





A MICRO-ABATTOIR ON GREAT BARRIER ISLAND

**A FEASIBILITY STUDY TO CONSIDER SUPPLY, DEMAND AND FUTURE
DIRECTIONS**

CONTENTS

1. Executive Summary.....	3
2. Introduction.....	4
3. Background.....	5
4. Objectives.....	6
5. Methodology.....	7
6. Farming Practices: Stock and Pasture Management.....	7
7. Operational Model.....	15
8. Potential Throughput.....	16
9. Potential Markets and Demand.....	17
10. Design Requirements and Specifications.....	19
11. The Need for additional ‘Added Value’ Operations	23
12. Suitability of Proposed Sites and Planning Constraints.....	24
13. Waste management issues and solutions.....	25
14. Estimated Build cost.....	27
15. Capital and Operating Costs.....	31
16. Cash flow.....	34
17. Staffing and Management.....	37
18. Possible funding sources.....	37
19. Proposed Ownership Structures.....	39
20. Conclusion and Recommendations.....	40
 Appendix 1 NEC Proposal - Abattoir Design	
 Appendix 2 Relocateable Abattoir Concept Plans	
 Appendix 3 Relocateable Equipment List	
 Appendix 4 Relocateable Ovine and Bovine Process Flow	

1. EXECUTIVE SUMMARY

This report was commissioned by AoteaOra Community Trust to test the feasibility of developing a micro abattoir on Great Barrier Island that could service local farmers and the wider local community. The study investigates proposed designs, estimates for the build, operating costs and potential profitability, and looking at changes that may be needed to make the project work.

Crippling property rates on the island and fluctuating beef values, combined with high transport costs, force most farmers to hold supplementary jobs to create cash flow to provide for their families. The farmers currently lack funds for improving pasture and stock to achieve increased returns. Further investment in the infrastructure would increase efficiency allowing farming to become more of a full time occupation.

A significant challenge for the majority of the local farmers is the fattening of their stock. This is because of a number of interconnecting issues; high stock numbers, deficient pasture quality, poor water quality, a challenging climate (wet winters and very dry summers). As such, stock is typically sold as either weaners or yearlings.

One approach to address these issues would be to establish an abattoir on the island as an alternative market for farmers and a local food source for residents and visitors. However, the last two decades has witnessed a significant reduction in small abattoirs both within New Zealand and across the globe. Previous evidence suggests that an abattoir model which purchases small quantities of local livestock and trades meat has a low level of feasibility due to low throughput and high operational and regulatory costs.

Changes in farming practices would be needed to provide sufficient quality fattened stock to meet abattoir requirements and consumer demand ;a cattle beast must sit between 200-220kg to meet premium requirements. Interviewed farmers expressed a willingness to work together to achieve this goal. The strategies discussed include the following: stock reduction, joint purchase of bulls and breeding stock, farmers specializing in one stage of the process, trialing alternative breeds and testing new pasture management techniques.

Throughput and number of days of operation have a major bearing on profitability. Estimates currently sit at a throughput of 10 cattle per week, and open for 3 days/week and 46 weeks a year (closing in mid-summer and mid-winter). An increase of throughput to the maximum possible would maximize profit /or reduce loss. Minimum throughput for year one would equate to 460 cattle per year.

There is strong community support for the development of an abattoir; this is motivated by the community being able to support local farmers, create local jobs, and purchase locally produced food. This enthusiasm is tempered with concerns about purchasing pragmatics, especially for those in the hospitality industry where food quality and supply reliability are critical.

Interviews, surveys and workshop results indicate the potential for a strong consumer base. However, diversity in meat purchase and consumption will require careful thought in meat cuts, processing, specialty products, packaging and pricing.

The Animal Products Act 1999 and the Animal Products Regulations 2000 provide the regulatory and risk management frameworks for all abattoirs (large or micro), irrespective of whether production is for export or the local market. As a result, the capital cost of building new, or refurbishing old, abattoirs are currently substantial and prohibitive for many local rural communities. These regulations are currently being reviewed by the Ministry of Primary Industries, with the aim of establishing a two tier system to separate out the requirements for meat to be exported from meat that is to be purchased domestically. These changes could enable a more cost effective build without a compromise to hygiene, meat safety and branding.

We estimate the cost to build a micro abattoir to cater initially for cattle (with a later introduction of sheep and other animals) and to provide chilling, cutting and butchering will be in the \$650-\$700,000 range. Napier Engineering Company Ltd. is working closely with the Ministry of Primary Industries (MPI) to create a workable template for a potential roll out across small-rural New Zealand.

Sealink is supportive of the micro-abattoir. The introduction of their refrigerator truck next year would enable meat to be transported back to Auckland at a competitive price. Sealink would be minimally impacted by the reduction and/or loss of shipping live stock to the Island.

I suggest, based on evidence presented here, that there is tentative demand for an abattoir that provides a slaughter service and has the capacity to procure local stock and sell meat, both on and off island. However, farmer enthusiasm is tempered by a need to resolve a number of issues; in particular, ownership and operational structures, build and operational costs, needed changes in farming practice required to achieve meat supply, marketing and sales expertise, branding, local meat processing skills, purchase and pricing structures, and local community support.

There is a consensus that management and operational structures need to have commercial rigor, be cooperative in nature, and provide local farmers with the opportunity to hold the majority of the Director's seats.

We expect the abattoir to operate at a loss for years 1 and 2 and a small profit for year 3. It needs to be emphasized however, that to be sustainable the build will need to be fully financed. This operation cannot afford an initial capital cost. It is proposed capital finances be secured through a combination of government and philanthropic grants and through sales of shares to stakeholders.

While it is difficult to build a business case on expectations of investment, there are sufficient indicators to suggest that the micro-abattoir could be a successful venture on the island. Further, it could make a positive contribution to the local infrastructure, support local industries and generate new jobs and business opportunities.

2. INTRODUCTION

The purpose of this study is to undertake preliminary work to establish the feasibility for a micro-abattoir to serve Great Barrier Island. We aim to explore the type of design, ownership and management concepts that could work; furthermore what would be the costs, opportunities and risks?

The report was commissioned by the AoteaOra Community Trust, with the Great Barrier Island Local Board and Great Barrier airlines funding. AoteaOra Community Trust was incorporated in June 2014. The objectives of the

Trust are to research, promote and practice the principles of sustainable living, create change toward environmentally sustainable living on Great Barrier Island and, and create change in people's attitudes, knowledge and practice of environmentally sustainable living on GBI.

Great Barrier island lies in the outer Hauraki Gulf 100 kilometers north-east of Auckland. With an area of 285 square kilometers it is the fourth largest island of New Zealand. The island boasts highly contrasting coastal environments. The eastern coast comprises long windswept sand-dunes, and heavy surfs. The western coast is more sheltered and home to hundreds of tiny, secluded bays. The inland holds several large and biologically diverse wetlands, rugged hill country, and old and regenerating kauri forests. Around 60% of the total area is administered by the Department of Conservation.

3. BACKGROUND

The amount of land dedicated to farming on Great Barrier Island has substantially decreased over the last century. Early settlers found the land harsh and difficult to farm, but determined hard work broke through native bush landscapes to establish pastures. Much of this land has now returned to bush and farms are now fewer and smaller, operating on the fringes of the bush.

Great Barrier Island is principally a store livestock production area: most calves are sold as weaners or as 'forward stores' at a year old. This method of farming practice has been adopted by the farmers because of the high transport costs to market and availability of feed and water for stock.

Stock is principally sold through PGG Wrightsons, Pukekohe at the Tuakau sale yards to farmers in the local region for fattening. Neville Brothers are the most commonly used trucking company on Barrier. Their trucks are frequently empty on arrival causing an inflated cost to the farmers. Crossings can be delayed and timing for re-booking can create issues. The cost of travel is high varying from \$100-\$150per cattle-beast. Travel time for the round trip is typically 12 plus hours. These inefficiencies could be reduced through the development of the abattoir on the island.

The meat industry is however, a tough and highly competitive industry to survive in. Large abattoirs dominate the New Zealand farming landscape, with smaller operators finding it difficult to get a sustainable foothold in the meat industry. There are four large abattoir chains: AFFCO, South Pacific, Silver Fern Farms and Alliance Group. These four chains slaughter 75-85% of New Zealand stock and 96-97% of the stock slaughtered in these abattoirs is exported.

Abattoir businesses, especially those on a small scale, struggle to be viable. Running costs are high, and throughput is variable and seasonal. The seasonality contributes to instability of employment and difficulties in attracting and retaining skilled employees, especially on an island with few supplementary work opportunities. Exacerbating these challenges is the issue of demand which is difficult to gauge and predict. Many small abattoirs in New Zealand have closed in recent years. The Chatham Island's abattoir is the most recent closure. It is understood that the closure was the result of a combination of factors including: an export focus, excessive transport costs, a short fattening season, a small local community and limited tourism population.

Funding and micro-financing for capital projects, such as micro abattoirs, is difficult to obtain, and funding for ongoing costs, even more so. Previous studies on the feasibility of establishing a micro abattoir have not been particularly encouraging.

However, there are a growing number of consumers demanding to know where their meat comes from, and how animals have been treated. We emphasize the clear growing trend of consumers being prepared to pay more for paddock to plate products, organics, and a guarantee of humane and hygienic slaughter practices. Further issues of food miles, reducing plastic packaging, and supporting small local rural economies are becoming increasingly important purchasing determinants.

The abattoir would provide Great Barrier Island with a local food option. This is in contrast to residents being forced to contend with the difficulties and escalating costs of purchasing meat from Auckland. In developing the abattoir farmers would expand and become closer to their customer base. This would support brand development and enable excellent feedback loops for further product development. Moreover, a local abattoir would reduce animal travel-stress, address the substantial food miles and contribute to the government's targets for a low carbon economy.

The Ministry of Primary industries (MPI) is signaling an increased commitment to support small rural communities who have a domestic consumer focus. The MPI advisers, Nigel Lucas and Emil Murphy visited the island in late 2014 to meet with local farmers. They also worked with Napier Engineering limited to design a micro abattoir customized to meet the new domestic regulatory requirements and their practical support with assisting the writer navigate the complexities of the regulatory environment have been much appreciated.

4. OBJECTIVES

The intentions of this report are to investigate and report on the following:

1. Review comparable island micro-abattoirs to isolate learning.
2. Describe beef farming practices on the island and report on possible farming changes that would be required to make the abattoir viable.
3. Identify resources and/or services available to support proposed development.
4. Review design, regulatory requirements and specifications for a micro and fully compliant abattoir capable of handling cattle, followed by sheep and in the future pigs and potentially wild animals, such as rabbits.
5. Assess added value butchery operations, e.g. hanging room, cutting room and processing room.
6. Propose waste management strategies that reduce wastage and add a potential revenue stream
7. Scope proposed sites and any planning constraints.
8. Produce estimated budget and potential funding for recommended options.
9. Identify waste management issues, risks and solutions.
10. Scope a possible business plan and operational model; including staffing and cash flow projections.
11. Make recommendations to AoteaOra Community Trust that will inform next action steps

5. METHODOLOGY

The following methodology was adopted in researching this work and preparing the feasibility study.

- Review previous studies, related reports, literature and local documentation
- Review comparable island micro-abattoirs (Skye and Lochalsh Abattoir. Chatham's, Norfolk)
- Interviews, individual and group, government and experts
- Workshops and Online Survey
- Requests for input, through local board data bases and the Bulletin
- Site visits with the Ministry of Primary Industries
- Design plans for a micro abattoir created
- Estimates of Capital and Operational Costs calculated
- Methods of waste disposal investigated and waste management strategies proposed
- 5 year Cash Flow calculated
- Recommendations formulated

6. FARMING PRACTICES: STOCK AND PASTURE MANAGEMENT

6.1 Stock

In the early days of Great Barrier Island's beef farming, Aberdeen Angus and Hereford cattle from Britain were numerically the most popular until the 1970s, when new "exotic" breeds arrived, mainly from Europe, primarily to cross on to the Friesian and Jersey dairy breeds. Today, most of these exotic breeds have been and gone, with only a few purebred studs, such as Dave Baldwin's small number of Highland cattle left. The Island's beef industry is now, once again, based mainly on Angus and Hereford cattle.

Angus is the predominant breed on the island. This is because of the strong market value Angus beef currently has and according to local farmers it is a great 'all-rounder'¹. Farmers say they use Angus in their cross breeding programmes for their maternal ability, carcass quality, and for their growth and hardiness;

¹ Refer to the Angus NZ website angusnz.com

Herefords, like the Angus, are also polled and can be horned. Farmers like Herefords because they are medium sized, mature early, are a good maternal breed and are adapted to a wide range of conditions. Also they are good foragers on hill country.

6.2 Selecting the right breed(s) for the Island

There has been significant discussion about cattle breed choice on the island and whether current choice of breeds thrive best on the island conditions and as such maximise potential profitability. Breed choice is a vital determinant to the success of not only each farmer, but also to the overall Great Barrier Island brand narrative. Breed determines whether or not the cattle match the:

- Climate and environment
- Desired slaughter weight and slaughter age
- Marketing strategy

The cattle have a very clear role to accomplish, produce the most beef for the least cost taking into account the *specific production conditions*. It is not about producing the most beef per cow, but rather about producing the most beef per acre at the lowest cost.

6.2.1 Goals of the beef farming system

Selecting the right breed for the grazing programme relates to farmer's goals of their beef production system. With the issue of potentially changing farming practices to fatten on the island, further advice may be needed to explore what changes are needed to enable farmers, either individually or as a collective group, to achieve this goal. Questions that may need further consideration are:

- If farmers grass-finish their cattle, do they want smaller framed calves that will finish before their second winter or is their production system and climate suited to larger-framed cattle that will finish heavier at 24 or 36 months of age?
- Do farmers want a grass-finishing (and slaughter) season that lasts as long as possible so you can supply fresh beef over an extended time span?
- Is there a price premium or marketing advantage to the breed?

6.2.2 Environment and Climate

Farmers have designed production systems that mesh with the climatic conditions on the island and the market that they are trying to target, (which currently focuses on selling weaners or yearlings). Should the abattoir proceed and there is a need to fatten cattle to 200-235kg on a 10 per week basis, with the exception of one month in mid-winter and one month in mid-summer, environmental issues also need to be considered when reviewing current breed choices.

- The kind of winters and summers and the level of temperature fluctuations
- The amount of rain, and the availability and management of water and water systems

- The types of soils –e.g. rocky, boggy, wet, or dry. Do cows need feet capable of withstanding rocky terrain or slow growing hooves that won't need constant trimming on soft boggy ground?
- Do cattle travel long distances or wander from one adjacent pasture slice to the next in the pasture rotation?
- Is bright sunlight (eye strain) an issue on the island? Would cattle benefit from having pigment in the hair around their eyes to reduce the glare and associated vulnerability to pinkeye disease?
- Are horns an asset or a liability? Is dehorning an option, or would polled cattle being better to avoid bruising and meat losses during transport. Horns also cause live cattle buyers to dock you with a price discount if your cattle are destined for a feedlot after they leave your farm.

6.2.3 Breed Choice Matching Marketing Strategy

Understanding and being responsive to customer need determines market stability and pricing. For example local farmers' current preference for Angus cattle is influenced by the strong domestic market demand and the high value of Angus beef.

New Zealand Red Meat Sector's 2014 strategy promotes action in three areas to lift their market value and share, two of which are relevant to the island:²

- **In-market coordination:** Creating a strong brand position and through greater coordination growing target markets.
- **Sector best practice:** Developing farming systems and improving productivity at all stages of the supply/value chain, leveraging research and development and knowledge transfer.

The development of a "Barrier beef" brand and marketing strategy will be needed to create a strong brand position for the meat to be successful in the highly competitive Auckland environment. In preliminary testing's, the brand "Barrier beef" appears to have appeal to prospective consumers. Customers are looking for a point of difference, a narrative (the wild, clean green bush lands of Barrier creates a great story) and product traceability. The story is about producing local food for local people efficiently, reducing the food miles and carbon footprint and bringing the farmer and customer closer together, building a relationship that offers feedback loops to ensure food produced meets customers' needs. A brand however will only ever be as good as the product quality and affordability.

Growing and sharing 'best practice' farming methods will be valuable for local farmers. It may also be valuable to farmers on similar remote islands who are faced with similar challenges. There are contestable Government funding opportunities available to support farmers who are interested in working cooperatively to lift farming productivity. For example, the MPI Sustainable Farming Fund (SFF) system provides funding to support farmers to explore benefits of alternative farming practices.³

6.2.4 Examples of Matching Cattle Breed to Farming Needs

There are substantive examples of cattle that have been bred to respond to **particular environments**. Two examples are:

² To read more on the strategy refer: beeflambnz.com/strategy

³ Refer: <http://www.mpi.govt.nz/funding, and, programmes/>

- Breeds that have been adapted for the cold include: the Simmental, Angus and Highland. One uses hair to insulate against the cold and rain, while the other two rely extensively on the thick fat cover that they form on their backs to provide added protection against the cold.
- On the other end of the spectrum is the heat tolerance of the tropical cattle, like the Brahman Cattle, with their enormous ears designed for exposing blood vessels to the air to allow the cattle to expel heat, much like the ears of an elephant. Or the Senepol cattle⁴, which were developed for the Caribbean heat by crossing N'Dama Cattle from Africa with the dual purpose Redpoll cattle from England.

6.2.6 Frame size and finishing weight

Traditionally, and still today, beef producers have improved their herds by selection for growth. Growth is an easy and economical trait to measure and is moderately heritable. Selection for growth traits has resulted in faster growing cattle.

There are clear beef cattle breed preferences among cow/calf and grass-finishing operations that rely on growing pasture to raise or finish their cattle for slaughter. It comes down to the length of the growing season. Where growing seasons are short, smaller framed, early maturing beef cattle breeds⁵ are preferred because this allows the cattle to be slaughter-ready before their second winter, which reduces costs and increases how many pounds of beef can be produced per acre because you don't need to feed or graze unnecessary animals through another winter.

In contrast, in climates with long growing seasons there is no specific seasonal cost-advantage to having smaller-framed, early-maturing cattle. In these climates, breed size is more dependent on picking a breed that is adapted to thrive among the other environmental and climatic challenges found in each region.

From discussions with farmers it appears the short growing season, combined with wet and difficult winters, and/or hot dry summers are challenging for current farming practices.

6.2.7 Breeding and Genetics

Definitions:

- **Pure breeding**, breeding from two pure-bred parents
- **Crossbreeding**, breeding from two different pure-bred parents
- **Mixed breeding programme**, there is no strict adherence to maintaining the same beef cattle breeds in the crossbreeding program from one generation to the next so cross-bred heifers are freely used as replacement breeding stock

Advantages and disadvantages of each breed:

a) Purebred breeding programmes: Can produce consistent sized calves. Since all calves are from within the same breed, they will all finish and be ready for slaughter at roughly the same weight, frame size, and within the same time-frame.

⁴ For more information refer to the breeders association website senepolcattle.com

⁵ For more information on frame scoring of beef cattle refer www.limousin.com.au

b) Crossbreeding programmes allows farmers to combine genetic advantages from multiple beef cattle breeds, such as the heat tolerance of a tropical breed with the smaller frame size, lighter (and younger) finishing weight, and cold adaptability of one of the British beef cattle breeds. If farmers rebreed cross-bred parents, they have a mixed breeding program.

c) **The mixed breeding programme** is the third option⁶ in which genetics are added to the herd and the best mixed genetic offspring are used as replacement heifers. There will be a wide range of genetic diversity in a mixed breed herd, with some cattle expressing purebred characters from either extreme of the genetic spectrum, and most being scattered somewhere along the sliding scale between the two extremes.

The great disadvantage of a true terminal crossbreeding program is that farmers cannot produce their own breeding stock and need to rely on either off-farm purebred producers to supply replacement heifers, or farmers need to maintain a second, separate purebred breeding herd that must produce sufficient heifers to maintain the herd numbers of both the purebred and the cross-bred herd.

6.2.8 Current Breeding Practices

Currently on GBI there is a mix of cross breeding and mixed breeding programmes. The Mabey farm is the only farm to have a cross breeding programme, using artificial insemination to select the desirable traits to be purposefully reproduced in the stock. This results in a greater consistency of calves.

The majority of farmers use a mixed breeding programme creating a broader range of characteristics in their stock. This may mean there is a significant variation in finishing times. In a strong seasonal climate, as there is on GBI, that may mean having to carry the larger-framed animals over a second winter so they can be grass-finished the following year. On the other hand, this may also mean there will be a more spread out grass-finishing season rather than finishing all calves within a few months of one another. One issue faced by the 'lower income' farmers is the cost of purchasing a new bull each year. This has resulted in the use of old, less productive bulls, and a degree of in-breeding in some herds, creating problems such as; as higher death rate in calves due to a genetic mutation that causes the calves to die upon being born, reduction in growth rates and productivity, high incidence of mutations that could compromise an animal's productivity.

6.2.7 Establishing a Mixed breeding programme

Should GBI farmers decide to establish more co-operative farming practices it is possible they could establish a more highly productive mixed breeding programme.

Ideally farmers will need to consider whether the initial breeding herd can be drawn from their current stock or whether new heifers will need to be purchased. Further, to maximise productivity new bulls will need to be purchased each year to replace old and injured bulls and to prevent inbreeding. As a co-operative, the bulls could be collectively purchased and used. Farmers would need to consider how to draw from a wide range of breeders to keep up sufficient genetic diversity in the herd to prevent inbreeding.

Management practices such as timing of mating and length of the breeding season also greatly influence the reproductive success and genetic differences among animals. Pasture management and the amount of good

⁶ To review the range of cattle breeding systems refer: www.dpi.nsw.gov.au

feed also impacts on breeding success. For example, cows that are capable of re-breeding successfully each year, may fail to re-breed, due to nutritional constraints following calving.

6.3 Pasture Management

There has been significant discussion by participants about the quality of the island's pasture, whether pasture quality could be improved and, if so, how this could be achieved.

Change of pasture ecosystem is an inevitable consequence of grazing. There are variable pasture management practices on the island, from highly managed to more informal in approach. All farmers are tasked with considering a system which gives the maximum benefit to animal production in the short term and sustainability of their environment in the longer term. Pressures between stock needs and environmental needs occur on the island's farms, particularly during dry summers.

Various factors farmers take into account in managing their pastures include:

- a) Grazing pressure: This considers the numbers of animals that can be carried to produce the most beef per acre at the lowest cost, without negatively impacting on the long term sustainability of the pasture and top soil.
- b) Grazing system: (distribution or spread of animals)⁷Decisions are made whether to use a *continuous grazing* system in which stock are distributed evenly over the available pasture area or a *rotational grazing* system in which stock are grazed in one paddock at a time and moved between paddocks.
- c) There are variable activities of pasture maintenance, such as controlled burning, over sowing, fertilization, which are used by farmers, to varying degrees to build pastures. The cost/benefit, time availability and best practice knowledge are determinants of approaches.

Under continuous grazing, the grazing pressure on any one area is low. This allows greatest selection for the most nutritious plants, however, useful species may decline and some types of pasture vegetation are not resilient under this system.

Under rotational system, the pasture stability can be maintained. The advantage of this system arises where there is an improvement in the density or composition of desirable plants.

Grazing different animals, e.g. cattle and sheep, can be used to achieve desirable vegetation characteristics by exploiting differences in grazing behaviour.

Ideally, farming practices work in synergy with the environment, ensuring long term pasture sustainability. Degradation of vegetation can occur as consequence of management techniques such as overgrazing or insufficient destocking in years of challenging climatic conditions and/or from weed or pest invasion and, most significantly on the island, flood or drought damage.

6.3.1 Grass types and the perennial issue of kikuyu

⁷ Nutrients are lost from pastures from grazing systems , See www.mdpi.com/2077,0472/2/4/282/pdf

Kikuyu pastures are a feature of livestock farms in Great Barrier Island. There are many opinions and perspectives on its pastoral value, and impact on stock productivity which were predominantly negative. Interestingly, in meeting with Rick Braddock, Managing Director of Motuhaku Farm Limited⁸ he had a different view. Rick's experience and management of kikuyu was to stop fighting it and to find a more suitable way to optimise the value of this grass. As experienced by GBI farmers he found kikuyu became long and rank very quickly, shading out other desirable pasture species like clover, and became particularly deficient in vital minerals, causing problems like staggers in stock.

However, he found, (using the advice of plant scientists) that under an eco-friendly system kikuyu can be managed as a balanced and beneficial constituent of pasture, which provides nutritious grazing even during the driest summers when other pasture species have shriveled up. Further, in recent research done on trial farms in Northland by the Kikuyu Action Group Management they have identified a range of techniques to manage kikuyu grass. These include:⁹

- Keep kikuyu in a growing and leafy state. This increases its food value.
- Control through topping or mulching to get rid of the matted kikuyu. Usually this is done in autumn. This also allows the other grasses to come through for adequate feed in winter and spring.
- Graze non-productive older animals (dry cows) on it hard. Molasses sprayed on makes it more palatable and adds energy through the molasses.
- Keep stocking rates high and paddock sizes appropriate to ensure the kikuyu is eaten out properly on each rotation.
- The maximum grazing rotation should be 4 weeks. During growth spurts of kikuyu it should be reduced to 2-3 weeks and then topped to 2.5cm to allow re-growth.
- Old fibrous kikuyu can take 3 weeks to digest. For maximum production, feed springers (young leafy kikuyu), in the 3 weeks prior to calving.
- In summer/autumn be mindful of the risk of facial eczema by not allowing a litter mass to accumulate.
- Ensure there is minimum mat left before any chance of frosts to avoid being left with no grass
- Over-sowing before mulching in autumn is recommended to improve sward diversity
- Free-range pigs can help control kikuyu by rooting up and eating the juicy stolon's, creating bare patches which allow the germination and spread of the other pasture species.

6.3.2 The use of Superphosphate as a pasture fertiliser

The use of Super-phosphate as a principle fertiliser on GBI farms in the 1970's and 80's was a very common feature. As articulated by a local farmer, "the government almost paid us to put superphosphate on our farms". He could recall the days of planes flying across the Gulf to spread super across his land and the sound the superphosphate pellets hitting the roof of the farmhouse.

⁸For more information on Motutapu farm see www.motutapu.org.nz

⁹For more information on pasture grazing techniques see www.mla.com.au/mbfp/Pasture,utilisation

Farmers across the island agree that farm productivity has dropped as result of a decrease in pasture health, and as consequence of minimal to no usage of pasture fertilisers. Today, Scott Mabey is the only farmer on the island that uses superphosphate to maintain and improve his pasture productivity. This is principally a cost based decision. For Scott, the cost not to fertilise is to lose productivity. For others, the cost to use super is too high, unaffordable for farmers who barely cover costs.

Increasingly, however, there are questions being asked about whether superphosphate is the best fertiliser for farms, both from farm production and environment impact perspectives and whether or not there are other more cost effective organic products and/or systems to use.

Advantages and Disadvantages

One of the ways in which fertilizers differ from one another is in the materials they use to deliver nutrients to plant soil. A phosphate fertilizer delivers higher concentrations of phosphorus than of other plant nutrients such as nitrogen and potassium.

According to Eoghan McCloskey¹⁰, a disadvantage of superphosphate is that should over-fertilization occur, particularly when there is an unrecognized nitrogen deficiency, not only does it fail to resolve the nutrient deficiency problem but it can actually make matters worse by causing leaf chlorosis and harming beneficial micro-organisms living in soil. Another major disadvantage, according to McCloskey, is the high probability of water pollution. Phosphorus that makes its way into soil via phosphate fertilizers binds tightly to soil particles so it is unlikely to move out of the soil. If too much phosphate fertilizer is applied to soil, excess phosphorus can find its way into water systems. Leaves or other plant matter that have been grown in soils with an overabundance of phosphorus will release their phosphorus into water, leading to algae and bacteria outbreaks and water contamination issues.

Linda Chalker-Scott of Washington State University sums up her research on phosphate fertilizers, stating, "excessive use of phosphorus in landscapes is a resource-wasteful, ecosystem-damaging practice." The operative word here, however, is excessive as using phosphate fertilizers properly can be a beneficial and safe way to improve soil fertility.¹¹

These findings show the value of soil testing, by farmers, to ensure fertilizer use not only adds value, but also it does not impact negatively on the pastures and wider environment. More research is needed to consider how farmers could also better utilise local resources to create cheap fertilizer for their farms. The waste from the micro-abattoir could provide one source. Other products such as seaweed, animal waste matter, fish waste etc. could be added to organic and/or inorganic matter.

6.4 Other Farming Challenges

6.4.1. Water and Water Management

Access to cool, clean drinking water is essential to keep an animal's internal body temperature within normal limit and to digest and move dry, fibrous feed through their gut. It is estimated that a dry beef cow requires 40-

¹⁰ For more information refer: www.ehow.com/info_disadvantages_phosphate_fertilizers.html

¹¹ For more information on Linda's work read: sustainablelandscapesandgardens.com

50 litres a day and this doubles with a cow with a calf. As water temperature increases from 20 to 30 degrees C, total water requirements for each animal will increase by about 2.5 times.

Water availability on the island is highly variable in both quantity and quality. While 2 or 3 farms have reticulated water systems and water troughs for animals, a larger number of farms are reliant on rain water, small streams and ponds which become precariously low in drought periods. Cows' access into streams is a compounding issue, whereby water becomes polluted impacting on the wider environment and the water quality for households, the cattle and other animals and birds.

From information gleaned from local farmers the cost of water bores can range from \$10-50,000. The calculation is worked on the premise that the deeper the bore, the better quality the water and the higher the cost. These costs can be prohibitive for some of the farmers; however it could be valuable to further explore cooperative government funded possibilities.

6.4.2 Fencing

Fences and fencing quality on the island is highly variable, albeit the majority of farms have suitably maintained perimeter fencing. Regulatory requirements relating to the killing of feral cattle and other animals are substantial. It would be preferable for the micro abattoir to take a position that feral animals will not be killed at the plant. This would save significant compliance costs and would ensure the Barrier Beef brand and meat safety issues are protected.

The fencing of streams and ponds is a secondary issue which will also need consideration going forward. As previously mentioned it may be possible to partially fund this work through government subsidies and have work completed through a variety of Ministry Of Social Development's employment schemes.

7. OPERATIONAL MODELS

There are generally speaking three models of abattoirs:

- a) The abattoir purchases livestock to slaughter and trades the meat (a wholesale trading model)
- b) The abattoir is set up to supply meat to retail outlets, e.g. butcher shops (a service model)
- c) The abattoir is set up to slaughter, add value to meat, e.g. butchering and/or processing and then on-sold (retail model)

Since 2004, New Zealand regulations have been driven by changes to EU meat hygiene regulations. This has meant that all abattoirs, whether large or small or micro, have to operate to the same standards. As a result, the capital cost of building new or refurbishing old, abattoirs increased substantially, leading to many small to medium abattoirs closing.

This increase in the overhead capital cost that abattoirs have to bear has been matched by increases in other key operating costs, i.e. energy, water and waste disposal. As a result, the unit cost for slaughtering animals increased.

Within the wider industry in New Zealand, a decline in animal numbers has led to an increased slaughter capacity and therefore, increased competition in procurement for stock. At the same time, the market for meat has concentrated into the hands of the major supermarkets that are supplied by a dedicated network of large abattoirs. As a result, the business model for a smaller abattoir to purchase and sell meat wholesale is increasingly competitive and difficult.

However, the Ministry of Business, Innovation and Employment (MBIE) are taking a new look at the decline of small rural New Zealand and small abattoirs that produced meat for the local economy. There is a growing recognition that abattoir facilities form an important part of often fragile rural communities. On GBI a micro abattoir could enable local agriculture businesses to capture local economic benefits and help sustain the island environment, as well as providing local food provenance for the tourism industry.

The points of difference for the Great Barrier Island that create a market opportunity for the micro abattoir are:

- Being island based provides a degree of protection from the competitive procurement processes of the large mainland abattoirs
- 'Barrier beef' products would focus on the domestic and boutique markets and would not focus on major supermarket chains
- MPI are currently reviewing New Zealand meat regulations to separate out export level standards from domestic standards. The GBI micro abattoir feasibility study is being developed in parallel with these developments

New Zealand has no other micro abattoir to use as a comparative model. The Chatham Islands' abattoir closed in 2012. It was originally established as a wholesale trading unit for meat exports and then later moved into a service model providing meat for local butcher shops, as it became evident transport costs were prohibitive to the profitability of exporting meat. Unfortunately the local market was too small for the supply available and the abattoir was forced to close. Chatham Island's has reverted back to GBI's current approach of selling yearlings to the mainland.

Of the other small island abattoirs reviewed globally¹², the majority are service abattoirs, either to supply butcher shops or to provide a service to livestock farmers, either to sell from farm or for home consumption, or sometimes to do both.

From information gathered in this study, it is most probable that model c) would be the model most likely to be sustainable and generate a small profit. This is an important point, as size of plant, throughput, management structure and operating costs are all affected by operational model.

7. POTENTIAL THROUGHPUT

¹² Other island abattoirs reviewed included: Norfolk Island, Skye and Lochlear, King Island and Shetland, Orkney, Islay, Mull, Lewis and North Uist

For the first operating year the abattoir will focus on slaughtering five 200kg cattle per day, for 2 days each week, for 46 weeks. This is a total of 460 cattle for the year. When there is capacity created, as result of staff having the skills techniques and procedures honed, older, leaner, lesser quality beasts could be added to kill days. (The initial focus will be producing premium quality beef which will attract the higher dollar, however realistically there will be a significant number of older cattle that will need to be killed to enable younger replacements. This meat can be used for production of good quality mince and sausages or sold as cheaper cuts.

Sheep and other species will be introduced in years 2 and 3 once full regulatory compliance standards and throughput goals are achieved.

An estimate of cattle numbers on the Island is tricky to pin down. While some farmers know exactly the number of stock they have, there is less certainty with others. This needs to be firmly established along with numbers of cattle individual farmers commit to preparing for the abattoir.

In dialogue with farmers:

- Supplying cattle rather than lambs to the local abattoir is mainly what producers would consider; though, as previously mentioned, there is a concern that they will be able to provide the numbers of finished stock. Working co-operatively and having specific individual targets to fatten an agreed numbers of cattle for agreed dates, makes this objective more realistic for farmers to manage. (For example a farmer commits to preparing 10x200kg cattle for weeks 2 and 3 of March and a further 10 for weeks 3 and 4 of April)
- Farmers recognise the Mabey farm will be the principal producer for the abattoir, as the largest and most developed farm on the island. As such, Scott and Isabel Mabey's support for the abattoir will be critical to its viability and success. It is acknowledged that this is a heavy weight of responsibility, particularly as the financial risk of their changing their farming practices to fatten on the island, would be the most substantial.
- Producers would prefer to be able to sell cattle to the abattoir or through a selling group with a premium price.
- There was a positive feeling for the abattoir from the majority of farmers who felt the abattoir would be good for them as individual farmers, as a collective of farmers, and for the whole island.

8. POTENTIAL MARKETS

8.1 On Island Meat Consumption and Purchasing Survey

A survey monkey was conducted with island residents, both full and part-time, in November 2014. There was a high response rate with 106 respondents completing the survey. Key findings from the survey were:

- 76% of respondent's ate more than 400gms of meat/ per person/per week, with 34% eating more than 700grams /per person/per week.
- Residents principally purchased meat from Auckland supermarkets, with local stores being the secondary retail outlet. Residents noted they shopped around, using a range of retailers to best meet their needs.

- Chicken was the number 1 purchasing item, followed by steak, sausages, and then mince. Bacon was also a frequently purchased meat item.
- Purchasing decision making was prioritised by:
 1. Quality
 2. Hygienic meat processing
 3. Traceability
 4. Support of local producers
 5. Animals killed humanely
 6. Meat cut
 7. Cost
- 25% of households were not satisfied with current meat purchasing opportunities, 60% were satisfied and 15% were highly satisfied. Comments suggested that households were strongly supportive of a local abattoir and they would be open to changing current purchasing practices providing; the quality of their meat maintained the same or better quality, they could trust that animals were killed humanely and the meat was hygienically packaged and/or processed, it was simple to purchase and costs were reasonable.
- Examples of comments included:
 - “Happy to purchase locally if hygiene standards are in place, animal are killed humanely, and was cost effective to do so, along with reasonable variety and supply.”
 - “If they supplied the range of meats that I purchase in Auckland. I would prefer to support Island based ventures.”
 - “Cost would have to be attractive and economics of the project would have to work. Personally I can't see how that is possible, but gravity is only a theory after all.”
 - “Price and quality need to be compatible. Don't mind paying a bit more for better quality”.

9.2 Island Hospitality and Retail Markets

All hospitality and retailers interviewed were conservatively enthusiastic about the abattoir. All would like to see local meat being able to be sold and/ or served at local lodges, pubs, eateries and cafes. The commonly articulated key issues were:

- Consistently high quality and hygiene standards
- Reliability of supply despite high variability of demand (summer versus winter demand)
- Ease of purchase and delivery
- Traceability (Liked the idea of being able to identify and talk to customers about which farm the meat came from)
- A well-developed brand would also add real value

9.3 Part-Time Residents

The survey suggests part-time residents would be interested to purchase local meat when they visit the island providing the meat was quality, easy to purchase and the kill was hygienic and humane. Interviews with local store keepers reveal that meat purchases do not considerably change between winter and summer seasons. This suggests holiday makers are bringing the majority of their meat to the island. The micro-abattoir creates a real opportunity to increase local sales.

9.4 Auckland demand

Preliminary explorative research into possible off-island retail markets is positive. The development of a brand and marketing strategy will be a key to accessing a boutique market or a retail markets such as Nosh or Hellabys.

10. DESIGN REQUIREMENTS AND SPECIFICATIONS

10.1 Basic principles

The design and operation of abattoirs and meat cutting plants are covered by The Animal Products Act 1999 and the Animal Products Regulations 2000. These regulatory and risk management frameworks are for all abattoirs, large or micro.

MPI is responsible for the regulation of food consumed in New Zealand. MPI's programmes help to ensure that food in New Zealand, whether it is produced, consumed or exported, is safe from 'farm to fork'. MPI accredits recognised agency/persons as an individual or body, recognised under the Animal Products Act (APA) 1999 to perform specialist food safety functions and activities, including evaluating and/or verifying food businesses operating under a Risk Management Programme (RMP)

The plant is registered, recognised and approved once compliance standards are met. Compliance evaluations are ongoing, however gradually reduce once evaluators are confident systems and processes are in place and complied with. With proposed regulatory modifications to reflect micro abattoirs and the domestic food market it is speculated a more pragmatic approach will be taken by the RMP evaluators towards the structures of the micro abattoirs provided that meat hygiene standards are not compromised. This will allow some design flexibility (e.g. standards for the construction of floors in meat plants are not specified as such, only that floors shall be constructed in a way that they can be hygienically cleaned). It is noted that MPI have been working closely with Napier Engineering and Contract Ltd in their proposed micro-abattoir design to ensure design and functionality are kept to the practical standards of safety and hygiene.

10.2 Size of Micro-Abattoir

The simplest definition of the size of an abattoir is made by the number of livestock killed. Using the following definition of Equivalent Livestock Units (ELU) (of 1 cattle beast = 2 calves = 5 pigs = 10 sheep), abattoirs are traditionally divided into five size ranges, which apply to both single species and multi species plants.

- Very large , over 90,000 ELU
- Large , 30,000 to 90,000 ELU
- Medium , 5000 to 30,000 ELU
- Small , 1000 to 5000 ELU
- Micro, under 1000

Under these definitions the Great Barrier Island abattoir would be defined as micro.

10.2.1 Factors influencing size

People's perceptions of the size of abattoirs are shaped by their own personal experiences. At one end of the continuum are the very basic small plants that serviced local butchers' shops, which consisted of no more than one small slaughter hall in which livestock were stunned and then bled and dressed while hanging from a central hook. Another example of the very small facility is the home-kill facilities that exist on the island for the occasional animal to be slaughtered for home consumption, which are rudimentary, but functional. At the other end of the continuum are the large abattoirs, such as AFFCO NZ Ltd, which a number of local residents have worked in.

Unfortunately from a cost point of view, but perhaps fortunately from a public hygiene and humane killing of animal perspectives, even small abattoirs serving the public today have to be built with accompanying structures that enable them to comply with the NZ food hygiene regulations. This means they have to have in addition to the slaughter hall, as a minimum to begin with, a lairage with a bovine rig (where ante mortem inspections can be carried out by the Official Veterinarian (OV) allocated by the RMP evaluators to the plant, who is responsible for overseeing animal welfare and meat hygiene at the plant.

10.3 The use of modular containers

The proposed plant is designed using four to five 20 foot containers. The philosophy behind using a modular kit-set is to supply a proven, cost effective, and ready to assemble processing facility on a site where there may well be little or no infrastructure for constructing food processing buildings or the supply of engineering/trades services.

10.4 Project Brief provided to Napier Engineers Ltd (Refer Appendix 1)

Please note this was the original brief for the first abattoir designed. The detail has since been slightly modified.

- The plant will initially process cattle but can be extended to enable the processing of sheep and eventually pigs at a later date.
- The total capacity numbers will be approximately 20 cattle, or 50 sheep per week. (This is total potential capacity if the abattoir was operating 4,5 days a week)
- The design kill capacity will be able to be increased with the introduction of extra labour.
- The plant will be a slaughter and carcass chill facility with the possibility of boning on rail and table when not slaughtering. Stockyards are not included.

Non-food items will be dealt with in the following manner.

- Hides & skins – taken off site fresh and/or salted.
- Heads, trotters etc. – taken off site fresh.
- Paunch, pet food offal – taken off site fresh.
- Effluent – septic tank to paddock. Solids to compost.

Services at the site are advised as follows:

- There is access to a power source. Power to be provided through solar and generator.
- There is access to clean, artesian or rain water.
- There is no piped sewage or effluent disposal.

Species to be processed

- Cattle – 200 to 220 kg live weight
- Sheep – 20 to 40 kg live weight.
- Animals are driven, or walked in by owners to facility.

Design throughput

- This small slaughter and carcass chill facility is for the supply of fresh chilled meat processed hygienically for local consumption and retail into the Auckland market.
- The design throughput capability is very dependent on worker skills but will nominally be 15 to 20 cattle per week using 2 men. There would obviously be the ability to improve this through put using extra skilled labour.

Description

- The philosophy behind using a modular kit-set is to supply a proven, ready to assemble processing facility on a site where there may well be little or no infrastructure for constructing food processing buildings or the supply of engineering/trades services.
- The facility would arrive on site and would be assembled by trained and experienced personnel supplied by NEC.

Site Requirements

- Access for road transport of containers to the intended site.
- Crane to unload and assemble the containers.
- The necessary local body, government and regulatory consents in place.
- Electricity to the building site. (Through generator and solar provision)
- Fresh clean water to the building site.
- A concrete pad to sit the container building on.

The facility includes:

- Containers prefabricated to assemble into slaughter room and a reefer container for carcass chiller.
- A multi species slaughter floor including all equipment to process cattle and sheep.
- Railing systems for a capacity of 40 quarters or 50 small animals (e.g. sheep)
- A product dispatch door.
- Hot water equipment attached to the side of the building.
- Water & effluent treatment systems.

Capability

The output is very dependent upon the skills of the operators. However, assuming the appropriate skills are available, the maximum output or capability of this abattoir is as follows: 10-20 cattle or 50 sheep per week.

- The carcass chiller has the capacity to hold 10 cattle in quarters or 50 sheep.

Further Considerations

- The chiller will be housed within one of the containers. This will be of sufficient size to accommodate one day's kill, to enable meat to be chilled to the regulation temperature before it is despatched. It is proposed that the OV will visit the plant once each day that the plant is slaughtering, combining the ante mortem inspection of the animals to be killed on that day, with the post-mortem inspections on the previous day.
- In practice it would be preferable from ease of operation to have two chillers, one where that day's kill can be brought down to temperature and the second where the previous day's kill can be held to await collection or further maturation (i.e. it is not good practice or energy efficient to put hot carcasses into the same chiller as cold ones). Currently there is one refrigerator unit in the plan, based on the principle of keeping costs to a minimum. This issue will need more thought.
- The lairage will need to be large enough to hold the livestock that are to be killed on that day. There will need to be an adjacent paddock where stock can be moved to should there be delays that prevent their being killed that day. Given there will be only five animals killed each day and the operation will include timed deliveries, the lairage space will not need to be large.
- To complete the plant, an external door from the refrigerator, which links to a despatch area to the refrigerator truck, is required to allow hygienic loading.
- Staff changing and hygiene areas that begin the good hygiene practice will be provided in a small staff room. In larger plants, there are hide and gut rooms to handle animal by products that are the residual output to carcass meat from the slaughter process. In this case it is proposed these products are taken off site for disposal. Offal will be dried and crushed on site with solids for compost.

11. THE OPPORTUNITY TO ADD VALUE

11.1 Maturation

To add value, traditional thinking is to hang meat for weeks on end, enough time for the flesh to become tender and the flavor to develop as it dries in the air, but before putrefication sets in. The thinking is that the longer the maturation, the more tender and flavoursome the meat will be.

Hanging the carcass, although traditional, is not the only way to mature meat. Meat can also be matured in a vacuum-packed bag. It still has to be hung to allow rigor mortis to pass but 48 hours is usually sufficient. This method is considerably cheaper than hanging and although it is common knowledge within the meat industry that most supermarket beef is matured in this way, what is perhaps surprising is that it is *not only* the standard and cheaper ranges that are vacuum-pack matured, but some of the premium ranges as well. For example, Tesco's premium beef range, under its finest, advertises on the pack that it is matured for 28 days, but is hung for just six to eight days on the bone before being put in a vacuum pack bag to finish the maturation process¹³.

11.2 Butchery

The skill in judgment over carcass cutting and adding value will be a vital component in determining the success of the micro-abattoir. It is proposed that the third day of operation will be focused on butchering and packaging, and preparing meat for market. This will include generic cutting for the general market and more 'customised' cuts to meet specific orders for local lodges, pubs and eateries. It is noted that the opportunity with providing meat to a local market for the butcher to become closer to his/her customer. This will enable excellent feedback loops to be developed and she/he will be able to receive direct feedback on preferred cuts, sizes and packaging to ensure customer needs are being met.

11.3 Processing

A secondary issue will be using the lower value cuts, (and eventually the older/leaner quality cattle) for mince, burgers, sausages etc. to ensure full carcass use. The current plant plan does not have a space for food processing. This product processing gap could be addressed by building a secondary room, alternatively it could create opportunity for another small micro-business.

11.4 Home-Kill

The abattoir could consider as a revenue stream providing a home-kill service for farmers. The farmer could book in their animal to be killed and order the cuts desired. This would need to be done in addition to set work and costings would need to be standardised.

11.5 Dog Food

The abattoir could also consider selling bones and dog food. More thought would be needed with respect to the level of processing required and cost/benefit of this proposal.

12. SUITABILITY OF PROPOSED SITES AND PLANNING CONSIDERATIONS

¹³ See more at <http://www.meatinfo.co.uk/news/archivestory.php/aid/4550/> In defense of hanging

12.1 Criteria

In discussions with resident farmers, MPI, and through information gained from reviewing other feasibility studies¹⁴, it has been identified that the following considerations need to be taken into account should the project proceed:

- Proximity to cattle: Located closest to the largest supplier of cattle
- Land Ownership: Land could be used 'free of charge' and/or have a pepper corn lease
- Direct road access
- Water availability
- Site size to accommodate plant, a secondary small office building and waste management concrete drying pad and septic system
- Flat, with ideally a gradual slope to enable ease of water drainage
- Suitable distance from other buildings and habitations
- Current usage of site
- Likely level of objections to change of use.

Based on the above information it would seem probable that a site on and/or adjacent to the Mabey farm in Okiwi would be a preferred location. An actual site would need further determining.

12.2 RMA requirements

Land, Water, Waste Management and Air discharge consents would be needed.

12.3 Expert Advice

MPI have offered their services to assist with the site selection process. Further, Ken Evans from Napier Engineering Limited has also offered to visit sites should a decision be made to proceed with their micro-abattoir design and product. Finally Berin Smith, a RMA consultant from Isle Land Ltd has indicated a willingness to provide RMA advice.

13. WASTE MANAGEMENT: ISSUES AND SOLUTIONS

13.1 Introduction

¹⁴ See preliminary feasibility study for abattoir at Skye and Lochalsh

Historically abattoirs earned money from the 'fifth quarter' (edible offal, animal by-products, including blood, hides/skins etc.). However, in the 1990's especially, many by-products were treated as waste which abattoirs have had to pay to be removed by specialist firms.¹⁵ This situation is gradually changing as result of operators being more diligent in maximising value of carcasses and with as result of the growth of the environmental sustainability agenda which has challenged businesses to become more aware of the country's finite resources and the environmental damage careless business practices can cause.

The location of the micro-abattoir on an island creates both challenges and opportunities. The challenges particularly relate to costs of shifting waste from the island, for example the pelts. The opportunity however is to be more creative in waste management, and to shift the focus from waste to resource.

In addition to producing meat, an abattoir will produce 4 main streams of 'waste products'. These are:

- animal by-products and offal's (some of which may not be true waste and could have value)
- effluent consisting of waste water mixed with blood, fat, urine and faeces
- other wastes such as plastics and cardboard
- lairage material and stomach and gut contents

13.2 The Legislative environment

RMA legislation requires land use and waste-water discharge consents. In addition, as there is a possibility of air discharge contaminants and discretionary activity air-discharge consent will be needed as per the rule from the Air, Land and Water Plan¹⁶.

13.3 Management of Waste Water

Preliminary advice sought suggests that an aerial irrigation system from the abattoir to the paddock is an acceptable approach to manage waste-water, for a rural based micro abattoir. It is imperative however there is no mixing of any domestic waste with the abattoir waste. If a portaloos was added for staff purposes then that would avoid that issue.

13.4 Waste Management Processes

13.4.1 The principles are:

- To do no harm
- Aim for zero waste (Reduce, recycle and eliminate)
- Sort, distribute or store to maximise dollar value

¹⁵ Refer guidelines of abattoir waste handling, www.dwaf.gov.za/Documents/Policies/WDD/AbattoirWasteHandling

¹⁶ See Auckland Council's, Regional Air, Land and Water Plan www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/plans

- Use processes that use minimal water and no generated power
- Create products that can contribute to the environment

Abattoir waste and carcasses may be disposed on-site through a “dry and crush’ process or other site-specific approved methods. Proper site selection for any disposal method is integral in protecting the environment and human health. Special consideration must be given to existing zoning laws and land use around the abattoir and disposal site.

13.4.2 Proposed Methods of Waste Management

- Hides & skins – are salted and taken off to be stored in an on-island storage unit until there is sufficient stocks to cost effectively sell and transport to the Napier tannery. This site has yet to be determined.
- Heads, trotters, bones, blood, urine, solid matter and paunch are crushed and dried on site and sold as high potency fertilizer
- Pet food offal – taken off site fresh to be sold to animal owners
- Waste water, used for aerial irrigation of resident farmer’s pasture

13.4.3 Blood

Alternative methods of treatment are;

- **Fresh Blood**

Where pigs and poultry are kept nearby, fresh blood can be directly incorporated into bran, or other stock food. This represents the simplest and most efficient means of disposal. With this method it is essential that the resulting meal be fed out the same day as it has no keeping properties.

- **Lime Treated Blood**

Where a somewhat longer life for the feed is required approximately 1 % of unslaked (burnt) lime can be added to the blood container and stirred in as the fresh blood is added. The hardened product will keep for up to one week. It should be used as described for fresh blood.

- **Dried Blood**

Where it is not possible to directly add fresh blood to pig or poultry feed, it may be mixed with bran or rushes as described under (a) and dried in the sun, on either a concrete floor, or matting. Drying will generally be complete in three days. (The drying area will need to be covered in the event of rain). During rainy periods it would be necessary to dry the mixture on corrugated iron trays placed over a copra dryer or similar fire.

13.4.4 Ruminal Contents

Particularly in the case of cattle a considerable quantity of ruminal contents has to be disposed of. A compost stack provides a simple and low cost method of disposal as well as providing a useful end product. Dung from the pens, effluent screenings and other wastes may be conveniently disposed of in this way. The addition of waste vegetable material such as maize and cassava stalks, straw etc. will increase the yield of compost and ensure aeration of the stack

13.4.5 Potential Partnerships

It would be useful to consider what partnerships could be established to manage the waste. For example with Ngati Rehua looking to take a lead role in the waste management sector, a useful partnership could be established that would reduce waste management costs for the abattoir and increase opportunities for Ngati Rehua. For example the waste management facility could store and/or on-sell the pelts and/or store and on-sell the abattoir fertilizer product.

14. PRELIMINARY ESTIMATED BUILD AND ESTABLISHMENT COSTS

14.1 Preamble

The actual cost of any abattoir can vary widely depending on the individual circumstances that a design has to accommodate and the nature of the materials used.

Napier Engineering Limited was approached in mid-2014 by the Great Barrier Local Board to design a micro-abattoir concept for the island. Since this time Napier Engineering has developed three proposals from a brief to design a modular facility, providing the maximum functionality at the lowest cost, without compromising the health and safety features. MPI has been working alongside Napier Engineering to ensure the plans met regulatory compliance features needed to process food for the domestic market.

The price for the full plant (outlined in this proposal and attached drawings) delivered, assembled and commissioned is **NZ \$388,000 plus GST**.

14.2 Purchase of a Truck

There has been preliminary discussion with farmers and MPI that it would be of value for the abattoir to purchase a truck that could be used to pick up stock from farms and deliver to the abattoir. While this is an initial capital outlay it could provide a revenue stream to the abattoir plus provide a valuable service to the farmers.

The Stock truck could be flat-backed. This would enable a live-stock container to be added for transporting stock and a chiller container for shifting meat to retailers. The chiller unit could provide the opportunity to deliver other products around the island, for example locally grown fruit and vegetables. A second-hand truck and container units have been quoted in the \$30-\$50,000 bracket.

14.3 Napier Engineering Limited's Offer

The Brief

The offer includes Proand / NEC designing and manufacturing the facility in Napier to prove all components work, disassemble it and load all the parts into four to five containers. From there it would be shipped to Great Barrier Island and delivered to site. They would liaise with the Project Manager to have the containers unloaded, re-assemble the facility and commission it on site.

- GBI will be responsible for arranging the supply to the edge of the building of services: including electricity, and water. Unless advised NEC will provide a power generator.

- GBI will provide the agreed level of insurance cover from the time of unloading at the Great Barrier port. This is to be in place before the unit is shipped from Napier.
- The plan assumes a flat site. It is GBI's responsibility to prepare the site and building platform to accept the new building.
- The plan assumes road access to the building site is suitable for trucking/containers/materials.
- GBI is to provide temporary power and water supply during construction period.
- GBI is to provide site security during construction.

The availability of training

- Critical to the success of this venture is the training of the local operators in the correct methods and procedures to produce hygienic safe meat. Within this package is an option to include the supply of a trained, skilled butcher who will teach the local operators how to commission and use these new facilities. The training being offered for the butcher on site is estimated on a weekly basis.

Exclusions

- No allowance for the cost of the land for the plant.
- No allowance for building permits.
- No telephone and / or connection if required.
- No connection to power or water services.
- No allowance for the processing of trimmings, unsaved viscera and offal, bones, heads, trotters and paunch content etc.
- No facility to handle the cattle hides or sheep skins other than temporary collection in a bin.
- No treatment of extracted air or odours emanating from the plant.
- No insurance cover once the unit has landed in Great Barrier.
- Freight handling and insurances.

14.4 The Cost of Risk Management Plans (RMP's)

Definition:

A Risk Management Plan (RMP) is a written programme designed to manage the hazards, safety and labeling of animal material and products. Hazards may be biological, chemical or physical. The RMP describes how to process products to meet the requirements of the Animal Products Act 1999.

This is to ensure the products sold are 'fit for purpose' – safe, suitable and truthfully labelled. All primary processors of animal material and products for human or animal consumption are required to operate under a registered and independently verified RMP.

Purpose:

The RMP sets out how the operator will identify and control, manage, eliminate or minimize food safety hazards and other risk factors. All animal products traded and used must meet the appropriate New Zealand animal product legislation. The RMP is legally binding and must be developed and implemented in accordance with the Animal Products Act 1999 and other relevant New Zealand legislation, and be registered with MPI.

It is the abattoir's responsibility to ensure processes are carried out in accordance with the RMP, all the risk management activities are working effectively, and records are kept. The contracted recognised agency will visit and verify records regularly to confirm that your RMP continues to deliver product that is fit for purpose. Frequency of verification depends on product type.

The development and evaluation of the abattoir's RMP is required prior to the commencement of operations. The major cost is the evaluation of the RMP. The evaluation is completed by an 'evaluator' who is a person recognised under section 103 of the APA to perform an independent external assessment of the validity of the RMP. Once an RMP is recognised as being valid, the abattoir can be recommended for registration.

A fair estimate of time would be somewhere between 20 and 40 hours to evaluate the RMP including a site visit. The price is set by each evaluator, or their employer, so subject to negotiation. Costs are estimated to sit in the \$150-\$250/hour bracket.

14.5. RMA Consent process:

It is estimated that \$30,000 should cover land use consent and wastewater discharge consent costs¹⁷.

A review of the consenting requirements involved would be needed to clarify these costs (i.e. whether a wastewater discharge or air discharge consent might also be required). Should an air discharge consent component be needed, as per the rule from the Air, Land and Water Plan below, "*the treatment of abattoir wastes, or abattoir waste water on the premises*" and the other activities listed, require a discretionary activity air discharge consent, further costs will be incurred. The Auckland Council deposit for this application is presently **\$15,335**. In addition a \$2,500 land use consent deposit fee and a \$3,500 wastewater discharge consent deposit fee will be required. This equates to **\$21,335** just to lodge the application. Assuming the worst case scenario an additional cost of \$40k could be added should any issues arise. This would be composed of \$22k Council fees, \$6k RMA consultant fees, \$6k wastewater consultant fees and \$6k air specialist fees. Additional costs to filter the air to comply could be added.

14.6. Project Manager:

An experienced Project Manager will need to be contracted to take this project to the next stage, should a decision be made to progress with the micro-abattoir. Based on an average wage for a Project Manager of \$30.00 an hour, and an estimate of 800 hours (40x20 hour weeks) to manage the process up to and including registration, this would be an added cost of \$24,000.

¹⁷ To clarify these costs it has been assumed suitable site that enables *non-notified* processing of the application (otherwise circa \$80k).

14.7 .Summary of Additional Establishment Costs (Preliminary estimates)

Expenditure	Assumptions	Estimated Costs
RMP costs		
a) Application for registering		500
b) Evaluation cost		8000
RMA consents		30,000
Building, land use water discharge consents		40,000
Air discharge consent		
Project Manager	Contract position	24,000
Cost of truck and containers	Purchased second hand	40,000
Cost of the land for the plant.	Locate on farmers land-free of charge or peppercorn lease	0.00
Secondary home office building,10 metre sq plus office equipment	Pre-fabricated 1-2 room with attached shower/chemical toilet and office equipment,	20,000
Driveway to site and pathways	Placement will be as close to a road as possible	20,000
Lairage 15sq metres	Big enough to hold 5 cattle	5,000
Concrete pad for Plant	50sq metre pad	10,000
Power System	25kva diesel generator, plus solar units	30,000
Water Supply- tanks, plumbing, irrigation system	Based on a price share basis with host farmer	15,000
Manual Crusher and external 10 metre square concrete drying pad	Needed to crush, dry and store waste until moved	4,000
Collection bins for hides and skins		500
On island freight and handling cost		2000
	Total	\$249,000 plus GST \$286,350

14.8 Total Capital Costs (preliminary estimate)

Based on the proposed contract costs of Napier Engineering Limited for the build of the plant plus the additional costs that have not been included in their budget the total build and set up costs are:

NZ \$388,000 plus \$249,000= \$637,000 plus gst

14.9. Possible Capital Cost Reduction Strategies

Options to reduce costs include:

- a. Postpone purchasing a truck until the business becomes more viable
- b. The General Manager of Aotea Ora Enterprises Ltd project manages the build
- c. Consider a second hand generator for Years 1 and 2
- d. Relocate an “excess to requirement” sleep-out or other one room dwelling for office
- e. Seek out gifted or ‘cost-only’ or subsidized contracts for roading, island transport costs etc. as an opportunity for local contractors to support this initiative.

14.10 An Alternative Option

The alternative to a fixed modular unit is a mobile facility, as used by Netherby Meats¹⁸ Netherby meats own a small fleet of mobile abattoirs which they use to kill, butcher and process individual farmers meat for them. The farmer pays for this service, and for the processing of the meat. The mobile abattoir is legally defined as a home-kill service. Home-kill animals are processed for the farmers own consumption including his/her household, family and farm workers. It is illegal to sell this meat to anyone.

This type of model therefore could provide a service to farmers, to have their home-kill provided for them. However, it would not be a business opportunity, unless there is a regulatory change by MBIE.

15. OPERATING COSTS

Other abattoir feasibility studies reviewed indicate that operating costs can vary significantly depending on the size of the abattoir and the efficiencies of the operation.

¹⁸ Refer Netherby meats website: www.netherbymeats.co.nz/processing/mobile,abattoir

15.1 Costs are dependent on the functionality of the Abattoir

In essence, this relates to decisions on what part of the meat processing activities will occur in the abattoir:

- a) Slaughter, chill to core temperature and cut into quarters for beef and sides for sheep and pigs, plus activities relating to the processing of waste, e.g. the crush and dry process.
- b) As above, plus hang, plus cut into primal cuts, (includes boning for beef), vacuum-packed and chilled,
- c) As above plus cut down into retail cuts and package, and process products, e.g. mincing and sausages, curing, salami etc.

15.2 .Cost Allocation

Studies indicate that an allocation of costs be based on the time and resources utilized in slaughtering and dressing each animal. An imprecise but commonly used ratio formula is based on 1 cattle beast, 5 sheep to 3 pigs, being equivalent.

Allocations of costs between fixed and variable are dependent on throughput, and decisions relating to meat processing activities. In simple terms the majority of costs relate to staffing, power and transport, compliance costs and purchase of stock from the farmers. It would be my recommendation we chose c) to maximise value add of the slaughter process.

15.3 Major Operating Costs

15.3.1 Labour cost assumptions

- Three permanent part time staff would be needed.
 1. An Office Manager and qualified Meat Inspector
 2. A qualified Butcher, slaughtering, cutting, boning, butchering
 3. A qualified meat processor, slaughtering, cutting, offal management
- For year 1 the plant would be open from 8am-3pm, three days weekly. This will be 20hours/week for 46 weeks a year; closing for one month mid-summer and one month mid-winter. These hours will potentially be increased when the abattoir increases its throughput in year 2.
- Salaries: These will vary depending on availability, qualifications and skills
 - Site Manager/Meat Inspector (.5 permanent/ part time) \$50-\$54,000 (Annual salary)
 - Butcher \$ 19-\$22 hour (.5 permanent/ part time) \$39,500-\$45,700 (Annual Salary)
 - Meat Processor (.5 permanent/ part time) \$15-\$18 /hour \$31,200-\$37,440 (Annual salary)
- Wages; casual staff to cover sick or training leave. \$15 an hour (10 days cover, \$1000/annual cost)
- Staff can be paid on a) contract/ i.e. carcass rate, b) hourly/weekly rate or c) a combination of both. It would be my recommendation to base payments on c) as this would create an incentive to work effi-

ciently and provide opportunity for staff to be involved in other activities such as meat processing and packaging, and waste management.

- Two casual and qualified on call staff to provide cover for leave, training etc.
- It would be reasonable to expect two men/women on a 6 hour shift (e.g. 8 to 2.00pm, including breaks) to kill and dress 5 cattle per day, with clean down occurring from 2 to 3pm
- The cost for a person to train as an official Meat Inspector through the training provider Assure is \$25,000. This does not include wages, travel etc. The training programme runs over a period of 6 months. A decision could be made to subsidize the cost of this training; however the majority share of this cost would need to be met by the individual.
- We have the opportunity to utilise the services of our local vet, Anne Kernohan for this role. Anne would require up-skilling in particular aspects of this. It may be possible to have ante-mortem inspections one day and combine ante and post on the second morning to reduce costs.
- A NZ meat inspector salary is approximately \$50,000 a year, full time, based on a \$25.00 an hour rate. Utilising Anne's services will require some careful consideration, as this rate is considerably lower than Anne's veterinary rates. Further, she would need to be paid transport costs to ensure she is suitably compensated for 2 hours travel per day/per week. The opportunity to utilise Ann's services would need to be balanced with a rate the abattoir could afford. An alternative would be to up-skill the Team leader to include the Meat Inspector's role. This option would potentially be more cost effective.

15.3.2 Inspections

RMP legal compliance is checked regularly by an MPI-recognised verifier. Verification is the process of checking that the abattoir is complying with the requirements of the Animal Products Act. Verification can only be performed by people who work for an MPI-recognised verifying agency. The agency will visit and verify records regularly to check that your RMP is delivering product fit for purpose. The frequency of this process depends on the level of compliance with the registered RMP and any market access requirements. If the operation complies with the documented programme, less frequent verification is required.

The cost of these inspections includes travel and the hourly rate of the verifier. These costs include travel costs plus approximately \$90/hour including travel time, a potential cost of \$1220 per visit. In discussion with MPI **estimated** total costs for inspections will be \$8,000k in Year 1, reducing to \$4,000 in year 2, \$2000 Year 3 and all going well \$1000 by Year 4 and onwards.

15.3.3 Levies, Tag and Slaughter

New Zealand's National Animal Identification and Tracing (NAIT) scheme is an identification system that links people, property and livestock. It was developed to identify and trace livestock (cattle and deer) within New Zealand and can provide, fast, reliable and accurate information on stock location and movements. To fund this scheme the government has introduced levies. These are:

- \$0.90 per tag excluding GST (is paid at the point of purchase as part of the cost of the tag), and
- \$0.50 per animal at slaughter excluding GST (administered by meat processors).

15.3.4 Distribution and Transport Revenue and Costs

Costs relate to local transportation and movement of meat to Auckland.

- a) **Sealink and Freightlink**, This would include a once weekly pick-up from the abattoir in Sealink refrigerator truck, and crossing on the ferry to Auckland and travel to a distribution point. The cost has not yet been confirmed. A figure of \$300-500 weekly is being used as a holder in the interim.
- b) Stock pick up from farms. **Farmers pay for cattle pick-ups**, mileage plus cost of driver. To facilitate 200 pick-ups, 2,3 cows pick up,/ 2 pick-ups per day/week for 46 weeks a year. \$20/hour for driver @50 cents per km, **Average \$60 a pick up**. $\$60 \times 2 / \text{day} / 1 \text{wk} \times 46 \text{ weeks} = \5520 , **Revenue**¹⁹
- **Costs:** Casual driver: wage \$20/hour/ (2 half days/week) 46 weeks/year, (\$7,360) plus fuel and truck maintenance costs \$20,000 = \$30,000

15.3.5. Other Operating Cost-Overheads

Additional fixed costs of running the micro-abattoir would include:

- **Rates:**(calculation would be completed by specialist evaluator, depends on site location)
- **Generated power:** The cost to run a 20kw diesel generator, which would burn 2 litres an hour for three days a week would be approximately \$800 a month.
- **Insurances:** Costs for an Abattoir would be high, given the high-risk nature of work. Costs can be up to \$15,000 a year.
- **Telephone/Computer:** \$1,000 to \$ 1,500 annually. This will be dependent on technology choice and contract specifications.
- **Administration costs:** \$5,500
- **Maintenance and equipment estimates include:** Year 1 and Year 2 \$15,000 increasing to year 3, \$25,000
- **Marketing and Brand development:** It is assumed that Aotea Ora Enterprises Limited will assume the major responsibility for marketing and brand development for the abattoir for years 1 and 2, while the abattoir is in development -phase. Further, there are local residents who are marketing and brand specialists who have offered their services to support this initiative. This being said the cost of this work needs to be calculated and \$20,000, albeit a modest sum, should cover the majority of the basic costs.
- **Gas:** Gas costs will principally relate to the heating of water for showers and the operation of a small gas hob in the office for food preparation.
- **Share-holder dividends:** This would depend on agreements of dividend percentages to be paid, once a profit is being made. There will be no dividends paid until the plant is making a profit.

¹⁹ Mabey cattle would not need to be collected because of their proposed proximity to the abattoir

- **Depreciation:** An agreed amount needs to be allocated to replace worn-out equipment. The basic slaughter structure should have a 20 year lifespan.

16. CASH FLOW

16.1. Cash flow Assumptions

- **Projected throughput**-year 1-460 premium cattle/per year plus 50 lower grade cattle
- Average schedule for a 200kg ,18 month old steer, based on \$4.20/kg is \$840.00
- Current schedule for a 150 kg boner cow, at \$3.20 a kg, for meat processing is \$480.00
- Fixed purchase rate 96% of schedule, (Share risk model: Takes into account farmers' risk in reducing stock numbers to fatten, farmers reduced transporting costs and abattoir's retail costs and risks) Based on 2014 schedule, purchase price of premium cattle beast (\$840) is \$806.00 and boner, (\$480) is \$460.00
- **Estimated procurement costs** for cattle \$806.00x 460= \$370,760 premium plus 50 x \$460 = \$23,000
- Total estimated procurement costs for cattle = \$393.760
- 10.50/kg (average) for retail of premium meat and \$6.00/kg for retail of processed meat
- **65% of carcass can be sold**, 200kg cattle= 130, 150kg, cattle= 97.5
- 130kg x \$10.5 x 400 =\$546,000 97kg x \$6.00x 50= \$29,100
- **Projected retail value of premium meat** is \$546,000 and processed meat is \$29,100 = \$575,100

16.2 Cash Flow Projections

		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Operating Costs						
Rates		5000	5,000	5,000	5,000	5,000
Cost of capital			-			
Insurance		12500	12,500	13,000	13,500	14,000
Transport		6000	10,000	10,500	11,000	11,500
Salaries/including meat inspector			69,000	70,000	70,000	70,000
Training/Upskilling		30000	10,000	10,000	10,000	10,000
Cattle			395,000	395,000	420,000	420,000
Maintenance/new equipment			15,000	15,000	25,000	25,000
RMA costs		1000	1,000	500	500	500
Regulatory			80,000	40,000	20,000	20,000
Levy	Tag levy		4,500	4,500	4,500	4,500
	Slaughter levy		500	500	500	500
Generator/Diesel/Gas			8,000	8,000	9,000	9,000
Office costs			31,000	31,000	31,000	31,000
Total		54,500	641,500	603,000	620,000	621,000
Revenue						
Revenue-stock		-	575,000	590,000	630,000	630,000
Transporting			5,500	6,000	6,500	7,000
Total		-	580,500	596,000	636,500	637,000
Profit (Loss)		-\$54,500.00	-\$61,000.00	-\$7,000.00	\$16,500.00	\$16,000.00

Year 1 makes a \$54,000 loss as result of set up costs without revenue generated from sales of meat. Year 2 has a significant loss as consequence of the \$80,000 in compliance costs for the first operational year. As compliance costs reduce, and slaughter numbers gradually increase, the plant becomes profitable, with a small profit being achieved in year 4.

17. STAFFING AND MANAGEMENT

17.1 The Site Manager/Meat Inspector

The Site Manager/Meat Inspector will hold the day to day management responsibility of the abattoir. He or she will report to the General Manager of AoteaOra Enterprises Ltd, until such time as the Abattoir becomes a Community Development Company in its own right. The Site Manager will then report to the Abattoir Board.

As the Plant Meat Inspector, he or she will play a pivotal role in maintaining the quality of meat for market.

The ante and post mortem duties include:

- Checking the quality and safety of product
- Identifying diseases and defects in product
- Collecting samples for laboratory analysis
- Ensuring the removal of any product not fit for human consumption
- Communication on quality and safety of product with clients and their employees.

In addition the Site Manager, duties would include:

- Site and Staff management,
- Co-ordination of bookings and arranging pick-ups of stock
- Invoicing and banking, paying bills and wages
- Liaising with compliance authorities
 - Monitoring and maintaining accurate recording of abattoir data
 - Arranging waste and hide collection.

17.2. Qualified Abattoir Butcher

Duties would include supervision of the more junior meat processor and would include: Slaughter and hanging of animals, cutting, boning of the carcass and butchering.

17.3. Qualified Meat Processor

Duties would include, slaughtering and cutting of animals, under the instruction of the butcher, pelt and offal management, meat packaging and waste management

17.4 Casual Meat Processors

Two casual contractors would be recruited to cover staff members that are on sick or training leave. Ideally annual leave will be taken during the two months the plant is closed.

There are several potential funding sources for this wider project.

18. POTENTIAL FUNDING SOURCES

18.1 Capital Investment

It is proposed funding be sought through a mix of local government, philanthropic and private investors.

- The Great Barrier Island Local board has set aside a possible \$200,000 towards this project.
- Philanthropics such as The Tindall Foundation who have a strong interest in community sustainability initiatives could be approached. Further research is needed on what other Trusts could be supportive of the project.
- Private investors. There have been a number of people, both permanent and part time residents, who have expressed an interest in investing in this project. I would envisage their investment will be-through significant share-holdings.
- Community share-holding opportunity. Share parcels will be offered to residents to enable a breadth of community ownership of the venture. More work is needed to shape this offering.

18.2 Farming Infrastructure Developments

- **The Community Irrigation Fund**

The Community Irrigation Fund (CIF) aims to build resilience in agricultural producers and rural communities, and ensure their long-term economic growth within sustainable environmental limits by reducing the risks they face from water shortages caused by climate change.

The CIF provides grants to assist community water storage and/or irrigation schemes, by offering community support and/or by carrying out detailed engineering design for schemes.

A total of \$5.7 million (excluding GST) spread over eight years (2008/09 to 2015/16) is available to provide financial support for up to 50 percent of valid costs to successful applicants. The Fund is contestable, will be accepted for a maximum of three years for local government water strategies, four years for generating community and/or investor support for community water storage and/or community schemes, and two years for the detailed engineering design of community water storage and/or community schemes.

- **Irrigation Acceleration Fund (MPI)**

This fund primarily supports regional rural water harvesting, storage, and distribution infrastructure. The 2011 Budget allocated \$35 million over 5 years (through to 30 June 2016) to support the development of irrigation infrastructure proposals to the stage where they are investment ready. To be considered investment ready, proposals must be technically and commercially robust and demonstrate a high level of community support.

18.3 Land, Pasture and Soil improvement

- **Sustainable Farming Fund (MPI)** The SFF funds 'communities of interest' to undertake applied research and extension projects that tackle a shared problem or develop a new opportunity. Applicants can apply for up to \$200,000 a year for a maximum of 3 years. The maximum total grant available is \$600,000. Projects require a non-government funding contribution of at least 20%. Most successful projects are able to leverage a high proportion of other funding or in-kind support to complement the SFF grant. For example, a grant might be applied for to have an advisor come to the island to work with farmers on stock management and pasture improvement.

- **The Erosion Control Programme**, (Ministry of Primary Industries)
A Trust can apply for this grant on behalf of a group of people who own or have an interest in the land. The ECP grant can be used to control erosion. The ECP offers grants for creating an operative tree cover by planting or encouraging natural reversion to native bush.

18.4 Skills Investment

- MSD has a skills investment subsidy that invests in disadvantaged job seekers by making a temporary contribution to skills training.
- Training Incentive Allowance,(MSD) provides non taxable assistance to clients receiving certain types of benefits to undertake employment related training that will improve their skills and increase their chances of getting work.
- This programme provides full-time, fully funded training options to targeted Work and Income clients, enabling them to develop skills and gain credits towards nationally recognised qualifications. This assists the move into employment, further education or training.

19. PROPOSED OWNERSHIP STRUCTURE

It is proposed the Abattoir and associated assets are initially owned by the AoteaOra Community Trust. The Trust is able to raise capital in the form of grants or loans to assist with the plant build and operations. Principle stakeholders, such as farmers or local residents with a key interest in the farming and food sector may be interested in investing funds into this venture, with the knowledge they are contributing to the build of the island's infrastructure and their monies will leverage future economic benefit to the island.

Once established and operational, Aotea Ora Enterprises Limited, GBI's social enterprise company, will appropriate the ownership and management of the abattoir. This will be facilitated in a stage by stage process with care being taken to ensure a smooth transition. The General Manager of the Social Enterprise will report to the governing Board, the AoteaOra Community Trust. He or she will also report to an Advisory group who will be experts in the fields of social enterprise and farming.

In principle, greater levels of social and economic impact are achieved when the Trust divests ownership and control to the Enterprise entity and greater impact is achieved when the Enterprise entity divests ownership and control to the shareholders of the ventures.

I propose the abattoir be divested from the ownership and governance of Aotea Ora Enterprises Ltd, into a stand-alone Community Development Company, using a limited liability company legal framework. This should occur when it becomes a self-sustaining business. It will allow stakeholders to convert their loans into shares and become substantial owners, maintaining and increasing their say in how it is run so it will have greater opportunity to become more profitable.

The Abattoir as a Business Development company will be a commercial business operating under a social imperative. The company will have clear commercially-driven objectives, and a focus on delivering a social benefit to all of the stakeholders which include its employees, customers, suppliers, and the wider community.

20. CONCLUSION AND RECOMMENDATIONS

In conclusion, the concept of a micro-abattoir is well supported across the island. The abattoir has the potential to become a valued part of the island's food producing infrastructure. It provides the opportunity for farmers to sell and slaughter their stock with less stress to the animals and without the substantial travel miles and without the substantial transport costs. It provides the island with a quality local meat source, and a food brand that would add breadth and interest to the local eateries. The venture also has the potential to create 4 to 5 part time positions.

More work is needed to accurately calculate both actual and desired projected capacity for beef farming on the island. These numbers are needed to project future sustainability. Current calculations are modest, based on the uncertainty of these numbers. If the island could produce 1000 cattle a year for slaughter, projected profitability would substantially increase. The environmental impact on the island would however need careful consideration.

The capital cost to set up the micro-abattoir venture is high. Securing investment of this level will be a challenge. Cash flow estimates predict a loss for the first three years, with a potential small profit by three years. As such, this venture contains moderate to high risks. The Trust and the Local Board will need to consider what level of risk is acceptable for the island. The Trust will also need to consider whether the risks are too high as a first venture for Aotea Ora Enterprises Limited.

The opportunity to support the Great Barrier Island farming community to become more productive, environmentally sustainable and financially viable as farming collective is both possible and highly desirable. As in most rural environments, when farmers are doing well, all of the community benefits from the increased circulation of local money. Regardless, whether the abattoir proceeds or not, it is my recommendation that the co-ordination and build of a farming collective be further explored and supported.

Should a decision be made to proceed with the abattoir, it is my recommendation that while more detailed site selection, a risk management planning processes be carried out, a concurrent farming development stream be scoped and coordinated.

Based on the island's enthusiasm for this venture, and the Ministry of Primary Industries strong support, it would be excellent to find a way to make the micro-abattoir work. The final decision must however be based on fiscal responsibility.



Napier Engineering & Contracting Ltd

Re-locatable food processing facility proposal Q10024

For
Shirley Johnson
Skills Manager
COMET Auckland

M: 021 2788557

P: 09 3072101

PO Box 3430, Shortland St, Auckland 1140

Level LL 2 Princes St

Auckland Central

www.cometauckland.org.nz

- **20 cattle per week slaughter & chill.**
- **50 sheep per week slaughter & chill.**

May 2014

While every effort is made to ensure the accuracy of the information and data contained herein, Napier Engineering & Contracting Limited accepts no liability for any errors or omissions, or any opinions expressed. To the best of the author's knowledge the information is true and accurate.

Ken Evans 0275165589 / ken@napiereng.co.nz / www.napiereng.co.nz



CONTENTS

1. Preamble
2. Project Brief
3. Species to be Processed
4. Design Throughput
5. Description
6. Capability
7. Plans and Drawings
8. Supply
9. Training
10. Exclusions
11. Spare Parts
12. Price



NEC



Napier Engineering & Contracting Ltd

1. PREAMBLE

- Shirley Johnson from COMET Auckland has approached Napier Engineering & Contracting Ltd, (NEC) for a proposal to supply a Re-locatable multi-purpose food processing facility for the slaughter, chilling and boning of up to 20 cattle or 50 sheep per week.
- The project design, build proposal will be a joint venture between NEC and PROAND LTD.
- PROAND LTD have over 30 years of design and project management service to the food Industry within NZ and Internationally. NEC has over 100 years of design, build capability for food processing plant and equipment.
- On behalf of Proand and NEC we thank you for the opportunity to offer our services for this project.
- Proand in conjunction with Napier Engineering (NEC) have prepared a concept design and budget costing for the proposed facility, which would be constructed in Napier, assembled to an operational state then disassembled and freighted to Great Barrier Island for onsite erection.

2. PROJECT BRIEF

- The plant will initially process cattle and sheep but can be extended to enable the processing of pigs at a later date. The facility will also be capable of processing wet fish when not being used for red meat processing.
- The total numbers will be approximately 20 cattle, or 50 sheep per week.
- The design kill capacity will be able to be increased with the introduction of extra labour.
- The plant will be a slaughter and carcass chill facility with the possibility of boning on rail and table when not slaughtering. Stockyards are not included.

Non-food items will be dealt with in the following manner.

- Hides & skins – taken off site fresh and/or salted.
- Heads, trotters etc – taken off site fresh.
- Paunch, pet food offal – taken off site fresh.
- Effluent – septic tank to paddock. Solids to compost.

Services at the site are advised as follows:

- There is access to electricity but a backup generator may be required.
- There is access to clean, artesian or rain water. (Refer option for water treatment to potable water).
- There is no piped sewage or effluent disposal.
- There are no trained operators for the plant.

3. SPECIES TO BE PROCESSED

- Cattle – 350 to 700 kg live weight
- Sheep – 20 to 40 kg live weight.
- Animals are driven, or walked in by owners to facility.



Napier Engineering & Contracting Ltd

4. DESIGN THROUGHPUT

- This small slaughter and carcass chill facility is for the supply of fresh chilled meat processed in hygienic surrounding initially for the local consumption.
- The design throughput capability is very dependent on worker skills but will nominally be 15 to 20 cattle per week using 2 men. There would obviously be the ability to improve this Through put using extra skilled labour.

5. DESCRIPTION

- The philosophy behind using a modular kitset is to supply a proven, ready to assemble processing facility on a site where there may well be little or no infrastructure for constructing food processing buildings or the supply of engineering/trades services.
- The facility would arrive on site and would be assembled by trained and experienced personnel supplied by NEC.

The only requirements needed on site would be:

- Access for road transport of containers to the intended site.
- Crane to unload and assemble the containers.
- The necessary local body, government and regulatory consents in place.
- Electricity to the building site.
- Fresh clean water to the building site.
- A concrete pad to sit the container building on.

The facility includes:

- Containers prefabricated to assemble into the slaughter room and one reefer container for the carcase chiller.
- A multi species slaughter floor including all equipment to process cattle and sheep.
- Railing systems for a capacity of 40 quarters or 50 small stock.
- A product dispatch door.
- Hot water equipment attached to the side of the building.
- Water & effluent treatment systems..

6. CAPABILITY

- The output is very dependent upon the skills of the operators required. However, assuming the appropriate skills are available, the maximum output or capability of this abattoir is as follows: 20-15 cattle or 50 sheep per week.
- The carcass chiller has the capacity to hold 10 cattle in quarters or 50 sheep.



Napier Engineering & Contracting Ltd

The equipment supplied to service the abattoir includes:

- See attached Re-locatable equipment list.

7. PLANS AND DRAWINGS

See attached plan.

8. SUPPLY

- As mentioned earlier, Proand / NEC propose to design and manufacture the facility in Napier to prove all components work, disassemble it and load all the parts into four to five containers.

From there it would be shipped to Great Barrier Island and delivered to site. We would liaise with you to have the containers unloaded, re-assemble the facility and commission it on site.

- The client will be responsible for arranging the supply to the edge of the building of services: including electricity, and water. Unless you advise NEC to provide a power generator.
- The client is to provide the agreed level of insurance cover from the time of unloading at the Great Barrier port. This is to be in place before the unit is shipped from Napier.
- The plan assumes a flat site. It is the client's responsibility to prepare the site and building platform to accept the new building.
- The plan assumes road access to the building site is suitable for trucking/containers/materials.
- The Client is to provide temporary power and water supply during construction period.
- The Client is to provide site security during construction.

9. TRAINING

- Critical to the success of this venture is the training of the local operators in the correct methods and procedures to produce hygienic safe meat.
- Within this package is an option to include the supply of a trained, skilled butcher who will teach the local operators how to commission and use these new facilities. The training being offered for the butcher on site is costed on a weekly basis.

10. EXCLUSIONS

- No workers to operate the abattoir. (refer option)
- No allowance for the cost of the land for the plant.
- No allowance for building permits.
- No telephone and / or connection if required.
- No connection to power or water services.
- No allowance for the processing of trimmings, unsaved viscera and offal, bones, heads, trotters and paunch content etc.
- No facility to handle the cattle hides or sheep skins other than temporary collection in a bin.
- No treatment of extracted air or odours emanating from the plant.
- No insurance cover once the unit has landed in Great Barrier.
- Freight and handling.
- Insurance cover up to and including landing at the nominated port.



Napier Engineering & Contracting Ltd

Options not included in the price:

- Training:

11. SPARE PARTS & SERVICE

- Spare parts, over and above those supplied with the facility, are available at a cost upon request.
- As built drawings will be supplied.

12. PRICE

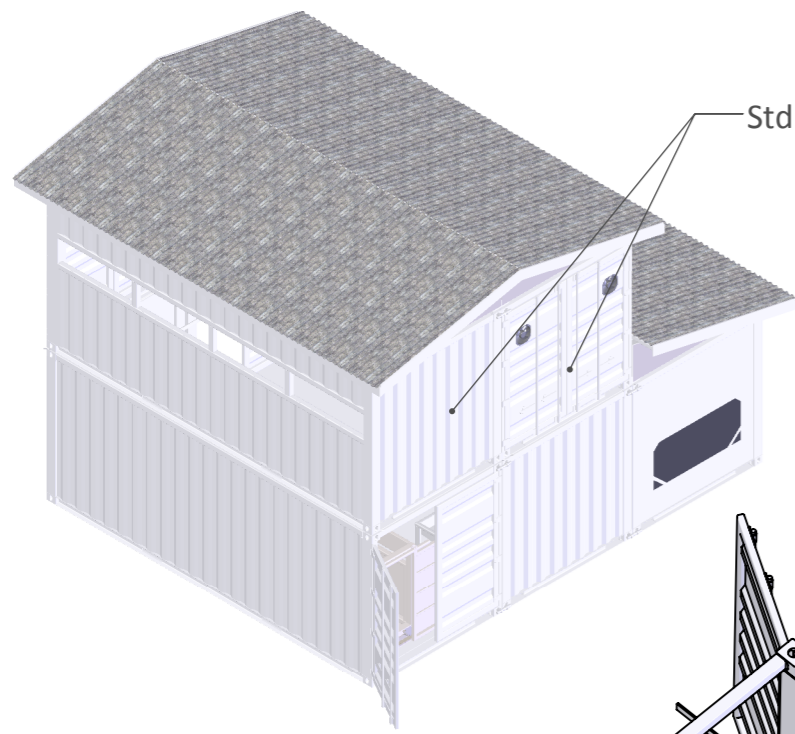
The price for the full plant (outlined in this proposal and attached drawings) delivered, assembled, commissioned is

NZ\$388,000 plus GST

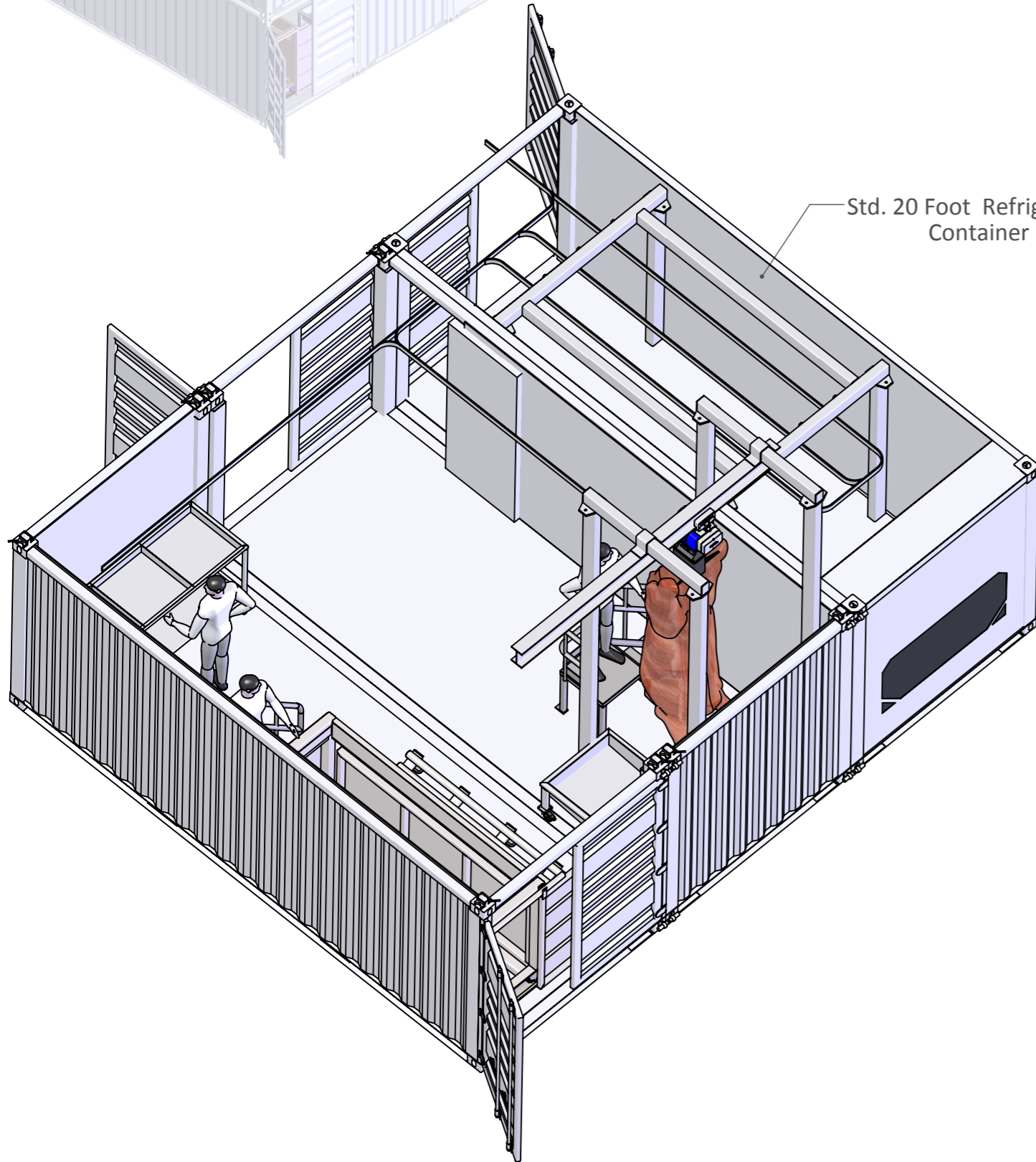
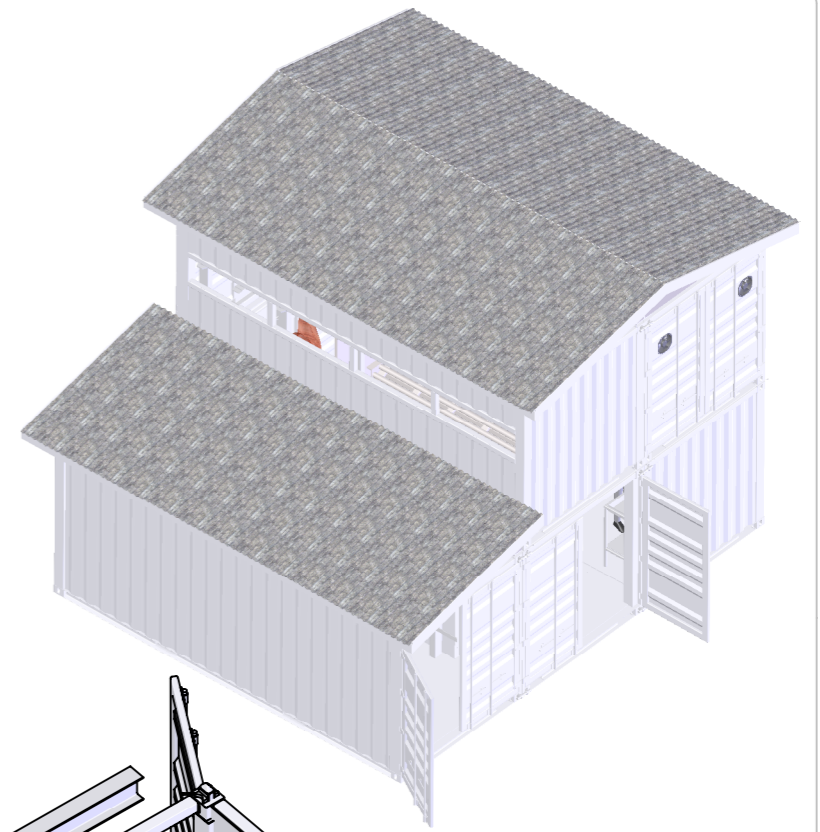
OPTIONS

- Reaman Industries Potable water system Filter, Storage tank plastic 25m³, Chlorine dosing, pressure pump & filter, ultra violet disinfection. Note: The system can be altered to lower the cost but it will result in lower efficiency.
\$95,000
- Operational, technical & training assistance.
\$4,250/week not including travel or accommodation.
- Personal & ancillary equipment start-up: Paper towels & dispensers, flanking paper, bung bags, weasand clips & rodder, liquid soap and dispensers, steels, knives, stones, pouchers, belts & clips, gumboots, aprons, overalls.

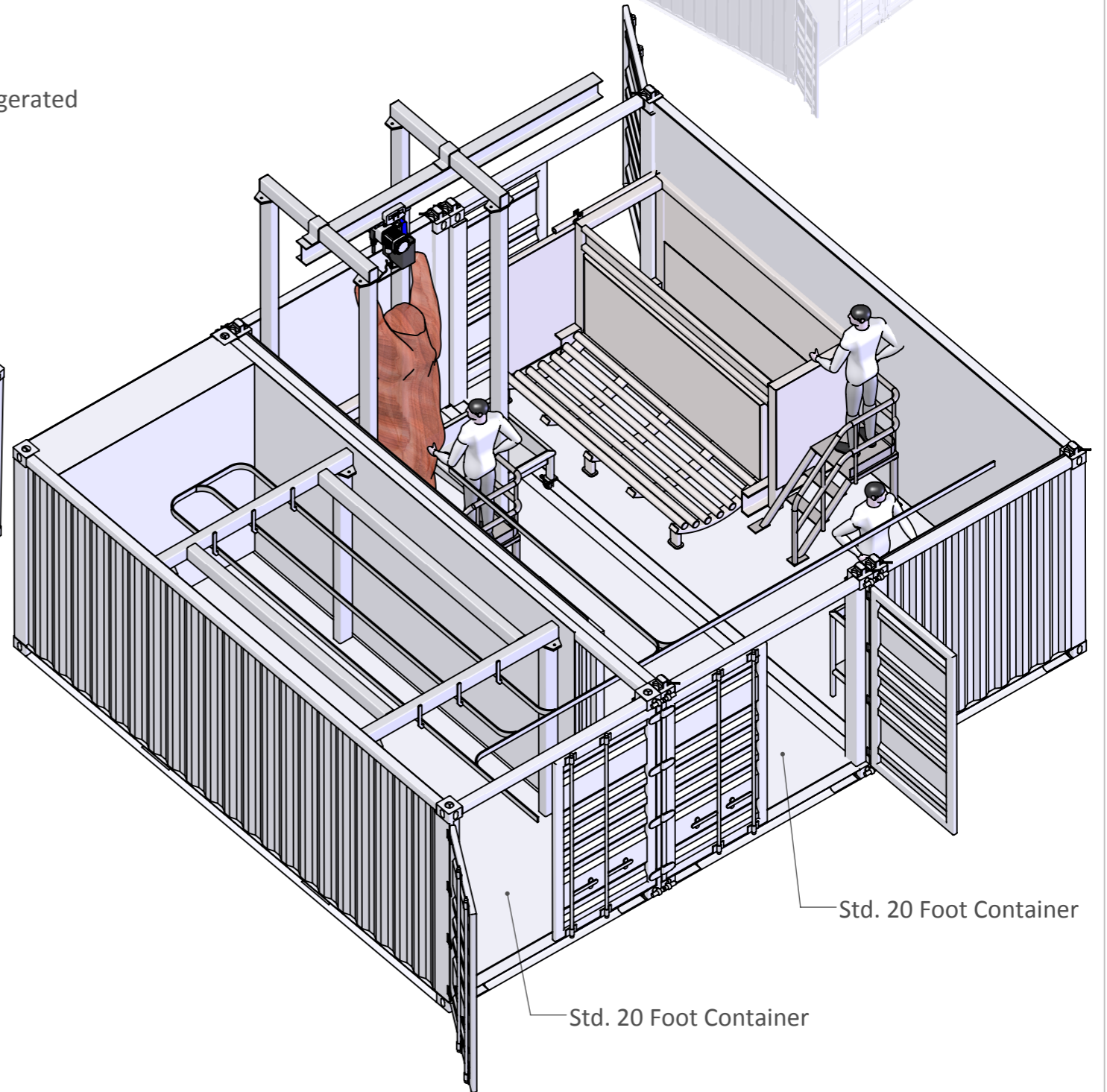
NEC



Std. 20 Foot Containers

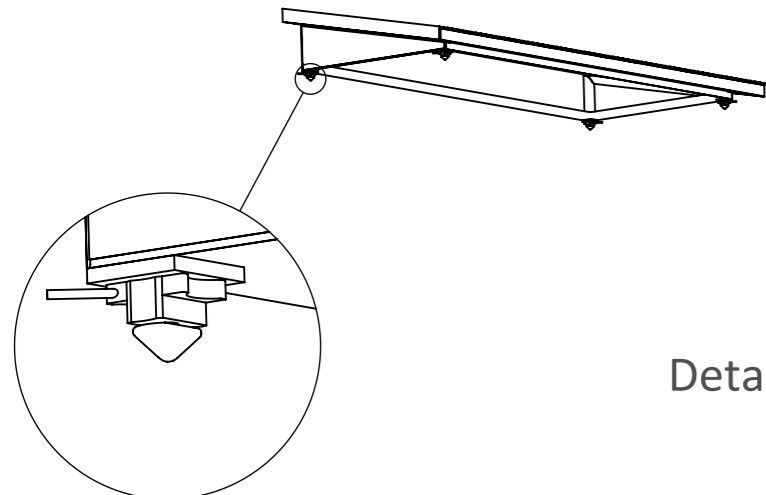


Std. 20 Foot Refrigerated Container

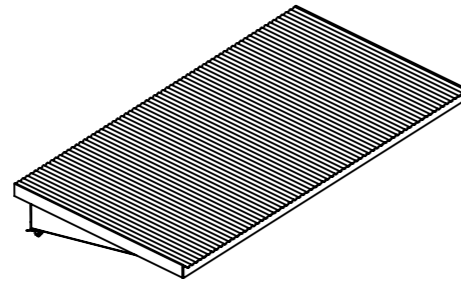


Std. 20 Foot Container

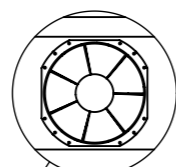
Std. 20 Foot Container



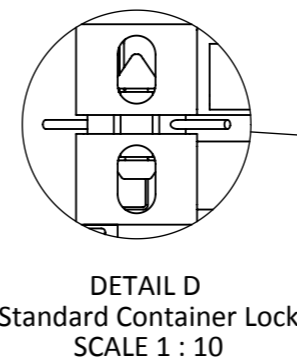
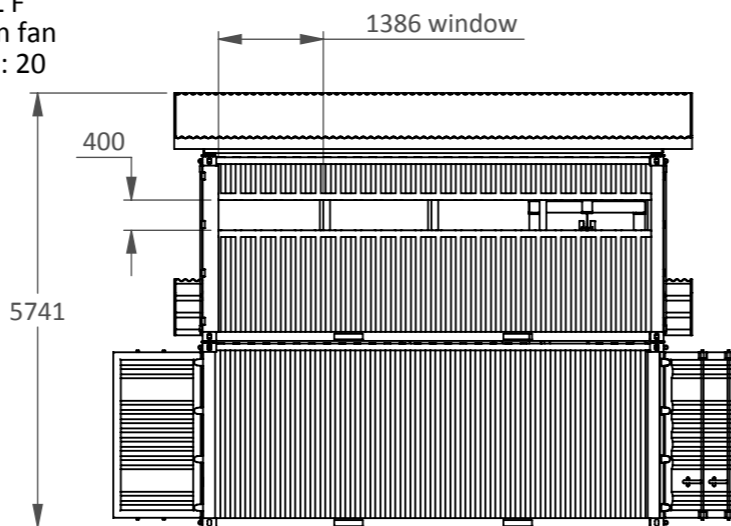
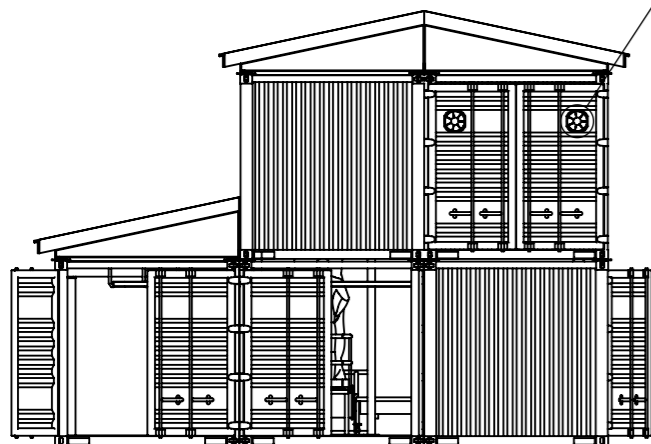
DETAIL E
Standard Container Lock
SCALE 1 : 10



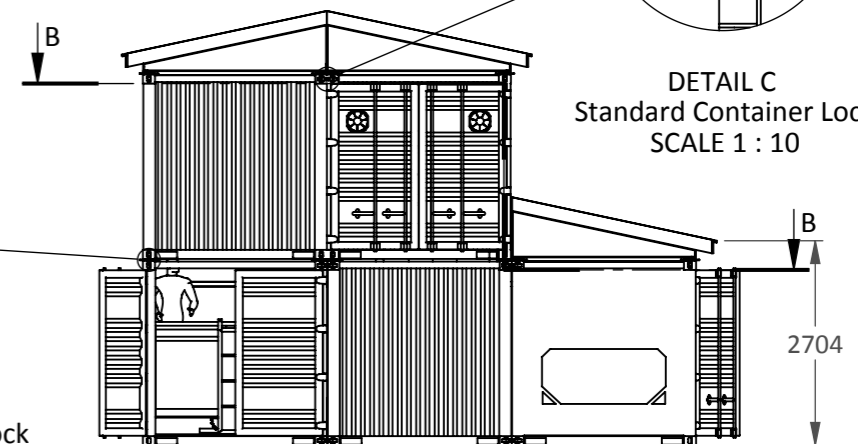
Detachable Roof



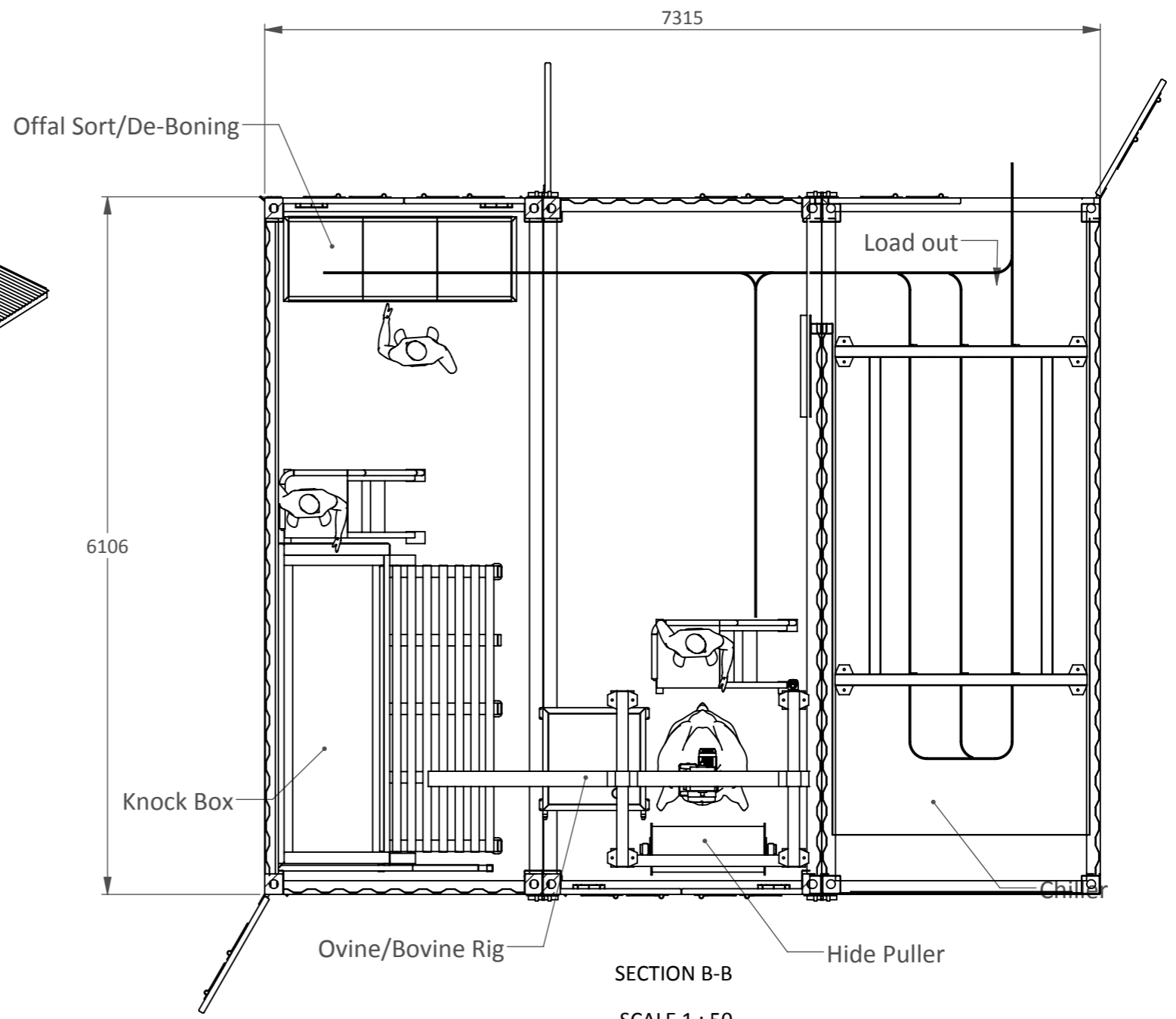
DETAIL F
ventilation fan
SCALE 1 : 20



DETAIL D
Standard Container Lock
SCALE 1 : 10



DETAIL C
Standard Container Lock
SCALE 1 : 10



SECTION B-B
SCALE 1 : 50

Stainless steel Hygiene ware

Under lean-too bootwash & handwash	Pre-entry cleaning, with liquid soap dispenser
Apron hooks inside process room	Aprons left clean & hanging inside room
Apronwash	43c water for hand & apron wash, with liquid soap dispenser. With foot activated valve
Portable steriliser	82c dunk/overflow type steriliser with 3m hotwater hose connect & drain hose. Moved to working location through process

Water & effluent

Infinity on demand LPG. Cold water at 60-80psi supply by others	1 x 82c unit & 1 x 43c unit. Clipped onto side of container with plumbed connections for Hygiene wear. 1 x hose point coupling
Process room waste to central drain. Floor falls to centre	Flooring is glass/ply with non-skid surface & Stainless trough drain
Covered sump/grease trap Immediately outside room take all liquid waste	Sump has pump to septic tank or filter then to field drains or spray irrigation

Process room

Basic Farmequip restrain knock box. Hatch door in side of container	Galv with hinged door. Used for cattle, sheep & goats. Stun gun with 1 x packet of cartridges.
Mobile Cradle	Castor locking wheels. Land cattle or sheep then move away from knock box to enable access around animal. Galv
Dressing rig	Portal frame from galv steel with electric gantry winch
Spreaders	For cattle and sheep. Stainless
Hide drop, Evisceration & Halving Platform	Stainless platform with steps & guard railing on lockable castors
Rails	Spring steel rail for ccs sides with spring loaded drop rail for quartering, quarter rail to chiller
Chiller rails	Rails at 350 spacing supported by portal frame with locks to separate quarter by animals. Galv
Electric saw EFA44 reciprocating	For brisket cut & halving. Single phase
Beef skids/hooks	Stainless x 18
Sheep gambrels/skids	Stainless x 10
Fold down boning/inspection bench	Stainless hinged off wall
Weasand rods & anal plug pusher	1 x rod for cattle, 1 x rod for sheep. 1 x Anal plug pusher
Containers	1 x reefer 20" container for chiller, 4 x standard 20' containers for process room as per drawing. Lean-too roof for boot wash area, weather roof, epoxy paint internal, plyglass flooring with coving & drainage channel, doors, windows.

Ancillary equipment

Gong brushes	2 of for cleaning saw and other equipment
82c wash down	½” valve with 15m Steam hose with nozzle, snap lock connection & hose reel
82c steriliser	Portable steriliser; steam hose, drain hose with snap lock connections
Plastic lidded tote bins	4 x heads, 4 x red offal’s
Plastic lidded half barrels	4 x paunch material
Plumbing	Process room & lean-too pre-plumbed for: <ul style="list-style-type: none"> • Infinity units, steriliser • Apronwash, bootwash, handwash & hose point. • Connection point for incoming cold water for Infinity units & 1 x cold water connection with snap lock.
Electrical	Pre-wired for: <ul style="list-style-type: none"> • Flouro lighting x 4, Bulk head light x 1 under lean-too. • Single phase water proof plugs X 2 inside & 1 x outside • 1 x Air filter & air in fan. 1 x Extract fan. Electrical supply by others.

+ GST

NEC Process engineer will assist with training on the beef/sheep rig & cradle.

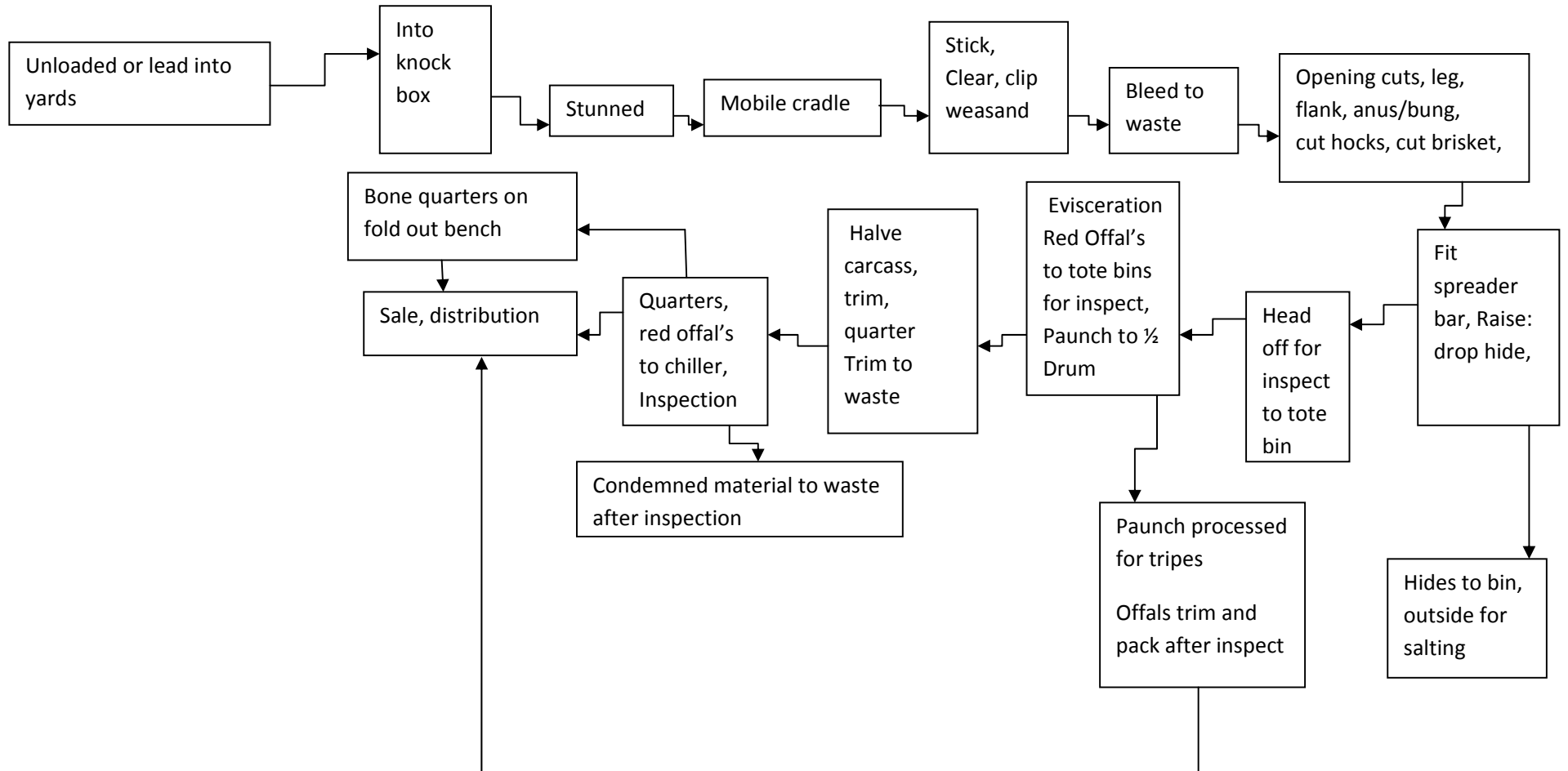
Other consumable equipment can be supplied

Anal plugs, weasand clips, plug & clip dispensers. Knives, steels, stones, aprons, knife pouchers, chain belts, paper towels & dispensers.

Suggest another container is purchased for consumables & equipment storage

Exclusions: Freight, travel & accommodation, permits, licensing, consents

Process flow:



Process flow:

