

Development of Persian soups

Development of Persian soups\meat dishes from
Australian Lamb for Export Markets

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1.0 Executive Summary

The project was titled 'Development of Persian soups\meat dishes from Australian Lamb for Export Markets.

THE PROJECT

The purpose of this project was to develop a range of Kaleh Pacheh Soups in a ready-made frozen meal format. Kaleh Pacheh is a Persian delicacy usually served for breakfast. It is a soup style dish made from sheep feet and Heads. The project aim was to lift lower-value offal's to higher-value items to lift profit margins and the overall return per head.

The scope of the project was to set up a pilot scale facility to validate the processes, identify market demand and evaluate the commercial business case to scale up.

The objective of the project was to develop three new sheep-based food products: Kaleh Pacheh Soup, Kaleh Pacheh with head meat and Kaleh Pacheh with feet meat.

PROJECT OUTCOMES

The pilot scale facility was successfully set up in Geelong and all regulatory licenses obtained to export meat products. Over the life of the project, we achieved sales more than five hundred thousand dollars. Many modifications were made to the equipment, facility, packaging, and recipe over the life of the project to improve our offering and processes.

For the Kaleh Pacheh products, it was a struggle to achieve commercial success and repeat orders. Some of the reasons for this included.

- Covid impact on consumers and commerce
- The total cost of the offering was too high.
- Flavour development
- Kaleh Pacheh is a delicacy and not frequently consumed.
- Some odours of head meat products are a deterrent.
- Traditionally, people make these recipes themselves.
- Cost of local restaurant (in international markets) supplied product cheaper than ready-made meal option.

Project Development

There were many learnings and improvements made over the life of the project.

On the equipment and facility side many improvements were made including cooking vessels, cooking baskets, exhaust fans, castors, carousel conveyors, overheating compressors, strip curtains and improved burner heads.

On the process side there were many learnings and development of techniques including.

- burning pots,
- cook time,
- yields in tray,
- excess liquid,
- loss of weight in cooking,
- raw material size variation
- fat in soup.

PROJECT EXTENSION

Paya - Paya is a sheep feet curry like Kaleh Pacheh which is consumed in the Indian subcontinent. As an extension to the original project development, Paya recipes would be complimentary to existing facility and expertise.

Charred Product – As part of the preparations of the Kaleh Pacheh the feet and heads are charred prior to cooking to remove hair and add flavour. It has been identified that there are existing markets for charred product in the Middle East and North America. Producing charred product would add an additional use for the facility and utilise existing equipment.

Washing Product from Dirty – The availability of white sheep feet and heads produced by Australian meat processors has reduced with the labour shortages brought about by COVID. Lack of immigration and changes in life choices has seen the labour market in the food industry become very scarce. Processors have focused on core business and have not had the resources to maximise offal collection. An extension to the original project would be to wash product from dirty to ensure the reliable supply of raw material.

INSIGHT

The project was very successful on many levels and some of our strengths included the development of the facility, licensing, idea execution, packaging, and branding.

Our limiting factors include facility overhead, regulatory barriers, narrow range of offering, target market, formulation of recipe, path to market and inconsistency of product.

With unlimited resources and funding, success at some level would be possible in the long run. However, playing in the space of 'Food Product Development' producing ready-to-eat meals for the international market is a huge extension from selling raw meat products. We underestimated the enormity of the task and probably overestimated the realistic success of such an endeavour.

CONCLUSION

In summary we have had limited success both internationally and domestically with our Kaleh Pacheh offering in the convenience market. Possibly the main factors include cost of final product, not enough focus on recipe development, cultural barriers and COVID 19 restrictions.

We will continue to focus on the new product opportunities of Paya and Charred Products and explore the possibility of cleaning feet from dirty.

We remain optimistic in the endeavour to shift traditional by-products from inedible to edible markets. While the value of all ready meat proteins continue to increase across the sector and become a luxury product there will continue to be greater demand for lower value proteins from the world market.

This project, like most projects, is challenged by limited financial and time resources. The greatest challenges include maintaining the facility overhead, choosing successful product development paths, keeping the project focused and overcoming regulatory barriers in a timely fashion to discover successful commercial offering to the market.

BENEFIT MEMBERS AND WIDER INDUSTRY

The Australian Red Meat processing industry continues to evolve. Over recent years many plants have shifted from largely selling carcasses to breaking down to cuts and shelf-ready items while by-products have increased in value.

This project explores one opportunity to further value-add offal items and extends from raw meat products to producing a ready-to-eat frozen meal. The value-add attempts to increase total value for the processors and further extend the supply chain and reach the final consumer.

Producing ready-made Kaleh Pacheh meals may not be an adopted solution by industry – but hopefully the project is thought provoking and extends the possibility of what may be achievable.

2.0 Introduction

The **purpose** of this project is to develop a range of Kaleh Pacheh Soups in a ready-made frozen meal format. Kaleh Pacheh is a Persian delicacy usually served for breakfast. It is a soup style dish made from sheep feet and heads. The purpose of the project is to lift lower-value offals to higher-value items to lift profit margins and increase the overall return per head.

The **scope** of the project includes.

- Secure a test location and machinery to complete pilot scale trials to validate yields and process and product specifications in transforming raw lamb bones, head and feet into value added Persian style soups and dishes (technical feasibility)
- Identify market demand and key product features and marketing mix (target market desirability)
- Evaluate commercial business case to scale-up (viability)

The **objective** of the project is to develop three new sheep-based food products:

- Kaleh Pacheh Soup, a nutritious broth-style soup
- Kaleh Pacheh with head meat, a nutritious soup with chunks of sheep head meat, tongue, and brain
- Kaleh Pacheh with feet meat, a nutritious soup with whole sheep's hoofs

The project is limited to value-adding sheep feet and heads into edible markets with a focus towards export markets.

3.0 Project Objectives

The recent 'Cost to Operate' report has further demonstrated that Australia is (1) the highest processing manufacturing country compared to its main competitors and (2) that the opportunities to reduce these costs required both a domestic and international large scale innovation driven solution to ensuring Australia can remain a competitive processing country and ideally lose the title of the world's most expensive country in which to process meat.

In addition to costs to operate, processing businesses also need to understand how they make profit and then in turn how to increase profit generation. Using the following depiction as an example the single biggest cost of undertaking a processing business is the purchase of livestock, with the single biggest income from primal sales.

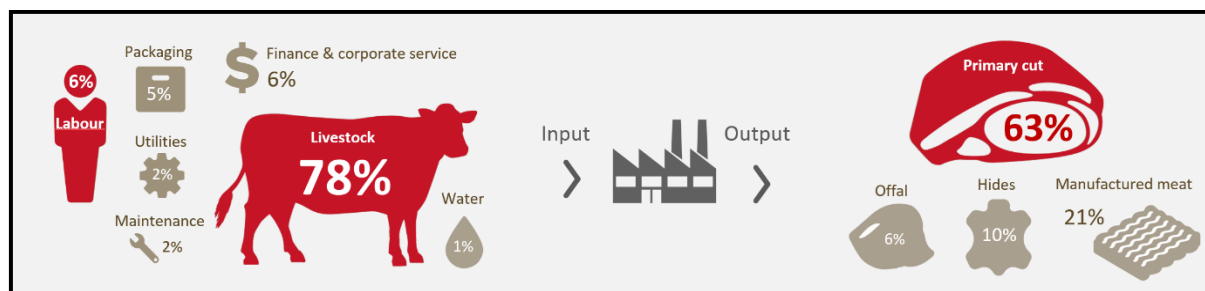


Figure 1: Cost of processing model: Input costs (left) of revenue generation (right)

If increased value can be obtained from offals (such as bones, head meat and feet meat), to develop export retail ready-value added offerings from these lower value 'offal' cuts, then the processor can increase the profit margin to the business and there is less of an impact on the cost side of the business.

This project will build on Hardwicks' recent presentation concept Kaleh Pacheh products at Gulfoods 2020 Trade show. This opportunity space will enable Hardwicks to design and deliver a range of Persian style dishes in soup and ready meal formats derived from Australian lamb bones, head meat and feet meat with deeper MENA market insights and process specifications completed.

Australian processors are both challenged by the costs of processing in Australia, compared to competing exporting countries, whilst at the same time having an opportunity to potentially charge a premium in certain markets that see Australian product as a safe protein choice. This, combined with the increased price of protein and portion sizes reducing, affords a perfect combination to position export-ready, retail-ready fixed portion cuts, with full traceability to Middle East and Asian markets with the willingness to pay for Australian product.

The question is, what cuts, what portion sizes, what presentation and at what price point, for each market considered would enable the overall value of primals per kilogram to be increased over and above any additional costs for processing primals to a retail ready export offering?

3.1 Cost to Operate

A recent study¹ by AMPC has reinforced both that labour is the highest cost of processing after livestock purchases, and that Australia's labour costs are significantly higher than that of the USA (@163% higher), Argentina (@238% higher), and Brazil (@278% higher). As such Australia has more to gain (and by consequence a higher driver) to automate any slaughter or boning room task where high value staff are removed from yield critical activities and in turn moved to higher value adding tasks. This study, when combined with the DMRI study, demonstrates the return on a yield improvement focus on processing efficiency not a labour minimisation approach by AMPC.

3.2 Revenue Model

Modelling developed by Sean Starling utilising 20+ years of data acquisition from various projects, processor visits and supporting documentation, resulted in a high-level summary of the major cost inputs and revenue generation streams. (Refer Fig 1)

The above was developed in 2010, at a time when cost of livestock (trade steer) was: \$1.81/kg, average sale price ex boning room of carcass was: \$3.70/kg, and labour was valued at: \$58,000/year (including on costs).

¹ Analysis of regulatory and related costs in red meat processing

Using the developed model (in 2010) to undertake various what-if scenarios, Figure 2 depicts the changes in profitability (or losses) when various processing levers are altered.

The single biggest impact on processing efficiency after movement in livestock prices is to ensure that accurate segmentation and deboning of livestock into the highest primal value possible. Having obtained a primal, then positioning that primal and primal portions in the market for the highest price possible per kg. (this is explained further below)

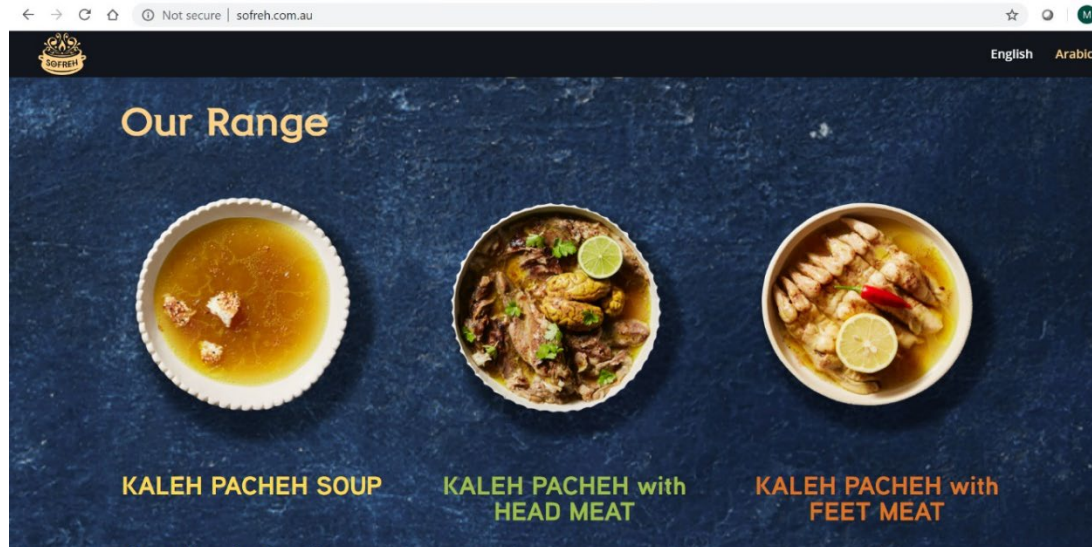
Using the model and undertaking scenario analysis, the importance of each input cost and revenue generation stream can be understood as to their impact on gross profit. Any primary cut processing inaccuracies results in primary cut meat being devalued to manufacturing meat. In the region of the loin (lamb), this results in meat valued at \$25/kg being sold as manufacturing meat with one fifth the value. Primary cut processing inaccuracies are a result of human error from poor cutting and the inability for humans to see the cutting lines without x-ray vision. Objective Measurement and Automation systems, when combined, remove these issues and costs to the supply chain. The focus for processing efficiency needs to be on accurate cutting not labour replacement (the later an AMPC approach to processing efficiency). Another approach using the same data is to lift the price point of lower value cuts (by value adding them) to a high primal equivalent price point. Case in point is instead of looking at the cost to the business of losing primal yield to trim, image the positive value generated if trim could be sold at the price of primal values. In this project Hardwick expect to lift the price of lower value offals (and associated co- and by-products) to primal meat pricing.

Annual Throughput	228000 (head)	Sales Income (millions)	Livestock Costs (millions)	Other Costs (millions)	Net Profit (%)	Profit / Head (\$/hd)	Position Change
Base Model							
		\$ 256.39	\$ 191.90	\$ 56.92	2.1%	\$ 23.26	
Variable 1 - Livestock purchase costs							
Change	↑ 1%	\$ 256.39	\$ 193.82	\$ 56.92	1.5%	\$ 17.37	-25%
Variable 2 - Labour							
Reduction of one full time equivalent (FTE) with constant processing throughput							
Change	↓ 1 FTE	\$ 256.39	\$ 191.90	\$ 56.87	2.1%	\$ 23.40	1%
Reduction of one full time equivalent (FTE) with resulting reduced offal recovery							
Change	↓ 1 FTE	\$ 255.62	\$ 191.90	\$ 56.92	1.9%	\$ 20.90	-10%
Increase in non-staff remuneration							
Change	↑ 2%	\$ 256.39	\$ 191.90	\$ 57.18	2.0%	\$ 22.45	-3%
Variable 3 - Deboning Yield							
Loss of yield to lower value primal (average 5mm cutting error)							
Change	↑ Lwr \$ cuts	\$ 256.10	\$ 191.90	\$ 56.92	2.0%	\$ 22.36	-4%
Loss of yield to trim (with average 5mm cutting error)							
Change	↑ Trim	\$ 255.27	\$ 191.90	\$ 56.92	1.8%	\$ 19.82	-15%
Variable 4 - Services Improvements							
% reduction of water as a result of all known water saving solutions							
Change	↓ 57%	\$ 256.39	\$ 191.90	\$ 55.61	2.4%	\$ 27.27	17%
% reduction of energy use as a result of all known energy saving solutions							
Change	↓ 9%	\$ 256.39	\$ 191.90	\$ 56.70	2.1%	\$ 23.92	3%

Figure 2: Impact of costs and revenue streams to processing P&L

Hardwicks strategy: Develop business case to produce products at Geelong site and secure supply chain and partners and customer base in MENA. Following completion of this PIP project, approach AMPC and MLA Co-Marketing for in-market launch support.

Hardwicks have started working on a new venture, Sofreh, to deliver on the projects outcomes – see website landing page below:



This project further builds on past MLA research – V.RMH.0074 - <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Review-of-meat-bone-by-product-processing/3859> and V.RMH.003 - <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Exploring-High-Valued-Opportunities-for-Natural-Flavour-and-Wellness-extracts-derived-from-red-meat-2Morrows-Foods/4263>.

3.3 Objectives

Development of three new sheep-based food products:

- Kaleh Pacheh Soup, a nutritious broth style soup
- Kaleh Pacheh with head meat, a nutritious soup with chunks of sheep head meat, tongue and brain
- Kaleh Pacheh with feet meat, a nutritious soup with whole sheep's hoofs

4.0 Methodology

- Secure test location and machinery to complete pilot scale trials to validate yields and process and product specifications in transforming raw lamb bones, head and feet into value added Persian style soups and dishes (technical feasibility)
- Identify market demand and key product features and marketing mix (target market desirability)
- Evaluate commercial business case to scale-up (viability).

5.0 Project Outcomes

5.1 Market Report

Kaleh Pacheh Products – International

At the time of writing the Milestone 3,4,5 & 6 report, dated 21/07/21, airfreight sample shipments of retail-ready Kaleh Pacheh had been sent to the Middle East and there were negotiations taking place for a commercially-sized shipment. Unfortunately, to date, a commercially-sized order has not been secured to international markets.

We had very strong interest from potential customers during the Gulfoods exhibition, who continued to show interest in product while the facility was being developed.

There are multiple factors for the limited success to date. Some of the major issues include:

- Covid has limited our ability to sit in front of customers with the product.
- Covid has limited distributors and retailers' appetite to trial new products.
- The total cost of our offering was too high
- Flavour development was inadequate.
- Kaleh Pacheh is a novel product not frequently consumed.
- Some odours of head meat products are a deterrent.
- Traditionally people make these recipes themselves.
- Cost of local restaurant (in international markets) supplied product cheaper than readymade meal option.

Kaleh Pacheh Products - Domestic

At time of writing Milestone 3,4,5 & 6 report, dated 21/07/21, sample product had been provided to a Melbourne based domestic distributor.

Following this there were negotiations around pricing and agreement for representation as domestic distributor.

An order was placed for 2160 retail ready trays. Point of sale marketing material was created and issues around GST were resolved.

It had to be determined if the product should have GST applied in the Australian market. For the GST resolution, examples were compared to soups that are traditionally GST-free. Additionally, similar products such as pre-cooked lamb shanks are GST free if they form part of a meal. Alternatively, a ready-made meal such as a roast meal with accompanying vegetables would have GST applied as it represents a complete meal. The accountants applied the ruling, like that of the lamb shank example, that our Kaleh Pacheh required additional items to make a complete meal and hence should be GST-free in Australia. This was a positive as it keeps the price lower to the end consumer.

The product was well-received initially by the retailers and distributed across the Melbourne market and all the product was distributed to retailers in a very short period. This was possibly due to the professional branding/packaging of the product, persuasiveness of the distributor and willingness of the retailers to present the products.

Some extremely good feedback was received from some of the customers early. However, overall, there was no repeat order for the product and some of the retailers had trouble moving the balance of the product even when discounting was applied.

Some of the identified underlying issues are:

- Cost of the product too high
- Flavour profile inadequate
- Some odour issues around head meat Kaleh Pacheh
- The Soup Kaleh Pacheh (one of the 3 main products) with no protein pieces made limited sense to the customer.

- Target customer base is a very traditional market who 'make this item ourselves'.
- Possibly a lack of trust from buyer. With offal products the hygiene of the raw material can be very inconsistent and often customers will only buy offal's from a well-known supplier who has a reputation of providing fresh and hygienic offal products. Winning the trust of the consumer is difficult.

Unfortunately, the feedback was inconclusive on how to improve the base product or pricing for future success. Additionally, we did not receive any enquiries directly from our websites or email addresses advertised.

A large amount of the product was distributed into the Melbourne market during the 2021 year. During this time, Melbourne was plagued with continual COVID 19 lockdowns and social restrictions. This made in-store interaction with end users impossible – the public were not willing to engage with strangers and retailers didn't want to introduce any additional risk in their stores. Instore cooking and tasting trials were not possible.

5.2 Opportunities – New Markets & Product

Whilst there has been limited success with the Kaleh Pacheh meals, we have also experimented with Paya, Charred Products and are now exploring also washing dirty feet.

Paya

Paya is a sheep feet curry similar to Kaleh Pacheh. The picture below depicts the offering.



An extract from Wikipedia *“Paya is a traditional food from the Indian Subcontinent. It is served at various festivals and gatherings or made for special guests. Paaya means 'legs' in Urdu The main ingredients of the dish are the trotters (or hoof of a cow, goat, buffalo or sheep); cooked with various spices.*

Paya originated from the amalgamation of South and Central Asian cuisine. The dish was adapted to the local cuisines by the Muslim cooks of Lahore, Hyderabad of Telangana State and Lucknow.

Paya has become popular all across India, Pakistan and Bangladesh. Outside of the Indian subcontinent, paya is available in restaurants that serve South Asian cuisine.”

At the commencement of the project, we were aware of Paya and understood it to be a sheep feet soup dish very similar to Kaleh Pacheh. We had added this recipe to our quality assurance manual at the start of the project to explore at a later date We chose Kaleh Pacheh as our original focus as we were seeing a large amount of Sheep Feet and Heads being exported from Australia to the Middle East and assumed most of this product was being consumed by people of Middle Eastern origin.

We are now exploring the development of Paya ready-made meals with the idea that possibly a large portion of the sheep feet and heads going to the Middle East were in-fact being consumed by people from the Indian Subcontinent origins, living in the Middle East and pursuing work opportunities.

If we look at immigration patterns out of south and central Asia, we find

- The largest Pakistani population outside of Pakistan is Saudi Arabia and the United Arab Emirates.
- The largest Bangladeshi population outside of Bangladesh is Saudi Arabia, Malaysia, and United Arab Emirates.
- The largest Indian population outside of India is United States, United Arab Emirates, Malaysia, and Saudi Arabia.

We have recently produced a commercial quantity (720 trays) of Paya ready-made meals for a domestic distributor in NSW who is moving the Paya product into the market.

Our NSW distributor had received some of our early Kaleh Pacheh samples during 2021 and was encouraging us to also make Paya. The distributor has helped us develop the recipes. Also, our Islamic supervisor, Ikram Kahan was born in Pakistan and has also been instrumental in the development of the Paya recipes.

For the Paya meals it is hoped that we can get some positive commercial feedback from the Australian market, further refine the recipe, and then promote to the export markets in due course.

Additionally, we have been in discussion with the Innovative Food Production department of Western Sydney University in relation to further development of the Paya dishes and structured consumer tasting trials. The University is keen to assist in this process. We are awaiting market feedback from the commercial product in the Australian marketplace prior to marking a decision to work with the university.

Charred Product

We have experimented with producing charred sheep feet and heads and selling in a more commodity-based market whilst also further utilising the facility equipment. The main market for these items is the United States and Canada.

Washing from Dirty

As with many industries, COVID 19 has decimated the Australian labour market and the hard physical trades. As such, meat-processing plants are experiencing their worst labour shortage in 30 years.

With the lack of immigration coming into Australia we are at an all-time low level of unemployment. When there is low unemployment in the Australian job market, individuals rarely choose to work in meat processing plants if cleaner, less-physical and better-paying jobs are on offer.

This being the case, meat processors have focused their attention on the core business - manning the slaughter chains and boning rooms - and have stopped collection of many highly valuable offals.

Most processors have not collected items such as feet, tripe, heads, and brains for most of this year. In addition, due to the reduced kill numbers the price for render material has increased 100% on mutton and up to 400% on beef. Higher rendering prices further removes necessity to collect edible offals.

This means that there have been very few sheep feet in the market and the sheep feet that are available have increased 30% in price since the inception of this project. Processors do not have product to offer and if they are offering, they are inclined to support their existing customer base over new entrants.

This has greatly jeopardised this project of further value adding. We were looking to produce low-cost, value-adding ready-made meals. Sheep feet have pushed into luxury food prices and the cost of our ready-made meals are struggling to be viable to the target demographic.

Currently we are exploring the possibility of taking dirty sheep feet from the processing plants and cleaning the product at our facility. We have a meeting book with the Department of Agriculture, Water and Environment to discuss harvesting of dirty feet from plants and protocols that can be put in place to transport the product to our facility, whilst ensuring food safety regulations can be adhered to.

In principle, if discussion with the department is successful, then we will consider the investment needed in dirty feet processing equipment and trade waste handling. This is not a path we were planning to go down but something we need to consider as it appears that plant labour shortage will not be resolved in the near future. The main concern is the increased render price mentioned above may lead to Processors requiring a significant price to procure the material. In addition, the collection process will have to be efficient, ensuring that minimal labour is required at the processing facility.

5.3 Product Improvement

5.3.1 Engineering

Many engineering improvements have been made over the journey to facilitate the trial.

Cooking Vessel

Larger cooking pots were custom made. Four 320lt Stainless Steel pots with valves on the bottom were procured to maximise the cooking space and production output. Some experimenting was done with an electric cooking pot however it was discovered that using natural gas heated pots allowed greater turndown of heat control.

When cooking the Paya product, we experienced some sticking and burning on the bottom of the pot. There was concern that the Stainless pot is more inclined to result in sticking and burning compared to the aluminium.

The sticking and burning issues were resolved through putting the gravy into the pot later in the cooking process. The gravy contained a lot of small solids, which settled to the bottom of the pot and stuck. Using a lower heat and extending the cook time along with occasionally stirring of the pot also helped to eliminate the sticking and burning.

Baskets For Cooking

Perforated baskets were made to place product in and lift the product in and out of the pot. The purpose was to improve manual handling and increase efficiencies. The baskets have been used with varying success to date. The possible time-savings using the baskets is somewhat offset by additional washing requirements. Possibly the efficiency of the baskets system would come into play if the intention was to have multiple cooked batches in the same pot in one day. Under this scenario the same hot water and stock could be re-used multiple times. This would save time on heating up, minimise herbs and spices required and reduce cleaning.

Castor wheels Replacement

We experienced failure on the castor wheels of our product trolleys, which were used for defrosting of product and blast freezing. The Shelves on the trolleys were rated to 350kg per tier. We were loading the entire trolley, of five tiers to a maximum of 400kg. Unfortunately, the castor wheels supplied were not suited to such loads, and several wheel failures occurred with the wheels buckling under the load. Luckily no one was hurt. New stronger wheels and castor inserts have been purchased and installed from a different manufacture to rectify the issue.

Carousel Conveyor for packing product

A custom-built carousel conveyor, 7m long and 1.4m wide, was fabricated to improve efficiency of packing cooked product into the ready-made meal trays. This improved the speed of packing, reduced labour and improved the hygiene of the trays as the trays did not have to be touched with dirty hands. The conveyor had the capacity to hold

100 readymade trays at any given time and was driven by a wireless foot pedal. In terms of labour-saving improvements this was possibly the best investment made.

Liquid Cool Freezer Compressor

The freezer compressors were sized to maximise blast capacity and ensure fast temperature transition from 80°C to -20°C. Ensuring product was cooled within specified regulatory windows and providing for good hygiene of the final product.

When the blast freezer was not operating, the large freezer compressors were being used to run the store freezer only, which has a very small refrigeration requirement. There was an ongoing issue with the freezer system failing under this operation scenario - the compressor motor was going out on high temperature. This issue was rectified by a modification to the refrigeration system of refrigeration liquid cooling the motor. This modification greatly improved the reliability of the refrigeration plant.

Strip Curtin in Blast Freezer

Three rows of strip curtains were added to the blast freezer to encourage greater airflow across the product and less short circuiting of air. This modification reduced the product blast freezing time allowing for faster cycle time and greater utilisation of the blast facility.

5.3.2 Processes

Cooked sheep feet and sheep head is considered a delicacy and often reserved for professional chefs and consumed on special occasions. Through our trials, skills have increased, but the dishes continue to present challenges when cooking on mass scale.

Burning of pot

The issue of the burning pot has been raised in earlier sections of this report. Due to the very extended cook times for the product, there is always a risk of product sticking to the bottom of the pot and burning taking place. We have learnt to mitigate against this by introducing gravies into the pot late in the cooking process to reduce the time which the small particles can accumulate on the bottom of the pot. We have also experimented with stirring of the product. Too much stirring smashes the protein pieces up and you are left with non-recognisable meat pieces. Not stirring enough will lead to sticking and burning. We have also experimented with the custom-made baskets, which lift the product off the bottom of the pot also reducing the risk.

Cook time

The cook time has been varied and we continue to optimise this process. The cook time has varied from three to five hours. Using gas stock pot cookers there is some control on the heat, but it is hard to be precise on the rate of cooking. Cooking for too long means that the product falls apart and can sometimes not be recognised in its full form. However, it has been decided that this is better than undercooking the product and it not being suitable for the customer to eat conveniently.

Some of the larger feet have not cooked fully. We now ensure that we stir the pot around enough to ensure there is more consistent transfer of heat across the product. On larger feet we sometimes knife the skin to open the feet and ensure that more cooking takes place, and that the cartilage is transformed into a jelly like state.

Yield in Tray

The initial intention was to put three full feet in each tray. This was good in theory, but we now find that there is a huge range in size of feet across the cartons from very small lambs to large sheep. Also, as we have pushed for longer cook times and the feet have broken down into more unrecognisable pieces. We had originally worked on the expectation that each tray would contain 0.6kg of raw material per tray. On our last production run this was more realistically 0.7kg of raw material per tray.

This is somewhat unfortunate as it pushes the cost of the tray up in both raw material cost and volume cooked from a production run. Currently we are filling the trays with solids by eye and possible should be more accurate, but this does come at additional labour cost and hygiene issues. While we are trying to get market acceptance of product,

we are also trying to be generous with our serves and look to possibly remove this generosity over time if we achieve success in the marketplace.

We have taken advice with our current distributor and are now putting a lot more bone back into the final dish which is improving our yields and reducing waste.

Excess liquid

We continue to juggle the liquid stock side of the process. Typically, we put 200 grams of liquid stock into a tray after the protein pieces. At the end of a cook run and traying up we can have somewhere from 60lts to 120lts of excess liquid.

It is a fine line between having too much and not enough liquid stock at the end of a cook. For the Kaleh Pacheh this was possibly one of our major downfalls. The seasonings added to the Kaleh Pacheh were not strong in flavours so excess liquid meant that the stock was watery in flavour and not very satisfying for the consumer.

We have attempted to reduce the stock after removing the meat with some success. However, sometimes there has been excessive amounts of stock and the time frame required to reduce to a suitable level is far too long in time and energy requirements. Also, we have a limited time from when we take the protein solids out of the pot and need to get the final product under refrigeration.

On the Paya product we are experimenting with not adding the gravy until the last 30-60minutes of the cook cycle. Just prior to adding the gravy, we remove approximately 30lts of water per pot. So far this has helped to improve the flavour concentration in the stock. Additionally, the Paya herbs and spices are a lot stronger in flavour than that of the Kaleh Pacheh making for a more flavoursome dish.

Size variation

The size variation of the feet and heads is large and there is considerable difference in size between a small lamb and a large ram. This presented many challenges in creating the ready-made meals when trying to present a consistent meal to the consumer. Ideally it would be beneficial to only cook lamb's feet, which would be more consistent in size and eating quality. However, raw material processors at this stage pack mixed lamb and sheep feet for the same commercial rate so there would be no incentive for them to pack lamb only without a significant price increase. Unfortunately, the red meat processing sector is always faced with discrepancies in weight ranges of livestock, and it is assumed that this will continue to be the case. Industries such as the chicken industry have a lot smaller tolerance on variation in weight ranges, however they are fully integrated, and the processors typically control the growing supply chain.

Fats in soup

Through the pot-cooking processes, the fats accumulate on the top of the pot. Although the feet are not very fatty, there is still a significant amount of fat at the end of a cook process. As per the recipe, we attempt to mix the fat back into the stock and ensure that it is evenly distributed across the trays. We have experimented with several different mixing techniques to ensure the liquid has been mixed homogeneously with varying success. We have used electrical / mechanical mixes and hand mixing. Although we have made our best endeavours this is a tricky process especially as the dynamic of the liquid changes as it cools.

Fat adds flavour to the dish. However, there are two concerns with too much fat. One that we do not evenly distribute the fat and some trays have pure liquid fat and very little soup. Secondly fat is very rich and having too much fat can make the final dish possibly too rich and a consumer may not be able to consume the entire content. The aim is that the dishes are desirable, and people want to consume on a weekly basis. If the dishes are too fatty, then consumers may be reluctant to buy a second time.

5.4 Sales Data

Over five hundred thousand dollars in sales were achieved over a three-year period. The main challenges in achieving sales included getting repeat orders, regulatory barriers and trying to reconcile the costs of supply with the timing of demand to obtain a margin on the sales.

6.0 Discussion

6.1 Key Project Challenges

Some of the major challenges that we need to work through as we move forward include the following.

6.1.2 Overhead

The annual overhead of the trial facility is approximately \$140k per year. The largest cost being rent, insurance, department regulatory costs and electricity.

The large overhead continues to be a challenge in sustaining a long term business model past the trial stage, even with good market uptake and strong demand for product. If 12 container loads were shipped per year, the overhead would equate to 47 cents per kg and 24 containers would equate to 23 cents per kg. The challenge is to find alternative revenue streams to sustain the facility or for the operation to be carried out at an existing processor's facility.

6.1.2 Product Development

Success of the facility is dependent on creating additional offerings to the market. Creating unique offerings to the market is extremely costly and carries very high risk. It is understood that further offerings need to be created, however any unique dish carries very large associated costs. Some of these costs include.

- Packaging & marketing development
- Recipe development
- Additional equipment to create commercial quantities.
- Getting samples into the market
- Time
- Product testing

6.1.3 Project Focus

This project has been driven on earlier success in the meat industry of selling commodity-based products, which have a pre-existing market.

A large amount of the focus has been on the Engineering / Process for the facility and ensuring that full container loads could be produced and sold.

This has been achieved for the feet products, and daily production levels could easily be increased by adding additional labour units without impacting per unit costs if strong market demand existed.

The weakness of the trial has possibly been on the recipe-development side and the potential market sector analysis. In addition to this, the cost to produce meals in a convenient format is expensive, which potentially the consumer is not willing to pay for. Trying to produce a dish for the masses, which everyone will be happy with, is an ambitious task especially for a team with limited experience in this space.

On reflection, or as a comparison, if we were trying to sell pre-cooked steaks across many countries it is a very difficult task to identify how to cook the steak and if there would be any reward for such an endeavour.

6.1.4 Regulatory Barriers

During the trial we have faced the harsh reality of international regulatory red tape trying to export meat products to foreign countries. Unfortunately, the industry continues to be challenged by changing barriers put up by importing countries every day, which continue to create huge risk to everyone involved in the sector.

We are no wiser on this issue from our recent experience. Even for the most diligent operator it is very hard to know if a new meat product will be accepted freely into an international market. Even with the best government to government relationships and customer insight there is always a huge risk.

6.2 Theoretical Steps of “Feed Product Development”

In this section of the report, some of the key theoretical steps in “Food Product Development” are covered. We consider some of the published advice in Food Development and compare it to our project outcomes.

6.2.1 Ideation

Our idea for Persian Soups/meat dishes was created out of the common push by meat processors to increase the value of by-products and shift value chain from render to edible products. We had also observed a demand in the market for the raw materials used to produce these products.

Feet and Heads were chosen as, across the industry, most of these items are being rendered and not achieving full commercial value.

Ambitiously, the project was extended beyond our skill base of selling primarily commodity-based raw meat products to creating a fully finished convenient meal for the consumer.

As a positive we had a unique idea and were offering something new to the market.

On reflection we were possibly very narrow in the one idea we were taking to the market and the format we were delivering. If our initial effort were broader such as 12 to 15 ideas, then there could have been a higher chance of getting a final 2-3 to be successful.

Additionally, we were very ambitious in trying to create a product targeted across the Middle Eastern community who consume Kaleh Pacheh. Probably, like most traditional food recipes, they vary from region to region and even household to household. Trying to produce Kaleh Pacheh on mass scale in our chosen frozen ready-made meal format at an economical price largely limited our flexibility in tailoring the offering to more regional or individual preferences. Also, our target markets are largely very traditional and not looking for the convenience we were offering.

6.2.2 Formulation / Product Developers

Formulation was possibly our greatest weakness in achieving commercial success. We engaged two professional chefs in the process of the recipe development. The chefs chosen had traditional experience with Kaleh Pacheh, however they probably could be considered more cooks and not experts in recipe formulation. Our chefs were engaged on an hourly rate, pay for service and had no long-term investment in the success of the project.

The project leader was more focused on producing a commercial quantity of food at an economical price than allowing for gradual development. Unfortunately, extensive trials and product development require a large amount of ingredients, packaging and time and we possibly did not allow adequate budgeting for this process – producing large amounts of product with no commercial benefit.

At the start of the project, we were not aware that there is a professional industry specialising in, and with a large amount of experience in, recipe formulation. Along the journey we became more aware of the industry of formulation and consumer trials. Late in the project we had a generous offer from the Western Sydney University to assist us with the Paya development. However, we were not able to take up their offer due to the late stage of the project and the lack of funds and time available. The large costs of recipe formulation can include ingredient and labour costs to develop formulation, running consumer trials and taking samples to the market – such a process could be repeated several times.

On reflection we should have invested more heavily in formulation at the start of the project.

6.2.3 Processing / Engineering and Production

The processing side was a strong point, and we were very proud of the facility that was established and the potential to produce scale.

Having an engineering-background in processing we were quick to identify improvements to the processes and implement changes to operations or equipment to refine the process. minimise labour and maximise output.

Unfortunately, too much time, focus and investment was placed into this side of the project, sitting with the natural skill base, leaving less time for the areas listed above including formulation.

In the current world of Red Meat Processing there is an ongoing business of shifting products from render to edible. The steps include.

- You have a product and work out a process to shift the value chain. Typically, the by-product does not have a high commercial volume.
- You put the process in place to produce the edible product.
- You take the product to market and the demand slowly builds.
- Over time all the product shifts from render to edible.

This project involving food product development is very different to our previous experience of commodity product shift. We underestimated the complexity and the cost of commercial development that extended well beyond putting the processing equipment in place and expecting the business would most likely follow.

6.2.4 Commercialization / Marketing and Sales

Some of our commercialization steps were very strong. We engaged a professional marketing firm to help us develop the brand and final packaging. We received many compliments on visual display of our product and this helped to get buyers and customer's interest.

Some of our weaknesses

- We initially tried to reach the market through a meat exporter we had an existing relationship with. Selling a commodity meat product versus developing a new food offering is a very different skill. Also, the meat trader did not have the right links into the sector of the market we were trying to penetrate. When the trader couldn't see a quick profit on each trade they lost interest.
- We did not have the resources in terms of people, time, or money to sell directly to the retailer. We chose to work with traders and distributors. This is possibly beneficial when you have an established product. However, when establishing a new product getting consumer feedback is essential to product development and improvement.
- Initially we tried to create an export product prior to establishing domestic success. As per the comments above this further distanced us from the customers and receiving the necessary feedback. Later in the project we moved our attention back to the domestic market.
- Initially we assumed that we were getting an inexpensive by-product and were going to create a low-cost meal for consumers and hence sales would be easy as the meal would be inexpensive. As we dived deeper into the project it was discovered that the input raw material cost was more costly than anticipated and the Kaleh Pacheh involves a complicated cooking process which is labor-intensive. Further, retailers and distributors work off large margins which further push the price of the product up to the end consumer. In the end our offering, when compared to other ready-made meals, was highly priced and in the luxury end of the market. Further when people compare the cost of a ready-made meal cost vs buying raw ingredients, they possibly do not consider their own time when weighing up the value proposition.

6.2.5 Key Team Members

Expanding the number of Team members would have been an advantage to the project, but additional talent comes at a cost. The greatest weakness to the project was in the recipe formulation and investing in the interaction with the

consumer and retailer. If we had our time again and resources allowed, having more energy put into these activities could have led to more successful outcomes.

6.2.6 Quality

There were challenges around trying to produce a quality and consistent offering to the customer. This was due to very many reasons but some of the key factors include:

- The feet and heads procured included lamb and sheep feet and heads. This being the case there was a large variation in size and quality of the meat going into the dishes. Also, the cooking times vary depending on the size so there were inconsistencies with some parts being overcooked while others were undercooked.
- The liquid reduction was tricky to get right when producing on scale. The flavor profile of the soup changed greatly with each batch depending on the reduction of the liquid stock. It was very hard to get replicated outcomes.

The more production runs the greater our consistency became. If we had have had continued operation over many months, then we believe our offering would have become a lot more constant and easier to repeat day in day out. However, having stop-start batching orders made it hard to turn out a consistent offering each time.

6.2.7 Regulatory

Compliance to regulatory requirements is straight forward and was not a major hurdle in the operation.

However regulatory politics was one of the biggest barriers for the following reasons.

- Regulatory costs for an export business are significant. Ongoing Licensing and Audit costs of Department of Agriculture, Fisheries and Forestry are a significant annual cost and not based on volumes of production. Regulatory costs are a huge barrier to entering new export markets.
- Getting regulatory approval from Australian and International government can take a significant amount of time. You must have a facility ready to operate but it can take many months to receive final approvals to operate.

7.0 Conclusions / Recommendations

In summary we have had limited success both internationally and domestically with our Kaleh Pacheh offering in the convenient format to date. Possibly the main factors include cost of final product, recipe development, cultural barriers and COVID 19 restrictions.

We will continue to focus on the new product opportunities of Paya and Charred Products and explore the possibility of cleaning feet from dirty.

Along the journey so far, we have made many improvements in both engineering and processing across the facility, which have greatly improved our final products and helped to reduce labour costs.

We remain optimistic in the endeavour to shift traditional by-products from inedible to edible markets. While the value of all red meat proteins continue to increase across the sector and become a luxury product there will continue to be greater demand for lower value proteins from the world market.

This project, like most projects, is challenged by limited financial resources. The greatest challenges include maintaining the facility overhead, choosing successful product development paths, keeping the project focused and overcoming regulatory barriers in a timely fashion to discover successful commercial offerings to the market.

8.0 Bibliography

No Bibliography reference relevant for this report.

9.0 Appendices

9.1 Kaleh Pacheh



1st Commercial Order – Traying up Kaleh Pacheh Heat meat.



Carousel Conveyor improved work efficiency and hygiene of trays.



The final Product.



Sleaving retail ready product.



Hardwick's all hands-on deck packing order.



1st Commercial Order packed and ready for market.



Loadout of order.



Point of Sales marketing material development.



Product in retail market.



Product in retail market.



Product in retail market.



Point of Sales Marketing Material.

9.2 Paya



1st Commercial Order – Traying up Kaleh Pacheh Heat meat



Carousel Conveyor improved work efficiency and hygiene of trays.



The final Product.



Sleeving retail ready product.



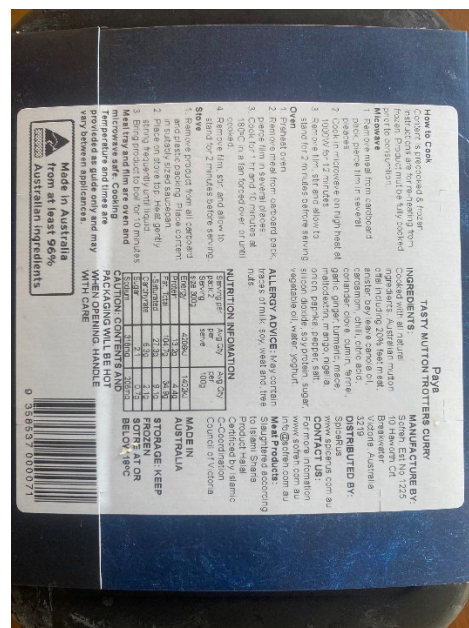
Feet and gravy combined for slow cook.



Ikram Khan supervising the cook.



Paya Self Ready – Front of pack.



Paya Shelf Ready – Back of pack.



Paya pallet of first commercial delivery.



Delivery of first commercial Paya order.



Sydney Retailer – Hub of Pakistan and Nepali's community in Sydney.



Product in Store.



Point of Sale and Social Media marketing material.

9.3 Export



1st Container Loaded for export – relief.



Container for packing.

9.4 Engineering



Purpose Built 320lt Stock Pots



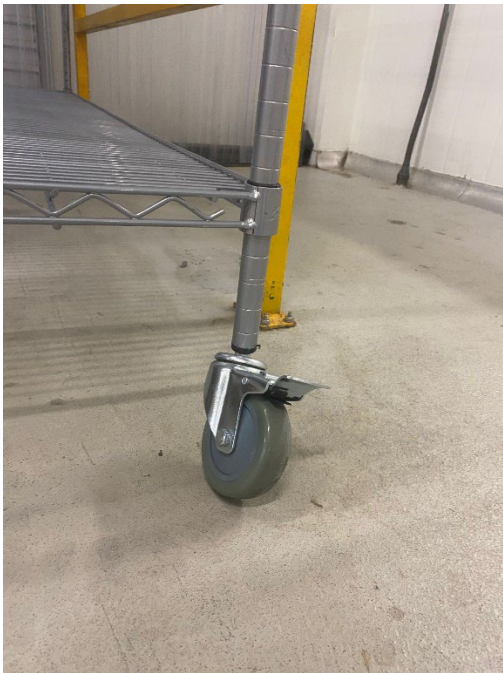
Cookline 960lt Stock Pot Capacity.



Basket for Cooking to easily remove product from basket.



Experimenting with tipping basket onto sorting table after cooking.



Trolleys used for product defrost and freezing. Castor wheels failing unable to support 400kg loads.



Castor failure for product trolley.



Carousel conveyor implemented to improve pack off efficiency and hygiene of trays.



Steps introduced in cook line to assist with working on pots.



Refrigeration compressors required liquid injection to cool motors to eliminate motor overheating. This was an issue when only low load was call for by store freezer.

9.5 Product Development



Trial Run – Needs improvement.



Product produced. No repeat order disposed of.