

Ergonomics of sheep handling equipment for shearing and crutching



University of Ballarat



Checklists



Ergonomics of sheep handling equipment for shearing and crutching

Checklists

Revised Edition, June 2000

Also in this series

- ❖ **Project report**
- ❖ **Design guide**
- ❖ **Equipment catalogue**

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Preface

Funded by WorkCover NSW (project 96-0094), the University of Ballarat recently undertook a research project that resulted in a set of resources regarding the "Ergonomics of sheep handling equipment for shearing and crutching".

The focus of the review was the assessment of safety and health issues associated with the use of the new technologies. The task of shearing and crutching is dramatically changed by the introduction of these types of equipment. Presently the use of handling devices for shearing is limited although several systems are emerging and some units are now commercially available as full working models. Many systems for crutching exist and have been widely used for a number of years. These crutching systems range from single operator units installed inside shearing sheds to multiple operator mobile units popular for crutching sheep in-field especially in the pastoral areas of New South Wales, South Australia and Western Australia. In some instances the mobile crutching units are used for shearing, usually in locations remote from shearing shed facilities. In conjunction with shearing and crutching, various husbandry tasks are often performed as ancillary operations (e.g. drenching, foot checking and paring, vaccination, etc). With the exception of foot checking and paring, the handlers seem to be rarely used for these activities in the absence of shearing or crutching.

Improvement at the design and manufacture stage represents an excellent opportunity to minimise occupational health and safety risks and for this reason an outcome of the research was the Design Guide for design for designers, manufacturers and, to a lesser degree, users of equipment. A set of Checklists contained in the Design Guide are available separately.

Together with good design, occupational health and safety risks can be influenced by the purchasing, operational and work system decisions of potential users of the equipment. Therefore a catalogue has been prepared to assist potential users of the equipment by providing a list of the equipment viewed during the research.

In summary, the project documentation includes:

- Project Report
- Design Guide
- Checklists (extracted from the Design Guide)
- Equipment Catalogue

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- Manufacturers and distributors of sheep handling equipment.
- Shearing and crutching equipment users and owners.
- The shearing industry reference group.
- WorkCover NSW.

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Table 1 Manual Handling Hazards Checklist

Manual Handling Hazards Checklist		
General Setup	4 x	Action
• <i>Is the worker able to maintain an upright and forward-facing posture?</i>		
• <i>Is the work visible with the trunk upright and head upright or inclined slightly forward?</i>		
• <i>Do all work activities encourage the worker to adopt a variety of safe postures?</i>		
• <i>Is it possible to provide a type of lean-bar seat for the worker?</i>		
• <i>Is the weight of the body, when standing, carried equally on both feet?</i>		
• <i>Is the work performed below the level of the heart?</i>		
• <i>Are the neck, trunk and upper limbs mainly in a neutral (comfortable) posture?</i>		
• <i>Are high forces exerted by the largest muscle groups?</i>		
• <i>Has allowance been made for workers of different size (e.g. shortest & tallest)?</i>		
Handpiece		
• <i>Is the handpiece stored clear of sheep being released?</i>		
• <i>Is the handpiece hook at working height or slightly higher (e.g. adjustable 900-1150mm)?</i>		
• <i>Does the handpiece hook encourage a neutral (comfortable) posture of the wrist?</i>		
Reach to Load Sheep		
• <i>If sheep are loaded by tipping, is the reach to load sheep less than 600mm?</i>		
• <i>Is the force applied by the shearer to tip the sheep minimised (e.g. by a slope inside the race, a tipping board, adjustable width race, etc.)?</i>		
Sheep Feed		
• <i>Are sheep encouraged to enter the handler without prompting?</i>		
• <i>Are leg stops used to prevent sheep reversing?</i>		
• <i>If sheep need to be manually prompted, is access easily available to the race and is there something on which to gain support while leaning over the race?</i>		
Cradle Working Height		
• <i>Is the working height adjustably between about 800-1050mm?</i>		
• <i>If not, is the cradle nearer the higher end of the range (e.g. 900-1050mm)?</i>		
• <i>And is an adjustable operator platform or matting available for shorter workers?</i>		
Cradle and Race Design		
• <i>Is the race adjustable to allow for different size sheep?</i>		
• <i>Does the race encourage sheep to enter without pushing?</i>		

Table 2 Mechanical Plant Hazards Checklist (modified list from AS4024.1—1996)

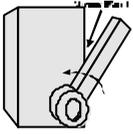
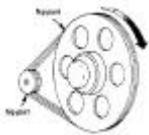
Mechanical Plant Hazards Checklist			
Hazard	Checklist	4 x	Action
<p>Entanglement: entanglement is possible where rotating parts are powered; for example, a motor driving a hydraulic pump through a drive shaft.</p>	<ul style="list-style-type: none"> • <i>Are entanglement hazards eliminated or guarded?</i> 		
<p>Friction and abrasion: friction and abrasion can occur when smooth parts operate at high speed.</p>	<ul style="list-style-type: none"> • <i>Are smooth operating parts eliminated or guarded?</i> 		
<p>Cutting/Stabbing and puncture: the main cutting/stabbing and puncture hazard is the handpiece.</p>	<ul style="list-style-type: none"> • <i>Is the handler designed to minimise the possibility of the sheep kicking the handpiece both by restraint of the sheep and positioning of the handpiece hook?</i> 		
<p>Shear: shear hazards exist where parts cross in a scissor action.</p>	 <ul style="list-style-type: none"> • <i>Are shear hazards eliminated or guarded?</i> 		
<p>Impact: impact by sheep can occur, although impact by a kicked or locked handpiece present a more serious injury risk.</p>	<ul style="list-style-type: none"> • <i>Is the restraint of the sheep and the release system designed to minimise the possibility of sheep kicking or jumping into the operator/ other operators?</i> • <i>Does the shearing gear have a safety clutch and pin drive (or another safe system) to minimise the likelihood and magnitude of injury in the event of the handpiece being kicked or locked?</i> 		
<p>Crushing: crushing may occur during transporting, positioning or unloading.</p>	<ul style="list-style-type: none"> • <i>Are crush hazards associated with transporting, positioning or unloading a mobile/portable unit minimised?</i> 		
<p>Drawing-in: drawing-in can occur in situations such as shown.</p>	 <ul style="list-style-type: none"> • <i>Are drawing-in hazards eliminated or guarded?</i> 		
<p>Compressed air, pressure & potential energy: potential energy can be stored in springs, hydraulics or compressed air (often used to operate handlers, handpieces and foot shears).</p>	<ul style="list-style-type: none"> • <i>Is the compressed air/other stored energy systems safe?</i> 		
<p>Material ejected from the machine: material can be ejected by such events such as breaking a comb.</p>	<ul style="list-style-type: none"> • <i>Is the handler designed to minimise comb breakage (e.g. by avoiding small-diameter metal parts)?</i> 		

Table 3 Non-Mechanical Plant Hazards Checklist (modified list from AS4024.1—1996)

Non-Mechanical Plant Hazards Checklist			
Hazard	Checklist	4 x	Action
Access: access hazards include obstructions or projections that can cause slips, trips and falls.	<ul style="list-style-type: none"> • <i>Do floor surfaces have adequate grip?</i> • <i>Are obstructions and projections eliminated?</i> 		
Manual Handling: the handlers may reduce manual work during operation but manual handling may be a risk when moving or installing equipment, and penning, loading and releasing sheep.	<ul style="list-style-type: none"> • <i>Does the design of the equipment allow it to be safely moved?</i> • <i>Is allowance made for the safe penning and loading of sheep?</i> • <i>Is allowance made for the safe release of sheep?</i> 		
Electricity: electricity is sometimes used to run shearing gear, compressor, lighting and the handler.	<ul style="list-style-type: none"> • <i>Are generators designed for outdoor use?</i> • <i>Are cables kept in good condition?</i> 		
Chemicals: chemical hazards are often present and chemical residues can exist in the fleece and on the feet of sheep.	<ul style="list-style-type: none"> • <i>Can safe chemicals be used?</i> • <i>Can chemicals be applied at another time?</i> • <i>Are the precautions followed as recommended by manufacturers?</i> 		
Noise and vibration: noise is a common problem (handpiece, shearing gear, compressor, woolpress, generator, dogs). Vibration occurs due to contact with the handpiece and the floor.	<ul style="list-style-type: none"> • <i>Is it possible to purchase quiet equipment?</i> • <i>Is it possible to locate equipment (e.g. compressor & generator) away from operators?</i> 		
Pressure: compressed air and hydraulics are pressure hazards.	<ul style="list-style-type: none"> • <i>Is the compressed air/other stored energy systems safe?</i> 		
Extremes of temperature: extremes of temperature often occur. Outdoor operators suffer both extremes whereas indoor operators tend to suffer only from high rather than low temperatures (because of the metabolic demand).	<ul style="list-style-type: none"> • <i>Are operators protected from direct sunlight and cold wind?</i> • <i>Can work be scheduled to avoid extremes of temperature?</i> • <i>Can work rotation be used to reduce the effects of heat?</i> • <i>Are radiant heat sources (e.g. steel roofing) insulated?</i> • <i>Is adequate water available?</i> • <i>Are rest breaks observed?</i> 		
Atmospheric contaminants: various environmental contaminants can exist such as dust, wool dust, chemical mists and exhaust fumes from generators.	<ul style="list-style-type: none"> • <i>Is diesel/petrol-powered equipment located away from operators?</i> • <i>Can dust be minimised by watering yards or considering wind direction?</i> • <i>Is the work area adequately ventilated?</i> 		
Radiation: exposure to the sun would be the common radiation hazard.	<ul style="list-style-type: none"> • <i>Are operators protected from sunlight?</i> • <i>Where protection is impractical (e.g. penning up) are adequate clothing, hats and sunscreen available and used?</i> 		
Biological: biological hazards can exist due to contact with the sheep.	<ul style="list-style-type: none"> • <i>Is the equipment designed to minimise cuts by restraint of the sheep feet?</i> 		

Table 4 Work Environment Checklist

Work Environment Checklist		
Climate (heat, humidity, cold, wind, rain)	4 x	Action
<ul style="list-style-type: none"> • For normal shearing hours (e.g. 8 hours per day), is the WBGT (Wet Bulb Globe Temperature) less than 25°C? <i>If not additional rest breaks may be needed.</i> 		
<ul style="list-style-type: none"> • For normal shearing hours (e.g. 8 hours per day), is the Wet Bulb less than 25°C? <i>If not additional rest breaks may be needed.</i> 		
<ul style="list-style-type: none"> • Are workers protected from the sun? 		
<ul style="list-style-type: none"> • Are workers protected from cold wind? 		
<ul style="list-style-type: none"> • Is adequate drinking water available? 		
<ul style="list-style-type: none"> • Is there are cool/warm place to rest during breaks? 		
Atmospheric Contaminants;		
<ul style="list-style-type: none"> • Are the yards/work area positioned to minimise dust in the work area? 		
<ul style="list-style-type: none"> • Are steps taken to minimise dust (e.g. paved forcing areas, watering down)? 		
<ul style="list-style-type: none"> • Are generators positioned to carry exhaust fume away from the work area? 		
Noise		
<ul style="list-style-type: none"> • Is the noise exposure over eight hours less than 85dB(A) [can you hold a conversation]? 		
<ul style="list-style-type: none"> • Are peak noise levels below 140dB(lin)? 		
<ul style="list-style-type: none"> • Has shearing gear noise been minimised (e.g. air handpiece, flexible downtubes)? 		
<ul style="list-style-type: none"> • Is the operation of the equipment quiet (e.g. deadening of contact surfaces)? 		
<ul style="list-style-type: none"> • Is the generator “quiet” or been positioned well away from the work area? 		
Lighting		
<ul style="list-style-type: none"> • Is the lighting adequate (at least 600lux)? 		
<ul style="list-style-type: none"> • Is glare (unwanted light) controlled (e.g. reflections, direct sunlight)? 		

Table 5 Work Organisation Checklist

Work Organisation Checklist		
Consultation	4 x	Action
• <i>Are workers consulted/involved in making decisions?</i>		
Work Pace		
• <i>Are workers able to pace their own work?</i>		
Job Design		
• <i>Does each job have a range of activities?</i>		
• <i>Are there opportunities for job rotation?</i>		
Hours of Work		
• <i>Do the hours of work allow for adequate rest considering the job and climate?</i>		