

Automatic equipment for handling the bung in the lamb slaughter process

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1.0 EXECUTIVE SUMMARY

The objective of this project was to evaluate the benefits and possibilities of adapting the existing automatic pork bung handling equipment, which is in use in Denmark, to slaughter lines for lamb under conventional Australasian lamb processing operations. The lamb slaughter process is very different from the pig slaughter process. In Australia, four abattoirs were visited in order to evaluate if the automatic bung handling equipment could be modified for typical lamb slaughter lines. Comprehensive data and information from the four visits were obtained and subsequently evaluated.

Manual trials conducted at the abattoirs indicated that the core principle used in pork slaughter lines could be transferred to lamb slaughter lines, with minor adjustments. The optimal location of the equipment to operate was identified to be after the carcasses are shackled in the hind legs, and when the bung is cut partially free but still remaining in its natural position. This location is preferred based on the positioning of the carcass, the optimal process and the space required for the equipment. Furthermore, it was validated that the anal cavity of lamb is generally larger compared to e.g. pigs that are presently handled by the automatic bung handling equipment. This should allow for applying a similar process in an adapted lamb equipment.

It was concluded that it is possible to modify the automatic equipment to handle the bung in an Australian lamb slaughter line, benefitting both efficiency and slaughter hygiene quality.

Furthermore, initial analysis of the cost benefit from using the automatic bung handling equipment indicates an interesting payback scenario, depending on local conditions and assumptions. For a typical processor, the simple payback time is estimated to be in the range of 6-9 months.

A Full Research Proposal has been submitted to AMPC for a step 2 to build, install and fine-tune performance including comprehensive validation of both hygienic and technical performance at an Australian Lamb processor site.

2.0 INTRODUCTION

An automatic unit, which handles the bung after bung dropping, has been developed and is in use at pig slaughterhouses in Denmark. The lamb slaughter process is different from the pig slaughter process. In Australia, four lamb abattoirs were visited in order to evaluate if the automatic bung handling equipment could be modified for lamb slaughter lines. The equipment is illustrated in Figures 1-2. For further interest in the developed equipment, please have a look at the following link: <https://www.dti.dk/specialists/automatic-handling-of-the-bung/35305> .



Figure 1. Automatic bung handling equipment in use at a Danish pork slaughterhouse.

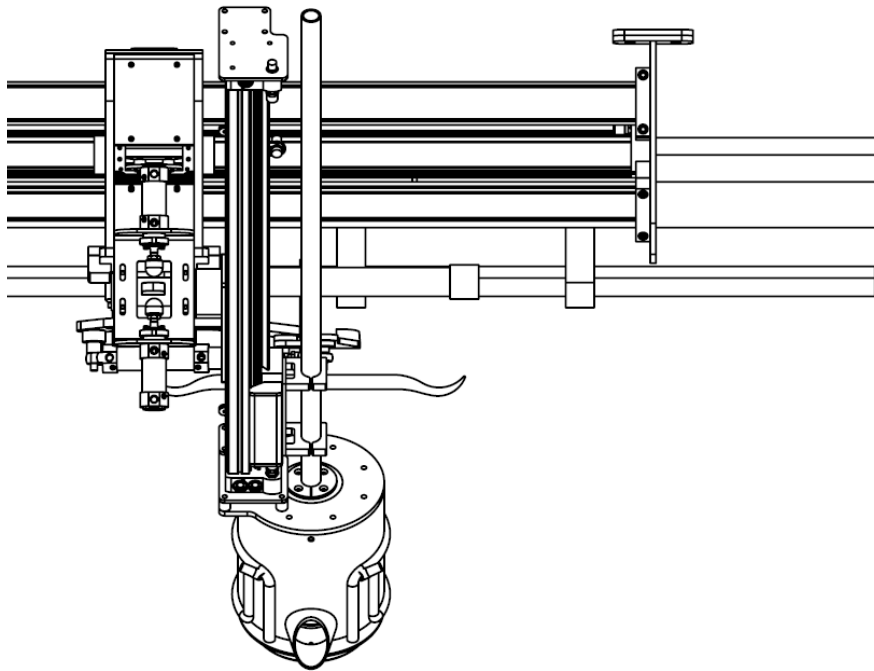


Figure 2. Design for the automatic bung handling equipment.

In milestone report 2, the results of the visits to four lamb processors were described. Following the visits, further analysis and design considerations have been conducted at DMRI.

This final report presents an initial cost benefit analysis of implementing the modified automated bung handling equipment at an Australian lamb abattoir. Estimations of development cost, machine cost, benefit and simple payback time are provided. Using data from the four lamb processor visits and results from expert consultation, web searches and contacts with vendors, the estimated capital equipment, labour, materials and other costs associated with or derived from these investments are estimated.

3.0 PROJECT OBJECTIVES

The objectives of the project were:

- To evaluate the benefits of adapting the existing pork bung handling equipment to slaughter lines for lamb under conventional Australasian lamb processing operations.
- To evaluate if the equipment could be modified for use on slaughter lines for lamb and the necessary steps and costs associated.
- To propose a plan and steps for adapting, installing and documenting one lamb bung handling unit on an Australasian lamb slaughter line, including modifications for the process.

3.1 Project description

The analysis was based on information from technical reviews of a number of Australasian slaughter facilities willing to share the information necessary. The visits were made by personnel from DMRI and Milmeq. The output from the first project step was an evaluation of how the equipment could be adapted and deployed for a lamb slaughter operation, and the benefits in hygiene and operational efficiency that might accrue from any change in or order of slaughter operations. As part of this evaluation, any modifications or alterations to the equipment to adapt it to ovine processing were identified. The costs for a consecutive step 2, including successful adaptation and documentation of an in-line installation, were outlined with the cost of a fully installed and operational unit in an Australasian slaughter plant, in collaboration with and fully supported by Milmeq.

3.2 Project background

The quality, characteristics and safety of meat products are important aspects for the meat industry. A loss of consumers or buyers' confidence in a company's products can be financially severe. Furthermore, export markets are important for meat suppliers, but food authorities or retailers in other countries might have strict regulations by which meat suppliers must comply. Ollinger and others (2011) have listed several motivations for food companies to invest in food safety practices or technologies, such as the fear of lost sales in the event of a recall, to support a certain brand and to meet customer specifications.

An automatic unit that handles the bung after bung dropping has been developed and is in use at pig slaughterhouses in Denmark.

The unit grabs the bung in the pelvic duct, wraps it in the mesentery and leaves it in the abdominal cavity. The unit can be used before or after opening of the midline. The primary objective for using the unit is that it reduces the risk of faecal contamination normally connected to manual handling of the bung after bung dropping. Furthermore, the “bagging” of the bung in the mesentery effectively prevents spillage from the bung during removal of the intestines. It saves labour for handling and bagging the bung. The capacity of the unit is ≥ 700 heads/hour.

The equipment is mechanically fairly simple, and it should be possible to modify it for use on slaughter lines for lambs, if the need is there, and benefits can be realized.

The lamb slaughter process is very different to the pig slaughter process. Many lamb-processing plants employ inverted dressing. In inverted dressing, each carcass is first suspended by all four legs in the hammock position for hide opening cuts and bung trimming, and then suspended by the forelegs while the pelt is fully removed, before it is suspended from its hind legs for the belly opening and evisceration tasks. As part of this process, there are a number of key tasks that are undertaken at an early stage that contribute to minimizing contamination when the bung is cleared and dropped into the pelvic cavity towards the end of the process.

This project has validated where in the process the automatic bung bagging and subsequently automated placement of the bung in the mesentery would be most appropriately implemented within the current process in order to maximize operational efficiency and minimize contamination.

4.0 METHODOLOGY

This report estimates the costs of developing, implementing and validating the automatic bung handling equipment in an Australian plant. Estimations of development cost, machine cost, benefit and time schedule calculation are provided. By using data and results from industry experts, consultations, web searches and contacts with managers from abattoirs, the estimated capital equipment, labour, materials and other costs associated with or derived from these investments were estimated.

5.0 PROJECT OUTCOMES

5.1 Observations and evaluations from visits

In the following section, observations, procedures and operations, obtained from visiting four Australian lamb abattoirs that have an impact on the development of the automatic bung handling equipment, are presented and evaluated.

Production data

In order to evaluate if the equipment could be modified to lambs, available production data were collected. The technical production data from the four abattoirs are presented in Table 1. These data form the basis for the final cost benefit analysis of purchasing and implementing the automatic bung handling equipment.

Table 1. Technical production data from the four visited lamb processors (minimum-maximum)

Lines	1-2
Line speed (cph)	280-720
Total employees	400-700
Killing floor employees	70-140
Shifts	1-2
Distance between carcasses (mm)	914.4
Time for bung removal and disinfection (s)	5-10

At all four processing plants, the carcasses were hanging in the hind legs during bung removal. Additionally, all carcasses were shackled on nylon/polymer gambrels. The fact that the carcasses were hanging in the hind legs is similar to pork slaughtering, which is optimal for the equipment.

The space available on the lines at the preferred positions varied between the slaughter line lengths. At some lines, there was already sufficient space to install the equipment whereas others needed some adjustment.

Manual trials of the bung handling operation similar to the automatic process were conducted to investigate whether it was possible to secure and protect the bung in its mesentery when carcasses were hanging in the hammock position. In the hammock position, the skin was not yet removed. In the skin removal equipment, the carcasses were hanging in the front legs. Consequently, when the skin was pulled off, the intestines were dragged through the anal cavity leaving the intestines exposed. Thus, it was concluded that the hammock position was not feasible for the automatic bung handling equipment.

The optimal location for the equipment was in the place where the carcasses were shackled in the hind legs, and the bung was cut free. Several manual trials were conducted with the bung handling operation similar to the automatic process, showing that it was possible to secure and protect the bung in its mesentery.

Species

At the four abattoirs, different species were processed, including not only older sheep and lambs, but at one abattoir, also bobby calves and goats were processed periodically. The sheep were categorized based on sex and age. All categories must be able to pass through or pass by the bung handling equipment. Preferably to be automatically processed in the bung handling equipment, or alternatively to be manually processed by operators.

Variability

The variability of the carcasses in weight and length was evaluated during the four visits. The variability of carcasses must be taken into consideration when developing an automatic equipment to handle prevailing biological variations.

Table 2 and Figure 3 reflect the weight of carcasses at one processor during both 2015 & 2016 for different seasons. Lamb represented the largest category (91.3%) processed at the abattoirs. Rams differed significantly from the other three categories regarding weight. Furthermore, the numbers revealed that hogget and ram were only rarely processed at this abattoir.

It is the perception that the data were indicative for what is generally processed at Australian lamb abattoirs.

As the difference in weight for the majority of the categories were within 1.2 kg on average (except from ram, see Table 2), it was concluded that it was realistic to design a prototype that could handle the majority of the variability represented by hogget, lamb and mutton.

The optimal function of the bung handling equipment would ideally allow automatic bung removal of all carcasses processed, but it may not be cost effective to develop equipment that can handle extreme carcasses that are only processed with low frequency. Here, a manual process was preferable, and manual processing should still be an option as a fall back procedure.

It was not possible to obtain population data of the length of the carcasses. In Table 2, the dressed weight of 59,054 carcasses is illustrated. Rams deviate from the other categories in weight by approx. 14 kg. It is likely that the bung handling equipment can handle rams, but the prototype will be developed for the other three categories. In that perspective, the prototype can handle 99.5% of the carcasses.

Table 2. Number of carcasses in categories slaughtered at the same date (per quarter) during 2015-2016. The weight is in average. (n=59,054).

Sex	Number of carcasses	%	Dressed weight (kg)
Hogget	161	0.3	25.5
Lamb	53,918	91.3	24.5
Mutton	46,58	7.9	24.3
Ram	316	0.5	38.4

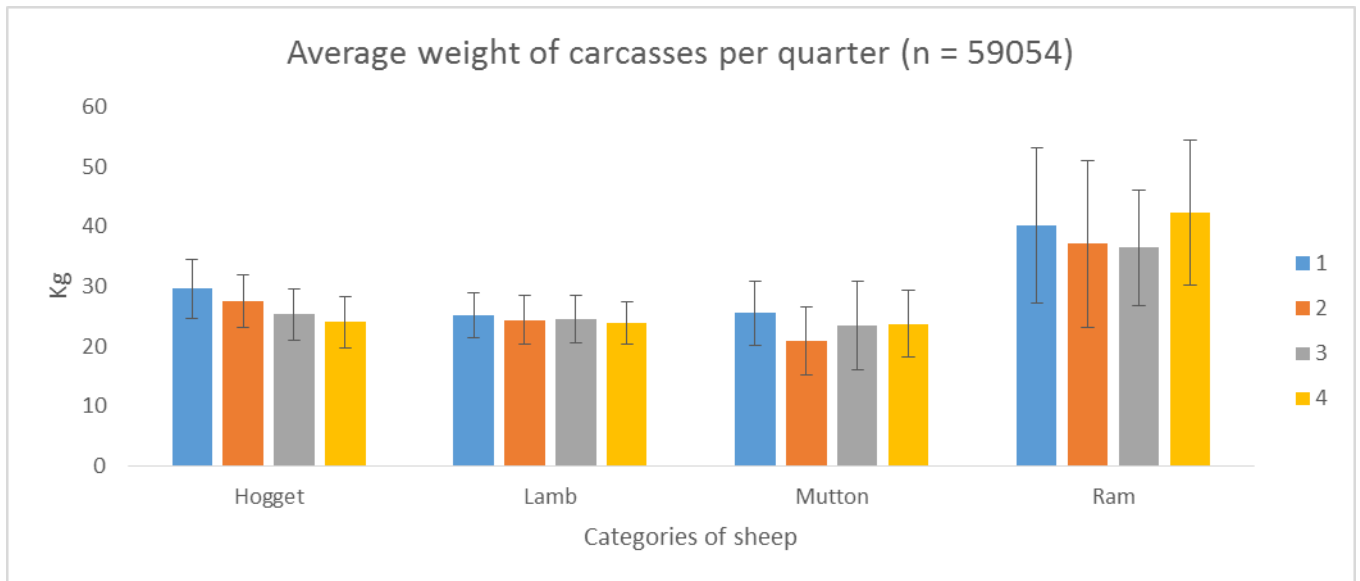


Figure 3. Dressed weight of carcasses slaughtered at the same date during both 2015 & 2016, reflecting stock weights for summer (1); autumn (2); winter (3); spring (4). (Error bars indicate standard deviation).

Removal of the bung – details of the current process

All abattoirs had the same procedure for removal of the bung. Two operators standing side by side on the production line conducted the removal of the bung in a two-step process. The two-step process was:

1. The bung was cut free with a knife by operator 1 and dropped down through the anal cavity, Figure 4-5.
2. The belly was opened by operator 2 from the hind legs up to the breastbone by the use of a knife. The major parts of the intestines dropped out of the carcass revealing the exposed bung, Figure 6.

At one abattoir, the exposed bung was removed by a single knife cut and tied with a knot. The other abattoirs secured the bung by placing it at the lowest point outside the carcass. The bung was released by tearing it downwards in an outgoing direction. Additionally, prior to this operation, the abattoirs secured the bung from faecal contamination by inserting either a sponge or a spiral plastic plug into the rectum.



Figure 4. The bung is cut free.



Figure 5. The bung is dropped down through the anal cavity.



Figure 6. The exposed bung is indicated by the red circle.

Manual trials – test of the proposed automatic procedure

In the automatic bung handling equipment for pig slaughter, the bung is grabbed by a vacuum cup and pushed into the mesentery, in which it is wrapped and secured. The anatomy of lambs is different from the anatomy of pigs. Consequently, it was necessary for adaptation of the equipment to conduct the operation manually and validate its feasibility.

The simple method, the automatic bung machine uses, was manually performed by the processor's staff following verbal instructions from employees from DMRI. Initially, the bung was cut approx. 30-40 mm into the muscle/ligaments. Note that the bung was then still not released entirely from the intestinal ligaments. The operator then pushed the bung downwards through the anal cavity into the mesentery with a folded hand, Figure 7. The bung was securely wrapped and covered inside the mesentery, and subsequently the operator easily removed the secured bung.

The process was demonstrated successfully at two abattoirs. It was considered that the "automatic procedure" will not only bring the benefits of automating a unit operation, but will also generate significant improvements in the slaughter hygiene quality.

It may imply minor changes in the manual operations to cut free the bung while still leaving it partially connected to the intestinal ligaments. In this way, the bung is not dropped through the anal cavity but instead placed ready for being handled by the automatic bung equipment, which will grip it and push it forward to be protected inside the mesentery. With training of the operators, it would be possible to achieve success with the prototype of the automated bung handling equipment.

Conclusion from the visits

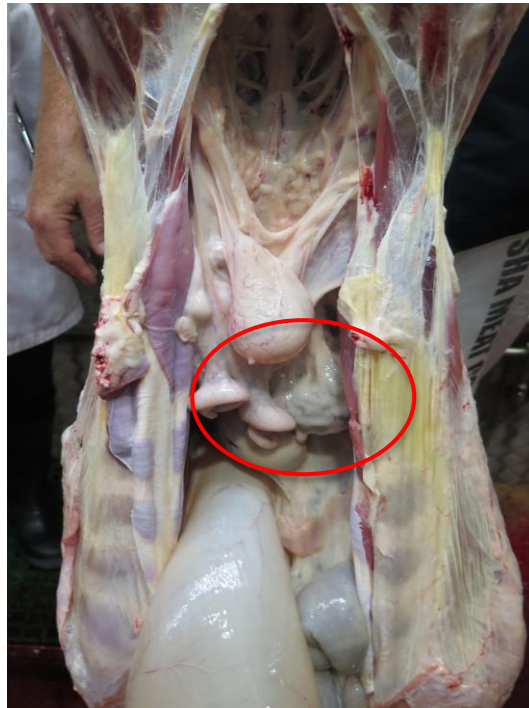
Based on comprehensive data and information from the four visits, it was concluded, that it is possible to modify the automated equipment to handle the bung in an Australian lamb slaughter line.

DMRI were convinced that a modified equipment can handle approx. 99% of the variability in size of the carcasses. The value propositions of implementing the modified bung handling equipment would be:

- Automation of a processing unit
- Savings of labour and space (in re-inspection areas)
- Improved slaughter hygiene
 - Ensure market access
 - Compliance with regulations and customer requirements
- Savings of rework (removal of faecal matter)
- Savings of materials (bung plug)



Pushing the bung into the mesentery



Bung secured inside mesentery



View inside the mesentery



Bung is secured and removed

Figure 7. The automatic bung handling process conducted and demonstrated as a manual procedure on a lamb. Upper left: Pushing the bung into the mesentery. Upper right: Bung secured inside mesentery. Lower left: View inside the mesentery. Lower right: Bung is secured and removed.

5.2 Cost benefit analysis

In this section, the cost benefit analysis of developing, implementing and validating the automatic bung handling equipment in an Australian plant is presented. Estimations of development cost, machine cost and benefit are provided. Using data and results from in person experts' consultation, web searches and contacts with vendors, the estimated capital equipment, labour, materials and other costs associated with or derived from these investments are estimated. If a company wishes to enter their own data into the cost benefit analysis, the Excel sheet calculation is available..

Preconditions and calculation example

The preconditions for conducting the cost benefit analysis are presented in Table 3. It should be noted that the preconditions are estimates derived from contacts with persons from Australian lamb processors and might not cover all plant sizes and production capacities. Especially wage estimates are determined as an average and could vary by region and plant size.

Table 3. Preconditions for the cost benefit analysis

Preconditions	
Carcasses slaughtered per year	1-4 mill.
Numbers of shifts per day:	2
Working hours each shift:	8
Working days per year:	300
Carcass weight (average)	25 kg
Wages and other costs for one operator per year	75,000 AUD

Furthermore, by implementing the automatic bung handling equipment, the calculations are based on the precondition that two operators are saved in the bung removal process and in the process of inserting the bung plug. The following example (Table 4-6) is calculated with these preconditions:

- 1 million carcasses slaughtered per year
- 10 g trimming/carcass
- 1 operator saved at the re-inspection

As illustrated in the calculated example, these preconditions result in a simple payback time of approx. 9 months. Other simple payback times have been calculated by varying the preconditions in the following ranges:

- 1-4 mill. carcasses slaughtered per year
- 10-50 g trimming/carcass
- 1-3 operators saved at the re-inspection

All the simple payback times calculated from the above preconditions are illustrated in Table 6. Each cost and saving from Table 4-5 are elaborated in section 5.3 and 5.4.

Table 4: Costs by implementing the automatic bung handling equipment at a company with a capacity of 1 mill. carcasses per year and 10 g of average saved trimming/carcass.

Costs - Investment & annual	What	Amount	Unit	Price per unit, AUD	Expense , AUD
Bung handling equipment, commercial model (Investment)	Equipment	1	pcs	160,000	160,000
Installation, fine-tuning and training (Investment)	Adaption	1	pack	40,000	40,000
Maintenance and service per year	Operational costs	1	year	10,000	10,000
Electricity per year	Operational costs	24,000	kWh	0,30	7,200
Water per carcass per year (0.2 L per carcass)	Operational costs	200,000	L	0,03	6,000
Costs total					223,200

Table 5: Savings by implementing the automatic bung handling equipment at a company with a capacity of 1 mill. carcasses per year and 10 g saved trimming/carcass.

Savings/increased value	What	Quantity	Unit	Price per unit, AUD	Expense per year, AUD
Saved labour for removal of bung	Operator	1	#	75,000	75,000
Saved labour for inserting bung plug	Operator	1	#	75,000	75,000
Saved costs for purchasing bung plugs	Bung plug	1,000,000	#	0,0056	5,600
Saved costs for service, maintenance and new bung plug insertion tools	Plug inserter	-	#	1,500	1,500
Saved labour for trimming at re-inspection	Operator	1	#	75,000	75,000
Trimming	Trim	10,000	kg	7,0	70,000
Savings/increased value total	-	-	-	-	302,100

Table 6: Calculated simple payback time by implementing the automatic bung handling equipment at a company with a capacity of 1 mill. carcasses per year and 10 g of average saved trimming/carcass.

	AUD
Costs total:	223,200
Savings/increased value total:	302,100
Net benefit per year due to cost benefit analysis:	78,900
Calculated simple payback time due to cost benefit analysis:	0,74 Year
In months:	9 months

Table 7: Payback times in months (simple payback times in shaded blue areas) by implementing the automatic bung handling equipment at companies ranging in capacity of 1-4 mill. carcasses per year, and in average 10 or 50 g of saved trimming per carcass, and savings from 1-3 operators in the re-inspection area.

4 mill.		Number of operators saved in re-inspection area			3 mill.		Number of operators saved in re-inspection area		
Average trimming carcass	saved per	1	2	3	Average trimming carcass	saved per	1	2	3
10 g		5	4	4	10 g		6	5	5
50 g		2	2	2	50 g		2	2	2
2 mill.		Number of operators saved in re-inspection area			1 mill.		Number of operators saved in re-inspection area		
Average trimming carcass	saved per	1	2	3	Average trimming carcass	saved per	1	2	3
10 g		7	6	5	10 g		9	7	6
50 g		3	3	3	50 g		5	4	4

5.3 Costs specification

Bung handling equipment, commercial model

The equipment purchase price is based on prices estimated by DMRI and CCM-Teknik who has experience in building the pork machines for bung handling. Installation costs will be site specific and will depend largely on the footprint available within the existing plant.

The budget does not take into account any compensation for the host slaughterhouse in terms of installation, possible impairment of carcasses in trials, nor any removal of the equipment when the trials are finalized.

Installation, fine-tuning and training

The price is based on costs estimated by DMRI and CCM-Teknik who has experience in building the pork machines for bung handling in Denmark. Installation costs will be site specific, and will depend largely on the footprint available within the existing plant. In sites the installation will be simple and straight forward with available space for equipment and placing of beams for mounting the equipment and space for pumps, cyclones, control cabinets etc., whereas modification of lines and movements of walls may be necessary at other sites. Costs for this could be considerable, however the simple payback method results indicate that the annual savings and other benefits are so high that the payback time will still be in a range to permit the technology uptake compared to capex investments in the slaughter industry. Training will be provided by the final equipment supplier.

Maintenance and service per year

Maintenance and service costs are costs handled by the processor's technical team and the equipment supplier. Maintenance costs are normal running costs that the plants will incur with the use of the installed equipment and include both components such as wearing parts and labour.

Electricity

The electricity price is estimated to 30 cents/kWh, based on prices provided by Aemc (2012).

Water per carcass

The automatic bung handling equipment uses 0.2 L/carcass during each process. The price is estimated to 3 cents/L based on prices provided by Sawater (2017).

5.4 Savings specification

Manual process

The current manual process in removing the bung has the following specifications.

1. The bung was cut free with a knife by operator 1 and dropped down through the anal cavity
2. The belly was opened by operator 2 from the hind legs up to the breastbone by the use of a knife.

The major parts of the intestines dropped out of the carcass revealing the exposed bung.

Automatic process

The automatic bung handling equipment will replace the operator who opened the belly from the hind legs up to the breastbone by the use of a knife. One operator is needed to cut the bung to be partially released.

It may imply minor and cost neutral changes in the manual operations to cut free the bung while still leaving it partially connected to the intestinal ligaments. Then the bung is not dropped through the anal cavity but instead placed ready for being handled by the automatic bung equipment, which will grip it and push it forward to be protected inside the mesentery where it is secured prior to removal.

The bung can then be removed securely in the pluck handling process with decreased risk of contamination from intestinal spillage.

Saved labour and materials for inserting bung plug

Prior to the operation where the bung is removed, the abattoirs secured the bung from faecal contamination by inserting either a sponge or a spiral plastic plug into the rectum. During the visits at the Australian plants, it was regularly observed that the spirals penetrated the intestines, thereby increasing the risk of contamination. With the automated bung handling equipment on the line, it is most likely that the process of inserting plastic spirals or use of sponges can be omitted, as the bung will be secured in the mesentery.

This will lead to:

- Saved costs for purchasing bung plugs
- Saved costs for service, maintenance and new bung plug insertion tools

The saved costs for service, maintenance and new bung insertion tool is assumed to be 1,500 AUD per year.

Saved labour for trimming at re-inspection

Before the carcasses enter the chilling room, faecal matter etc. are removed by knife by typically four operators. The automatic bung handling equipment will eliminate or significantly reduce the faecal matter originating from the binging process. It is estimated, by implementing the equipment, that the number of operators in the re-inspection area can be reduced by 1-2 operators. This will generate a reduced cost of labour in the re-inspection area. It will also facilitate benefits for the meat inspection process of the carcass and side stream products.

Trimming

The average dressed weight is determined to be 25 kg based on data from the milestone 2 report from this project (Table 3). Based on interviews with managers from Australian abattoirs, the average price per kg meat was fixed to be 7 AUD/kg. This price will differ over time and can easily be changed in the calculations.

Saved recalls and other complaints

This category of potential savings is not included in the calculations because it is variable depending on processor and thus not possible to estimate with the information available. Meat plants can suffer large financial loss if they have a food safety failure eg. export of Australian lamb to the US. The US's zero tolerance of faecal contamination, the removal of one rejection at the US border would make a major effect in the cost benefit analysis. Furthermore, the costs incurred by producers because of food safety outbreaks or failures in products are far greater than preventing such an outbreak (Ribera L.A. et al., 2012). It is necessary to invest more in food safety technologies to provide optimal food safety as the meat industry needs to meet their customers and food authorities' demands. Finally, meat plants can use food safety investments as a way to help maintain process control and also as a marketing tool that could be useful for winning more business. The amount of investment in food safety technology indicates a company's commitment to food safety and also its capacity to prevent foodborne contamination (Ollinger, M. et al. 2011).

6.0 DISCUSSION

The estimated costs and savings by implementing the automatic bung handling equipment should be evaluated based on the used available a data and the information level achieved.

The estimates in the cost benefit analysis are based on consultations with industry experts, web searches and contacts with managers from Australian lamb abattoirs. Rather than trying to determine a specific estimate for actual plants cost and savings, the analysis was made general to cover presumed industry variation in ranges of different capacities, saved trimmings and labour etc. This provides a greater range, and the analysis will cover a greater amount of different lamb abattoirs based on their individual size and production capacities.

It is a critical factor to balance the line between equal workload after installation of a bung handler for lamb, in terms of making a cost benefit analysis. Variations in economic benefit will occur when installing and implementing the same equipment at different plants. Consequently, exact calculations must be made with respect to the actual plant using their own conditions. The calculations should be performed with respect to specific costs e.g. wages, installation costs, rebalancing the line, yield etc., and consequently, the cost benefit analysis must only be used as a rough guideline.

In addition, other potential savings were not included in this analysis, e.g. the possible savings on veterinary inspection labour due to reduced amount of faecal matter and microbial contamination. Under some processing conditions, this may be a realistic additional saving.

The improved hygienic conditions by implementing the bung handler will also generate increased value of side streams. Decreased number of damaged intestines from penetrating bung plugs will increase the value, and contaminated side streams from spillage of the intestines will be significantly decreased.

The visits were conducted in the summer season when the faeces is more solid compared to the winter when it is liquid. The fact that the texture of the faeces varies during the seasons will have an impact on the hygienic standard. Trials should be conducted during the planned step 2 project with a bung handler used in different seasons in order to validate that the insertion process of bung plugs can be omitted or not. The bung will be secured in the mesentery by using the automated equipment, and based on observations during the visits it is evaluated that the bung plug insertion process most likely can be omitted.

It is the perception that the cost benefit analysis is indicative for what is generally processed at Australian lamb abattoirs, and for a typical processor, the realistic simple payback time is estimated to be in the range of 6-9 months.

7.0 CONCLUSIONS/RECOMMENDATIONS

Based on comprehensive data and information from the four visits, it is concluded, that it is possible to modify the automated equipment to handle the bung in an Australian lamb slaughter line. It was estimated that a modified equipment can handle approx. 99% of the variability in size of the carcasses. The value propositions of implementing the modified bung handling equipment were analysed.

Adaptation of the equipment for lamb slaughtering will require adjustments on the line, but it is the perception that the cost benefit analysis is indicative for what is generally processed at Australian lamb abattoirs, and for a typical processor, the realistic simple payback time is estimated to be in the range of 6-9 months, where space is available for installation. This is very positive given the benefits that are expected to be generated from adapting the equipment.

Recommendations

The installation of the automated bung handling equipment will benefit the Australian lamb processing sector as an enabling tool to decrease the faecal matter and microbial number on carcasses and improve the hygienic standard on the entire processing line. It is considered that the “automatic procedure” will not only bring the benefits of automating a unit operation, but will also generate significant improvements in the slaughter hygiene quality.

The automatic bung handling equipment will help maintaining process control and also be useful for obtaining and maintaining market access and finally ensure compliance with national food authorities and customers’ requirements.

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