AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Knife Sharpening
Part A

A systematic and collaborative approach with processing plants to improve knife safety and analysing IOT technology in the red meat industry at a plant level – Part A

Project Code	Prepared by	Date Submitted
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Project Description

The aim of this project was to reduce laceration and soft tissue injuries in a meat processor through knife sharpening training and assessment. Training to upskill meat processor employees in knife safety and knife sharpness was conducted. Knife sharpness was also monitored across the various departments of the the Abattoir using a Anago Analyzer and the Angle Me app (which is available through the App store & Google Play) to quantitatively analyse knife sharpness and straightening of the edge. Workplace injuries and various knife sharpening factors (e.g. types of steel used, job specific details) were recorded and assessed to identify factor which influence knife sharpness and/or knife injuries and require further targeted knife training.

Figure 1: The Anago Analyzer

Project Outcome

Practical demonstrations and recommendations were provided to 158 employees to help improve the employees' overall understanding of knife use and reduce musculoskeletal disorders and lacerations from the use of dull knives.

Many knives presented by the trainees were poorly sharpened. Common problems included:

- variations in sharpening angles
- no defined cutting edge (as knives were rounded from rubbing back on bench stones)
- thick shoulders
- severely worn and/or chipped knives that were unable to be sharpened effectively.

Knives were analysed in the Anago Analyzer and the scores were recorded. The trainers recorded the employees' steeling and slowed down the play back to analyse their technique using the Angle Me App. Steeling technique training was then provided to explain the importance of angles and pressure when straightening a dulled edge. Technique was corrected and trainees were taught how to read a knife so they can steel accordingly.

All knifes used in a meat processing environment should receive a score of 8.0 or above to effectively perform their intended job and avoid employee over-exertion. The manufacturer provided sharpness zones are shown below (Table 1).

Table 1: Manufacturer provided sharpness zones and knife sharpness zones at the Abattoir

Broad level	Detailed level	Score	Knives in category (%)	Knives in category (number)
Unsatisfactory	Below the recommended minimum level	< 8.00	52%	133
Satisfactory	Sharp	8.00 - 8.99	48%	122
	Very Sharp	9.00 - 9.49	0	0
	Extremely Sharp	>9.50	0	0

Table 1 shows that of the 255 knives analysed, only 133 of them met the minimum criteria (52%). The remaining knives (48%) were characterised as Sharp with no knives reaching a score level of Very Sharp or Extremely Sharp (Table 1). The average score was 7.76 with a minimum score of 3.81 and a maximum knife sharpness score of 8.85. This average score is slightly lower than the average score of 7.89 that was reported in a previous knife sharpness study that analysed 1,727 knives from 13 abattoirs [1].

Significant variation in knife sharpness was noted. Steeling a knife with a Rod was associated with higher knife scores, compared to Ergo, and was the predominant (used 97% of the time) method by which steeling occurred. In addition, knives used on cattle (bovine) received higher knife sharpness score in this study than knives used on sheep (ovine). Highly significant differences in knife sharpness were found across individuals ($P > 0.001$).

There was a significant interaction between Round and Individual ($P > 0.001$). This indicates that individuals knife scores changed between subsequent analysis rounds. Assessment of these results showed that of the 158 employees who underwent knife training 41 were analysed in both Round 1 and Round 2. Of these, 73% increased their knife sharpness scores from Round 1 to Round 2. In this group, the average score in Round 1 was 7.55 and the average score in Round 2 was 8.05. Thus, knife training and assessment increased knife sharpness scores from a unsatisfactory level to a satisfactory level.

Finally, highly significant differences in job title ($p < 0.001$) and job task ($p < 0.05$) were noted. For example, Muslim Slaughterman were found to have unsatisfactory levels of knife sharpness (average score of 7.51). Knives used in this job regularly cut through skin which can quickly dull knife blades. Extra attention should be placed on knife sharpening in this area to reduce injuries due to dull knives.

Benefit for Industry

An initial low level of knife sharpness was found at the abattoir. This is consistent with previously reported industry-wide knife sharpness levels [1]. Regular knife testing and training improved knife sharpness in 73% of employees who underwent multiple testing rounds. The score in this cohort increased from an average score in the unsatisfactory category (7.55) to an average score in the satisfactory (8.05) knife sharpness category. Despite these positive findings it is recommended that regular knife testing and training practices are implemented to train new staff and maintain focus on the importance of knife sharpness to safe work practices. On-site recommendations to further improve knife sharpness include:

- Training team leaders to provide on-site trainers.

- Replacement of all worn or damaged knives

- Continued training of new personnel

- Employees requiring help to be identified and released for training when Response trainer on-site

- Repair and maintenance of hollow-grinder (and other equipment as necessary)

- Training two operators in the use of the hollow-grinder so they can grind knives in the mornings before production.

A detailed work instruction has been provided for use by the industry to demonstrate proper knife sharpening techniques.