final report

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Ovine spinal cord removal

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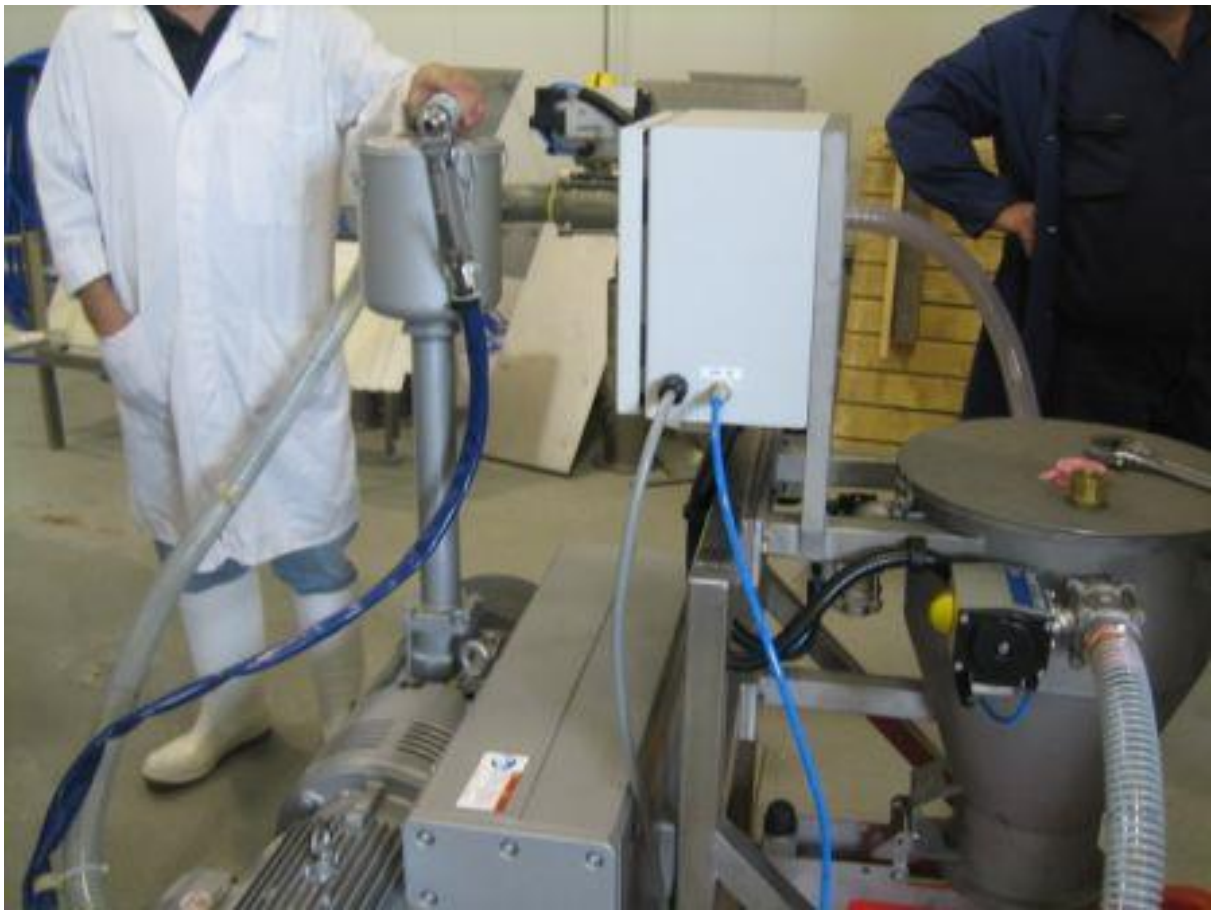
Executive summary

A processing option does not currently exist for spinal cord removal in lamb carcases. Currently the manual process is extremely erroneous in labour time and requires skilled labour to effectively remove affected material. Another issue with current manual methods of removing spinal cord from lamb carcases is the lack of certainty containing the contaminated material and ensuring it is safely removed from the process. There have been several unsuccessful earlier attempts (using other methods) to collect and safely contain spinal cord from lamb carcases. The current project proposed to evaluate a modified commercial beef spinal cord removal system to efficiently and accurately removal spinal cord from lamb carcase.

Existing beef equipment has been developed and currently manufactured and serviced by Food Processing Equipment. This project will evaluate a prototype and JBS will evaluate the potential benefits and cost benefit of the system. An additional benefit of the system which has been recently commercially proven by FPE for the beef version of the system will be investigated in these trials to remove spinal cord from shortloin pairs, which hasn't been able to done with guaranteed success in the past.

As a result of the project, all spinal cord was totally eliminated from the process area. While removal of spinal cord may contribute to enhanced shelf-life, there is no requirement to remove spinal cord for smallstock processing. As a result of the project the technology was not subsequently adopted by a commercialiser. Currently no commercial units are in operation.



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Background

Due to resurgence of BSE outbreaks more recently in the last 15 years, spinal cord has been identified as a serious contaminant to meat. Currently, the manual removal of spinal cord during slaughter and dressing of lambs is costly, inefficient and non-viable. Any residual spinal cord that is not collected and safely contained from the process results in product retain until complete removal of all residual spinal cords matter. Spinal cord left in chilled product is known to also reduce shelf life of product. There are significant costs to the industry related to product retaining, isolation and in some cases downgrading product to render when foreign spinal matter cannot be removed. While there are no existing processing options available for ovine spinal cord removal (other than manual trimming, entrapment and containment by hand), there is a spinal cord removal system that has been developed successfully for beef processing. The commercial beef system uses a vacuum vessel and pump, a mobile stand and modified network of tubing and vacuum hoses. This system which is applied to affected spinal cord areas allows an operator to consistently and precisely pickup all intact spinal cord and remove as a continuous length. Critically, all material that is cord is drawn into a fully contained vessel; allowing for total containment of contaminated matter for disposal. Existing beef equipment has been developed and currently manufactured and serviced by Food Processing Equipment (FPE).

While JBS has conducted a series of trials using various technologies over the past several years, there is currently no commercially proven processing option to effectively and precisely remove ovine spinal cord and contain it with 100% assurance with less labour. Failure to remove and safely contain spinal cord is a regulatory breach which has significant commercial implications with rejected product and additional labour time to re-process contaminated product. MLA is not currently investing nor has MLA invested in this technology in the past. The current project proposes to modify existing beef spinal cord systems and evaluate initially in pilot trials. It is proposed that JBS & MLA will work with FPE to modify existing beef equipment to resolve current issues associated with the effective and precise removal and containment of spinal cord from lamb carcase parts including shoulders, racks and shortloin pairs. The proposed benefits of this system will be significant reduction in processing costs by removal of labour units and certainty that all collected spinal cord will be contained and completely removed from the process and direct deposit into rendering. The current manual system does not assured containment of manually removed spinal cord. An additional benefit of the system which has been recently commercially proven by FPE for the beef version of the system will be investigated in these trials to remove spinal cord from shortloin pairs, which hasn't been able to done with guaranteed success in the past.

Project Outline

Spinal cord is a specific risk material (SRM) that tends to go 'off' because of the protein/fatty nature, moisture and position which must be fully removed on the slaughter floor including the duramata (i.e. the membranous sheath that surrounds the spinal cord). There is a manual tool that has been developed successfully for extraction and entrapment of beef spinal cord material. The commercial beef system uses a vacuum vessel and pump, a mobile stand and modified network of tubing and vacuum hoses. This system which is applied to affected spinal cord areas allows an operator to consistently and precisely pickup all intact spinal cord and remove as a continuous length. Critically, all material that is cord is drawn into a fully contained vessel; allowing for total containment of contaminated matter for disposal. Existing beef equipment has been developed and currently manufactured and serviced by Food Processing Equipment (FPE).

Current research and development is proposed to further modify existing manual beef spinal cord removal tool in the development of an efficient and cost effective manual spinal cord extraction and entrapment system for processing ovine carcases. While similar principles that have been commercially proven for beef will be used for ovine spinal cord removal, there are unknown risks in the effectiveness of collection from smaller access areas in lamb carcases. This work proposes to modify commercial beef spinal cord removal equipment, commercially prove the equipment firstly in small pilot lamb carcase trials and evaluate the business case and cost benefit to JBS for the implementation of the modified system. At the conclusion of the project, JBS will evaluate the potential benefits of the system including a preliminary cost benefit analysis. JBS & MLA will develop materials including written materials and video footage of the system working to be used for dissemination to wider industry. Any requests for information and demonstrations of the technology by the industry will be demonstrated by the potential commercialiser FPE (who already have a beef spinal cord removal system).

Project objectives

The objectives of the project were:

- Develop lamb carcase spinal cord prototype
- Evaluate prototype in small scale commercial trial (at JBS Bordertown SA plant)
- Accessed by AQIS to be an approved process
- FPE to conduct demonstrations at their pilot facility to the wider industry on request.

Experimental work

The following were the milestones and research approach :

1 Deposit, scoping and planning - Scoping completed and acquisition of equipment, materials and parts.
2 Assembling of modified equipment vacuum vessel and pump, mobile stand with Trimvac conversion kit and additional materials and parts Prototype equipment commissioned and tested ready for pilot trial at JBS Bordertown plant
3 Conduct trial using prototype equipment on a small batch of lamb carcases Initial trials completed. Assessment of residual spinal cord material and report to MLA & JBS (ie report & video footage)
4 FPE & JBS to develop a report, record video footage & seek AQIS approval. JBS to evaluate the potential benefits and conduct preliminary cost benefit analyses Submit report & video to MLA and AQIS approved. Report on potential benefits and preliminary (JBS) CBA. JBS & MLA communication to wider industry. FPE to conduct demonstrations at their pilot facility to the wider industry on request

Results & Discussion

The ovine spinal cord removal system was supplied by FPE and installed in Cobram, Victoria. The machine clearly demonstrates the ability to cleanly and effectively remove the spinal cord from lamb loin pairs.

Significant modifications were required:

- Slight modification of the nozzle location into the spinal cavity was completed to improve operators speed.
- A tee junction and two way valving can also be used to remove spinal cords from split shoulders, racks or loins when the specification asks for spinal cord removal.

- The current joint R&D with JBS at Cobram plant trialled a modified version of FPE's beef spinal cord removal system that has been adapted considerably for smallstock processing
- The equipment was considered operational and appeared to be working as tasked
- One outstanding minor issue relates to excessive noise produced from the vacuum pump. Solution being looked at relates to relocation of the vac pump outside the processing area.

As a result of this project, all spinal cord is currently totally removed from the process area.

Cost Benefit Analysis

It is expected the benefits by development & implementation of the proposed system at the manual vacuum system will be:

1) Significant reduction in processing costs by removal of at least 2 labour units that are currently involved in removal of spinal cord removal.
2) Complete removal of spinal cord extracted out of the process and direct deposit into rendering
3) Likelihood of enhanced shelf-life of product due total removal of spinal cord from the process
4) It is proposed pull spinal cord from shortloin pairs, which hasn't been able to done with guaranteed success in the past. (Note that FPE has recently discovered from the beef version of the system that it will also pull spinal cord from shortloin pairs, which hasn't been able to done with guaranteed success in the past).

A JBS review of the benefits of the technology was undertaken as part of the project for lamb processing only. It was determined that:

- Significant reduction in processing costs by removal of 2 full time equivalent (FTE) labour unit(s) currently involved in removal of spinal cord removal. Assured collection and entrapment of spinal cord extracted from ovine carcases and direct deposit into rendering. Enhanced product shelf-life due to total removal of spinal cord from the process.
- Resulting in an estimated $0.21 per head benefit
- At JBS Cobram operation the benefit is estimated AUD $130,000 per annum (based on 624,000 lambs processed).

Commercialisation / dissemination strategy

At the conclusion of the project if successful, JBS will roll out the technology within other JBS lamb or beef processing plants.

At the conclusion of this project, JBS and MLA will have delivered:

- A report detailing the impact of the technology on yield, quality aspects of the product processed by this technology, potential labour savings and anticipated economic impact will be completed at the end of the project.
- A video of a system in trial operation will be produced in conjunction between MLA, JBS in the course of the project.

As a result of the project the technology was not subsequently adopted by a commercialiser. Currently no commercial units are in operation.

Conclusion

A processing option does not currently exist for spinal cord removal in lamb carcases. Currently the manual process is extremely erroneous in labour time and requires skilled labour to effectively remove affected material. Another issue with current manual methods of removing spinal cord from lamb carcases is the lack of certainty containing the contaminated material and ensuring it is safely removed from the process. There has been several unsuccessful earlier attempts (using other methods) to collect and safely contain spinal cord from lamb carcases. The current project proposes to evaluate a modified commercial beef spinal cord removal system to efficiently and accurately removal spinal cord from lamb carcase. Existing beef equipment has been developed and currently manufactured and serviced by Food Processing Equipment. This project will evaluate a prototype and JBS will evaluate the potential benefits and cost benefit of the system. An additional benefit of the system which has been recently commercially proven by FPE for the beef version of the system will be investigated in these trials to remove spinal cord from shortloin pairs, which hasn't been able to done with guaranteed success in the past.

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Appendix A – Photographs of FPE modified equipment

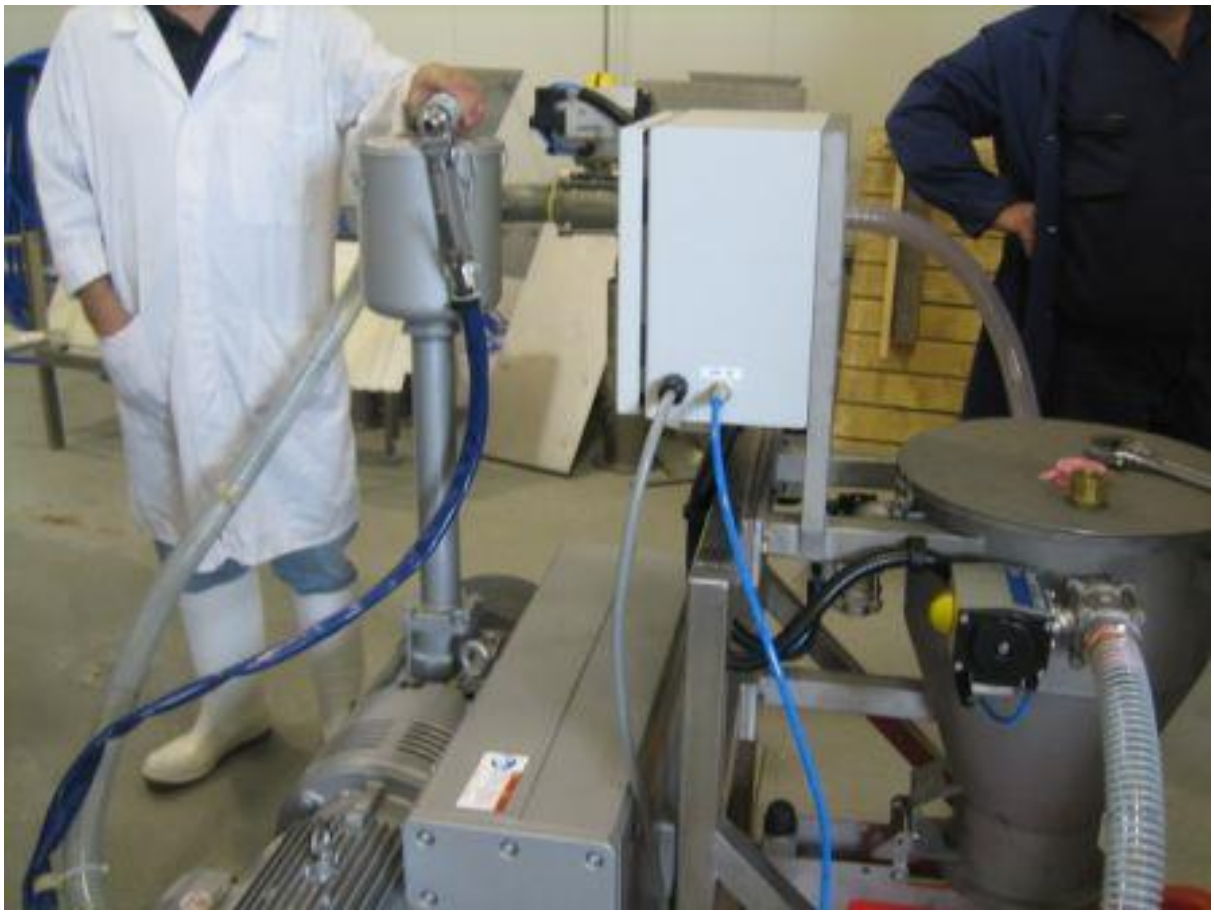

Photo 4: Modified ovine spinal cord removal system.

Photo 5: Extraction of spinal cord.

Photo 6: Extracted spinal cord.

Photo 7: Extracting spinal cord.

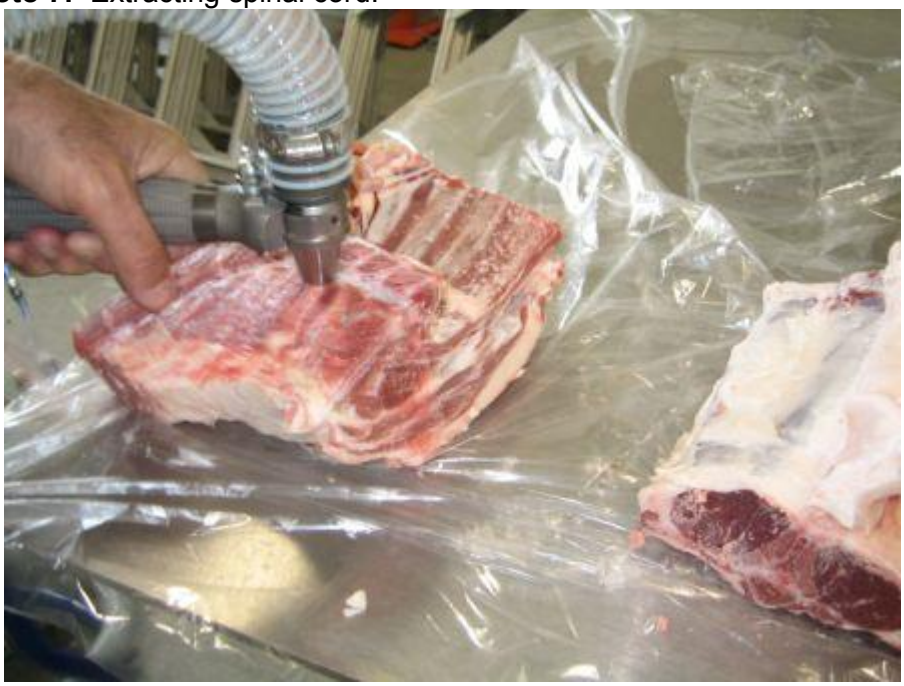

Photo 8: Extracted spinal cord.

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Photo 9: Spinal cord.

Appendix A – Jarvis Spinal Cord equipment

SPINAL CORD REMOVER
Model SPC 165G

U.S. Patents
6,805, 696
6,511,483
European Patent No.
EP 0 890 313 B1

The Jarvis Model SPC 165G - pneumatically powered spinal cord remover for beef or pork.

JARVIS

- Latest patented technology for grinding away BSE risk material, including the spinal cord and the meninges (spinal cord skin).
- Connected to a vacuum system that collects the removed spinal cord material for disposal.
- Lightweight and flexible. Suitable for beef or pork in small and medium sized processing plants.
- Powerful - high efficiency air motor for more horsepower and faster spinal cord removal.
- Heavy duty construction holds up under the harshest processing conditions.
- Stainless steel and aluminum construction.
- Meets national and international requirements for hygiene and safety. USDA and CE approved.

POWERFUL - LIGHTWEIGHT - FLEXIBLE

SPINAL CORD REMOVER
Model SPC 165G

Specifications		
Drive		Pneumatic
Model SPC165G		
Motor Power	0.85 hp	630 W
Operating Pressure	90 psi	6.2 bar
Air Consumption	27.3 ft^3 / min	0.77 m^3 / min
Blade Speed		1775 rpm
Control Handle	Single Trigger	Pneumatic
Cutter Head Width		
Pork	0.51 in	13 mm
Beef	0.63 in	16 mm
Cutting Depth (maximum)		
0.51 in / 13 mm wide blade - pork	0.81 in	20.6 mm
0.63 in / 16 mm wide blade - beef	0.88 in	22.4 mm
Overall Length	15.5 in	394 mm
Weight	7.5 lbs	3.4 kg

Equipment Selection and Accessories		Order Number
Model SPC 165G		
Complete Tool, 0.51 in / 13 mm wide blade - pork		4001061
Complete Tool, 0.63 in / 16 mm wide blade - beef		4001064
Complete Tool, 0.39 in / 10 mm wide blade - beef		4001076
Air Hose	16 ft / 5 m	3059018
Air Filter / Regulator / Lubricator		3022003
Cutter Heads		
	0.51 in / 13 mm blade	1023549
	0.63 in / 16 mm blade	1023550
	0.39 in / 10 mm blade	1023634
Balancer		4042033

JARVIS

Products for the meat and poultry industry

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