



final report

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Pulled Beef – proof of concept development

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Abstract

Pulled meats have continued to grow in popularity in the domestic and export retail and foodservice market. This follows the “slow cooked” movement trend.

This project considered producing pulled beef in a faster (spiral cooker) method than the more common sous vide platform MLA presented in 2014 (A.MPT.0059) with final product concepts designed in the project targeting foodservice quick service restaurants – a key market for Comgroup Supplies.

The project included development of key process design parameters along with yields and market feedback on pulled beef concepts suitable for hot bun sliders.

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1 Background – Pulled meats market overview

Comgroup Supplies currently produce burger patties and pizza mince toppings for Hungry Jacks, Burger King, Eagle Boys and Dominos using a Multipurpose Oven (MPO) impingement cooking platform. Comgroup have a second site in Brisbane with spiral cook capabilities and have identified market opportunities within domestic Quick Service Restaurants (QSR) sector for pulled beef products. This follows the long standing market success in USA for pulled pork and trend for slow cooked, meat sandwich fillings and premium pizza toppings.

Pulled meats are already a popular American BBQ style item within the slow cooked, meat fillings segment as displayed below:



Figure 1: Current BBQ Pork products in Wendy's QSR Asia and Walmart retail USA

Whilst the project was being completed, the domestic market also saw launches for pulled meats for sandwich fillings and pizza toppings as per below:





Figure 2: Current BBQ Beef/Pork products in Australian QSR and retail market 2015

It is estimated this pulled beef domestic target market is an initial 6 - 8 MT per week (for Comgroup, but likely to be 30 MT per week from several domestic suppliers in total) (based on \$13.00/kg for the QSR market and \$36.60/kg for retail price), and provide added value to cuts such as beef topside, brisket, shoulder and inside skirt.

2 Project objective

The key objective of the project was to develop and commission a pulled meat process and proof of concept development, thereby evaluating alternative (faster) processing interventions to the traditional slow cooked model and to present value proposition for red meat based sandwich fillings and pizza toppings which are traditionally dominated by cheaper proteins such as pork and chicken.

3 Methodology

Discussions with customer partners and market review for pulled meats was initially undertaken to define pulled beef product brief – this included intended use and target quality such as texture, tenderness, accompanying sauce and reheat and serve requirements.

Different meat cuts and grades were considered along with interventions such as moisture infusions and massage/injection equipment. Spiral cook cycles were then designed with various pieces of new and existing shredding equipment and quality systems adapted to complete series of trials. Process flow chart and product costings were completed with intended product builds following positive feedback on selected prototypes.

4 Results and discussion

4.1 Raw meat selection

Three different beef cuts were evaluated as listed below with price and availability key considerations. Meat tenderness and colour was best “controlled” via the processing interventions.

- Beef inside skirt HAM 2205
- Beef point end brisket HAM 2350
- Beef pectoral brisket HAM 2328

Secondary cuts were selected to deliver a whole muscle appearance for meat fibres to be “shredded/ripped”. Values to purchase the raw red meat cuts were - Skirt (\$8.95/kg), Topside (\$6.50 - \$7.00/kg) and Brisket (\$6.40/kg) respectively. Inside skirt was preferred cut of meat, but did require trimming to remove membrane and fat (up to 30% yield loss). Any cuts of meat that were greater than 30mm in height were also sliced to ensure product could be fed through later stages shredding.

The initial “usage” per meal scoped was 50g pulled meat per burger and 250g per pizza.

4.2 Process design

Alternative process to the traditional slow cooked Sous Vide process was evaluated. Further, developing Comgroup’s capability from individually quick frozen (IQF) ground meat patties to consider an expanded red meat portfolio resulted. This included learnings beyond typical grinding – forming – belt cooking - in not only how to shred, but evaluate use of spiral cook and ingredient functionality (such as enzymes and phosphates) that can tenderise the meat rather than rely on slow cooking process. Consideration for gas flush, chilled store products compared to IQF was also reviewed.

In summary, a combination of additional processing interventions such as ageing, moisture infusions and product temperature when shredding and potential gas flushing (meat: gas volume ratio) as well as building final menu concepts using pulled beef were considered.

Key design features were:

- 2 x different moisture infusion methods (vacuum massage, injector)
- 1 x injectant brine (with fajita seasoning included) – target 22% pickup
- 2 x spiral cook fan timer/direction settings
(fixed Spiral cook cycle – 26mins/160C/60-80% relative humidity)
- 2 x shredder set-ups (spokes number/spiral angle/speed) to deliver consistent shred shape

4.2.1 Equipment trials and yields

Brine retention in Vacuum massager was excellent and preferred over single head injector process. Filling the chamber up to 2/3 volume with current cycle times and speeds were suitable and did not represent any bottle neck to overall productivity rate of 600kg/hr.

A 20-22% pickup was achieved with a salt-phosphate-thickeners solution selected that also included TexMex (fajita) spice ultimately preferred.



Figure 3 : Photo of raw meat and brine after massaging

During the soaking and cooking cycle, product was found to swell with portions greater than 50mm thick unable to pass through the spiral cook belt. Likewise, the initial belt feeding into the shredder was unsuitable as product fines were found to pass through the belt leading to large yield loss and was required to be changed (along with subsequent spiral direction for meat shape consistency) using equipment displayed below.



Figure 4: Photo of old and new conveyor belt to reduce yield loss

Using a continuous in-feed belt from spiral cook to the shredding step allowed the product to be pulled when hot (producing natural look). A core temperature of 71°C was achieved but changes to both the fan direction and timer settings were required to improve consistency during spiral cook. The cook cycle time of 28 mins (at 160°C/60-80% relative humidity, with alternating swing fan direction) successfully produced a 600kg/hr throughput.

Shred thickness and length was able to be modified based on the number of spokes and angle as displayed below.

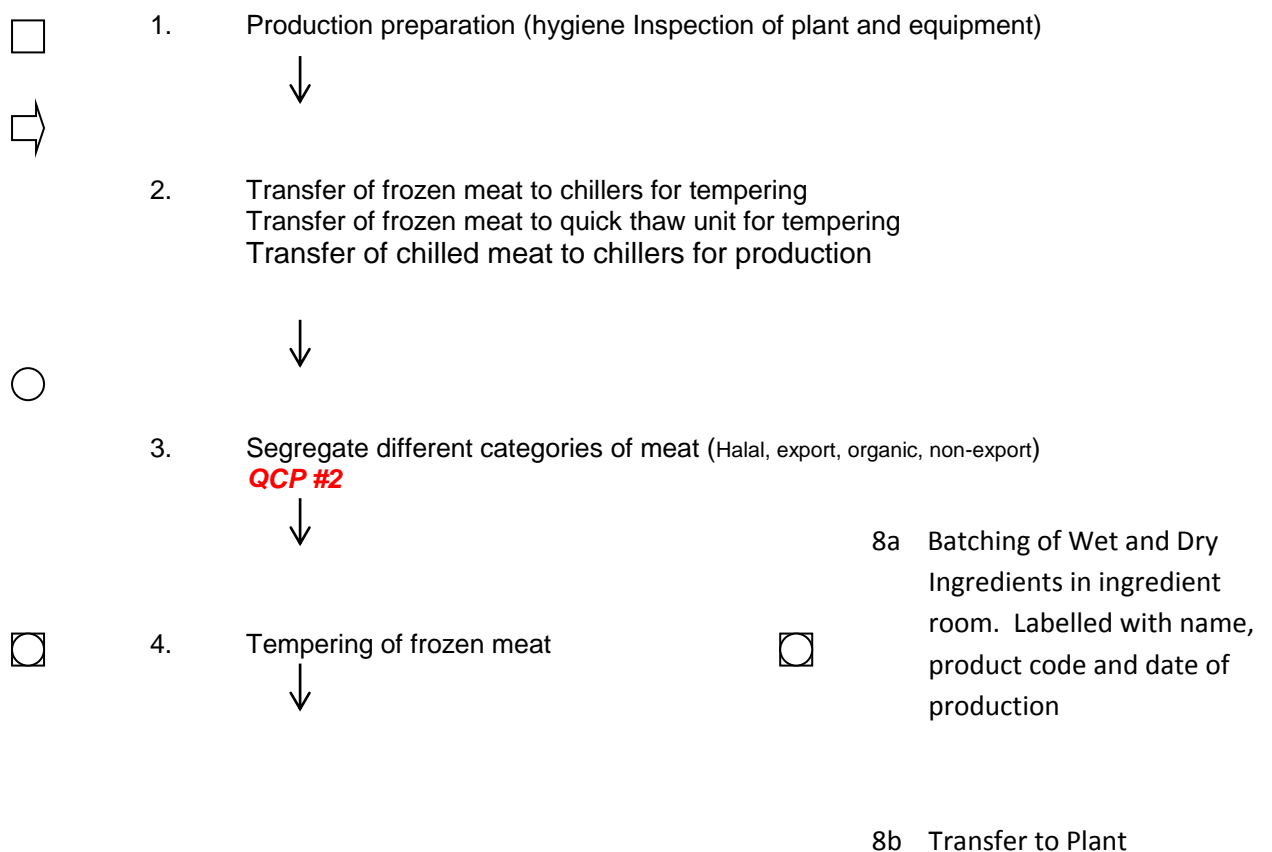


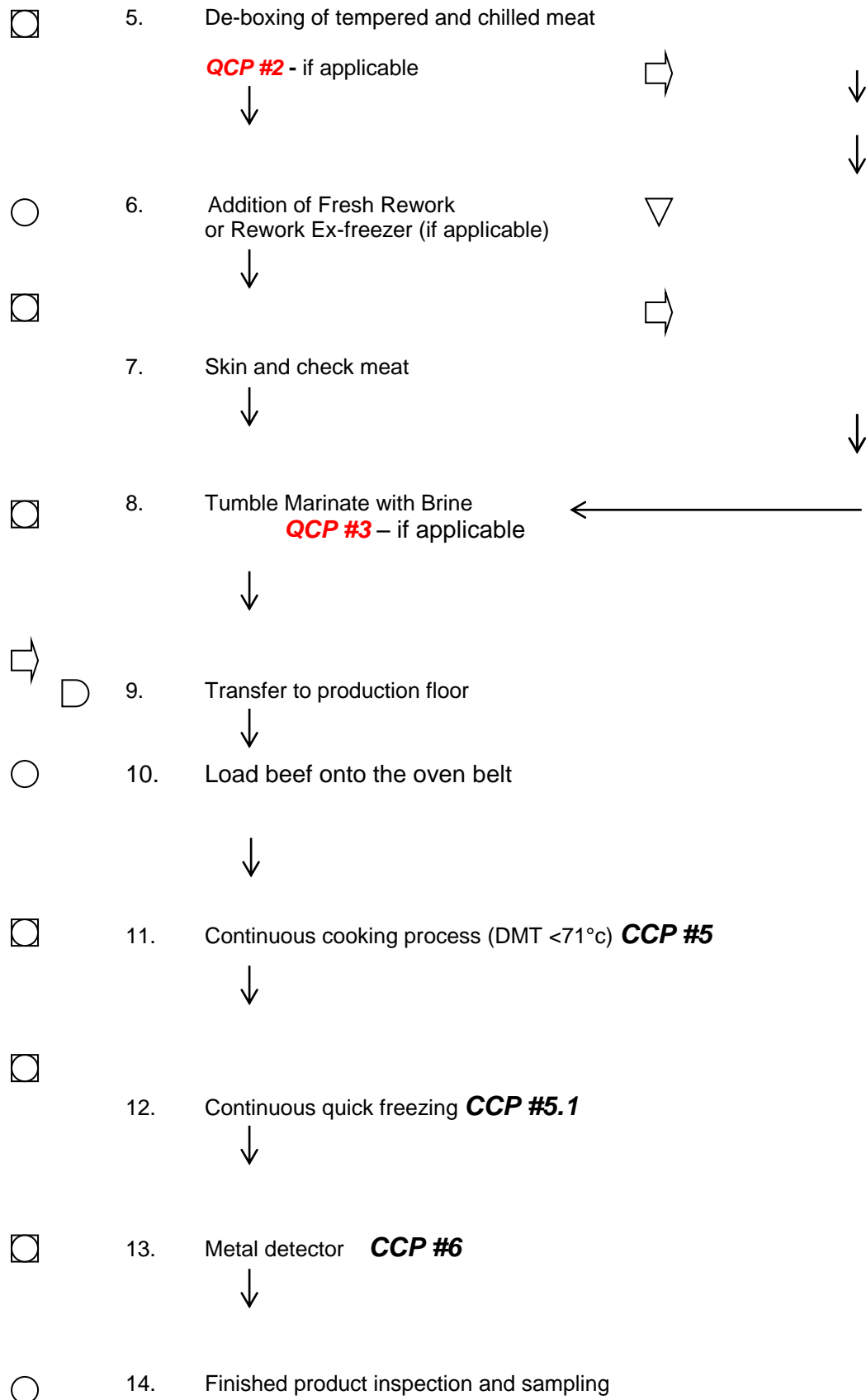
Figure 5: Currethers slice/shredder equipment

4.2.2 Pulled beef process flow chart

It is acknowledged every site and product formulation and final product specification results in customised HACCP based quality system, critical control points and process flow chart.

The ensuing pages considers fundamental good manufacturing practices for cook-chill pulled meat product requiring reheat and serve prior to consumption.





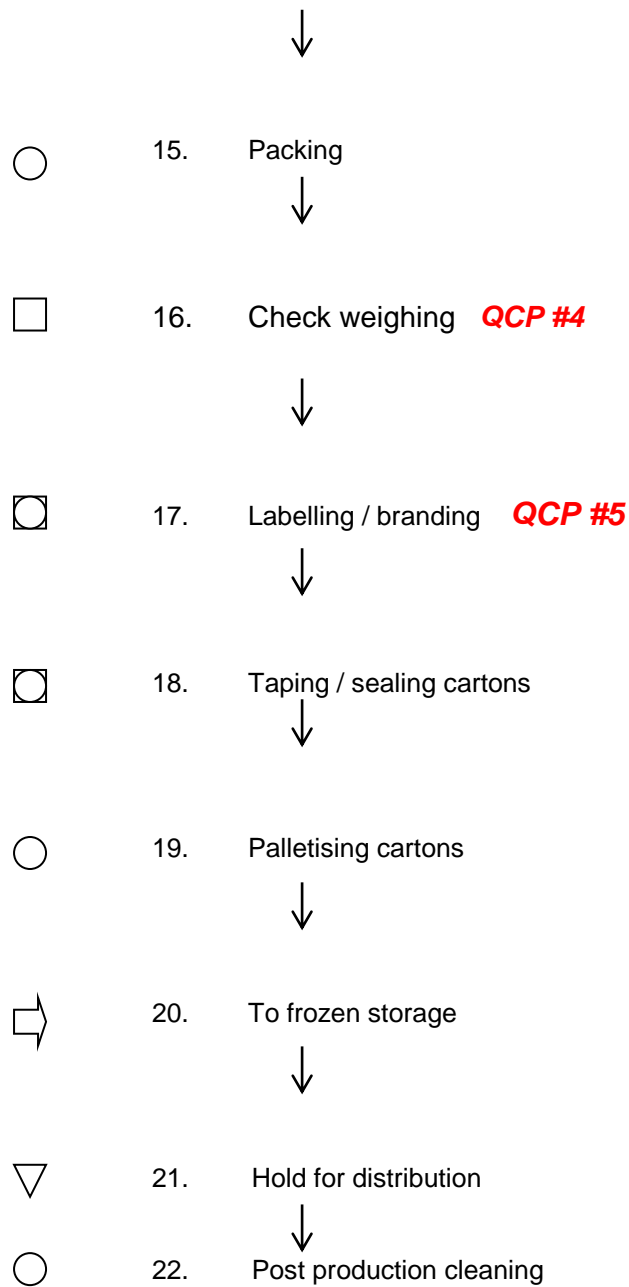


Figure 6: Process Flow chart – pulled beef (spiral cook cycle)


4.3 Product concept


A number of concepts were screened for both pizza toppings and sandwich fillings applications.




After feedback from product development committee and value chain partners and end users, a preferred concept for hot bun slider was agreed with the following product description and intended use:

- Made from lightly TexMex seasoned Australian Beef Brisket, Pulled Beef is an ideal sandwich filling. Mix 1 x 600g Pulled Beef IQF in bowl with 400mL sachet of BBQ marinade sauce and place in the microwave for 1 minute; store in holding unit (maintaining min 63C) and use within 30 minutes.
- Apply 30gm of product per slider; or 50gm of product per 4” burger bun.
- Retail sale for 1 burger \$4.95 ea, and for 2 x sliders, \$5.95.

08. PULLED BEEF SANDWICH





-  4" Corn Dusted Bun crown
-  11g Mayonnaise
-  11g Dry Slaw
-  11g Spicy Gravy
-  50g Pulled Beef
-  11g BBQ sauce
-  4" Corn Dusted Bun heel

COUNTRY OF LAUNCH	AUV	INCIDENCE
AUSTRALIA	45	6%

RELEVANCE Please circle your choice, 1 being least relevant and 10 being extremely relevant

1 2 3 4 5 6 7 8 9 10

TASTE Please circle your choice, 1 being not tasty at all and 10 being superbly tasty

1 2 3 4 5 6 7 8 9 10

CREDIBILITY Please circle your choice, 1 being not credible at all and 10 being superbly credible

1 2 3 4 5 6 7 8 9 10

ROLLOUT INTEREST

YES! Let's do it!

Hmm, let me think about it.

Nah, not interested.

Other Remarks, if any :

Figure 6: Product build – pulled beef hot bun slider

Typical Nutritive Value and Ingredient listing pulled beef (excludes any sauces):

Beef (85%), Water, Salt, Thickeners (407, 415), Potato Starch, Flavour, Spices, Mineral salt (451, 450).	
NIP (theoretical)	Per 100g
Energy kJ	571
Protein g	23.2
Fat – total g	4.4
Saturated fat g	1.8
Carbohydrates g	0.7
Sugars g	0.3
Sodium mg	666

Figure 7: Typical nutritive value and ingredient listing for pulled beef (excludes sauces and bun)

Feedback from internal and external customer was that the pulled beef concepts were of good quality and meeting target price points. There was found to be some variation in cook doneness and some tougher portions than current sous vide product from a market competitor. The fajita-tex-mex flavour notes were deemed acceptable and in line with developed sandwich build (dryslaw and sauce). The product was found to be less “chalky” and more oven roasted in appearance.



Figure 8: Photo of pulled beef concept product to be sold to QSR outlets

Whilst the yields and costs for spiral cooked pulled meats is viable, it is unknown if without sous vide slow cooking there maybe customer backlash of being not authentic. A possible option could be to use a cook in bag (but not slow cook process) such as self venting bags to mimic steam cabinet as opposed to water immersion sous vide cooking. Future trials using film materials as presented in recent article from Australian Meat News September 2015 edition could be used through the spiral cooker with yields and taste needing to be assessed (although the extra step to remove from bag prior to shredding may impact temperature at time of shred and quality). See Sealed Air's Youtube feature on "oven ease": <https://www.youtube.com/watch?v=bMFHh1MAWgY>



Figure 9: Cryovac Oven Ease packaging

4.4 Value Proposition – pulled beef concept

Product costings and yields were recorded for the various concepts. As mentioned, Skirt was selected as the preferred meat cut as it delivered a good injectant pick up and meat texture of fajita meat appearance. The trimmed meat cost increased to \$8.50/kg due the trimming, however at time of completing the project market pricing in fact increased the meat component up to \$12.00/kg which could impost future commercialisation plans.

The selected final version bills of materials are listed on the ensuing page.

Based on the above formulation and yields, the added value in making pulled beef from a cut not normally used for QSR outlets per head of cattle (i.e. 2 x raw inside skirts of an average 650g producing 937g cooked IQF product) produces 18 x pulled beef sandwiches (and using the trimmings from raw inside skirt, and blended with leaner trimmings, likely to produce a further 4 x 110g patties for burgers).

Disregarding the potential profit at QSR outlet and any margin from boning operation, the listed \$1.14/kg profit would therefore represent \$1.48/head net margin from this created new demand. Based on a planned 6 week limited time offer of 50 MT finished product (53,362 head of cattle equivalent), this would equate to \$57,000 value (and \$632,500 sales).

Input	Kgs	Value \$/kg	Yield comment
Beef skirt	100	\$6.85	
Trimmed meat	70.00	\$8.50	30kgs x 65CL trim credit -\$3.50
Water & premix	19.75	\$0.21	22% pickup
BATCH	89.75		
Cook/shred/IQF pack loss	-17.68		19.7% loss
FINISHED MEAT	72.07	\$9.56	
Packaging		\$0.12	
Labour		\$1.14	
Overheads, Freight		\$0.69	
Manufacturing margin		\$1.14	Potential net profit 9% of sale
SELL PRICE		\$12.65/kg	
600g IQF Pulled Beef CTNx10			

Figure 8: Pulled Beef concept – indicative product costing

5 Conclusions

Pulled beef continue to be a growing sandwich filling item – a market currently limited to sliced roast beef, corned beef against the proliferation of ham and chicken options. This project has showed pulled beef can be made using combination of moisture infusion and spiral cook process at 600kgs/hr throughput – an alternative to the more traditional sous vide bath or steam cabinet cook in the bag process which typically require 8-10 hours cooking alone (MLA project A.MPT.0059 key findings) . Initial feedback is that product was less “chalky” and less “bland” in colour but not as tender and with higher variation in cook doneness (pink colour incidence) when compared to sous vide current product. Refinements to the concept and tailoring intended use with key client remain next step for commercialisation.

Adding value to secondary cuts such as beef skirt was also showcased – albeit a significant increase in raw material cost may now require alternative cut to be considered to achieve target market pricing and premiums above pulled pork / chicken alternatives.