final report

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Dehairing of cattle and sheep heads and hooves – Pilot technology evaluation

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Contents

1 Background

1.1 Introduction

This project was conducted in response to enquires from Korea about the purchase of beef feet. Previous experience was that Australian processes may not produce beef feet of suitable quality for export to Korea. The project was intended to develop a process to produce an export quality product.

1.2 Background to the beef feet dehairing project

The Australian red meat industry is subject to increasing pressure to achieve and maintain global market competitiveness. A contributor to this increase in pressure has been international animal disease outbreaks such as BSE and FMD. These diseases have affected consumer confidence in global markets and this has translated into significant downturn in consumption.

The Australian industry relies upon exports income to sustain viable businesses. It is essential that Australian enterprises strategically and tactically meet the challenges of global markets and ultimately protect and promote superior products to the world. One way of doing this is to develop new product opportunities such as the one proposed in this project.

This project capitalises on the international market for beef feet. Beef feet are popular in Korea and Indonesia where they are used in soups and stews.

The main use of beef feet is to render them to make meat meal and tallow. The yield of tallow and meat meal from beef feet is about 49% (W.F. Spooncer, 1992). One tonne of feet yields about 440 kg of meat meal and 50 kg of tallow with a value of about $272 (values based on June 2008 report of MLA Co-products market analysis project). Early investigations showed that the value of beef feet can exceed $2.00 / kg. Assuming a minimum weight loss of 10% during processing the net value of unprocessed beef feet is about $1800 per tonne. The yield of beef feet is about 7.5 kg per head. For a kill of 200,000 head per year, the revenue from rendering beef feet is about $400,000 per annum. The potential revenue from edible beef feet is about $2.7 million per annum.

2 Project Objectives and outcomes

In the past the Australian red meat industry has not been successful in the production or sale of beef feet. This project aims to capitalise on the international market for beef feet and create new product opportunities. In order for the project to fulfil this aim the following project objectives must be met:

a) To develop a process design for the beef feet hair removal process;
b) To install and validate a beef feet hair removal process; and
c) To contribute to the development of dissemination material.

Upon completion of the project it is expected that the outcomes will benefit the Australian red meat industry in general. The project outcomes are:

a) *An evaluation of beef dehairing technology* – while no new technology was developed during the course of this project, existing technology not currently used within the

Australian red meat industry was evaluated for business acceptance and market opportunities. This information will be available for dissemination to the industry upon completion of the project.

b) *A video of the completed process* – the video will be used for dissemination within the Australian red meat industry and will contain details of the process in terms of operation and product as well as an evaluation of the market size for the process.

c) *Intellectual property* – the project intellectual property comprising of the Final Report will be the sole property of MLA.

3 Methodology

The main sections of the project are:

Research into market size

a) Prepare a validation of market size a full financial evaluation and benefit;

b) Research, tabulate and evaluate on paper the various machines types and associated equipment available for this process;

c) Develop a process design including price and evaluate the project potential to determine whether it is viable to move forward; and a “Go” / “No Go” decision will be made by MLA based on the outcomes of the research and development and the validation of the market size.

Procurement and installation of equipment

a) Purchase the capital items at their own cost; and

b) Transport, install and dry commission equipment.

Train, trial and optimisation

a) Train operational and maintenance staff in the operation of the equipment; and

b) Trial the equipment and optimise the operation to obtain maximum efficiency

Validation and report

a) Validate the efficiency of the process;

b) Apply and get acceptance for new product classifications if applicable; and

c) Produce a Final Report.

4 Results and Discussion

4.1 Market and product investigation

The development of a new product is driven by the market and client product specifications. An investigation into the potential market for beef feet was conducted to ensure that production of beef feet will be profitable. The results of this investigation are summarised below.

4.1.1 Market investigation

The investigation into the potential markets was conducted by first identifying the global region and then narrowing this down to determine the potential countries, sector and finally the client base.

On a global scale the demand for the beef feet is primarily located within the Asian market, specifically concentrated in Southern Korea and Indonesia. In addition to Korea and Indonesia there is potential for the market to expand into other areas of Asia such as China.

Once the relevant countries were identified the sectors within these countries were targeted. Clients for the beef feet can be found in the trading, wholesale and retail sectors. These clients include supermarkets, hotels, and restaurants.

Beef feet are used as a primary ingredient in soups and stews. They may be sold as a primary or unprepared product or may undergo secondary and tertiary preparation before sale depending on the client. Demand is subject to seasonal changes and other global influences such as the current BSE fears concerning products from the US. There is minimal consumption specific data available. However, potential customers may enter into long term commitments to buy product.

4.1.2 Generic product specifications

Specific product specifications for beef feet are driven by the client's requirements. However there are some generic product requirements for the beef feet. These are:

- Full leg
- No hair
- No toe nail

Other general specifications that may affect the market value of the beef feet product are:

- Toe colour – the toe area should be pink in colour. Grey toes lower the product grade.
- Damage to the joint, nail or leg – The more damage to a foot the lower the product grade.
- Skin colour – The skin should be pale and almost white in colour. Dark pigmented patches of skin lower the product grade and thus the market value.

Figure 1 illustrates beef feet produced as part of this project that have met the generic product specifications and requirements.

Figure 1 – Example of the Australian beef feet product

A recent market report of beef in Korea, known as Hanwoo, compiled by KAMIS showed that there are differences in beef feet product produced locally in Asian regions and feet that are imported into the region. These differences are outlined in 1 below.

Table 1 – Comparison of Hanwoo beef feet and beef feet imported into Korea

Hanwoo	Imported beef
• Its shank bone is slender • The skin colour is light yellow. • When cooked for some time gives out a delicious smell	• Shank bone is thick • The skin colour is almost white • Gives out less delicious smell when cooked

Of the differences outlined in 1, skin colour is an important one to note. Clients indicate a preference for high quality beef feet with pale almost white skin within the Korean market. The ability for Australian processors to produce beef feet with these qualities could result in a competitive advantage over other processors.

4.1.3 Market value of beef feet

The specific market value for beef feet will depend on the quality of the product and the client. The value is also affected by seasonal changes, global influences and demand. There is minimal information on market vale trends for beef feet without commissioning specific information however the current average market value of beef feet is within the range of $1 – 3 per kg of primary product.

4.2 Beef feet production process development

In order for the project to be successful the production process must be easily integrated into existing processing facilities. It must be simple and cost effective to operate while producing high quality beef feet that meet international standards. Materiels Charles Mecal (MCM) is a world leader in co-product processing solutions. MCM provided information on the most efficient methods of processing beef.

A brief description of the beef feet production process as advised by MCM is given below. This process was optimised during trials outlined in section 4.5 of the report, which ultimately resulted in the final beef feet production process detailed in section 4.6.

The beef feet production process starts with the removal of the feet on the slaughter floor. Once removed the feet are transferred to the beef feet processing room. The fist stage in feet processing is to scald the feet and remove the hair. This is done in a dehairing machine in batches of approximately 100 pieces. Each batch is processed in 3 stages.

The total cycle will take approximately 25 - 35 minutes to complete. The temperature may vary depending on the mix (size & colour) of feet being processed. The feet should be checked periodically during the process to ensure that the hair is being removed successfully and that scalding is taking place as expected.

Once the scalding and dehairing process is complete the feet are removed from the machine and transferred for further inspection and trimming. Next the toenails are removed from the feet using a hoof removal machine. Damage to the soft tissue should be avoided when removing the toenail.

The products are again checked, trimmed and distal ends are removed by bandsaw if required to remove damaged or contaminated ends. The finished article is then transferred to the packing room for final inspection and grading. Finally it is packaged, labelled and transferred to the freezer.

4.2.1 Required changes to the slaughter process

Typically, feet are removed from the carcass on the slaughter floor and sent to the rendering facility. With the introduction of the process of collecting the feet for further processing the operators' tasks may be altered at two stations in the slaughtering process to facilitate the removal of the feet in a way that satisfies the needs of the final specification and to meet the regulatory requirements.

To facilitate beef feet production the feet are removed by first marking the hide of the front legs with a knife and then removing the foot at the joint with a knife. This eliminates the task of removing the feet with mechanical clippers. It should be noted that marking the hide creates the possibility of contamination of the legs. Additional trimming is required on the slaughter floor to ensure that any contamination is removed from this point.

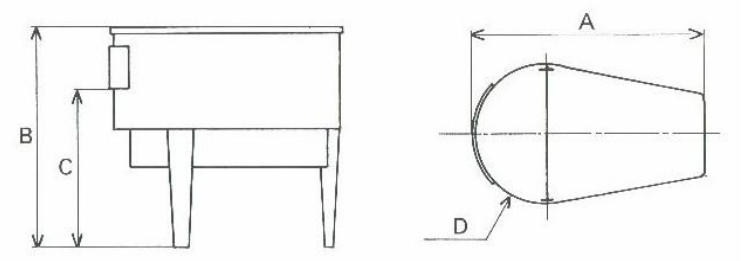
In addition to changes on the slaughter floor a collection bin was placed at the bottom of the chute that sent the beef feet to the rendering facility. Once full, the collection bin was transported to the beef feet processing room. This process can be automated in permanent installations.

4.3 Machinery and associated equipment

4.3.1 Review of available machinery and associated equipment

A search for appropriate machines and associated equipment for the beef feet dehairing process resulted in only one appropriate supplier, Materiels Charles Mecal (MCM) based in France.

MCM manufactures and supplies dehairing machines and pneumatic hoof removers. MCM's dehairing machine, type EGX, is used for dehairing cattle feet. It is produced from stainless steel making it durable and easy to clean. The dehairing machine can be seen in Figure 2 below.



	Dimensions (mm)			
Type	A	B	C	D
EGX 8	1600	1250	850	1020
EGX 12	2000	1400	850	1270
EGX 15	2350	1400	850	1520

Figure 2 – MCM dehairing machine type EGX (Figure from the MCM brochure found in Appendix A)

The dehairing machine is available in three different sizes as shown in the equipment sketch in Figure 2. Type EGX 15 was chosen as the most suitable as the volume of the machine is the most appropriate for the expected throughput of beef feet.

In addition to the dehairing machine a hoof remover is also required. MCM's hoof remover is pneumatically operated and performs quickly and securely. The hoof remover is also made of stainless steel and is supplied complete with a regulating and lubricating air filter. The unique design of the hoof remover allows 500 feet to be processed per hour. The hoof removal machine is shown in Figure 3.

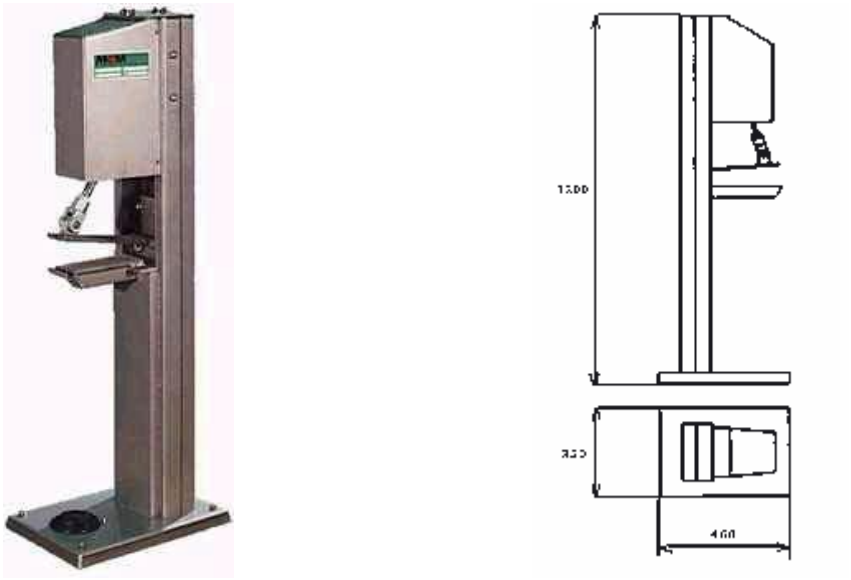


Figure 3 – MCM pneumatic hoof remover (Figure from the MCM brochure found in Appendix A)

The brochures for these pieces of equipment have been included in Appendix A.

4.3.2 Procurement and installation of equipment

The dehairing and hoof removing machines were supplied and installed by Food Processing Equipment Pty Ltd (FPE). A summary of the equipment capital, installation and commissioning costs are given in Table 2.

Table 2 – Summary of the equipment capital, installation and commissioning costs

Item	Quantity	Cost (2004 r.r.p.)
MCM dehairing machine EGX 15	1	AUS$68,970
MCM hoof remover	1	AUS$9,190
Installation and commissioning	-	AUS$10,000
Total	**-**	**AUS$88,160**

The main considerations when installing and commissioning the equipment was the location of the equipment within the production facility, the connection of services such as electricity and water and the removal of wastes from the beef feet processing stations.

4.4 Training of operational and maintenance staff

The training of operational and maintenance staff working on beef feet production is an ongoing process and will evolve as the beef feet production process itself is further optimised. Work instructions have been developed and are currently under review.

4.5 Processing system trials and optimisation

The purpose of the processing system trials was to optimise the processing system in terms of product quality and operational costs. These trials were conducted in three phases:

Phase 1 – Process trials
Phase 2 – Product and process trials
Phase 3 – Mechanical process trials

Details of these trials are given in the following sections.

4.5.1 Phase 1: Process trials

The purpose of the phase one trials was to conduct processing system testing and commissioning. The testing was conducted with product however the focus was on the process and not product quality.

Trial period: Jan 2004 to Jun 2004

Outcomes: The process and equipment were commissioned successfully allowing the trials to commence to phase 2.

4.5.2 Phase 2: Process and product trials

The phase two trials were conducted in conjunction with the client and the client's operators. The purpose was to adjust the process to produce a product of acceptable quality for the client.

Trial period: Sep 2004 to May 2005

Outcomes: A product of acceptable quality for the client was achieved however the process required a considerable amount of additional manual labour. The extra labour was required, because the dehairing machine did not removing all of the hair from the feet. In order to meet the product specifications the additional operators manually removed the remaining hair from the feet after it exited the machine. The additional costs in labour meant that the process was no longer cost competitive.

4.5.3 Phase 3: Mechanical process trials

The purpose of the phase three trials was to rectify the problem of the additional labour required to meet product specifications from phase two trials.

Trial period: Start date – Oct 2005

Outcomes: The solution to the manual labour problem was to remove the hair in the dehairing machine using a two stage process, first with a processing additive and secondly with mechanical abrasion to achieve complete hair removal. The mechanical abrasion

includes abrasive pads on the walls of the dehairing machine and the use of extra toenails for added abrasion.

This process was effective in removing majority of the hair from the feet. The small amount of remaining hair is removed by flaming and scrubbing the feet as detailed in section 4.6 of this report. This process is most successful in processing feet that have light hair. Darker hair tends to be coarser and more difficult to remove. In addition to this the dark hair is usually coupled with dark pigmented patches of skin that lowers the grade of the foot and its market value.

4.6 Process description and product flow diagram

This section of the report details the final beef feet production process resulting from the process system trials and optimisation. The process is illustrated in the product flow diagram shown in section 4.6.2. Details on the process are provided in section 4.6.1.

4.6.1 Final beef feet production process description

The process description for beef feet production below is an expanded version of the beef feet product flow diagram shown in Figure 4. Please refer to Figure 4 when reading the following description for photographs illustrating each step in the process.

STEP 1 – Transfer and sorting of beef feet
The beef feet are collected in bins after they are removed from the carcass on the slaughter floor. The feet are then transferred in these bins to the beef feet processing room. Upon arriving at the beef feet processing room the feet are sorted according to their colour into light, medium and dark. The reason for this is that the process of removing the hair varies with colour. In general the darker the hair the more difficult it is to remove and therefore adjustments to processing time may be required.

Risk – Contamination of product during transfer.

Control – Lids are fitted on the bins before they are transferred to the processing room from the slaughter floor to prevent contamination.

STEP 2 – Hair removal in the MCM dehairing machine

After they are sorted the feet are loaded into the Scudder and one batch will contain 100 feet. The feet should be evenly distributed within the Scudder.

Once the machine is loaded the lid of the Scudder should be closed in preparation for the first cycle. A processing aid is added during the cycle to assist in hair removal. Operators should perform visual checks throughout the cycle and stop the process once all of the hair has been removed. Different batches may require different processing times depending on how coarse the hair is.

The second cycle is a rinse cycle operating at low speed with a gradual increase in water temperature. During the wash cycle the operator will periodically remove a leg and attempt to remove its toenail. Once the toenail can easily be removed the cycle is stopped and the contents of the Scudder is emptied onto a sorting table.

Risk – Product not washed properly

Control – The water temperature is monitored and controlled using a temperature gauge on the input water. The time of each cycle is also monitored and visual checks on the product are performed throughout the process.

STEP 3 – Product sorting and inspection

The legs are separated from the toenails on the sorting table. The legs are also inspected for defects and any defective legs discarded to ensure that product standards apply. The remaining legs are removed to a holding station to await toenail removal. The extra toenails are placed in tubs ready to be loaded into the dehairing machine again.

Risk – Product that does not meet product standards being further processed and packed.

Control – Feet are inspected at this point and may be reprocessed in the dehairing machine or discarded to ensure product standards apply. Any product coming into contact with the floor must be excluded from further processing.

STEP 4 – Intermediate holding station

The intermediate holding station is a table with overhead water jets where the beef feet are held while awaiting toenail removal.

STEP 5 – Toenail removal

The toenails are removed in the toenail removal machine. The machine is pneumatically operated with a pedal at the base allowing operators to control the machine with their foot. After removal, the toenails are dropped into collection tubs at the base of the machine. Care must be taken by operators to prevent damage to the upper toe area during this process, as damage will lower the product grade and thus market value.

Risk – Waste product build up.

Control – The collection tubs at the base of the machine should be emptied on a regular basis. In future this process may be automated.

STEP 6 – Flaming

A flaming device is passed over the feet to singe any remaining hairs on the leg. If a large clump of hair is present on the leg it should be shaved with a knife prior to flaming to avoid leaving burn marks on the leg.

Risk – Burning of skin (both the feet product and operator)

Control – The flaming area should be located away from the trimming area and has suitable measures in place to prevent burning operators. Operators operate the flaming device taking care not to burn the skin of the beef feet. Again any product coming in contact with the floor should be excluded from further processing.

STEP 7 – Water bath soak

The legs are soaked in a water bath to assist in the removal of any remaining hairs.

Risk – The water becomes dirty.

Control – The water in the bath should be changed regularly before it becomes dirty to prevent contamination.

STEP 8 – Trim and scrub

After removal from the cold-water bath the legs are scrubbed to remove any remaining hairs. If any hair cannot be removed the feet may need to be flamed again. After the scrub the feet are stored in water again in wait to be transferred to the grading room.

Risk – Non clean product being packed.

Control – All feet are inspected and visible hair removed. This may require further trimming and flaming. Any product that comes in contact with the floor should be excluded from further processing.

STEP 9 – Grading

The legs are graded on their physical appearance including skin colour and defects. The grading system was developed in conjunction with the client and may be changed in future depending on client specifications. The product is also allowed to “drip dry” on the grading table before being packed.

STEP 10 – Packing

The product is packed into cartons and palletised in preparation for freezing and transport. Cartons are to be identified by a label.

Risk – Time and temperature requirements

Control – The room in which the products are to be graded and packed is kept at 10°C. Once palletised the cartons are sent to the Cold Storage facility on conveyor belt.

4.6.2 Beef feet product flow diagram

The beef feet production process is illustrated in the beef feet product flow diagram shown in Figure 4 on the following page.

Figure 4 – Beef feet product flow diagram

4.7 Cost benefit analysis

A cost benefit analysis was performed to determine the net profit margin for the beef feet project.

The amount of beef feet product produced each week is calculated in Table 3. For these calculations it was assumed that 40% of the feet collected on the slaughter floor would be recovered for beef feet production. This assumption is based on the current production capacity of 13 cycles per shift, 2 shifts per day and approximately 100 feet per cycle. In addition 95% of the beef feet processed will be able to be sold. This accounts for the occasional foot that is below product standards.

Table 3 – Mass of beef feet product produced

Assumptions	Units per week	Raw material (kg)	Estimated finished product (kg) (95%)	Weekly production (kg)	Annual production (kg)
Cattle kill per week	4000				
Hind feet recovered (40%)	1600	4.4	4.18	6,688	334,400
Fore feet recovered (40%)	1600	3.8	3.61	5,776	288,800
Total	**3200**			**12,464**	**623,200**

From Table 3 it can be concluded that the beef feet production process will produce 12,464kg of beef feet per week and 623,200kg per annum.

The capital and operating costs are calculated in Table 4. The capital costs were amortised over 5 years with an interest rate of 8%. The cost of labour was taken to be the current $52,850 per labour unit.

Table 4 – Capital and operating costs summary

Capital		Annual cost (AUS$)	Weekly cost (AUS$)
Machinery system & installation		132,000	
Amortise 5 years		26,400	528.0

Interest 5 years @ 8%		10,560	211.2
Operating costs			
		Annual cost (AUS$)	**Weekly cost (AUS$)**
Labour	Labour = 3, Shifts = 2 Units/week = 6 x $52,850/unit	317,100	6,342
Repairs and maintenance		19,800	396
Processing aid	$1.80/L	33,178	691
Power, water, effluent		36,000	720
Packaging and distribution		174,496	3,490
Site costs (share with Kill floor)		94,350	1,887
Value of reduced render return		112,176	2,244
Total		**824,060**	**16,509**

From Table it can be concluded that the capital and operating costs of the beef feet production process will be $824,060 per annum and $16,509 per week. Therefore the cost of the process per kilogram of product is the total capital and operating costs divided by the total mass of beef feet produced. This equates to $1.32 per kg beef feet.

The net profit margin for the process is calculated in Table 5 These calculations were based on the sales assumptions for the amount of each grade of beef feet that the current production process produces.

Table 5 – Net margin for the beef feet process calculations

Sales assumptions (Korea)	Current market value (AUS$)	Less Costs (AUS$)	Nett margin per kg (AUS$)	Net margin on sales per week ($)	Net margin on sales per annum ($)	Net margin PA
35% Prem Gold	2.50	1.32	1.18	5,128	256,395	

35% Premium	2.20	1.32	0.88	3,819	190,959	
21% Standard	1.70	1.32	0.38	983	49,140	
9% Select	1.40	1.32	0.08	85	4,233	
0% Prem cut	2.00	1.32	0.68	-	-	
100% recovery				**$10,015**	**$500,728**	**$500,728**

From Table 5 it can be concluded that the net margin for the beef feet production project is $500,728 per annum.

5 Conclusions

From the initial market review for this project it can be concluded that there is a potential product opportunity for Australian processing companies who are willing to develop processing systems for the production of beef feet.

The cost benefit analysis shows that the net profit from this process is expected to be $500,728 per annum.

6 References

KAMIS (2004) “Market report of Beef Hanwoo”

W.F Spooncer, (1992). By-product yields from sheep and cattle. Meat Research Report 2/92. CSIRO Division of Food Processing. Cannon Hill QLD.

7 Appendix A – MCM equipment brochures

The equipment brochures supplied by MCM when investigating the equipment for the beef feet production process are displayed on the following pages.

EPILEUSE POUR TETES ET PIEDS

VEAUX, MOUTONS
BŒUFS

TYPE EGX

ÉPILEUSE POUR TÊTES ET PIEDS
(veaux, moutons, bœufs)

Notre épileuse accepte aussi bien les têtes de veaux que les pieds de bœufs, de veaux et de moutons.
Elle permet un travail parfait grâce au dosage des parties actives d'épilage proprement dites et d'abrasifs de finition. Ces abrasifs sont interchangeables par plaques, ce qui évite toute immobilisation de la machine. Les techniques d'utilisation sont diverses suivant les produits travaillés. Elle existe en plusieurs versions.

EGX DEHAIRING MACHINE

The EGX machine is used for dehairing cattle and sheep heads and feet. It is also suited for calves heads.
The unit is fitted with easily replaceable abrasive blocks, which enables the machine to vigorously remove the unwanted hair.
The EGX machines have many uses in the field of dehairing and can be supplied in several sizes.

EGX ENTHAARUNGS-MASCHINE FUR KOPFE/FUβE
(Kälber, Schafe, Rinder)

Unsere Enthaarungsmaschine ist einsetzbar für Kälberköpfe, Rinder-, Schafs- und Kälberfüße. Durch die Dosierung der aktiven Teile und Schleifmittel wird eine perfekte Arbeit ermöglicht. Diese Schleifmittel sind in Platten eingesetzt und durch den Betreiber selbst austauschbar, ohne daβ die Maschine von ihrem Standpunkt ausgewechselt werden muβ. Die Verwendungstechniken und Schleifmittel sind je nach den Produkten unterschiedlich. Diese Maschine wird in mehreren Ausführungen (Größen) hergestellt.

PELADORAS EGX CABEZAS - PIES
(terneras, corderos, bueyes)

Nuestra peladora acepta tanto las cabezas de ternera como los pies de buey, ternera o cordero.
Permite un trabajo perfecto gracias a la dosificación de las partes activas de pelado propiamente dichas y de abrasivos de acabado.
Estos abrasivos son intercambiables por placas, lo que evita toda inmobilización de la máquina. Las técnicas de utilización son diversas según los productos trabajados.
Existe en varias versiones.

MCM
MATERIEL CHARLES MECAL
B. P. 8 - 42580 L'ETRAT - Tél. 77 92 80 90 - Fax 77 92 80 99

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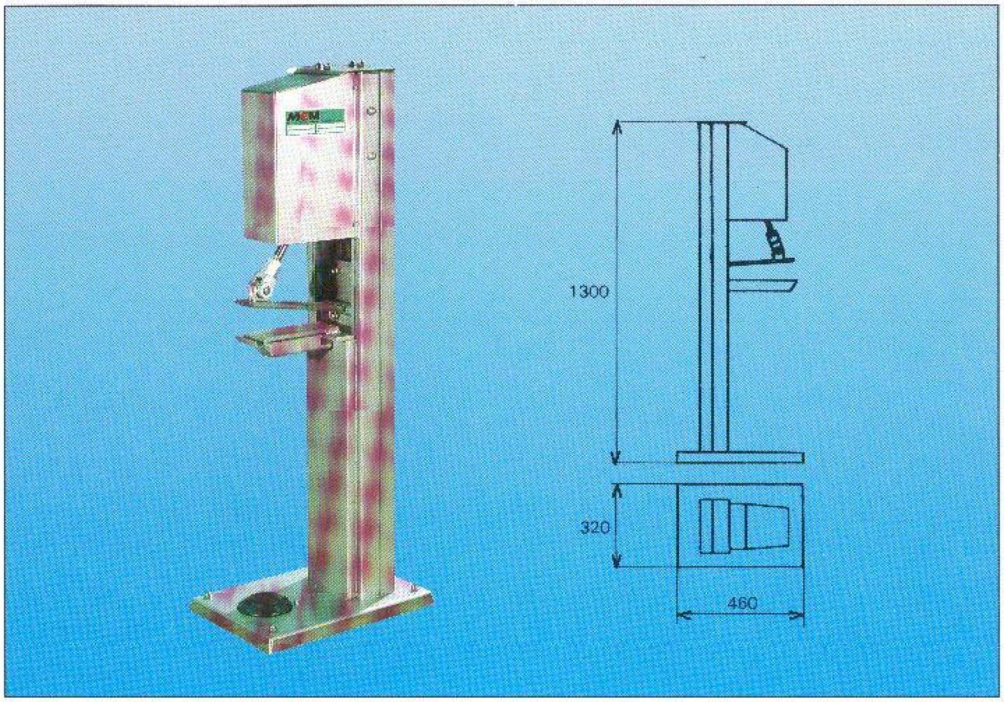
DÉSERGOTEUSE



Données techniques modifiables sans préavis. Cadences et consommations données en situation moyenne.
Our policy is one of continual development and technical specifications may change without prior notice. Capacities and consumptions stated are for equipment operating under average conditions.
Änderungen vorbehalten. Alle Angaben ungefähr und unverbindlich.
Características técnicas modificables sin aviso anticipado. Cadencia y consumo se entienden en situación normal.

DÉSERGOTEUSE

Notre désergoteuse est une machine pneumatique à compression. Elle est rapide et sans danger.
Sa consommation d'air est très faible. Elle s'adapte au désergotage de toutes sortes de pieds. Un utilisateur peut travailler jusqu'à 500 pieds par heure. Son plus gros atout repose sur sa conception qui permet un travail en toute sécurité.

CARACTÉRISTIQUES TECHNIQUES

Ces machines sont entièrement réalisées en acier inoxydable.

Elles sont livrées avec :
- un filtre régulateur lubrificateur.

Fluide :
- Air comprimé : pression amont 6 bars.

Commande par pédale.

HOOF REMOVER

The hoof remover is pneumatically operated and performs its function very quickly and securely.
Air consumption is minimal, and the unit can be adapted for hoof removal on a number of species. The unique conception of the hoof remover will permit an hourly production quantity of 500 feet to be obtained.

TECHNICAL DESCRIPTION

These machines are entirely produced from stainless steel and are supplied complete with the following item :
- regulating and lubricating filter.

Energy :
- Air pressure : 6 bars.

Foot operated machine.

HUF-ENTFERNER

Unser Huf-Entferner ist eine pneumatische Maschine, die mit Druckluft schnell und gefahrlos arbeitet.
Der Luftverbrauch ist sehr gering. Diese Maschine ist für das Entfernen der Hufe von Fußen aller Art geeignet.
Eine Person kann bis zu 500 Fuße pro Stunde verarbeiten. Der größte Vorteil dieser Maschine ist ihre Konzipierung, die eine ganz gefahrlose Arbeit ermöglicht.

TECHNISCHE ANGABEN

Diese Maschine ist aus rostfreiem Edelstahl hergestellt.

Sie ist ausgerüstet mit einer Wartungseinheit für Druckluftöl.

Anschlußwerte :
- Druckluft ca. 6 bar.

Maschine wird durch Fußhebelgesteuert.

ARRANCADORA DE PARTES CORNEAS DE PEZUÑAS DE VACUNO

Nuestra arrancadora es una máquina neumatica de compresión. Es rápida y sin peligro. Su consumo de aire es muy reducido. Un operario puede trabajar hasta 500 pezuñas por hora. Su mayor ventaja descansa en su concepción que permite un trabajo en toda seguridad.

CARACTERISTICAS TECNICAS

Estas máquinas están realizadas enteramente en acero inoxidable.

Se entregan con :
- Un filtro regulador y lubrificador.

Fluidos necesarios :
- Aire comprimido : presión anterior : 6 bars.

Mando por pedal.

MCM
MATERIEL CHARLES MECAL
B.P. 8 - 42580 L'ETRAT - Tél. 77.74.05.70 - Fax 77.92.50.39

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