



final report

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Goat skin-on head and feet browning furnace development

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Abstract

The processing of Skin-on Heads & Feet has been developed for a particular market that requires these items (head and feet (shanks)) to be 'Browned' after the de-hairing process.

The process of 'Browning' is a traditional means of preparing an animal carcass for consumption. Firstly the animal is slaughtered and then is placed on an open fire to singe all of the hair from the carcass, the result from the removal of the hair in this method is that the skin remains as a toasted outer layer to the meat. The carcass can then be cut up – portion – for further cooking and then consumption.

For obvious reasons our modern day food safety concerns would not allow such a process to be performed on a commercial volume, nor would this process be permitted in a meat processing facility. The compromise therefore to enable the customer to purchase a 'traditional' product is to add the process of 'browning' as a further component to the finished skin-on product.

The aim of this project was to develop a customised gas furnace to brown product to ensure a reliable, consistent processing outcome together with processing efficiency and other workplace safety features.

Executive Summary

In order to improve the processing efficiency, workplace safety, and product quality, of browned goat products, Wesmartin Leonda was engaged to assist a processor to develop and manufacture a suitable furnace.

Based on guidance from the processor, site visits, and factory acceptance trials, a machine was constructed and delivered to a processing site. Some efforts during production testing were required to optimise the process, and the final design includes various aspects of practical know-how.

In conclusion, the machine has proven to be a valuable production machine with benefits generally in line with expectations, allowing the redeployment of 4 FTEs. The machine is now commercially available through the technology provider.

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1 BACKGROUND

Browned or “Flamed” Goat products, such as heads and feet, are an important value added export product. Several plants (approximately 7 plants) in Australia are or are potentially involved in this market which exports to the USA, into the Caribbean, Taiwan, and other countries in Asia (and with a potential for EU as well).

Currently the browning of heads takes place by the hanging of the head on a stainless skid and rail system and for feet placing them on a rotating rack. Then a manually held gas blow torch is used, rotating the heads or feet as required to achieve an even browning. This process is labour intensive, physically demanding with exposure to heat and flame, and lacks product consistency.

2 PROJECT OBJECTIVE

The purpose of this project is to automate, refine and standardise the browning process, by designing a revolving rotisserie/conveyor/rail type system enclosed within a blow torch tunnel/chamber.

Further to this the objective is to increase volumes of uniform product, to achieve increased productivity, to reduce labour costs, increase product availability to meet demand for export markets, to increase company profile, and to produce a superior export product of an even specification and attractiveness.

3 DESCRIPTION OF PROJECT

The current state-of-the-art is labour intensive, physically demanding, and time consuming. Although this process of browning heads and browning of feet is an important part of the value-adding of these products, the process has not reached its productive potential due to the current process design.

It is believed that currently there is no machinery that has been designed specifically for this process and our objective has been to develop a prototype system to further develop these products.

In consultation with a specialist furnace manufacturer we have progressed through design concepts to finally arrive at the finished equipment.

This project aims to develop an automated system encompassing designs including: conveyor/rail speed adjustment, gas/flame adjustment, ventilation, cleaning, waste storage & drainage, to develop a cost effective, consistent, and robust system of browning goat heads and feet.

Functional Specification of the machine (the general guidelines around which the machine has been designed around):

- Expected footprint Refer to attached Drawing LW62001
- Throughput 1200 Heads Per Hour. (5 Hooks per minute, each hook has a 4 head capacity)
- Operator controls
 - Fixed speed on/off on Hook Chain

- Fixed Speed on/off trotter conveyor
- Head Burners on/off with manual valve control
- Trotter Burners on/off with manual valve control
- Expected gas usage
 - Head Burner Max 579 MJ/h @ 2.75 kPa (LPG)
 - Trotter Burner Max 992 MJ/h @2.75 kPa (LPG)
- Control system to ensure the product consistency
 - Fixed Speed throughput with Fixable burner rates.
- Any general arrangement drawings, electrical schematic, etc. Please refer to attached drawing LW62001
- Acceptance & Installation plan. On Site FAT, Followed by installation and commissioning on site.

4 PROJECT IMPLEMENTATION

Site visits were conducted to the manufacture at critical phases of the project to ensure the direction was to ensure confidence in the success for the final outcome. Sample products were tested through the machine to determine effectiveness and fine tuning of how the browning would be achieved.

Once the machine construction was completed and transport, installation and commissioning on site was conducted – product trials were initiated. At first, these trials were proving a great success with the design ability of the machine.

A serious issue that has been encountered is the control equipment for the burner ignition system having been supplied with solenoids not rated suitably for a meat processing facility. To enable effective cleaning to required hygiene standards the solenoids are not rated to withstand water ingress. Initially the fault with the machine was not able to be determined as this was an intermittent fault and frustrated efforts to effectively operate the machine.

Once discovered the replacement of solenoids to a more appropriate IP rated has been conducted and to date the feet browning section of the machine is operating to efficiently brown the feet to a consistent standard.

Following further replacement of the solenoids for the head browning section the machine is now fully operational and throughput is increasing with the efficiency of production.

5 OUTCOME OF PROJECT

To date we have an effective system for the browning of goat heads and feet, we are currently producing increased volumes of consist product as per our specification requirements.

Labour costs have reduced significantly (4 FTEs redeployed) where only a couple of people are required for the actual browning process.

Feet Browning section in operation

<refer to commercialiser>

Head Browning section in operation

<refer to commercialiser>

Furnace under construction



Machine Schematic

