

Incoming Livestock and Slaughter Process Assessment Tool – Beef

User Manual

This Manual will help you use the tool to assess how well the processes at your abattoir cope with livestock contamination and minimise microbiological contamination on final carcasses.

You can use the tool to assess your operation in several ways. For example, you can assess the impact of sourcing a large proportion of livestock from distant feedlots. Or you might want to measure whether installing an intervention step such as a pasteurisation cabinet will make much difference to your process. Or you can check how well your process copes with seasonal effects such as processing wet, dirty cattle in winter and spring.

Livestock Questions

The following questions help you to assess various livestock characteristics which make hygienic processing of animals more difficult. The answers to these questions are combined to give a **PROBLEM SCORE** which estimates the problem you face when you slaughter such animals.

What percentage of cattle processed comes from feedlots?

Animals sourced from feedlots are generally considered to be dirtier than cattle from pasture. Consequently, the higher the proportion from feedlots the greater the problem posed to your plant.

Time livestock is in transit to your plant

The longer cattle are on the truck the more likely their hides are to become contaminated with faeces.

The tool allows you to select one of three transport modes and requires you to input the percentage of cattle in each haul category:

- Short-haul (less than 12 hours)
- Medium-haul (12-48 hours)
- Long-haul (longer than 48 hours)

Combined Haul Score

The combined haul score is used as an intermediate step in the calculation to the problem score; the tool calculates this value automatically once you put in your three scores.

If you make a mistake putting in data and the percentages don't add up to 100% a warning message is displayed in red: "Warning! Haul proportions do not add up to 100%". So go back and check the percentages you're keying in – make sure the three numbers add up to 100.

Degree of contamination of hides

The greater the amount of faecal matter and soil attached to the hide of the animal, the more difficult it is to prevent faecal bacteria getting onto the carcase.

The tool asks you to input the percentage of your livestock which have various tag scores and you can find out how to do this by looking at Appendix: Tag Scores.

There are four categories of tag:

- Tag 2 (or less)
- Tag 3
- Tag 4
- Tag 5 (or greater)

Combined Tag Score

The combined tag score is used as an intermediate step in the calculation to the problem score; the tool calculates this value automatically once you put in your four scores.

If you make a mistake putting in data and the percentages don't add up to 100% a warning message is displayed in red: "Warning! Tag proportions do not add up to 100%". So go back, check the percentages you're keying in and make sure the four numbers add up to 100.

Problem Score

The tool calculates the **PROBLEM SCORE** by multiplying the percentage of cattle from feedlots with the combined haul score, and with the combined tag score. The problem score captures how big a problem your plant faces– the higher the score the bigger the problem.

Processing Questions

The following questions aim to assess processing practices used within your plant. These practices have the potential to either control or worsen the incoming problem, and hence to affect contamination levels on carcasses. The answers to these questions are combined to give a **PROCESS SCORE** which measures the effectiveness of your plant's processes and procedures.

Are spear cuts used for hide opening cuts?

Spear cuts are superior as the hide is incised outwards rather than inwards, minimising contamination of the carcase along the cutting line.

Are 2-knife systems used?

A 2-knife rotation system is considered superior to using a single knife which is swished under running water, then dipped quickly into 82°C water.

Is the hide pulled up or down?

Downward hide pullers remove the hide from the hindquarters by pulling it downwards over the head while upward hide pullers take the hide upwards and jerk it away from the carcass. The former is considered superior in limiting airborne contamination around the freshly de-hided carcass.

Are hide-on and hide-off areas physically separated?

Physical separation of the hide-on and hide-off areas minimises the spread of airborne microbial contamination.

Are viscera removed onto a moving belt or into a wheel barrow?

Viscera may be removed either onto a moving belt or into a wheelbarrow. The former system is considered superior because the viscera table undergoes automatic cleaning and sanitising between carcasses. Dropping viscera into a barrow is more difficult and can sometimes lead to contamination of the viscera and the barrow.

Are carcasses washed automatically, manually or not at all?

An automatic carcass washing system where each carcass passes through a wash cabinet with automatic delivery of water at constant pressure is considered superior to manual washing of carcasses. No washing is considered to be as good as automatic washing.

Are carcasses washed completely or along the brisket only?

Washing of the entire surface of each carcass side is considered superior to washing the brisket only. Select whether carcasses are washed completely or along the brisket only – if carcasses are not washed, select not applicable.

What type of decontamination wash is used (if any)?

Use of a decontamination cabinet supplying a hot water or an organic acid wash to the carcass is considered part of a superior processing system. Of these two types of decontamination systems, the hot water system was considered superior to the acid wash system.

Process Score

The tool calculates the **PROCESS SCORE** by multiplying the scores of the individual questions. Most questions are scored either 1 (good) or 2 (not so good). An exception is the decontamination step which scores 10 for no intervention, 5 for an acid wash or 1 for hot water intervention.

The **PROCESS SCORE** measures how well your procedures and operations can control contamination on incoming livestock – the higher the **PROCESS SCORE** the less effective the process.

Total Score: What does it mean and how can it be used?

What does it mean?

In the table below, examples of two plants with very different scores are presented. Plant A has a very low incoming problem – livestock are sourced from nearby pastures and tag scores are generally low. For plant B the opposite occurs – almost all are feedlot cattle, some travelling from distant feedlots and the vast majority have a high tag score. Consequently, the incoming problem for plant A is 0.57, which is about as good as it gets, while for plant B the incoming problem is 458, which is about as bad as it gets.

When looking at the effectiveness of the process of the two plants, plant A scores slightly better as a result of two parts of the process scoring better.

However, when considering the problem and process scores in combination, via the total score (obtained by multiplying the process and problem scores together) you can see that plant A has an excellent score, while the plant B score indicates processes which can't cope with the incoming livestock contamination.

How can the total score be used?

Put yourself in the position of the QA and Plant Managers at Plants A and B.

At Plant A you can see that the operation is about as good as it can be – clean livestock and a good process.

If you managed Plant B, however, you can immediately see that the incoming problem is always going to be hard to solve on the factory floor unless you make radical changes. For example, if you spent a lot of money and separated the hide-on and hide-off areas, installed a viscera table and a hot-water decontamination cabinet your process score would improve to 0.1, and reduce your total score from 458 to 45.8.

Or, you could look at reducing the incoming livestock problem. If you reduced the proportion of stock coming from feedlots to 50% and installed an effective stock washing system you would reduce substantially the contamination load you currently bring onto the slaughter floor.

So the tool can be used to predict various scenarios which impact on the hygienic quality of your carcasses. It can also help you understand why you score well, or not so well, when you get results of your micro counts.

Example scores for two plants

	Plant A	Plant B
What percentage of cattle processed comes from feedlots?	10	98
What percentage of cattle are short haul (<12 hours)?	97	50
What percentage of cattle are medium haul (12-48 hours)?	2	47
What percentage of cattle are long haul (longer than 48 hours)?	1	3
Combined Haul Score	1.02	1.39
What percentage of cattle have tag 2 or less?	30	0
What percentage of cattle have tag 3?	30	5
What percentage of cattle have tag 4?	35	20
What percentage of cattle have tag 5 (or greater)?	5	75
Combined Tag Score	5.6	335
<i>Problem posed by incoming livestock</i>	0.57	458
Are spear cuts used for hide opening cuts?	1	1
Are 2-knife systems used?	1	1
Is the hide pulled up or down?	1	1
Are the hide-on and hide-off areas physically separated?	1	2
Are the viscera removed onto a moving belt or a wheel barrow?	1	2
Are carcasses washed automatically or manually?	2	2
Are carcasses washed completely or along the brisket only?	2	2
What type of decontamination wash is used (if any)?	1	1
<i>Effectiveness of process</i>	4	16
Total Score	2.28	7328

Appendix: Tag Scores

The tag scoring system used in this work is based on a paper by David Jordan and his co-workers. David did his PhD on tag contamination of cattle in North America and then applied the same criteria to cattle in Australia.

To calculate the tag score for an animal, three sites are inspected on the animal:

- **Belly:** “The ventral surface of the animal extending cranially from the base of the udder or scrotum to the brisket and laterally bounded on both sides by a line between the skin fold attachments to the body of the caudal aspect of the front leg and the cranial aspect of the hind leg.”
- **Leg:** “The entire hind leg and rump extending medially to the midline and as far cranially as the wing of the ileum.”
- **Side:** “The lateral surface of the thorax and abdomen bounded by the leg and belly regions.”

Each region receives a score which is based on the area covered and the thickness of the faecal matter.

- Heavy (Score = 3): “Large aggregates of matted faecal material and/or soil clinging to the hair coat in such a manner that most of the region was affected.”
- None (Score = 0): No visible faecal matter or soil clinging to the hair.
- Light (Score = 1) and Medium (Score = 2): Intermediate between heavy and none.

The scores for the individual sites are then added to give a total tag score between 0 and 9. Appropriate adjustments can be made up or down based on whether individual sites were scored conservatively or generously.

Bibliography

Jordan, D., S. A. McEwen, et al. (1999). "Reliability of an ordinal rating system for assessing the amount of mud and faeces (tag) on cattle hides at slaughter." Journal of Food Protection **62**(5): 520-525.