



# final report

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## **Sharpness of workers' knives: a case study of thirteen Australian abattoirs**

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### Executive summary

Despite knife sharpening being one of the key skills required by a competent meat processing worker little has been done to assess the best way to train, assess and monitor knife sharpening skills.

During 2007-8 MINTRAC, in conjunction with a variety of RTOs around the country, gathered data on the sharpness of operators' knives. Utilising a standardised testing machine many thousands of knives were assessed for sharpness and these results tabulated and aggregated.

These observations when analysed gave us an insight into what the state of play is with regard to:

- knife sharpening skills in the industry
- where the problems are most severe
- what sharpening techniques are achieving the best results

Similarly although there has been ongoing concern about the level of knife sharpening proficiency in the processing sector, very little has been done to ensure trainers have the necessary skills, techniques and training materials to achieve the standard of competency that ensures knife hands can work effectively and safely.

This project investigated what training delivery strategies are being used by RTOs and employers, what is working and what can be improved in terms of training materials, PD for trainers and supervisors as well as strategies for ensuring workers have sharp knives.

This project sought to identify:

- the most effective knife-sharpening equipment and techniques
- how to improve training materials to reflect current technology and practice
- what PD opportunities should be provided to industry and RTO trainers

#### **First and final Milestone requirements:**

The first stage in this project was to analyse the knife sharpness data gathered at 13 abattoirs in eastern Australia. This data has provided ample evidence that the average knife used by meat processing workers is not sharp. The data was gathered by companies and RTOs using an Anago knife sharpness testing machine. Knife sharpness is described in this report in two ways – at the broad level (unsatisfactory/satisfactory) and at a more detailed level. The relationship between the broad and detailed categories is shown below:

Broad level	Detailed level	Score
Unsatisfactory	Needs improvement	<8.00
Satisfactory	Sharp	8.00-8.99
	Very sharp	9.00-9.49
	Extremely sharp	>9.50

Of the 1,724 knives tested, only 6% were very sharp or extremely sharp, and 52% were rated as needing improvement. The overall mean (average) knife sharpness was 7.89 and the overall median knife sharpness was 7.97. Both are classified as unsatisfactory according to the knife sharpness scale used.

Of the 13 abattoirs in the study, none were rated better than sharp, based on their mean knife sharpness. Eight (62%) had an unsatisfactory mean knife sharpness (that is, rated as needs improvement). The other five were rated as satisfactory, although three barely so, with scores very close to 8. In median terms, the situation is similar, with six abattoirs rated as sharp and seven as needs improvement.

Only four of the 13 plants had individual scores of 9.5 or over (extremely sharp). Seven plants had a maximum score of 9 to 9.5 (very sharp) and the remaining two plants had a maximum score between 8 and 9 (a sharp rating). All minimum plant scores were unsatisfactory, with some being very low (all were under 7 and 3 was the lowest).

It seems reasonable to assume that 'plant level effects' would contribute to knife sharpness.

These would include factors such as species processed, organisational practices, training type and intensity, staff selection and so on. However, with limited data on abattoirs in the study under common ownership (a possible proxy for plant level effect), it is not possible to be conclusive on this point.

The report contains a detailed report on this statistical analysis. It is interesting to note that these results are similar to the outcomes of research undertaken in both the USA and New Zealand where similar data was gathered.

The project has also identified that workers acquire knife sharpening skills through:

- informal coaching by fellow workers
- structured training programs delivered by the company trainers prior to employees taking on a knife hand position
- undertaking formal training in the National Unit of Competency "Sharpen Knives" as part of a traineeship

Currently there is very little in the way of a standardised approach to knife sharpening training given that each trainer brings his or her own idiosyncratic approach to knife sharpening and steeling.

General formal knife sharpening training consists of an introductory session to using a knife sharpening stone plus some steeling instruction followed by some supervised practice on the

chain. After that there is usually some follow up on the floor with a trainer checking on how the trainee is maintaining their knife edge.

When reviewing the statistics it is apparent that standardised knife sharpening techniques using a jig appear to achieve the best knife sharpening results. This is backed up by the extensive research and work that has been done on knife sharpening in New Zealand. The initial work was undertaken by Silver Fern Farms (previously PPCS) at their 25 abattoirs. Their results showed quite clearly that formalised and standardised knife sharpening training utilising a jig resulted in:

- a significant improvement in worker skills levels with regard sharpening and steeling
- a more open culture towards monitoring and improving knife sharpness
- an improvement in yields
- decrease in soft tissue injuries.

This initial work was followed up by the Accident and Compensation Commission of NZ which was so impressed by the success of the PPCS program that it initiated a scheme to facilitate the introduction of the program into all other meat processing companies in NZ. In response to the NZ experience MINTRAC organised six knife sharpening workshops in all the mainland states to demonstrate the NZ approach to sharpening and steeling. There was overwhelming endorsement to this approach by both industry and Registered Training Organisations. This resulted in 30 processing companies at 37 sites interested in implementing this approach to knife sharpening.

In addition to facilitating the introduction of a more standardised approach to knife sharpening, MINTRAC has also rewritten the knife sharpening training materials and had them reviewed by a panel of industry trainers. These reviewed materials form Attachment 2 of this report.

### **Other matters or issues relating to this project**

MINTRAC now has a renewed and ongoing commitment to encouraging companies and RTOs to review their approach to knife sharpening and more importantly the outcomes being achieved. As part of this push MINTRAC is working with a variety of bodies to systematic review knife sharpness standards in plants before and after the introduction of improved knife sharpening training.

Clive Richardson

May 2009

### **Acknowledgements**

The report was prepared by a consultant for MINTRAC, Sheridan Roberts.<sup>1</sup> Clive Richardson of MINTRAC provided essential background for the study and to the Australian meat industry.

Special thanks are due to the abattoirs and registered training organisations that provided data for the study.

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# 1 Introduction

## Introduction to the project

1. Blunt knives have been shown to reduce meat yield and to increase the likelihood of occupational injuries<sup>2</sup>. A sharp knife is therefore a key tool for a meat processing worker.

Despite this, little work has been done on the best way to train workers to properly sharpen their knives, and to assess and monitor knife sharpening skills and knife sharpness.

2. Over the last two years, MINTRAC, in conjunction with a variety of registered training organisations around the country, has gathered data on the sharpness of abattoir workers' knives. Utilising a standardised testing machine and method, knives of the case study plants were assessed for sharpness. It was expected that analysis of measurements would provide information on the general state of knife sharpness in the Australian meat industry.<sup>3</sup> In addition, it was hoped that the data would reveal any relationships that existed between the sharpness of knives and the following factors:

- individual abattoirs (the 'plant effect');
- employee characteristics (gender, task and department);
- knife characteristics (make, sharpening method and condition); and
- type of animal being processed (cattle or sheep).

## 1.1 Project methodology

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### Methodology used to measure knife sharpness

3. Knives were tested using the Anago KST200 knife sharpness tester, devised by Peter Dowd of Anago in New Zealand.<sup>4</sup> Stages of knife sharpening are grinding, honing (or 'stoning') and steeling. These are explained by Dowd<sup>5</sup> as follows:

- Grinding involves removing a significant amount of metal from behind the cutting edge in order to reduce the drag behind the cutting edge and to thin the blade behind the cutting edge. Some modern knives do not need to be ground.
- Honing ('stoning') generates the small cutting edge along the length of the blade and creates the right edge angle.
- Steeling straightens the edge that is already there and restores the cutting edge.

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<sup>2</sup> R&D Brief, Meat New Zealand, 2002,

[http://209.85.175.132/search?q=cache:qnGixaSOk\\_wJ:www.meatandwoolnz.com/download\\_file.cfm/RD\\_Brief\\_100.pdf%3Fid%3D167,f+Peter+Dowd+ANAGO&hl=en&ct=clnk&cd=7&gl=au](http://209.85.175.132/search?q=cache:qnGixaSOk_wJ:www.meatandwoolnz.com/download_file.cfm/RD_Brief_100.pdf%3Fid%3D167,f+Peter+Dowd+ANAGO&hl=en&ct=clnk&cd=7&gl=au).

<sup>3</sup> Strictly, in respect of the abattoirs involved in the case study. However, the selection of abattoirs for the study resulted in a reasonably representative set of plants, therefore it is likely that the results are broadly applicable to the whole industry.

<sup>4</sup> In 2001, Peter Dowd was commissioned by Meat New Zealand and the NZ Meat Industry Association to investigate how to improve knife sharpness in the meat industry. A video on the operation of the sharpness tester can be found here <http://tw.truveo.com/Anago-Knife-Sharpness-tester-lores/id/3138158047>.

<sup>5</sup> <http://www.anago.co.nz/images/usr//articles/knife%20sharpness%20article.pdf>.

4. The scale associated with the KST200 tester yields results on a measurement scale of 0 to 10. For the current study, a score of less than 8.00 is rated as *needs improvement*, a score of 8.00 to 8.99 is *sharp*, 9.00 to 9.49 is *very sharp* and scores of 9.5 and over are *extremely sharp*. A score of 8.00 or over is considered to be satisfactory and a score below 8.00 unsatisfactory. In this report, scores have been rounded to two decimal places. The lowest score in the case study was 3.0.<sup>6</sup>

5. Knife sharpness is described in this report in two ways – at the broad level (unsatisfactory/satisfactory) and at a more detailed level. The relationship between the broad and detailed categories is shown below:

<b>Broad level</b>	<b>Detailed level</b>	<b>Score</b>
<b>Unsatisfactory</b>	<b>Needs improvement</b>	<b>&lt;8.00</b>
<b>Satisfactory</b>	<b>Sharp</b>	<b>8.00-8.99</b>
	<b>Very sharp</b>	<b>9.00-9.49</b>
	<b>Extremely sharp</b>	<b>&gt;9.50</b>

6. The abattoirs in the case study are clients of the six registered training organisations that collected the data. They are considered to be reasonably representative of the red meat processing industry in Australia and included export and domestic plants, beef and sheep plants, and large and small plants.

7. Data were edited and standardised. The following adjustments were made to the raw data:

- *Type of knife* was standardized (and renamed *Knife make*) to show only make (original data were a mix of make, and make and model);
- a number of descriptions were standardized to match the classifications used, for instance, steel sharpening methods described as *polished* were changed to *smooth*, some employees initially categorised as *staff* were amended to *supervisor*, and
- a small number of anomalous records and data were removed (for instance, several records for AQIS inspectors who are not employed by the abattoirs, data relating to the use of a pipe, which is very rare).

8. It should be noted that only a small number of records and fields were changed as a result of these adjustments.

9. The names of individual abattoirs have not been used in the report. The 13 abattoirs are described by the letters A to M. In addition, comparisons between knife makes have been confidentialised by use of terminology – make i, make ii etc.

10. The data were described in terms of a set of standard descriptive statistics as defined below. Because of the large number of categorical variables in the study, more sophisticated analysis, such as multiple regression analysis was not undertaken.

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<sup>6</sup> The graphs in this report use 3.0 as the lowest y axis value for this reason.

- **Categorical variable.** Most of the variables in the case study are categorical variables, that is, they are qualitative and their values are labels, for instance, the values of the variable, *department* are the names of different departments such as 'boning room'.
- **Maximum/minimum** – the highest and lowest values in a particular set of data.
- **Mean** – also referred to as 'average'. Mathematically, the mean is the sum of all observations divided by the number of observations. In this report, means are only calculable for the variable knife sharpness (the only quantitative variable).
- **Median** – the middle observation in a series, for instance, in the series 1, 3, 4, 7, 10, the median is 4. Where there is an odd number of observations, the median is the average of the two middle observations, for instance, in the series 1, 3, 4, 6, 7, 10, the median is 5 (the average of 4 and 6).
- **Range** – the difference between the maximum and minimum values.
- **Rank** – refers to the placement of a value in an ordered set. In this study, the record associated with the highest value of knife sharpness in a set of data is ranked first and the lowest value last.
- **Record** – refers to the data associated with a single observation. In this study, there were 1,724 useable records. After editing and standardising, each had the following fields: plant, species, knife make, knife condition, stone sharpening method, steel sharpening method, gender of user, department, task and knife sharpness score. Each record is associated with one (and only one) employee and the knife used by that employee. Not all fields contained data, in particular, the fields for *knife condition*, *stone sharpening method* and *steel sharpening method* were only populated for some records.
- **Standard deviation** – a standard measure of the variability of data within a dataset. A low value indicates that the data are clustered around the mean. A high value indicates that the data are widely spread. The standard deviation is equal to the square root of the average value of the squares of the deviations from the arithmetic mean.

## 2 The general picture

### Box 1. The general picture: highlights

The level of knife sharpness in the 13 case study abattoirs is disappointing. Of the 1,724 knives tested, only 6% were very sharp or extremely sharp, and 52% were rated as needing improvement. The overall mean (average) knife sharpness was 7.89 and the overall median knife sharpness, 7.97. Both are classified as unsatisfactory according to the knife sharpness scale used.

Of the 13 abattoirs in the study, none were rated better than *sharp* based on their mean knife sharpness. Eight (62%) had an *unsatisfactory* mean knife sharpness (that is, rated as *needs improvement*). The other five were rated as *satisfactory*, although three barely so, with scores very close to 8. In median terms, the situation is similar, with six abattoirs rated as *sharp* and seven as *needs improvement*.

Only four of the 13 plants had any individual scores of 9.5 or over (*extremely sharp*). Seven plants had a maximum score of 9 to 9.5 (*very sharp*) and the remaining two plants had a maximum score between 8 and 9 (a *sharp* rating). All minimum plant scores were unsatisfactory, with some being very low (all were under 7 and 3 was the lowest).

It seems reasonable to assume that 'plant level effects' would contribute to knife sharpness. These would include factors such as species processed, organisational practices, training type and intensity, staff selection and so on. However, with limited data



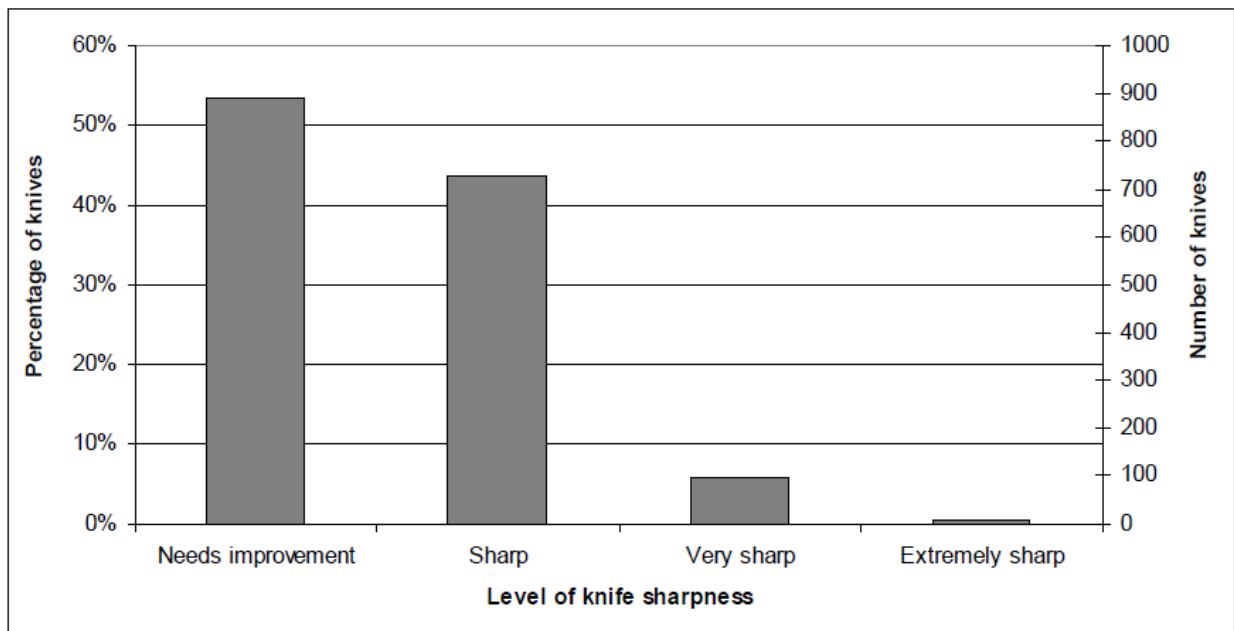
on abattoirs in the study under common ownership (a possible proxy for plant level effect), it is not possible to be conclusive on this point.

**Introduction**

11. Firstly, it is useful to recall from Chapter 1 that knife sharpening scores of less than 8 are unsatisfactory and indicate a need for improvement. Scores of between 8 and 9 are considered *sharp*, while those between 9 and 9.5 are *very sharp*. Scores of 9.5 and over are *extremely sharp*.<sup>7</sup>

12. There were 1,724 records in the study. Each record corresponds to a knife of one (and only one) employee. For each abattoir, all available employees’ knives were tested. As Chart 1 below shows, there are few knives that were rated as *very* or *extremely sharp* (6% of the total) and over half (52%) were rated as *needs improvement*.

**Chart 1. Sharpness of knives in the study: percentage and number at each sharpness level**



Source: MINTRAC edited data set.

13. The mean and median values for knife sharpness by abattoir are shown in Table 1 below. They are ranked, 1 to 13, by the value of mean knife sharpness. A rank by median would change the order slightly (but would not affect the top or bottom three ranked abattoirs).

14. A graphical presentation, also ranked by mean knife sharpness, is shown in Chart 2.

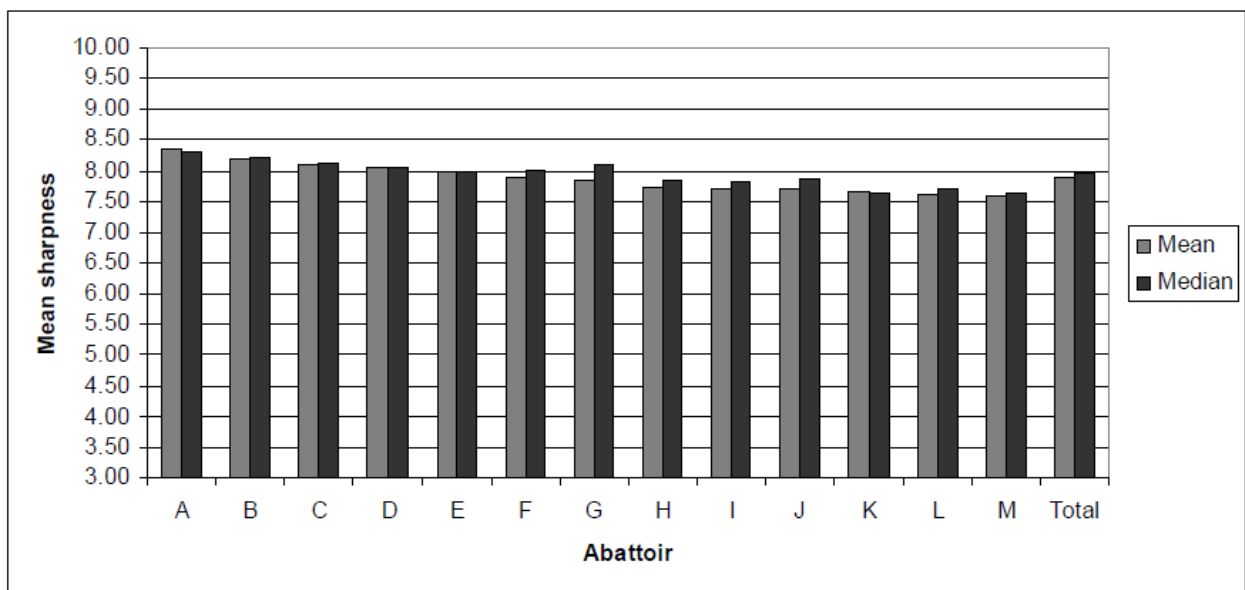
15. Both the table and the chart show the relative ranking and rating of the 13 abattoirs in the study. None of the abattoirs were rated better than sharp based on mean knife sharpness. Eight (62%) had an unsatisfactory mean knife sharpness (that is, rated as *needs improvement*). The other five were rated sharp, although three barely so, with scores very close to 8.0 (8.00, 8.04

<sup>7</sup> The exact ranges are: less than 8.00, 8.00 to 8.99, 9.00 to 9.49 and 9.50 and over. For the purposes of this report, scores are rounded to two decimal places

and 8.10). In median terms, the situation is similar, with six abattoirs rated as satisfactory and seven needing improvement.

16. It seems reasonable to assume that there could be ‘plant level effects’ contributing to knife sharpness. These would include factors such as species processed, organizational practices, training, staff availability and selection and so on. Of the 13 abattoirs in the case study, there are two pairs that have an ownership relationship. The two top-ranked abattoirs are under common ownership, indicating a possible ‘plant level effect’ for this entity. However, the two other related plants have mean sharpness rankings of 6 and 11, indicating that there is probably not a plant level effect within that pair.<sup>8</sup>

**Chart 2. Knife sharpness by abattoir: mean and median values (ranked by mean sharpness)**



Source: MINTRAC edited data set.

17. A measure of dispersion of scores is the *standard deviation*. Together with the *range* of values (the difference between the top and bottom scores), it indicates how closely the scores are clustered. The standard deviations for abattoir-level data range from 0.55 to 1.09, while the ranges are variable, with the lowest being 1.86 points and the highest 6.70. High ranges and high standard deviations are associated with a small number of very low sharpness values (of around 3.00).

18. The maximum values for each plant indicate the best knife sharpness score. Only four of the 13 abattoirs had a maximum sharpness value of *extremely sharp*. No abattoirs had a maximum value that was unsatisfactory (that is, less than 8). On the other hand, all minimum values were very low, with none being satisfactory.

<sup>8</sup> Note that all the abattoirs under common ownership process cattle exclusively or predominantly. Therefore the slightly better performance of ‘cattle plants’ over ‘sheep plants’ is not a confounding factor when looking at common ownership.

Summary statistics

Table 1. Summary statistics by abattoir (ranked by mean knife sharpness)

	A	B	C	D	E	F	G	H	I	J	K	L	M	Total (all abattoirs)
Rank (mean)	1	2	3	4	5	6	7	8	9	10	11	12	13	n.a.
Mean	8.38	8.19	8.10	8.04	8.00	7.91	7.83	7.72	7.71	7.69	7.66	7.60	7.59	7.89
Median	8.32	8.23	8.12	8.04	7.99	8.01	8.10	7.83	7.81	7.89	7.65	7.69	7.64	7.97
Standard Deviation	0.55	0.64	0.76	0.59	0.78	0.79	1.09	0.90	1.03	0.86	0.73	0.66	0.69	0.81
Range	2.68	4.36	6.54	1.86	4.24	3.71	6.07	6.28	6.70	4.92	3.54	3.76	3.16	6.70
Minimum value	6.75	5.18	3.00	6.98	5.39	5.55	3.40	3.00	3.00	4.38	5.58	5.52	5.32	3.00
Maximum value	9.43	9.54	9.54	8.84	9.63	9.26	9.47	9.28	9.70	9.30	9.12	9.28	8.48	9.70
Number of records <sup>9</sup>	43	154	430	27	129	144	43	165	96	186	70	213	24	1,724
Rank (highest high score)	6	3	3	12	2	10	5	8	1	7	11	8	13	n.a.
Rank (highest low score)*	1	4	10	2	7	8	9	13	12	11	5	5	3	n.a.
Below /above average	Above	Above	Above	Above	Above	Above	Below	Below	Below	Below	Below	Below	Below	n.a.
Type of animal processed	Cattle	Cattle	Cattle and sheep	Sheep	Cattle	Cattle	Sheep	Cattle	Sheep	Sheep	Cattle	Sheep	Sheep	n.a.

Source: MINTRAC edited data set.

<sup>9</sup> This is equivalent to the number of employees who took part in the study and the number of knives tested.

### 3 The relationship between knife sharpness and employee characteristics

**Box 2.**

**Knife sharpness and employee characteristics: highlights**

The only obvious relationship between knife sharpness and employee characteristics is in the type of task carried out by employees. Trimmers and slicers had the sharpest knives, on average. Perhaps surprisingly, inspectors, supervisors and QA staff had the lowest. Only trimmers and slicers had, on average, satisfactory mean knife sharpness scores (8.27 and 8.11 respectively). All other tasks categories had mean scores of less than 8.0, that is, classed as *needs improvement*.

There do not appear to be major differences in the level of mean knife sharpness between departments or sexes.

**Introduction**

19. Employee characteristics, for the purposes of this report, are: gender, task and department. They are categorised as shown in Table 2 below.

**Table 2. Employee characteristics: categories used in the study**

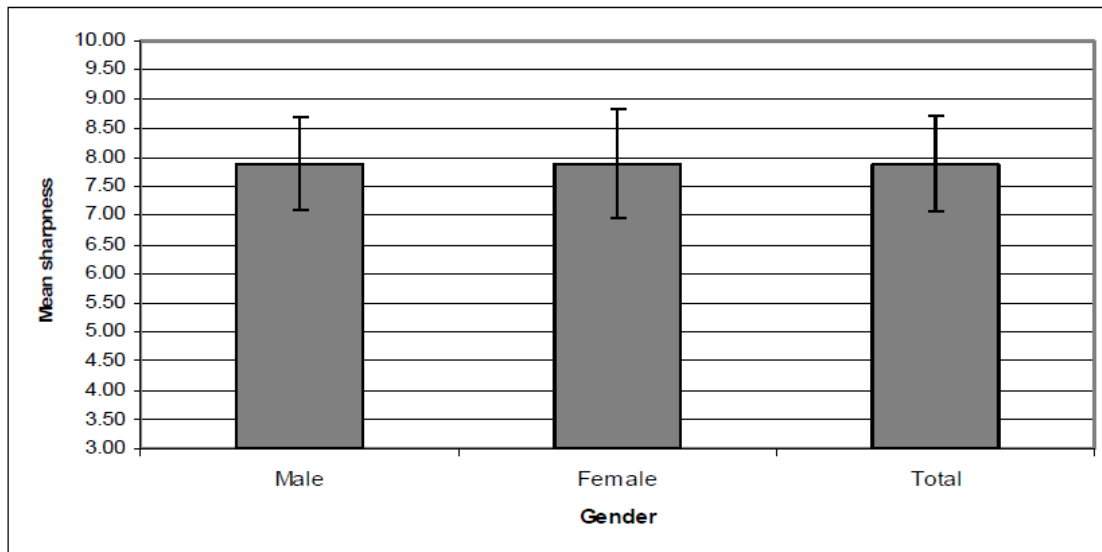
Characteristic	Categories used in the study
Gender	Female, Male
Task	Boner, Inspector, Labourer, QA staff, Slaughterman, Slicer, Supervisor, Trimmer
Department	Boning room, Offal room, Slaughter floor

20. Some discernible relationships between employee characteristics and knife sharpness were expected. However, with the exception of employee task, the differences were small.

**Gender**

21. There was very little difference in mean knife sharpness scores between men and women (both 7.89). There was a higher level of variation among scores of women (standard deviation 0.94 compared with 0.8 for men).

**Chart 3. Knife sharpness by gender: mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

22. Trimmers and slicers had the sharpest knives, on average. Inspectors, supervisors and QA staff had the lowest mean scores. Only trimmers and slicers had satisfactory mean knife sharpness scores (8.27 and 8.11 respectively). All other tasks categories had mean scores of less than 8.0 (*needs improvement*). As Chart 4 shows, variation among scores (as shown by the standard deviation) was greatest for QA staff (1.12) and least for trimmers (0.55).

**Chart 4. Knife sharpness by task: mean values and standard deviation<sup>10</sup>**



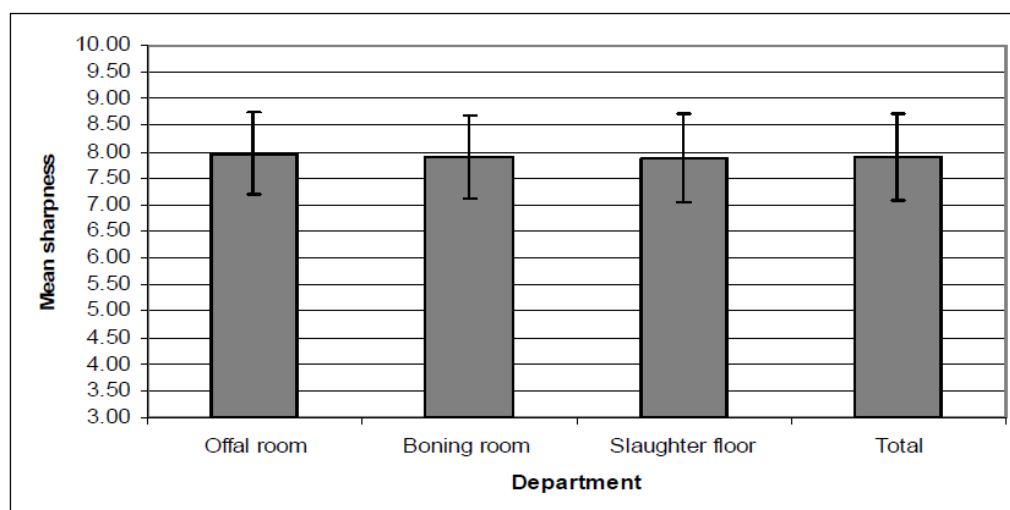
Source: MINTRAC edited data set.

<sup>10</sup> The vertical bar shows a range of one standard deviation either side of the mean. The standard deviation is a measure of data variability. Note that the bar is not the same as a confidence interval around the mean.

**Department**

23. There was little difference in mean knife sharpness scores across departments. The highest scores were for offal rooms (7.97), with the lowest for the slaughter floor (7.88). The mean scores for all departments were unsatisfactory, that is rated as *needs improvement*. The variation among scores was similar for all three groups.

**Chart 5. Knife sharpness by department: mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

**Summary statistics**

**Table 3. Summary by employee characteristic (ranked by mean knife sharpness)**

Employee characteristic	Mean	Median	Standard Deviation	Range	Minimum value	Maximum value	Number of records
<i>Gender<sup>11</sup></i>							
Male	7.89	7.97	0.80	6.70	3.00	9.70	1538
Female	7.89	8.00	0.94	6.63	3.00	9.63	185
<i>Task</i>							
Trimmer	8.27	8.25	0.55	2.25	7.05	9.30	16
Slicer	8.11	8.19	0.72	3.96	5.34	9.30	79
Boner	7.93	7.98	0.76	6.49	3.00	9.49	384
Slaughterman	7.91	8.01	0.83	6.70	3.00	9.70	436
Labourer	7.84	7.89	0.83	6.63	3.00	9.63	768
QA	7.84	8.19	1.12	3.80	4.76	8.56	10
Supervisor	7.83	8.00	0.95	4.29	5.18	9.47	23
Inspector	7.72	8.06	0.97	2.76	6.07	8.83	8
<i>Department</i>							
Offal room	7.97	8.12	0.78	3.41	5.88	9.29	58
Boning room	7.91	7.95	0.79	6.49	3.00	9.49	710
Slaughter floor	7.88	7.98	0.83	6.70	3.00	9.70	956
<b>Total</b>	<b>7.89</b>	<b>7.97</b>	<b>0.81</b>	<b>6.70</b>	<b>3.00</b>	<b>9.70</b>	<b>1724</b>

Source: MINTRAC edited data set.

<sup>11</sup> Note that one record was ignored for the purpose of the gender analysis as *Gender* was not coded.

## 4 The relationship between knife sharpness and knife characteristics

### Box 3. Knife sharpness and knife characteristics: highlights

Because of the large number of factors involved in knife sharpness, it is not possible to state that any particular knife characteristic is a likely determinant of knife sharpness. However, there are relationships between certain knife characteristics and knife sharpness that may be influential and could be further investigated.

Make of knife is possibly influential, with quite a large difference between mean knife sharpness scores across brands. The highest mean score for a knife make was 8.45, while the lowest was 7.73. Only two brands had a mean score that was satisfactory (over 8.00), with the mean score for all other brands rated unsatisfactory (*needs improvement*). However, for most makes, there were examples of knives rated as *very* or *extremely sharp*. The variability of the data and the incidence of high and low scores for most brands, indicate that the relationship between knife make and sharpness is not a simple one and that other factors are likely to be involved.

Of the 1,724 knives in the study, the majority (940) were *Victorinox* models. The next most popular brand was *Victory* with 302 knives. *Dexter Russell* and *Dick* brands were represented to a reasonable extent, with 196 and 149 knives respectively. The numbers for all other brands were relatively small.

Not surprisingly, the sharpening methods used appear to be related to the level of knife sharpness. Knives sharpened with a jig had a higher mean sharpness level (8.28) than those sharpened with a stone (7.81).

Knives that were 'smooth steeled' were sharper, on average, than those that were 'coarse steeled', with mean sharpness scores of 8.03 and 7.72 respectively.

24. Knife characteristics, for the purposes of this report, are: knife make (knife model was disregarded<sup>12</sup>), stone sharpening method and steel sharpening method.<sup>13</sup> The knife characteristics used are detailed in Table 4 below.

25. There were limited data collected on sharpening method. Two abattoirs collected reasonably complete data on sharpening method, with another collecting partial data.

<sup>12</sup> The availability and consistency of information on knife model was highly variable.

<sup>13</sup> Data on knife condition were collected by some plants (two abattoirs collected complete data on knife condition, with another five collecting data for some employees). However, the description of knife condition appears to be inconsistent, therefore the results were not included in the analysis.

**Table 4. Knife characteristics: categories used in the study**

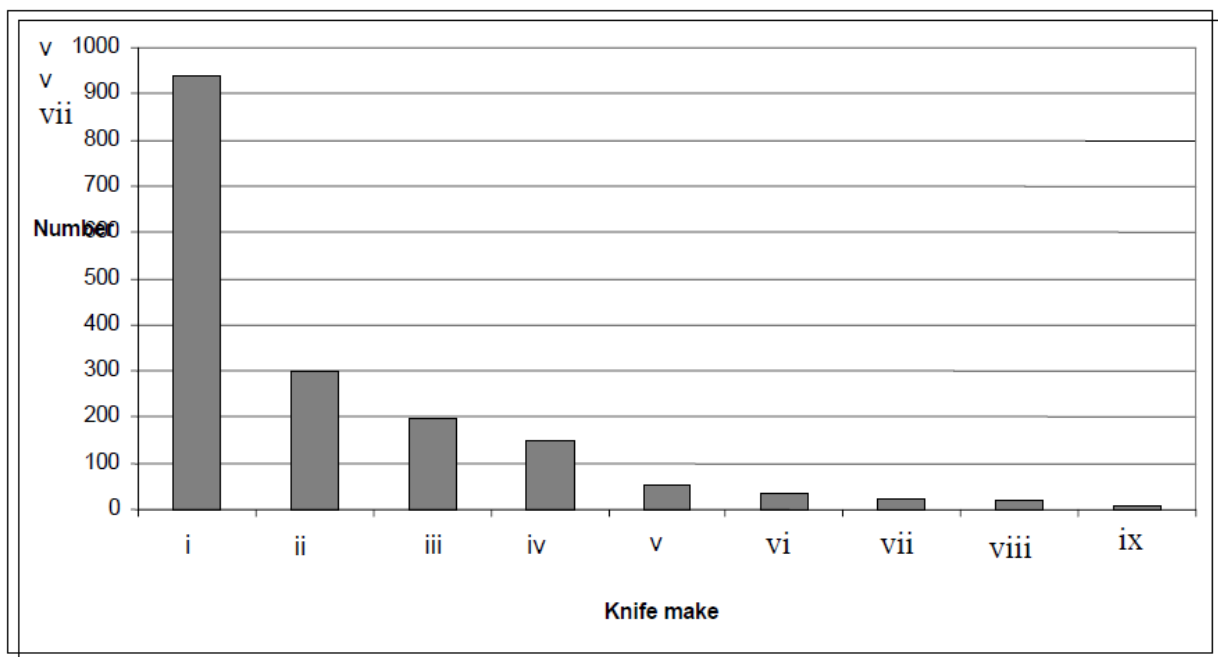
Characteristic	Categories used in the study
Knife make	Dexter Russell, Dick, Dkinox, Green river, Other, Progrid, Swibo, Victorinox, Victory. Individual knife makes were not identified in data comparisons (they are shown instead as i, ii, iii etc).
Sharpening method – stone	Grinding stone, Knife jig, Stone
Sharpening method – steel	Coarse and smooth, Coarse steel, Smooth steel

**Knife make**

26. 1,724 knives examined in the study and the major brands were among those tested including, were models from *Victorinox*, *Victory*, *Dexter Russell*, *Dick*, *Swibo*, *Green River*, *Dkinox* and *Progrid*

27. The distribution of makes is shown in Chart 6 below.

**Chart 6. Knives in the study: number of each make**



Source: MINTRAC edited data set.

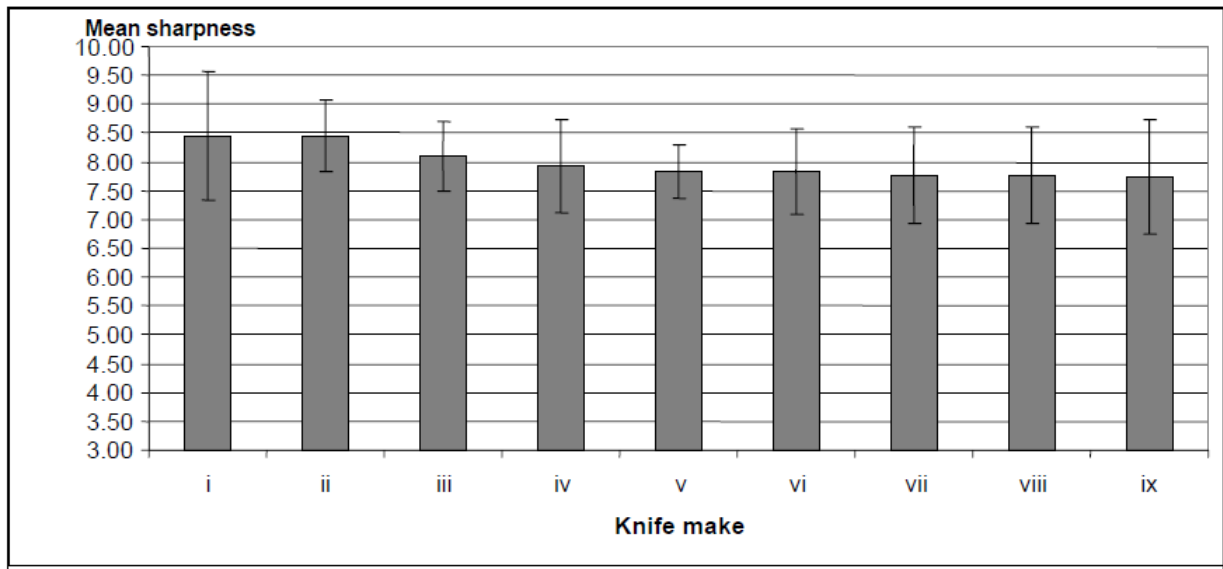
28. The highest mean sharpness score for any knife make was 8.45, while the lowest was 7.73. Only two brands had a mean score that was sharp (over 8.00), with the mean score for all other brands rated as *needs improvement*. For most makes, there were examples of knives rated as *very* or *extremely sharp*. The variability of the data, and the incidence of high and low scores for



most brands, indicate that the relationship between knife make and sharpness is not a simple one and that other factors are likely to be involved.<sup>14</sup>

29. The situation is complicated by the fact that some makes are more likely to be associated with some types of tasks.

**Chart 7. Knife sharpness by knife make: mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

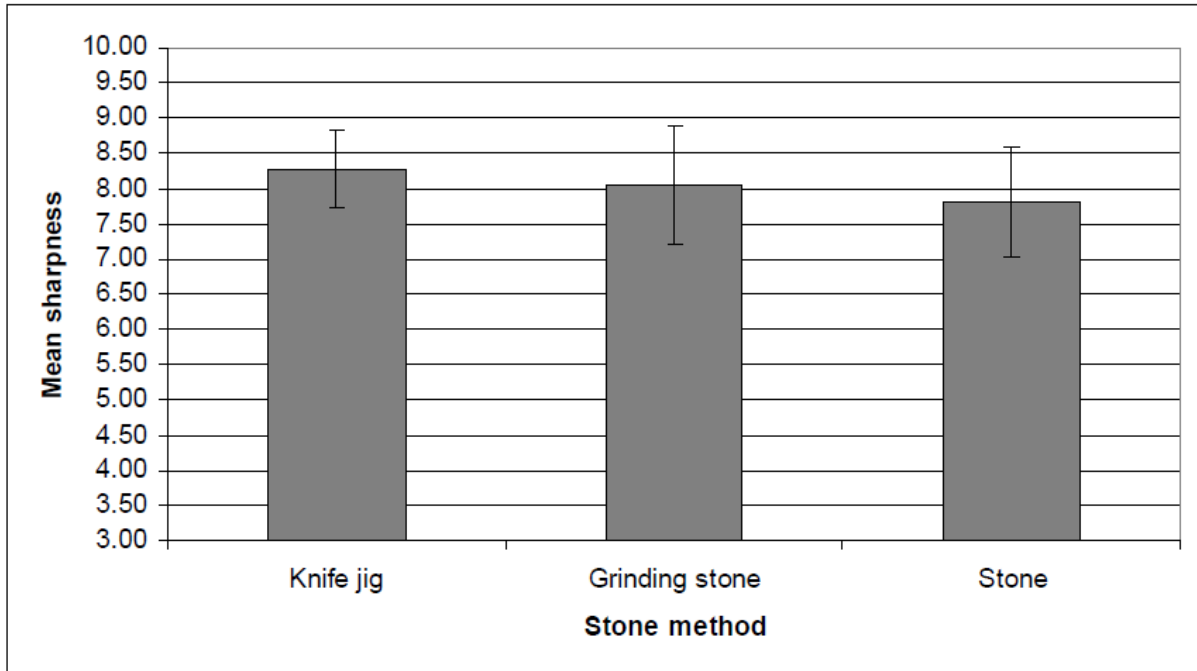
### Sharpening method

30. The data indicate that the stone sharpening method, *Knife jig*, is the most effective way of stone sharpening knives. Mean sharpness associated with this sharpening method was 8.28, considerably higher than for the least effective method, *Stone*, which had a mean score of 7.81.

31. There is also a difference between the three identified steel sharpening methods, with *smooth steel sharpening* associated with a higher mean sharpness than *coarse steel sharpening* (8.03 compared with 7.72). The method, *coarse and smooth steel sharpening*, was in between, with a mean sharpness value of 7.97.

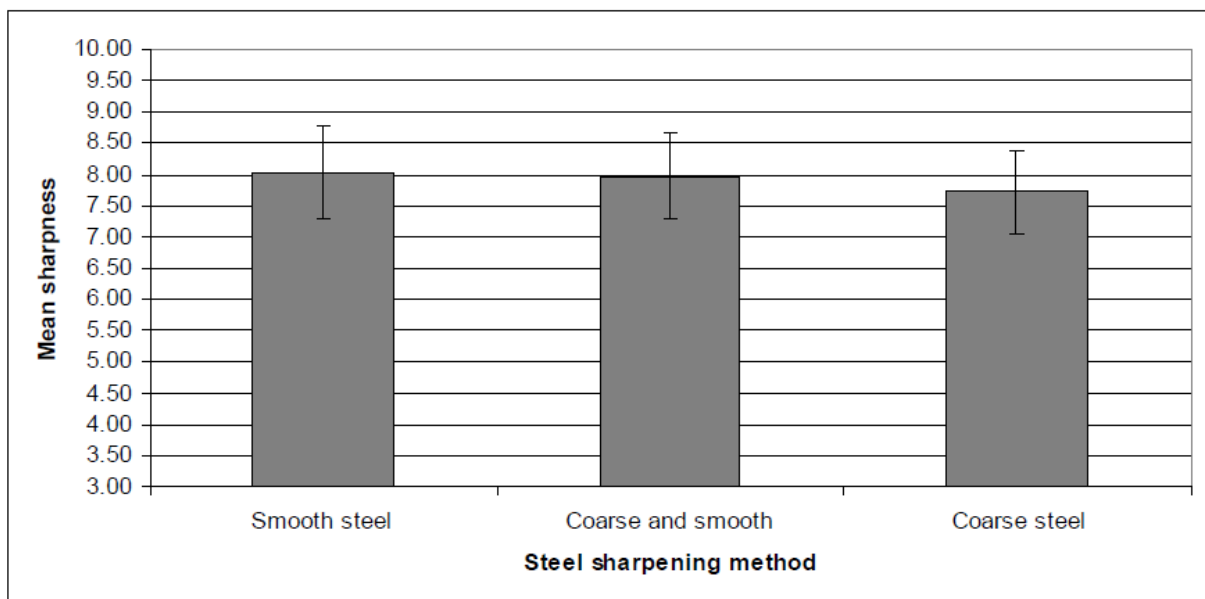
<sup>14</sup> This is explored further in Chapter 6. It is also probable that not all of those factors have been measured in this study. See Chapter 7 for a discussion on this.

**Chart 8. Knife sharpness by stone sharpening method: mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

**Chart 9. Knife sharpness by steel sharpening method: mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

Summary statistics

Table 5. Summary statistics by knife characteristic (ranked by mean knife sharpness)

Knife characteristic	Mean	Median	Standard Deviation	Range	Minimum	Maximum	Number of records
<i>Make</i>							
i	8.45	8.68	1.11	6.54	3.00	9.54	n.a.
ii	8.45	8.51	0.63	2.73	6.46	9.19	n.a.
iii	8.11	8.10	0.60	2.45	6.83	9.28	n.a.
iv	7.93	7.98	0.81	6.70	3.00	9.70	n.a.
v	7.84	7.87	0.46	1.86	6.62	8.48	n.a.
vi	7.83	7.91	0.73	4.10	5.27	9.37	n.a.
vii	7.77	7.86	0.83	6.30	3.00	9.30	n.a.
viii	7.76	7.92	0.84	6.14	3.40	9.54	n.a.
ix	7.73	8.11	1.00	2.93	5.75	8.68	n.a.
<i>Sharpening method – stone</i>							
Knife jig	8.28	8.25	0.56	2.30	7.12	9.42	21
Grinding stone	8.04	7.85	0.84	2.32	7.08	9.40	9
Stone	7.81	7.82	0.79	4.24	5.39	9.63	162
<i>Sharpening method – steel</i>							
Smooth steel	8.03	8.02	0.74	4.36	5.27	9.63	460
Coarse and smooth	7.97	7.96	0.69	3.00	6.24	9.24	42
Coarse steel	7.72	7.89	0.66	2.53	6.17	8.70	27
<b>Total<sup>15</sup></b>	<b>7.89</b>	<b>7.97</b>	<b>0.81</b>	<b>6.70</b>	<b>3.00</b>	<b>9.70</b>	<b>1724</b>

Source: MINTRAC edited data set.

## 5 The relationship between knife sharpness and type of animal processed

### Box 4. Knife sharpness and type of animal processed: highlights

Of the 13 abattoirs in the study, six exclusively or predominantly process cattle and six sheep. One abattoir processes both cattle and sheep.

The data indicate a relationship between the type of animal processed at the case study abattoirs and the level of knife sharpness. Of the top six single-species abattoirs (ranked by mean value of knife sharpness), four process cattle and of the bottom six, four process sheep. Cattle-only abattoirs had sharper knives on average, with ranks for the six cattle abattoirs being 1, 2, 4, 5, 7 and 10. For the six sheep-only abattoirs, the ranks were 3, 6, 8, 9, 11 and 12. This is illustrated graphically in Chart 10.

Consistent with this finding, workers who process cattle had, on average, sharper knives than those who work with sheep.

<sup>15</sup> As explained in the Chapter, there were a relatively small number of observations for knife characteristics (with the exception of *knife make*). *Total* in this table does not refer to the set of observations for which characteristics data are available but to the total of all observations (that is, 1724 observations).

**Introduction**

32. For the purposes of this study, abattoirs were classified as *sheep*, *cattle* or *cattle and sheep*. Two of the 13 plants in the study, predominantly process one species but deal with a small number of the other species (one predominantly processes cattle and was classified as *cattle*, while the other predominantly processes sheep and was classified as *sheep*).

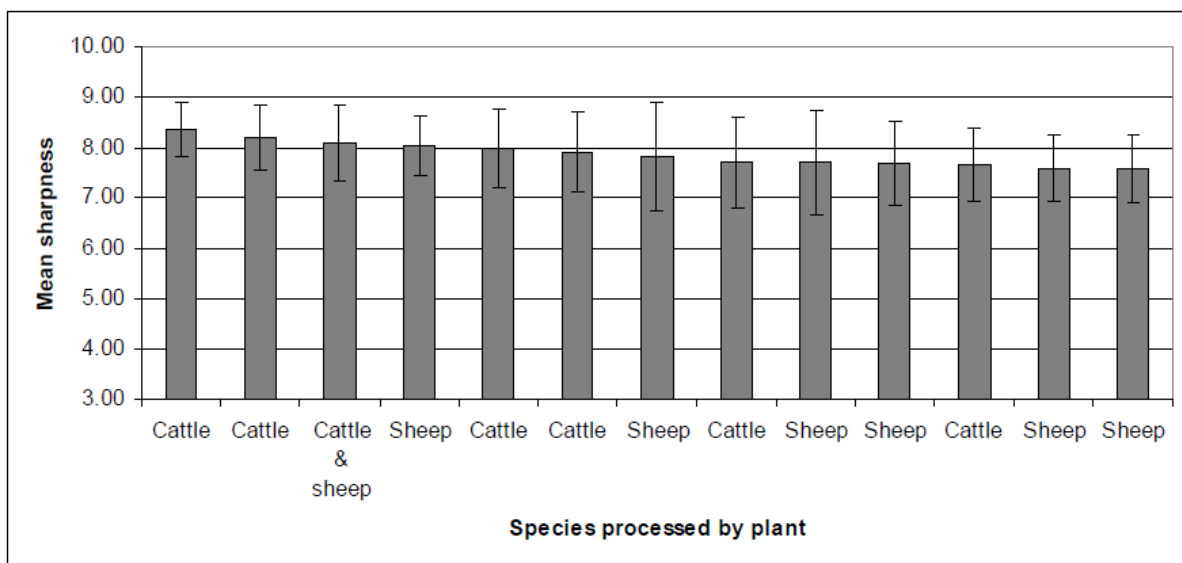
33. Each employee was classified as being a processor of either *sheep* or *cattle*.

**Plant differences by species**

34. At the plant level, there appears to be a relationship between the type of animal processed and the level of knife sharpness. Of the top six single-species abattoirs (ranked by mean value of knife sharpness), four process cattle and of the bottom six, four process sheep. Cattle-only abattoirs have sharper knives on average, with ranks for the six cattle abattoirs being 1, 2, 4, 5, 7 and 10. For the six sheep-only abattoirs, the ranks are 3, 6, 8, 9, 11 and 12.

35. Table 1, *Summary statistics by abattoir*, shows plant level data for all abattoirs, classified by *cattle*, *sheep* or *cattle and sheep*.

**Chart 10. Knife sharpness by species processed (plant): mean values and standard deviation<sup>10</sup>**

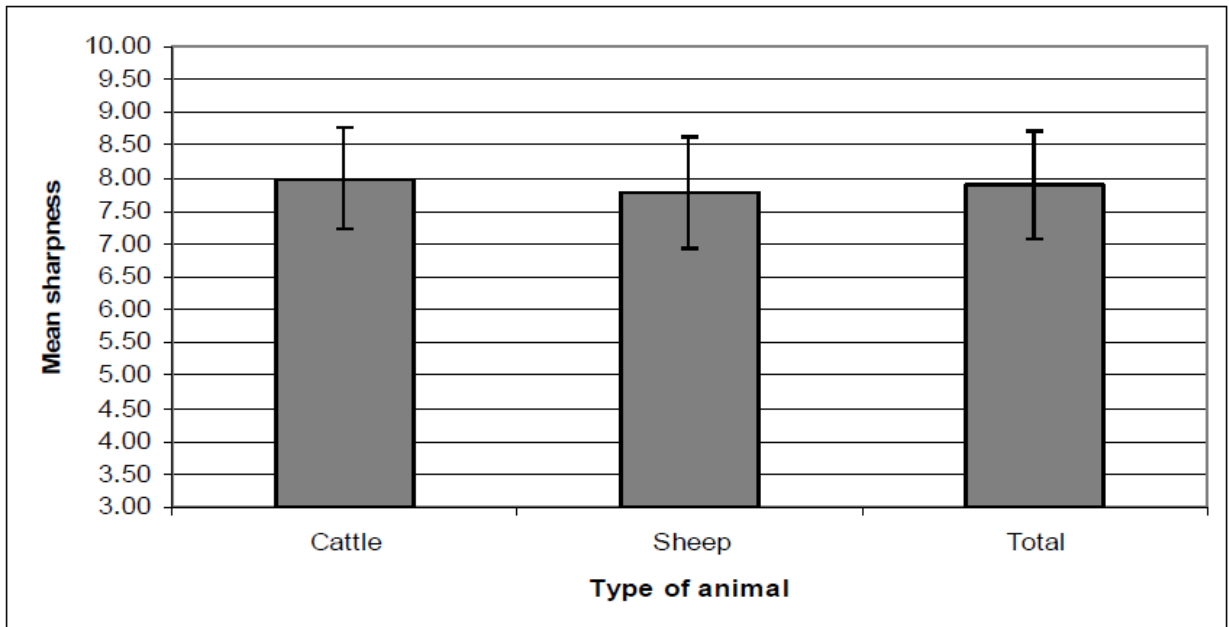


Source: MINTRAC edited data set.

**Employee differences by species**

36. Employees who process sheep constituted 51% of all workers in the study; those who process cattle constituted 49%. As Chart 11 shows, the mean knife sharpness for sheep workers is lower than for cattle workers. This is consistent with the differences between sheep and cattle plants.

**Chart 11. Knife sharpness by species processed (employees): mean values and standard deviation<sup>10</sup>**



Source: MINTRAC edited data set.

## 6 Further investigation of apparent relationships

### Box 5.

#### Further investigation of apparent relationships: highlights

We saw, in Chapters 2 to 5, that some of the factors measured in the study appear to be related to knife sharpness, while others do not. A closer look at the apparently related factors is warranted in order to ascertain whether they are interrelated.

The analysis showed that trimmers have the sharpest knives (on average) but do not use the sharpest brands. In addition, they almost always process sheep, the species that, at aggregate level, is associated with a lower mean knife sharpness. It seems that trimmers have sharper knives, on average, irrespective of the make of knife they use and the type of animal they are processing.

Slicers, who have the second sharpest knives on average, mostly use knife make iv (the make ranked fourth in mean sharpness) and mainly process cattle. For slicers, mean sharpness scores for most make-task combinations are satisfactory, that is the mean sharpness is at least 8. There are a larger number of slicers than trimmers and they are found across more plants.

The finding that trimmers and slicers have the sharpest knives, on average, is consistent with the nature of their work. Unlike other tasks, they do not cut bone or hide, both of which will blunten knives.

Data associated with the main task groups (boners, slaughtermen and labourers), and the main knife makes, indicate that there is a 'species effect'. For the knife make-task combinations with both cattle and sheep observations, most show a higher mean knife sharpness for cattle than for sheep. While it is not possible from the data alone to determine whether the relationship is one of cause and effect, it appears to be the case, as grit in the wool of sheep is known to have a blunting effect on knives.

37. As we saw in Chapters 2 to 5, some of the factors<sup>16</sup> in the study appear to be related to knife sharpness, while others do not. Without further investigation of the interrelationships between those 'related factors', it is not possible to state with any confidence that any are more important than others. If we consider only the factors for which data are available for all or most records, the factors that appear to be related to knife sharpness are: species, knife make and task. An analysis of these factors is not likely to be conclusive as we have ignored other factors, some of which may interact with the factors we have chosen, without appearing to be related at an aggregated level. In addition, there are several factors that have not been considered in the study at all. These are discussed in the next chapter.

38. With those caveats in mind, a closer look at the three factors identified above might throw more light on the determinants of knife sharpness.

39. The first step is to cross-tabulate the three factors of interest and then consider mean knife sharpness in each cell of the tabulation as well as the contribution of factors in terms of number of observations. Table 6 shows such tabulations for makes and tasks, and the two species. In the table, knife make data are ranked top to bottom by mean sharpness (across all observations) and task data are ranked left to right by mean sharpness (across all observations). Therefore cells in the top left part of the table are more likely to have higher values for mean sharpness than cells in the bottom right of the table.

<sup>16</sup> These can also be viewed as independent variables, with knife sharpness being the dependent variable (that is, its value is a function of the values of the independent variables).

**Table 6. Mean knife sharpness by knife make, species and task**

Knife make <sup>17</sup>	Species	Trimmer	Slicer	Boner	Slaughterman	Labourer	Total <sup>18</sup>
<b>i</b>	Cattle		8.32	8.74		8.58	<b>8.66</b>
	Sheep				8.67	7.73	<b>7.88</b>
	Total		8.32	8.74	8.67	8.15	<b>8.45</b>
<b>iii</b>	Cattle		8.31	8.00	8.03	7.97	<b>8.04</b>
	Sheep		7.24	8.41	8.79	8.27	<b>8.31</b>
	Total		8.18	8.05	8.54	8.04	<b>8.11</b>
<b>iv</b>	Cattle	8.18	8.16	8.18	7.87	7.96	<b>8.01</b>
	Sheep	8.00	7.89	7.73	8.09	7.76	<b>7.82</b>
	Total	8.02	8.13	7.98	7.96	7.86	<b>7.93</b>
<b>v</b>	Cattle					7.55	<b>7.55</b>
	Sheep			7.86		7.73	<b>7.86</b>
	Total			7.86		7.69	<b>7.84</b>
<b>vi</b>	Cattle			8.25	8.00	7.79	<b>7.94</b>
	Sheep			7.53	7.80	7.91	<b>7.75</b>
	Total			7.59	7.90	7.85	<b>7.83</b>
<b>vii</b>	Cattle	8.09	8.16	7.81	8.12	7.62	<b>7.78</b>
	Sheep	8.82	8.67	7.54	7.67	7.92	<b>7.76</b>
	Total	8.70	8.33	7.67	7.79	7.73	<b>7.77</b>
<b>viii</b>	Cattle				8.01	7.86	<b>7.94</b>
	Sheep		6.16	7.88	7.69	7.61	<b>7.66</b>
	Total		6.16	7.88	7.84	7.70	<b>7.76</b>
<b>Total<sup>19</sup></b>	<b>Cattle</b>	<b>8.14</b>	<b>8.18</b>	<b>8.15</b>	<b>7.93</b>	<b>7.93</b>	<b>8.00</b>
	<b>Sheep</b>	<b>8.29</b>	<b>7.74</b>	<b>7.71</b>	<b>7.88</b>	<b>7.75</b>	<b>7.79</b>
	<b>Total</b>	<b>8.27</b>	<b>8.11</b>	<b>7.93</b>	<b>7.91</b>	<b>7.84</b>	<b>7.89</b>

Source: MINTRAC edited data set.

40. Some tentative conclusions can be drawn from the information in these tables. Firstly, trimmers appear to have sharper knives, irrespective of the make of knife they use and the type of animal they are processing. Trimmers have the sharpest knives but do not use the sharpest brands. In addition, they almost always process sheep, the species that, at aggregate level, is associated with a lower mean knife sharpness. Therefore the data for trimmers do not follow the broader relationships for either knife make or species data. Given that there were not many trimmers in the study and that they are only found in three plants, a ‘plant effect’ needs to be ruled out. Most of the trimmers work in one plant and it is ranked 10th out of the 13 plants (the other two plants are ranked 2 and 7). Therefore a plant effect seems unlikely as an explanation of the higher mean sharpness of trimmers’ knives.

<sup>17</sup>Not all makes are included in this table. A make with a small number of knives (*make ix*) has been excluded as has the ‘other make’ category (*make ii*).

<sup>18</sup> Total across all tasks, includes the tasks not shown in the table, that is, QA, supervisor and inspector.

<sup>19</sup> Total across all makes, not just those shown in the table.

41. The nature of the work done by trimmers may explain why their knives tend to be sharper than for the other tasks. Unlike other tasks, they do not cut hide nor hit bone, both of which will blunten knives.

42. Secondly, *there appears to be a 'species effect' associated with the main task groups (boners, slaughtermen and labourers) and the main knife makes.* For the knife make-task combinations with both cattle and sheep observations, most show a higher mean knife sharpness for cattle than for sheep. It is not possible to determine from the data alone whether the relationship is one of cause and effect – there are too many other factors involved.<sup>20</sup> However, it is known that grit in the wool of sheep has a blunting effect on knives. This strongly suggests that there is a causal relationship between the species processed and the sharpness of knives.

43. Slicers, who have the second sharpest knives on average, mostly use knife make iv and mainly process cattle. Most slicer cells are satisfactory, that is the mean sharpness is at least 8. There are a larger number of slicers than trimmers and they are found across more plants. This seems to rule out a plant effect but there could be a species effect, therefore no tentative conclusions are presented in respect of slicers.

Like trimmers, slicer do not cut hide nor hit bone and this is likely to at least partially explain the relative sharpness of their knives.

## 7 Summary and recommendations

### 7.1 Summary

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44. The main finding is that there is generally a low level of knife sharpness in the abattoirs involved in the case study. Of the 1,724 knives tested in the 13 case study abattoirs, only 6% were very sharp or extremely sharp, and 52% needed improvement. The overall mean knife sharpness of the knives tested was 7.89 and the overall median knife sharpness, 7.97. Both are classified as unsatisfactory (*needs improvement*), according to the knife sharpness scale used.

45. Some relationships between knife sharpness and plant, task, knife make, method of stone sharpening and species are indicated by the study. The results can be summarised as follows:

- Of the 13 abattoirs in the study, none were rated better than sharp based on their mean knife sharpness. Eight (62%) had an unsatisfactory mean knife sharpness (that is, rated as *needs improvement*). The other five were satisfactory, although three barely so, with scores very close to 8. In median terms, the situation is similar, with six abattoirs rated as satisfactory and seven needing improvement.

- In relation to employee characteristics, the only obvious relationship with knife sharpness is in the type of task carried out by employees. Trimmers and slicers had the sharpest knives, on average. Inspectors, supervisors and QA staff had the lowest. Only trimmers and slicers had, on average, satisfactory knife sharpness scores (8.27 and 8.11 respectively). All other tasks categories had mean scores of less than 8.0, that is, classed as *needs improvement*.

- In relation to the characteristics of knives, there are relationships between certain knife characteristics and knife sharpness that appear to be influential. Make of knife is possibly influential, with quite a large difference between mean knife sharpness scores across brands. The highest mean score for an individual knife make was 8.45, while the lowest was 7.73. Only two brands had a mean score that was satisfactory (over 8.00), with the mean score for all other brands rated as *needs improvement*. However, for most makes, there were examples of knives rated as *very* or *extremely sharp*. The variability of the data and the incidence of high and low

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<sup>20</sup> Some of which were not considered by the study, see Chapter 7 for a discussion of such factors.



scores for most brands, indicate that the relationship between knife make and sharpness is not a simple one and that other factors are likely to be involved.

- Stone knife sharpening method is another characteristic that appears to be related to knife sharpness. Knives sharpened with a jig have a higher mean sharpness level (8.28) than those sharpened with a stone (7.81). Knives that were 'smooth steeled' were sharper, on average, than those that were 'coarse steeled', with mean sharpness scores of 8.03 and 7.72 respectively.
- Regarding species, the data indicate a relationship between the type of animal processed at the case study abattoirs and the level of knife sharpness. Of the top six single-species abattoirs (ranked by mean value of knife sharpness), four process cattle and of the bottom six, four process sheep. Cattle-only abattoirs have sharper knives on average, with ranks for the six cattle abattoirs being 1, 2, 4, 5, 7 and 10. For the six sheep-only abattoirs, the ranks are 3, 6, 8, 9, 11 and 12. Consistent with this finding, workers who process sheep had, on average, less sharp knives than those who work with cattle.
- Cross-classified data were examined in an attempt to better understand the influence of the factors, knife make, task and species on the sharpness of knives. The analysis revealed that trimmers have the sharpest knives (on average) but do not use the sharpest brands. In addition, they almost always process sheep, the species that, at aggregate level, is associated with a lower mean knife sharpness. It seems that trimmers have sharper knives, on average, irrespective of the make of knife they use and the type of animal they are processing. The finding that trimmers have the sharpest knives, on average, is consistent with the nature of their work. Unlike other tasks, they do not cut hide or hit bone, both of which will blunten knives.
- Data associated with the main task groups (boners, slaughtermen and labourers), and the main knife makes, indicate that there is a 'species effect'. For the knife make-task combinations with both cattle and sheep observations, most show a higher mean knife sharpness for cattle than for sheep. While it is not possible from the data alone to determine whether the relationship is one of cause and effect, it appears to be the case, as grit in the wool of sheep is known to have a blunting effect on knives.
- There do not appear to be major differences in knife sharpness between departments or sexes.

## 7.2 Recommendations

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46. An obvious general recommendation is that the abattoirs and abattoir workers involved in this study need to do a better job of maintaining knife sharpness.

47. Even though the abattoirs were not selected on a statistical basis (and are therefore not strictly representative of all Australian abattoirs), because the selection method was not obviously biased (for instance, targeting known poor or good abattoirs), it is likely that the main finding is broadly relevant to other abattoirs in Australia.

48. Other recommendations are directed to the 13 abattoirs in the case study (but many are likely to be more broadly applicable). They include:

- The abattoirs should consider trialling the use of jigs as a sharpening method, especially for staff who are less skilled in knife sharpening.
- They should also consider using smooth steels in preference to coarse steels.
- Workers who cut hide (or hit bone) and those who work with sheep are more likely to have blunt knives. As such workers constitute a large proportion of all workers in the meat industry, particular attention should be paid to their training, knife sharpening equipment and frequency of sharpening.

- Practices of the highly ranked abattoirs could be examined to ascertain whether their work practices explain their higher scores; if so, other plants might consider adopting these practices.
- Inspectors, supervisors and QA staff should be more attentive to the sharpness of their knives. Arguably, they have a role in setting an example for other staff.

49. Should MINTRAC wish to further investigate knife sharpness, it is suggested that it work with selected individual abattoirs to learn more about the relationships between the factors of interest and knife sharpness. In particular, worker behaviour and skill level are likely to be determinants of knife sharpness, with factors such as the frequency of knife sharpening, sharpening skill level, worker output, worker payments<sup>21</sup> and the stone and steel sharpening methods used, likely to have an impact on knife sharpness.

50. Other factors of interest include whether some tasks and/or species are more 'demanding' on knife sharpness<sup>22</sup> and whether particular cutting surfaces are harder on knives than others.

51. In respect of the type of knife used, this study only considered knife make, not model. It is likely that all makes have a range of knives of varying quality and price. Therefore, *make* alone, is unlikely to be very informative. It would be more useful to collect complete and standardised data on at least the more common makes/models<sup>23</sup> and/or the current cost of equivalent knives.

52. There are also highly likely to be 'plant effects', for instance, practices regarding the frequency and method of knife sharpening, training of workers and soon.

53. Any follow-up study should take advantage of industry knowledge to select the factors likely to be most important. In addition, it would ideally employ some experimental design principles. A statistically designed test using such principles would better enable identification of the effect of individual factors<sup>24</sup> on knife sharpness and its elements could include:

- Random selection of at least one cattle abattoir and at least one sheep abattoir to take part in the study.
- Random selection of workers within the selected abattoirs to take part in the study; workers selected should cover the major departments and tasks of interest (it might not be feasible to include all categories of worker).
- Controlling for 'worker effects' by having individual workers use several (randomly allocated) knives and sharpening techniques, in similar situations (such as species, task, volume of throughput, frequency of sharpening etc). For instance, worker *a* in plant *b* might use three different knives on three consecutive days, where the level of throughput, the task and the knife sharpening techniques are the same, or similar, on all days.
- Controlling for 'plant effects' if possible by selecting plants that are similar in respect of training regimes etc. Plant effects are likely to be complex so this may not be possible. Controlling for worker effects might be sufficient.
- Standardising relevant knife-related practices (such as the frequency and method of sharpening) across the chosen abattoirs. In particular, measurement of knife sharpness should be standardised in respect of timing and frequency of measurement.<sup>25</sup> Industry

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<sup>21</sup> Wages and bonuses. Worker output and payments are likely to be correlated with skill level.

<sup>22</sup> The analysis indicates that this is the case.

<sup>23</sup> It is suggested that a classification is developed before data are collected.

<sup>24</sup> This is especially true given the large number of factors which are likely to interact in their effect on knife sharpness. An example of a controlled experiment on knife sharpness is described by Dowd *et al* in 2004 (Cutting Moments and Grip Forces in Meat Cutting Operations and the Effect of Knife Sharpness, <http://209.85.175.132/search?q=cache:rdjnWP15wCkJ:www.anago.co.nz/images/usr//articles/nzes%25202004%2520sharpness%2520paper.pdf+knife+sharpness+scale+anago&hl=en&ct=clnk&cd=1&gl=au>).

<sup>25</sup> It is assumed that is already standardised in terms of the technique used to measure sharpness.

knowledge is important in determining how this should occur. For instance, should knives be tested at a given frequency (e.g. each two hours) or after a given throughput (e.g. after a particular number of beasts is processed)?

- Including, in the analysis, other factors that may be related to knife sharpness, for example, worker output, experience and payments (all as a proxy for skill level).
- In addition, it could be useful to include a qualitative assessment by workers. For instance, of the different knives and sharpening methods they used, which did they think were most effective?

## 8 Attachment - Training and assessment support materials

### MTMMP11C Sharpen knives

#### MTM07 Australian Meat Industry Training Package

Certificate II Meat Processing



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### Note to users

These training and assessment support materials must be read in conjunction with the MTM07 Australian Meat Industry Training Package.

In particular, trainers and assessors must address the requirements described in:

- Volume I
- Volume II, introductory section
- The complete Unit of Competency, as presented in Volume II of the MTM07 Australian Meat Industry Training Package.

### Please help to keep these materials current

MINTRAC intends to regularly update these materials to ensure that they continue to reflect current practices and regulatory requirements in the industry.

Please assist in this process by taking the time to notify MINTRAC of any errors, changed requirements, incorrect information, additional materials, or any other ways in which these materials might be improved, by emailing [mintrac@mintrac.com.au](mailto:mintrac@mintrac.com.au).

## Using these support materials

### What are the materials for?

The materials are for the MTM07 Australian Meat Industry Training Package.

### How can they be used?

The support materials can be used by **trainers** to:

- plan and deliver training
- give additional information to trainees
- keep a record of the training they have delivered.

The support materials can be used by **assessors** to:

- plan assessment – after training and for recognition of current competence/prior learning
- show trainees the areas they need to work on to be competent
- keep a record of the evidence used in assessment.

Some parts of these training materials can be used by **trainees**:

- as a resource during training
- to review knowledge, understanding and learning
- to prepare for assessment.

### How are the materials organised?

Each booklet covers one unit of competence from the Training Package. The **unit title** identifies which unit the materials support.

The **Employability Skills** section provides advice on the identification, assessment and recording of Employability Skills contained within this Unit of Competency.

The **Inclusive Practices** section provides advice for users of the Australian Meat Training Package about the training and assessment of equity groups including people from diverse cultural and language backgrounds, those who require assistance with Language, Literacy and Numeracy (LLN), Indigenous people and people with a disability.

**Topic headings** are used to break the training material into sections.

The **questions** and **answers** cover the required knowledge that trainees need to know for the particular unit. Trainers need to understand this information before the training starts. Assessors also need to understand this material before they assess anyone for this unit. The questions and answers can be copied and given to the trainees as training notes.

The **Ideas for training** section includes on and off-the-floor activities that trainers can use to help the trainees understand the information. It lists:

- materials and equipment the trainer needs to deliver the training
- the method, or how to run the training session
- activities for the trainees to help them understand the training.

Trainers can also develop their own ideas for training, to suit the trainees.

The **Training record sheet** is for trainers to keep a record of the training activities they have completed.

The **Assessment** section provides general information on how to approach and prepare for Assessment. It is important that this section should be read in conjunction with the advice provided about Assessment in Volume 1 of the *MTM07 Australian Meat Industry Training Package*.

The **Evidence Guide** maps the Elements and Performance Criteria, and Required Skills and Knowledge to the sample Assessment Materials provided for this unit. It is important to note that assessors may need to modify the Evidence Guide after they have customised the materials to suit each individual assessment situation.

The **Assessment Materials** are sample materials which may be customised and used to assess the requirements of this Unit of Competency. Assessors can also develop their own Assessment Materials to suit the trainees.

The **Resources** section has a list of other resources the trainer can use in the training.

The **Bibliography** lists the books and other sources of information that were used to write the training materials.

## How is the training and assessment customised?

Every meat processing company is different. The training and assessment should match the operations of the company and the requirements of the units of competence. The material in this booklet must be customised to the company's and trainee's needs by including the:



Company **work instructions** for the tasks in the material.

### SOPs

Company **standard operating procedures** for the tasks in the material.

### E

Company **equipment** used for the tasks in the material.

### D

Any company **documents** or forms used for the tasks in the material. This includes safety signs, Material Safety Data Sheets (MSDSs), Quality Assurance checklists and company memos.

The icons in the question and answer section show:

- where to put the company information in the materials
- when the training and assessment must be applied to company operations.

These training materials must be updated for any changes in relevant legislation, regulations, guidelines and codes of practice – for example, the AS 4696:2002 *Australian Standard for the hygienic production and transportation of meat and meat products for human consumption*.

## Employability Skills

This section provides advice on providing training and assessment of Employability Skills in relation to MTMMP11C *Sharpen knives*. It should be read in conjunction with the advice provided about Employability Skills in Volume I, and with Employability Skills: From Framework to Practice (DEST 2006), available from [http://www.training.com.au/documents/Employability%20Skills\\_From%20Framework%20to%20Practices.pdf](http://www.training.com.au/documents/Employability%20Skills_From%20Framework%20to%20Practices.pdf)

Employability Skills are to be considered as equal in importance to all of the other components which make up units of competency. As such they are subject to the same principles and issues in delivery and assessment.

### **Employability Skills Framework**

Every qualification within the *MTM07 Australian Meat Industry Training Package* now includes an Employability Skills Framework. This framework provides a table of the eight Employability Skills and examples of the types of skills and behaviours which further describe how each Employability Skill is applied in the context of the given qualification. This information is included in the front section of the relevant *MTM07* Volume.

### **Facets**

Facets are specific examples of skills and behaviours which contribute to the overall application of a particular Employability Skill in the context of a given qualification.

Every qualification in a *MTM07* has its own unique set and mix of facets.



### **Employability Skills Summary**

Every qualification in *MTM07* contains an Employability Skills Summary. The summaries describe how each Employability Skill and its facets are applied in the day to- day contexts of the occupation(s) covered by the specific qualification concerned.

This information is included in the front section of the relevant *MTM07* Volume.

## **General principles for incorporating Employability Skills into training delivery and assessment**

Delivery and assessment of Employability Skills share two common principles, which must be taken into account, regardless of the context in which they are to be worked with.

- Learners or candidates for assessment must be made aware of what Employability Skills are, and particularly how they pertain to the given job role
- Learners and candidates for assessment must be provided with opportunity to reflect on and/or demonstrate the Employability Skills and the contributions they make towards the successful completion of tasks

Volume I of *MTM07* contains additional advice which supports the above principles and incorporates other important approaches that can be utilised.

## **Employability Skills in MTMMP11C Sharpen knives**

This unit covers a range of facets identified by the meat industry as of importance to abattoir workers. These include:

- communication
  - listening and understanding
  - speaking clearly and directly
  - sharing information
- teamwork
  - working as an individual and as a team member
  - working with diverse individuals and groups
  - applying knowledge of own role as part of a team
  - applying teamwork skills to a range of situations
- problem solving
  - solving problems individually or in teams
- initiative and enterprise
  - adapting to new situations
- planning and organising
  - managing time and priorities

- self management
  - monitoring and evaluating own performance
  - taking responsibility at the appropriate level
- learning
  - being open to learning and new ideas and techniques
  - learning in a range of settings including informal learning
  - participating in ongoing learning
  - learning in order to accommodate change
  - learning new skills and techniques
- technology
  - using technology and related workplace equipment
  - using basic technology skills
  - applying OH&S knowledge when using technology

### **Delivery and assessment strategies**

Training delivery can occur in either a work or classroom based context, or a combination of the two. Workplace based approaches to learning are the preferred approaches in the meat industry, and can be useful in the instruction of technical tasks, as well as in the instruction and development of Employability Skills. Learning in the workplace develops knowledge which may be highly contextualised through the incorporation of business objectives, policies and procedures and specific information on equipment, technology and processes unique to the workplace.

#### ***Workplace-based***

Research performed by Smith and Comyn (2003) explored the many ways in which Employability Skills were developed in novice workers in workplace settings. These approaches included; induction processes, buddying / mentoring systems, meetings, assessment and appraisal systems, and task rotations. What all of these approaches share in common is that in the context of a specific workplace, new workers have opportunities to gain wide exposure to the variety of tasks, resources, behaviours and personnel unique to the context of the wider organisation.

#### ***Classroom-based***

Where workplace learning opportunities may not be available, practical case studies, simulations and activities with industry representatives can help address the difficulties inherent in developing Employability Skills in the classroom. Where activities take place in the classroom, developers of training need to ensure the currency, accuracy and relevance of material. This places extra emphasis on developers to ensure strategies used have a direct industry focus and relevance. This is of particular importance when the learners are unemployed or from different enterprises.

### **Developing active, lifelong learners**

Volume I of *MTM07* also discusses the importance of learning strategies in the development of training. These strategies describe actions, principles and attitudes towards learning that are

increasingly expected of learners and trainers alike. Incorporating these approaches into training activities creates a strong foundation for the inclusion of Employability Skills, but most significantly elements of the **Learning** facets of Employability Skills.

**Responsible Learning** encourages learners to take ownership of the learning process through more direct active participation in the learning process and includes: making meaning out of new knowledge, distilling principles which will aid transference to new contexts and practicing skills and mastering processes.

**Experiential learning** emphasizes 'learning to do' and 'learning from doing'. Authentic learning occurs when learners have an opportunity to apply their skills and knowledge in authentic work environments or in contexts which attempt to simulate the real. With its emphasis on real-time demonstration of skills, experiential learning can provide a strong basis for the demonstration and development of all Employability Skills. It can be particularly useful to create opportunities in which **problem solving** and **planning & organising** skills are applied in real-time.

**Cooperative learning** encourages collaborative approaches to learning where learners; learn from each other, share learning tasks and learn from a range of people including colleagues, mentors, coaches, supervisors, trainers, etc. Cooperative learning based activities can be particularly useful in the classroom to provide opportunities to work with **teamwork** and **communication** skills.

**Reflective learning** is about consciously and systemically appraising experience to turn it into practical applications for the future. This can be introspective, where learners are encouraged to examine changes in their own perceptions, goals, confidences and motivations. It addresses: developing critical thinking skills, learning to learn and developing attitudes that promote lifelong learning. While reflective learning can be useful in directly addressing **problem solving, initiative & enterprise** and **self management skills**, it is an irreplaceable component of the overall instruction of Employability Skills. Learners must be provided with an opportunity to reflect on the ways the skills contribute to job effectiveness as well as their own abilities in relation to each of the skill areas.

## Inclusive practices in training and assessment

An individual's access to the training and assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in the Training Package.

Inclusive practices means acknowledging and valuing differences in people and cultures and providing training and assessment that takes into account these differences. Simple adjustments can be made to training and assessment environments, processes and materials without affecting competency outcomes and this section of the resources provides information and advice about adjustments for a range of groups including people from diverse cultural and language backgrounds, those who require assistance with language, literacy and numeracy, Indigenous people and people with a disability.

### Training and assessing workers from diverse cultural and linguistic backgrounds

Currently in the meat industry, there is increasing use of workers from overseas, and there may be cultural issues that impact on the training and assessment process. For example, this could relate to the need to use interpreters, the wearing of particular clothing, allowances for religious or cultural observance, cross-gender contacts and authorities, observance of status etc.

Trainers and assessors need to be flexible and to exercise cross-cultural sensitivity in training and assessment situations. Where appropriate, they should make reasonable adjustments to the

training and assessment process whilst maintaining the integrity of the unit of competency. For example, in some cultures, it may not be appropriate for a male to conduct the assessment. Where in doubt, trainers and assessors should seek expert advice (some suggestions are made in the section 'Sources of help for training and assessment', below).

### ***Strategies for understanding spoken and written language in a classroom environment***

- Learners can be encouraged to use their own language to help each other. To use this strategy it is important to have a small group of participants who speak the same language in each training group. This enables them to discuss new information and technical terms in their first language and check their understanding.
- A 'translator/interpreter' can sit in on each class. Preferably, interpreters should come from the plant and be experienced and qualified workers in the areas covered by the training. When someone does not understand, they can ask the interpreter to clarify the information.
- Ensure current workplace documentation, e.g. hygiene and sanitation requirements, signposted instructions etc, are written in plain English, and diagrams and pictures are used as much as possible to assist understanding.
- Translate key materials into the language(s) of the workers. Ensure that the translator is competent to understand the requirements of the documentation, to ensure an accurate and meaningful translation. Ask other workers, competent in both the language and relevant processes, to check the accuracy of the translations.
- Take photographs of processes, products etc, and ensure that they relate coherently to written text.
- Use short video clips to demonstrate a sequence, process or practice in association with written text.

### ***Strategies for supporting learning and assessment on-the-job***

1. Use on-the-job demonstration and practice using a translator to explain key aspects of sequencing and underpinning knowledge.
2. Bi-lingual workers can be used as support trainers and presenters. In particular they can assist with the translation and understanding of terms and jargon which are commonly used in the workplace.
3. Trainers can learn key words and phrases in the workers' language in order to be able to offer commendation, correction and encouragement during training and assessment processes.

### ***Sources of help for training and assessment***

The Federal and State/Territory Governments relevant departments of ethnic and cultural affairs should be able to assist.

Culture at Work (2004 Commonwealth of Australia).

Department of Education Science and Training (DEST)

<http://www.dest.gov.au/literacynet/resources1.htm#Language>

### **Language, Literacy and Numeracy in training and Assessment**

Every workplace task involves using the skills of speaking, listening, reading and writing and often mathematics skills as well – in other words, language, literacy and numeracy (LL&N). Some employees may need assistance with language, literacy and numeracy skills if they are to participate effectively in job training. If a trainee does have difficulty with certain LL&N skills, it is more effective if LL&N assistance is given while the work task is being learnt.

*Literacy* in the workplace means being able to:

- recognise workplace documents and signs
- read and/or interpret workplace documents and signs
- write what is required on the job in order to do your job accurately and effectively.

*Numeracy* involves being able to carry out the mathematical operations that are necessary in one's job. This could be taking measurements, using time, making calculations, working out percentages, estimating, and recording mathematical data.

*Language* in the workplace relates to the use of

- English words, verbal structures and gestures used to convey meaning
- first or Indigenous language
- languages other than English
- forms of communication based on visual communication skills such as Australian Sign Language (AUSLAN)

Required LL&N skills may be explicitly stated in competency standards, but more likely they will be 'hidden', and say, for example, 'report faults to a supervisor', or 'record data'.

As a **trainer**, you will have to:

- take the existing LL&N skills of the trainee into account
- make sure you communicate effectively while training
- give trainees the opportunity to develop the speaking, listening, reading, writing and mathematical skills they need on the job.

As an **assessor**, you will have to:

- take the existing LL&N skills of the candidate into account
- provide appropriate assessment for the task (which may, for example, include alternatives to reading and writing, such as oral questions)
- make sure the assessment does not involve a higher level of LL&N skills than the tasks being assessed actually require
- be flexible in the provision of assessments and allow reasonable adjustment in assessment where necessary to allow those with LL&N issues every opportunity to participate fully in training and assessment.

### ***Sources of help for training and assessment***

The Reading and Writing Hotline

Telephone 1300 655 506

LiteracyNet website

[www.dest.gov.au/literacynet/resources.htm](http://www.dest.gov.au/literacynet/resources.htm)

Adult Education Resource and Information Services

[www.aris.com.au](http://www.aris.com.au)

*Built in Not Bolted On* - this kit, originally published in 1998, is now out of print however the content has been revised and updated in 2000 and provides information for language, literacy and numeracy practitioners, training managers and industry trainers about language, literacy and numeracy issues in the delivery of training packages.

<http://antapubs.dest.gov.au/publications>

### **Training and assessing workers within Australian Indigenous settings**

There are many sensitivities and complexities involved in Indigenous cultures. These include issues of ownership within Indigenous cultures and nations, as people identify with and exercise affiliations. Cross cultural issues are not only a function of Indigenous/non-Indigenous interactions, but also between and within Indigenous cultures and sub-groups and can be extremely complex and sensitive.

When training and assessing Indigenous trainees in the meat industry, trainers and assessors will need to consider:

- languages for delivery and training and for assessment, including localised English definitions and terms
- levels of literacy and numeracy, and comfort with and relevance of written materials and written work
- local cultural rules and constraints
- types and styles of communication and interpersonal interactions, and
- meeting the needs of Indigenous trainees within non-Indigenous settings.

As resources are developed, consideration will need to be given to the selection of appropriate trainers and assessors, and the development or adaptation of appropriate resource materials. Some possible strategies for addressing these needs might include:

- consulting elders or local Indigenous community representatives about appropriate methods for accessing and using knowledge
- allowing time to develop rapport and trust, to develop and explore viewpoints, on-going consultation, communication and problem-solving
- encouraging participation of local elders as presenters, mentors, advisers and supporters. Even if they do not take an active role, their presence and inclusion lends both authority and permission.

Training and assessment approaches might include:

- verbally-based training with explanation and demonstration
- using artwork or illustrated visual presentations
- consulting with trainees about preferences and how they feel they can best demonstrate their competence
- taking a flexible approach to time and achievement of outcomes
- identifying culturally appropriate and sensitive trainers and assessors
- training external trainers in appropriate and localised approaches

- personalising training materials with appropriate, local illustrations and applications.

The resources developed within these training and assessment support materials contain suggested activities and examples, some of which may require modification for use with Indigenous workers. The challenge is in balancing local situations and needs with national competency standards and qualifications. Qualifications are national and therefore 'portable' and these aspects must be considered.

### **Sources of help for training and assessment**

Quality training for Indigenous people

[www.westone.wa.gov.au/workingwithdiversity/](http://www.westone.wa.gov.au/workingwithdiversity/)

National Aboriginal and Torres Strait Education web site

Website: [www.natsiew.nexus.edu.au](http://www.natsiew.nexus.edu.au)

Most State and Territory Education Departments have an Indigenous Unit which may be able to provide advice and information.

### **Training and assessment for people with a disability**

When learning to work, every person has slightly different needs. This section will assist employers and trainers in the meat industry to meet the reasonable adjustments needs of trainees with disabilities. An open mind, common sense and tailoring to individual circumstances will, as often as not, assist employees and trainees to achieve the standards described within the Units of Competency. There is no need to go to great lengths to meet the needs of employees with disabilities – it is about identifying which adjustments might reasonably be made and how they might be put into place.

A disability presents some impairment to everyday activity. In practice, some people with a disability do not have any impairments resulting from their disability. For example, a person who has a hearing impairment which is compensated for by a hearing aid may function without any adjustments. Detailed information on how to adjust training and assessment for the disabilities which may affect the full range of human functions cannot be provided within this section.

However, there are many resources available, some of which are listed below.

There are three steps which can be taken to make training and assessment more appropriate and fair for those with disabilities:

- **Attitudes:** Positive language can create, for the speaker and listeners alike, an atmosphere of mutual respect. For example, generally when referring to people with special needs, the 'people' come first – this signifies the primary importance of the person, rather than the disability.
- **Preparation:** Identify any functional issues arising from the nature and extent of a person's disability. This can usually be done quickly by discussing such issues with the trainee. In most cases, this consultation will identify any reasonable adjustment needs which can be put into place. There are many things that you can do to make reasonable adjustment to enable the trainee to succeed in training and assessment. In some cases, professional support may be required.
- **Application:** Once you have in place any reasonable adjustment, it is important to monitor and evaluate what has been done to ensure the best environment for continuous training. In most cases, an informal chat with the trainee may be all that is necessary. However, should adjustments be substantial, or a trainee is not acquiring competencies at a reasonable rate, a more formal process may be justified.

### ***Some examples of reasonable adjustment:***

- *mobility impairment*: oral rather than written presentations
- *hearing impairment*: use of Plain English documents, sign language interpreters, fire and alarm systems fitted with flashing lights
- *psychiatric disability*: use of reflective listening skills, identification and avoidance of stresses, use of on-going rather than formal assessments, providing 'time-out' breaks in assessment
- *speech impairment*: provision of time and patience, paraphrasing, getting them to put things in writing, minimising stress.

### ***Sources of help for training and assessment***

Commonwealth Disability Services Program Contacts

<http://www.facs.gov.au>

Quality training for people with a disability

[www.westone.wa.gov.au/workingwithdiversity/](http://www.westone.wa.gov.au/workingwithdiversity/)

Australian Federation of Deaf Societies

c/- 59 Cadbury Road

Clairmont TAS 7011

(03) 6273 2422

Australian National Association for Mental Health

Tweedie Place

Richmond VIC 3121

(03) 9427 0370



### Training support materials for MTMMP11C Sharpen knives

These materials are for training in MTMMP11C *Sharpen knives* in the Certificate II Meat Processing.

#### What must be considered when choosing a knife?

When you are choosing a knife the following factors are important:

- stainless steel blade
- thickness of the blade
- length of the blade and of the knife
- shape of the blade
- type of handle.



**Boning knives**



**Skinning knife**

*Picture courtesy T&R Murray Bridge South Australia*

In general, a broader, heavier blade is better for most slaughter purposes, such as skinning, and a thinner, flexible blade is better for boning and slicing. Most knives have blades between 125 to 175 millimetres long. Shorter blades, when sharp, require less force to cut and may reduce repetitive strain injuries. Some boning knives have a ring to prevent 'run through' cuts if the hand slips onto the blade. These knives are good for trimming but do pose a risk if used for boning.



Here the knife is being held in a typical trimming or slicing grip, the ring has obvious safety advantages.

*Picture courtesy T&R Murray Bridge South Australia*














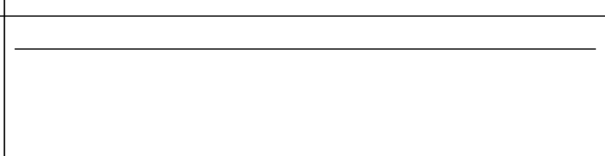


A typical boning grip, you can see the ring has no advantage, if it gets caught on a piece of bone it could pull the knife out of the hand. The choice of knife is dependant on its use.

*Picture courtesy T&R Murray Bridge South Australia*

**Different types of knives**

There are many different types of knives in the industry. Certain jobs in the industry require the correct knife and if you change the cutting work e.g. skinning to boning, you may have to replace the knife you use.

<p><b>Butchers steak knife</b></p> 	<p><b>Skinning knife – Hollow ground</b></p> 
<p><b>Butchers steak slicing knife</b></p> 	<p><b>Skinning knife</b></p> 
<p><b>Butchers knife – bull nose</b></p> 	<p><b>Boning knife straight – Narrow blade</b></p> 
<p><b>Meter steak knife</b></p> 	<p><b>Boning knife straight –Wide blade</b></p> 
<p><b>Breaking knife</b></p> 	<p><b>Boning Knife Curved - Wide Blade</b></p> 
<p><b>Breaking knife – Granton</b></p> 	<p><b>Boning Knife Curved - Narrow Blade</b></p> 
<p><b>Breaking knife – flexible</b></p> 	

### What are the parts of a knife?

There are two sections to a knife – the handle and the cutting blade.



Parts of a knife © MINTRAC

Parts of a knife *Picture courtesy T&R Murray Bridge South Australia*

### **The handle**

The shape of the handle needs to be comfortable for you to grip. It must also provide some safety for you, as the heel of the handle prevents your hand from slipping over the blade or the blade coming back through your hand (commonly known as a 'knife slip'). A rough texture also helps to prevent slipping, however it should be impervious (unable to be penetrated by moisture) to avoid biological hazards.

Plastic-handled knives are easier to clean. However, they can be a safety hazard if fat builds up on the handle, because this can increase the chance of your hand slipping. You need to clean your knives regularly to prevent this from happening. Modern handles are made from a slip resistant surface but they still require regular cleaning.

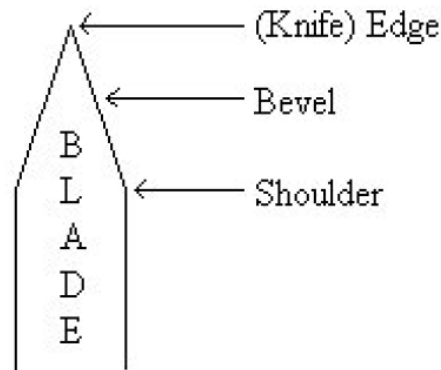
Wooden-handled knives are not as hygienic as plastic-handled knives. This is because wooden handles absorb moisture, which can encourage the growth of micro-organisms that can contaminate or spoil the product. So you must dry the wooden handle at the end of each shift and ensure that no damage has occurred to the handle.

Wooden-handled knives or wooden handled steels cannot be used at export-registered establishments or where State requirements don't allow their use.

### **The cutting blade**

Blades are made of stainless or carbon steel.

Different parts of the blade have different names, as shown below.



Cross section of a blade © MINTRAC

Chromium steel is a stainless steel which is a softer steel than carbon. It is easy to sharpen but does not stay sharp as long.

Manganese is a type of stainless steel that will not rust. It is a hard steel which keeps its sharp edge longer than a carbon steel knife does and is easier to keep hygienically clean.

Carbon steel knives are still used by some workers, although they are less common than they were. As carbon steel is softer than manganese, it is easier to sharpen. The main problem with carbon steel is that it rusts easily. At the end of each day you must:

- clean and sterilise the blade
- dry the blade
- rub the blade with emery paper to remove any rust
- smear the blade with oil (rarely used)
- store in a dry area.

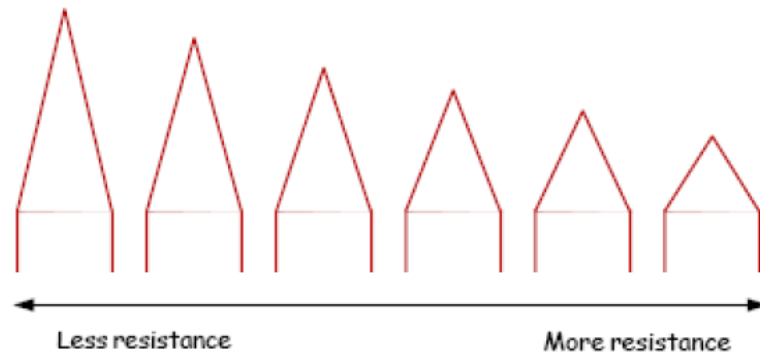
### How is the knife maintained in good order?

Your knife must be kept sharp at all times. This will reduce the risk of an accident and ensure more efficient use and reduce repetitive strain injuries. In order to sharpen and maintain knives we need various tools and equipment:

- knives and their correct storage equipment
- sharpening stones
- grinding wheels (grinders)
- washing and sterilising facilities
- steels.

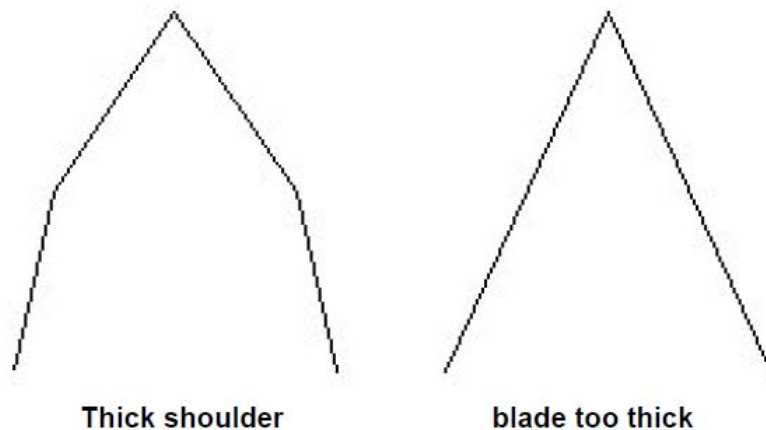
You must use your knives skilfully and safely.

Before the knife edge can be sharpened, you must decide what shape the blade is to be. This depends on its shoulder and bevel. The thicker the shoulder, the greater the angle of the bevel, the more resistance you will get when cutting. Thicker shoulders are useful when cutting around bones or thick wool as they minimise the edge being 'rolled over', which would then require steeling. A rough steel may be required to straighten the edge after contact with bones / thick wool or the like. If the blade is too thick or has large shoulders, the edge will quickly become dull and will not cut easily.



© Big Bay Skills Training Ltd

## The bevel

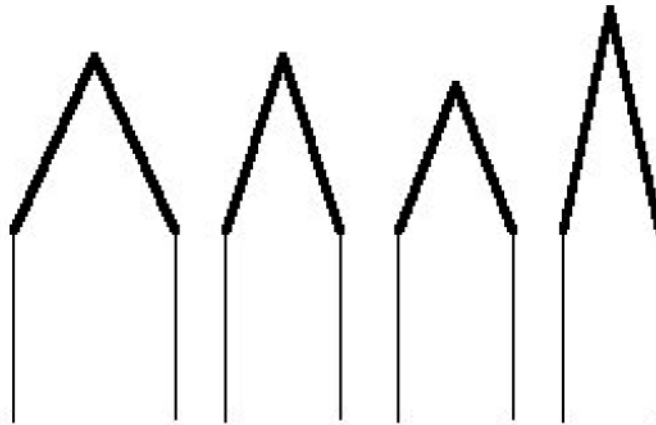


© MINTRAC

The bevel is the pointed part of the blade and can be a different shape on different knives. There are different shapes of bevel because:

- different tasks need different shapes, e.g. boning, slaughtering
- types of steel vary – hard or soft
- shape of blades vary.

The bevel is shown by the darker lines on the following diagram.



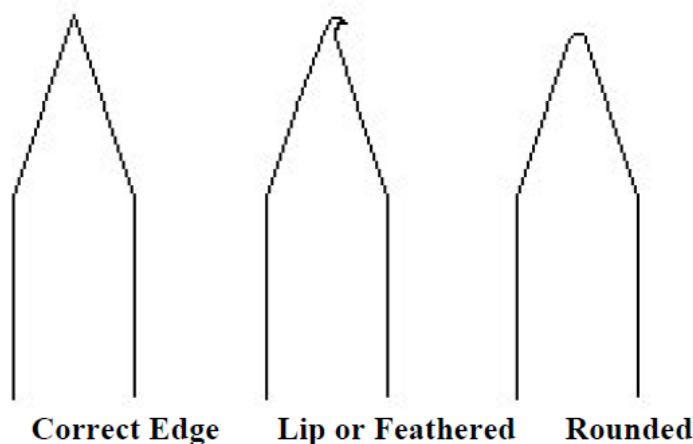
Different bevels on knives © MINTRAC

Because the knife manufacturer has already shaped the knife-edge, it shouldn't need to be reground unless the knife-edge has been damaged. The bevel should be about 1 millimetre wide. Both sides of the blade should have an even bevelled surface at an angle of 15–25 degrees. The two bevels must meet precisely along the full length of the blade. This can be difficult along the curved part of the blade. During the sweeping motion of sharpening, the knife handle will need to be lifted slightly to allow the bevel to continue down the curved blade. The use of a black marker to mark the bevel will enable the user to see where the metal is coming off the knife, and enable the bevel to be even the full length of the blade.

The bevel is different for each type of work. For example boning knives, frequently come in contact with bone. A fine bevel will often result in large chips in the cutting edge, so a thicker bevel is best. Slicing or skinning knives need a fine bevel or hollow grinding to remove resistance or pressure needed to cut.

### ***The knife edge***

The knife edge is the point where these two bevelled edges meet. The edge will be very thin if both the shoulder and the bevel have been maintained correctly. This can result in the edge turning over and forming a 'lip' or 'feather'. You must take this lip or feather off or the edge will double or sometimes treble in thickness. It will then not cut cleanly.



Types of edges © MINTRAC

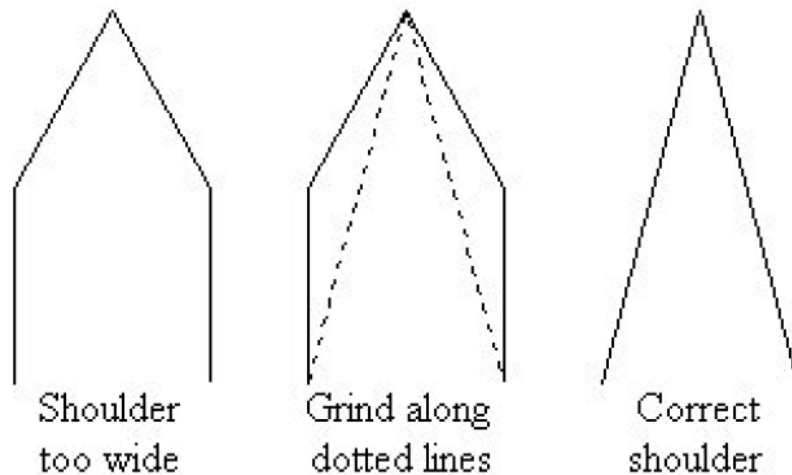
### ***The grooved blade***



The grooved blade is used for dense meat such as pork. Blades have grooves cut into them to reduce drag. The grooves allow air to flow in much the same way as the grooves in a rifle bayonet.

### **The grindstone**

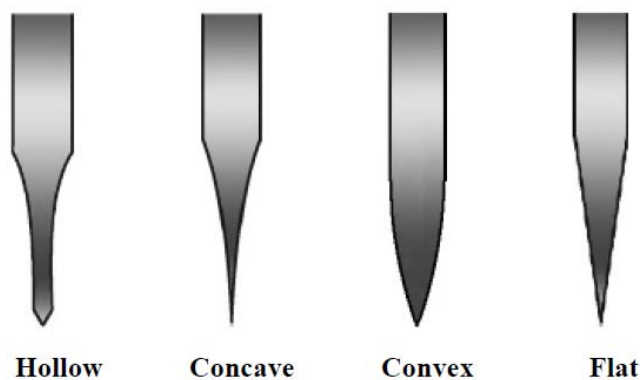
You should use a grindstone to thin the shoulder of the knife to the desired shape, as shown in the following diagram. A sandstone or emery wheel may also be used for this purpose.



Types of shoulders on blades © MINTRAC

Common shapes that can be achieved by using the grindstone:

- hollow grind
- flat grind
- concave grind
- convex grind



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When operating the grindstone, you should use enough water to prevent damage to the knife and stone. Make sure any filings are cleared from drainage outlet, magnetic fixtures and water jets. The wheel should turn away from you and the knife edge should be facing away from you. Always hold the knife with the back facing you. You must not let the knife face towards you, as it



can dig into the grindstone, twist rapidly and cut into your hand (knife roll). To set the grindstones on the knife sharpening machine use a piece of A4 paper placed between the stones to ensure the correct spacing or gap between grinder wheels. The paper should be held sufficiently between the grinder wheels without the need to hold the paper before unwinding the grinder wheels. Unwind the adjustment until the paper can be moved freely between the wheels without tearing or falling out on its own. This is the ideal setting for the grinder wheels.



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Untrained workers should seek assistance from experienced operators.

Sometimes different edges are required for different animals to prevent damage to the knife. Often 'lot fed' cattle have hides with a build up of mud and faeces. Cutting through this, especially the leggers and flankers, will quickly blunt a sharp knife. You will often be better off with a thicker bevel and rough steel reserved for this task. When using a knife sharpening machine place the tip of the knife in the middle where the two grindstones meet. Lightly push the knife tip through the channel ensuring they contact the grindstones evenly. Avoid placing fingers on the blade. Push forward and then pull backwards across the grindstones ensuring even pressure forwards and backwards. To get a good, flat, cutting bevelled edge, you must Repeat the process on both sides until both sides are the same. The knife is now ready to be honed.



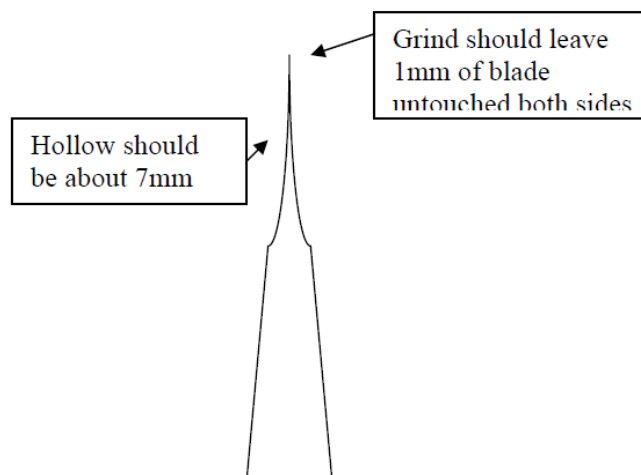
**Knife sharpening machine**

*Photo courtesy Fletcher International WA*

### **Hollow grinding**

Hollow grinding is when you need a fine very sharp edge. Not recommended where the knife is likely to contact bone or hard table surfaces; recommended for slicing (using cutting boards) and skinning tasks. Both sides of the blade are ground to produce a slight hollow usually about 7 mm wide and finishing about 1mm from the edge of the blade. Don't grind right down to the edge or you will have a 'feather' edge and that defeats the purpose.

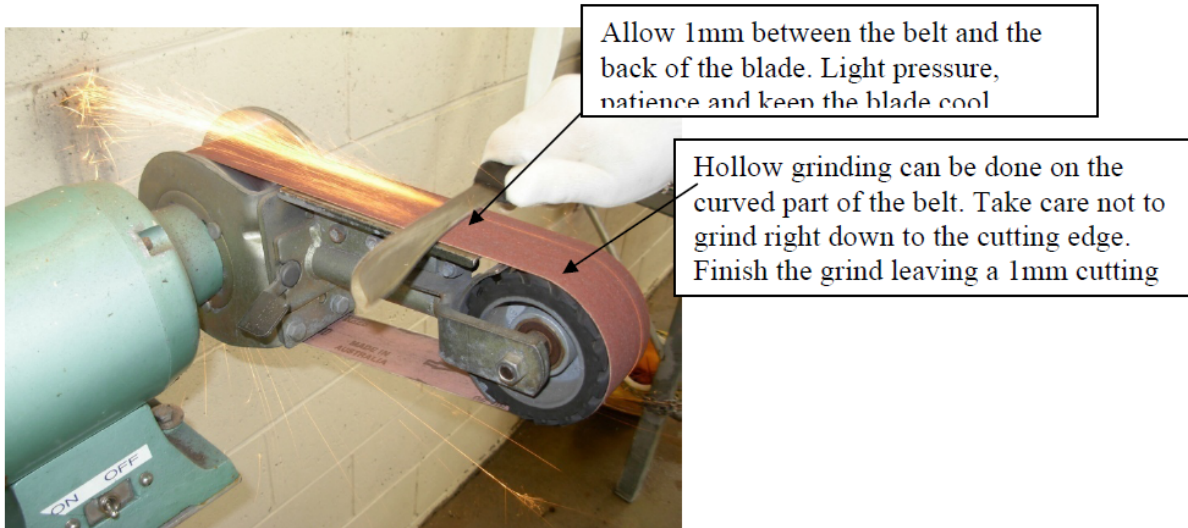
The main advantage of hollow grinding is the ability to quickly sharpen the edge by placing the blade flat on the stone so the blade edge of the hollow is being sharpened; it also reduces knife drag, reducing effort and wear and tear on your wrists. Take care not to overuse the wet stone or you could produce a feather edge. You'll know if you have as fine bits of the edge will come off as you steel the knife. Always check for this before you go near the product again.



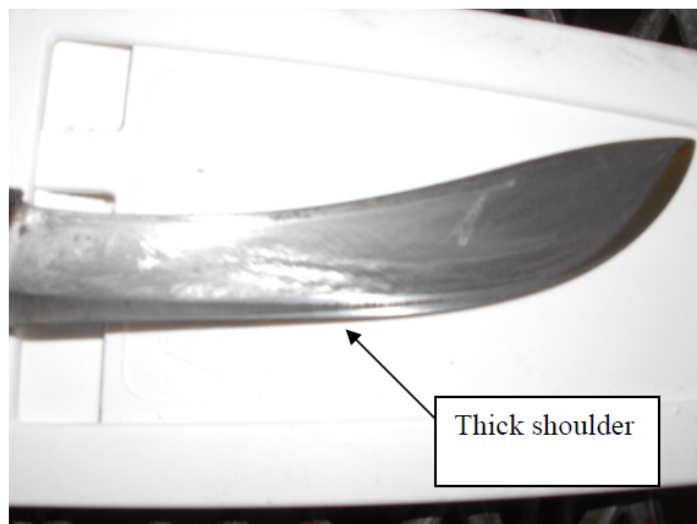
### **Belt grinders**

Belt grinders are the choice of most modern abattoirs. They are a versatile tool that can be used for flat grinding, hollow grinding and reshaping the knife. Two important things to remember are safety and pressure. Safety - always use eye protection, the belt should be firmly attached not tight and rotate away from the body.

Pressure - keep it light to prevent heat, excessive heat will burn the steel and make it brittle. Always have a water container handy and regularly cool the blade. When flat grinding hold the blade flat and just lifted up so the back of the blade is 1mm clear of the belt. The back of the blade is where the strength is so don't grind it off.



**Belt Grinder** *Picture courtesy T&R Murray Bridge South Australia*



**Blade prior to grinding note the thick shoulder**

*Picture courtesy T&R Murray Bridge South Australia*



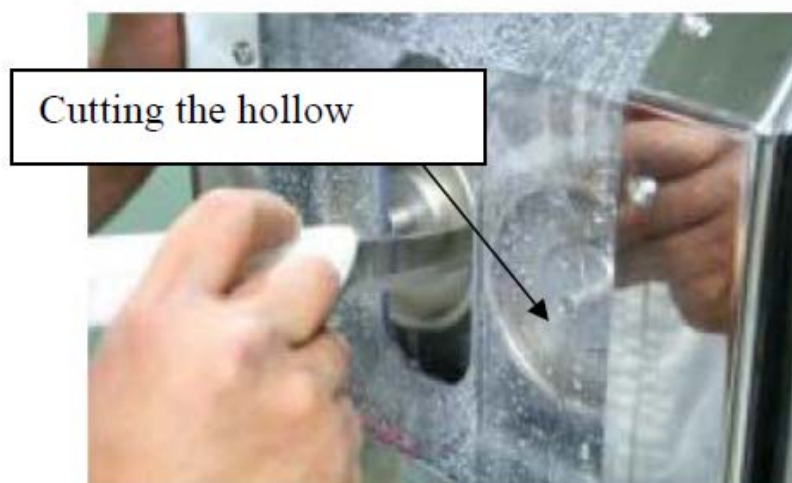
Finished flat ground blade - note the shoulder is completely gone.

*Picture courtesy T&R Murray Bridge South Australia*

At this point you can decide whether or not you wish to hollow grind the blade. If you do you can use the belt sander or a hollow grinding machine.

### **Hollow grinding machines**

Always wear approved safety glasses or goggles and your haircover, before commencing knife grinding. These machines have two opposing wheels set at what ever grinding setting you require. They can be set extremely close for a fine cutting edge and small hollow or wide for thick knives that need a bigger hollow. To begin grinding a knife start the grinder and turn on the water supply. Insert a knife in the slot of the front cover between the grinding wheels. Let the knife rest down between the grinding wheels to begin creating a grind. Let the machine do the work don't force the blade through, just guide it. Push forward and then pull backwards across grindstones ensuring even pressure forwards and backwards. Lift the knife handle when pulling backwards to grind the tip, tilt handle up when pushing forward to grind the heel of the knife.



*© Big Bay Skills Training Ltd*





A perfectly hollow ground knife *Pictures courtesy T&R Murray Bridge South Australia*

### **The Oilstone**

Man-made oilstones are made from silicon carbide and aluminium oxide. The abrasive grit is pressed and heated like a ceramic to a high temperature until it is effectively a stone. These materials cut faster than the natural stones but require a lighter touch to achieve the same results.

You can use an oilstone or whetstone to shape or bevel the sides of the knife blade which forms the edge. This process is called honing the blade. The knife is honed between runs to smooth away excess metal and create a new shape edge. A larger two layer oilstone is the easiest to use. One side should be a medium coarse abrasive and the other medium fine. The finer the stone grit size, the smoother the bevel of the knife edge.

Honing oil, (white oil is a good choice) as well as water and detergent, are used on the oilstone to stop the stone from clogging up with small pieces of metal from the knife. Do not use lubricating oils for honing as they form a sludge which makes it difficult to cut the metal of the blade. They also tend to clog the porous feature of stones. A stone clogged with sludge or fat will appear glossy and be of little use to you. Hot water and a strong detergent will get it out. Don't be tempted to use the caustic in the hook shed no matter what any 'old timers' tell you. It's extremely dangerous and against company safety rules. Caustic reacts with moisture and fat to create heat. It'll burn a hole in your skin.

- Place the stone on a clean surface or stainless steel frame (stone holder) to eliminate cross-contamination. Use a clean piece of towelling to prevent the stone slipping.
- A fixed stone holder is the safest and best way to secure the stone.
- Clean the knife before sharpening.
- Clean the stone after each use to remove fat build-up. (If hot water will not remove fat build up contact maintenance to dip in acid wash with the rollers) This will add 'bite' to your stone.
- Store the stone in a clean area.

When honing, the blade should be drawn across the oilstone from the heel to the point, as shown in the following diagram.



**Knives sharpened on oilstone** *Pictures courtesy T&R Murray Bridge South Australia*

You must keep the knife at the same angle that it was ground on the grinding stone. Use as much of the stone as you sagely can and make an average of between 5-15 strokes on each side.

Note; when the stone becomes worn (scalloped) it will need reversing or replacing.



**Notice the lifting motion without changing the bevel angle to obtain a sharp edge on a curved blade.**

*Photo courtesy Goulburn Ovens Institute of TAFE*



**Sharpening stone**

*Photo courtesy Fletcher International © MINTRAC*

Honing at the wrong or an inconsistent angle and missing parts of the knife edge are the main problems when using an oilstone or whetstone. Take your time and go slowly. The correct angle is where the flat of the bevel is stroked across the stone, not the shoulder and not the cutting edge.



*© Big Bay Skills Training Ltd*

Ensure that the blade is evenly sharpened on both sides. The knife is now ready to be steeled.

### ***The steel***

The steel is used to remove and smooth any burrs or imperfections on the sides of the cutting edge. It does not sharpen it. It finishes off and maintains the edge that you achieved by using the grindstone and oilstone.

There are many different types of steels, such as:

- smooth - honing should be done with a smooth steel to make as fine an edge as possible
- mild – used to straighten rolled over edges. For best results complete honing back onto smooth steel before recommencement.

- coarse – mainly used for straightening severely bent or rolled over edges from cutting into bones or through thick wool and the like. For best results complete honing back onto smooth steel before recommencement.
- diamond impregnated - the diamond particles are of a particular shape to ensure optimal honing of the edge, and the steel surface is coated with diamond granules
- wire-styled steel – similar to a smooth steel with set angles to pull the knife through.



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When using the steel, place the heel of the knife on the steel and turn the knife gently towards the cutting edge. Stop turning just as the cutting edge makes contact. Rotation of the knife on the downward stroke is a common problem when steeling, so you're your time! Lightly stroke the knife a few times each side is all it should take, on a smooth sharpening steel to restore the shaving edge each time it dulls. You should always use the same amount of strokes on each side of the blade.

A bad habit many workers develop is to beat the knife on the steel, often resulting in chipped blades. The end of the steel is magnetised - this is all the contact pressure you need. Get into the habit of guiding the blade down the steel *gently and slowly*. A steel is only intended to *straighten or restore* the cutting edge not grind it- that's what the sharpening stone does!





Hold steel as above with the thumb tucked behind steel



Check arm, steel and knife are square and in line. Knife handle centre of wrist

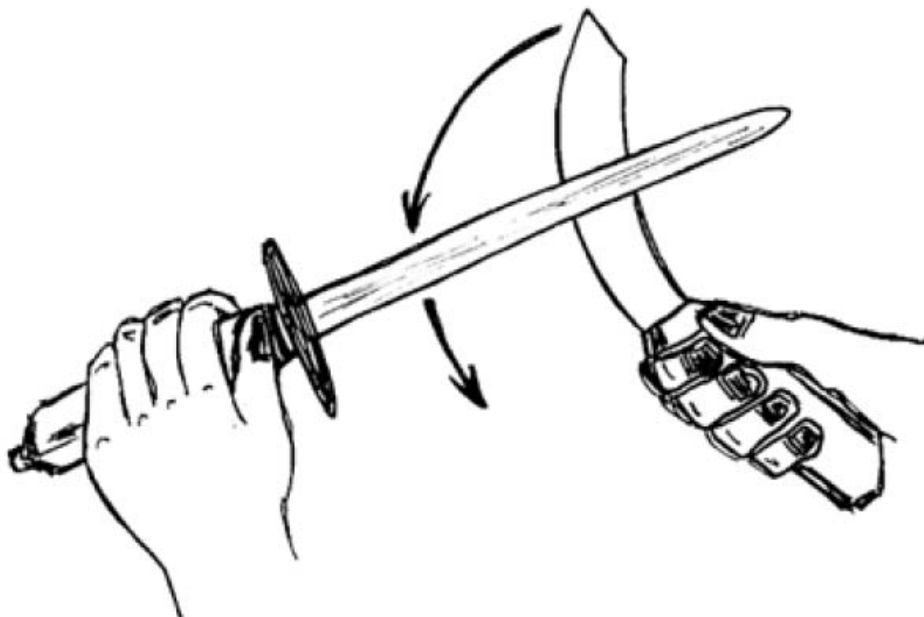


Knife handle centre of wrist, Hold steel firmly, thumb behind guard for safety. Lift right elbow until arm, wrist, knife and steel line up.



Pull outside and push inside

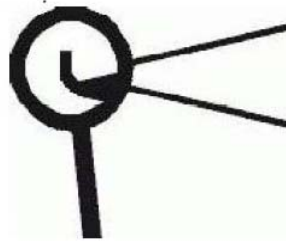
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**Thumb on same side as fingers - cut resistant gloves are also recommended**

© MINTRAC

After using the steel you should sterilise the knife. If the edge on the knife has been 'rolled over' the use of a rough steel maybe required to straighten the edge prior to using a smooth steel. The rough steel has more bite than a smooth and hence straightens a rolled blade more easily and quickly.



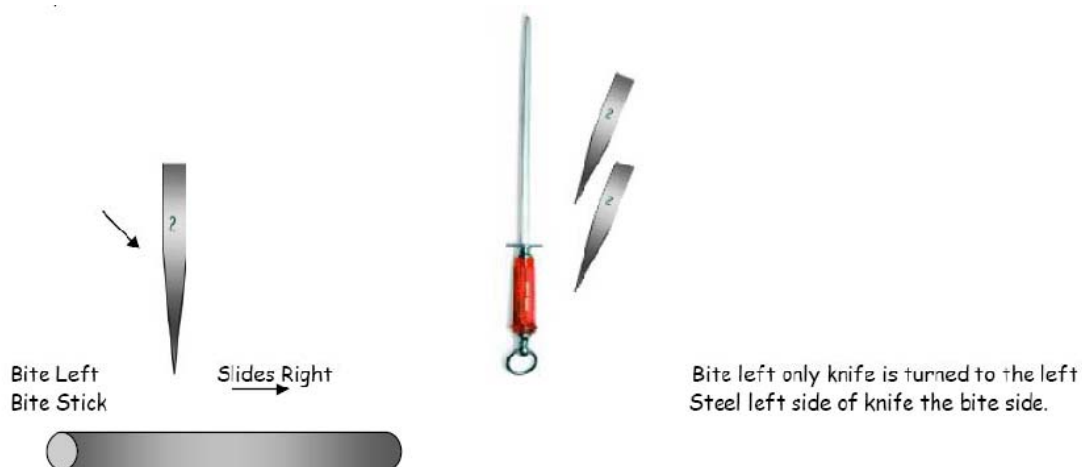
© Big Bay Skills Training Ltd

When you think the knife is ready for use, check for bite. The bite indicates that the knife edge is centred and the knife is sharp. Bite is what you feel when you place the cutting edge on a bite stick and it bites left and right. If the knife edge is sharp it will bite both ways into your bite stick. Always use a bite stick, not your nail!



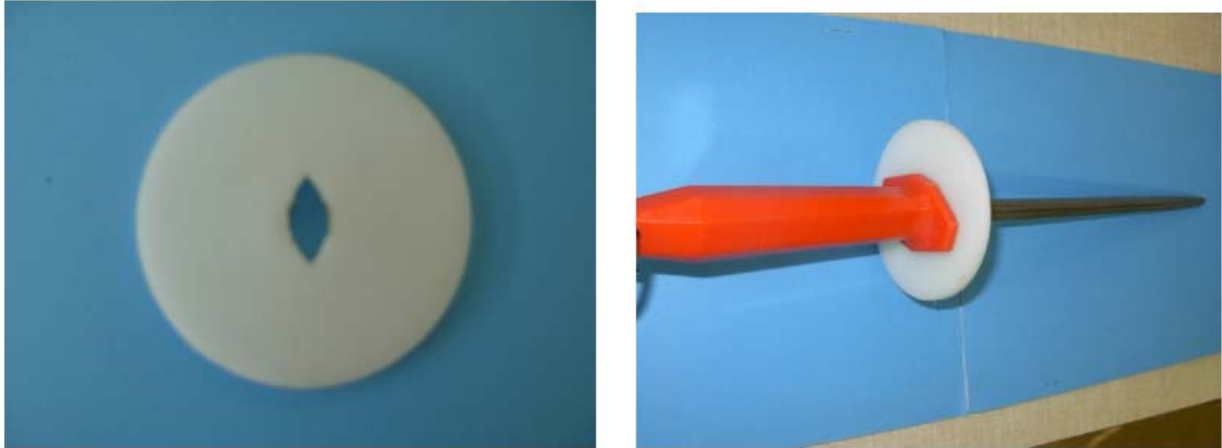
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For example, if the knife bites left and slides right, the knife is turned to the left. You will need to steel the left side (the bite side) to straighten the knife.



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The knife is then ready for use. For safety most employers insist on an aftermarket hand protector fitted to the shaft of the steel. They are mostly made of a rounded piece of cutting board with a hole in the middle; it slides down the shaft to the handle. They are essential for protecting your thumb against cuts whilst steeling. Always watch what you are doing when steeling. Don't become complacent.



**Hand guards** *Pictures courtesy T&R Murray Bridge South Australia*

### **How is sharpening equipment prepared and maintained?**

To maintain a good surface on your steel and protect it from becoming a source of contamination, make sure you scrub your steel thoroughly in hot soapy water, then dry it, at the end of production every day. You may also like to coat your steel with vegetable oil at the end of each day.

Every day before you use your steel and wherever required by your workplace procedures, sterilise it in the steriliser. Other sharpening equipment such as grindstones and oilstones or whetstones, must also be prepared and maintained in good working order.

### ***Grindstones / sandstones***

Make sure that there is a continual supply of water on the sandstone when it is in use. It keeps the stone clean and the blade cool.

Check there are no chips or pieces missing from the stone as this can be a safety hazard and can damage your knife when grinding. Also look for hard lumps in the sandstone; they can cause the knife to be bounced off the wheel. Lumps or bumps will require wheel maintenance (cutting down the surface).

Maintain the machine bearing to ensure smooth turning and shape of the stone. High speed grinders are good as long as they are operated properly. Safety is the major concern, so get an expert to demonstrate its use. Make sure that there is no visible damage to the grinder and that it is still functioning properly. Run the machine and check for any unusual noises and that all functions of the machine are working properly. Stop the machine with the emergency stop. Heat is the next major concern - the blade must be kept cool. Don't be tempted to press hard for a quick result. Be patient because if the blade overheats (goes dark or blue) your knife edge is ruined. It will become brittle, chip easily and require all the damaged steel to be carefully removed. Most people find it easier to buy a new knife and start again.

### **Oilstone (whetstone)**

You must clean the oilstone regularly with soap and water and also sterilise it. If necessary, a bristle brush should be used to gently scrub away clogged surfaces on a stone. This will help to prevent micro-organisms building up and will maintain a better surface for honing. Rinse in warm to hot water and allow to dry. Don not wipe with a cloth as fibre may catch on the abrasive surface.

Oilstones should be stored correctly to make sure they don't get contaminated, damaged or stolen.

### **What are the OH&S issues with knives?**

Knives are important tools in the meat industry. However, they are also one of the most dangerous utensils if they are not handled and used correctly and safely.

The number of injuries involving knives is a major concern in the meat processing industry. The most common type of injuries are lacerations. These often require medical attention and may need suturing or skin grafting. Avoid injuring yourself with a knife. Commonsense and concentration will help you avoid knife accidents. Knife accidents are most likely to occur when you are tired and not concentrating on the job you are doing. It is very easy to cut yourself when you become distracted from your job or careless in your approach to work.

Complacency is a common cause of knife accidents. Workers become so accustomed to handling knives they quickly forget how dangerous they are.

Always put knives in your pouch when not in use.

If you miss the pouch when putting the knife away, let the knife fall!

Don't talk with a knife in your hand especially if you '*talk with your hands*'.

Don't use a knife to move pieces of meat, especially to someone else e.g. a slicer to a packer. One slip and you've stabbed someone. Don't use a knife as a scraper.

Injuries include:

- cuts to the non-knife hand or arm (most common)
- cuts to the hand holding the knife which occur when the hand slips off the handle, known as a 'run through'.
- cuts which occur with a reverse grip and pulling back towards the body
- cuts to another person, inadvertently, where people are too close together when working
- sprains or strains (e.g. from the extra effort required to use knives that are not sufficiently sharp).

Make sure you find out what personal protective equipment is required to protect you from knife related and other potential hazards, such as distracting noise, in the job you are doing.



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### **Choosing a knife**

Well-designed knives have features that assist in safer cutting with less force. To stop the hand slipping down the knife, look for:

- an easy to clean non-slip handle; for example glass filled nylon, textured plastic, a finger loop in handle
- a hilt guard, there are several types; for example samurai or sabre style, a + or T shaped guard.

To enable a cut to be made with less exertion, look for:

- grooves in the blade - grooves break the vacuum during the cut and reduce the force needed for the cut
- a hard steel alloy blade - these blades keep a sharp edge for longer and require the use of a knife sharpening machine
- a strong, thin, flexible blade - This reduces the reaction force in the wrist due to blade bending while cutting.

To ease hand or wrist strain, look for a handle that:

- has been shaped to reduce excessive bending of the wrist
- is the right size for the hand - the handle needs to be large enough in diameter to reduce the tendency for an excessively tight grip, but not overly large for an inadequate grip
- is suitable for left or right handed use.

### **Scalloped blades**

Scalloped blades are particularly good when cutting dense meat like pork or fat meat.

The scallops reduce friction and drag and produce an air cushion reducing adhesion to the fat or meat. Scalloped knives come in various designs from boning / trimming to large steak knives.



Scallops reduce drag and produce an air cushion

*Picture courtesy T&R Murray Bridge South Australia*

### **Avoiding injury when sharpening knives**

To avoid injury when sharpening knives:

- when using a sharpening stone, make sure the stone is on a slip-proof, flat surface
- when using a stone, always keep your free hand away from the stone and knife. Invest in a pair of cut resistant gloves even an old pair is better than nothing.
- make sure your steel has a safety guard between the handle and the body of the steel
- when using a grindstone, make sure the rotation of the stone and the cutting edge of the blade are away from your body
- if you drop your knife, let it fall, don't try to catch it
- always place your knife in the scabbard or pouch when not in use – it should not be left laying around benches and handbasins, etc.
- always use a sharp knife as you will need to use more force with a blunt knife and will have less control
- if you must look away, stop cutting – never take your eyes off the cutting path of the knife
- never cut towards yourself or towards another individual
- always be aware of the movement of people around you
- never fool around with a knife in your hand or fool around with others who may have a knife in their hand
- always keep the handle of the knife clean and free of fat and grease
- always use mesh or cut resistant gloves as required in the work instructions
- take care when washing your gear at the end of the day. Many cuts have been the result of someone feeling around in the soapy water for a dropped knife.

Wash them one at a time and don't let go Scallops reduce drag and produce an air cushion

- make sure when transporting knives around site they are in their pouch (no steeling while walking)

- dismantle pouch to ensure effective sterilisation of pouch and knives at the end of your shift.

### **How can knife hygiene affect food safety?**

A product contact surface is something that comes in direct contact with the product you are handling. Knives are product contact surfaces.

If this surface becomes soiled or contaminated, the contamination can be carried from one product to another. This is known as cross-contamination. Both visual contamination such as grease, ingesta, hair, wool and non-visual contamination such as micro-organisms or bacteria, can be harmful to meat production.

Therefore it is important to sterilise knives to kill harmful micro-organisms or bacteria.

Knives are sterilised by immersing them in a steriliser containing hot water at a minimum of 82°C.

You should sterilise your knife:

- before starting work for the day
- after grinding, honing or steeling a knife
- if visually contaminated
- as required by workplace procedure or regulations, for example sterilising between carcasses.

The scabbard or pouch should be cleaned and scrubbed every day.

### **How and where do you store your knife while you are working?**

When you are not using your knife, always keep it in a scabbard attached to your belt. At present the two-piece plastic scabbard is used in most plants and is considered the easiest to keep clean. Some meat workers modify scabbards to accommodate a steel and/or inspection hook.

This is permitted as long as all modifications are hygienic and safe. Knives that 'rattle' in a pouch are losing their edge from banging against the plastic or metal. Clean rubber bands will hold them steady and in place while not being used, and will also stop them falling out onto your foot or into your boot!!

### **How do you attach the steel and scabbard?**

The chain belt worn by meat workers must be rust resistant and have a safety link. White plastic is the most common type of chain; it's easy to clean and won't rust. This link or snap will allow the knife kit to be pulled away safely from the worker if it becomes accidentally caught in the machinery or a fixed object. Steels must be carried on the worker at all times and not left in sterilisers or work benches or tucked into boot tops. The steel is hung from a chain attached to the belt. The chain must be long enough to allow freedom of movement while you are steeling but short enough so that the steel does not touch your boots. This helps prevent cross contamination: floor contacts the boots, boots contact the steel, steel contacts the knives, knives contact the product. Some plants use a steel holder attached to the belt, or place the steel through the chain belt, with no chain attached to the steel.

# Ideas for training

Here are some ideas for training. Trainers can develop other activities to help learners achieve the unit of competence.

## Activity one: Sharpen knives

### Materials and specialist personnel

- Knives.
- Grinding stones.
- Whetstone.
- Steel.
- Experienced knife sharpeners from the plant.
- Diagram of different types of knives.

### Method

Discuss with the trainee how to decide which knife is the correct one to use.

Discuss the safety issues when knife sharpening.

Describe the various sharpening equipment available. Explain how and why this equipment is maintained.

With the assistance of a person with advanced knife sharpening skills, demonstrate the correct technique for:

- grinding
- honing
- steeling.

Explain the hygiene requirements when sharpening knives.

### Trainee activities

Ask the trainee to:

- mark the parts of a knife on a diagram or point out the parts on a knife
- identify the various types of knives used in a meat works
- while under close supervision, take a blunt knife, grind, hone and steel to an acceptable standard.

Ask the trainee to stone and steel a knife during a day's production.



# Training record sheet

Trainers can use this page to record completed training activities.

**Activity one: Sharpen knives**

**Date** \_\_\_ / \_\_\_ / \_\_\_

# Assessment materials for MTMMP11C Sharpen knives

## General information about assessment

The meat industry has specific and clear requirements for evidence. A minimum of three forms of evidence is required to demonstrate competency in the meat industry. This is specifically designed to provide evidence that covers the demonstration in the workplace of all aspects of competency over time. These requirements are in addition to the requirements for valid, current, authentic and sufficient evidence.

Three forms of evidence means three different kinds of evidence – not three pieces of the same kind. In practice it will mean that most of the unit is covered twice. This increases the legitimacy of the evidence. All assessment must be conducted against Australian meat industry standards and regulations.

When preparing for assessment, assessors must refer to the information about assessment contained in Volume I of the *MTM07 Australian Meat Industry Training Package*.

## Assessing Employability Skills

Learners or candidates for assessment must be made aware of what Employability Skills are, and particularly how the frameworks and facets unique to each qualification mark the presence of Employability Skills throughout units of competency and Training Packages. The tool *Mapping Employability Skills into existing activities for MTMMP11C Sharpen knives* can be used to provide this information to learners. Enterprise or industry consultation and validation of assessment tools and processes is an important aspect of assessment activities. This ensures that assessment is placed into the appropriate context and that the Employability Skills being assessed are documented and validated through contact with industry.

Learners and candidates for assessment must be provided with opportunity to reflect on and/or demonstrate the Employability Skills and the contributions they make towards the successful completion of tasks.

## Recognition of currently held competencies

Assessors need to ensure that recognition processes for currently held competencies are available. This has particular implications for those candidates undergoing assessment only activities. Assessors will need to work with candidates to ensure they are aware of how Employability Skills have a role in the assessment process. Evidence of Employability Skills should also be considered in the recognition process.

## Principles of Assessment

The four principles of assessment serve to ensure assessors are undertaking appropriate processes.

**Validity** ensures that assessment activities are assessing what it claims to assess. In relation to Employability Skills, this underscores the need, identified above, to ensure that candidates for assessment are made aware of Employability Skills. In addition to the relevant Employability Skills Framework and summary, this also includes understanding the concept of Employability Skills. For an example of a handout that could be used to achieve this, see Handout 1 at the end of this section.

**Reliability** ensures consistency in assessment and can be achieved through appropriate interpretation and use of assessment benchmarks derived from the unit(s) of competency being assessed. Reliability in assessing Employability Skills can be enhanced through an ability to interpret and unpack units of competency and apply to assessment tasks and/or recognition process. Handout 1 will also help to benchmark assessment reliability.

Assessment processes are considered to be **fair** when both the candidate and the assessor have an agreed and shared understanding of the process. Fair assessment also encompasses the concept of reasonable adjustment, whereby assessment tools and methodologies are adjusted to address the specific requirements of the candidate being assessed. The same arrangement for the assessment of Employability Skills may involve a discussion and negotiation between assessor, candidate and representatives of the enterprise to establish how assessment can best occur.

**Flexible** assessment takes into consideration the needs of candidates and other parties involved in the assessment. It is important to note that flexibility applies to the assessment process and not the competency standards themselves. Opportunities to assess Employability Skills using different methods should be encouraged and used.

### **Rules of Evidence**

The gathering of evidence is guided by rules of evidence which address the principles of validity and reliability in assessment. Taken together, their implication for the assessment of Employability Skills is that candidates for assessment must be given ample opportunity to respond to and demonstrate Employability Skills, which can be done in a number of manners.

**Valid** evidence must relate directly to the requirements of the competency standard. In ensuring evidence is valid, assessors must ensure that the evidence collected supports demonstration of the outcomes and performance requirements of the competency standard together with the knowledge and skills necessary for competent performance. Valid evidence must encapsulate the breadth and depth of the competency standard. This will necessitate using a number of different assessment methods.

**Sufficiency** relates to the amount of evidence collected. The collection of sufficient evidence is necessary to ensure all aspects of the competency standard have been captured and satisfy the need for repeatable performance. Supplementary sources of evidence may be necessary.

**Currency** relates to the age of collected evidence. Competency requires demonstration of current performance – therefore the evidence collected or provided must be recent. This is particularly relevant when candidates seek recognition of existing competence through an assessment only pathway.

**Authenticity** relates to ensuring the evidence is from the candidate and not another person. Where evidence relies on indirect or supplementary forms of evidence or the direct evidence is not directly observable other complementary evidence that supports authenticity may need to be provided.

### **Assessment Context and Pathways**

While workplace-based assessment is preferred in the meat industry, in some circumstances assessment can occur in a classroom-based context, or a combination of the two. Workplace-based approaches to assessment are important when assessing against technical tasks including Employability Skills. Assessment in the workplace allows pathways to knowledge which may be highly contextualised through the incorporation of business objectives, policies and procedures and specific information on equipment, technology and processes unique to the workplace. The following are examples of assessment activities which can easily be used to incorporate Employability Skills in either classroom or workplace based settings.

#### **Observation**

Observation is a holistic approach to assessment and involves having access to the learner performing the task in the workplace. This access will also provide assessors and candidates with an excellent opportunity to observe and discuss the Employability Skills in the context of the unit(s) and workplace being assessed.

#### **Third Party Reporting**

This approach can be used when workplace evidence is required but there is no opportunity to directly observe the candidate. While the final assessment decision is made by the assessor, third party reporting necessitates clear communication of the assessment process between the candidate, supervisor and the assessor. It also means that the appropriate Employability Skills, their facets and context need to be demonstrated by the candidate to the workplace observer and clearly communicated to the assessor.

### ***Structured Activities***

Structured Activities can be utilized when it is not possible to access real work or real time evidence and may include: demonstrations, simulations, activity sheets and projects. Similar to observation, structured activities, while not in a 'real' context can still provide an excellent opportunity to observe and discuss the appropriate Employability Skills in the context of the unit(s) being assessed and see them demonstrated in the production of tangible pieces of work over a period of time.

### ***Questioning***

Questioning can occur in either a written or an oral format. Questioning can assist candidates in providing them an opportunity to directly demonstrate Employability Skills such as communication and problem solving. An opportunity to respond to questions allows candidates to demonstrate their understanding of the application of other Employability Skills and their transferability to other skills, contexts and situations.

### ***Portfolios***

Portfolios contain pieces of evidence and reflection on work completed and collected by individual candidates. Portfolios are commonly used as evidence in the assessment of generic skills.

## Mapping Employability Skills into existing activities for MTMMP11C Sharpen knives

The following worksheet is provided as a simple tool to analyse what Employability Skills are inherently present in existing training and / or assessment activities you use.

Along the top, you enter your activities / tasks. Working down, you tick each Employability Skills if it is present in each activity you have listed.

<b>Activities/Tasks:</b>								
<b>Communication</b>								
<b>Teamwork</b>								
<b>Problem Solving</b>								
<b>Initiative &amp; Enterprise</b>								
<b>Planning &amp; Organising</b>								
<b>Self Management</b>								
<b>Learning</b>								
<b>Technology</b>								

## Evidence Guide

<b>Trainee:</b>					
<b>Assessor:</b>					
<b>Company/workplace:</b>					
<b>Registered Training Organisation:</b>					
<b>MTMMP11C Sharpen knives</b>					
<b>Elements</b>					
1 Sharpen knives					
1.1 Knives are sharpened according to workplace requirements.					
1.2 Knives are sharpened to maintain bevel edge.					
1.3 Steel is used correctly to maintain bevel edge and to meet OH&S requirements.					
2 Work safely with others					
2.1 Knives are used in ways which minimise the risk of injury.					
2.2 Knives are used safely at all times in accordance with OH&S, hygiene and sanitation, and food safety requirements.					
3 Maintain knives and associated equipment					
3.1 Knives are maintained to hygiene and sanitation, and workplace requirements.					
3.2 Knife-sharpening equipment is maintained, cleaned and stored to hygiene and sanitation, and workplace requirements.					
<b>Elements and performance criteria</b>		<b>On-the-job demonstration with assessor observation</b>	<b>Workplace referee's report</b>	<b>Explanation, question and answer of underpinning knowledge</b>	
Element 1	1.1	✓	✓		
	1.2	✓	✓		

	1.3	✓	✓	
Element 2	2.1	✓	✓	
	2.2	✓	✓	
Element 3	3.1	✓	✓	
	3.2	✓	✓	
<b>Required Skills and Knowledge</b>				
Demonstrate correct steeling of a knife.		✓	✓	
Demonstrate safe techniques of knife sharpening to workplace, hygiene and sanitation, and OH&S requirements.		✓	✓	
Describe technique to sharpen a knife with an appropriate bevel edge.		✓		✓
Explain the preparation of new steel.		✓		✓
Explain the theory of knife sharpening.		✓		✓
Identify and apply relevant regulatory requirements.		✓	✓	✓
List the steps in steeling a knife to maintain edge.		✓		✓
Outline sterilisation, and hygiene and sanitation requirements related to knife sharpening.		✓		✓
State the OH&S issues related to the use and sharpening of knives.		✓		✓

## Sample assessment tools

How to use these assessment tools.

### **1. Customise them to the trainee's work situation.**

This may include:

- adding or removing questions
- inserting relevant work instructions
- adjusting the language to suit the individual workplace
- adding sections for additional assessors to sign off
- adjusting the assessment task to suit the learning needs of individual learners.

### **2. Adjust and re-check the Evidence Guide**

You will need to ensure that the Evidence Guide is updated to include any changes you have made to the assessment tools.

### **3. Use the assessment sheet**

Remember:

- remove the answers if trainees are expected to write on them
- record your own comments as a record of the assessment situation
- collect the relevant signatures
- retain the completed assessment sheet as part of your assessment evidence



**On-the-job demonstration with assessor observation**

<b>Trainee:</b>	
<b>Assessor:</b>	
<b>Company/workplace:</b>	
<b>Registered Training Organisation:</b>	
<b>MTMMP11C Sharpen knives</b>	
<b>Elements</b>	
<p>1 Sharpen knives</p> <p>1.1 Knives are sharpened according to workplace requirements.</p> <p>1.2 Knives are sharpened to maintain bevel edge.</p> <p>1.3 Steel is used correctly to maintain bevel edge and to meet OH&amp;S requirements.</p> <p>2 Work safely with others</p> <p>2.1 Knives are used in ways which minimise the risk of injury.</p> <p>2.2 Knives are used safely at all times in accordance with OH&amp;S, hygiene and sanitation, and food safety requirements.</p> <p>3 Maintain knives and associated equipment</p> <p>3.1 Knives are maintained to hygiene and sanitation, and workplace requirements.</p> <p>3.2 Knife-sharpening equipment is maintained, cleaned and stored to hygiene and sanitation, and workplace requirements.</p>	
<b>Evidence:</b>	<b>Comment:</b>
<p><b>Does the trainee:</b></p> <ul style="list-style-type: none"> <li>• use a stone correctly to sharpen a knife: <ul style="list-style-type: none"> <li>keep oil stone oiled/grind stone wet?</li> <li>grip knife safely?</li> <li>apply the knife to stone using correct angle?</li> <li>apply the knife to stone using correct pressure?</li> <li>apply the knife to stone using correct stroke?</li> </ul> </li> </ul>	

<p>use smooth and course sides of the stone appropriately?</p> <p>achieve the correct edge?</p> <ul style="list-style-type: none"> <li>• use grinding machinery (if available) safely to achieve flat or hollow grind?</li> <li>• use a steel correctly to sharpen a knife: <ul style="list-style-type: none"> <li>preparing the steel?</li> <li>grip the steel behind the guard?</li> <li>apply the knife to the steel edge at the correct angle?</li> <li>use correct strokes on both sides of the steel edge?</li> </ul> </li> <li>• keep knife sharpening kit clean: <ul style="list-style-type: none"> <li>placing stones on clean surface?</li> <li>cleaning knives before used with a stone?</li> <li>cleaning stones to remove any fat build up?</li> <li>storing stones in clean area?</li> <li>securely attaching steel to chain?</li> <li>making sure steels do not touch the floor?</li> </ul> </li> <li>• work hygienically with a knife: <ul style="list-style-type: none"> <li>storing knife in a scabbard on the job?</li> <li>sterilising correctly to prevent contamination and cross contamination?</li> <li>keeping knife kit clean?</li> <li>sterilising or discarding dropped knives?</li> </ul> </li> <li>• work safely with a knife: <ul style="list-style-type: none"> <li>using appropriate knife techniques including cutting away from self?</li> <li>maintaining knife sharpness during production?</li> <li>storing knife in scabbard when not in use?</li> <li>working with due consideration of others?</li> <li>letting dropped knives fall (and not</li> </ul> </li> </ul>	
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<p>catch them)?</p> <p>demonstrate and describe how to put a proper bevel edge on a knife?</p> <p>demonstrate how to steel a knife properly?</p> <ul style="list-style-type: none"> <li>• follow workplace OH&amp;S procedures including: <ul style="list-style-type: none"> <li>workplace policies and procedures?</li> <li>PPE?</li> <li>knife techniques?</li> <li>safe operation of a knife?</li> </ul> </li> <li>• follow hygiene and sanitation procedures including: <ul style="list-style-type: none"> <li>personal hygiene SOP?</li> <li>work instruction?</li> <li>sterilising knife and kit correctly?</li> <li>washing hands properly as required?</li> </ul> </li> </ul>	
<p><b>Required skills and knowledge</b></p>	
<p><b>Does the trainee:</b></p> <ul style="list-style-type: none"> <li>• demonstrate correct steeling of a knife?</li> <li>• demonstrate safe techniques of knife sharpening to workplace, hygiene and sanitation, and OH&amp;S requirements?</li> <li>• describe technique to sharpen a knife with an appropriate bevel edge?</li> <li>• explain the preparation of new steel?</li> <li>• explain the theory of knife sharpening?</li> <li>• identify and apply relevant regulatory requirements?</li> <li>• list the steps in steeling a knife to maintain edge?</li> <li>• outline sterilisation, and hygiene and sanitation requirements related to knife sharpening?</li> <li>• state the OH&amp;S issues related to the use and sharpening of knives?</li> </ul>	
<p><b>Trainee sign off:</b></p>	
<p><b>Assessor sign off:</b></p>	

## Workplace referee's report

**Trainee:**

**Assessor:**

**Company/workplace:**

**Registered Training Organisation:**

### MTMMP11C Sharpen knives

#### Elements

- 1 Sharpen knives
  - 1.1 Knives are sharpened according to workplace requirements.
  - 1.2 Knives are sharpened to maintain bevel edge.
  - 1.3 Steel is used correctly to maintain bevel edge and to meet OH&S requirements.
  
- 2 Work safely with others
  - 2.1 Knives are used in ways which minimise the risk of injury.
  - 2.2 Knives are used safely at all times in accordance with OH&S, hygiene and sanitation, and food safety requirements.
  
- 3 Maintain knives and associated equipment
  - 3.1 Knives are maintained to hygiene and sanitation, and workplace requirements.
  - 3.2 Knife-sharpening equipment is maintained, cleaned and stored to hygiene and sanitation, and workplace requirements.

<b>Relevant work instruction(s):</b>	
<b>Evidence:</b>	<b>Comments:</b>
<p><b>Does the trainee consistently:</b></p> <ul style="list-style-type: none"> <li>• follow each step in correctly preparing a knife?</li> <li>• maintain a knife kit properly?</li> <li>• prepare a steel properly?</li> <li>• work safely with a knife?</li> <li>• work hygienically with a knife?</li> <li>• maintain a sharp edge on a knife during production?</li> <li>• follow workplace OH&amp;S procedures including: <ul style="list-style-type: none"> <li>workplace policies and procedures?</li> <li>PPE?</li> <li>not trying to catch dropped or falling knives?</li> <li>sharpening a knife safely?</li> <li>use of appropriate knife techniques?</li> <li>sterilising knife safely during production?</li> <li>storing knives in scabbard when not in use?</li> </ul> </li> <li>• follow hygiene and sanitation procedures including: <ul style="list-style-type: none"> <li>personal hygiene SOP?</li> <li>work instruction?</li> <li>cleaning and sterilising knives before, during and after production?</li> <li>clean and store a knife kit properly?</li> <li>demonstrate and describe how to put a proper bevel edge on a knife?</li> <li>demonstrate how to steel a knife properly?</li> </ul> </li> <li>• demonstrate correct steeling of a knife?</li> <li>• demonstrate safe techniques of knife sharpening to hygiene and sanitation requirements?</li> <li>• identify and apply relevant regulatory requirements?</li> </ul>	
<b>Required skills and knowledge</b>	
<b>Does the trainee consistently:</b>	

<ul style="list-style-type: none"><li>• demonstrate correct steeling of a knife?</li><li>• demonstrate safe techniques of knife sharpening to workplace, hygiene and sanitation, and OH&amp;S requirements?</li><li>• apply relevant regulatory requirements?</li></ul>	
<b>Trainee sign off:</b>	<b>Date:</b>
<b>Referee sign off:</b>	<b>Date:</b>

## Explanation, question and answer of underpinning knowledge

**Trainee:**

**Assessor:**

**Company/workplace:**

**Registered Training Organisation:**

### MTMMP11C Sharpen knives

#### Elements

- 1 Sharpen knives
  - 1.1 Knives are sharpened according to workplace requirements.
  - 1.2 Knives are sharpened to maintain bevel edge.
  - 1.3 Steel is used correctly to maintain bevel edge and to meet OH&S requirements.
  
- 2 Work safely with others
  - 2.1 Knives are used in ways which minimise the risk of injury.
  - 2.2 Knives are used safely at all times in accordance with OH&S, hygiene and sanitation, and food safety requirements.
  
- 3 Maintain knives and associated equipment
  - 3.1 Knives are maintained to hygiene and sanitation, and workplace requirements.
  - 3.2 Knife-sharpening equipment is maintained, cleaned and stored to hygiene and sanitation, and workplace requirements.

Question:	Answer:	Comments:
What must be considered when choosing a knife?	<ul style="list-style-type: none"> <li>• thickness</li> <li>• length of blade</li> <li>• type of handle</li> <li>• what knife is used for.</li> </ul>	
What are the parts of a knife?	<ul style="list-style-type: none"> <li>• point</li> </ul>	

	<ul style="list-style-type: none"> <li>• edge</li> <li>• handle</li> <li>• heel</li> <li>• nose</li> <li>• butt of handle.</li> </ul>	
How is a knife maintained in good order?	<ul style="list-style-type: none"> <li>• maintain correct bevel using an oilstone or grindstone</li> <li>• maintain correct edge with a steel.</li> </ul>	
How is sharpening equipment prepared and maintained?	<ul style="list-style-type: none"> <li>• prepare steel</li> <li>• keep grindstone wet</li> <li>• keep oilstone clean.</li> </ul>	
What are the OH&S issues with knives?	<ul style="list-style-type: none"> <li>• sharpening</li> <li>• cut away from yourself</li> <li>• correct storage</li> <li>• keep handle clean</li> <li>• PPE</li> <li>• be aware of others.</li> </ul>	
How can knife affect food safety?	<ul style="list-style-type: none"> <li>• cross-contamination of product</li> <li>• correctly sterilise a knife to prevent this.</li> </ul>	
How and where to you store your knife while you are working?	<ul style="list-style-type: none"> <li>• scabbard.</li> </ul>	
Explain the steps required to prepare a new steel?	<ul style="list-style-type: none"> <li>• refer to training notes.</li> </ul>	
How do you attach the steel and scabbard?	<ul style="list-style-type: none"> <li>• chain belt with safety link.</li> </ul>	
<b>Required skills and knowledge</b>		
<b>Does the trainee:</b>	<ul style="list-style-type: none"> <li>• describe technique to sharpen a knife with an appropriate bevel edge?</li> <li>• explain the preparation of new steel?</li> <li>• explain the theory of knife sharpening?</li> <li>• identify relevant regulatory requirements?</li> <li>• list the steps in steeling a knife to maintain edge?</li> <li>• outline sterilisation, and</li> </ul>	



	hygiene and sanitation requirements related to knife sharpening? <ul style="list-style-type: none"><li>• state the OH&amp;S issues related to the use and sharpening of knives?</li></ul>	
<b>Trainee sign off:</b>		<b>Date:</b>
<b>Assessor sign off:</b>		<b>Date:</b>

**Record of completed assessment**

<b>Trainee:</b>		
<b>Assessor:</b>		
<b>Company/workplace:</b>		
<b>Registered Training Organisation:</b>		
<b>MTMMP11C Sharpen knives</b>		
<b>Elements and performance criteria</b>	<b>Assessor's initials</b>	<b>Date</b>
Element 1		
1.1		
1.2		
1.3		
Element 2		
2.1		
2.2		
Element 3		
3.1		
3.2		
<b>Required Skills and Knowledge</b>		
All Required Skills and knowledge have been assessed and achieved.		
<b>Compliance with Company requirements</b>		

Complies with company work instructions and/or standard operating procedures.		
<b>Forms of evidence used to assess competence</b> Note: A minimum of 3 forms of evidence are required to demonstrate competence.		
1.		
2.		
3.		
4.		
5.		
6.		
<b>Context of assessment</b> <i>(if applicable)</i>		
Equipment/machinery:		
Species:		
Technique:		
<b>Signatures</b> This trainee has been assessed according to the requirements of the unit of competence identified above. Competence has been demonstrated.		
Assessor _____	Date	___ / ___ / ___
Trainee _____	Date	___ / ___ / ___

### Additional resources

These materials may be useful to help plan and deliver training in MTMMP11C *Sharpen knives*.

#### Note

- Please refer to Volume I for generic resources and references in relation to Training and Assessment.
- Additional resources may have become available since these materials were developed.

For an updated list of available resources, please refer to the MINTRAC website at

[www.mintrac.com.au](http://www.mintrac.com.au)

Agriculture and Resource Management Council of Australia and New Zealand, AS 4696:2002

*Australian Standard for the hygienic production and transportation of meat and meat products for human consumption*, CSIRO Publishing, Collingwood, Vic.

WorkSafe – Victorian Workcover Authority: *Knives in the meat and food industries - Safe use and maintenance*. <http://www.worksafe.vic.gov.au/wps/wcm/connect/WorkSafe/Home/>

### Bibliography

This publication was used to develop this training material.

Agriculture and Resource Management Council of Australia and New Zealand, AS 4696:2002

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WorkSafe – Victorian Workcover Authority: *Knives in the meat and food industries - Safe use and maintenance*. <http://www.worksafe.vic.gov.au/wps/wcm/connect/WorkSafe/Home/>