MEAT TECHNOLOGY UPDATE
Cutting edge technology for the meat processing industry

Meat technology update

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Maximising offal yields

- **Australian meat processors surveyed in 2007 produced high quality offal, but yields of offal products were not well monitored. The standard of data collection in the offal recovery area is generally poor and variable.**
- **While opportunities for improved recovery rates are sometimes impossible because of structural problems and limitations in available labour, an opportunity exists for processors to increase offal recoveries by simply improving the collection and usage of offal data from their own processes.**

The total value of edible offal to the red meat industry is about $450 million per year. The value is greatly affected by the markets available and, to some extent, the quality and trim of the products.

The potential value of edible offal per head is about $75 for 240 kg steers, but the value of offal collected ranges from $45 to $60 per head depending on condemnation rates, collection efficiency and which offal items an abattoir decides to recover. The number of beef offal items collected by different abattoirs ranges from 8 to 25. Preferred brands can achieve premiums of 30% over the average price, and there are premiums for chilled offal in some markets. The returns to processors are also affected by yields which, in turn, are affected by recovery rates and the number of condemnations.

While meat companies appreciate the value of investing in offal recovery, the systems for controlling yields and ensuring the appropriate quality and yield expected by customers and processors respectively, are generally not as well developed as they are for boneless meat.

As part of a recent MLA project, tools have been developed that assist meat companies to manage offal recovery data. Companies can use the tools to establish their own benchmarks of offal recovery and, as a result, control both the quality and yields of edible offal.

Investigations undertaken

Eight Australian meat-processing plants were each surveyed on 2 occasions. The mix of single and mixed species plants provided data from 5 beef operations and 5 smallstock operations. The investigation focused on beef and sheep items and this Update is confined to data on those. Some data were also collected on calves and goats; the project report available from MLA provides the calf and goat data.

Three of the plants provided offal recovery data over a 6-week period to provide a clear picture of their ability to provide consistency in offal collection. Between them, the plants generated data from 2 beef operations and 2 smallstock operations.

Findings

Offal quality

The introduction and use of the Refrigeration Index in 2006, and adherence to AUS-MEAT specifications for offal, have been particularly effective. No quality issues of significance relating to offal quality or condition were found at any of the abattoirs surveyed. All plants used the AUS-MEAT specifications for their product and, although there were some minor variations between plants in what was actually packed, this variation reflected customer demands and trimming practices at the plant. The variations were all within the AUS-MEAT specifications.

Offal yield

Three major issues associated with yield were identified: structural impediments; shortage of labour; and deficiencies in information about offal yields, both before and after AQIS condemnations.

Structural issues

Structural constraints at some plants limited the ability of the operators to collect all offals. The wide range of layouts and facilities at the different plants meant that the structural issue was very site specific. Problems identified included:

- restricted collection facilities (e.g. head meat items);
- restricted inspection facilities (generally due to limited space around the viscera table);
- restricted further processing facilities (e.g. tripe processing);
- restricted correlation facilities between body parts and carcases (e.g. beef feet).

Plant managements are well aware of the structural limitations. They are also aware that, in most instances, they can only

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overcome them through the expense of significant structural alterations. It is in the offal inspection and collection areas that the limitations are most evident. More detailed guidelines on the layout of inspection and collection areas would be of considerable benefit.

Labour shortages, culture

Shortage of labour is a major cause of reduced offal yields. Abattoirs near other major labour users, e.g. mining areas, clearly had the greatest problem. The use of imported labour has assisted some plants.

Where shortage of labour was a problem, plants generally halted offal collection and processing in favour of slaughter-floor activities. This obviously affected offal yield. Collection and processing of the lowest value products or those products requiring the highest labour input were the first to be discontinued. As an example, head meat collection was often dropped, as it was both low value and required a high labour input. Runner collection was rarely dropped. Some plants reduced slaughter and processing rates to maintain a labour balance that allowed collection of all available offal.

The other labour issue identified was operator performance. This varied largely according to the culture at the abattoir. At some plants, greater supervisory input was required than at others and, when this input was not evident, yield appeared to be lower. It appeared that less-skilled labour tended to be used for offal collection and processing.

Again, plants are well aware of their limitations and work to maximise both the quantity and quality of labour available for offal collection.

Monitoring offal yields

All abattoirs surveyed had systems in place to monitor offal yields; however, the systems were generally cumbersome and lacked accuracy. A major impediment to the collection of accurate yield data was that the quantity of offal condemned by AQIS was generally not determined. This information is desirable and procedures for recording condemnations should be investigated, preferably with assistance from AQIS inspectors who have ease of access to data at the point where condemnation occurs.

Table 1. Beef offal yields; ranges for all offal (including condemned items) and recoverable offal (excluding condemned items).

	Yield (% of HSCW)		Yield (% of pieces)	
Offal	All [1]	Recoverable[2]	All [1]	Recoverable [2]
Cheek	0.22–0.57	0.22–0.57		
Hearts	0.59–0.78	0.61–0.85	93.1–95.0	95.0–100.0
Kidneys	0.21–0.30	0.21–0.34		
Lips (papillae)	0.20–0.28	0.20–0.38		
Livers	0.76–2.43	1.65–2.92	45.2–73.9	92.7–99.8
Thin skirt	0.27–0.46	0.27–0.49		
Thick skirt	0.23–0.47	0.24–0.51	74.1–97.5	81.6–99.6
Tails	0.36–0.48	0.37–0.49	80.5–97.7	87.8–99.6
Tongues	0.44–0.59	0.44–0.61	86.0–98.7	89.7–100.2
Honeycomb	0.19–0.34	0.19–0.28	79.0–91.3	87.8–92.8
Pillar Tripe	0.12–0.24	0.14–0.26	70.9–91.4	78.9–87.7
Tripe pieces	1.34–2.67	1.36–2.22		

[1] 'All' – when condemned pieces included in measures

[2] 'Recoverable' – condemned pieces not included in measures

Plants used piece counts, where available, or average offal weights derived from periodic in-house snapshots, to determine yields. Data from this study confirmed data from other researchers that typical offal weights are difficult to establish when there are wide ranges of offal and animal types. The expected yield based on such typical offal weights is not a suitable measure of the efficiency of offal collection.

A summary of data collected from the survey of the 8 plants is shown in Tables 1 & 2. This data shows:

- the variation in % HSCW yield that occurs due to plant-to-plant variations in animal type, trim standards and actual condemnation rates.
- the variation in % piece yield that occurs due to individual plant difficulties in collecting piece data and condemnation data.

The variability in yield is exacerbated by the inability of most plants to collect accurate data on condemnations.

Table 2. Sheep offal yields; ranges for all offal (including condemned items) and recoverable offal (excluding condemned items).

	Yield (% of HSCW)		Yield (% of pieces)	
Offal	All [1]	Recoverable[2]	All [1]	Recoverable [2]
Livers	1.78–2.97	1.78–2.97	70.5–88.5	86.9–88.6
Kidneys	0.30–0.47	0.30–0.47	63.2–85.8	63.5–88.1
Hearts	0.69–1.02	0.69–1.02	88.6–91.2	88.7–95.7
Tripe	2.02–2.28	2.05–2.28		
Thin Skirt	0.19–0.51	0.19–0.53		
Lamb runners	2.46–3.70	2.46–3.72	70.2–98.5	70.9–98.6
Sheep runners	1.23–2.74	1.26–2.75	74.7–88.3	77.0–88.3
Total runners	2.46–3.08	2.46–3.08	72.3–98.5	73.7–98.6

To address the problem of inconsistent and unreliable data collection, an Excel workbook-based tool (Offal Yield Analysis Tool) has been developed to numerically and graphically present offal-recovery information from raw data collected by the abattoir. To use the tool, the following information is required:

- daily numbers of cattle processed, (split between cow/bull, steers, grain fed) or sheep processed (split between mutton and lamb);
- daily total weight of hot beef carcases (HSCW) (split between cow/bull, steers, grain fed) or sheep processed (split between mutton and lamb);
- daily condemnations by AQIS (pathology) and the company (cosmetic & hygiene), by offal type;
- daily weights packed, by individual offal types;
- where available, daily numbers of pieces packed, by individual offal types.

The tool presents the data numerically in tables on two bases, % offal weight based on HSCW and % pieces based on total numbers killed. Within each of these two sets are two sub-sets. These subsets are, respectively, data for all offal (including AQIS and company-condemned items) and data for recoverable offal (excluding AQIS and company-condemned items, where this data is known). The availability of a system to collect data on condemnations, preferably from AQIS sources, will greatly enhance the accuracy and usefulness of the tool.

Recovery of offal as a percentage of HSCW allows the processor to determine a weekly expected weight yield for each product according to animals being processed. Percentage recovery against piece counts allows the processor to determine the slaughterfloor and offal-room performance in recovering all potentially available offal.

A second tool allows processors to compare data from up to 6 separate production weeks. The Excel-based Offal Yield Validation Tool analyses the data from the Offal Analysis Tool. It is envisaged that future work to refine this tool will allow a six-week moving average yield to be generated for each offal product.

Table 3. Beef offal yields (% HSCW and % pieces) over a six-week period — recoverable offal (excluding condemned items).

Offal	Mean (% of HSCW)	Range of %HSCW	Mean of % piece counts	Range of % piece counts
Cheek	0.54	0.52–0.56		
Hearts	0.29	0.60–0.67	95.5	93.8–97.4
Lips (papillae)	0.26	0.26–0.27		
Livers	1.88	1.80–1.95	100.0	100.0–100.1
Thin skirt	0.47	0.38–0.49		
Thick skirt	0.30	0.30–0.31	98.6	96.3–100.7
Tails	0.43	0.42–0.44	98.5	97.7–99.4
Tongues	0.45	0.44–0.46	100.1	99.7–100.8
Honeycomb	0.18	0.17–0.19	95.1	92.2–98.6
Pillar tripe	0.25	0.24–0.26	100.0	99.9–100.1
Tripe pieces	1.32	1.10–1.44		

Application of the second tool to the data from the 6-week survey shows a greatly improved accuracy of both % HSCW yield and % piece yield as shown for selected items in Tables 3 & 4.

Table 4. Sheep offal yields (% HSCW and % pieces) over a six-week period — recoverable offal (excluding condemned items).

Offal	Mean (% of HSCW)	Range of %HSCW	Mean of % piece counts	Range of % piece counts
Livers	2.49	2.18–2.68		
Kidneys	0.28	0.22–0.37		
Hearts	0.71	0.70–0.86		
Thin Skirt	0.41	0.31–0.49		
Lamb runners	2.84	2.75–2.96	97.0	91.8–101.1
Sheep runners	2.04	1.85–2.20	87.2	70.9–93.9
Total runners	2.38	2.26–2.51	72.3–98.5	82.3–97.7

The tool includes a visual presentation of performance data to assist management in interpreting performance as shown in Figures 1 and 2 for selected beef items . The six green bars for each product are the weekly values; the blue bar is the average of those six.

Potential increases in returns

Accurate yield performance data provided by these tools should allow processors to increase their yield significantly. The initial survey of 8 plants indicates a range of potential yield improvements, examples of which are used in Tables 5 & 6. Table 5 shows potential improvements in the value for beef offal, and Table 6 shows potential improvements for sheep offal.

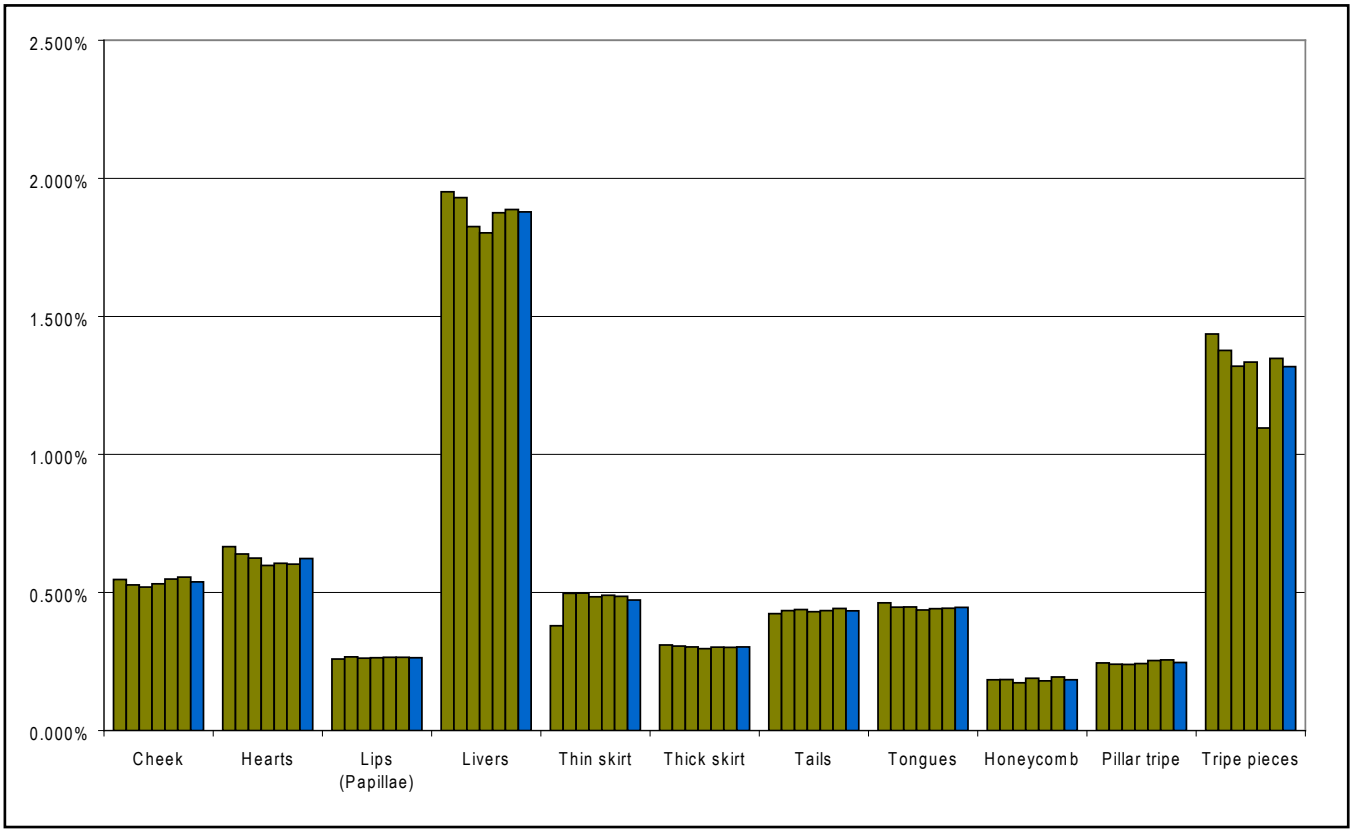

Figure 1. Beef offal yield (recoverable offal) as % of HSCW clearly showing consistent week-to-week performance.

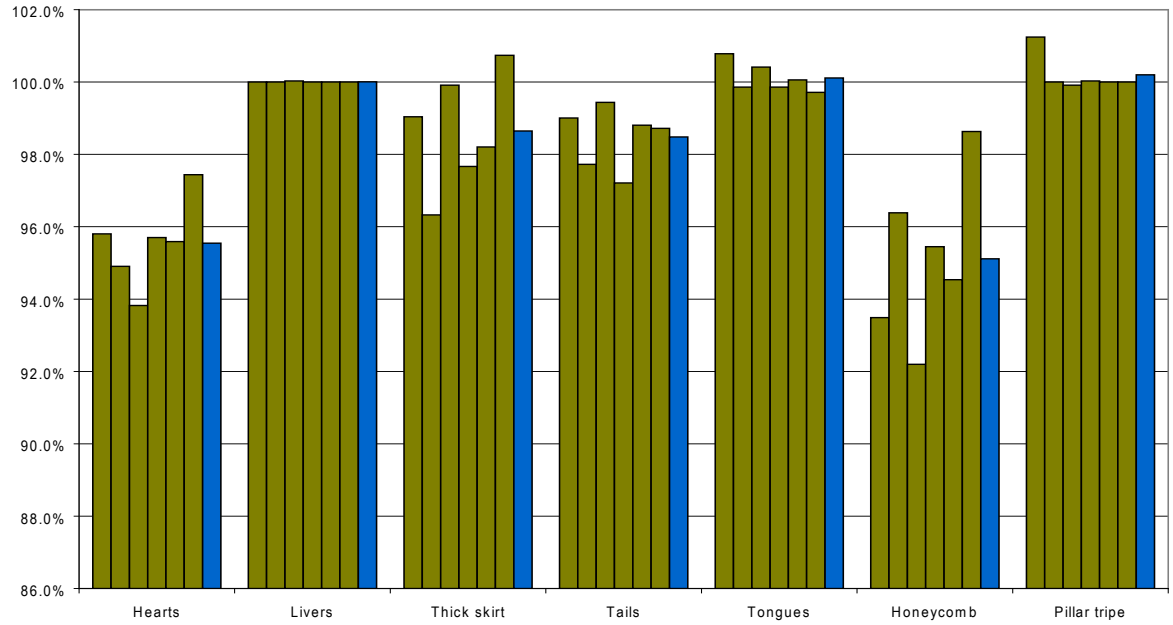

Figure 2. Beef offal yield as % of available pieces of recoverable offal (selected products) showing some variability in recovery.

Table 5: Indicative increases in daily returns for selected beef offal products

Item	For yield increase of:	Daily value [1] improvement on 500/day kill ($)
Hearts	5%	215
Livers	5%	197
Thick skirt	5%	95
Tails	5%	186
Tongues	1%	86
Tripe	5%	167
Pillar Tripe	2%	105
Total		1051

[1] Offal values based on prices quoted in MLA Co-Products Monitor for September quarter 2007

The suggested increased recoveries return an average $2 per head for beef. On a 500 per day kill, the annual potential increase in value would be $252,000.

For sheep, on a 4,000 per day kill, the annual potential increase in value would be $140,000. Increased recoveries are estimated to be around $0.15 per head.

Table 6: Indicative available increases in daily returns for selected sheep offal products

Item	For yield increase of:	Daily value [1] improvement on 4000/day kill ($)
Livers	5%	175
Kidneys	5%	10
Hearts	5%	57
Tripe	3%	130
Thin skirt	5%	Unknown pricing
Runners	10%	205
Total		577+

[1] Offal values based on prices quoted in MLA Co-Products Monitor

Summary

Australian meat processors have an opportunity to better understand their offal recovery rates through improved data collection, interpretation and presentation. A better understanding of performance, through improved information, should result in increased offal recoveries and an improved financial return.

Further information

Contact Client Innovation Services, MLA for: MLA Final report – MLA project A.COP.0037 Best Practice for Offal Collection; and copies of the yield tools.

Contact us for additional information

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