvements, several experiments were completed throughout the diagnostic.

A typical approach used when conducting experiments was to team up with line managers, supervisors, and senior operators to conduct the experiment together. This approach means all stakeholders witnesses the activities and the corresponding results. Subsequently stakeholders were aligned on the improvement potential.

Depending on the hypothesis for improvement, we conducted between 1-5 experiments per operational area (e.g. lamb boning room 5 experiments, lamb slaughter floor 1 experiment). Some experiments were short counting or timing experiments (e.g. dropped meat), whereas other experiments were carried out over several hours and if necessary were conducted multiple times (e.g. meat on bone).

The behavioural yield recovery experiments we conducted included:

- Lamb meat on bone
- Lamb standard carcass trim
- Lamb dropped meat
- Beef meat on bone
- Beef trim meat
- Beef dropped meat

4.9.1 Lamb -Meat on Bone

When spending time on the shopfloor it was observed by Partners in Performance subject matter experts that a portion of viable product became unusable through meat being left on bones. Such meat is lost to yield (and higher value products) and goes to lower value products (e.g. render).

Teaming up with boning room managers, supervisors, and operators a statistically significant number of bones were sampled. The collection of sample bones formed an agreeable representation basis to determine, versus standards, a potential to reduce yield loss due to meat left on bones.

Figure 30: Lamb – Meat on Bone Experiment

4.9.2 Lamb - Carcass Trim

When spending time on the shopfloor it was observed by PiP subject matter experts that carcass trim was inconsistent with Australian standard (i.e. there was an opportunity to trim more to meet Australian standard).

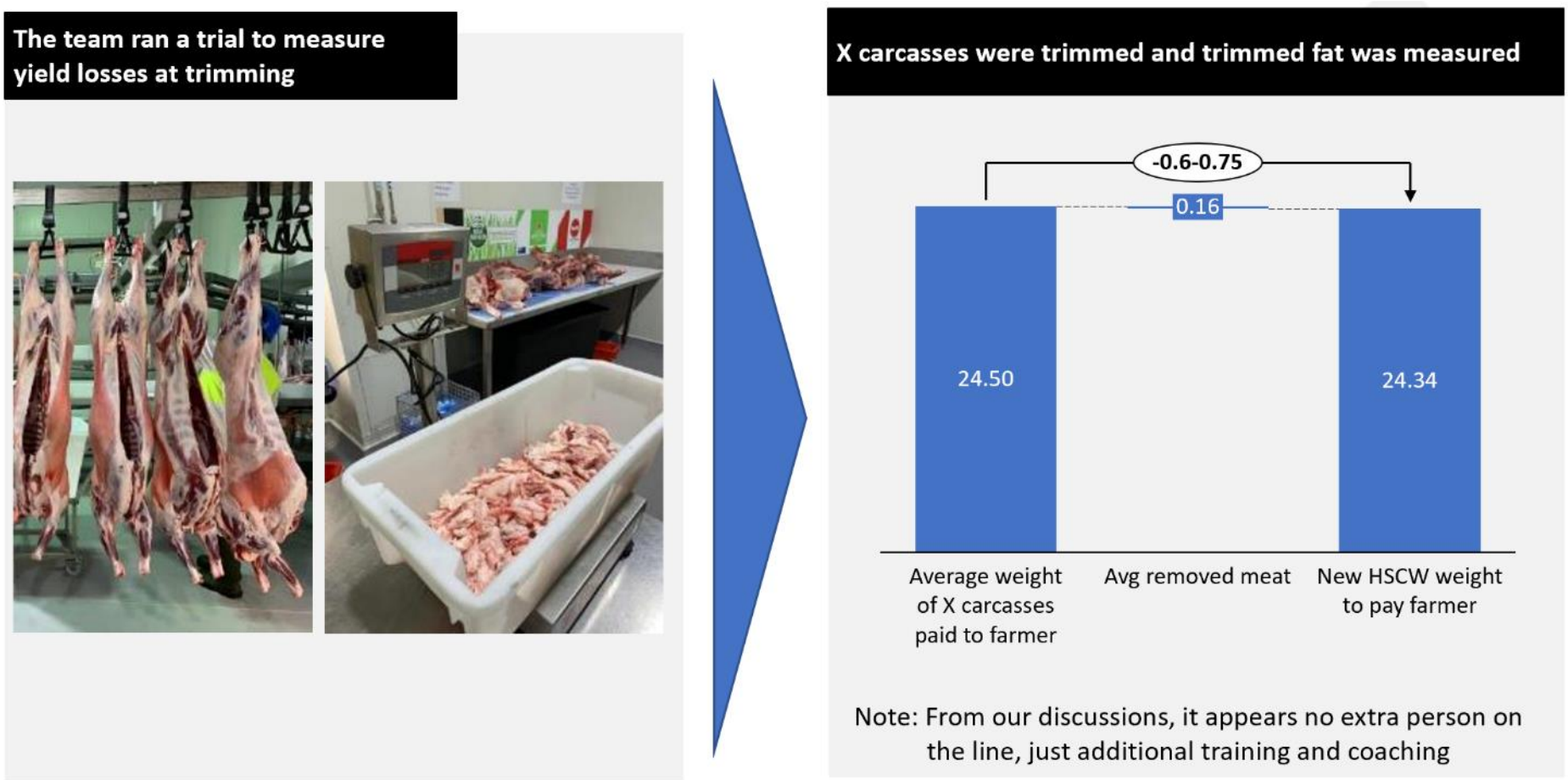
Being a sensitive aspect of the process, it was important to first align on the standard, secondly re-observe carcasses together with line management and PiP subject matter experts, thirdly agree on that there was the potential for improvement, and fourthly run a trial to measure yield losses caused by trimming (i.e. under trimming on standard carcass trim, and over trimming viable product).

To assess the potential a statistically significant number of carcasses were randomly sampled and trimmed to standard. This activity was witnessed by a stakeholder from both slaughter floor and boning room.

Trim from a statistically significant number of carcasses was also collected to determine extent of over trimming viable product. Stakeholders from boning room conducted the sampling with the Partners in Performance team to create alignment on quantum of the losses and ability to improve.

Figure 31: Lamb – Carcass Trim Experiment

Disguised Example



4.9.3 Lamb – Drop meat

On the initial plant walk-through, the team observed meat dropped on the boning room floor. Line management and supervisors agree that the observed quantities were typical of day-to-day operations and that there was a potential to improve.

To determine the extent of dropped meat the team ran several trials across multiple runs and days to collect and weight dropped meat. To add practicality and validity to the dropped meat trails only the high value meat was selected and quantified.

Figure 32: Lamb –Drop Meat Experiment

The team collected meat to understand drop meat % yield loss

Step 1: Identified drop meat in the fab room

Step 2: Selected only the meat that was high value

Step 3: Weighed the drop meat

Collection	
# of heads:	1535
Total waste collected:	70 kg
Average waste per head:	**45g**

We only collected high value meat and believe it was a conservative estimate based on timing restrictions

Range of yield increase = 0.2% - 0.25%

Additional drop meat opportunity exists, with drop meat that is trimmed and put back on line. To be quantified

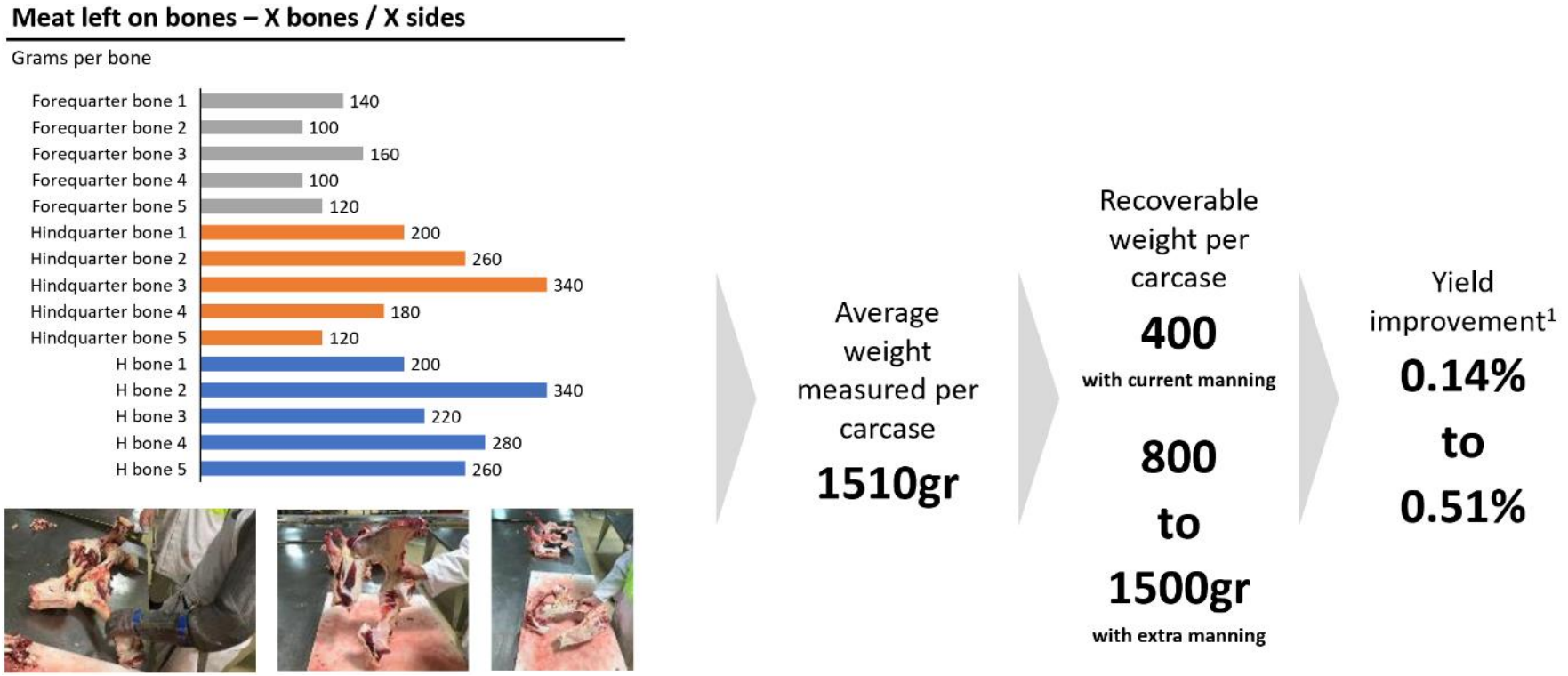
4.9.4 Beef -Meat on Bone

When spending time on the shopfloor it was observed by Partners in Performance subject matter experts that a portion of viable product became unusable through meat being left on bones. Such meat is lost to yield (and higher value products) and goes to lower value products (e.g. render).

Teaming up with boning room managers, supervisors, and operators a statistically significant number of bones were sampled. The collection of sample bones formed an agreeable representation basis to determine, versus standards, a potential to reduce yield loss due to meat left on bones.

Figure 33: Beef – Meat on Bone Experiment

Disguised Example



Notes: [1] Average weight per carcase: 292.5kg

4.9.5 Beef – Trim Meat

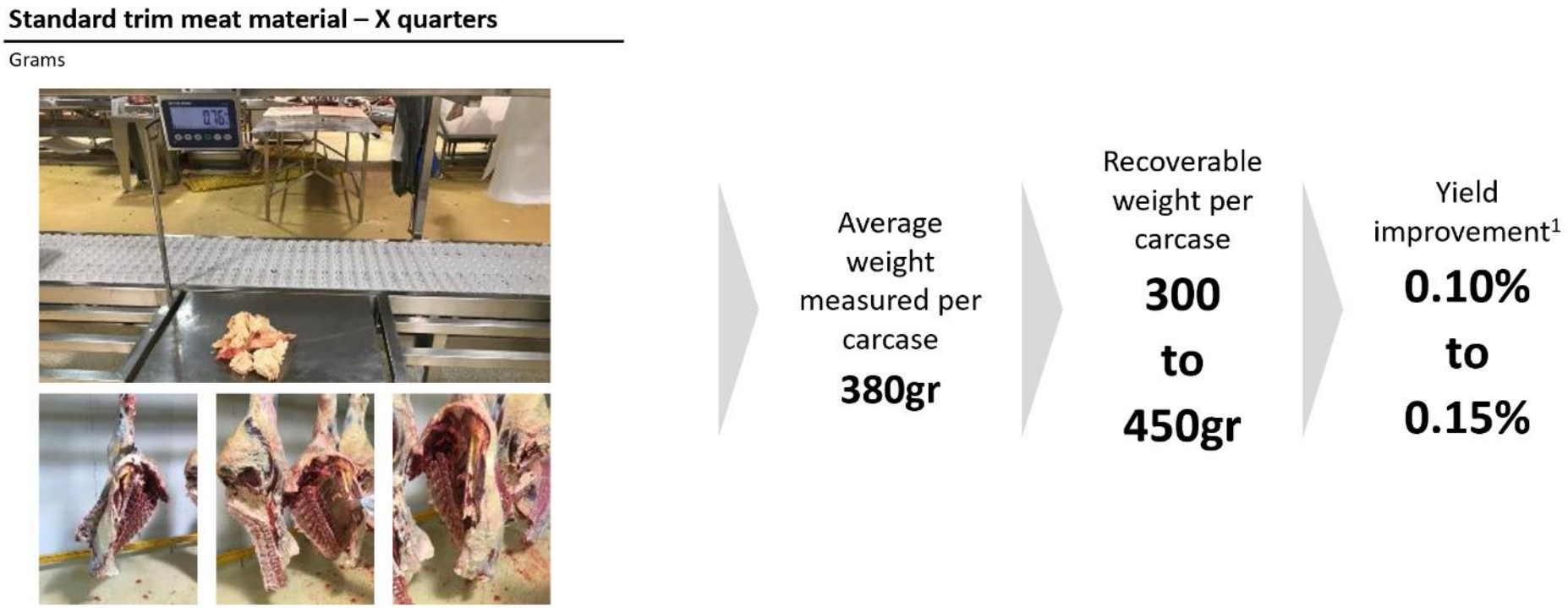
When spending time on the shopfloor it was observed by Partners in Performance subject matter experts that carcass trim was inconsistent with Australian standard (i.e. there was an opportunity to trim more to meet Australian standard).

Being a sensitive aspect of the process, it was important to first align on the standard, secondly re-observe carcasses together with line management and Partners in Performance subject matter experts, thirdly agree on that there was the potential for improvement, and fourthly ran a trial to measure yield losses caused by trimming (i.e. under trimming on standard carcass trim, and over trimming viable product).

To assess the potential a statistically significant number of carcasses were randomly sampled and trimmed to standard. This activity was witnessed by a stakeholder from both slaughter floor and boning room.

Trim from a statistically significant number of carcasses was also collected to determine extent of over trimming viable product. Stakeholders from boning room conducted the sampling with the Partners in Performance team to create alignment on quantum of the losses and ability to improve.

Figure 34: Beef – Trim Meat Experiment



Notes: [1] Average weight per carcase: 292.5kg

Figure 35: Beef – Trim Meat Experiment

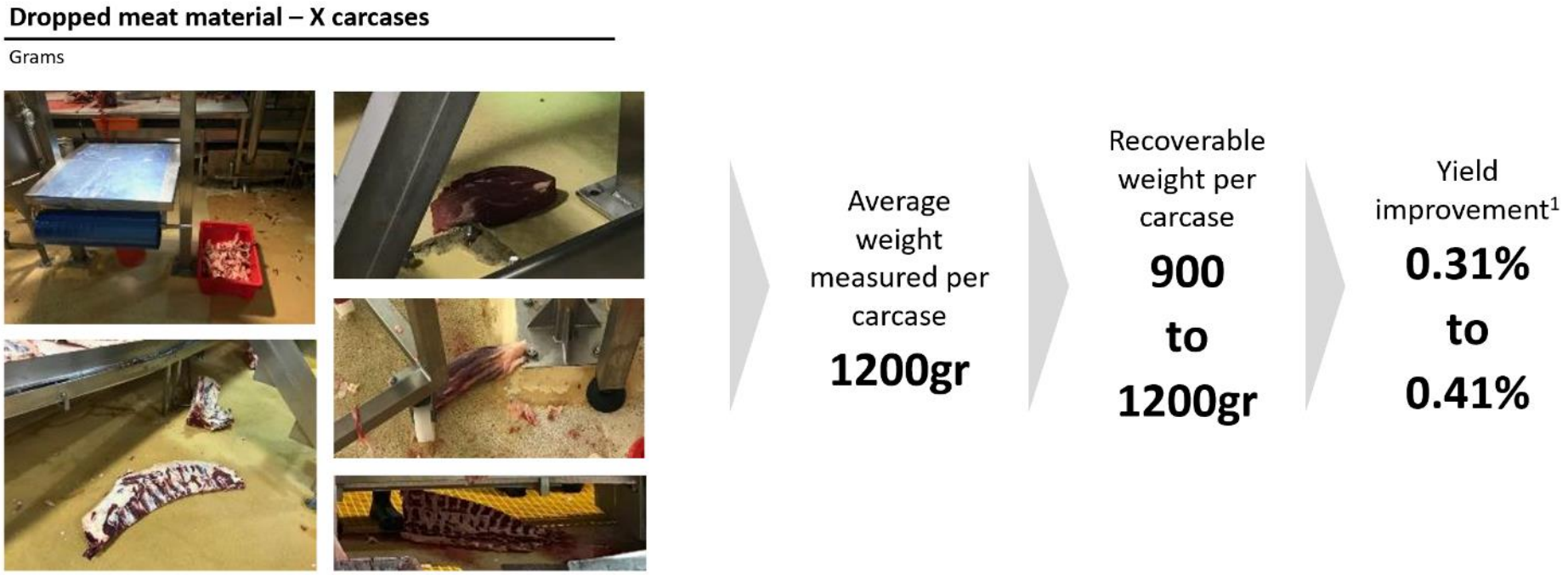
Notes: [1] Average weight per carcase: 292.5kg

4.9.6 Beef – Drop meat

On the initial plant walk-through, the team observed meat dropped upon the boning room floor. Line management and supervisors agree that the observed quantities were typical of day-to-day operations and that there was a potential to improve.

To determine the extent of dropped meat the team ran several trials across multiple runs and days to collect and weight dropped meat. To add practicality and validity to the dropped meat trails only the high value meat was selected and quantified.

Figure 36: Beef – Drop Meat Experiment



Notes: [1] Average weight per carcase: 292.5kg

5 Prioritisation of areas for development of idea pipeline

As diagnostic is a short exercise, it is extremely important to avoid 'boiling the ocean' i.e. trying to analyse all parameters and size all the losses. Relentless prioritisation from the day one is key to diagnostic's success. Therefore, focusing the diagnostic team on the highest potential areas with the highest ease of extracting it, is essential. During the diagnostic the team was running daily prioritisation of areas for deep dives and later for idea generation. Areas with insufficient potential or ease of the implementation were not analysed further. Improvement ideas developed during the analysis would be logged to the idea list, but ideas would not be taken further to detailed evaluation stage.

Prioritisation would be challenged by and aligned with key client's stakeholders. By exercising this approach (see illustrative example below) the diagnostic team would set client for successful implementation later, as client would keep laser-sharp focus on delivering value through limited number of ideas.

Figure 37: Illustrative example of daily prioritisation funnel:

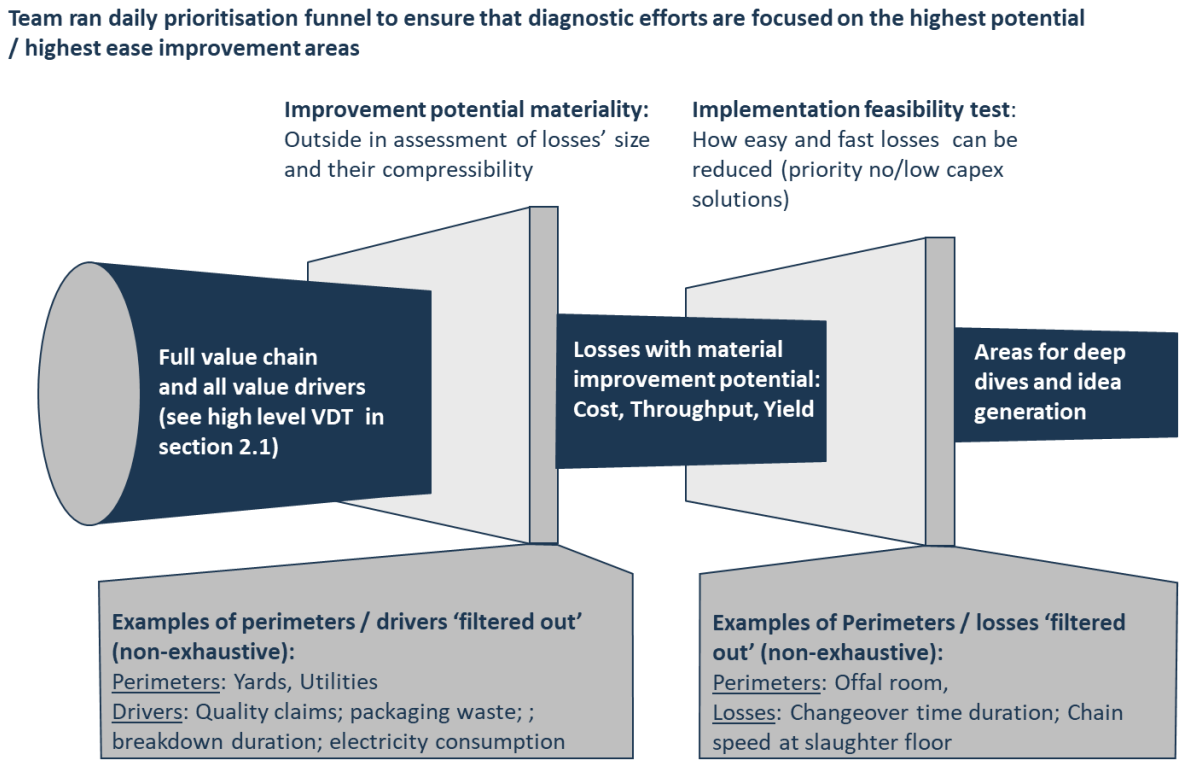


Figure 38: Example of ideas that were 'parked' and not taken for further evaluation:

Issue and root cause	Area where occurred	Idea Description	Description of the captured potential
Chillers are ran even after operations are stopped and chillers are empty	All chillers at beef and lamb	Establish an SOP for fabrication floor supervisors to communicate to Maintenance and Engineers end of production, so chillers can be ramped down immediately	10-15 minutes of electricity consumption for running chillers at full load
Chiller 8 is open at the time cleaning heating up fast	Chiller X	Install separation wall / curtain in chiller X so when cleaning starts chiller will not be warmed up as much as now	Heat radiation reduction in chiller X
Chillers' doors are often open even theer is no lading / uloading in place	All chillers at beef and lamb	Establish SOP for chillers supervisors to regularly check whether doors are closed, report audit results by maintenance on opened doors during next week 8 am production meeting	Heat radiation reduction in all chillers

Based on the observations, data analysis and interviews team has identified areas with the highest potential. These areas were subject to deep dive analysis in order to have more data points for idea generation sessions.

Figure 39: High level overview of the improvement potential identified for deep dives and idea generation – Illustrative (final agreed potential may not be fully in line with original assessment)

Legend	Low
	Medium
	High

Areas of opportunities: for deep dives and Idea Generation Sessions

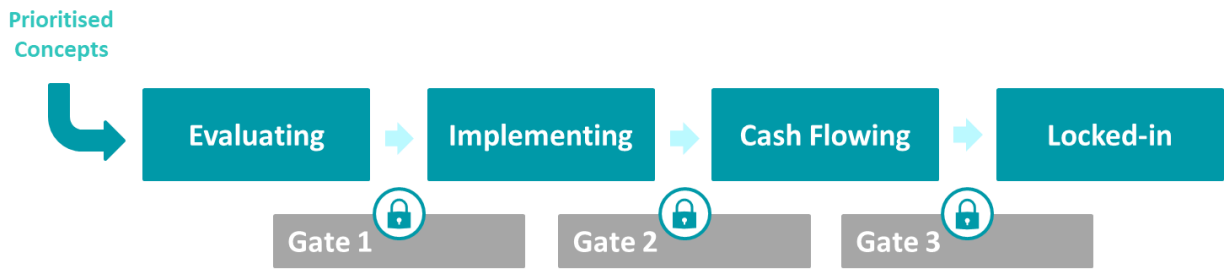
Lamb	Yards	Slaughter floor	Chillers	Boning
Cost				
Throughput				
Yield				
Quality				

Beef	Yards	Slaughter floor	Chillers	Boning
Cost				
Throughput				
Yield				
Quality				

Other area	Value Add	Cold Storage	Utilities	Offal
Cost				
Throughput				
Yield				
Quality				

6 Ideas Pipeline

An ideas pipeline is a business process for managing improvement ideas through the stages of idea generation, prioritisation, evaluation, approval, implementation, cash flowing and locked-in. We use an ideas pipeline to ensure the highest value ideas are implemented: on time, deliver full value and are sustainable over the long term. During the diagnostic focused on idea generation and prioritisation. Detailed evaluation and implementation follows the diagnostic phase; in this case it was delivered by the client. Prioritisation and estimation of potential were assessed in workshops with key stakeholders. This was to establish relative potential, hence priority. Outputs of these sessions are covered later in this section.



After concepts are developed into ideas, they go through four (4) stages in the ideas management pipeline:

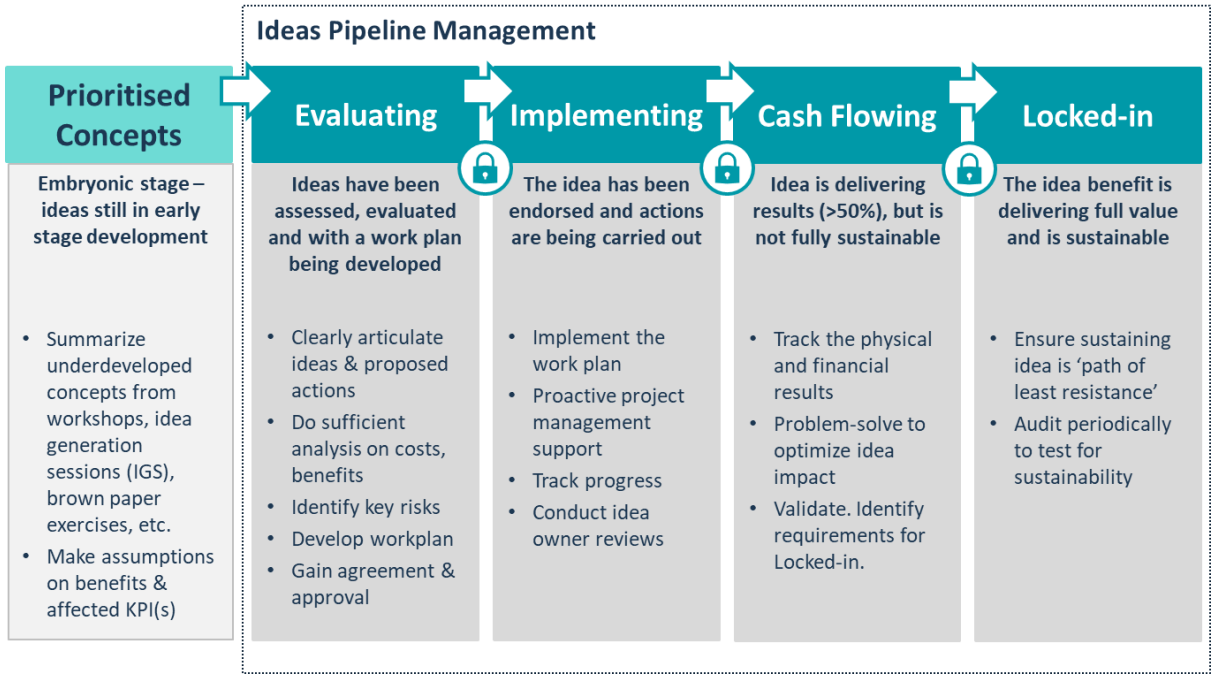


Figure 40: Ideas Pipeline

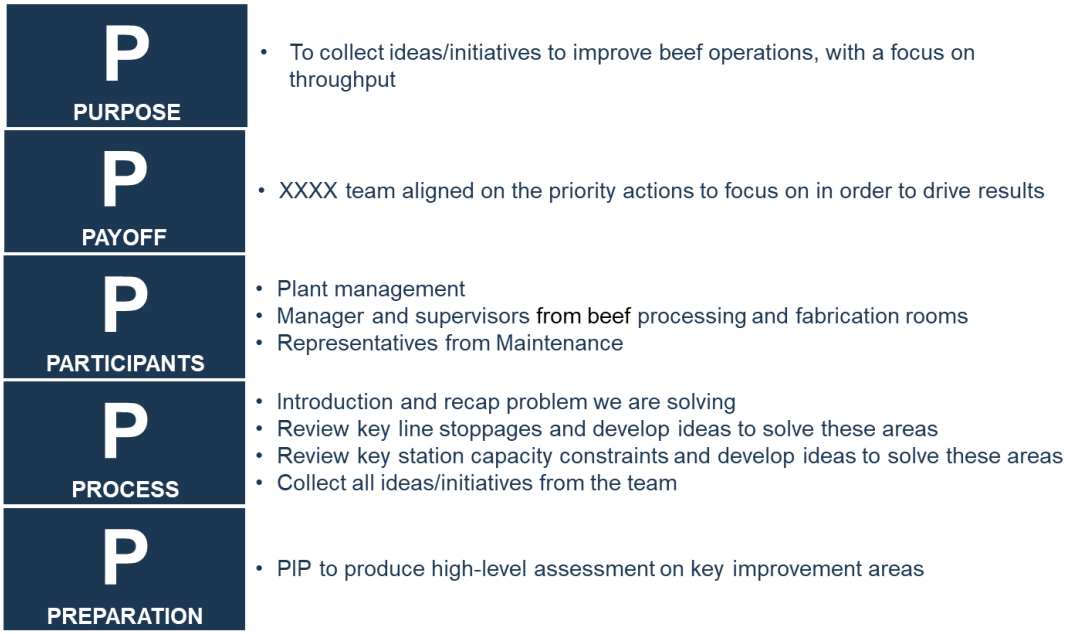
6.1 Ideas generation

Once we had identified the areas with the greatest potential for 'MeatCo' to improve, we worked with each of the teams to create and prioritise ideas to address opportunities using Idea Generation Sessions. An Ideas Generation Session (IGS) is a structured approach to generate ideas or solutions. Idea generation sessions engage key stakeholders to generate ideas which are then prioritised for further evaluation and development. There were four IGS conducted as part of this diagnostic:

1. Improvement potential in lamb
2. Improvement potential in beef
3. Improvement potential in Cold Stores / Chiller
4. Improvement potential in Value added

Figure 41: Meeting 5Ps for Improvement Potential in Beef IGS

Disguised Example



Idea Generation Session Output

The picture below is an example of the output from one of 'MeatCo's IGSs. The picture shows a process flow chart with several identified improvement initiatives in green. The process chart, accompanied by production data, provided content and context for the idea generation. The session's outputs (i.e. ideas) are the green Post-It notes which have been placed at different points of the process. The session you see below generated 15 ideas.

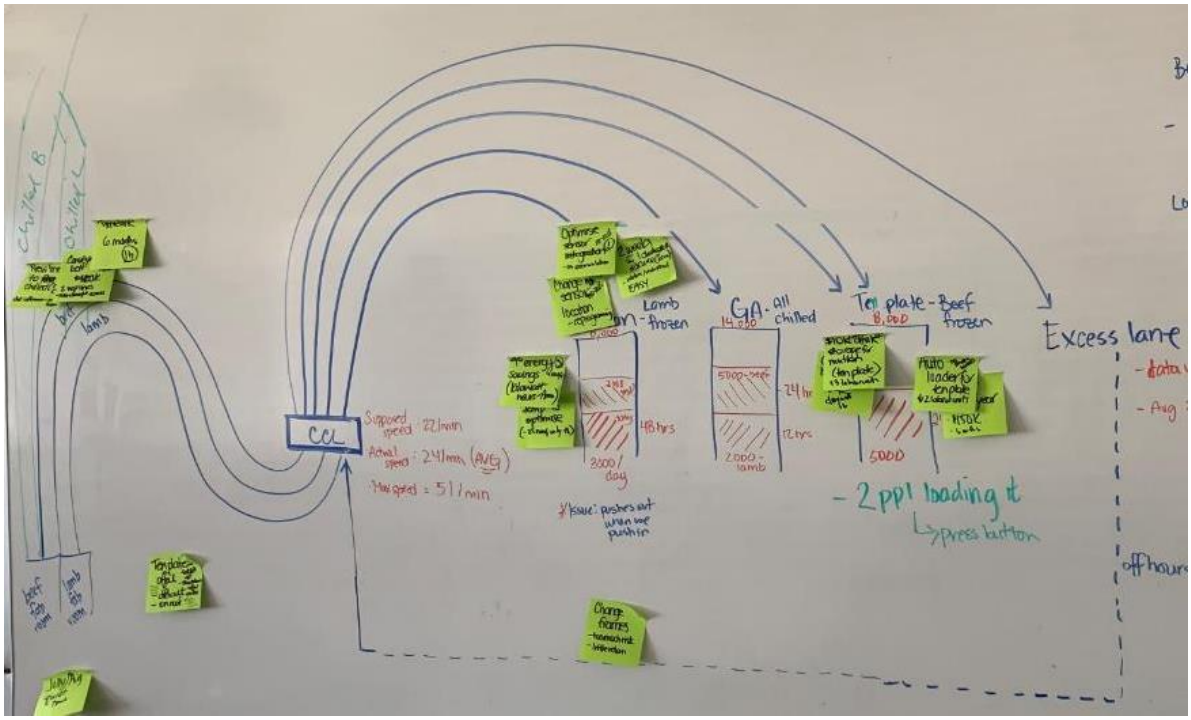


Figure 42: Idea generation

Overall, the Idea Generation Sessions resulted in 70 ideas (they were rolled up when their implementation was co-dependent) for which the team estimated potential net financial impact. The ideas represent a potential financial improvement of ~75% of 'MeatCo's annual EBITDA.

Table 1: A list of all ideas generated through the diagnostics can be found in the table below.

List of the ideas is based on intermediate stages of sizing potential, ease and acceptance of the ideas by the client stake holders. Some of the ideas could be later rejected, valued as well as implementation time could have been revised					
Idea Number	**Idea type**	**Idea Name**	**Underlying Idea Description**	**% of EBITDA**	**Implementation time in months**
MBT01	Throughput	Increase beef slaughter floor chain speed	Increase speed of motors and knocking box so that the slaughter floor can move faster.	Not valued	Not valued
MBT02	Throughput	Reduce beef changeover times	Downgrade if batch are inferior to 10 bodies and price between 2 batches is identical Implement side chain system Purposely schedule changeovers to fall during smoko to reduce idle time where workers are ready.	7.96%	Not considered for the implementation now due to complexity and prohibitive cost (payback expected to be 3 years or more

MBT03	Throughput	Reduce extra break duration in beef boning room	Add 15 minutes at the end of day to make up for lost time resulting from breaks	7.86%	6
			Increase the size of washrooms to reduce queues and pause duration		3
			Remove additional break allowances.		3
			Increase availability of soap and paper to reduce queues and pause duration	2.36%	Not considered due to concerns over hygiene
MBT04	Throughput	Tune and upgrade beef packaging - phase 1	Implement manual balancing between chilled and frozen lines to equalise utilisation of the two Sastek machines	3.32%	1
			Implement third Party modifications to increase the lidding machine capacity from x cartons per minute to x per minute. If not possible, implement x labour units to do manually		3
			Manually transfer more bags to Cryovac 1 to fully utilise capacity		1
			Move lidding machines from current position to closer to corridor to cold stores to allow more space when stocks builds up		3
			Optimise human machine interface to reduce number of selections required per carton		3
			Redefine specs and enforce compliance for the label provider to drive specs consistency		3
			Tune cryovacs to increase speed without creating leakages		2
MBT05	Throughput	Tune and upgrade beef packaging - phase 2	Add an additional lidding machine	7.24%	3
			Implement a two-person hook change over system		1
			Install an additional Sastek machine to increase throughput.		3
			Optimise hook change over process, e.g. move from rollers to different system.		3
			Replace lidding machine with new one with increased capacity (yy to zz carton / minute)		3
			Replace manual data entry with ring scanning system to reduce time per carton at Sastek machines		3
MBT06	Throughput	Increase beef boning and slicing capacity	Add an additional scribe saw position	10.58%	3
			Do one more cut to side during slaughter to shorten time required at the scribe saw station in boning room		1
			Hire more boners to increase carcass capacity, use training line as required to		1
			Increase number of slicers and extend slicing line		2
MBT07	Throughput	Reduce defects	Reduce leakers. Change layout of bagging area to increase space, and improve bad presentation to cryovac	Idea not valued	Idea not valued
			Reduce X-ray rejects. Better supervise slicing - have a KPI on the bone chips that are found downstream of the line		

MBT08	Throughput	Improve maintenance response time	Idea not valued as expected benefits are not material	Idea not valued	Idea not valued
MBT10	Throughput	Improve maintenance response time	Hire and station more fitters and electricians on the boning room floor to reduce downtime	Idea not valued	Idea not valued
MBY01	Yield	Optimise yield	Increase yield through reducing losses across key drivers (dropped meat/ meat on bone/ carcass trim/ conveyor to render) - Supervision, coaching and management of KPIs - Display performance on visual boards - Installation of additional guarding and conveyors improvement - Adjustment of spraying parameters in chiller	7.04%	6
MCC01	Cost	Gordon sensor	Move the laser location in the Gordon tunnel to be in the room instead of outside of the entrance	Idea not valued	1
MCC02	Cost	New CCL flow	Create a new line for the chilled product and then use the current CCL line for only frozen products	0.56%	6
MCC03	Cost	Install additional mutton conveyer belt and remove off-site mutton storage (freeze in blast freezer)	With the additional capacity from removing chilled from the CCL machine, we should include mutton in the freezing capacity, this requires an additional conveyer belt	0.80%	6
MCC04	Cost	Optimise Gordon blast freezer room temperature - it is currently at a higher rate than needed and using excess electricity	Increase the temperature of the Gordon blast freezer (lamb) as the lamb is in there for x hours	0.17%	3
MCC05	Cost	Automate ten-plate loading process	Automate the ten plate blast freezer loading process	0.48%	3
MCC06	Cost	Move offal room	Move offal room to other side of the building so that the same freezers can be used as for lamb/beef	0.84%	Idea is not taken into implementation as it might be costly and complex. It will be considered later when key objectives of the program are delivered

MLT01	Throughput	Dedicated Engineering team for each room	Have dedicated electrician and mechanical fitter for each room	1.26%	2
		Robot bypass optimisation	Increase bypass by developing a 'game plan' for immediate deployment when robot breaks - includes alarm, manning process, steps by step process	3.26%	2
			Increase bypass rail side (accumulation rail) to increase number of carcasses that can bypass	3.26%	2
		Scott's operator for robot	Have dedicated robot operator	1.00%	2
MLT02	Throughput	Optimise in and out of room flow - pretrim and blast chilling	Debottleneck the CCL machine: The CCL machine has a number of initiatives to reduce the bottleneck and decrease backlog - please refer to CCL initiatives for full list	0.42%	6
			Enhance pretrim efficiency: A number of additional measures have been added to the slaughter floor to increase pretrim effectiveness (whiz knives, stands etc) - possible to reduce the number of people on the pretrim team accordingly	0.90%	6
MLT03	Throughput	Optimise and redesign the packing and boning areas	Change boning team configuration: Change the boning team formation with 2-3 boners doing the Aitch bone and giving the teams legs. This team of 3-4 would be rotating throughout the day. Only need the first portion or rail would be required and the boners could get their own carcasses	0.77%	6
			Increase number of boners in room: Add boners to boning team roster, put the boners in place each day based on result and performance	0.59%	6
			Optimise and redesign the packing are: Redesign the packing area to increase flow and increase throughput. This includes auto bag packers, changing the layout of tables, adding rollers to tables on the side, changing the flow of some of the frozen product and potentially moving location of conveyers	2.57%	6

MLT04	Throughput	Enhance grading ability of carcasses	Deautomate all chillers to grade carcasses from slaughter floor : Deautomate chiller #xxx to allow for accurate grading of carcasses as they flow into the chiller (as they come from the slaughter floor floor)	7.08%	8
			Deautomate chillers v only to grade carcasses from slaughter floor : Deautomate chiller #v to allow for accurate grading of carcasses as they flow into the chiller (as they come from the slaughter floor floor)	0.88%	8
			Reprogram chillers to allow to grading from slaughter floor : Reprogram the chiller program to allow each carcass to be sent to a specific chiller room based on weight - this will allow for approximately x weight ranges	0.47%	8
			Add x colour ticket machine to easily identify carcasses in chiller to grade : When the carcass gets weighed and graded after the slaughter floor , make the tag coloured so that it can be easily identified to grade	Not valued	8
			Change ticket on carcass to have large number identifier to identify grade: When the carcass gets weighted and graded after the slaughter floor , make the tag have a large number/letter on it so that it can be easily identified to grade	Not valued	8
			Reduce conveyer belt interruptions : Decrease number of times the conveyer belt moves up, mainly based on preparing packing with cut plan prep (this is enabled by grading of carcasses)	Not valued	8
MLT05	Throughput	Redesign finishing area	Add shrink to remove chilled product conveyer (drop) leaker issue : Add another shrink to remove the long conveyer journey for vac packed products, resulting in leakers	0.52%	6
			Reduce claims through new conveyer belts: Install a new conveyer belt system. Either that have no drops but push onto next belt or a curved conveyer belt post cryovac machine to reduce leakers		6
			Add ring scanning to back of room load out : Add ring scanners to balance the load in the finishing area		6
MLT07	Throughput	Implement staggered breaks	Introduce staggered breaks in room : Stagger breaks and enhance cleaning room supplies to make sure that time is not wasted waiting for equipment	1.80%	1
			Introduce staggers starts/ends in room (runoff) : Stagger starts and ends of day to ensure that people are working the full allocated 100% time that they are paid for	Not Valued	1

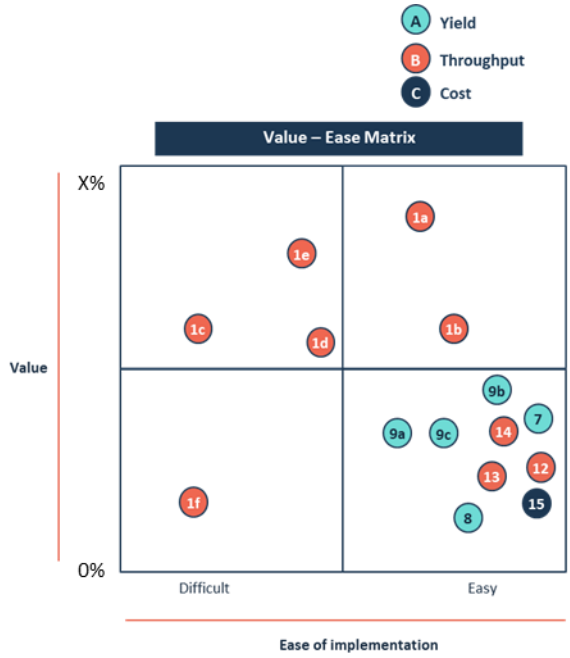
MLT09	Throughput	Add training cell, off the line for training positions	Have an area off the line that trains people, removing the pressure that exists on the line. This would decrease mistakes, yield impacts and ensures that the individual feels competent before they go the full speed of the line	Not valued - enablers	12
		Add training translators to ensure that there is clear and practical instructions for all employees	Bring on a translator for the languages that are the most frequently spoken to help with training	Not valued - enablers	12
		Change buddy system to be only trainers (longer, more detailed)	Instead of buddying a new person to someone in the section, use dedicated trainers (changing their role) on the most difficult jobs so that the individual is set up for success	Not valued - enablers	12
MLY07	Yield	Improve boneless yield	Increase yield through reducing losses across key drivers (dropped meat/ meat on bone/ carcass trim/ conveyor to render) - Supervision, coaching and management of KPIs - Display performance on visual boards - Installation of additional guarding and conveyors improvement - Adjustment of spraying parameters in chiller	13.64%	18
MUC01	Cost	Reduce utility costs by optimising shut down strategy for chillers when production stops	Establish an SOP for boning room floor supervisors to communicate to Maintenance and Engineers end of production, so chillers can be ramped down immediately	Not valued	1
MUC02	Cost	Reduce utility cost by isolating chiller y from heat radiation during clean up	Install separation wall / curtain in chiller y so when cleaning starts chiller will not be warmed up as much as now	Not valued	3
MUC03	Cost	Reduce utility cost by ensuring chiller doors are always closed unless loading / unloading program is currently running	Establish SOP for chillers supervisors to regularly check whether doors are closed, report audit results by maintenance on opened doors during next week 8 am production meeting	Not valued	1

MVC01	Cost	Reduce give away for steaks to 9%	Establish SOP for regular Morell calibration. Procure crust freezing / press to press equipment. Include tracking of giveaway for steaks to standard giveaway report and daily KPIs	1.20%	10
MVC02	Cost	Replace current xxx machine	Replace existing machine with new equipment, that has speed double of the existing one. No additional resource to manage machine vs. current tone will be required	2.39%	10
MVC03	Cost	Optimise VA room layout to streamline / level production flow	Streamline production flow with dedicated production lines will reduce in-shop transport time as well as level production	1.21%	12
MVC04	Cost	Install airblades and shrink tunnel to eliminate wet packaging of easy carve leg	Install new air blades to dry up wrapped leg roast (easy carve leg) + install new shrink tunnels.	0.19%	6
MVC05	Cost	Redesign boning room 10 layout	As robot CT scanner has been removed, boning room xxx can be reconfigured to take over the freed up space. This will free up space for the new VA chiller: infrastructure already exists just walls and doors have to be rebuilt.	0.33%	4
MVC06	Cost	Install carboard crushing machine(s) in VA	Install cardboard crusher or cardboard baler at VA.	Not valued	Idea not valued

6.2 Prioritisation

Once the improvement opportunities were identified, they were prioritised by key stakeholders on expected value and ease of implementation, allowing the team to develop actions for high priority opportunities. This prioritisation is essential, as it allows 'MeatCo' to focus on the 'precious few' areas, rather than becoming distracted by trying to 'do everything at once'. Organisations which focus on the precious few ideas deliver far higher financial impact than those who have 500+ ideas in the pipeline stretching and scattering their people.

Figure 44: Example Prioritisation – Value / Ease Matrix



Ideas	
Throughput - chiller debottlenecking (ideas not additive in throughput gain)	
1a	Convert the training room into an additional chiller
1b	Convert the corridor between the boning room and the chillers into a chiller
1c	Stagger the slaughter and boning shifts to reduce peak chiller load at the end of slaughter shift
1d	Put a chiller door and refrigeration units in the corridor between chiller 1 and 8
1e	Realign the rails in chillers 1 and 6 to run the opposite direction*
1f	Curtain to segregate hot and cold carcass in chiller 3
Yield improvement	
7	Implement a check weigh station
8	Rail by rail spray chilling program
9a	Boning room wiring (drop meat, rack to CL, bone cleaning)
9b	Standard Carcass trim
9c	Boning room tools and adjustments
Throughput - packing line improvements	
12	Reduce rework by redirecting/mitigating fan blow
13	Rebalance vacuum packer load
14	Bagging area improvements
Cost improvement - Skin line (Case Ready improvement)	
15	Overhead reduction

Figure 44: Prioritised lamb throughput ideas

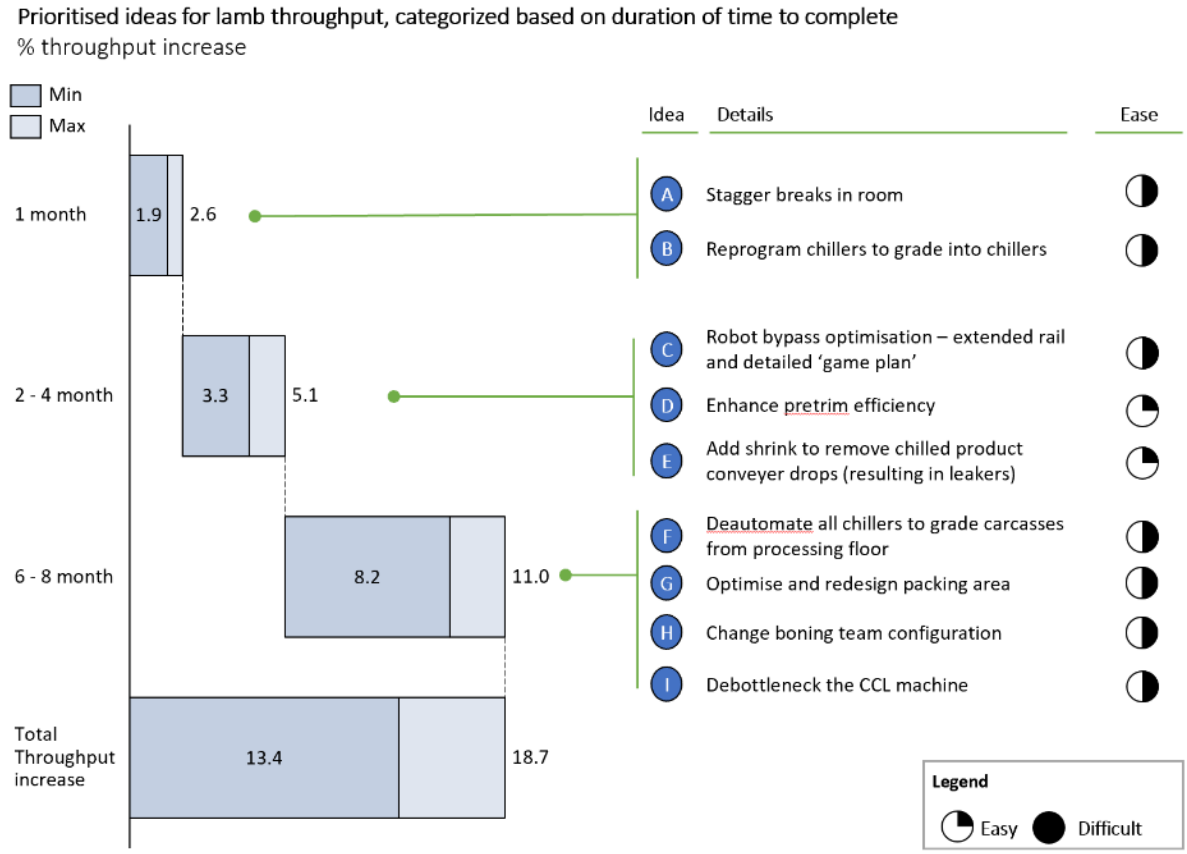
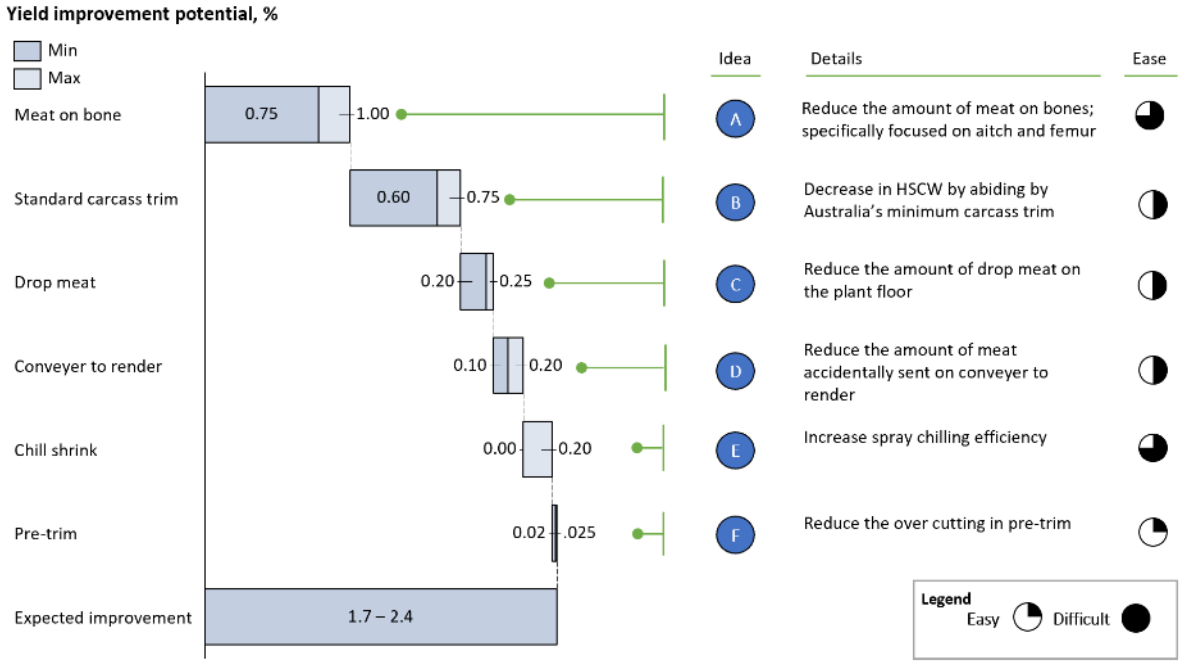


Figure 45: Prioritised Lamb Yield Ideas



Yield improvement will come from combination of loss reduction efforts, largely through 'rewiring' the shopfloor

Type	Ease	Impact	One off cost	Implementation time
Yield	Easy – Medium	0.6% - 1.3% increase in yield	$xxk - $xxk	Immediately – 6 months

Observation

- The yield (that we can obtain) is lower than desired (currently ~xx%) with an opportunity to increase red meat yield
- When spending time on the shopfloor it was observed that a portion of viable product became unusable through multiple channels – the biggest opportunity observed is meat dropped on the floor

Root Case

- While yield is tracked, there was no measurement of drop meat, meat to bone ratio or review of standard carcass trim on the shopfloor
- The beef room moves at a fast pace, as such, it's difficult for supervisors to always focus on yield while also managing the full floor
- Blockages and the absence of appropriate guarding in key points of the line contribute to meat falling on the floor

Proposed Change

- Use the yield that JBS tracks, however, show how this relates to the shopfloor (kgs of drop meat on floor, % of meat left on bone etc.)
- Display this information on easily accessible and visible boards with simple visual tools (e.g. red / green)
- Measure drop meat periodically, train and measure meat on bone and audit standard carcass trim
- Implement engineered solutions where possible (guarding)

Implementation risk

- Difficult to track in all areas
- May slow down the line if people are extremely focus on yield but not time

Loss sources	Specific tracking suggestions
Dropped meat	✓Install new guarding and tables ✓Measure waste on floor before throwing out
Meat on bone	✓Review and coach on key bones each day over time ✓Implement additional staffing if economically viable
Chiller shrinkage	✓Review shrinkage results and other parameters (QA) and adjust spraying accordingly
Standard-trim	✓Daily audits for trim review
Hygiene pre-trim	✓Review and coach pre-trimers to better target trimmed parts and remove only the right quantity of fat ✓Coach stick person to avoid hitting bone and reduce neck bruising

0.6% - 1.3% yield increase

Figure 46: Prioritised beef throughput ideas

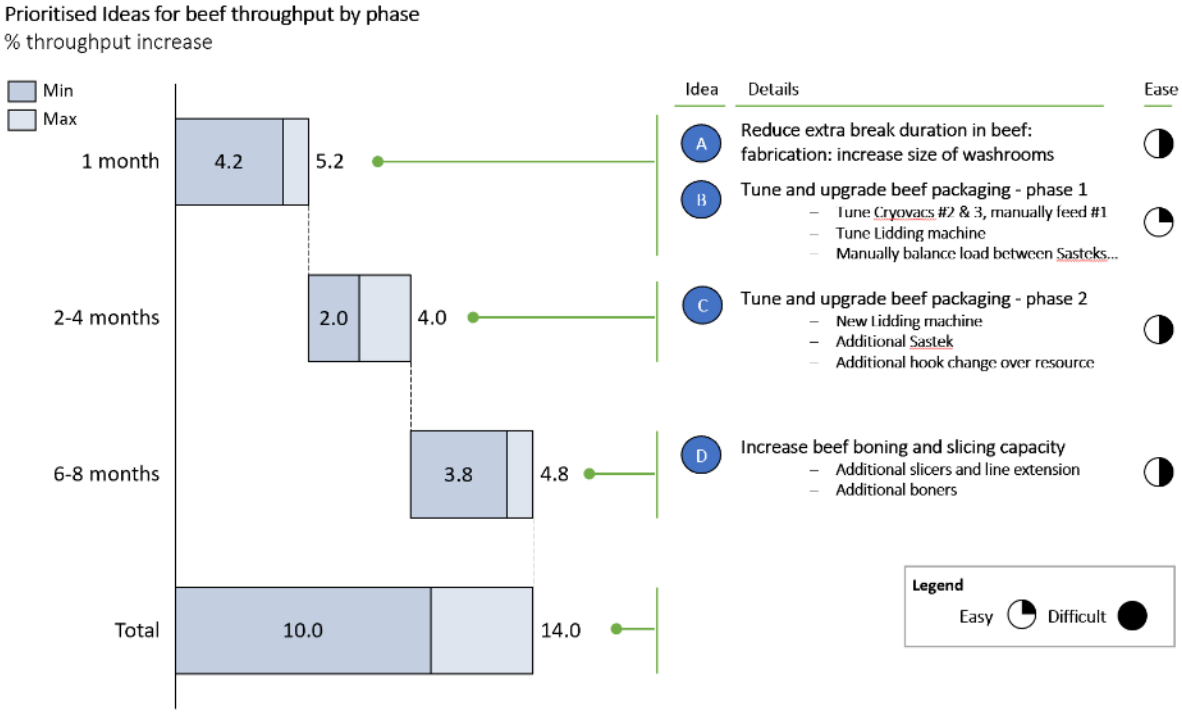
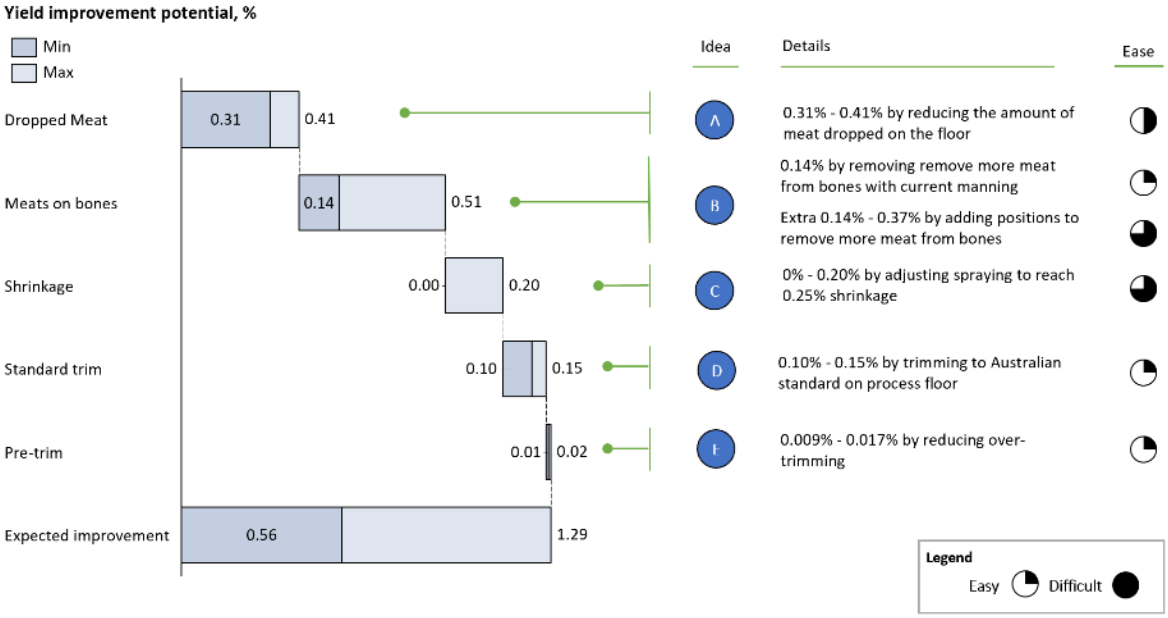


Figure 47: Prioritised beef yield ideas

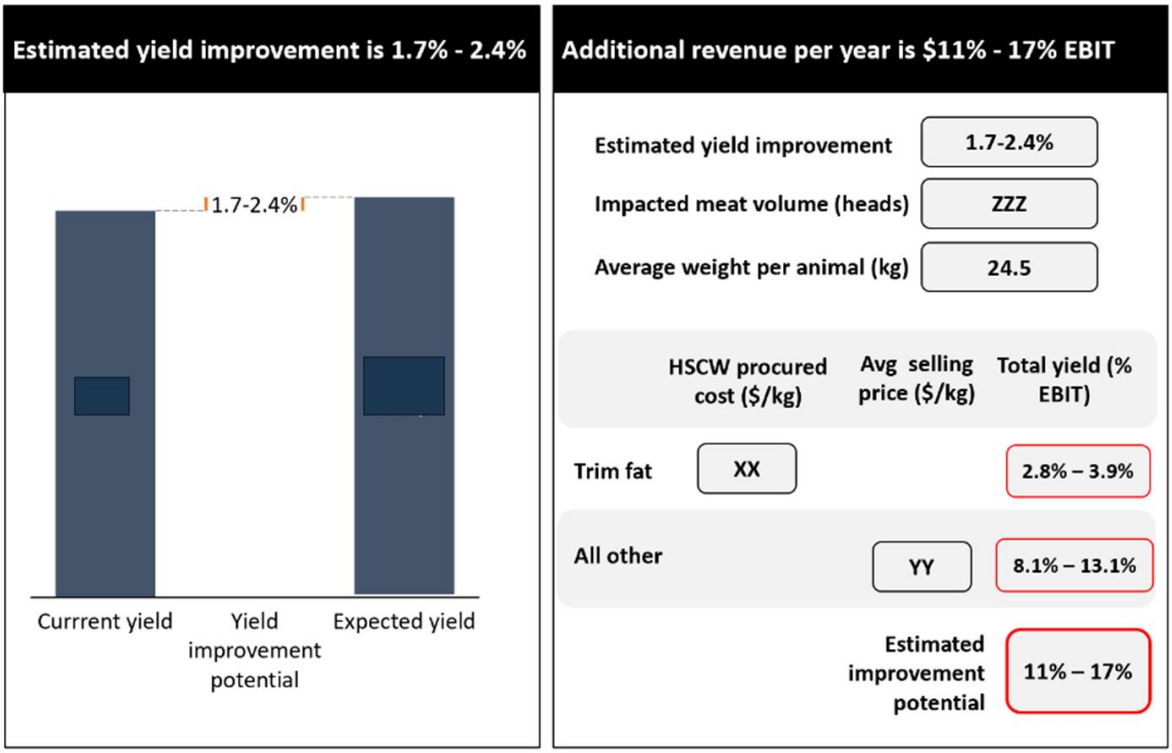


6.3 Quantified opportunities

Prioritised ideas were further evaluated through additional analysis and supported by estimates of one-off cost (capex or idea implementation cost). Each prioritised idea was allocated a 'MeatCo' sponsor, known as the Idea Owner. The Idea Owner's role in the first instance is to drive the assessment of the idea.

Sufficient analysis should be completed on the costs and benefits of each idea. A VDT should be used to calculate the value of each improvement ideas and the impact of a change in a lever on 'MeatCo's EBIT.

Figure 48: Estimated lamb yield improvements (current yield is disguised)

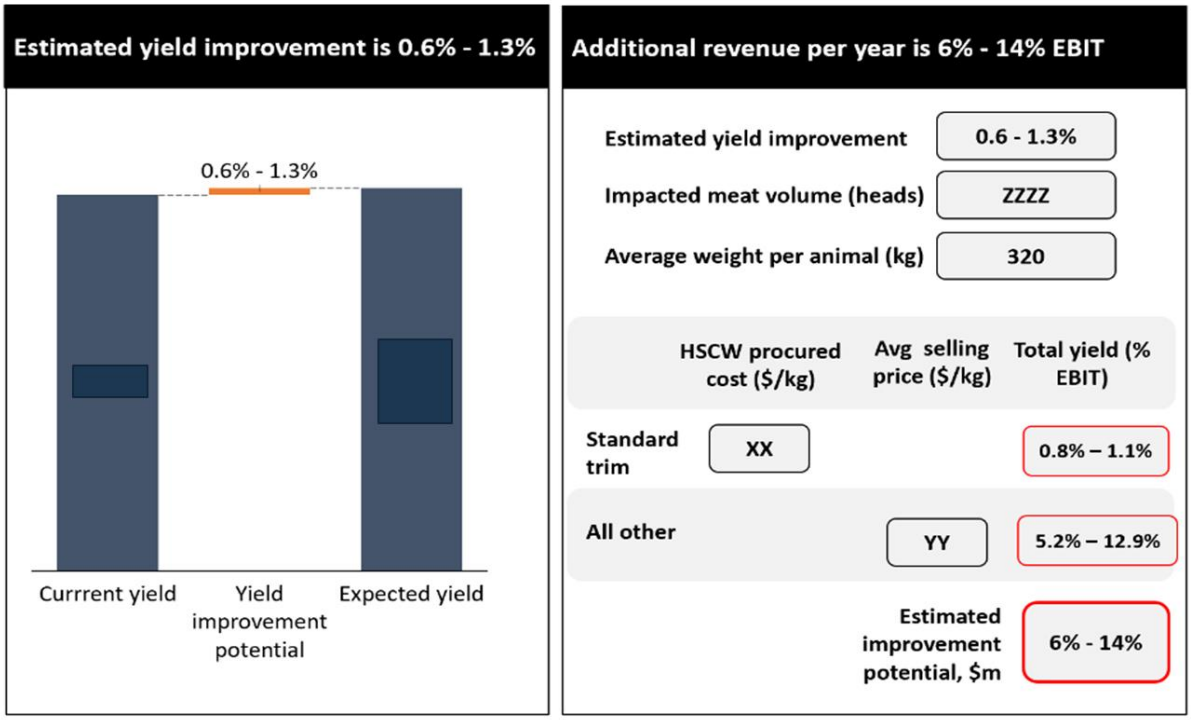


The value of additional throughput should be calculated using a marginal contribution per head.

Lamb considerations	Cost per kg	Per head
Avg carcass kg		
Revenue per head		
Offal + skin processing		
Cost for skin		
Tally rate beef bone per head		
Tally rate beef (saw) per head		
Cost to farmer (per kg)		
Freight and storage per animal		
Packaging per head		
1 extra person + machine for offal		

Initial Marginal contribution		
Mutton opportunity lost per head		
Overall lamb marginal contribution		

Figure 49: Estimated beef yield improvements (actual yield is disguised)



The value of additional throughput should be calculated using a marginal contribution per head.

Beef	Cost per kg	Per head
Avg carcass kg		
Revenue per head		
Skin + offal		
Contract service per hide		
1 extra person + machine for offal		
Tally rate beef bone per head		
Tally rate beef (slice) per head		
Cost to farmer (per kg)		
Freight and storage per animal		
Packaging per head		
Marginal contribution		

7 Targets

Targets need to be agreed upon so that the team has a clear goal to aim for. For each idea, upper and lower cost benefit ranges were provided. The upper range should be used as a stretch target. The upper target should be a stretch but not out of reach. Targets must be a possibility on the spectrum of certainty within the planning timeframe.

See section 6.2 for examples

8 Implementation plans and roadmap

A summary implementation plan was developed with a roadmap for implementing the ideas capturing improvement opportunities. The plan was developed in conjunction with the 'MeatCo' management team. This ensured that it was practical for 'MeatCo', considering any resource limitations or dependencies. Building the implementation plan together with 'MeatCo' management also further gained buy in and ownership for the success of the program.

The ideas contained in the implementation plan will still need to be validated. As part of the evaluation stage of the ideas pipeline, validated ideas will need to have a detailed implementation workplan developed. As part of the workplan, all ideas need to have an eye on how to sustain the idea – locking in the benefits

One of the key outputs after the workplan is agreed is benefits target S-curve, that client needs to track progress against, and expected cashflow forecast that takes into account benefits and one off investments (see disguised examples below)

Implementation Plan

Area/Department	Idea Type	Idea Description	Start of implementation	Duration of implementation (in months)	End of Implementation
Lamb	Throughput	Robot bypass optimisation	Mar/19	2	30-Apr-19
		Optimise in and out of room flow - pretrim and blast chilling	Mar/19	6	31-Aug-19
		Optimise and redesign the packing and boning areas	Apr/19	6	30-Sep-19
		Enhance grading ability of carcasses	Apr/19	8	30-Nov-19
		Redesign finishing area	Jul/19	6	31-Dec-19
		Implement staggered breaks	Mar/19	1	31-Mar-19
	Yield	Improve boneless yield	Mar/19	18	31-Aug-20
Beef	Throughput	Reduce extra break duration in beef fabrication	Mar/19	6	31-Aug-19
		Tune and upgrade beef packaging - phase 1	Mar/19	3	31-May-19
		Tune and upgrade beef packaging - phase 2	Jun/19	6	30-Nov-19
		Increase beef boning and slicing capacity	Jan/20	3	31-Mar-20
	Yield	Optimise yield	Mar/19	6	31-Aug-19
VA	Cost	Reduce give away for steaks to 9%	Mar/19	10	31-Dec-19
		Replace current Darfresh machine	Jun/19	10	31-Mar-20
		Optimise VA room layout to streamline / level production flow	Jun/19	12	31-May-20
		Install airblades and shrink tunnel to eliminate wet packaging of easy carve leg	Jun/19	6	30-Nov-19
		Redesign bonning room 10 layout	Jul/19	4	31-Oct-19
CCL / Blast freezer	Cost	Move the laser location in the Gordon tunnel to be in the room instead of outside of the entrance	Apr/19	1	30-Apr-19
		Create a new line for the chilled product and then use the current CCL line for only frozen products	Apr/19	6	30-Sep-19
		With the additional capacity from removing chilled from the CCL machine, we should include mutton in the freezing capacity, this requires an additional conveyer belt	Oct/19	6	31-Mar-20
		Increase the temperature of the Gordon blast freezer (lamb) as the lamb is in there for 48 hours	Mar/19	3	31-May-19
		Automate the ten plate blast freezer loading process	Oct/19	3	31-Dec-19

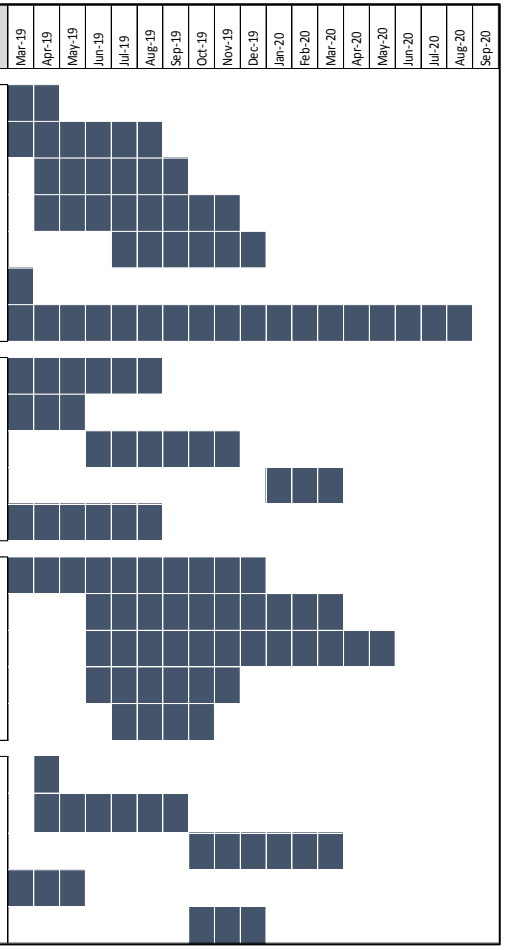


Figure 50: Implementation Planning

Figure 51: Benefits ramp up S curve (figures are disguised)

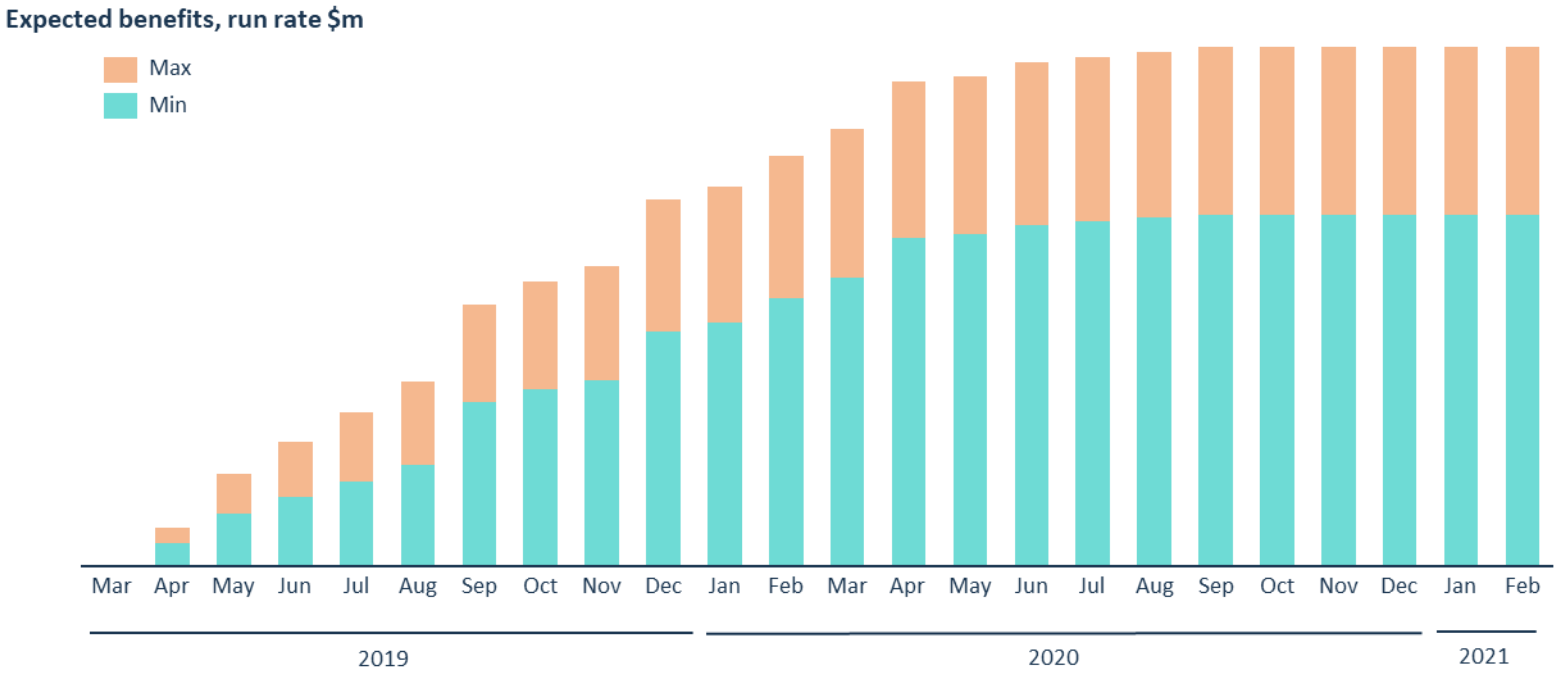
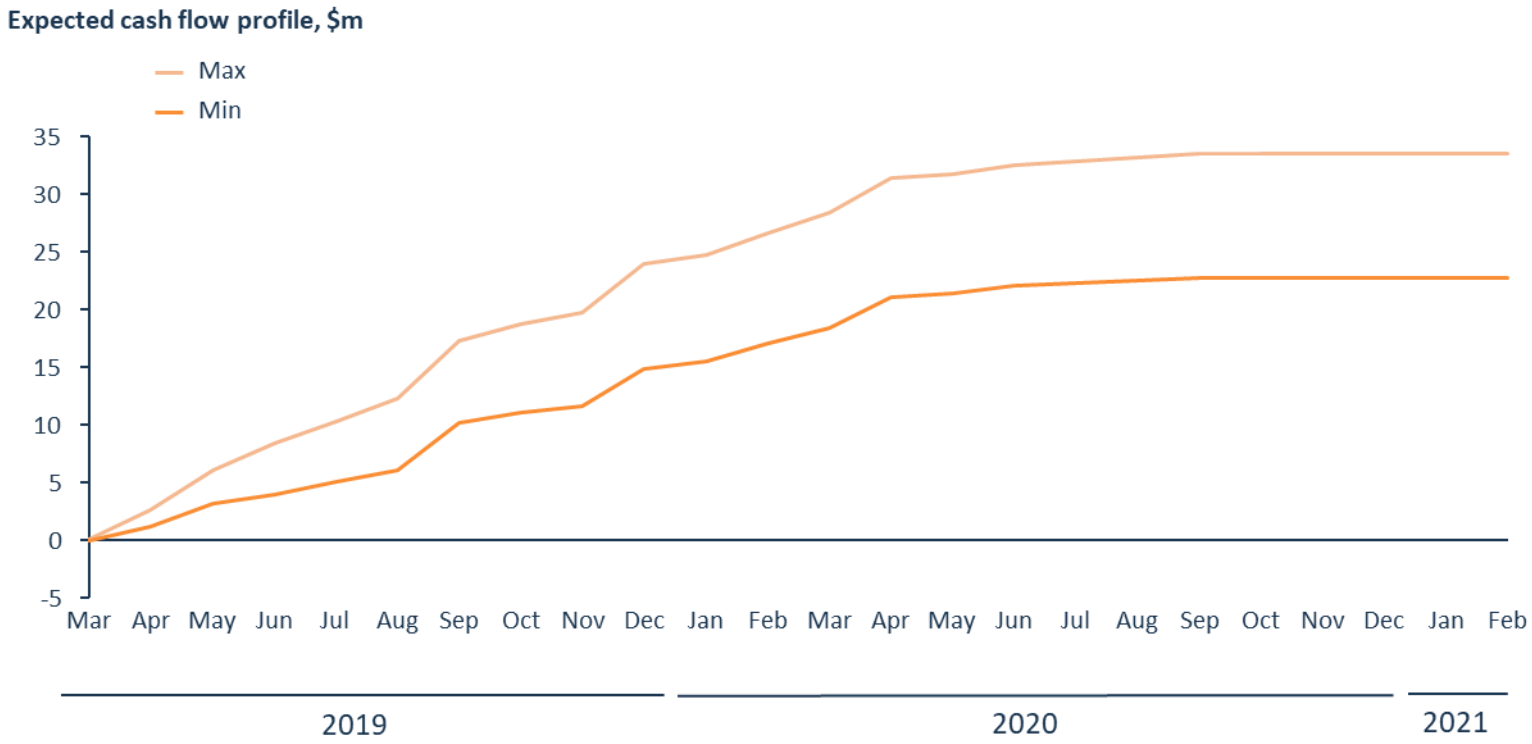


Figure 52: Cashflow curve (figures are disguised)



.

9 Sample outputs/findings

The diagnostic developed and syndicated a plan with the 'MeatCo' team which:

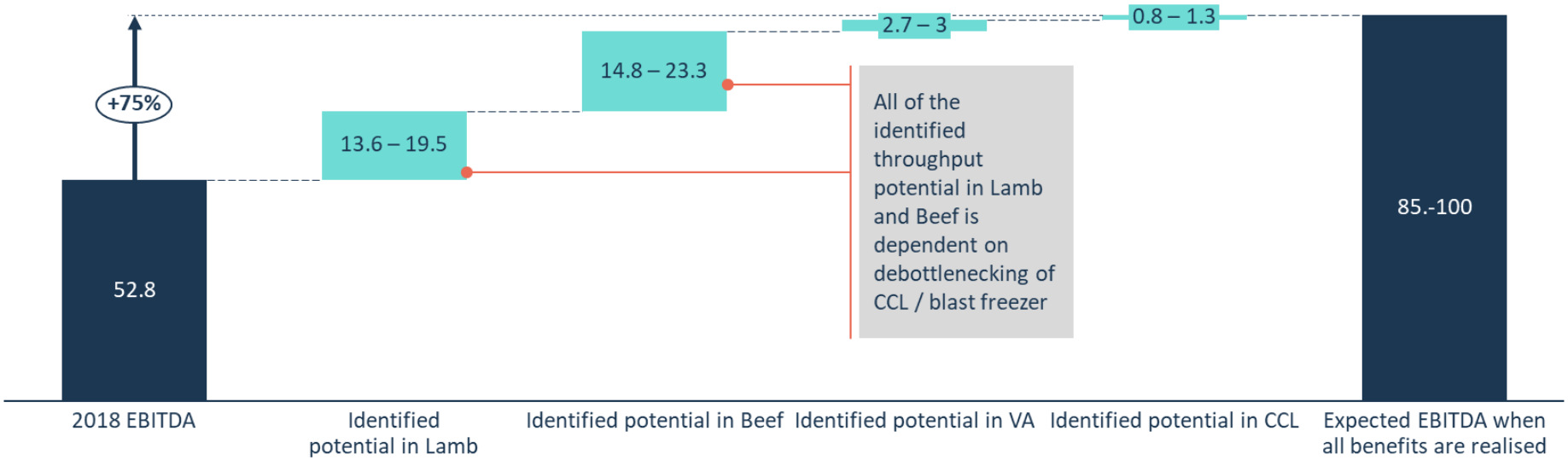
- Identified the size of the opportunity and where the money will come from
- Prioritised which opportunities should be pursued first
- Recommended how to deliver high priority opportunities, including required resources and timing of benefits
- Assessed 'MeatCo's current ability to capture the money (wiring)

Some sample outputs and findings from the diagnostic are outlined below (some of them were already shared in the previous sections).

We identified and prioritised ideas worth ~75% in EBITDA improvement

Figure 53: EBITDA improvement potential, $m

Disguised Example



If identified potential is fully delivered, cost per head of Lamb and Beef is expected to be improved by 175% and 34% respectively

Figure 54: EBITDA improvement potential Lamb, $/ head boned

Disguised Example

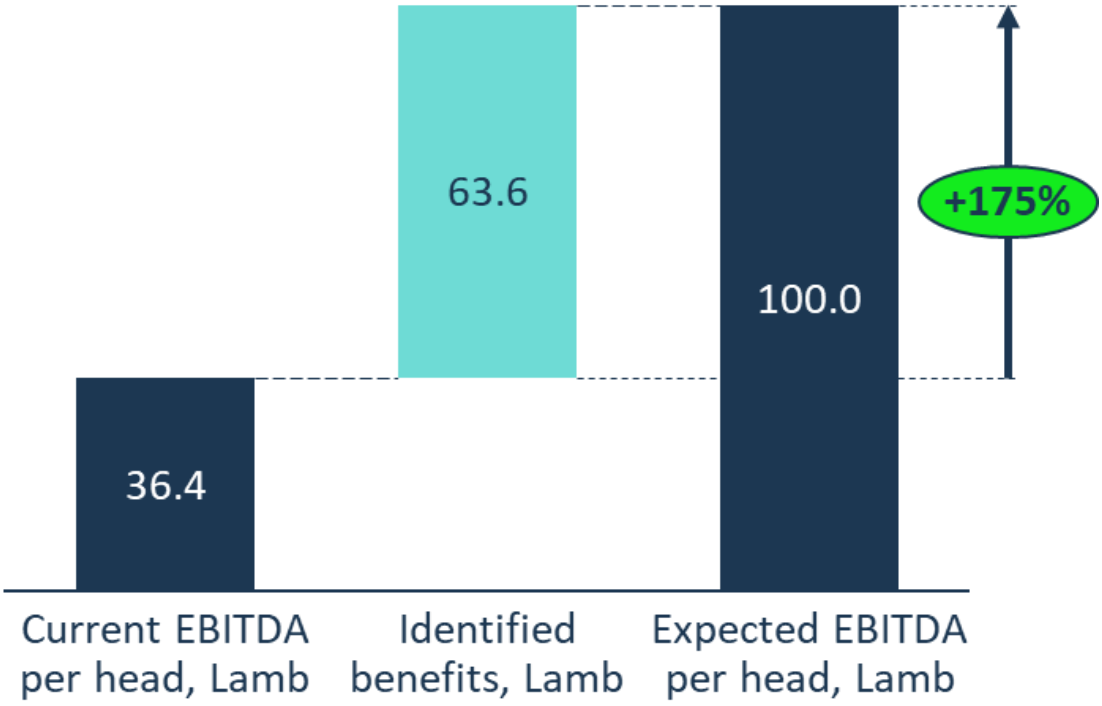
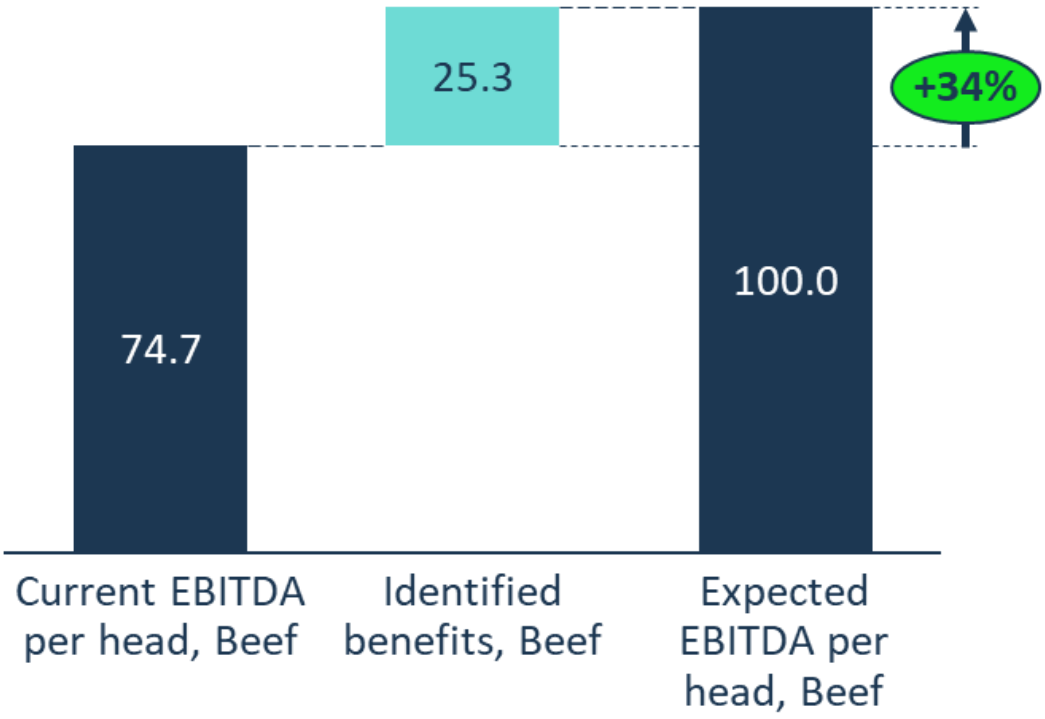


Figure 55: EBITDA improvement potential Lamb, $/ head boned

Disguised Example



CCL machine and the blast freezer entrance are key to unlocking full potential for beef and lamb throughput.

Figure 56: Beef Throughput Disguised Example

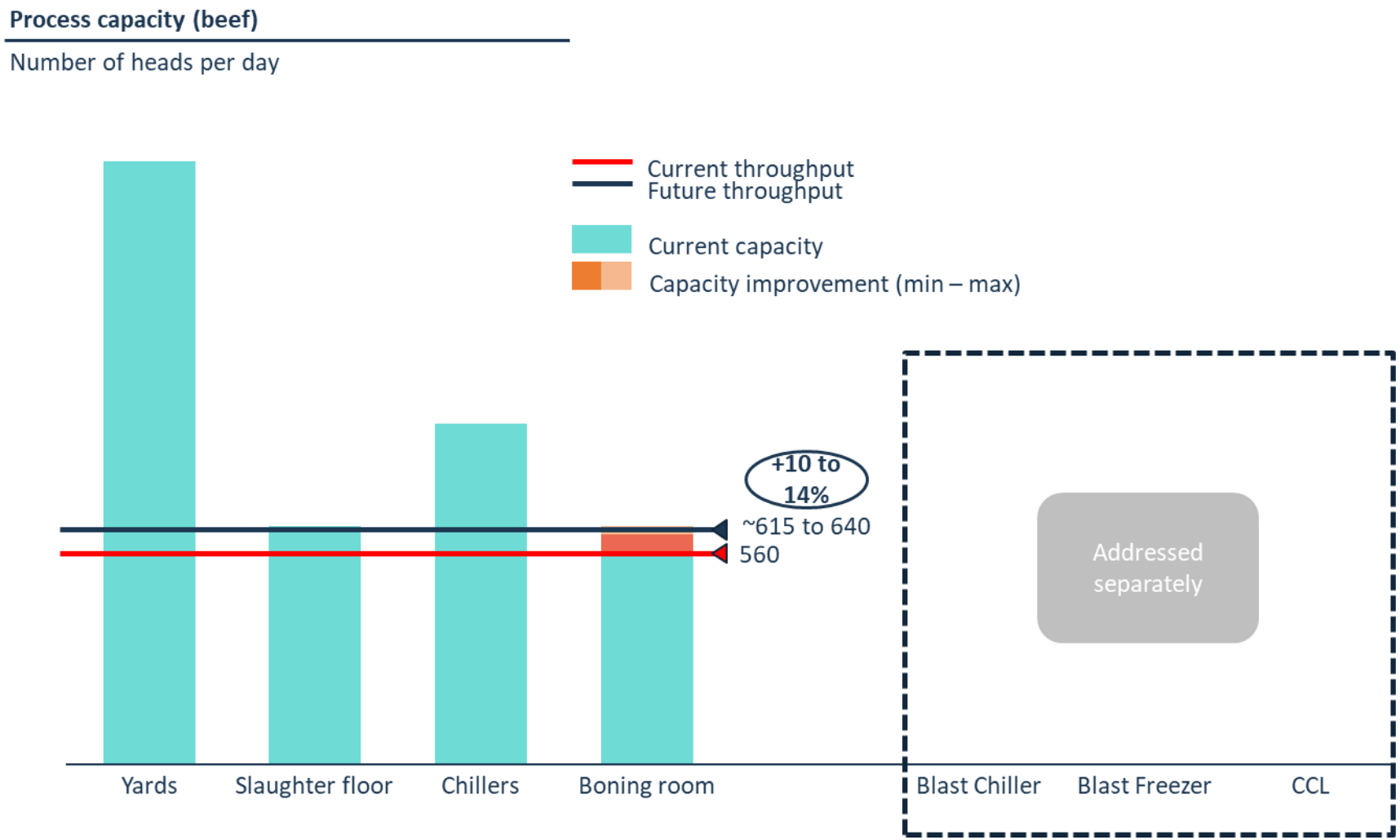
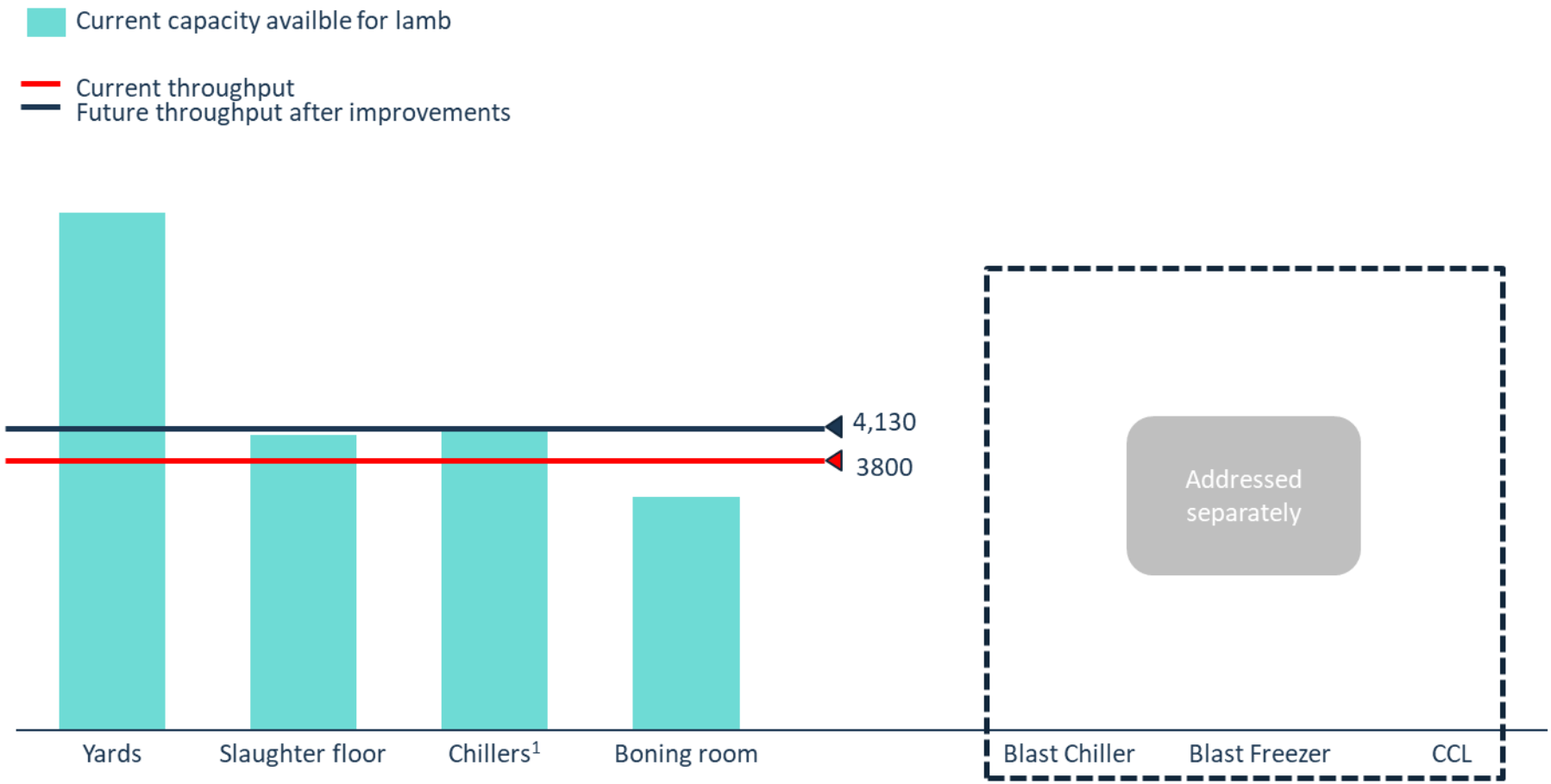
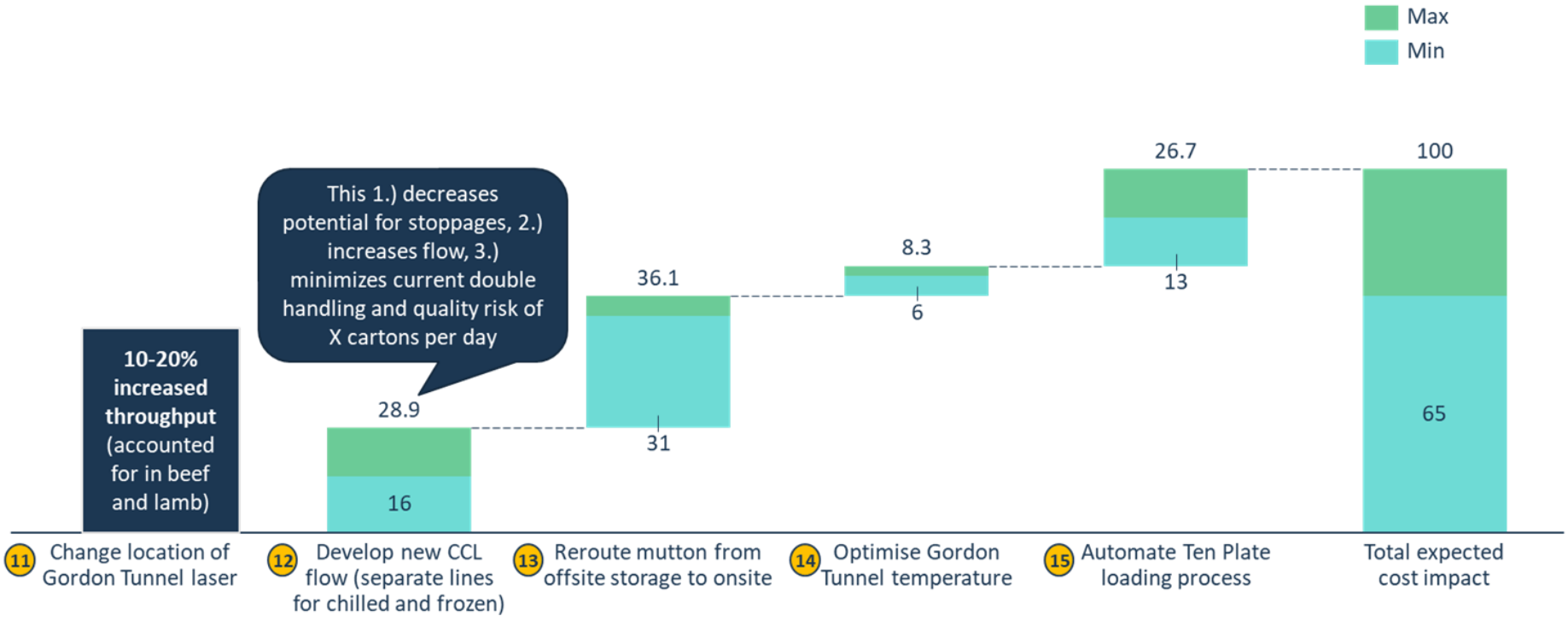


Figure 57: Lamb Throughput Disguised Example



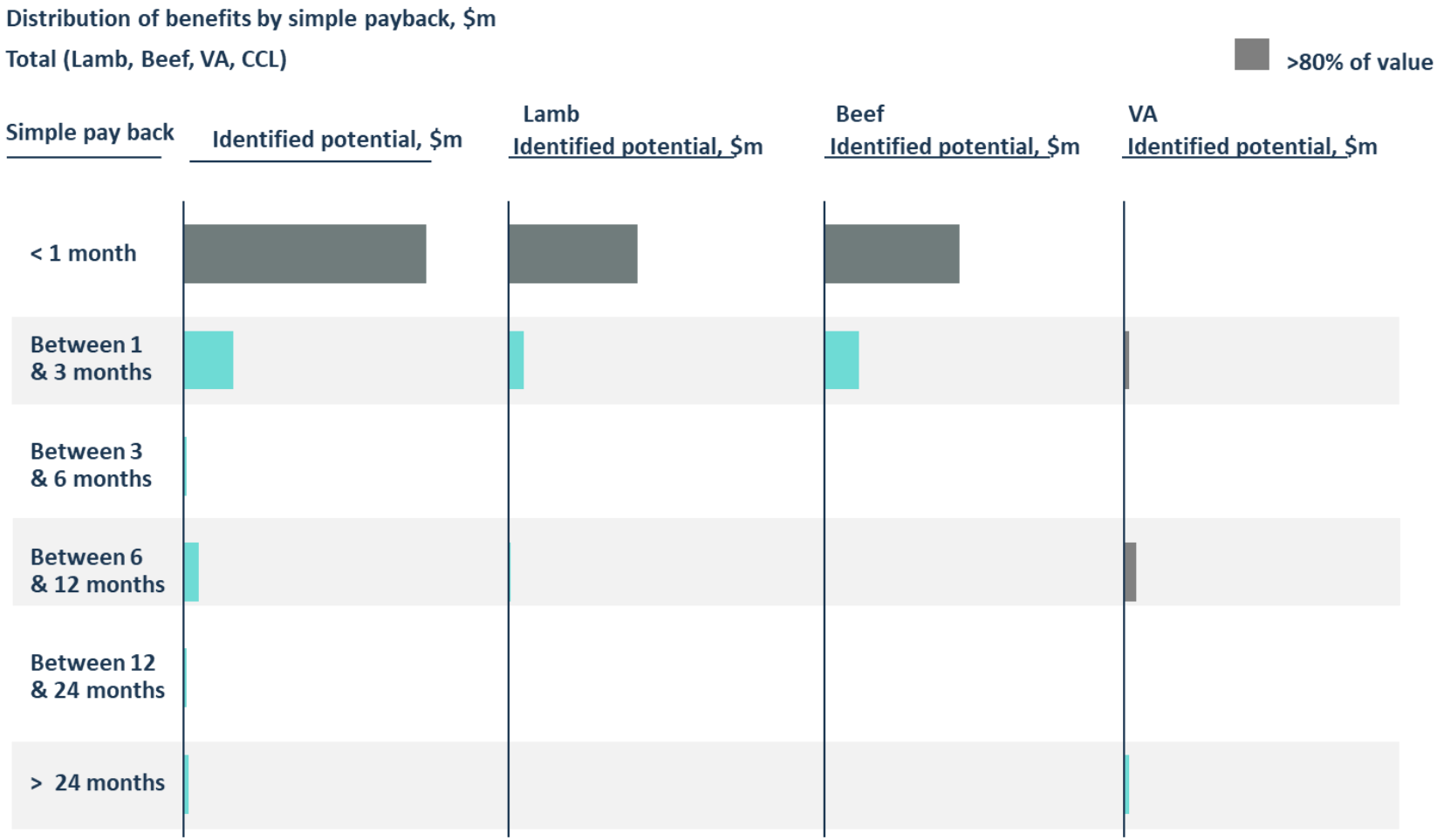
We have identified improvement potential in the CCL and blast freezers; additionally, these improvements will increase throughput for beef and lamb.

Figure 58: Improvement potential, $m, Disguised Example



We have assessed required one off investment and ensured that majority of value is delivered through no or low investment ideas

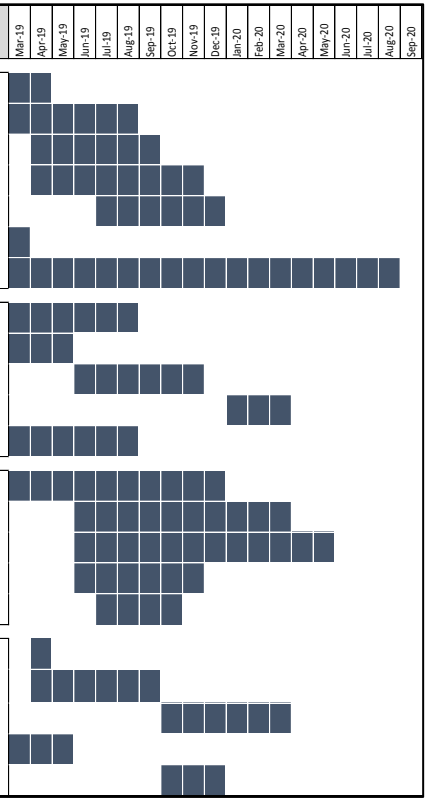
Figure 59: Improvement potential, $m by payback. Disguised Example



Based on discussions with key stakeholders and availability of resources team has developed an idea implementation roadmap

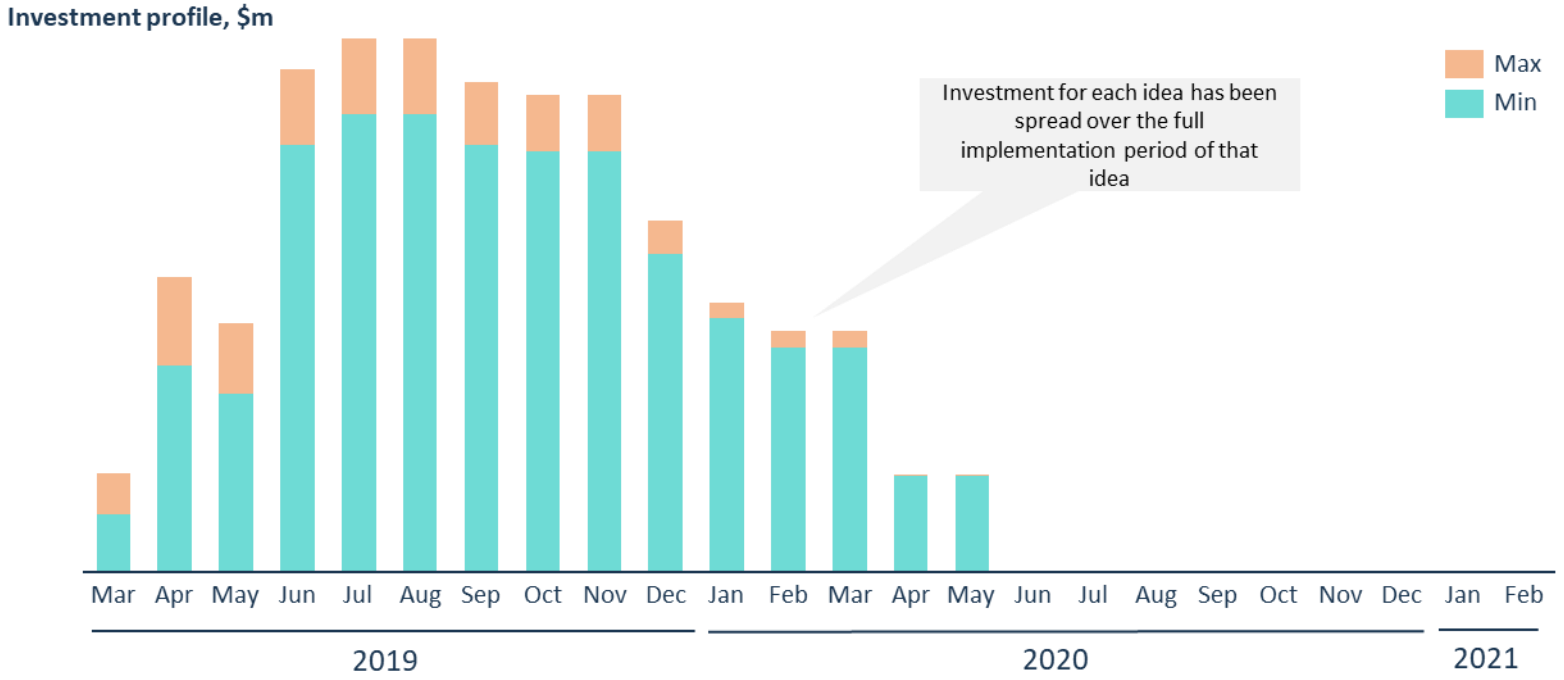
Figure 60: Implementation roadmap. Disguised example

Area/Department	Idea Type	Idea Description	Start of implementation	Duration of implementation (in months)	End of Implementation
Lamb	Throughput	Robot bypass optimisation	Mar/19	2	30-Apr-19
		Optimise in and out of room flow - pretrim and blast chilling	Mar/19	6	31-Aug-19
		Optimise and redesign the packing and boning areas	Apr/19	6	30-Sep-19
		Enhance grading ability of carcasses	Apr/19	8	30-Nov-19
		Redesign finishing area	Jul/19	6	31-Dec-19
		Implement staggered breaks	Mar/19	1	31-Mar-19
	Yield	Improve boneless yield	Mar/19	18	31-Aug-20
Beef	Throughput	Reduce extra break duration in beef fabrication	Mar/19	6	31-Aug-19
		Tune and upgrade beef packaging - phase 1	Mar/19	3	31-May-19
		Tune and upgrade beef packaging - phase 2	Jun/19	6	30-Nov-19
		Increase beef boning and slicing capacity	Jan/20	3	31-Mar-20
	Yield	Optimise yield	Mar/19	6	31-Aug-19
VA	Cost	Reduce give away for steaks to 9%	Mar/19	10	31-Dec-19
		Replace current Darfresh machine	Jun/19	10	31-Mar-20
		Optimise VA room layout to streamline / level production flow	Jun/19	12	31-May-20
		Install airblades and shrink tunnel to eliminate wet packaging of easy carve leg	Jun/19	6	30-Nov-19
		Redesign bonning room 10 layout	Jul/19	4	31-Oct-19
CCL / Blast freezer	Cost	Move the laser location in the Gordon tunnel to be in the room instead of outside of the entrance	Apr/19	1	30-Apr-19
		Create a new line for the chilled product and then use the current CCL line for only frozen products	Apr/19	6	30-Sep-19
		With the additional capacity from removing chilled from the CCL machine, we should include mutton in the freezing capacity, this requires an additional conveyer belt	Oct/19	6	31-Mar-20
		Increase the temperature of the Gordon blast freezer (lamb) as the lamb is in there for 48 hours	Mar/19	3	31-May-19
		Automate the ten plate blast freezer loading process	Oct/19	3	31-Dec-19



Resources required to support implementation has been assessed and planned along the idea implementation timelines

Figure 61: Idea implementation one-off investment, cash outflow. Disguised example



Diagnostic team has identified critical changes to performance management practices required to wire program implementation for success

Figure 62: Wiring recommendation example

	Actions	Example of possible changes
Reinforced alignment through the line	Reinforce **alignment** from shopfloor to the top on key **metrics** for measuring **performance** and how to **track** them	• OEE for major equipment / lines • Rework • Yield drivers (drop meat, clean bone)
Data driven decision making	Align on one **source of truth** to measure the **performance** at each level, and enable **data driven decisions** making	• How OEE data are recorded • Number of cartons rejected by X-ray caused by bone chips at slicing line x • Root causes of for low OEE / high rework
Performance visible to all	Ramp up **visual management** tools to identify **performance gaps** fast and steer **improvement**	• Visual boards with targets vs. KPIs at shopfloor (build from success of safety visual boards) • Critical KPIs trends over time • Root cause logs for breakdowns
Fast performance review cycle	Streamline cadence of **performance dialogues** ensuring root causes of performance gaps are identified, **accountability to close gap** established, and implementation tracked. **Celebrate successes**	• Start / end of the shift review at visual board: Yield, key equipment 'up time', status of actions; escalation of issues to supervisors / managers • 1-to-1 weekly reviews between supervisors and area leaders to coach how to improve performance
Sufficient supervision on the shopfloor	Ensure there are **no supervision gaps**: define mitigation plans for absences; establish a **cadence** of regular **performance checks** in all areas to identify and **resolve issues** quickly	• Supervisor diary: areas to inspect, inspection schedule, performance check list (equipment, people), coaching tips • Area leads audit of 'downstream' stations to check whether any losses occurring are generated in the area they are responsible for
Managed idea pipeline	Implement **ideas** pipeline **management system** to embed and **accelerate progress**	• Formalise process of collection / evaluation of ideas on how to improve performance • Deploy centrally managed idea management tool that would allow to track idea implementation plans, operational KPIs impact and financial benefits

10 Ownership by ‘MeatCo’ team

A key aspect of the approach was achieving ownership by the “on the ground” ‘MeatCo’ team. This was achieved as a consequence of working *with* the team and on the floor in conducting the diagnostic and creation of implementation. This is distinct from a more traditional consulting approach – having a group of smart young people, tucked away in a room, reaching an outsider’s point of view based on observation – this approach yielding theoretical rather than practical outcomes.

As a consequence of this approach the work is owned by the ‘MeatCo’ team. The final outcomes – the findings – were delivered not by consultants but by the ‘MeatCo’ team.

This ownership is reflected in implementation also. At the progress report delivered 2 months after the conclusion of the engagement, the results, presented once again by the ‘MeatCo’ team were that more than 1/3 of targeted benefits had already been delivered. In addition, the presented an updated and coherent implementation plan to deliver the remainder.