



# Final report

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## Business Design Scoping of DTS: Diathermic Syncope® Stunning Technology

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## *Abstract*

End consumers are becoming more concerned where their food comes from. Adding to the complexity of market access requirements, marketing, labelling and plant licensing are the different religious stunning requirements. MLA and industry have invested in the development of new and improved stunning methods that address at a scientific and technological level, all the animal welfare regulations and religious slaughter requirements. This project explored and developed business models that facilitate the adoption of improved technology which induces insensibility to enable the Australian and international meat processing industry to address the current and increasing concerns around animal welfare and pain free livestock practices at the time of exsanguination.

Models were developed which showed the cost benefit analysis for processors under a range of stunning methods and with different levels of religious certification. To support the commercialisation process of the DTS: Diathermic Syncope® Stunning Technology, a commercialisation strategy, marketing strategy, business plan, communication plan and marketing materials were developed. Research was undertaken to refine and develop the product offering based on customer's needs and wants. A pricing model and service model were developed, and future value propositions explored and documented to maximise adoption and return on investment for processors and stakeholders.

## Executive summary

### Background

The purpose of the research was to identify and address business and commercialisation risks (barriers to adoption) and develop pricing and product service models which facilitate adoption of the DTS system. The target audience for the communication materials, pricing and product service models were Australian and international beef processing facilities. Elements of the business models and communication materials were prepared and shared with stakeholders including:

- industry representatives, in Australia and internationally,
- animal welfare advocates (RSPCA, Animals Australia, Veterinarians)
- religious certifiers and leaders, across the world and
- European regulatory bodies.

Anticipated industry benefits from the technology justifies supporting the transition from invention to prototype to commercialisation. A proposed business model and a commercialisation plan were developed to support the process from invention to working prototype with a business plan for commercialisation. The proposed business model is the DTS system (applicator + generator) is owned by Wagstaff Food Services Pty Ltd. A faraday cage and knocking box will be required and can be purchased or built by the processor. A toll processing fee of \$7 per head is paid by the processing plant each month. Wagstaff Food Services will support and train staff to maintain the DTS system as part of the toll processing fee.

### Objectives

The objectives of the project were to:

1. Develop business models for commercialisation of the technology for the induction of insensibility,
2. Develop communication materials,
3. Elevate the confidence of target consumer groups.

Communication materials including flyers have been shared with stakeholders and a website developed and launched. Engagement with Australian and international stakeholders resulted in Chief Rabbis in Australia and Israel personally wanting to understand the process and technology as to help address the unfulfilled demand for Kosher beef in Australia and in Israel.

### Methodology

The business model involved mapping current processor practices, downgrades, issues and losses against prices for individual cuts of meat and offal. Stakeholders were engaged to understand their issues, questions and opportunities. Potential processors (customers) of the DTS system were engaged to understand their perspective barriers to adoption. A workshop was held using the Business Model Canvas framework where industry experts identified unrealised value and opportunities from which products and services using the DTS were further defined.

## **Results/key findings**

The research identified the type of product, services required and barriers to adoption were impacted by the number of animals processed per day.

Smaller processors are interested in a single box to focus on religious slaughter, and require assistance to engineer and design the faraday cage. Larger processors' major barrier to adoption is operation or line speed and they were not necessarily restricted by access to capital, engineers and tradesmen. DTS installation profitability was also dependent on external factors such as limited labour. Increasingly, a constrained labour supply increases the need for successful Halal certification (achieved by DTS), which allows for all offal to be sold as Halal compliant rather than rendered.

## **Benefits to industry**

A calculator was developed to help communicate the financial benefits to processors, supporting practice change. DTS prototype demonstrations were given to industry and meat processor representatives (potential customers) as well as religious certifiers and animal welfare advocates (enablers). Research to test the theory of recoverability post DTS application, which is critical to comply with Kosher laws was scoped, designed and implemented. This research was undertaken as a separate program of work, led by Dr Alison Small.

## **Future research and recommendations**

**Refine system design** to facilitate a quicker, more reliable build as part of the commercialisation process.

**High-speed design** and development of a two cage-one race system, providing a double box that can stun simultaneously and also fit in the constraints of the available space.

**Ongoing collaboration** with animal welfare organisations in Australia, United Kingdom, United States of Australia and Europe to be recognised as a best practice option which is compliant with Halal and Kosher religious slaughter requirements.

**Develop installation and service model** to deliver, install and service DTS systems across Australia and internationally. Further development and refinement of the commercialisation strategy to include options for accessing international markets.

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## 1. Background

Religious stunning requirements differ (Halal, Malaysian Halal, Kosher etc.) and impact on Australian plant licensing and market access. Requirements are met in some cases at sub-optimal levels. Emerging international regulations around stunning practices, driven by animal welfare concerns are questioning the status quo of approved methods. Some methods are approved for some markets but not others. As animal ethics agendas drive change in markets e.g. the European Union, they impact and conflict with approved methods for other markets e.g. Halal. Changing international requirements will impact market access for Australian plants in many ways, all of which are restrictive to trade.

MLA and industry have invested in development of new and improved stunning methods to address all animal welfare regulations and religious slaughter requirements at scientific and technological levels. The challenge is to develop commercialised and operational business models which adopt best practice and provide the greatest value to the Australian industry.

Australian and international processors are obvious customers for adoption of more efficient or safe processing technologies. However, new technologies in the meat industry have historically had slow adoption, particularly when seen as a necessary cost, rather than a value add. This is the case with induction of insensibility at exsanguination.

**Who is the customer of the DTS(R) system?** Processors, or their customers such as retailers, or defined consumer categories interested in animal welfare and or religious requirements.

End consumers are becoming more concerned with where their food comes from. Animal welfare, pain management, true Halal and Kosher certification are causing end consumers to ask more questions – “What does Halal really mean?”, “Is Halal processing humane and how do we know?”, “Woolworths has a Halal brand, but do they comply with my religious requirements?”. McDonalds Hamburger Chain is investing in a range of research and development (R&D) in the red meat industry such as carbon neutrality for beef production to preserve demand for their core product offering. Chicken and Pork brands have RSPCA approved certification addressing animal welfare requirements.

**The research and development undertaken in this project explored and developed business models that will facilitate the adoption of DTS.** By adopting DTS it will enable the Australian and international meat processing industry to address animal welfare concerns. A range of customer value propositions for this technology beyond the processing sector may be beneficial to the Australian industry were not fully investigated as part of this project. Communication materials were developed for external stakeholders and engagement undertaken with customers and consumers in Australia and further afield.

## 2. Objectives

The objectives of the project were to test and validate high level, potential value propositions to:

- 1) Develop business models for commercialisation of MLA and Wagstaff's technology investments,
- 2) Develop communications materials to underpin international enhancement of humane methods for livestock processing,
- 3) Preserve/elevate the confidence (of various consumer groups) in where their meat comes from and eliminate risk of negative news,
- 4) Create a competitive advantage for Australian meat supply chains in export markets.

Additionally, business and commercialisation considerations were addressed as follows:

1. Identify risks and barriers to adoption from all stakeholder groups including, not limited to:
    - a. international legislation,
    - b. religious requirements,
    - c. consumer needs (e.g., Halal consumers, stay-at-home mums who want to know that cow was happy),
    - d. customers who on-sell meat (retailers, importers etc),
    - e. processors.
  2. Design solutions to these barriers into a business model(s) for DTS systems and DTS products/services.
  3. Develop a communication and implementation strategy that minimises disruption, from these risks and barriers to existing market access and business continuity for Australian processors.
- Develop a 1<sup>st</sup> stage business plan for DTS to initiate the 12-month domestic notice period between MLA and Wagstaff.
  - Implement a commercial model to achieve ROI and sustainability of the DTS technology and reduces risks, to the meat industry, from negative sentiment to current stunning methods.
  - Create a technology, service arrangement, and pricing model that provides long term competitive advantage for the Australian industry.
  - Explore new value propositions to create income beyond technology provision such as branded food certification/licensing income streams.
  - Consider adoption strategies that facilitate the above objectives. This includes innovative ways of funding early adoption for the Australian industry.
  - Develop pricing models that maximise ROI and patent Intellectual Property (IP), also facilitating market penetration for DTS system adoption.



### **3. Methodology**

The business model mapped current processor practices, downgrades, issues and losses against prices for individual cuts of meat. It showed potential price premiums for certain cuts if inaccessible Halal markets were made accessible due to the use of DTS. Stakeholders were engaged to understand issues, questions and opportunities. Potential processors (customers) of the DTS system were engaged to understand barriers to adoption from their perspective. A workshop was held using the Business Model Canvas framework with industry experts to identify unrealised value and opportunities from which products and services using the DTS were further defined. This project developed:

- a business plan,
- communication plan,
- communication resources and materials,
- commercialisation plan, and
- product and service offerings.

#### **3.1 Internal steering committee**

An internal steering committee was established for project governance. The steering committee included representatives from Wagstaff Services and Greenleaf Enterprises. The steering committee were presented with the major findings and recommendations, discussing implications and defining the next steps of work to be undertaken.

#### **3.2 Business plan and pricing model**

The developed pricing model aligned with financial gains secured by the processor by installing the DTS technology. Each stunning method, their advantages, costs, rejection rates and market access based on religious certification was calculated by individual pricing, per cut on a beef carcass. Scenarios were developed for domestic and export markets, medium and large processors. A business plan was developed using the pricing model.

#### **3.3 Prototype business models**

A workshop was held with industry experts using the business model canvas to identify unrealised value and potential revenue streams. Customer segments were identified, developed and refined for each product segment.

#### **3.4 Commercialisation and business development**

A marketing plan and materials were developed to support commercialisation. Flyers and a website were developed and published. A commercialisation plan and communication plan were also developed and revised based on one-on-one discussions with processor and industry representatives.

## 4. Results

### 4.1 Business plan

This section contains the Business Plan created as part of the project. The business plan includes a market analysis (section 4.1.1), a SWOT analysis (4.1.3) and processing plant value propositions (4.1.4).

### 4.2 Consumer expectations

Changing consumer expectations and international regulatory forces do and will continue to impact the Australian red-meat industry. Market access and consumer acceptance are two areas where DTS technology can help beef processors gain consumer confidence and a competitive advantage in an international marketplace.

Defined consumer groups have specific requirements. DTS addresses the different consumer groups requirements including:

1. Pain free and humane exsanguination to optimise welfare outcomes,
2. Full recoverability from unconsciousness required for Kosher and Halal markets,
3. Optimised eating quality through maximal blood removal and reduced incidence of ecchymosis.

The state of unconsciousness and accompanying painlessness is commonly affected by mechanical or electrical means in a stunning process. Increased concern about animal welfare from the industry and consumer market has resulted in more countries mandating stunning. Current techniques have variable outcomes, and many are considered misaligned with religious requirements and country specific market access requirements. There is growing demand for improved stunning approaches. Some electrical stunning is not permitted in Australia for Halal purposes. Further to this, electrical stunning can impact meat quality with incidences of ecchymosis. DTS provides a non-concussive, humane, reversible stunning which appears favoured by religious leaders and animal welfare advocates.

#### 4.2.1 Background on slaughtering requirements

Slaughter methods prevailing throughout the world are governed either by tradition, ritual or legislation depending upon people and country. In most developed countries, a complete state of unconsciousness is rendered prior to bleeding.

The requirements of defined consumer groups in how best to apply insensibility can be incompatible. Current compromises could impact Australian market access in future. There is a growing demand for alternative stunning approaches that are consistently quick, humane, have length of insensibility, and are acceptable by all religious and non-religious market segments and animal welfare groups.

For more than a decade, considerable investment has been made by DTS, Meat and Livestock Australia, Australian Meat Processing Corporation (AMPC) and the Australian meat industry in inducing insensibility in the cattle exsanguination process has been aimed at addressing these emerging red meat market demands.

#### 4.2.2 Halal slaughter

Halal food laws are based on interpretation of the Quran, the Muslim scripture, and set out the range of beverages and foods (including meat) acceptable for Muslims. The procedures for Halal slaughter can vary from country to country due to the differing interpretations of the Quran. The acceptability of stunning as part of Halal slaughter is now becoming popular. It has gained recognition in countries such as Indonesia, Egypt, Malaysia, Turkey, Kuwait, Saudi Arabia, Yemen, Tanzania and the United Arab Emirates.

The only type of stunning accepted is reversible stunning. This is where an animal can make a full recovery. This type of stunning assures that, although the stun induces a state of unconsciousness, it does not cause death. It is important to note that all currently available forms of stunning are a compromise in the absence of an alternative.

#### 4.2.3 Shechita slaughter (Kosher)

Kosher food laws are based on interpretation of the Bible and the Torah, the Judaic scriptures, and set out a range of beverages and foods (including meat) that are acceptable for people of the Jewish faith. For meat to be Kosher, animals must be slaughtered in accordance with Judaic rites which requires for slaughter to occur without prior stunning. The majority of the Jewish scholars believe that the non-stun, traditional method is superior, painless, and causes instantaneous insensibility.

#### 4.2.4 Halal export in Australia

Abattoirs that export meat products may operate under a Tier 1 or Tier 2 arrangement. Tier 1 Regulatory oversight is provided by the state regulatory authority. Tier 1 markets include inter alia Egypt, Kuwait, and Indonesia. Halal products must also be certified under the Australian Government Authorised Halal Program (AGAHP). Tier 1 operations are registered under the Export Control Act 1982 (Cth) [94] and operate under an Approved Arrangement issued under Schedule 2 of the Export Control (Meat and Meat Products) Orders 2005 (Cth) [95] or the Export Control (Wild Game Meat and Wild Game Meat Products) Orders 2010 (Cth) [96]. Essentially, this regulatory framework requires compliance with the Meat Standard, and therefore all slaughter must involve pre-stunning.

Tier 2 export markets require registration and oversight of facilities by the Federal government. Tier 2 accreditation allows access to all export markets, including the EU. This is primarily achieved by employing Australian Government Authorised Officers (AAOs) and in-plant dedicated veterinarians (Veterinarians-in-Charge) to inspect meat. In addition to the Australian Meat Standard, facilities must meet the requirements of the Export Control Act 1982 and any additional requirements of the importing country [98]. A vital feature of the regulatory regime for both Tier 1 and 2 abattoirs is the need for adherence to the Meat Standard. As discussed earlier, this requires pre-stun for all slaughter except in exceptional circumstances.

Furthermore, the Department of Agriculture, Fisheries and Forestry (DAFF) has developed specific guidelines [99] issued pursuant to the Export Control Act 1982, which regulates the slaughter of animals for halal export purposes. Standard 6 requires that animals must be effectively stunned before sticking. Based on this network of delegated legislation, the public should be assured that pre-stunning of animals is very much the norm in Australia for halal export products.

#### 4.2.5 Religious certification

Religious stunning requirements differ (Halal, Malaysian Halal, Kosher) which has varying levels of impact on Australian plant licensing and market access. Areas which need to be considered include:

- In some cases, certification requirements are met at sub-optimal levels with some of the industry approved methods.
- Emerging international regulations around stunning practices, driven by animal welfare concerns, already question the status quo of approved religious and non-religious stunning methods.
- Some stunning methods are approved for some markets but not others. Not all methods are approved internationally in all situations.
- As animal ethics agendas drive change in some markets like the EU, they impact and conflict with approved religious methods for other markets such as Halal consumers.
- As international requirements change, market access for Australian processing plants will be impacted in different ways, all of which may restrict trade and/or limit access to current and emerging markets around the world.
- Free trade agreements will need to seek equivalence statements such as UK and EU which will prove scientifically impossible.

Essentially, pneumatic stunning is not seen as religiously acceptable due to contradicting religious rites. The European Union (EU) does allow live sticking to meet religious requirements. However, individual countries legislate against it. Kosher requires no stunning at all, against animal rights and welfare demands. Islamic requirements are theoretically the same but have made allowances.

#### 4.3 Market analysis

The target markets for the DTS solution are the group (or groups) of processors and consumers who best fit the benefits of the solution offered. The range of potential markets include:

- Domestic bovine processing plants (11) supplying domestic markets
- Domestic bovine processing plants with current or future export markets (45 plants currently are assessed as have export certification)
- International bovine processing plants
- Kosher religious bovine markets
- Halal religious bovine markets
- EU Bovine animal welfare markets
- Malaysian bovine Halal
- Middle East bovine Halal
- Domestic religious bovine markets (if different to the general religious markets)
- Large consumer corporates e.g., McDonalds, Retailers, Value-added Food Manufacturing brands delivering tertiary bovine products
- Domestic bovine consumers who are conscious of where their food comes from and how the animals are treated
- International bovine consumers who are conscious of where their food comes from and how the animals are treated

### 4.3.1 Processing plants in Australia

The following table summarises the number and size of major processing plants in Australia based on recent data from AMPC.

**Table 1: Bovine processing plants in Australia**

Row Labels	large Plants	Ave Head pd	medium Plants	Ave Head pd	small Plants	Ave Head pd	Total Plants	Total Ave Head pd
<b>NSW</b>	<b>8</b>	<b>1,131</b>	<b>2</b>	<b>400</b>	<b>3</b>	<b>90</b>	<b>13</b>	<b>778</b>
Domestic			1	300	2	80	3	153
Export	8	1,131	1	500	1	110	10	966
<b>QLD</b>	<b>12</b>	<b>1,191</b>	<b>3</b>	<b>527</b>	<b>2</b>	<b>180</b>	<b>17</b>	<b>955</b>
Domestic					1	100	1	100
Export	12	1,191	3	527	1	260	16	1,008
<b>SA</b>	<b>1</b>	<b>800</b>			<b>2</b>	<b>73</b>	<b>3</b>	<b>315</b>
Domestic					2	73	2	73
Export	1	800					1	800
<b>TAS</b>			<b>2</b>	<b>475</b>			<b>2</b>	<b>475</b>
Export			2	475			2	475
<b>VIC</b>	<b>6</b>	<b>1,050</b>	<b>8</b>	<b>338</b>	<b>3</b>	<b>209</b>	<b>17</b>	<b>567</b>
Domestic			2	300	2	183	4	242
Export	6	1,050	6	351	1	260	13	667
<b>WA</b>	<b>1</b>	<b>730</b>	<b>2</b>	<b>400</b>	<b>1</b>	<b>76</b>	<b>4</b>	<b>402</b>
Domestic					1	76	1	76
Export	1	730	2	400			3	510
<b>Grand Total</b>	<b>28</b>	<b>1,113</b>	<b>17</b>	<b>402</b>	<b>11</b>	<b>134</b>	<b>56</b>	<b>705</b>

Plants which are considering replacing or upgrading their current stunning methods/knocking boxes are expected to be early adopters. A value proposition for them is to open or shore up current and future target markets. Small plants and paddock-to-plate enterprises that focus on delivering high quality product are potential early adopters as well.

### 4.3.2 Competitor analysis

The stunning methods included in Table 2 are in modern use, and others have been investigated although are not commercially viable. From a technology perspective there are three main competing stunning methods:

- Mushroom Stunning
- Bolt Stunning
- Electrical Stunning

The key players in the slaughter equipment market include:

- Marel (Iceland)
- BADDER Group (Denmark)
- BAYLE SA (France)
- Prime Equipment Group (US)
- CTB (US)
- Brower Equipment (US)
- Jarvis Equipment (India)
- Industries Riopel (Canada)
- ASENA (Azerbaijan)
- Dhopeswar Engineering Private Limited (India)

- Meatek Food Machineries (India)
- BANSS (Germany)
- Limos (Slovenia)
- Best & Donovan (US)
- Blasau (Spain)

**Table 2: Stunning methods commercially available or under investigation**

	<b>Mechanism</b>	<b>Reversible</b>	<b>Ecchymosis</b>	<b>Halal</b>	<b>Kosher</b>
<b>Captive bolt stunning (Penetrative)</b>	To inflict a forceful strike on the forehead with the bolt to induce unconsciousness. The bolt penetrates the skull of the animal, enters the cranium, and catastrophically damages the cerebrum and part of the cerebellum. Concussion causes destruction of vital centers of the brain and an increase in intracranial pressure, causing the animal to lose consciousness.	No	No	No	No
<b>Non penetrative percussive stunning (Mushroom head)</b>	The bolt strikes the forehead with great force and immediately retracts. The impaction of the heavy mushroom head of a non-penetrating stunner against the frontal bone of cattle causes a large concussive force to be delivered to the skull. This leads to a downward acceleration of the brain.	No	Low	Yes <sup>#</sup>	No
<b>Electrical stunning low current (Head only/ Head + Cardiac arrest electrical)</b>	Electrical stunning is done by sending an electric current through the brain and/or heart of the animal before slaughter. Current passing through the brain induces an immediate but non-fatal general convulsion that produces unconsciousness. Current passing through the heart produces an immediate cardiac arrest. This lasts for 90 seconds before regaining some consciousness.	Not fully	Yes	Yes	No

<b>Diathermic Syncope (DTS)</b>	Electromagnetic energy technology induces recoverable insensibility in animals and results in an effective reversible stunning method that is suitable for religious slaughter. The mechanism of action selectively increases temperature in the brain, by 7 or 8°C, to the point that hyperthermic syncope (fainting) occurs, but below the point at which brain damage and death occurs. Insensibility lasts for 3-4 minutes enables full bleeding to death during unconsciousness.	Yes	No	Yes	Under review as at March 2023
<b>No Stun</b>	Slaughter to occur without prior stunning	No	No	Yes	Yes

# Compliance rates vary from 75-92% with non-compliant carcasses being segregated and offal's being discarded.

### 4.3.3 Potential customers

Australian and international processors are the obvious customers for adoption of more efficient or safe processing technologies. However, new technologies in the meat industry have historically had slow adoption, particularly when they are seen as a necessary cost, rather than a value add (i.e., retain or pursue value added market access). This is the case with induction of insensibility at slaughter.

The question is whether the target market for the stunning solution is the:

- processing plant,
- the end customers such as retailers,
- consumers who purchase the beef products,
- the various religious communities and related interest groups, or
- customers who are extremely concerned about animal welfare during the slaughter process,
- The Regulator and or Certifiers.

End consumers are becoming more concerned with where their food originates. Animal welfare, pain management, health treatments, growth stimulation, and true Halal and Kosher certification are causing end consumers to ask more questions such as:

- “What does Halal really mean?”
- “Is Halal processing humane and how do we know?”
- “Retailer X has a Halal brand, but do they comply with my religious requirements?”
- “As a corporate global citizen, we have a responsibility to maintain the industry and Australia’s reputation as a leading provider of fresh meat products. What is the reputational risk and impact on our business”?

DTS provides non-concussive humane, 3-4 minute reversible, stunning which has been accepted by religious leaders, animal welfare groups, governmental agencies and regulators in Australia and abroad.

The chicken and pork brands are adjusting management practices and gaining certification as RSPCA approved to address end consumer concerns regarding the humane arrangements associated with caging and penning animals. Corporate food companies such as McDonalds are investing in R&D in the red meat industry such as carbon neutrality for beef production to preserve demand for their core product offerings. It is a matter of time before beef markets will also be required to address other areas of customer expectation and concern.

Within Australia each processing plant has different decision making timeframes which impact the ability for DTS system to be purchased and installed. The decision cycles and access to capital was identified in Table 3 as a component of the market analysis which was then used to define the product and service offering.

**Table 3: Customer product service mix by plant size**

<b>Customer characteristics</b>	<b>Smaller plant</b>	<b>Larger plant</b>
Ability and timeliness in making decisions	More agile in decision making (1-6 months)	Longer lead time with (6-18 months)
Access to capital	Limited access to capital	Greater access to capital
Payment	Prefer pay as you go option Lease/toll/ other options	Prefer to buy outright
Engineering requirements	Require engineering support.	Inhouse engineers. Require little/no outside support.
Repairs, Maintenance and Service	Will require some support in maintenance and servicing.	Prefer to do all in house.
Motivation	Market access to Malaysia, Kosher and Halal certification. Animal welfare as point of differentiation.	Consumer and retailer pressures, pressure from international QSR's and major purchasers. Market access to Malaysia and Halal certification.

#### **4.3.4 Compliance solution – DTS: Diathermic Syncope®**

The DTS Diathermic Scope offers the red meat industry an appropriate animal stunning apparatus and methodology that addresses the need for sufficient animal stunning pre-slaughter while also aligning with various legislative, religious and animal welfare requirements.

A sufficient increase in mammalian brain temperature causes fainting. As the brain temperature reduces below this threshold they regain consciousness without side-affects. The DTS mechanism of action selectively increases the temperature in the brain, by only 7 or 8° C, to the point that hyperthermic syncope (fainting) occurs, but below the point of brain damage, making the process completely reversible. The stunning solution, DTS Diathermic Syncope®, utilises electromagnetic energy to induce recoverable insensibility in animals and result in an effective reversible stunning method suitable for religious slaughter.

A DTS knocking box comprises the following components as shown in Figure 1:

- a. Beef ritual rotating box
- b. Faraday cage and associated interlocks
- c. DTS stunning system
- d. Landing table or cradle



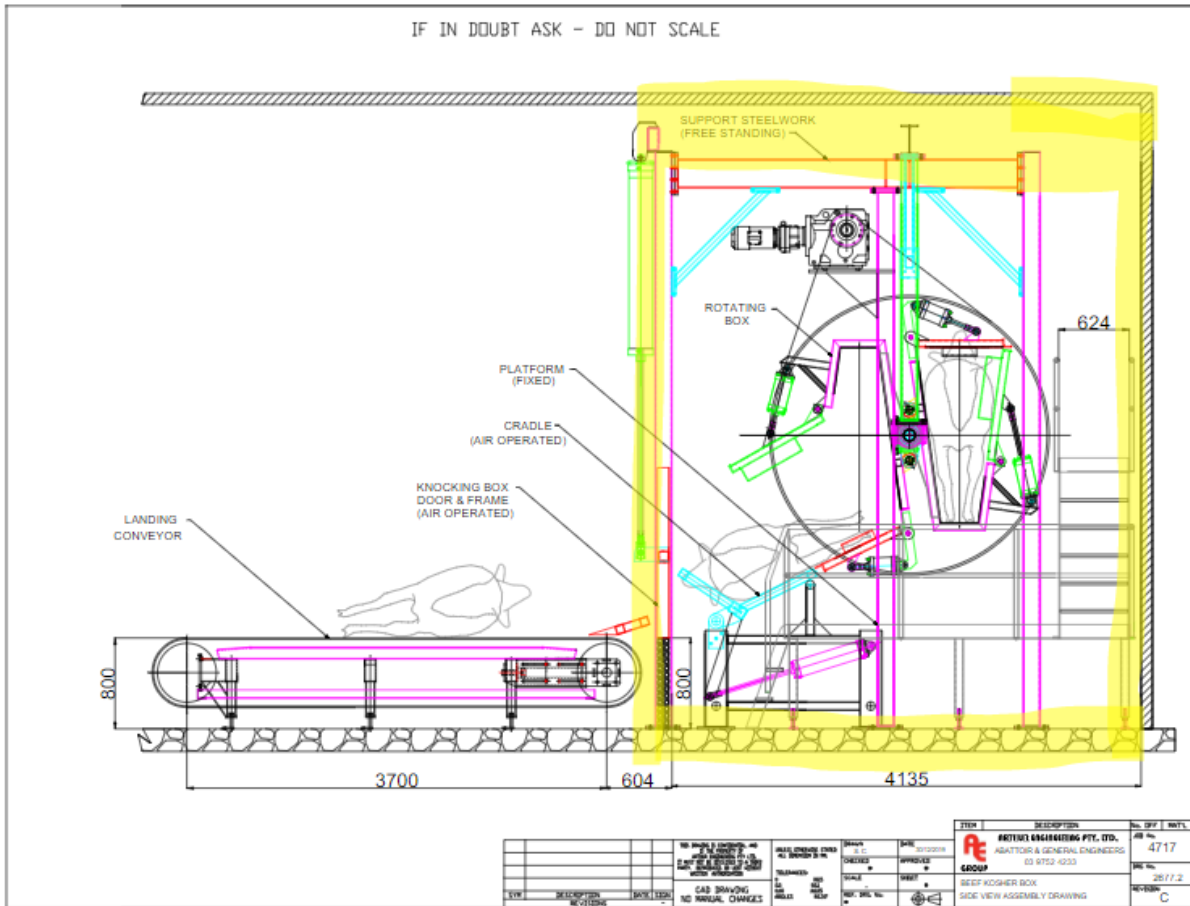


Figure 1: Bovine Microwave Stunning solution using DTS

## **4.4 SWOT analysis of the DTS system**

### **4.4.1 Strengths**

- A stunning technology that meets the requirement of animal welfare regulation/ policy while also aligns with Halal and Kosher religious slaughtering requirements. The non-concussive, non-penetrative process delivers a stable, reversible stun that results in 3-4 minutes of unconsciousness of the cattle.
- Offers 100% assurance of no cracked skulls and no ecchymosis.
- Positive feedback from industry representatives and welfare advocates who have seen the system demonstrated.

### **4.4.2 Weakness**

- Installation requires a new knocking box to be installed which requires plant down time.
- The technique is revolutionary in an industry that is risk and change averse.
- Not yet proven in a high-speed processing plant where consistency is essential (2 minutes per animal with R&D ongoing)

### **4.4.3 Opportunities**

- Increasing concern for animal welfare
- Increasing demand by religious red meat consumer market.
- Europe and United Kingdom are considering changes in legislation for stunning techniques and mandatory pre-stunning for all religious slaughter.
- The increase in price of beef has meant a rise in interest as processors look to increase yield and compliance %.
- DTS has raised awareness of alternative stunning methods and animal welfare need not be exclusive to compliance with religious slaughter requirements

### **4.4.4 Threats**

- Single pulse ultra-high current stunning could potentially deliver the same result in a stun, however work has been on going for 10 years without successful products to date.
- Competitors may emerge if the international market pushes the meat processor to adopt reversible/ humane stunning method.

## 4.5 Processing plant benefit cost scenarios

A detailed analysis of the value propositions for DTS has been undertaken. This includes benefit cost analysis across several processing plants and direct communications, supported by industry cost and market pricing data. The findings summarise the levels of performance for mushroom stunning and the impact this has on different types of processing businesses, considering Halal market share and secondary product sales.

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*Based on processors surveyed across Australian Industry DTS is likely to generate \$30<sup>+</sup>/head in increased product value. Depending on livestock type, Halal proportion of total sales and current non-compliance, this could range from \$8.04 to \$41.71/head*

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There is currently a significant cost to processors in complying with religious requirements that a DTS system could recover. The most common scenario is an Australian processor with 17% non-compliance to Halal requirements and approximately 45% of product sold as Halal. The net increase in value using DTS in this case is \$30<sup>+</sup>/head.

Electrical stunning is used in Australia for Halal with anecdotal reports of ecchymosis. New Zealand research identified higher incidence of ecchymosis in animals treated with hormone growth promotants (HGPs). The benefits of DTS versus mushroom stunning are similar to DTS versus electrical stunning.

Malaysian listing is less common in northern Australian plants relative to southern processing plants. This limited market access has not been included in the benefits summarised.

## 4.6 Commercialisation

As part of the activities to facilitate commercialisation a communication plan and stakeholder engagement strategy was developed. Part of the stakeholder engagement strategy was live demonstration of the DTS technology.

## 4.7 Communication plan and stakeholder engagement

A communication plan and communication materials were developed. The communication materials include a website at the following URLs:

- [www.diathermicsyncope.com](http://www.diathermicsyncope.com)
- [www.diathermicsyncope.com.au](http://www.diathermicsyncope.com.au)

The purpose of the website was a communication tool to industry, animal welfare advocates and religious certifiers to help understand the system and process, provide a summary of findings from scientific research which has been undertaken and a repository for research publications.

Internationally, DTS was contacted by parties interested in supplying the Kosher market in the Middle East. Governmental agencies in Europe contacted DTS to seek permission to undertake trials to provide stunning for Halal and Kosher markets.

The communication plan identified the next steps were to continue to engage with religious certification bodies and other stakeholders in Australia and abroad to (1) raise awareness and (2) explain the technology solution which has been tested and is entering commercialisation. Future engagement is required with:

- Animal Health and Welfare bodies,
- International and domestic supply chain beef customers.

An extract of the communication plan in Table 4 describes the process from awareness to purchase.

**Table 4: From prospect to customer communication process**

Stages	Details	Actions
<b>Awareness</b>	I am aware there is a new stunning method which may be of benefit to me. It could open up new markets, generate greater efficiencies, keep my business certified and enable me to address animal welfare concerns.	Demonstrate to prospective customer how DTS addresses these areas in presentation (PPT, website, brochure)
<b>Consideration</b>	What do I need to do to benefit from the DTS solution? What changes do I need to make in my processing plant? What will it cost? What will be the benefits? What are my long-term costs compared to my current costs?	Work with prospect on what it might mean for them (adjust the model to specific circumstances of the potential client). Demonstration of the DTS system.
<b>Engagement</b>	Come and talk to me about what I need to do and what it means to me.	Establish a preliminary Statement of Work to design a unique solution for the customer's plant.

		Undertake the investigation, analysis, design and proposal with costings and benefits unique to their operation.
<b>Purchasing</b>	I have weighed up the numbers, the value proposition, the changes on floor and timing to get up to speed and I happy to proceed. Come and do a full due diligence, design and costing to remove my old knocking box and build a DTS solution fit for my purposes.	Draft contract and program of works to build DTS solution, demolish customer’s knocking box, redesign killing floor and complete infrastructure works in preparation for DTS solution installation. Install, test and commission DTS solution within agreed timeframes and costs.
<b>Using</b>	You have commissioned the DTS solution and I am now using it. Am I getting the benefits I expected over the short, medium and long term?	Train users, establish MoU and support agreement to ensure optimum working solution and benefits to customer’s operations. Deliver support team on site and remotely to iron out any issues in line with critical business activities and timelines.
<b>Recommending</b>	The experience and value of using the DTS solution is so good, I am now recommending it to other peers and company partners.	Provide opportunity for continuous feedback and configuration modifications to ensure optimum value delivery for customer’s operations, in the most cost effective way for Wagstaff/DTS. Provide incentive for customers to recommend solution to peers and affiliated companies.

DTS was demonstrated to representatives of Kosher religious slaughter (Rabbi’s) from Australia and Israel, Australian processors, and industry. Feedback from Australian processors informed refinement of the product for small and large processors. This included developing two systems with different speeds and footprints. A single rotating box with a small footprint complements the double rotating box.

To improve the communication process and support processors in their decisioning, a calculator (in Figure 3) was developed for DTS marketing purposes to help potential customers to evaluate their DTS value proposition, given their unique mix of halal and non-halal products, and other possible product mixes. The grey cells can be changed to input what is accurate for the processor. The calculator highlights the \$\$ benefit from increased compliance with Halal certification, increased meat and offal available for sale, and reduced segregation costs.

An explanation of terms can be found in Figure 2, with assumptions for this marketing calculator found in Figure 5 and Figure 6.

What do these terms mean?	
Average carcass weight (HSCW) kg	Average Hot Standard Carcass Weight post the standard 24 chiller hours (industry average)
Work Days in year	Average number of work days for a 5 day week for one shift
Number of head processed per day	Average number of head processed per plant per day
Certification Rejection Rate	The proportion of animals to be certified that are rejected due to unacceptable stunning
Base % of meat sold as religiously certified	The proportion of total plant production destined for religious certification markets
Offal downgrade due to rejection	The percentage of Offal that is downgraded due to non-compliance. This is normally 100% due to no offal segregation in plant.
Dress weight / dressing % of carcass - yield	Overall Yield of Carcass (Primal Cuts, Trim and Waste)
Average price / kg Carcass SMY	Average price for non-certified carcass yields per kg (Carcass Saleable Meat Yield) & (ex offal)
Average price /kg Certified Carcass	Average price for certified carcass yields per kg (ex offal)
Certification margin	Resulting \$/kg certification margin per carcass
Average Offal Yield	Average Offal Yield expressed as % of HSCW
Segregation Benefit (\$per Head)	Cost of saved labour as no segregation required
Offal Certification Premium \$/kg	Margin \$/kg for certified Offal, based on specific offals that obtain a premium when certified

Figure 2: Terms used in DTS Marketing Calculator

INDUSTRY AVERAGES			
Average carcass weight (HSCW) kg -		250	
Work Days in year		240	
Number of head processed per day		600	
Certification Rejection Rate		17%	
Base % of meat sold as religiously certified		45%	
Offal downgrade due to rejection		100%	
Primal Saleable Meat Yield (SMY)		79%	
Average price / kg Carcass SMY	\$	6.29	
Average price /kg Certified Carcass SMY	\$	6.80	
Certification margin	\$	0.51	
Average Offal Yield		28%	
Segregation Benefit (\$per Head)	\$	5.55	
Non-Halal Offal \$/kg	\$	4.09	
Offal Certification Premium \$/kg		\$0.26	

Assuming Offal certified is not separated from non-certified, ie 1 non-certified instance implies all offal is non-certified OR non-certified is disregarded.

	Yield	Weight	per head
Primal SMY	79%	197.75	\$100.85
Saved cost of segregation			\$ 5.55
Offal	28%	68.96	\$299.74
<b>Total / head downgraded</b>			<b>\$406.14</b>

	\$	<b>18,642</b>	Per Day	\$	<b>31.07</b>	Overall per Head Gain each day
	\$	<b>4,474,072</b>	Per Year			

Figure 3: Calculator to identify potential benefits for processors using industry averages

UNIQUELY YOURS (change whatever you like)			
Average carcass weight (HSCW) kg -		200	
Work Days in year		240	
Number of head processed per day		450	
Certification Rejection Rate		12%	
Base % of meat sold as religiously certified		100%	
Offal downgrade due to rejection		100%	
Dress weight / dressing % of carcass - yield		0.0%	
Average price / kg total carcass	\$	8.00	
Average price /kg Certified Carcass	\$	9.50	
Certification margin	\$	1.50	
Average Offal Yield		28%	
Segregation Benefit (\$per Head)	\$	5.55	
Non-Halal Offal \$/kg	\$	4.09	
Offal Certification Premium \$/kg		\$0.11	

Assuming Offal certified is not separated from non-certified, ie 1 non-certified instance implies all offal is non-certified OR non-certified is disregarded.

	Yield	Weight	per head
Primal	79%	158.00	\$237.00
Saved cost of segregation			\$ 5.55
Offal	28%	56.00	\$235.00
<b>Total / head downgraded</b>			<b>\$477.55</b>

	\$	25,788	Per Day	\$	57.31	Overall per Head Gain each day
	\$	6,189,031	Per Year			

Figure 4: Customisable calculator to identify potential benefits

Average carcass weight	100	180	275	380	200	300
	Vealer 70-110 kg	Yearling 110-220 kg	Steer 220-340 kg	Steer grain fed 300-400 kg	Cow 150-300 kg	Bull 220-420 kg
AUSMeat trim	5.0%	7.4%	8.2%	12.2%	6.3%	3.5%
Bible	4.2%	3.3%	3.9%	2.9%	4.5%	2.8%
Caul	0.9%	1.1%	1.6%	1.7%	2.3%	0.1%
Cheek meat	1.1%	0.5%	0.4%	0.3%	0.5%	0.4%
Feet	4.8%	3.6%	3.0%	2.1%	3.7%	3.4%
Head	5.2%	4.2%	4.2%	3.0%	4.6%	4.7%
Heart	0.6%	0.5%	0.5%	0.5%	0.7%	0.5%
Intestine	7.9%	7.2%	6.0%	6.4%	9.5%	5.8%
Kidney	0.6%	0.4%	0.4%	0.3%	0.5%	0.3%
Lips	0.6%	0.4%	0.3%	0.2%	0.4%	0.3%
Liver	2.6%	2.4%	2.1%	1.7%	2.5%	1.9%
Lungs	1.2%	0.9%	0.9%	0.7%	1.2%	0.9%
Paunch	4.0%	3.3%	3.5%	2.8%	4.4%	3.0%
Root	1.0%	0.7%	0.2%	0.5%	0.6%	0.5%
SC Tongue	0.7%	0.4%	0.7%	0.4%	0.8%	0.6%
Skirt	0.5%	0.3%	0.3%	0.2%	0.4%	0.3%
Spleen	0.6%	0.4%	0.2%	0.2%	0.4%	0.3%
Tail	0.4%	0.4%	0.3%	0.3%	0.4%	0.3%
Tongues	1.7%	1.2%	1.2%	0.9%	1.6%	1.1%
Trachea	0.8%	0.7%	0.9%	0.8%	1.0%	0.9%
<b>Total Yield</b>	<b>44.0%</b>	<b>39.8%</b>	<b>38.7%</b>	<b>38.2%</b>	<b>46.0%</b>	<b>31.6%</b>

Figure 5: Carcass offal assumptions used in DTS marketing calculator

Segregation Costs			
Halal Compliance rate	Inputs	Cost/head	Cost/kg
Number of days / week producing Halal	5		-
<b>Chiller Segregation (lost volume)</b>			
Chiller rails required for segregation (Carcases / rail)	4		0
Lost Production Space/Halal day	25		0
Lost Production Space/Halal Week	100		0
Percent of year at capacity production	500		0
Lost chilling capacity (annual carcasses)	15%		-
Fixed Cost/head	3,600		0
Lost fixed cost allocation	\$ 30.00	3000%	\$ 0.15
	\$ 108,000	75%	\$ 0.00
<b>Boning Capacity (lost throughput)</b>			
Boning Room chain gaps (lost volume)	6		0
Boning Labour cost / carcass	\$ 20.00	2000%	\$ 0.10
Lost boning capacity (annual carcasses)	\$ 120		0
Lost boning cost allocation	5,760	4%	-
	\$ 691,200	480%	\$ 0.02
<b>Other Costs Not Calculated</b>			
Separate pallet segregation (lost volume)	These benefits have not been quantified as they will vary widely between plants.  They have been listed here for plants to consider the impact and value generated for their specific situations.		
Chiller Segregation / Marshalling (Labour			
Chiller Segregation and Boning separation			
Chiller Segregation and Boning separation			
Chiller Segregation and Boning separation			
QA Policy for segregation and separation			
Multiple product lines (Ctn Labels)			
Other			
Total Other Segregation Benefits		\$ -	
<b>Total Segregation Benefits</b>		\$ 5.55	/Hd

Figure 6: Halal/Non-Halal segregation assumptions used in DTS marketing calculator

### 4.8 Discovering a range of new value propositions arising from DTS

To uncover innovative new value propositions (VP) arising from installing DTS in a plant for example halal branded certification, licensing, or emerging DTS certifications, a workshop was held with market, value-add, supply chain and red meat experts. Topics covered in the workshop are shown in Figure 7. When workshopping through The Value Proposition Canvas, it starts with the customer segment. For each customer and consumer:

- (1) Identify their jobs. What are the functional, social and emotional jobs that they are required to do linked to the product and service on offer?
- (2) Identify pains, frustrations, risks and obstacles.
- (3) Identify potential gains and measures of success which the product/service on offer could provide per customer and consumer segmentation?

The next section of the workshop considered the value propositions per customer and consumer segment.

- (1) What creates gain, what are the benefits and how can the outcomes be maximised?
- (2) What relieves pain points/makes life easier?
- (3) What are optimum products, services, designs or offers? 'Optimum' is both a gain creator and pain reliever.



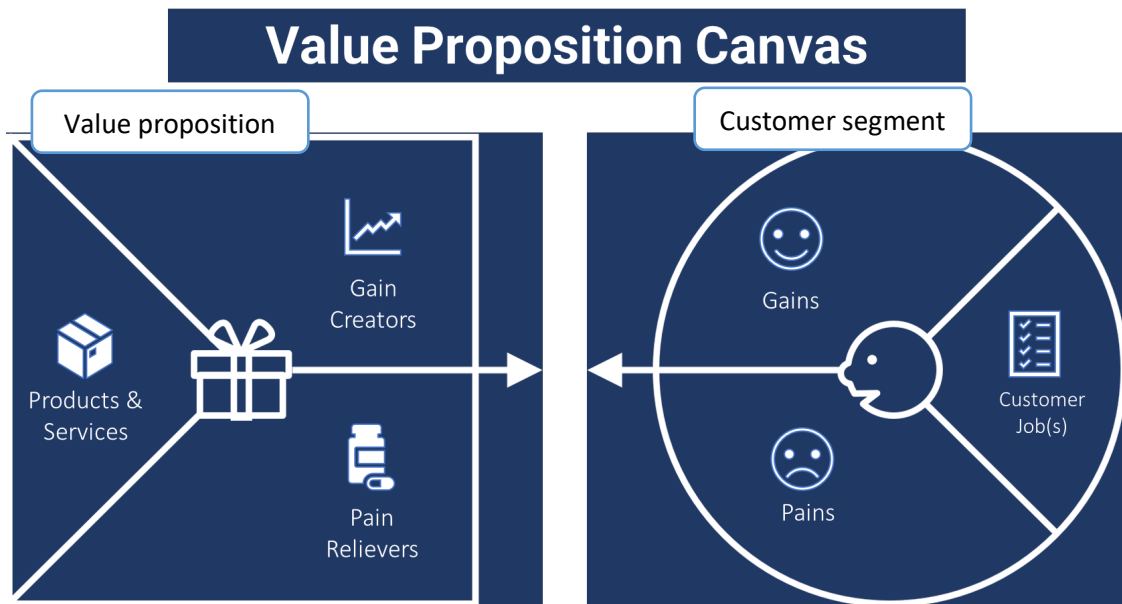


Figure 7: Value Proposition Canvas

Findings from the workshop are summarised per the topic headings of the Value Proposition Canvas.

#### 4.8.1 Customer segments:

- (1) Small processors
- (2) Larger processors
- (3) Extremely large processors: these processors were considered unsuitable customers for DTS due to the current speed of operation and their system setup.

#### 4.8.2 Stakeholders and influencers:

- Retailers
- Quick Service Restaurants
  - McDonalds have branded “deforestation free beef”. To improve consumer confidence. How to brand in a way that communicate an ethical, humane life/end-of-life?
- Wholesalers
- Consumers
  - Flexitarian (Conscious consumers) – only eat ethically sourced meat
  - Animal welfare standards (EU + Aus/NZ)
  - Religious requirements
    - Malaysian Halal
    - Indonesian Halal
    - Emirates / Gulf States
    - Kosher.

#### 4.8.3 Processor (small and large combined)

##### Jobs:

- Understand market drivers
- Undertake marketing to develop and maintain brands to drive customer and consumer sales
- Understand cost drivers and reduce costs

- Process meat and ensure the plant meets quality assurance standards and the range of legislative, regulatory and market access requirements to continue operating profitability.
- Mitigate external environmental influences – reduce carbon emissions, reduce electricity and water usage, optimise animal health and welfare, identify ways of working in through disrupted labour supplies, supply chain disruptions eg access to shipping containers and cargo space and low cattle supply.

Small processor: being a market disrupter in low-risk areas.

Large processor: justify capital spend and expected ROI in targeted areas of the business against other competing investment elements with a view to stay ahead of the competition internationally and ensure there is payback on the capital outlay as expected.

**Pains:**

- Skills and labour shortage
- Space constraints on site
- Product segregation and tracking products (Kosher certification requires every carton of meat to be tracked)
- Costs of certification, needing to have someone on plant every day and different certification tiers for Halal
- Market mis-information has the potential to destroy the business.

Large processor: internal processes take a long time for change to be considered and adopted. Focus is on volume throughout and cost minimization so if make a change it needs to be tested and reliable to ensure it can support the throughput.

**Gain creators**

- 100% success rate with stunning which means no need for separation and segregation of carcasses and offal (increased efficiency).
- Lead the world in use of technology – improved competitive advantage and ability to clearly differentiate the brand in an international marketplace with improved social license to operate and improved animal welfare standards.
- Increased income through saleable offal to Halal markets.
- Guaranteed market access and eligibility to new markets. Kosher is regarded as the strictest and most difficult certification to obtain with no stunning currently regarded as acceptable. Animal rights groups regard slitting animals without stunning as inhumane and in Australia the RSPCA, Animals Australia and Farm Transparency among others are seeking to ban the practice. Obtaining Kosher approval will open up market access for processors and DTS in international markets in Europe, South America and Israel.
- Independent data is available for each animal which doesn't have human interaction to provide opportunity for improved data management, external auditing without visiting the site and external reporting on plant knocking box outcomes.

**Processor pain relievers:**

- Consolidation of market requirements for Kosher, Halal and Animal welfare and potential to streamline religious certification requirements.
- Development of automated system from knocking box into plant.

- More efficient and effective stunning method with no risk to the operator and doesn't require the use of a skilled operator.

**Table 5: Generalised key value propositions per market in Australia**

<b>Value proposition</b>	<b>Processing plant</b>
Halal certification	Actively looking for a better solution to ensure maintain their listing and market access. Loss of market access is of utmost concern.
Kosher certification	Potential interest if can supply domestic and international markets.
Animal Health and Welfare	Markets (consumers and customers) are interested in very low stress on animals to maximise meat quality.
Improved plant efficiency	Interested in reducing labour costs and increasing efficiency.
Branding	There is scope for clear branding of product slaughtered in accordance with Halal certification requirements.

A request from the larger processors was an automated system which removed a labour unit at the knocking box. The animal is caught, chin rest in place and a robot arm places the DTS applicator on the forehead of the animal, all automated. This requires additional research, development and capital outlay with a focus on robotics. Market review and scoping are required before this investment is considered viable.

## 4.9 Apply a business model canvas framework to refine meat industry business structure for viable operation to mitigate Australian industry risk

A business model canvas identifies high level strategic details needed to bring a product to market. The key building blocks needed to develop, manage, maintain and market a product are identified through describing product value propositions, customer segments, key activities and resources, channels, customer relationships, key partners, cost structure and revenue streams shown in Figure 8.

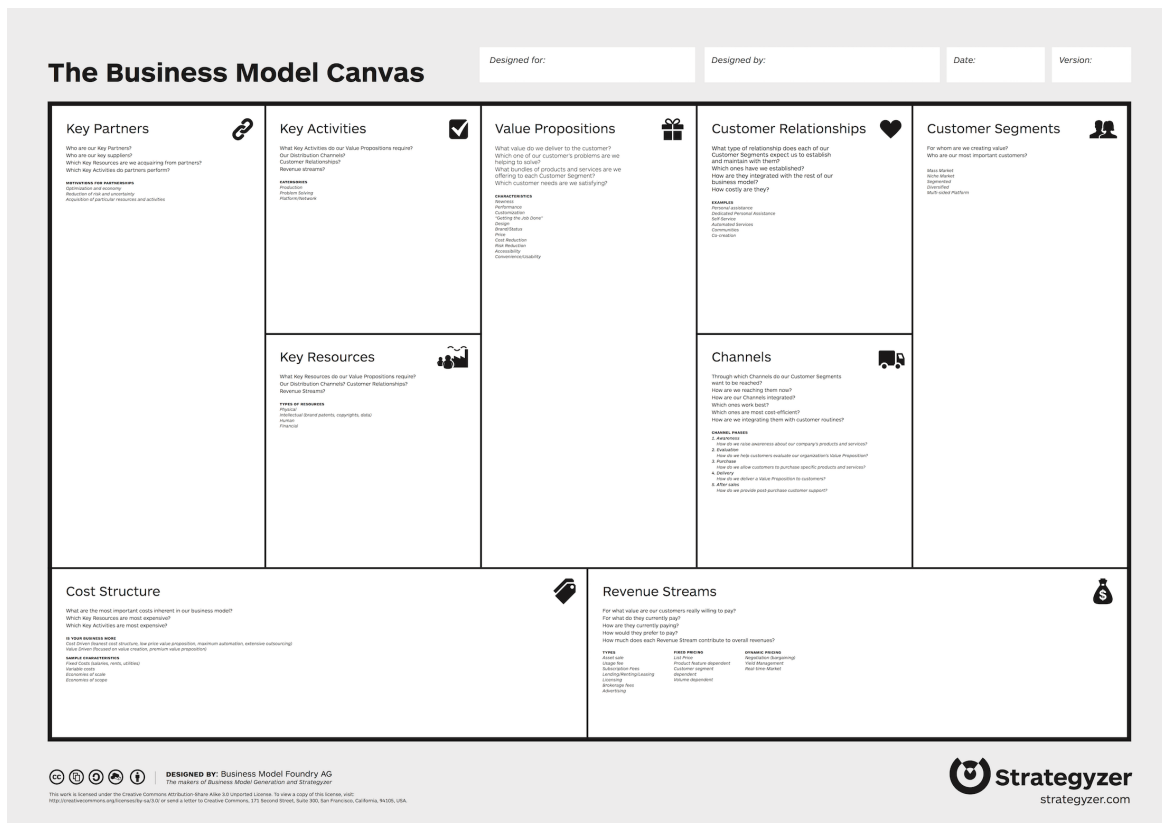


Figure 8: Business Model Canvas

The business model canvas was applied to the DTS system. Three product offerings were developed and described. Seven business scenarios were developed including 3 business models, 2 religious certification models and 2 marketing models.

## 5. Conclusion

Developing a good idea into a commercial product can be a long process and requires multiple skills sets including prototype R&D, engineering, regulatory compliance, business development, business management (finance, human resources, planning, inventory and input supplies), marketing, sales, after-sales service and maintenance. This project provided Wagstaff Services with business development and marketing support to advance the DTS system commercialisation process.

Regulatory approvals in some instances stifled international market access for animals processed using DTS. Considerable time and energy were and will continue to be directed toward providing Australian and international government departments and agencies with reports and additional information seeking market access and approvals for a product which addresses an emotive service.

The direct value generated through commercialisation, installation and use of the DTS system for the beef industry is \$8 to \$41 per head depending on:

- current stunning system,
- market and religious certification, and
- quantity and price of product sold as Halal.

Additional, unquantified benefits were identified as part of the business development process including:

- market access,
- product branding,
- consumer sentiment,
- trust and accountability through feedback reports, and
- no brain or skull damage with complete reversibility.

### 5.1 Key findings

External business development services expedited commercialisation through writing the business and marketing plans, uncovering value propositions, and developing the *modus operandi* for the business with a formalised business model.

A fee-for-service model required communication tools to justify replacing typical, outright equipment purchase. The customisable value calculator for processors was one such communication tool, allowing interested processors to identify value opportunities per average animal.

Processor throughput per day influenced the type of DTS product required and potential barriers to adoption. Barriers to adoption included:

- **Footprint size** - New designed focused on a smaller footprint and the development of a single box system for plants with a smaller throughput.
- **Access to capital** - A business model was developed whereby a deposit is required and higher usage fees applied to payback the infrastructure costs.
- **Operation speed** - The double rotating box together with improved design tweaks focuses on increased the speed of operation.
- **Religious certification and market access** – Discussions were held with key stakeholders to identify where market requirements could overlap, or where markets would exclude each other.

- **Time and effort for approvals** - Selling product in some countries required extensive time and effort to gain regulatory approval of this novel process.
- **Labour shortage reduces financial payback** - Influenced by Halal certification and the quantity of offal packed and sold to the Middle East. A labour shortage means less offal is packed and the financial gains in use of the DTS system are reduced.

## 5.2 Benefits to industry

DTS is a knocking box system which meets Halal requirements and addresses animal health and welfare concerns for bovines, providing whole-of-chain economic, social and cultural benefits. Per processor the benefits include improved Halal compliance and an elimination of ecchymosis. For most Australian processors, a 15% non-compliance to Halal requirements and approximately 30% of product sold as Halal may be recouped up to ~ 0 % and ~ 100 % respectively, and the net increase in value using DTS could be \$30ca/head.

DTS prototype demonstrations were given to industry and meat processor representatives (potential customers) as well as religious certifiers and animal welfare advocates (enablers). Research was also scoped, designed and implemented to test the theory of recoverability post DTS application which is critical to comply with Kosher laws. This research was undertaken as a separate program of work, led by Dr Alison Small.

The project identified two categories of knocking box system required by the target market. The project facilitated understanding and scoping product requirements to remove some barriers to adoption.

## 6. Future research and recommendations

**High-speed design** and development of a two cage-one race system providing a double box that can simultaneously stun and fit in the constraints of the available space.

**Ongoing public collaboration** with animal welfare organisations in Australia, United Kingdom, United States of Australia and Europe to be recognised as a best practice option which is also compliant with Halal and Kosher religious slaughter requirements.

**Develop installation and service model** to deliver, install and service DTS systems across Australia and internationally. Further development and refinement of the commercialisation strategy to include options for accessing international markets.

**Refine system design** to facilitate a quicker, more reliable build as part of the commercialisation process.

## 7. Appendix

### 7.1 Discovering a range of value propositions – workshop findings

#### 7.1.1 Customer segments:

- (1) Small processors
- (2) Larger processors
- (3) Extremely large processors: these processors were considered not suitable customers for DTS due to the current speed of operation and the way the chains are set up.

#### 7.1.2 Stakeholders and influencers:

- Retailers
- Quick Service Restaurants
  - McDonalds have branded “deforestation free beef”. Working on consumer confidence. How to brand ethically and humane life and end of life?
- Wholesalers
- Consumers
  - Flexitarian (Conscious consumers) – only eat meat which is ethically sourced
  - Animal welfare standards (EU + Aus/NZ)
  - Religious requirements
    - Malaysian Halal
    - Indonesian Halal
    - Emirates / Gulf States
    - Kosher.

Locations (in no particular order of importance):

- Australia
- New Zealand
- Indonesia
- Israel
- South America (with exports to Kosher and Halal markets for example Uruguay and Paraguay)
- EU.

#### 7.1.3 Small processor

##### Jobs

- Processing meat
- Marketing, developing and maintaining brands
- Understanding market drivers
  - MSA
  - Australia
  - Carbon Neutral
  - Veganism / Flexitarian / Animal Welfare
- Customer sales
- Ensuring plant remains certified across the range of certification programs required



- Religious
- Quality assurance
- Reducing costs and understanding cost drivers
- Identifying, developing and maintaining a niche market to remain competitive
- Being a market disrupter in low risk areas.

### **Pains**

- Capital constraints and costs of doing business
- Don't like leading regulatory change, don't like to be first, risk reduction, want to know that something else
- Space constraints
- Market mis-information – potential to destroy business (reverse with good social media)
- Skills and labour shortage
- Cost of auditing
- Cost of certification and staff don't have enough time
- Product segregation
- Tracking products (Kosher particularly rigorous – account of every carton of meat),
- Have to get in religious people in every day on plant
- Different religious certification tiers for Halal.

#### **7.1.4 Large processor**

### **Jobs**

Same as small processor:

- Processing meat
- Reducing carbon emissions
- Animal welfare
- Marketing, developing and maintaining brands
- Customer sales
- Ensuring plant remains certified across the range of certification programs required
- Reducing costs
- Identifying, developing and maintaining a niche market to remain competitive (potentially a focus on meat quality)
- EPA compliance.

Plus:

- Need to stay ahead of the competition working in low risk areas
- Need to justify capital spend and expected ROI compared to other competing elements in the business
- Ensuring payback on capital outlay.

### **Pains**

Same as small processor:

- Capital constraints and costs of doing business



- Don't like leading regulatory change, don't like to be first, risk reduction, want to know that something else
- Space constraints
- Market mis-information – potential to destroy business (reverse with good social media)
- Skills and labour shortage
- Cost of auditing
- Cost of certification and staff don't have enough time
- Product segregation
- Tracking products (Kosher particularly rigorous – account of every carton of meat),
- Have to get in religious people in every day
- Different certification tiers for Halal.

Plus:

- Internal processes take a long time. For change to be considered and adopted takes a considerable period of time.
- Toll fee - ongoing cost
- Volume issue with throughputs + tested reliability.

#### **Processor gain creators:**

- Eligibility to new markets (Malaysia)
- Guaranteed to retain market access (not walking a fine line with warnings)
- reduced costs,
- allow develop niche market bigger processors don't want to play,
- Independent data that doesn't have human interaction + data support,
- new markets for AusMeat,
- clear brand differentiation
- Animal welfare rating system – working with a 5 star system
- Supporting social license to operate
  - Develop social media presence
- 100% success rate with stunning (no near misses, no damage)
- Lead the world in use of technology – improved competitive advantage.

#### **Processor pain relievers:**

- centralised audit system,
- consolidation of market requirements
  - Halal
  - Kosher
  - Animal welfare.
- Development of automation – from knocking box into plant
- More efficient stunning
- Creation of a system which doesn't require skill operator knowledge
- no risk to try DTS from a regulatory framework perspective
- installation challenges
- Service is provided to help and support market access
- no religious inspectors onsite

- Religious certification automated.

### Processor products:

- Third party certification of Halal by DTS
- work on one certification for all requirements around AHW & religious slaughter
- DTS in a container for remote places / developing countries
  - live export validation (-niche)
  - generator as part of the DTS system (as said access to power an issue)
- Use the long race going into knocking box if space is an issue
- Social media/PR organisational support (Red Meat Industry Council – endorsement) – third party independents)
- funded trial period for early adopters
- Leasing model - includes maintenance, services etc.
  - Develop flexible pricing package
  - Membership model
  - Reimburse over time from sale of offals into Halal markets
- Collaborate with Halal council so it's less costly in \$'s and in labour hours for certification.

### Service

- Help get the certification (Halal/Kosher)
- Develop relationships with an independent third party – AH&W, Halal, Kosher which can certify all three
- Help establish boxed beef exports into Indonesia, finance element in the rollout /brand establishment
- Help sell the product (product differential – of offal that wasn't sold Halal goes to rendering – share in the margin) – act as a sales agent
- Sales of product as a consortium (rather than individuals competing eg NZ lamb for example)
  - Develop an Australian value proposition for Australian exported product which use microwave stunning system.
- Industry consortium becomes seller of multiple products in Malaysian (sales agent v sales consortium) – offal reimaged in Aust
- Industry communication support
  - Media management is Red Meat Council Australia
  - RSPCA.
- How to take advantage of growing wealth in Africa and tap into Halal beef market
- Work with the supply chain to enhance / facilitate individual animal feedback based on EID
- Whole of Australian branding value proposition – Animal welfare branding – position in Australian international markets + living wage in Australian meat processing facilities + Carbon neutral (de-risks the whole industry)
- Risk that exposes all of the processing plants
- Industry funded adoption \$200M fund which does the rollout. Individual plants need to manage the certification.
- Animal welfare positioning – guarantee the level of animal welfare at slaughter.
- Australian industry consortium (non voting shareholding in the company – Aust guys reimbursed for cost – to point break even and zero cost).

- Industry good for Australia (how does that get marketed) – separate organisation (NewCo)
- Industry discussing setting up and R&D processing plant to do stuff for industry
- DTS part of the picture of social license to operate (portfolio to enable).

Could DTS help them get market access to Halal market – AMPC funding – market access + certification (DTS take part of increase in revenue for Halal Markets). DTS offer to sell the product and make their margin on it.

### 7.1.5 Corporate Food Company

#### Gains

- Corporate company image
- Differentiated sales proposition (product and certification)
- Breed specific product differentiations increase market share (McDonalds + Angus in SE Asia)
- Larger customer base

#### Pains/risks/obstacles

- Impact of drought
- Losing country access due to regulatory policy
- How to communicate happy life and death to customers and consumers
- What is the size of the Kosher market in Australia?

### 7.1.6 Consumer

#### Jobs

- What meal to cook: if having guests over need to fit into acceptable level of hospitality  
→ what food to buy: need to satisfy conscious, have a level of trust that it has a level of sustainability and getting what paying for (certifications are accurate)  
→ how to access the meat and ingredients
- Check certifications and find a brand, processors, retail outlet which trust
- Consider the type of protein consuming
- Consider the animal welfare rating (RSPCA approved)
- Consider:
  - Food miles
  - Carbon footprint
  - Supply chain
  - Supply chain traceability
  - International certification
  - Reading published reports, Fair trade reports.
- Find food and food ingredients to serve on special occasions which are going to satisfy guests (be great).

#### Consumer pains

- Cost of meat
- Lack of verification on products

- Information on products (Meat) are from a range of sources as consumers want to know status of what they are buying
    - Australian
    - Ethical
    - Sustainable + Carbon neutral
    - HGP's / Grainfed / Grassfed
  - Pressure of needing to cook a nutritious meal
  - Finding something with good taste and good animal welfare practices
  - Different versions and levels of Halal – So when labelled Halal what exactly is it?
    - Evidence supports the certification
    - Organisation's that I trust support certification (ensure good conscience)
  - Trust in the traceability along the beef supply chain
    - For some consumers want to see with their own eyes
    - Source information directly from the source – eg connected and short supply chain (buy from farmer)
    - Trust independent organisation to support the Animal Welfare aspects of it.
  - Non Muslim population wary of eating Halal meat as fees paid to the Imams (against fees being paid and where these fees end up) wary of eating meat that hasn't been killed humanely if Halal.
  - Was the animal killed humanely? Feel guilty about eating meat.
  - Distrust in the supply chain – was the animal humanely raised and killed and if not, becoming vegetarian and vegan due to animals' death. People are feeling guilty for eating meat as they assume it has not been processed humanely.
- ⇒ Research is required to understand why people are becoming vegan/vegetarian/flexitarian.

### **Gains:**

- Want to be able to easily buy what I want
  - List of locations can buy happy cow meat
  - Education on religious options (information)
  - Ability to choose
- Want to be able to trust the products and process of what purchasing
- Want supply chain transparency
- Money I am spending is supporting the best outcome
- Want to "Feel Good"
- Supporting ongoing research into humane practices in beef supply chain
- Kudos for quality meat and meal cooked for family and or friends
  - Social media comments, likes, shares.

### **Consumer pain relievers:**

- Choices making are assured by someone – certifier, influencer, knowledgeable person
- Consumer education to relieve the guilt and know sponsored a great outcome. Consumers want to know that beef they are eating came from a happy animal that was killed humanely and with respect.
- Consumer education that there is no such thing as plant based diet which doesn't kill animals. Monoculture legume and grain production kills more animals than beef production. The question is who decides what face is cute.

- Industry continues research for advancement of animal health and welfare in the beef industry
- The ability to trust the meat supply chain
  - ⇒ An independent reviewer to relieve and reduce suspicion
  - ⇒ QR code or blockchain to provide supply chain visibility and know status of what the consumer is buying
- Reduce the amount of research required by conscious consumers with all the information available from one source
  - ⇒ International certifying body with a food rating like a Canstar rating which includes:
    - food miles and carbon footprint
    - level of processing
    - labour (slave, child, paid a living wage)
    - sustainable production
    - ethical production.

### Consumer product and services:

What do the products and services look like which make life easier for the consumer?

Ideas to consider:

- 1) Establishment of a data company where integrate paddock data to plate using of QR code
  - a. Way it was killed is linked to NLIS code which is linked to QR code on box and product
  - b. Visibility across the entire supply chain to know animal eating – full traceability, links to images of animals life
  - c. Link to food miles, carbon footprint,
  - d. International certifying body
    - i. Certification of individual animal comfort level
    - ii. Certification of low stress (yards, trucking, death)
    - iii. Certification – labour, AH&W, “happy life”, environmentally friendly footprint.
  - e. External company reviewing the supply chain.
- 2) External way to view show the graph of the energy applied to each individual animal. This can focus on data and temperature in the brain.
- 3) Auditing – how link in with conscious consumer and religious certification to show animals which have a certificate from being killed using DTS technology and reduce the auditing requirements from religious certification perspective.
- 4) Augmented reality of the animal’s life linked to the traceability.

### Other elements:

These elements were ideas from outside the “Value proposition Canvas”

- Small processor – maintenance cost + ability to buy the machine + engineering solution
- How to address the question in the EU and which is expanding to Australia – the right to farm
- How best to reach and education / link to the market in the EU
- What are the different product / service mix on offer from DTS to processors?
- What are the drivers for vegan / flexitarian?

- What are the drivers for different Halal markets?
- What is the potential for supply chain disruption – sell /link directly to consumer?
- Servicing of the equipment – firms wanting and not wanting to outsource or rely on DTS
- How to tap into Kosher slaughter
- What improvements are required for industry adoption
- How much can educate the supply chain – customers and consumers
- To what degree is the focus on B2B and B2C marketing, education, communication
- How to focus on value based marketing
  - o Product features
  - o Financial implications
  - o Emotional connection.
- How to facilitate cost reduction cost for Australian industry
- Brand “OZHumane – TrueOzzie – AH&W, sustainable beef, no harm to environment, no harm to animals, minimum standard of production (CN30).

## **7.2 Business model canvas for DTS: Diathermic Syncope® stunning technology**

The DTS stunning technology is moving from a prototype Phase III to first stage commercialisation. The commercial model is business to business (B2B), with the technology being licensed for use to bovine processing plants. Wagstaff Food Services Pty Ltd are designing, building, installing and servicing the equipment in the first stages of commercialisation.

This report provides detailed insight into the business model canvas. The business model canvas describes the rationale of how a firm creates, delivers and captures value. This business model canvas has been undertaken from the perspective of the DTS equipment sale and installation. The business model canvas covers the four main areas of any venture: customers, offering, infrastructure, and financial viability. There are nine building blocks that describe and assess a business model: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

### **Customer segments**

This section identified who the customers are and who are we creating value for.

**Target customers:** Bovine meat processors, processing 50+ head per day.

The market is a segmented market where customers have slightly different needs and problems. Small (250-600/day), medium (600-1000) and large (1000+) throughput required with different sized footprint (space) available. There is an upper limit to the number of animals per minute based on the product installed – single or double.

The target customers for the DTS technology include processors from Australia, South America, Western Europe (France), United Kingdom, Malaysia and Indonesia.

Specific value propositions apply to processors who are wanting to sell to consumers who require Kosher and Halal certification.

Conscious consumers who are interested in animal welfare outcomes are also a target market for the processors.

### **Value proposition**

A value proposition provides a description of what the product or service does to fulfill the customer's needs (what problem is being solved) and what is offered to each customer segment. A value proposition includes product, price and how product delivery is managed for each customer segment.

DTS provides a turnkey solution which complies with Kosher and Halal requirements for bovines for its products and the option for equipment licensing only for processors who have their own engineers, metal fabricators and trades people onsite and don't require a turn-key solution.

The core value propositions of DTS:

- New product unlike any other for the Kosher market
- New design as a point of differentiation for the Halal and conscious consumer market
- Support provided to processors for obtaining Kosher and Halal (Malaysian) registration\*<sup>TBC</sup>
- Cost reduction
  - reduces the need for segregation and separation if skull damaged
  - Increases value of carcase and organs if selling into Halal market.
- Risk reduction
  - Reduces risk of failing audits or irregularities if selling into Halal market
  - Reduces future risk with conscious consumers
  - Scientifically proven with improved animal welfare outcomes.
- Offsite build – installed and commissioned in 3-4 days so minimal downtime.

DTS provides enhanced animal welfare outcomes. With a rising interest in improved animal welfare outcomes from customers, consumers, industry stakeholders and the general public, DTS provides an opportunity to counteract negative connotations, particularly with religious slaughter practises. In the United Kingdom and Europe there is a particular groundswell of attention being paid to religious slaughter practises. DTS provides a solution which aims to satisfy religious slaughter requirements while upholding the highest animal welfare standards.

### **Key partnerships**

As part of developing the business model it is important to identify the key partners and suppliers which work together to complete the product and service and what key activities are undertaken by partners. Partnerships provide opportunities however partnering also provides if not well managed a level of risk and uncertainty.

### **Key equipment and technology suppliers include:**

- microwave technology
- software provision
- generator and associated parts
- steel.

**Key partners:**

- CSIRO – Dr Alison Small – Chief Researcher
- Engineering firm – design and creation of blue prints.

**Stakeholders:**

- Meat & Livestock Australia
- DAFF
- Religious certifiers
- major retailers and quick service restaurants.

**7.3 Key activities**

In this section the key activities to support the value propositions are identified.

**Commercialisation**

When moving into commercial production it is important to manage (1) inventory levels, (2) order fulfilment, (3) production flows, (4) demand forecasting and (5) quality of product and service delivered. Design flaws may be identified during the commercialisation process, therefore it is important to adopt a continuous improvement model and document issues and design changes.

A commercialised product requires a detailed Bill of Materials. A Bill of Materials is a complete list of all individual parts which will make one single production unit. It is important to plan for the worst when it comes to availability of parts.

Bill of Materials template:

Item	Part number	Description	Quantity	Material	Make/Buy	Primary Vendor	Cost each	Second vendor	Cost each

**Product requirements document**

As part of the activity to develop a commercial product a PRD (Product Requirements Document) needs to be created. This provides an overview of the physical elements, performance elements, packaging, repairs and warranty. (Source: <https://www.kdproductdev.com/blog/how-to-move-products-from-prototype-to-production/>)

1. Introduction
  - 1.1 Product description
    - 1.1.1 What is it?
    - 1.1.2 What’s unique?
    - 1.1.3 A summary of how it works
    - 1.1.4 Pricing
    - 1.1.5 Availability
  - 1.2 Who is the product for?
    - 1.2.1 Description of target buyers



- 1.3 Competitive comparisons
- 1.4 Schedule projects and requirements
2. Physical description
  - 2.1 Weight, size, overall
  - 2.2 Colour, material, finish
  - 2.3 User interfaces – switches, buttons, I/O
  - 2.4 Worldwide compatibility
3. Major elements of the system
  - 3.1 Mechanics
    - 3.1.1 Functions and construction
    - 3.1.2 Schematics and diagrams
  - 3.2 Electronics
    - 3.2.1 Functions and construction
    - 3.2.2 Flow charts and diagrams
  - 3.3 Major component details (motor, display)
4. Performance Requirements
  - 4.1 Product lifetime requirement
  - 4.2 Environmental requirements
  - 4.3 Accessibility
5. Packaging
  - 5.1 Package description
  - 5.2 Out of Box experience
  - 5.3 User manual
  - 5.4 Getting started guide
6. Approvals (regulatory)
7. Repairability / serviceability
8. Warranty.

## **Customer relationships**

This section dissects the type of relationship each of the customer segments expect during and after the purchase of the product. Developing and maintaining customer relationships costs money, so it's important to understand the costs associated with maintaining the relationships with the different customer segments to ensure there is a suitable return on investment.

Relationships have been established with several processors. Within the processing sector there are different decision levels.

The decision levels include:

- (1) technical feasibility: Does the product perform suitably? Does it operate as per marketing materials and trials?
- (2) logistical feasibility: Can the product fit in the space available? Can the product keep up with the chain speed?
- (3) financial feasibility: Will the product provide a 10% return on investment and a less than 2 year payback on infrastructure?

Relationships therefore need to be established with different decision makers at different levels of the potential customer to facilitate a purchase decision.

Based on interactions with interested parties small and medium sized processors are interested in a higher degree of support and provision of a turnkey system. Medium and larger processors have their own teams inhouse and are interested in deployment of the technology.

After sales service levels need to be determined for each of the customer segments.

**Key resources**

This section identifies the key resources required for the value propositions, customer relationships and distribution. Resource types include physical, human, financial and intellectual (patents and data).

The business activities include (1) operations, (2) marketing, (3) production, (4) problem-solving, (5) administration and finance and (6) research and development

Suggested table to complete:

	Physical resources	Human resources	Financial resources	Patents / data
Operations		Person who involved in installation, servicing, maintenance		
Marketing	Website, brochures, PPT with business case analysis	Person who takes calls, answers questions, organises demonstrations, presents to boards		
Production	Workshop	Engineers and workshop staff		
Problem-solving				
Administration and finance	Office			
Research and development		Dr Alison Small & CSIRO	Wagstaff funding Industry funding	

**Channels**

While the Business Model Canvas seeks to understand which channels will reach what customer segments – at this moment there is only one channel – which is a direct business to business

channel. Within two to five years there could be a distributor model where different partners in Europe and South America are involved in sales, installation and servicing DTS stunning technology.

### **Marketing and sales activities**

In 2023, the marketing plan should be revised and further developed based on changes in the external environment (legislation, market access, further product development and testing).

These are general marketing, sales and customer support activities to be undertaken including:

- ❖ **Gaining product awareness** – marketing materials, individual conversations, presentations to key stakeholders
- ❖ **Facilitating the potential customer's evaluation pre purchase** – demonstration in person, presentation with cost benefit analysis, video demonstration
- ❖ **Facilitating the customer's purchase** - cost benefit analysis, meeting face to face where present service model
- ❖ **Delivery of product** – provision of turn-key service model with minimum downtime
- ❖ **Customer support and after sales service** – training, yearly servicing, support for certification, collaboration with industry stakeholders so processors.

### **Cost structure**

This section covers the most important and most expensive costs in the business model including key activities and resources.

A major cost and decision required is the value and quantity of inventory on hand. Currently there are shortages, lengthy wait periods, price increases and supply chain disruptions for components of the DTS stunning equipment as well as the restraint equipment and faraday cage. To ensure systems can be manufactured in a timely manner and repairs and servicing carried out essential parts will need to be purchased and kept on hand which is an outlay and business cost.

The next cost structure and decision required is the number of type of staff required to operate the business. As the business moves into a commercial operation expertise will be required in manufacturing, engineering, maintenance and servicing, sales, customer relationship management, finance, business operations and management, international commerce and certification (religious, animal welfare) at an international scale.

#### **Fixed costs**

Salaries

Utilities

#### **Variable costs**

Visits to potential customers

Research and development activities

### **Revenue streams**

This section includes what and how customers will pay, what customers are willing to pay and how much each revenue stream contributes to the overall revenue.

The revenue stream model includes:

- (1) Outright sale of faraday cage and associated entry and containment equipment + engineering support

**Price:** Fixed pricing based on quotations for associated infrastructure and turnkey solutions.

(2) Lease of DTS stunning equipment

**Price:** Leasing of DTS stunning equipment has a usage fee \$7 per animal with annual CPI adjustment). Payment is 30 (or 45) days on the volume processed for the month.

(3) Servicing and maintenance of DTS equipment

**Price:** Time and materials for servicing and maintenance.

(4) Technical assistance to obtain religious certification (Kosher, Halal)

**Price:** Time and materials or fixed price based on quotation.

(5) Outright sale of DTS stunning equipment (considered only in unique circumstances)

**Price:** Fixed pricing.

### **Business model – Scenario 1 –**

**The models have been reviewed and this has been agreed by Wagstaff Food Services as the Preferred operational model.**

License fee payment includes servicing and basic parts are included. These costs include system upgrades, servicing, maintenance and replacement parts. A Certificate will be issued upon completion of the servicing and maintenance stating the DTS system is operating effectively and efficiently.

Wagstaff Food Services owns and services the equipment associated with the DTS Stunning.

Wagstaff covers the cost of replacement component parts. It is Wagstaff Food Services responsibility to ensure equipment is replaced and maintained to ensure optimal reliability and continuity of use.

Parts which break and are easily replaced without specialised knowledge are required to be stored onsite as part of the contract.

The licensee is responsible for maintenance of the restraining equipment and faraday cage. Wagstaff Food Services will provide a regular (6 month/12 month?) report identifying any issues with restraining equipment and faraday cage which require rectifying. Wagstaff will issue a certificate as appropriate that the faraday cage is working efficiently and effectively as part of the regular servicing and testing process.

#### **Advantages of complete service package:**

1. Guarantee system is working efficiently and effectively.
2. Ensure the DTS system has a reputation for being reliable and working effectively.
3. Ensure the DTS system has a reputation for highest animal welfare standards.
4. Differentiate DTS from other systems and maintain the differential through the complete service package (as new technology and improved technology will compete in the next 2-5 years with the DTS technology).
5. Licensee knows costs in advance for the next three years, which is linked to production output.
6. Ensure retain Intellectual Property as not requiring licensee engineers and electricians to pull apart equipment to service it.
7. Business model aligns with license fee per animal to introduce businesses to the benefits of a fee for service model. Relate the model to a 3-year factory warranty on new cars – where

basic service and parts are covered providing service is always done by accredited Wagstaff Food Services staff.

8. Enables direct feedback to design engineers and Wagstaff which parts and components require replacing, how often and where the weakness or design flaw is. Identifying parts which are breaking, wearing more than expected can help in the design of the next prototype to either use a different part or redesign the model so the part is redundant. If the design can't be changed, then it can become a requirement for the licensee to have replacement parts on hand.
9. Guarantee the maintenance and servicing is done properly with appropriate replacement parts used, ensuring quality outcomes for the animal and the reputation is retained.

**Implications:**

1. Representatives from Wagstaff Food Services will need to visit, inspect, service and maintain installed units. This needs to be costed into the license fee.
2. An understanding of the service requirements, frequency of part replacement will need to be known beforehand – which is currently an unknown in the prototype phase.