final report

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Best practice for offal collection

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Abstract

The aim of this project was to establish benchmark data on quality and yield in edible offal collection, for the Australian Meat industry, as there was little available data on the subject either here or overseas. Eight abattoirs participated in the project.

The quality of the offal produced as measured by condition and adherence to AUSMEAT specification was excellent. The introduction of the refrigeration index in 2006 was a significant factor in ensuring good quality across the board.

All the abattoirs surveyed, collected as much offal as their facilities, the availability of labour, value of the offal and AQIS condemnations allowed. If labour was short the least profitable items were dropped first. The availability of labour and the condemnation rate due to disease or other abnormality by AQIS were the main factors that affected yield.

The research team found it difficult at first to benchmark yields for two reasons:

- There was no consistent form of recording yield data between the abattoirs
- AQIS does not record condemnations of offal unless associated with carcase condemnation

This meant that all the abattoirs found it difficult to get accurate yield data. They mainly used counts where available e.g. for runners or percentage of HSCW based on in-house studies. The latter was extremely unreliable due to large variations in offal weight between animals of different types.

To address this problem the research team developed an Excel-based management tool that was used to benchmark offal yield at the eight participating abattoirs for both beef and sheep offal over two separate weeks. This tool can be used by the industry to develop their own in-house benchmarks at each abattoir and to compare performance with other plants with a similar output.

Three of the original abattoirs collaborated with the researchers in a further 6-week data survey to validate the repeatability of the data collection system using a further Excel based tool.

The tools are not perfect but have shown their ability to provide useful performance data highlighting opportunities for improvement and will be more accurate when AQIS introduces a disease recording system that identifies the amount of offal condemned because of disease.

Executive Summary

Project rationale

This project was intended to develop tools that will assist meat companies to control quality and yields of edible offal by providing yield benchmarks for offal recovery and identifying the key points for maintaining offal quality. The project builds on previous MLA work in the Offalcom projects.

The project aimed to set benchmarks for the recovery of a wide range of offals, determine reasons for abattoirs falling below benchmarks and determine any factors that limit setting benchmarks.

Note: Although calves and goats were also looked at at one plant the emphasis of this project was on beef and sheep offals

Findings

All the abattoirs that participated in the study demonstrated a strong emphasis on offal quality and offal yields as part of their overall strategy for maximising returns on meat processing.

Quality issues

The introduction and use of the Refrigeration Index in 2006 and adherence to AUSMEAT specifications for offal meant that there was no quality issues of significance relating to condition found at any of the abattoirs.

Yield issues
There were three major issues associated with yield:

- Structural issues
- Labour availability
- Measurement of offal yields/AQIS condemnations

Structural issues
Structural issues at some plants limited the ability of the operators to collect all offals

Labour issues
This was a major cause of reduced yields.

At some locations lack of labour meant that offal collection was the first job dropped off in favour of continuing slaughter-floor activities. This obviously affected yield. The lowest value products or highest labour input products were the first to go e.g. Head meat collection was often dropped as it was both low value and high labour input.

Abattoirs near mining areas had the greatest problem and had resorted to employing imported labour.

The other labour issue was operator performance. This varied largely according to the culture at the abattoir. Some plants required greater supervisory input than others and when this input was not evident yield dropped

Measurement of offal yields/AQIS condemnations

All abattoirs had systems in place to monitor offal yields, although the systems were often cumbersome and lacked accuracy, because the quantity of offal condemned by AQIS could not be determined.

This was overcome in all plants by using a piece count where available or an in-house developed average offal weight, as a percentage of HSCW to determine yields, usually taken as periodic snapshots.

All plants used the AUSMEAT HAM 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. However these variations were still within the AUSMEAT specification.

The variation in trimming of various offals and the variation in age and weight of the animals slaughtered at the various plants meant that the use of a standardised offal weight as a percentage of carcase weight to determine yield was prone to gross inaccuracies. It also meant that this parameter was difficult to use as a measure of the efficiency of offal yield.

To address this problem the research team developed an Excel-based management tool that was used to benchmark offal yield at the eight participating abattoirs for both beef and sheep offal over two separate weeks.

Three of the original abattoirs collaborated with the researchers in a further 6-week data survey to validate the repeatability of the data collection system using a further Excel based tool.

Project benefits

The benchmarking tool developed as part of this project develops weights of offal yield as a percentage of HSCW on an ongoing basis, developed from total weights packed and not from snapshot surveys. It is thus more accurate.

The tool allows changes in the percentage weight of offal as changes in animal type and condition varies through the year, so that an ongoing picture of yield is developed.

The tool is Excel-based and should be able to be used by any abattoir with a simple Microsoft-based computer system, by inputting a minimum amount of data,namely:

- Daily total numbers of cattle processed split between cow/bull, steers and grain fed or sheep processed split between mutton and lamb.
- Daily total weight of hot standard carcases (HSCW) split between cow/bull, steers and grain fed or sheep processed split between mutton and lamb.

- Daily condemnations by AQIS (pathology) and the company (cosmetic & hygiene), presented by offal type
- Daily weights packed, presented by individual offal types
- Daily numbers of pieces packed, presented by individual offals. Note: Piece counts may not be available for all offals collected.

This tool can be used by the industry to develop their own in-house benchmarks at each abattoir and to compare performance with other plants with a similar output using as a benchmark the published data from the eight abattoirs that participated in the survey.

The resultant data can be used in the tool to identify variations in yield on a weekly basis with the accuracy improving as the database increases.

By having a single suite of tools used by all participating plants, national yield data could also be developed, similar to the MLA Coproducts price monitor

Recommendations

The tools developed during this project are better than current systems in use for determining yield, but accurate yield data will only be available when AQIS introduces an accurate system of disease recording for offal condemnations that can be electronically incorporated into the individual company's data collection system.

Processors wishing to use these project tools should:

1. Collect data as identified above
2. Apply this to the tools as instructed on the "Instructions" worksheet
3. Select a site from the data given in Appendices B-F that best matches their production mix
4. Compare data presented by the tools and data from the selected benchmark in the appendices

Contents

Background

The total value of edible offal to the red meat industry is about $450 million per year. The potential value of 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 about 8 to 25 and the value is greatly affected by the quality and trim of the products.

Prices for offal are a function of competition from other countries and buying strategies of importers. But prices have also been affected by loss of markets through hygiene concerns (e.g. China) and licensing difficulties (Malaysia and Russia). Prices are also clearly affected by quality and presentation styles. Preferred brands can achieve premiums of 30% over the average price and there are premiums for chilled offal in some markets.

Maintaining offal markets and maximising offal values is in the hands of abattoir management. While meat companies appreciate the value of investing in offal recovery, the systems for controlling yields and ensuring the appropriate quality and hygiene expected by customers may not be as well developed as they are for boneless meat.

This project was intended to develop tools that would assist meat companies to control quality and yields of edible offal by providing benchmarks of offal recovery. The project builds on previous MLA work in the Offalcom projects. In this project benchmarks for the recovery of a wide range of offals were to be set and reasons for abattoirs falling below benchmarks and factors that limit setting benchmarks at higher levels were to be identified. Where appropriate, further investigations of issues that inhibit the recovery of edible offal were to be identified.

Food Safety Services (FSS) recognised that many of the issues surrounding offal recoveries may be linked to regulator controlled issues, which can include sensitive issues. As a result Food Safety Services collaboratied with Eddie Andriessen Consulting Services (EACS) on this assignment. EACS brought extensive experience in regulator activities on abattoir slaughterfloors and strong links with regulators at the site, State and National level.

1 Project Objectives

The initial objectives of the project were:

- Benchmark offal recovery and combined with the MLA Co-products price monitor demonstrate the potential value of offal available from different classes of stock;
- Provide strategies for maximising recoveries and quality of offal by identifying best practice recovery systems;
- Demonstrate the value of the benchmarks through improved recovery of offal at up to three Australian abattoirs

But as the project progressed it became evident that these objectives were unrealistic as there were no uniform accurate systems in place to measure offal yields for benchmarking purposes.

It also became obvious that with the introduction of the Refrigeration Index for offal in 2006, quality issues related to condition had virtually disappeared.

So with the agreement of the MLA, the specifics of the objectives were changed slightly with the emphasis now on issues related to yield:

- Developing a tool for monitoring and measuring offal yield.
- Implementing the tool in up to three abattoirs
- Developing benchmarks from the data collected for use by the industry

2 Methodology - Section

2.1 Part One

The project team recognised that MLA has previously conducted a number of studies of offal collection issues and had published these as reports that could be of both confidential and open publication natures. The initial activity of the assignment was to review all available information available to MLA on the issue of offal recoveries, offal value and offal quality and to review any other relevant information available both here and overseas.

Based on information from these reports and on MLA's, FSS's and EACS's own experiences and knowledge a site assessment proforma was developed.

2.2 Part Two

The project team was aware of the commercial and regulatory sensitivity of some of the issues surrounding offal collection. As a result we saw it as essential that early in the project we worked closely with MLA's Co-Products Program Manager to identify the ideal sites for assessment in this project. A total of 8 sites were included in the on-site survey work. We believed that these sites would clearly represented the Australian export meat processing industry and should include:

- 2 Queensland beef abattoirs - 1 large (>1,000 head per day) and 1 medium (5-700 head per day) sized
- 2 New South Wales abattoirs – 1 beef only & 1 mixed species
- 2 Victorian smallstock abattoirs – 1 large (>4,000 head per day) and 1 medium (2,500 – 3,000 head per day) sized
- 1 South Australian mixed species abattoir
- 1 West Australian smallstock abattoir

This would give detailed information on the collection of beef and smallstock offals at 5 abattoirs each. However it was recognised that the availability and willingness of some processors to participate in the assignment may have amended this mix or number of processors. MLA's involvement at this stage was essential to maximise the possibility of obtaining effective processor participants.

A preliminary visit was be made to one of the participating processing sites to evaluate the site assessment methodology. As a result of this visit and the preliminary data collected it was

determined that rather than conduct 2 separate site visits (one each by researchers involved in this project), it would be more effective to travel together to cover both visits as one.

This would prove to provide better interaction between the researchers and we believe better quality data. It has also had a lesser impact on each site.

As a result, each site would be visited for a minimum of one production day and information identified in part 1 would be collected using the specifically developed proforma. . The first site to be visited was a mixed species site to establish a consistent data collection methodology, for both species, using the proforma.

The site visit proforma focussed on:

- expected yields per head;
    - typical recoveries per body;
- losses due to condemnations;
- losses due to other reasons;
- number of staff involved in offal collection;
- other costs of offal collection.

Management at all participating sites was contacted prior to their visit to advise of the format of the visit and the data that was sought. A copy of this letter is included as Appendix A. Separate contact was made with AQIS staff at each site to explain the project and the activities to be undertaken. A copy of this letter is included as Appendix B. Good communication with both management and AQIS ensured strong support from both parties at every site.

At each site Chris Sentance would focus on:

- data collection methods and the performance indicated by this data
- offal collection (or non-collection) drivers
- how data is used by management as a performance tool.
- the data collection snapshot taken was the week immediately prior to the site visit

At each site Eddie Andriessen would focus on:

- slaughterfloor performance on offal recovery
- prevalence and type of typical pathological problems in animals processed.
- offal room performance on offal recovery
- the pathology snapshot taken was generally 100 carcases or each type of animal processed on the day of the visit. This only varied if the animals available for review were limited.

2.3 Part three

Since it is known that offal collection is an area that is very subject to labour availability, it is recognised that collecting offal recovery information was likely to be unreliable from one site visit. So

based on data obtained at the initial site visits a second collection of the same yield data would be made by remote contact.

It became apparent from the data obtained through the comprehensive joint site visits that it was possible to prepare a simplified data collection system from which it would be possible to obtain data from further sites

2.4 Part four

All site information was collated and a summary prepared of existing performance as a benchmark for other processors. From this summary and the on-site observations by FSS & EACS staff, a series of best practice recommendations were drawn up as a guide for individual processors to improve offal yields and quality.

At this stage two rounds of benchmark data had been collected from each of the 8 plants. Data had been entered into a standard “data collection template”. This collection template was linked to a suite of spreadsheet workbooks developed during milestone 4. These spreadsheets presented data as both percent HSCW yields and percent piece yields and compared all like species plants in both numerical and graphical formats
The main focus of Milestone 4 of the project had been to benchmark improved offal yield data collection using a specifically developed suite of data collection, analysis and presentation tools.

The tools are driven by a simple data collection template that requires the input of only 5 figures:

- Total kill numbers for each class/species of livestock
- Total weight of product (HSCW) for each class/species of livestock
- Weight of each type of offal packed
- Numbers of each type of offal packed
- Numbers of each type of offal condemned or not collected

The first four figures had proven to be easily collected from existing data and can be depended on for accuracy. At some plants, piece data had also proven to be easily collected especially offal that is packed by piece number, such as runners.

The condemn figures are however often difficult to ascertain as AQIS is not required to keep this data, so this required the counting of offal losses by a company operative. This works adequately in smaller plants but is prone to major errors on faster chains, or in high condemnation areas, due to operator inattention. It is known that AQIS is developing a disease recording system. Piece-counts should improve in the future when the disease recording system is introduced, so long as the system is made compatible with other meat industry data collection needs.

Also required for the project system is an estimated average weight for each type of offal produced, to allow for the weight loss associated with condemnations. Some plants already had this available from individual in-house studies or historical company performance data.

Data on the relationship between carcase weights and offal weights is available from the CSIRO publication Meat Research Report 2/92-Byproducts yields from sheep and cattle W.F. Spooncer. Several factors affect offal weight and they cannot all be controlled:

- Age of the animal
- Carcase weight
- Sex
- Fat score
- Trimming

Further data had been developed and reported in an MLA sponsored student project - Specialty coproducts offal product process recovery yield assessment - ACC coproducts development program, 2007, Alexander Smith

These studies have shown that the correlation between HSCW and offal weight is poor. These studies indicate that this approach is also prone to errors as it depends on using a standard weight for each type of offal to determine yield. The range of factors that can affect offal weight compared to carcase weight cause large errors to be introduced resulting in unrealistic yield figures of up to 200%.

As a result of the concern with the marginal repeatability of this parameter, this aspect was further investigated in this project.

2.5 Part five

3 sites were chosen as models sites to implement the recommendations prepared in part four and demonstrate their effectiveness. These sites included both beef and sheep processing and were participants in the previous site assessments.

3 Results and Discussion - Section

3.1 Results and Discussion – Part one

3.1.1 Available information reviewed included:

MLA

The review of the MLA CoProducts program (ACOP 0044) conducted by Birrrk Associates- December 2006 would indicate that there were only 9 useful studies in the MLA archives

M.256	Edible offal market study
COPR.099	Offal pathology
PRCOP.016	Enhanced recovery of co-products-tripe
PRCOP.016 part 2	Enhanced recovery of co-products-tripe
PRCOP.029	Risk analysis survey of sheep meat processors
PRCOP.033A	Beef and lamb offal specification for China
PRCOPVA.001	Recovery of sheep brains and tongues
SASO.01	Storage life of frozen edible offal to Saudi Arabia
PSHIP.169C	De-hairing of cattle and sheep heads and hooves

Even these had little data that were relevant to this project

Food Science Australia

MRR 02/92 Byproducts yield of beef and sheep. This contained useful background information on yield of individual offal items from sheep and beef.

Meat Technology Update 01/05 Alternative techniques for the hygienic processing of offal. This was largely a summary of other MLA funded projects.

AQIS

The Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (2006).
Export Control (Meat & Meat Products) Orders 2005
Meat Manual Volume 2 – Requirements for overseas countries
AQIS Meat Notices

These are the main legislative requirements that specify the parameters for offal condemnation and hence offal recovery. These legislative requirements can limit yield and control quality of offal.

AUSMEAT

Handbook of Australian Meat- International red meat manual seventh edition, 2005. This is the essential standard for offal specifications and details the specific preparation criteria for individual offal items. As a trimming and presentation standard it naturally creates some limitations on offal yield

Other

Various internet sources have been investigated to see what is happening overseas within the scope of this project e.g www.meat.tamu.edu US National beef quality audit-2000.

Meat Safety Quality and Veterinary Public Health in Australia (2006) by Eddie Andriessen. Penny Farthing Publishing PO Box 3322 Port Adelaide SA 5015

Speciality coproducts offal product process recovery yield assessment-ACC coproducts development program 2007 Alexander Smith

3.1.2 Summary of findings

A review of the literature indicated that quality and yield for edible offal is a low priority for research both here and overseas, due largely to its low value with respect to carcase meat.

The only useful information that could be found was condemnation rates for beef offal from the US National beef quality audit-2000.

This information was well embedded in the report and was obviously a low priority compared to other quality and yield issues.

It did indicate that in the US when carcase condemnation was at 0.1%, offal condemnation was as follows:

Liver 30.3%
Lungs 13.8%
Tripe 11.6%
Heads 6.2%
Tongues 7.0%

It implied that between 10-30% of condemnations were due to contamination, but the audit parameters were such that this was not clear.

It was our impression that Project A.COP.0037 would be breaking new ground.

A proforma to be used as the basis of site investigations had been prepared. This proforma had already been trialed at one of the target sites (Site E)) to determine its suitability as a data collection tool. It had been found to generally be able to identify useful data from the first trial site but would need some minor modification before use at the other chosen sites.

3.1.3 Identification of eight processor sites for assessment

The final mix of sites selected to participate in the benchmarking aspect of this project, based on agreement to participate and fit with our original needs were:.

- QLD – 2 x beef
- NSW 1 x beef, 1 x mixed, 1 x smallstock
- VIC 1 x smallstock
- SA 1 x mixed
- WA 1 x smallstock

Note: For confidentiality reasons the eight sites are only identified in this report and in the benchmark data by the letters of the alphabet - A to H.

3.2 Results and Discussion – Part two & three

3.2.1 Data Collection

All sites included in the benchmark project collected data that allowed them in some way to assess their performance. Data collection occurred in two ways:

- Piece based data
- Weight based data

3.2.1.1 Piece based data

Piece based data generally gave reliable information on the number of items of product actually collected. For beef this was generally very accurate and included in most cases data on the number of condemned items rejected from the slaughterfloor. This data reflected activities by AQIS identifying producer faults or the Company identifying processor faults. Most beef sites had a system for tracking piece counts on the key items of livers, tongues, tails and mountain chain tripe. At some sites additional items were included in piece counts.

For sheep piece counts are more difficult due to the high numbers of animals processed and data was generally less reliable. Sites tackled the problem of piece counts in different ways including:

- test counting several boxes of each offal each day to obtain averages
- periodically establishing average counts per box using light duties labour.

When condemn data was collected on the slaughterfloor for smallstock, the accuracy of this data was thought to be inaccurate given the potentially large numbers of condemned items. As a result many sites did not collect this data for smallstock but built in loss factors in their yield calculations.

Only runners were accurately counted as a set number of items are packed in each carton/drum.

-Runners are sold by number not weight.

As a performance tool, piece based data is readily compared with the theoretical obtained from the number of animals killed. Kill figures for each day are readily available from all sites.

Piece based data where accurately collected will give good benchmark performance information as the collection performance should be independent of the type of animal processed. Some exceptions to this were observed. For example low weight range pillar tripe has a limited marked so in some cases pillar tripe from light animals is not collected although the demand, and price, for high weight range pillar tripe is good.

3.2.1.2 Weight based data

Weight based data is generally easier to obtain as all product is weighed and labelled after packing with pack weights recorded for future use by sales staff and despatch staff. However weight based data is difficult to use, as there is no reliable figure to compare actual performance with. Theoretical weights are handled by participating plants in different ways including:

- Using a recognised industry standard (regression equations) from data prepared by WF Spooncer in 1992 and Browne & Markey in 1994. Regression equations were shown as early as Spooncer's work to be of minimal accuracy as factors other than animal type and Hot Standard Carcase Weight (HSCW) affected offal weights.

- Using in-house developed standards. These were based on sample sizes ranging from 10 to 300 animals and were expressed as regression equations or as simple numerical averages. In some cases these were a simple average of all animals killed but in most cases were done by

animal type so that a more accurate weighted-average could be achieved. In one case the standard weights for each item were developed by anecdotal evidence brought by Supervisors from other sites. Weighted averages should be more accurate than simple averages but all are thought to lack accuracy.

- Establishment of daily average weights by counting a number of boxes of known weight each day.

3.2.2 Presentation systems

Each plant had its own system of presenting and using data. Data was generally presented in some form of spreadsheet ranging from particularly complex to quite simple. Outcomes from these spreadsheets included simple piece based % yield, HSCW % yield or kg yield, $ per head of offal recovered, deficit/gain against standard in kg, % or $.

Some plants that were part of national groups received little or no formal feedback on performance unless significant discrepancies occurred. However these plants informally tracked performance on-site in simple terms to ensure that performance remained adequate.

All plants were aware of the importance of offal yields but those plants that were providing a service kill generally appeared to be more diligent in offal tracking and accountability, as the offal was normally one of only a few items that belonged to the processor and gave them an opportunity to improve their profitability..

All plants had some target yields to work to. In most cases these were documented although in some cases these were not and were based on the managers intuition and experience as to whether the yields were acceptable. Generally Plant Managers, or QA Managers, assessed data with discrepancies investigated by offal department supervisors.

3.2.3 Slaughterfloor and Offal Room Assessments

3.2.3.1 Factors affecting recovery rate

There are two major causes of loss of quality and yield in offal

- Producer causes
- Processor causes

Producer causes are largely due to the environment in which the animals are raised. These include the various diseases and other conditions that cause offal to be rejected at post mortem inspection

Processor causes are those causes that are due to the processing and handling of offal during slaughter, processing, packing and refrigeration.

3.2.3.1.1 Producer factors affecting recovery rate

During the assessment stage of the project approximately 100- 200 offal sets were assessed at each location at the post mortem inspection position.

The relevant meat inspector was asked to advise of the reasons for rejecting offal at post mortem inspection.

A record of reasons for rejection was made and percentages determined.

It is important to note that although the results were not statistically valid they were remarkably consistent with the usual causes of rejection at each abattoir as advised by the AQIS meat inspection staff at the plant.

In summary young stock such as yearlings, lambs and calves had few offal rejections.

However older animals had higher rates of rejection of offal with the filter organs such as livers and lungs showing the highest rates of rejection.

The range of causes of rejection was actually quite small.

Lambs
Very few rejections unless grain fed when liver abscesses were noted
Ecchymosis was a common cause of rejection of hearts and thick skirts
Some hearts were rejected due to C. ovis

Sheep
Livers-causes of rejection include C. tenuicollis and hydatids
If from an irrigated area livers were mainly condemned for liver fluke
Hearts- C. ovis

Calves
No significant rejection of offal due to disease

Beef-yearlings
Any grain fed animals showed high levels of abscesses in the livers. Otherwise there were few disease causes of rejection of offal

Beef-cows
If from an irrigated area livers were mainly condemned for liver fluke. Lungs were often also affected

Disease of liver due to liver fluke also caused offal to be condemned due to adhesions in the peritoneal cavity resulting in burst viscera and resultant heavy contamination of carcases and all offal other than head meat

If from Qld, hydatids was the main cause of liver rejection due to the sylvatic cycle of the organism in dingoes and wild dogs

Lot fed cattle
Any grain fed animals showed high levels of abscesses in the livers.

Other conditions reflected the geographical source of the animals e.g. if in Queensland hydatid cysts were frequently found in the livers of these animals

If from irrigated areas fluke infestation was to be found in the livers.

General
Across all species and ages a small percentage of kidneys were rejected due to white spots probably nephritis. Rejections did not seem to be related to age, geographical location or feeding regime.

3.2.3.1.2 Processing factors affecting quality

All plants that participated in the project showed excellent handling of offal with product being placed under refrigeration expeditiously. All plants had “Approved Arrangements” with the refrigeration index of all offal approved by AQIS.

In addition chilled offal for export was pre-chilled with ice. This is a highly recommended procedure for high quality/value product.

3.2.3.1.3 Processing factors affecting yield

These varied from plant to plant, but can be grouped into two major causes:

Structural issues

Labour issues

Structural issues
At one plant offal collection/inspection facilities reduced offal collection markedly. Other plants were limited in their ability to collect offal such as tripes by lack of adequate facilities

Labour issues
This was a major cause of reduced yields.

At some, but not all, locations lack of labour meant that offal collection was the first job dropped off in favour of continuing slaughter-floor activities. This obviously affected yield. One plant claimed to tailor its kill to match total labour requirements including adequate staff for full offal recovery.

The lowest value products or highest labour input products were the first to go e.g. Head meat collection was often dropped as it was both low value and high labour input.

Runner collection was rarely dropped.

Abattoirs near mining areas had the greatest problem and resorted to employing imported labour.

The other labour issue was operator performance. This varied largely according to the culture at the abattoir.

Some plants required greater supervisory input than others and when this was not evident yield dropped

3.3 Results and Discussion – Part four

3.3.1 Identifying the value of quality data collection

We believe that the main issue for offal processors is yield. The problem experienced to date with yield is that, while meat companies appreciate the value of investing in offal recovery, the systems for managing yields are not well developed and are generally inaccurate.

To paraphrase Milton Friedman the economist: “if you cannot measure it, you cannot manage it”. Site surveys in Milestones 2 & 3 indicated that many meat companies cannot measure their offal yield accurately. Consequently we believe that they cannot manage it adequately.

There appear to be two reasons for this:

The condemnation rate for offal is much higher than for carcases. For example in some areas a very high proportion of beef livers are condemned due to parasitic infestation. This is outside the control of the meat company but is not often recorded, as it does not affect carcase condemnation rates. Site B data indicated an average condemnation rate of 55% for beef livers. We believe that this figure may be as high as 90% at some plants in Northern Queensland.

No records are currently required to be kept by the inspection service of offal condemnation other than condemnation associated with a total carcase condemnation.

The establishment of an accurate piece-count of offal requires counting of offal losses by a company operative. This is effectively carried out in smaller plants, and in larger plants with very low offal condemnation rates such as plants processing young stock only or those located in low risk areas. However accurate data is difficult to obtain on faster chains or at high condemnation rates, due to operator inattention.

Most companies collect useful yield data by analysis of automatically collected data such as slaughter numbers, carcase weights and the weight of packed offal. This can result in a percentage figure based on hot standard carcase weight (HSCW). This data does not however allow for condemnations or any other losses that may occur during processing.

Many companies perform both a piece-count and a weight based assessment in order to cover the deficiencies in both systems. In milestone 4, the project team developed an Excel spreadsheet based tool for offal data collection and analysis by adopting the same approach.

The good performance against quality parameters at all 8 plants surveyed, identified in Milestone 2 & 3 report, indicated that our original intention to be able to significantly improve performance at 3 plants by implementing improvements in best practice was not realistic. We did not believe that best

practice was the issue rather it was the need to measure performance accurately and meaningfully to enable each plant's management to assess their plant's achievement of best practice.

As a result the project objectives were changed slightly as indicated in 3.4 & 3.5 above. The focus was now on establishing consistency of data performance from 3 plants over a 6- week period.

At the end of the project the outcomes would then be:

- Produce summary data on observed performance during our site visits to each plant.
- Provide benchmark criteria that would enable a processor to pick a plant processing similar stock to theirs that they can benchmark against.
- Provide detailed benchmark data from each of these plants on a comprehensive range of offals.
- Prepare a standard tool to collect, analyse and present data on an on-going basis. This tool could be the standard for future on-going benchmarking exercises similar to the existing Co-Products monitor but based on offal recovery performance.

3.3.2 Benchmarked data from 8 plants.

The tables and graphs in Appendices C-G have been developed from data from the 8 participating sites using the standard spreadsheet tools prepared during this milestone. Data is reported for 5 sites processing beef, 5 sites processing sheep, 1 site processing goats and 2 sites processing calves. For each site the mix of animals killed from various classes are given along with average carcase weights. This is provided so that any processor wishing to use this benchmark data can identify the data from a site that processes a mix and carcase weight similar to their own.

These tables and graphs report:

- Percentage yield of pieces of offal against kill number, prepared as including, and not including, condemn data where available.
- Average item weight against HSCW, prepared as including, and not including, condemn data where available. Where available site-specific weighted-average weights per item were used to determine the weight loss from condemned offal. Where not available, estimated weights were used based on average data collected from each plant.

Some plants collect only a limited quantity of some offals. In most instances this is because they have a specific order for a quantity of offals less than their potential daily production. As this could be incorrectly seen as a poor performance benchmark these occasions are highlighted in the tables.

To use the information in Appendices C – G processors should identify the site that has a production mix most similar to theirs and then use the data within that table as their benchmark.

3.4 Results and Discussion – Part five

3.4.1 Offal Yield Benchmarking

An Excel workbook based tool (Tool 1) has been developed to numerically and graphically present offal-recovery performance information from raw data supplied by the abattoir. Information supplied by the abattoir on a weekly basis is:

- Daily total numbers of cattle processed split between cow/bull, steers, grain fed or sheep processed split between mutton and lamb.
- Daily total weight of hot standard 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), presented by offal type
- Daily weights packed, presented by individual offal types
- Daily numbers of pieces packed, presented by individual offals. Piece counts are not available for all offals collected.

Data is presented numerically in tables on two bases, % offal weight on HSCW and % pieces on total numbers killed. Within these two sets are two sub-sets. These subsets are, excluding allowance for condemnations and including condemnations.

% recovery against HSCW allows the processor to determine an average expected weight yield from their animals being processed. % recovery against piece counts allows the processors to determine the slaughterfloor and offal room performance in recovering all potentially available offal.

For sites B (beef), D (sheep) & A (mixed) data was collected for all 6 weeks of a 6-week validation trial. The benchmark data as prepared by Tool 1 was applied to an Excel based Validation Tool (Tool 2). Data is again presented numerically in tables on two bases, % offal weight on HSCW and % pieces on total numbers killed. Within these two sets are two sub-sets. These subsets are, excluding allowance for condemnations and including condemnations. In addition this data is presented graphically.

3.4.1.1 Site B - Beef

Numerical data from the 6-week validation is shown in Appendix H Tables 16 - 19.

Graphical representation of this data from the 6-week validation is shown in Appendix H Graphs 10 - 13.

Comments
Beef offal yield on % of HSCW basis was very consistent across the 6-week period as indicated by Graphs 10 & 11, particularly when condemns were taken into account. This reflects the consistent mix of animal types in the kill and the consistent average HSCW.

Beef offal yield on piece count basis was also quite consistent across the 6-week period as indicated by Graphs 12 & 13, particularly when condemns were taken into account. However please note that for this site the level of liver condemns was very high and as a result condemnation rates were only determined as kill minus pieces packed.

While piece yields were generally high there was both inconsistency and some loss of yield with hearts and honeycomb. While the plant's data did not highlight any concerns this representation of data indicates a potential increase of yield of:

- Hearts 4%

- Honeycomb 5%

On average recovery weights and market prices (Co-products monitor Sept 07 quarter) this would be a potential increase of $540 per week.

3.4.1.2 Site D - Sheep

Numerical data from the 6-week validation is shown in Appendix I Tables 20 - 23.

Graphical representation of this data from the 6-week validation is shown in Appendix I Graphs 14 - 17.

Comments
Sheep offal yield on % of HSCW basis was very consistent across the 6-week period as indicated by Graphs 14 & 15, particularly when condemns were taken into account. This reflects the consistent mix of animal types in the kill and the consistent average HSCW.

Sheep offal yield on piece count basis was also quite consistent across the 6-week period as indicated by Graphs 16 & 17, particularly when condemns were taken into account. However please note that for this site the level of kidney recoveries was extremely low as this plant is in a cadmium risk area. With an average mutton component of 95% of the kill across the 6-week period almost all kidneys were condemned and no data on actual condemn numbers was determined.

While piece yields were generally reasonable there was some inconsistency with livers in particular. Also yields on most items could be improved. While the plant's data did not highlight any concerns this representation of data indicates a potential increase of yield of:

- Livers 5%
- Hearts 5%
- Total runners 9%

On average recovery weights and market prices (Co-products monitor Sept 07 quarter) this would be a potential increase of $4,320 per week.

3.4.1.3 Site A – Mixed Species

Numerical data from the beef 6-week validation is shown in Appendix J Tables 24 - 27.

Graphical representation of this data from the beef 6-week validation is shown in Appendix J Graphs 18 -21.

Comments
Despite the availability of considerable quantities of data on production and condemnations, both % HSWC and piece based yields showed considerable variation (see graphs 18 & 21). Some of this variation can be accounted for by:

- Some days not all offal was collected due to labour constrains or market requirements.

- A considerable portion of the kill on some days is designated as non-halal due to head damage on stunning. Limited offals are collected from non-halal cattle.

However some excessively high yields were noted on a large number of production days often causing weekly performance to exceed 100% of kill on a piece basis. It is not known whether the error is in counting of pieces packed or counting of condemnations. It is suspected that it is likely to be a combination of both given that on some occasions even when condemnations were not included the yield exceeded 100% (see graph 20.)

The value of the 6-week validation tool is demonstrated with Site A Beef data as the 6 week average on most items is very close to 100%. The exception is Pillar Tripe where piece yields averaged approximately 90%. This loss of yield is likely to be due to the limited market for low weight range Pillar Tripe and the non-collection of these items. However given the accuracy of condemnation data from this site it would be worthwhile investigating the cause of this yield loss in detail as there is a potential additional gain of 10% or some $126,000 pa.
.
Numerical data from the sheep 6-week validation is shown in Appendix K Tables 28 - 31.

Graphical representation of this data from the beef 6-week validation is shown in Appendix J Graphs 22 - 25.

Comments
Sheep yields as weight % of HSCW showed considerably less variation than for beef (see graphs 22 & 23). Piece data is determined for runners only so pieced based yields are not available for other offals. Piece based yields for runners indicate an opportunity for an additional yield recovery of around 5 - 10% (see graph 25). An additional 8% yield would amount to approximately $96,000 pa

3.4.2 Offal Weight Survey

Both the literature and this project indicate that there is wide variation in all offal types as a percentage of HSCW. So as a management tool it has limited application in managing yield.

It also makes comparison of yield between plants difficult to determine.

To confirm this finding a detailed study was done at one plant of offal weights. Five to 10 samples of offal were collected throughout the day and weighed on calibrated scales.

The offal came from a range of weights and grades of animals from both the beef and the sheep slaughter line

The offal was collected at random throughout the day.

The data collected is summarised at Appendix L.

In summary the data collected was no more accurate than that collected by the company who obtained their data by weighing only 10 offals of each type about 3-4 times a year.

Two conclusions could be drawn from this minor survey

- The survey confirmed that the correlation between offal weights and HSCW is poor
- Weighing a sample of offal on a snapshot basis to use as base data for determining yields leads to inaccurate data

The tool developed as part of this project develops weights of offal yield as a percentage of HSCW on an ongoing basis, developed from total weights packed and not from snapshot surveys. It is thus more accurate.

The tool allows changes in the percentage weight of offal as changes in animal type and condition varies through the year, so that ongoing picture of yield is developed.

3.4.3 MLA Offal Yield Analysis Tool

An Excel based Offal Yield Analysis Tool has been developed as part of this project and is separately supplied on CDROM. To use this tool processors will need to collect the following data for a week's production:

- Total kill numbers for each class/species of livestock
- Total weight of product (HSCW) for each class/species of livestock
- Weight of each type of offal packed
- Numbers of each type of offal packed
- Numbers of each type of offal condemned or not collected

The Yield Analysis Tool is a multi-page workbook. The first page contains the instructions for use. The second page is the data entry page with all cells locked other than those in which the data is to be entered. Once data is entered into the Data Entry page all calculations and graphing are automatic. A number of calculation pages are hidden. Data presentation pages include:

- Tabulated data
    - Weight yield as % of HSCW (excluding and including allowances for condemnations)

- Graphical data
    - Piece yield as % of kill (excluding and including allowances for condemnations)

All pages except the data entry page are password protected so that the calculations cannot be inadvertently modified

Data generated by this tool can be used as a benchmark against the data collected by this project and represented in Appendices C – G. An in-house benchmark of weekly data using this Tool can also be generated to assess on-going performance.

Results from the initial 8 test sites have demonstrated the value of collecting weekly performance data and analysing using this tool.

3.4.4 MLA Offal Yield 6 Week Validation Tool

A second tool has been developed to allow processors to compare data from up to 6 separate production weeks. The Excel based Offal Yield Validation Tool is separately supplied on CDROM.

To use this tool processors will need to analyse the following data for six separate week's production, using the Offal Yield Analysis Tool:

- Total kill numbers for each class/species of livestock
- Total weight of product (HSCW) for each class/species of livestock
- Weight of each type of offal packed
- Numbers of each type of offal packed
- Numbers of each type of offal condemned or not collected

The Yield Validation Tool is also a multipage workbook. The first page contains the instructions for use. No data is directly entered into this tool. The tool instead collects data directly from Offal Yield Analysis Tool files in associated folders. Once data is available, all calculations and graphing are automatic. Data presentation pages again include:

- Tabulated data
    - Weight yield as % of HSCW (excluding and including allowances for condemnations)

- Graphical data
    - Piece yield as % of kill (excluding and including allowances for condemnations)

All pages are password protected so that the calculations cannot be inadvertently modified

Data generated by this tool can be used benchmark against the 6-week data collected by this project and represented in Appendices H - K. An in-house validation of weekly performance using this Tool can also be used to assess on-going performance.

Results from test sites in 4.4.1.1 – 4.4.1.3 have demonstrated the value of collecting weekly performance data and analysing using this tool.

4 Success in Achieving Objectives

4.1 Potential cost savings by typical yield improvements – Beef

The provision of accurate yield performance data by using the tools provided should allow processors to increase their yield recoveries significantly. The initial survey of 8 plants indicated a range of potential yield gains:

Item	Range of Yields	Potential Yield Increase Estimated as Available	Daily Value on 500/day kill
Hearts	89.5 – 99.7%	5%	$215
Livers	92 – 100%	5%	$197
Thick skirt	81.6 – 100%	5%	$95
Tails	87.8 – 99.6%	5%	$186
Tongues	89.7 – 100%	1%	$86
Honeycomb Tripe	86.7 – 96.4%	5%	$167
Pillar Tripe	78 - 100%	2%	$105
Total			$1,051

Offal prices are based on September quarter 2007 data from the MLA CoProducts Monitor.

On a 500 per day kill, the annual potential increase in value per annum would be $252,000. Typical increased recoveries can be estimated as $2/head.

4.2 Potential cost savings by typical yield improvements - Sheep

The provision of accurate yield performance data by using the tools provided should allow processors to increase their yield recoveries significantly. The initial survey of 8 plants indicated a range of potential yield gains:

Item	Range of Yields	Potential Yield Increase Estimated as Available	Daily Value on 4,000/day kill
Livers	86.9 – 95.1%	5%	$175
Kidneys	? - 88%	5%	$10
Hearts	88 - 96%	5%	$57
Honeycomb Tripe	96%	3%	Unknown pricing
Thin skirt	91%	5%	$Unknown pricing
Runners	80 – 95.6%	10%	$205
Total			$447 +

Offal prices are based on September quarter 2007 data from the MLA CoProducts Monitor.

On a 4,000 per day kill the annual potential increase in value per annum, would be $120,000. Typical increased recoveries can be estimated as $0.10 – 0.15/head.

5 Impact on Meat & Livestock Industry – now & in five years

Because most offal is of much lower values than carcase meat there has been little research either in Australia or overseas on best practice recovery of edible offal or benchmarking of yields. The main outcomes from this project are:

- Indications that quality issues do not seem to a problem with the production of edible offal in Australia
- Indications that better quality information on offal yield performance will enhance opportunities for increased yield and increased dollar returns to processors
- Tools for monitoring and measuring edible offal yields
- A means of benchmarking offal yield performance across the industry
- The need for AQIS to develop a condemnation record system that can also be used by each abattoir to measure offal yields more accurately

Once AQIS develops a condemnation records system for offal, the tool developed as part of this project will enable individual abattoirs to develop their own in-house benchmarks based on data that is already routinely collected:

- Type of animal slaughtered
- HSCW

- Kill numbers
- Weight of offal packed
- Numbers of offal packed
- Offal condemnations/rejections

This will enable abattoirs to develop their own accurate benchmark yield data and also compare their yields with other similar plants.

This should enable abattoir management to identify on a daily basis any causes of reduced yield and address them immediately.

As the data builds up in the tool the predicted yield of each offal type should become more accurate and even minor losses should be able to be identified and rectified. This is not possible with systems currently in place at the abattoirs surveyed. The data will be even more accurate when AQIS develops a condemnation records system for offal that can be used by the individual abattoirs to determine yield

Accurate data on offal yields could allow processors to potentially increase their product value by $2/head for cattle and $0.15/head for sheep. Based on an estimated annual Australian kill of 6.5 million cattle and 20 million sheep this is total potential value in increased offal production of $17.7 million pa.

Investment in accurate yield recording is indeed a profitable exercise for the Australian meat industry.

6 Conclusions and Recommendations

The eight plants that participated in the study demonstrated a strong emphasis on offal quality and offal yields as part of their overall strategy for maximising returns on meat processing.

The introduction and use of the Refrigeration Index in 2006 for offal meant that there were no quality issues of significance relating to condition found at any of the plants.

All abattoirs in the survey packed product according to AUSMEAT specifications, but the amount of trimming varied according to in-house practices and customer demands, so direct comparison of yields of some offal types between abattoirs was difficult

Although quality was not an issue, yield was an issue at all plants.

There were three major issues associated with yield:

- Structural issues
- Labour availability
- Measurement of offal yields/AQIS condemnations

Structural issues
At one plant offal collection/inspection facilities reduced offal collection markedly. Other plants were limited in their ability to collect offal such as tripes, by lack of adequate processing facilities

Labour issues
This was a major cause of reduced yields.

At some locations lack of labour meant that offal collection was the first job dropped off in favour of continuing slaughter-floor activities. This obviously affected yield. The lowest value products or highest labour input products were the first to go e.g. Head meat collection was often dropped as it was both low value and high labour input. Runner collection was rarely dropped.

Abattoirs near mining areas had the greatest problem and resorted to employing imported labour.

The other labour issue was operator performance. This varied largely according to the culture at the abattoir. Some plants required greater supervisory input than others and when this was not evident yield dropped

Measurement of offal yields/AQIS condemnations
They all had systems in place to monitor offal yields, although the systems were often cumbersome and lacked accuracy, because the quantity of offal condemned by AQIS could not be determined.

This was overcome in all plants by using an in-house developed average offal weight to determine yields.

All plants used the AUSMEAT HAM specifications for their product and although there was some minor variations between plants in what was actually packed, this variation reflected customer demands and trimming practices at the plant. At these variations were still within the AUSMEAT specification.

The variation in trimming of various offals and the variation in age and weight of the animals slaughtered at the various plants meant that the use of a standardised offal weight as a percentage of carcase weight to determine yield was prone to gross inaccuracies. It also means that it is difficult to use as a measure of the efficiency of offal yield. Because of these difficulties the project team decided to develop their own tool for measuring yield.

The tool developed as part of this project generates weights of offal yield as a percentage of HSCW on an ongoing basis, developed from total weights packed and not from snapshot surveys. It is thus more accurate.

The tool allows changes in the percentage weight of offal as changes in animal type and condition varies through the year, so that an ongoing picture of yield is developed.

The tool developed during this project is better than current systems in use for determining yield, but accurate yield data will only be available when AQIS introduces an accurate system of disease recording for offal condemnations that can be electronically incorporated into the individual company’s data collection system

7 Bibliography

MLA publications

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M.256	Edible offal market study
COPR.099	Offal pathology
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PRCOP.029	Risk analysis survey of sheep meat processors
PRCOP.033A	Beef and lamb offal specification for China
PRCOPVA.001	Recovery of sheep brains and tongues
SASO.01	Storage life of frozen edible offal to Saudi Arabia
PSHIP.169C	De-hairing of cattle and sheep heads and hooves

Food Science Australia

MRR 02/92 Byproducts yield of beef and sheep.
Meat Technology Update 01/05 Alternative techniques for the hygienic processing of offal.

AQIS

The Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (2006).
Export Control (Meat & Meat Products) Orders 2005
Meat Manual Volume 2 – Requirements for overseas countries
AQIS Meat Notices

AUSMEAT

Handbook of Australian Meat- International red meat manual seventh edition, 2005.

Other

Various internet sources have been investigated to see what is happening overseas within the scope of this project e.g www.meat.tamu.edu US National beef quality audit-2000.

Meat Safety Quality and Veterinary Public Health in Australia (2006) by Eddie Andriessen. Penny Farthing Publishing PO Box 3322 Port Adelaide SA 5015

Speciality coproducts offal product process recovery yield assessment-ACC coproducts development program 2007 Alexander Smith

8 Appendices

Appendix A – Letter of advice to plants

MLA Project A.COP.0037

Edible Offal Best Practice Benchmarking

Thank you for agreeing to be one of the 8Australian processors to participate in the Edible Offal Best Practice Benchmarking project. Eddie Andriessen and I will be scheduling a visit to your site during the month of May. We are proposing to visit your site on Wednesday 30th May. I will be in touch by telephone closer to this date to confirm this date and advise times of arrival and departure.
For this initial visit we will need to be at your site for the full day. When on site Eddie will be spending much of his time on the slaughterfloor observing those activities that impact on the quality and yield of offals. He will be looking at those issues that impact on rejection or downgrading of offals such as pathology, hygiene and knife damage.
I will be specifically focusing on data collection relating to offal processing. This will be a one-week snapshot of information collected during the week prior to our visit. We will be seeking a wide range of information including:

General
- Average slaughter data – numbers processed, shifts, etc
- The range of all offals collected
- Reasons for some offals not being collected
- The way in which offal data is utilised
- Corrective action systems for lower than standard yields

Snapshot period specific
- Slaughter numbers and weights by animal type
- Weights of offal collected
- Standard company yields for individual offals
- Actual yields for individual offals
- Reasons for lower than standard yields for individual offals

We will also both spend some time in the offal processing/packing room observing activities that may have some impact on offal quality and yield.

To assist us during this visit we would like you to arrange an entry meeting with area Managers/Supervisors who will be affected by our visit so that we can outline out activities. We would also appreciate their availability to us periodically during the day to assist will data collection and explaining factors affecting offal collection.

We will complete this visit with a brief exit meeting to explain our general findings and any future requirements. As the project nears completion you will receive an individual report on your determined performance against the industry benchmark that we establish.

Should you have any concerns about this visit or require further information please do not hesitate to contact me on 0419 944 022 or 08 8370 7466.

Kind regards

Chris Sentance

Appendix B – Letter of advice to AQIS

MLA Project A.COP.0037

Edible Offal Best Practice Benchmarking

Dear AQIS officer,

We are conducting research into offal yield and quality.

The project is intended to develop tools that will assist meat companies to control quality and yields of edible offal by providing benchmarks of offal recovery and identifying the key points for maintaining offal quality. Key outcomes for the project are:

1.Determine the yield of edible offals available from a range of beef and sheep carcases;
2. Determine the typical and maximum recovery rates of offal items;
3. Identify factors that inhibit or prevent the recovery of offal and result in reduced recovery rates;
4. Identify processing factors that may affect the quality of offal collected for human consumption;
5. Recommend best practice for offal recovery

In this project benchmarks for the recovery of a wide range of offals will be set and reasons for abattoirs falling below benchmarks and factors that limit setting benchmarks at higher levels will be identified. Where appropriate, further investigations of issues that inhibit the recovery of edible offal will be identified.

As part of this project we will be collecting data to differentiate between producer (pathology and disease) and processor causes of reduced yields. This is following on from a preliminary study on beef offal conducted earlier this year.

It is evident from this study that losses due to producer causes (pathology and disease) were very low in tongues, hearts skirts and tails, but significantly higher in the “filter” organs such as lungs, livers and kidneys. This is to be expected.

Producer causes for lowered yields are outside the scope of this study, as the emphasis of our work will be identifying processing factors that affect yield and quality so that benchmarks can be developed for use throughout the industry.

That study only looked at some beef offal, whereas we are collecting data on a wider range of offals from beef, sheep, goat and calves.

Our study is being conducted at about 8 beef and sheep plants across Australia. This plant is one of those that have agreed to participate in the project.

Senior AQIS staff are aware of the project.

There are three aspects to this study.

- Data collection from company records
- A review of offal handling post slaughter floor
- Data collection on the slaughter floor

As part of the project I will be collecting data on the slaughter floor on offal yield and quality.

Note: We are not studying the post mortem inspection decision-making process. But assessing the comparative data between processor causes and producer causes of rejection or downgrade.

To do this I will be spending some time at the post mortem inspection position and recording the reasons for rejection of sheep offal, beef offal and beef head meat.

-This may involve asking the AQIS meat inspector for the reasons for condemnation

I will be spending about an hour on the slaughter floor for each category of stock

We will also study the offal room looking at rejection and downgrade factors.

A copy of the forms I will be using is attached.

I hope you can assist me in this matter

Yours sincerely

Eddie Andriessen

Appendix C – Beef offal performance

Table 1 – Beef offal yields on HSCW basis (not including condemns)

Site	A			B			C			E			F		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average	Run 1	Run 2	Average E	Run 1	Run 2	Average F
% cow/bull by wgt	18%	41%	30%	25%	50%	38%			#DIV/0!	85%	87%	86%	0%	17%	9%
% steers by wgt	82%	38%	60%	75%	50%	63%	9%	6%	8%	15%	13%	14%	100%	83%	92%
% grain fed by wgt	0%	58%	29%	0%	0%	0%	91%	94%	93%	0%	0%	0%	0%	0%	0%
Average HSCW	328.36	276.45	302.41	272.81	281.32	277.07	213.66	213.66	213.66	237.07	265.96	251.52	232.80	237.07	234.94
Aorta	0.039%	0.080%	0.060%										0.037%	0.027%	0.032%
Cheek	0.242%	0.512%	0.377%	0.580%	0.555%	0.568%	0.252%	0.219%	0.236%	0.316%	0.291%	0.304%	0.260%	0.187%	0.224%
Headmeat	0.133%	0.214%	0.174%	0.275%	0.299%	0.287%									
Hearts	0.567%	0.996%	0.782%	0.605%	0.583%	0.594%	0.667%	0.651%	0.659%		0.723%		0.673%	0.670%	0.672%
Kidneys	0.273%	0.334%	0.304%				0.271%	0.227%	0.249%	0.206%	0.221%	0.214%	0.268%	0.251%	0.260%
Lips (Papillae)	0.002%	0.418%	0.210%	0.285%	0.268%	0.277%	0.095%	0.105%	0.100%	0.215%	0.182%	0.199%	0.077%	0.069%	0.073%
Livers	1.624%	3.233%	2.429%	0.734%	0.782%	0.758%	2.312%	2.203%	2.258%	0.302%	0.394%	0.348%	1.856%	1.424%	1.640%
Lungs	0.620%	1.178%	0.899%				0.414%	0.314%	0.364%						
Skirt membrane	0.600%	0.086%	0.343%	0.157%	0.141%	0.149%	0.021%	0.016%	0.019%	0.047%	0.060%	0.054%	0.096%	0.065%	0.081%
Skirt pieces	0.074%	0.166%	0.120%												
Thin skirt	0.240%	0.597%	0.419%	0.459%	0.454%	0.457%	0.374%	0.374%	0.374%	0.280%	0.255%	0.268%	0.260%	0.406%	0.333%
Thick skirt	0.416%	0.527%	0.472%	0.304%	0.278%	0.291%	0.283%	0.264%	0.274%	0.215%	0.237%	0.226%	0.229%	0.243%	0.236%
Tails	0.315%	0.469%	0.392%	0.461%	0.438%	0.450%	0.485%	0.480%	0.483%	0.366%	0.361%	0.364%	0.370%	0.362%	0.366%
Tendons	0.055%	0.348%	0.202%	0.157%	0.187%	0.172%									
Tongue Roots	0.814%	1.044%	0.929%							0.115%	0.091%	0.103%	0.183%	0.079%	0.131%
TR Fillet	0.043%	0.226%	0.135%	0.052%	0.056%	0.054%									
Tongues	0.413%	0.759%	0.586%	0.465%	0.439%	0.452%	0.457%	0.436%	0.447%	0.483%	0.415%	0.449%	0.423%	0.449%	0.436%
Weasand meat	0.029%	0.118%	0.074%				1.214%		1.214%						
Feet										1.811%	2.221%	2.016%			
Spleen										0.268%	0.278%	0.273%			
Honeycomb	0.140%	0.337%	0.239%	0.186%	0.187%	0.187%	0.017%	0.027%	0.022%	0.244%	0.191%	0.218%	0.053%		0.053%

Site	A			B			C			E			F		
Pillar tripe	0.069%	0.121%	0.095%	0.240%	0.204%	0.222%				0.261%	0.211%	0.236%			
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average	Run 1	Run 2	Average E	Run 1	Run 2	Average F
Tripe pieces	1.121%	2.670%	1.896%	1.435%	1.244%	1.340%	0.236%	0.312%	0.274%	1.668%	1.505%	1.587%	0.674%	0.027%	0.351%
Small intestine	1.156%		1.156%				0.204%		0.204%						
Omasum				0.297%	0.222%	0.260%				0.601%	0.549%	0.575%	0.044%		0.044%

Graph 1 – Beef offal yields on HSCW basis (not including condemns)

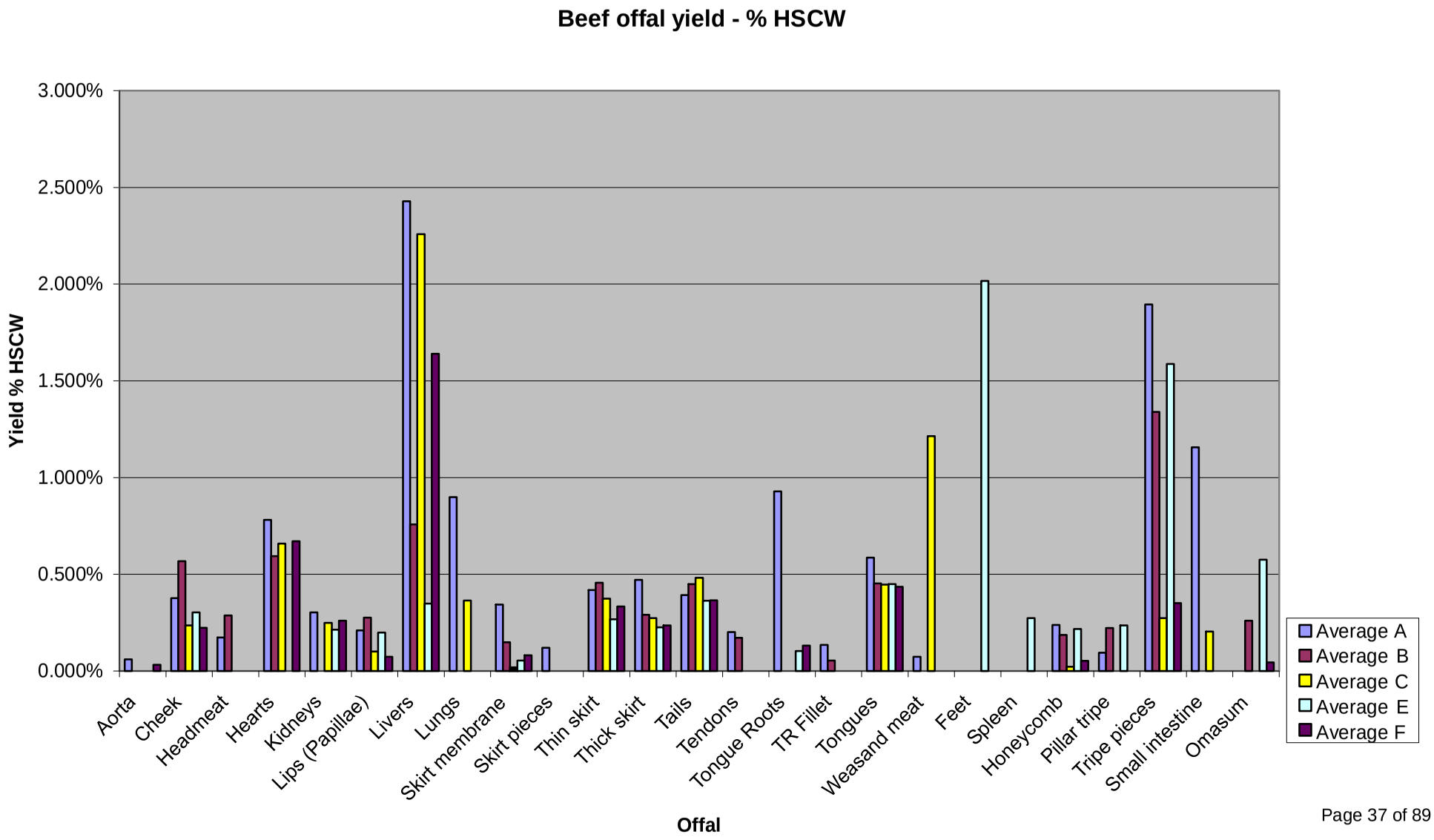


Table 2 – Beef offal yields on HSCW basis (including condemns)

Site	A			B			C			E			F		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average	Run 1	Run 2	Average E	Run 1	Run 2	Average F
% cow/bull by wgt	18%	41%	30%	25%	50%	38%			#DIV/0!	85%	87%	86%	0%	17%	9%
% steers by wgt	82%	38%	60%	75%	50%	63%	9%		9%	15%	13%	14%	100%	83%	92%
% grain fed by wgt	0%	58%	29%	0%	0%	0%	91%		91%	0%	0%	0%	0%	0%	0%
Average HSCW	328.36	276.45	302.41	272.81	281.32	277.07	213.66		213.66	237.07	265.96	251.52	232.80	237.07	234.94
Aorta	0.040%	0.088%	0.064%										0.037%	0.027%	0.032%
Cheek	0.253%	0.628%	0.441%	0.590%	0.555%	0.573%	0.252%		0.252%	0.316%	0.323%	0.320%	0.261%	0.187%	0.224%
Headmeat	0.137%	0.228%	0.183%	0.280%	0.304%	0.292%									
Hearts	0.592%	1.098%	0.845%	0.613%	0.597%	0.605%	0.667%		0.667%		0.760%		0.700%	0.670%	0.685%
Kidneys	0.315%	0.340%	0.328%				0.271%		0.271%	0.206%	0.221%	0.214%	0.269%	0.251%	0.260%
Lips (Papillae)	0.232%	0.533%	0.383%	0.289%	0.268%	0.279%	0.095%			0.215%	0.182%	0.199%	0.077%	0.069%	0.073%
Livers	1.983%	3.864%	2.924%	1.807%	1.722%	1.765%	2.312%		2.312%	0.302%	1.645%	0.974%	1.867%	1.424%	1.646%
Lungs	0.700%	1.370%	1.035%				0.414%		0.414%						
Skirt membrane	0.061%	0.090%	0.076%	0.161%	0.146%	0.154%	0.021%		0.021%	0.047%	0.060%	0.054%	0.096%	0.065%	0.081%
Skirt pieces	0.080%	0.197%	0.139%												
Thin skirt	0.265%	0.652%	0.459%	0.488%	0.489%	0.489%	0.374%		0.374%	0.280%	0.255%	0.268%	0.262%	0.406%	0.334%
Thick skirt	0.431%	0.580%	0.506%	0.277%	0.286%	0.282%	0.283%		0.283%	0.224%	0.248%	0.236%	0.230%	0.243%	0.237%
Tails	0.350%	0.577%	0.464%	0.463%	0.439%	0.451%	0.485%		0.485%	0.374%	0.373%	0.374%	0.372%	0.362%	0.367%
Tendons	0.057%	0.360%	0.209%	0.164%	0.191%	0.178%									
Tongue Roots	0.833%	1.097%	0.965%							0.115%	0.091%	0.103%	0.184%	0.079%	0.132%
TR Fillet	0.044%	0.231%	0.138%	0.053%	0.056%	0.055%									
Tongues	0.422%	0.790%	0.606%	0.472%	0.443%	0.458%	0.457%		0.457%	0.513%	0.436%	0.475%	0.425%	0.449%	0.437%
Weasand meat	0.031%	0.124%	0.078%				1.214%		1.214%						

Site	A			B			C			E			F		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average	Run 1	Run 2	Average E	Run 1	Run 2	Average F
Feet										1.997%	2.018%	2.008%			
Spleen										0.268%	0.361%	0.315%			
Honeycomb	0.155%	0.406%	0.281%	0.191%	0.187%	0.189%	0.017%			0.244%	0.207%	0.226%	0.054%		
Pillar tripe	0.079%	0.197%	0.138%	0.255%	0.233%	0.244%				0.284%	0.227%	0.256%			
Tripe pieces	1.512%	2.931%	2.222%	1.469%	1.244%	1.357%	0.236%			1.668%	1.505%	1.587%	0.677%	0.027%	0.352%
Small intestine	1.156%	1.156%					0.204%								
Omasum				0.305%	0.222%	0.264%				0.601%	0.549%	0.575%	5.000%		

Graph 2 – Beef offal yields on HSCW basis (including condemns)

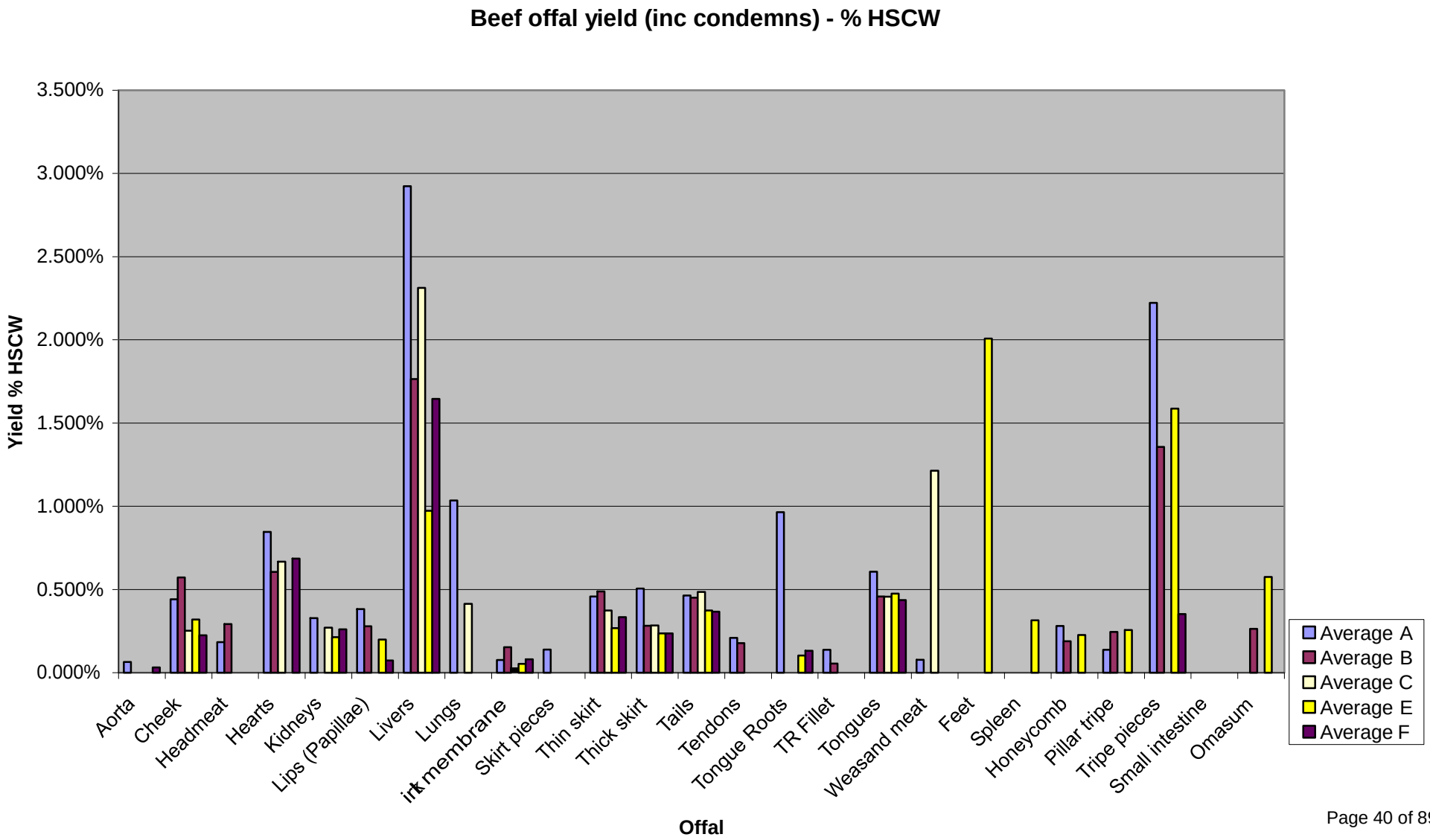


Table 3 – Beef offal yields on piece basis (not including condemns)

Site	A			B			E			F		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average E	Run 1	Run 2	Average F
% cow/bull by #	24%	41%	33%	25%	50%	38%	87%	87%	87%	0%	17%	9%
% steers by #	76%	38%	57%	75%	50%	63%	13%	13%	13%	100%	83%	92%
% grain fed by #	0%	58%	29%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Average HSCW	328.36	276.45	302.41	272.81	281.32	277.07	237.07	265.96	251.52	232.80	237.07	234.94
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average E	Run 1	Run 2	Average F
Cheek								91.993%	91.993%			
Hearts				94.108%	92.063%	93.086%		95.018%	95.018%			
Livers	73.840%	73.990%	73.915%	42.385%	47.937%	45.161%	16.750%	21.530%	19.140%	72.089%	59.690%	65.890%
Thin skirt	121.560 %	97.220%	109.390 %								117.140 %	117.140%
Thick skirt	75.101%	73.010%	74.056%	98.036%	96.927%	97.482%	92.500%	93.416%	92.958%	89.843%	75.969%	82.906%
Tails	81.426%	79.650%	80.538%	96.954%	98.350%	97.652%	97.500%	95.374%	96.437%	88.192%	86.822%	87.507%
Tongues	86.026%	85.880%	85.953%	98.207%	99.118%	98.663%	95.125%	95.196%	95.161%	93.476%	98.191%	95.834%
Feet							72.656%	75.178%	73.917%			
Testes								20.285%	20.285%			
Honeycomb	79.988%	77.980%	78.984%	91.773%	90.754%	91.264%	87.000%	89.858%	88.429%			
Pillar tripe	71.420%	70.500%	70.960%	89.838%	66.202%	78.020%	91.250%	91.637%	91.444%			

Graph 3 – Beef offal yields on piece basis (not including condemns)

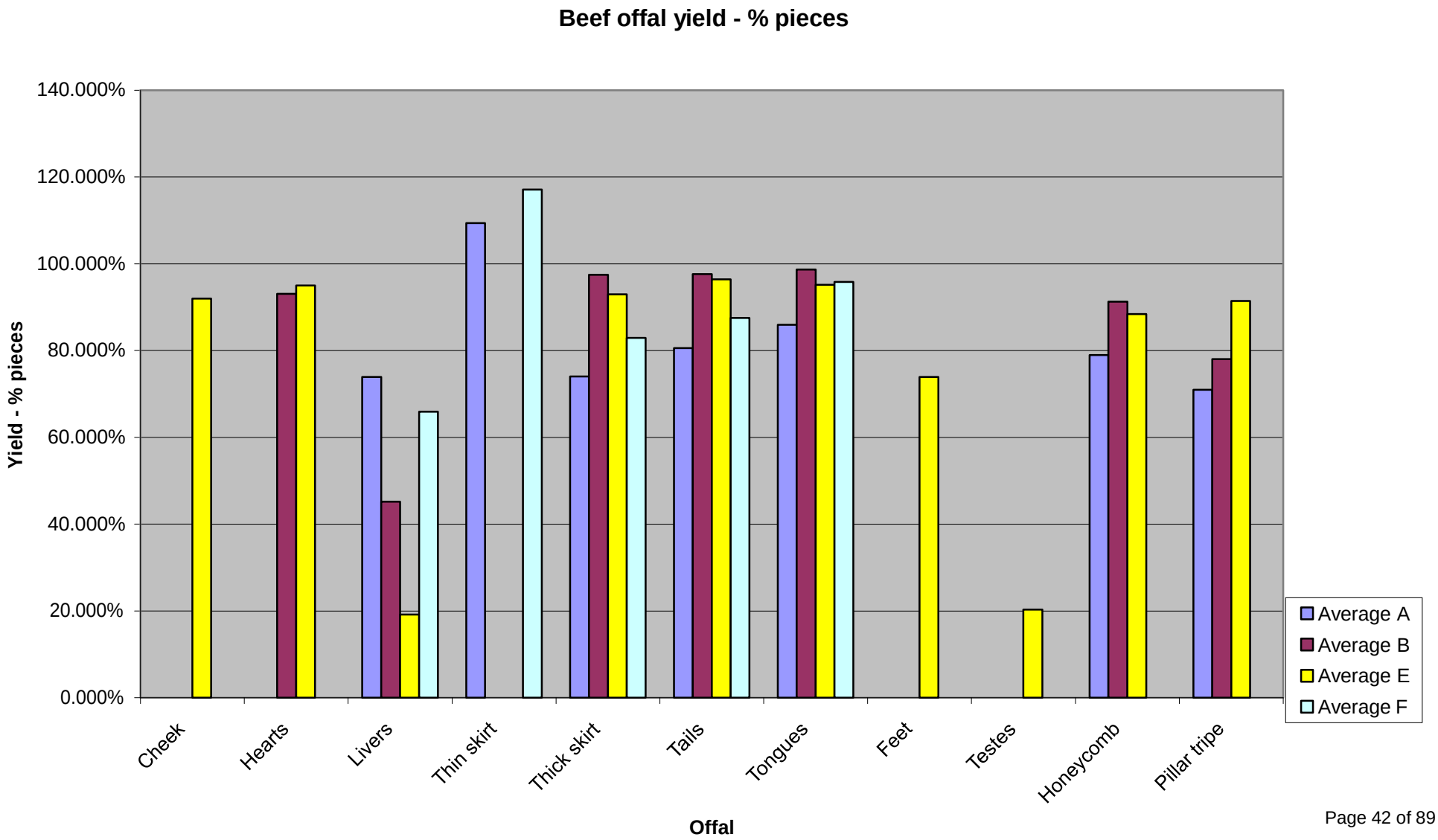
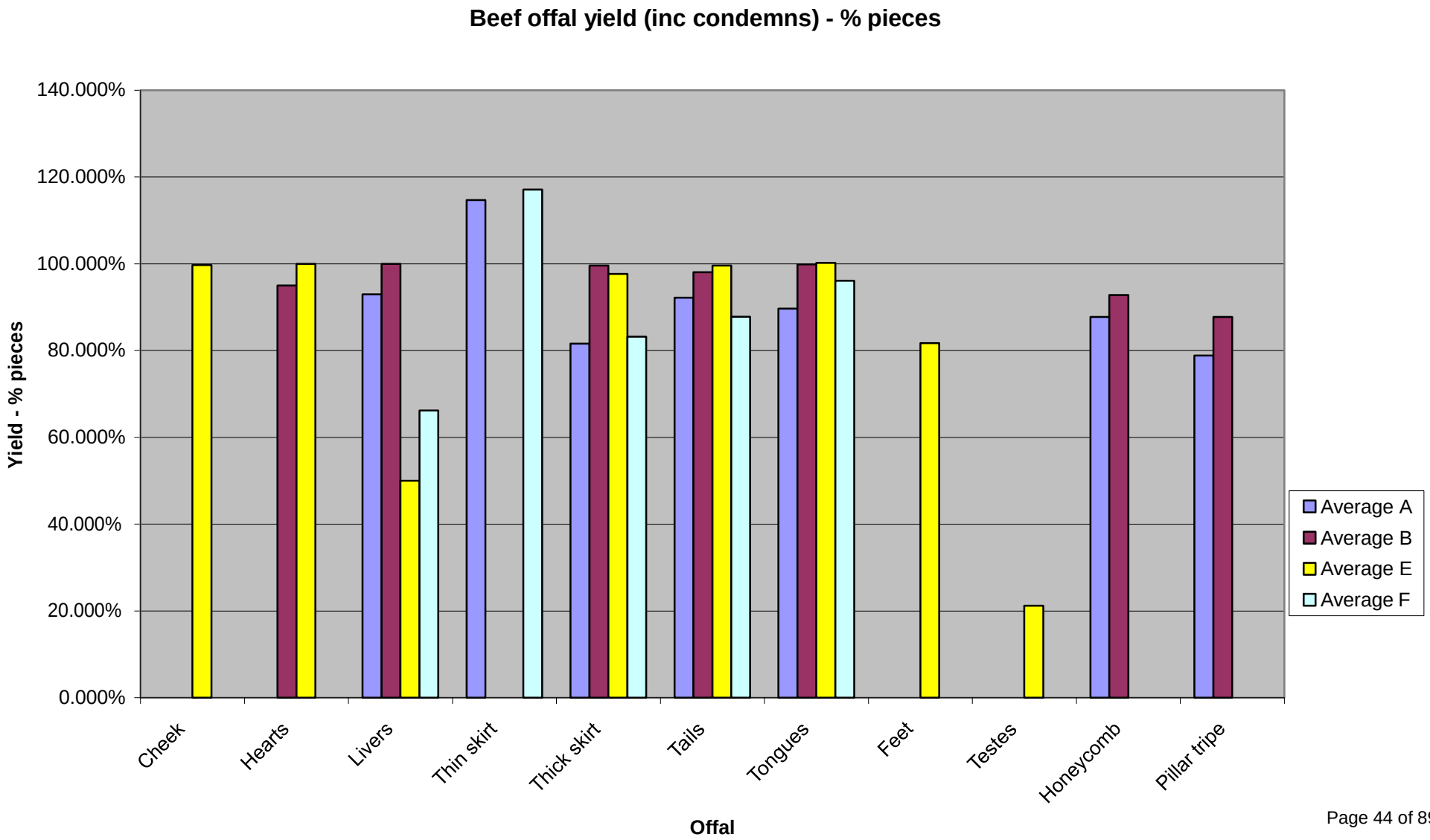


Table 4 – Beef offal yields on piece basis (including condemns)

Site	A			B			E			F		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average E	Run 1	Run 2	Average F
% cow/bull by #	18%	41%	30%	25%	50%	38%	87%	87%	87%	0%	17%	9%
% steers by #	82%	38%	60%	75%	50%	63%	13%	13%	13%	100%	83%	92%
% grain fed by #	0%	58%	29%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Average HSCW	328.36	276.45	302.41	272.81	281.32	277.07	237.07	265.96	251.52	232.80	237.07	234.94
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average B	Run 1	Run 2	Average E	Run 1	Run 2	Average F
Cheek								99.733%	99.733%			
Hearts				95.474%	94.481%	94.978%		100.000%	100.000%			
Livers	93.790%	92.140%	92.965%	100.000%	100.000%	100.000%	0.168%	99.822%	49.995%	72.667%	59.690%	66.179%
Thin skirt	130.937%	98.430%	114.684%								117.140%	117.140%
Thick skirt	80.966%	82.280%	81.623%	99.573%	99.602%	99.588%	96.250%	99.110%	97.680%	90.421%	75.969%	83.195%
Tails	91.662%	92.790%	92.226%	97.580%	98.606%	98.093%	99.750%	99.466%	99.608%	88.770%	86.822%	87.796%
Tongues	88.959%	90.420%	89.690%	99.772%	100.000%	99.886%	100.750%	99.644%	100.197%	94.055%	98.191%	96.123%
Feet							80.406%	83.052%	81.729%			
Testes								21.174%	21.174%			
Honeycomb	86.774%	88.720%	87.747%	94.848%	90.754%	92.801%						
Pillar tripe	78.206%	79.520%	78.863%	95.417%	80.057%	87.737%						

Graph 4 – Beef offal yields on piece basis (including condemns)

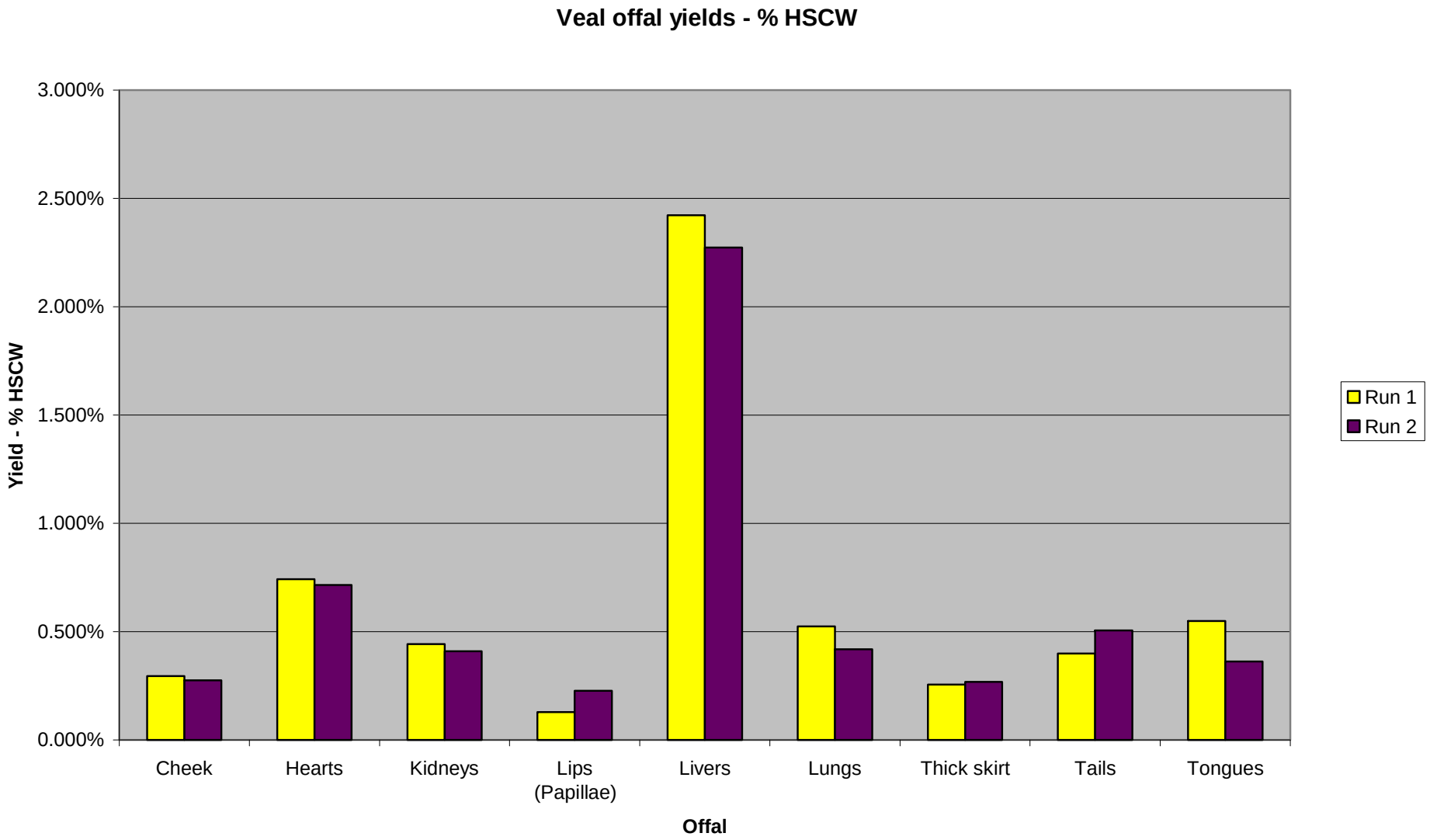


Appendix D – Veal offal performance

Table 5 – Veal offal yields on HSCW basis

Site	C		
Offal	Run 1	Run 2	Average
Average HSCW	97.42	97.42	97.42
Cheek	0.294%	0.275%	0.285%
Hearts	0.742%	0.716%	0.729%
Kidneys	0.443%	0.410%	0.427%
Lips (Papillae)	0.128%	0.227%	0.178%
Livers	2.422%	2.273%	2.348%
Lungs	0.524%	0.418%	0.471%
Thick skirt	0.256%	0.268%	0.262%
Tails	0.399%	0.506%	0.453%
Tongues	0.550%	0.362%	0.456%

Graph 5 – Veal offal yields on HSCW basis



Appendix E – Sheep offal performance

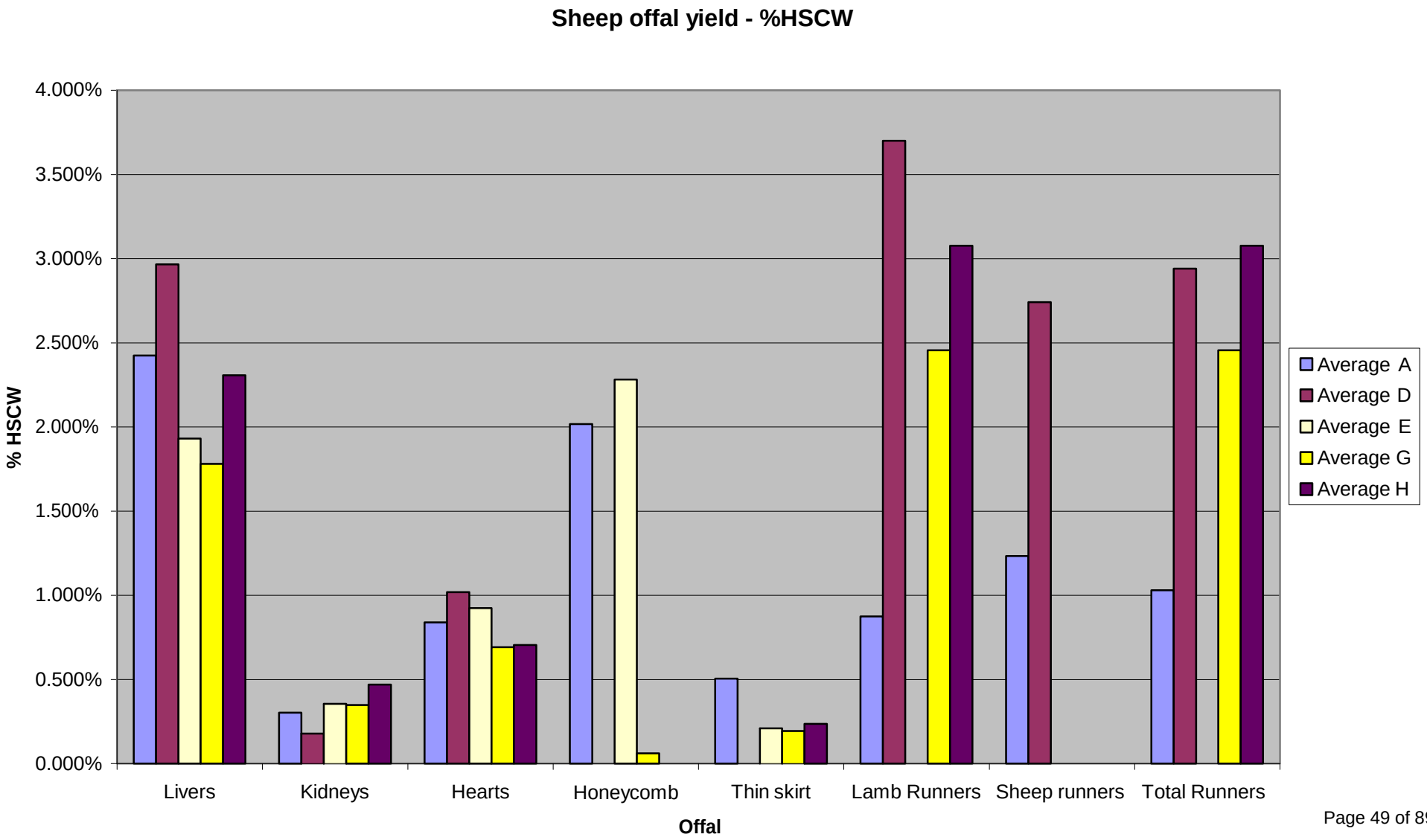
Table 6 – Sheep offal yields on HSCW basis (not including condemns)

Site	A			D			E			G			H		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average D	Run 1	Run 2	Average E	Run 1	Run 2	Average G	Run 1	Run 2	Average H
%lambs	57%	58%	58%	33%	1.00%	17%	46%	13%	30%	100%	100%	100%	97%	100%	99%
% mutton	43%	42%	43%	67%	99.00%	83%	54%	87%	71%	0%	0%	0%	3%	0%	2%
Average HSCW	0.23	24.46	12.34	17.66	21.32	19.49	14.63	16.49	15.56	25.22	26.21	25.72	N/A	21.65	21.65
Livers	2.431%	2.418%	2.425%	3.064%	2.868%	2.966%	1.820%	2.042%	1.931%	1.774%	1.788%	1.781%		2.307%	2.307%
Kidneys	0.307%	0.299%	0.303%	0.178%		0.178%	0.354%	0.355%	0.355%	0.344%	0.351%	0.348%		0.470%	0.470%
Hearts	0.879%	0.799%	0.839%	0.996%	1.041%	1.019%	0.927%	0.921%	0.924%	0.730%	0.652%	0.691%		0.705%	0.705%
Honeycomb	2.008%	2.026%	2.017%				2.415%	2.149%	2.282%	0.079%	0.043%	0.061%			
Thin skirt	0.571%	0.440%	0.506%				0.207%	0.211%	0.209%	0.125%	0.263%	0.194%		0.236%	0.236%
Lamb Runners	0.874%		0.874%	3.678%	3.721%	3.700%				2.401%	2.511%	2.456%		3.077%	3.077%
Sheep runners	1.233%		1.233%	2.511%	2.972%	2.742%									
Total Runners	1.030%		1.030%	2.897%	2.983%	2.940%				2.401%	2.511%	2.456%		3.077%	3.077%

Table 7 – Sheep offal yields on HSCW basis (including condemns)

Site	A			D			E			G			H		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average D	Run 1	Run 2	Average E	Run 1	Run 2	Average G	Run 1	Run 2	Average H
%lambs	57%	58%		33%	1.00%		46%	13%	30%	100%	100%	100%	97%	100%	99%
% mutton	43%	42%		67%	99.00%		54%	87%	71%	0%	0%	0%	3%	0%	2%
Average HSCW	22.77	24.46		17.66	21.32		14.63	16.49	15.56	25.22	26.21	25.72	N/A	21.65	21.65
Livers	2.735%	2.676%	2.706%	3.075%	2.868%	2.972%	1.820%	2.042%	1.931%	1.774%	1.789%	1.782%		2.307%	2.307%
Kidneys	0.307%	0.300%	0.304%	0.179%		0.179%	0.354%	0.355%	0.355%	0.344%	0.351%	0.348%		0.470%	0.470%
Hearts	0.931%	0.874%	0.903%	0.999%	1.041%	1.020%	0.927%	0.921%	0.924%	0.730%	0.653%	0.692%		0.705%	0.705%
Honeycomb	2.034%	2.055%	2.045%				2.415%	2.149%	2.282%	0.079%	0.043%	0.061%			
Thin skirt	0.571%	0.493%	0.532%				0.207%	0.211%	0.209%	0.125%	0.263%	0.194%		0.236%	0.236%
Lamb Runners	0.979%		0.979%	3.717%	3.721%	3.719%				2.401%	2.511%	2.456%		3.077%	3.077%
Sheep runners	1.262%		1.262%	2.524%	2.972%	2.748%									
Total Runners	1.045%		1.045%	2.918%	2.983%	2.951%				2.401%	2.511%	2.456%		3.077%	3.077%

Graph 6 – Sheep offal yields on HSCW basis (not including condemns)



Graph 7 – Sheep offal yields on HSCW basis (including condemns)

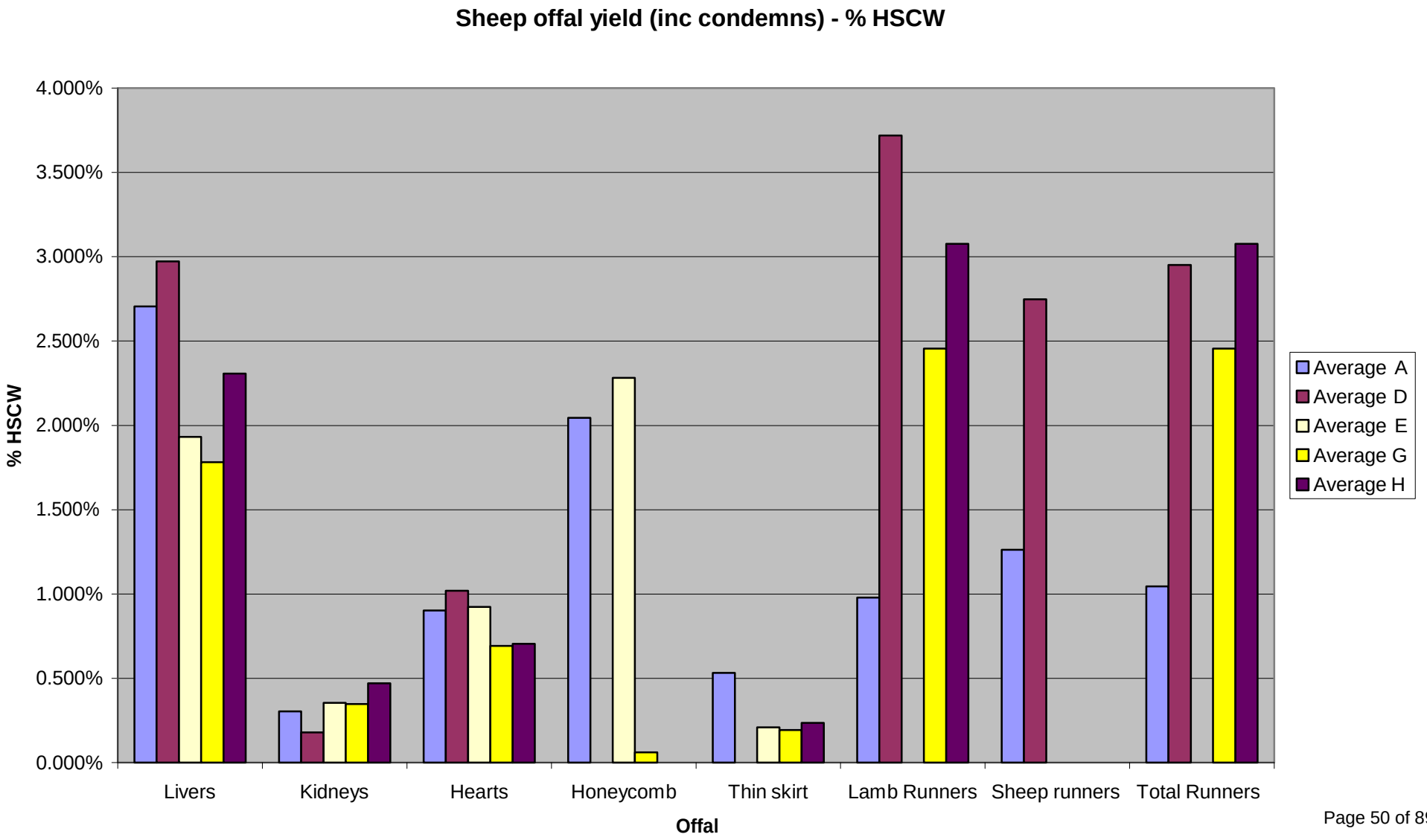


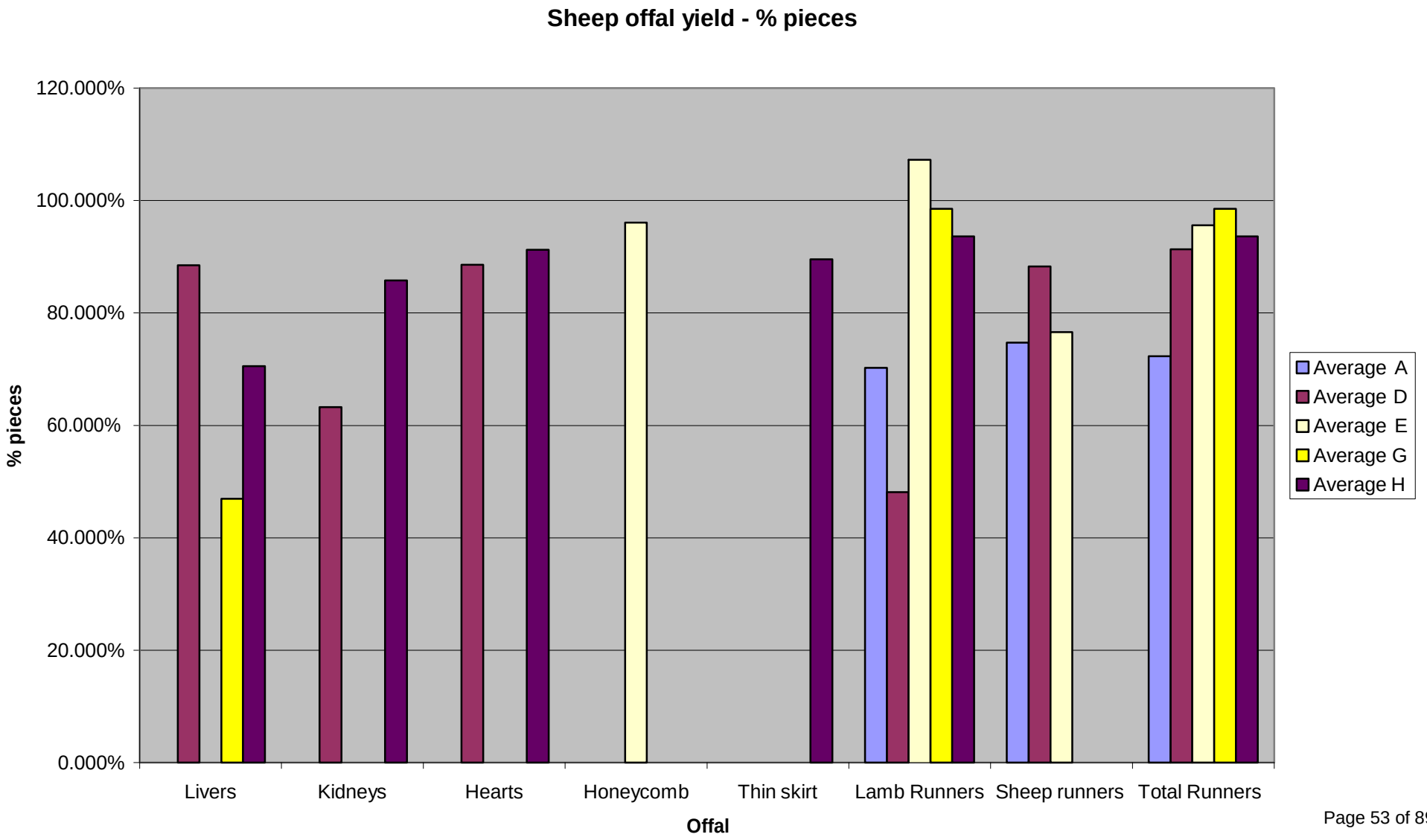
Table 8 – Sheep offal yields on piece basis (not including condemns)

Site	A			D			E			G			H		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average D	Run 1	Run 2	Average E	Run 1	Run 2	Average G	Run 1	Run 2	Average H
%lambs	54%	58%	56%	31%	1.00%	16%	41%	12%	27%	100%	100%	100%	97%	100%	99%
% mutton	46%	42%	44%	69%	99.00%	84%	59%	88%	74%	0%	0%	0%	3%	0%	2%
Average HSCW	22.77	24.46	23.62	17.66	21.32	19.49	14.63	16.49	15.56	25.22	26.21	25.72	N/A	21.65	21.65
Livers				81.599%	95.397%	88.498%				46.925%		46.925%	71.924%	69.145%	70.535%
Kidneys				63.220%		63.220%							83.053%	88.489%	85.771%
Hearts				81.593%	95.581%	88.587%							90.691%	91.756%	91.224%
Honeycomb							96.847%	95.307%	96.077%						
Thin skirt													91.119%	87.972%	89.546%
Lamb Runners	40.205%	100.225%	70.215%	94.042%	2.168%	48.105%	118.379%	96.159%	107.269%	99.206%	97.831%	98.519%	89.937%	97.266%	93.602%
Sheep runners	58.599%	90.823%	74.711%	81.289%	95.271%	88.280%	63.862%	89.323%	76.593%						
Total Runners	48.369%	96.240%	72.305%	85.228%	97.439%	91.334%	95.872%	95.328%	95.600%	99.206%	97.831%	98.519%	89.937%	97.266%	93.602%

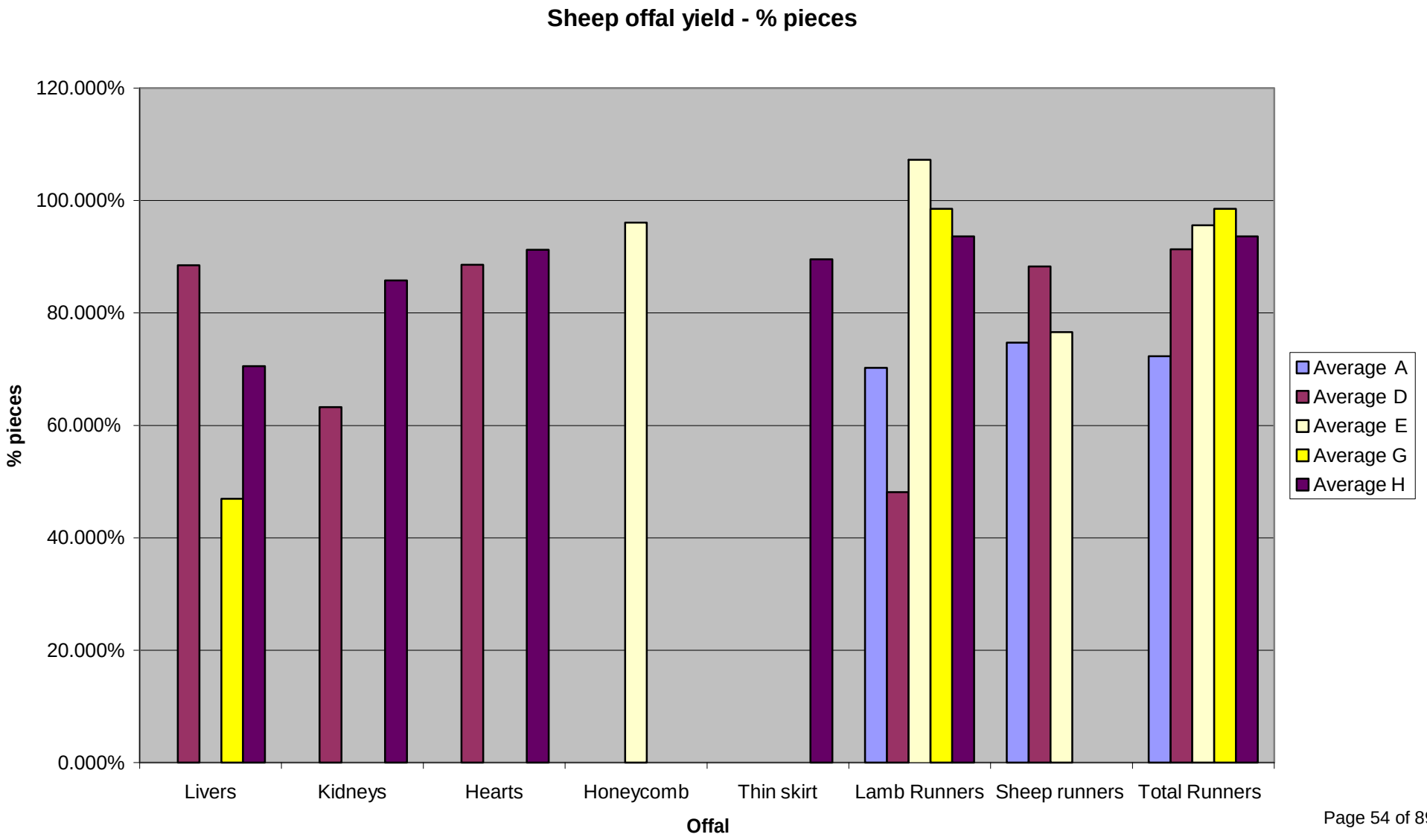
Table 9 – Sheep offal yields on piece basis (including condemns)

Site	A				D		E			G			H		
Offal	Run 1	Run 2	Average A	Run 1	Run 2	Average D	Run 1	Run 2	Average E	Run 1	Run 2	Average G	Run 1	Run 2	Average H
%lambs	54%	58%	56%	31%	1%	16%	41%	12%	27%	100%	100%	100%	97%	100%	99%
% mutton	46%	42%	44%	69%	99%	84%	59%	88%	74%	0%	0%	0%	3%	0%	2%
Average HSCW	22.77	24.46	23.62	17.66	21.32	19.49	14.63	16.49	15.56	25.22	26.21	25.72	N/A	21.65	21.65
Livers				81.901%	95.397%	88.649%				46.925%		46.925%	86.921%		86.921%
Kidneys				63.522%		63.522%							88.054%		88.054%
Hearts				81.896%	95.581%	88.739%							95.690%		95.690%
Honeycomb							96.847%	95.307%	96.077%						#DIV/0!
Thin skirt													91.119%		91.119%
Lamb Runners	40.670%	101.081%	70.876%	94.052%	2.173%	48.113%	118.379%	96.159%	107.269%	99.206%	97.921%	98.564%	89.937%		89.937%
Sheep runners	60.957%	93.100%	77.029%	81.289%	95.277%	88.283%	63.862%	89.323%	76.593%						#DIV/0!
Total Runners	49.674%	97.699%	73.687%	85.228%	97.450%	91.339%	95.872%	95.328%	95.600%	99.206%	97.921%	98.564%	89.937%		89.937%

Graph 8 – Sheep offal yields on piece basis (not including condemns)



Graph 9 – Sheep offal yields on piece basis (including condemns)



Appendix F – Goat offal performance

Table 10 – Goat offal yields on HSCW basis (not including condemns)

Site	E		
Offal	Run 1	Run 2	Average
Average HSCW	16.72	17.98	17.35
Livers	1.866%		1.866%
Kidneys	0.287%		0.287%
Hearts	0.574%		0.574%
Tripe	2.217%	2.058%	2.138%
Lungs	1.579%		1.579%
Testes	0.234%	0.349%	0.292%
Pizzles		0.070%	0.070%

Table 11 – Goat offal yields on HSCW basis (including condemns)

Site	E		
Offal	Run 1	Run 2	Average
Average HSCW	16.72	17.98	17.35
Livers	1.934%		1.934%
Kidneys	0.292%		0.292%
Hearts	0.586%		0.586%
Tripe	2.278%	2.058%	2.168%
Lungs	1.579%		1.579%
Testes	0.234%	0.349%	0.292%
Pizzles		0.070%	0.070%

Table 12 – Goat offal yields on piece basis (not including condemns)

Site	E		
Offal	Run 1	Run 2	Average
Average HSCW	14.63	16.49	15.56
Tripe		73.537%	73.537%
Lungs		25.084%	25.084%

Table 13 – Goat offal yields on piece basis (including condemns)

Site	E		
Offal	Run 1	Run 2	Average
Average HSCW	14.63	16.49	15.56
Tripe		73.620%	73.620%
Lungs		25.084%	25.084%

Appendix G – Calf offal performance

Table 14 – Calf offal yields on HSCW basis

Site	E			H		
Offal	Run 1	Run 2	Average	Run 1	Run 2	Average
Average HSCW	18.13	11.32	14.73	N/A	21.65	21.65
Livers	3.333%	1.792%	2.563%		2.663%	2.663%
Hearts		0.768%	0.768%		0.720%	0.720%
Vells	5.229%	3.584%	4.407%			

Table 15 –Calf offal yields on piece basis

Site	E			H		
Offal	Run 1	Run 2	Average	Run 1	Run 2	Average
Average HSCW	18.13	11.32	14.73	N/A	21.65	21.65
Livers				96.830%	90.303%	93.567%
Hearts				82.020%	35.405%	58.713%
Vells		95.860%	95.860%			

Appendix H –Site B Beef 6 Week Validation.

Table 16 – Site B - Beef offal yields on HSCW basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by wgt	40%	27%	31%	23%	28%	23%	29%
% steers by wgt	60%	73%	69%	77%	72%	77%	71%
% grain fed by wgt	0%	0%	0%	0%	0%	0%	0%
Average HSCW	262.94	264.65	281.38	280.44	278.88	276.88	274.19
Cheek	0.530%	0.514%	0.501%	0.519%	0.536%	0.544%	0.524%
Headmeat	0.271%	0.335%	0.285%	0.296%	0.222%	0.261%	0.278%
Hearts	0.645%	0.623%	0.600%	0.588%	0.594%	0.592%	0.607%
Lips (Papillae)	0.253%	0.260%	0.254%	0.258%	0.259%	0.260%	0.257%
Livers	1.145%	1.155%	0.897%	1.005%	0.950%	0.948%	1.017%
Skirt membrane	0.163%	0.134%	0.132%	0.131%	0.130%	0.125%	0.136%
Thin skirt	0.333%	0.460%	0.454%	0.450%	0.452%	0.450%	0.433%
Thick skirt	0.300%	0.297%	0.289%	0.289%	0.295%	0.295%	0.294%
Tails	0.420%	0.431%	0.430%	0.429%	0.433%	0.439%	0.430%
Tendons	0.301%	0.300%	0.335%	0.306%	0.312%	0.304%	0.310%
TR Fillet	0.059%	0.050%	0.050%	0.059%	0.060%	0.060%	0.056%
Tongues	0.453%	0.441%	0.435%	0.432%	0.439%	0.439%	0.440%
Honeycomb	0.177%	0.179%	0.164%	0.182%	0.173%	0.189%	0.177%
Pillar tripe	0.179%	0.185%	0.198%	0.193%	0.215%	0.225%	0.199%
Tripe pieces	1.383%	1.339%	1.254%	1.281%	1.045%	1.309%	1.268%
Omasum	0.259%	0.244%	0.233%	0.242%	0.252%	0.240%	0.245%

Table 17 – Site B - Beef offal yields on HSCW basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by wgt	40%	27%	31%	23%	28%	23%	29%
% steers by wgt	60%	73%	69%	77%	72%	77%	71%
% grain fed by wgt	0%	0%	0%	0%	0%	0%	0%
Average HSCW	262.94	264.65	281.38	280.44	278.88	276.88	274.19
Cheek	0.547%	0.527%	0.520%	0.532%	0.549%	0.555%	0.538%
Headmeat	0.280%	0.342%	0.294%	0.303%	0.228%	0.267%	0.286%
Hearts	0.666%	0.640%	0.625%	0.598%	0.606%	0.602%	0.623%
Lips (Papillae)	0.259%	0.267%	0.263%	0.264%	0.265%	0.265%	0.264%
Livers	1.951%	1.930%	1.826%	1.802%	1.875%	1.887%	1.879%
Skirt membrane	0.181%	0.147%	0.148%	0.144%	0.144%	0.138%	0.150%
Thin skirt	0.380%	0.497%	0.498%	0.484%	0.490%	0.486%	0.472%
Thick skirt	0.310%	0.306%	0.303%	0.296%	0.302%	0.301%	0.303%
Tails	0.424%	0.434%	0.438%	0.431%	0.434%	0.442%	0.434%
Tendons	0.306%	0.300%	0.335%	0.306%	0.312%	0.304%	0.310%
TR Fillet	0.059%	0.051%	0.052%	0.060%	0.061%	0.062%	0.058%
Tongues	0.462%	0.447%	0.447%	0.437%	0.441%	0.443%	0.446%
Honeycomb	0.184%	0.185%	0.173%	0.189%	0.180%	0.194%	0.184%
Pillar tripe	0.245%	0.240%	0.239%	0.243%	0.254%	0.256%	0.246%
Tripe pieces	1.436%	1.377%	1.319%	1.334%	1.096%	1.348%	1.318%
Omasum	0.271%	0.252%	0.247%	0.254%	0.263%	0.249%	0.256%

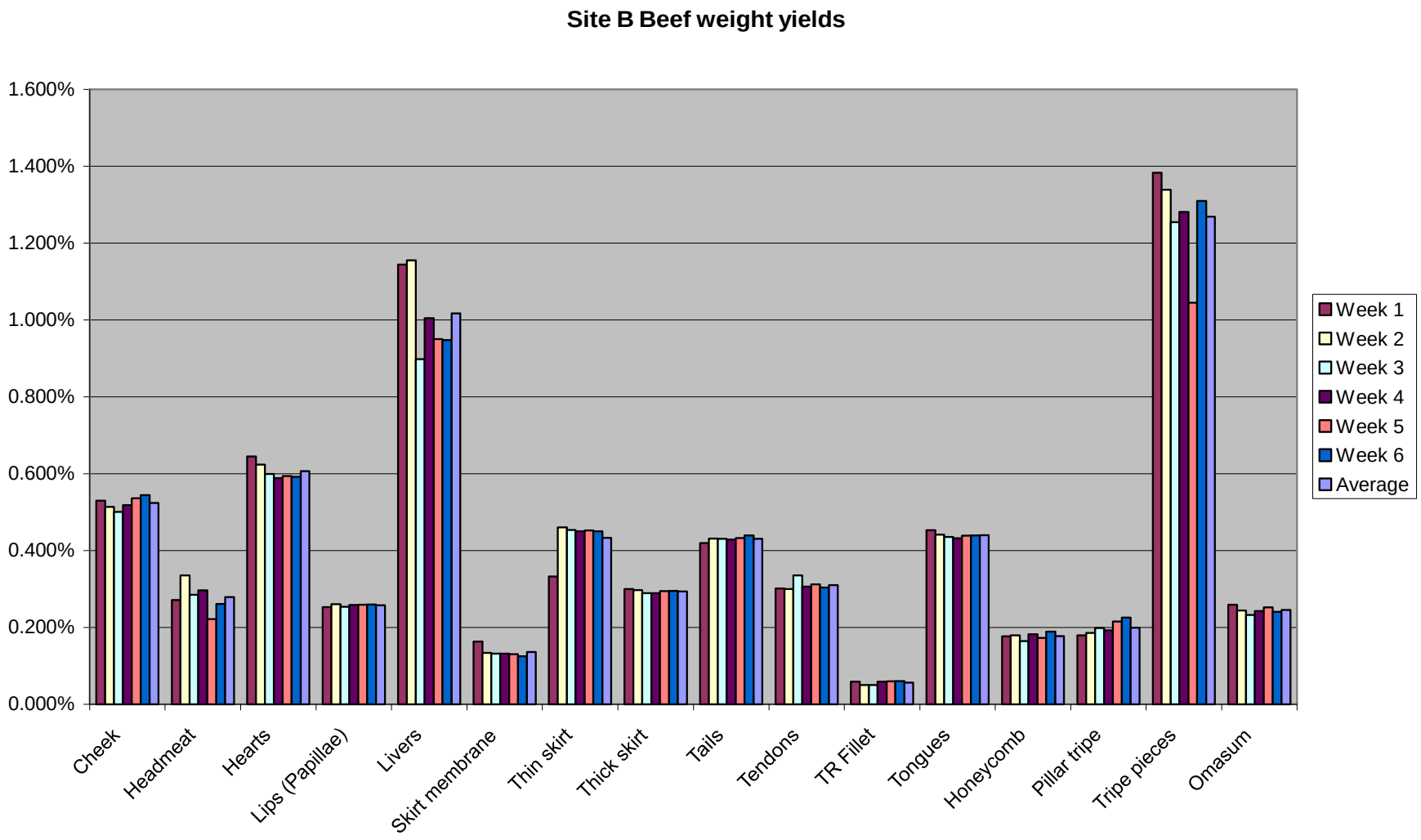
Table 18 – Site B - Beef offal yields on piece basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by #	41%	29%	32%	30%	31%	26%	31%
% steers by #	59%	71%	68%	70%	69%	74%	69%
% grain fed by #	0%	0%	0%	0%	0%	0%	0%
Average HSCW	262.94	264.65	281.38	280.44	278.88	276.88	274.19
Hearts	92.494%	92.260%	89.509%	94.109%	93.625%	95.646%	92.941%
Livers	58.236%	59.590%	48.611%	55.976%	49.203%	48.805%	53.403%
Thick skirt	95.980%	93.597%	95.242%	95.219%	95.845%	98.719%	95.767%
Tails	98.186%	96.983%	97.665%	96.756%	98.463%	98.150%	97.701%
Tongues	98.684%	98.577%	97.370%	98.719%	99.374%	98.890%	98.602%
Honeycomb	88.830%	93.056%	86.141%	90.467%	89.841%	95.048%	90.564%
Pillar tripe	71.896%	75.299%	80.083%	76.295%	81.787%	85.714%	78.512%

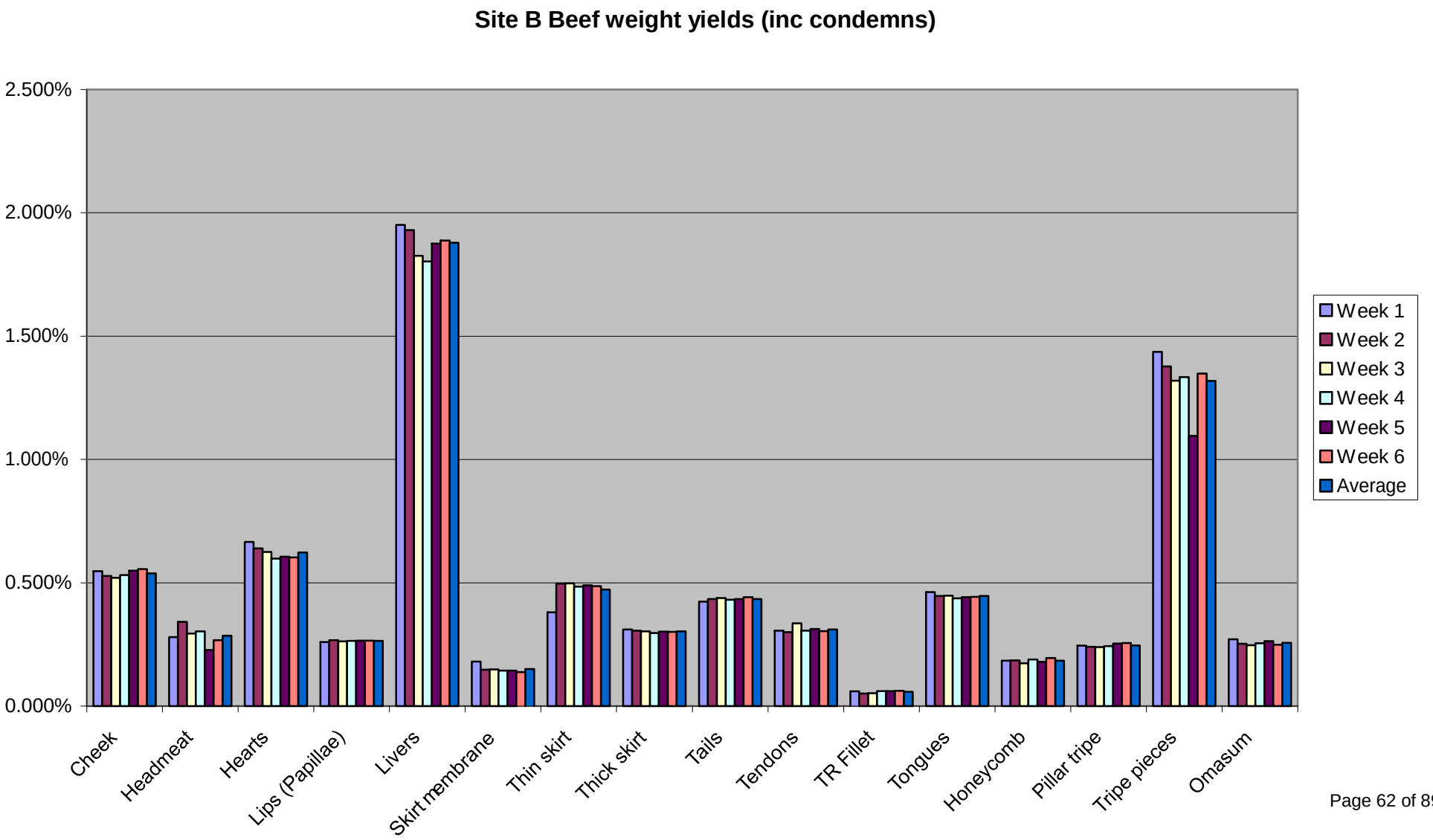
Table 19 – Site B - Beef offal yields on piece basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by #	41%	29%	32%	30%	31%	26%	31%
% steers by #	59%	71%	68%	70%	69%	74%	69%
% grain fed by #	0%	0%	0%	0%	0%	0%	0%
Average HSCW	262.94	264.65	281.38	280.44	278.88	276.88	274.19
Hearts	95.802%	94.906%	93.824%	95.703%	95.589%	97.439%	95.544%
Livers	100.000%	100.000%	100.030%	100.000%	100.000%	100.000%	100.005%
Thick skirt	99.039%	96.329%	99.911%	97.666%	98.207%	100.740%	98.649%
Tails	99.004%	97.723%	99.439%	97.211%	98.805%	98.719%	98.484%
Tongues	100.783%	99.858%	100.414%	99.858%	100.057%	99.715%	100.114%
Honeycomb	93.490%	96.386%	92.199%	95.447%	94.536%	98.634%	95.115%
Pillar tripe	101.245%	100.000%	99.911%	100.028%	100.000%	100.000%	100.197%

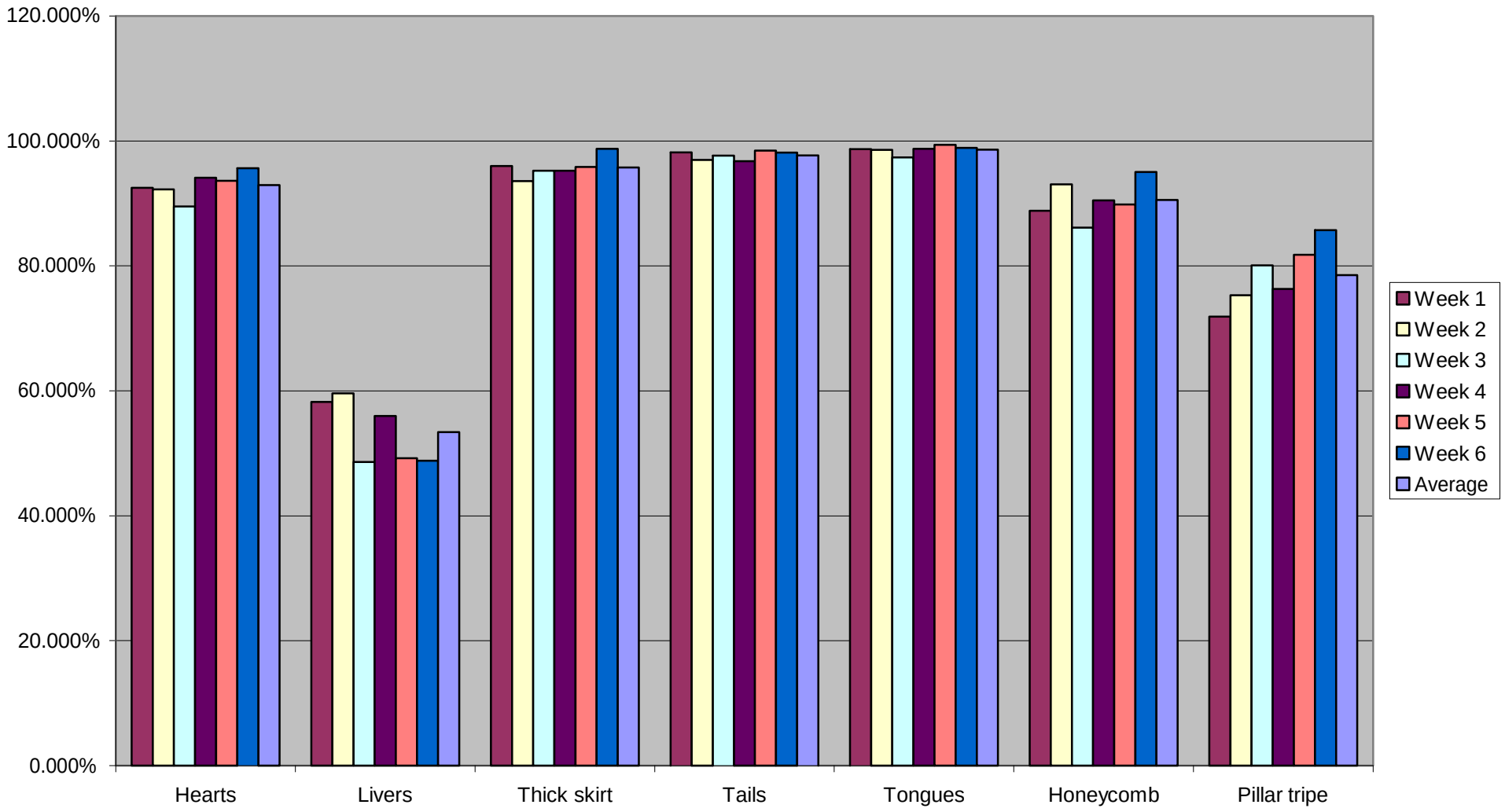
Graph 10. Site B - Beef offal yield as % of HSCW (Condemnations not included in calculations)



Graph 11. Site B - Beef offal yield as % of HSCW (Condemnations included in calculations)

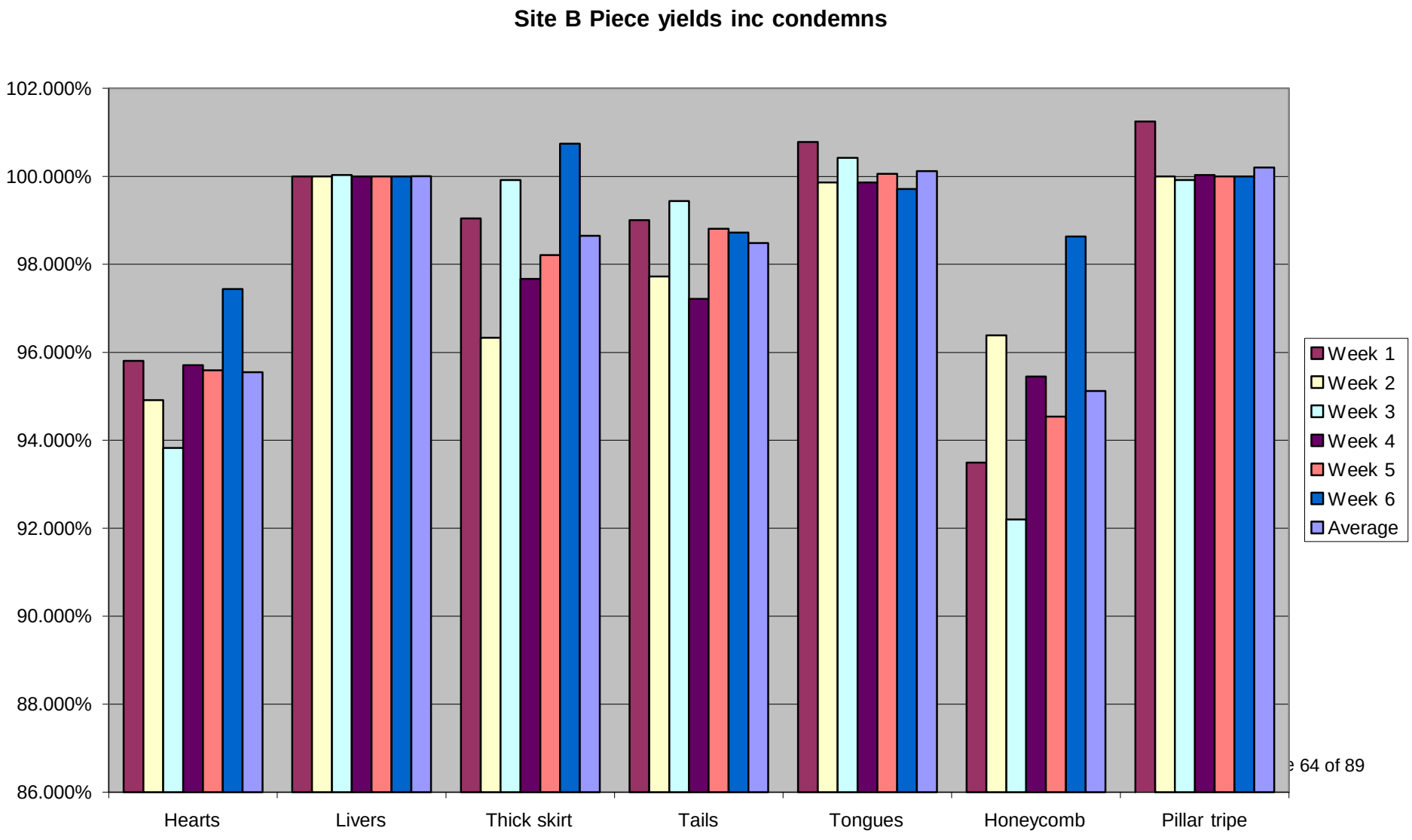


Graph 12. Site B - Beef offal yield as % of available pieces (Condemnations not included in calculations)



Graph 13. Site B - Beef offal yield as % of available pieces (Condemnations included in calculations)

Note: Liver yield (including condemns) always = 100% because, due to high condemned levels at this plant, condemnations are recorded as kill minus number packed.



Appendix I – Site D Sheep 6 Week Validation.

Table 20 – Site D - Sheep offal yields on HSCW basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by wgt	97%	91%	95%	95%	99%	96%	96%
% Lamb by wgt	3%	9%	5%	5%	1%	4%	4%
Average HSCW	22.18	18.86	22.40	22.43	23.34	23.52	22.12
Livers	3.781%	4.071%	3.538%	3.508%	3.572%	3.241%	3.618%
Kidneys	0.013%	0.011%	0.018%	0.011%	0.000%	0.000%	0.009%
Hearts	1.067%	1.177%	1.029%	1.015%	1.004%	0.978%	1.045%
Lamb Runners	3.914%	4.290%	3.967%	4.337%	4.654%	3.719%	4.147%
Sheep runners	3.140%	3.711%	3.102%	3.082%	2.979%	2.958%	3.162%
Total Runners	3.161%	3.762%	3.147%	3.147%	2.994%	2.988%	3.200%

Table 21 – Site D - Sheep offal yields on HSCW basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by wgt	3%	91%	95%	95%	99%	96%	80%
% Lamb by wgt	97%	9%	5%	5%	1%	4%	20%
Average HSCW	22.18	18.86	22.40	22.43	23.34	23.52	22.12
Livers	3.782%	4.073%	3.539%	3.509%	3.573%	3.242%	3.620%
Kidneys	0.014%	0.011%	0.018%	0.011%	0.000%	0.000%	0.009%
Hearts	1.067%	1.178%	1.029%	1.016%	1.004%	0.979%	1.045%
Lamb Runners	3.914%	4.290%	3.967%	4.337%	4.654%	3.719%	4.147%
Sheep runners	3.140%	3.711%	3.102%	3.082%	2.979%	2.958%	3.162%
Total Runners	3.161%	3.762%	3.147%	3.147%	2.994%	2.988%	3.200%

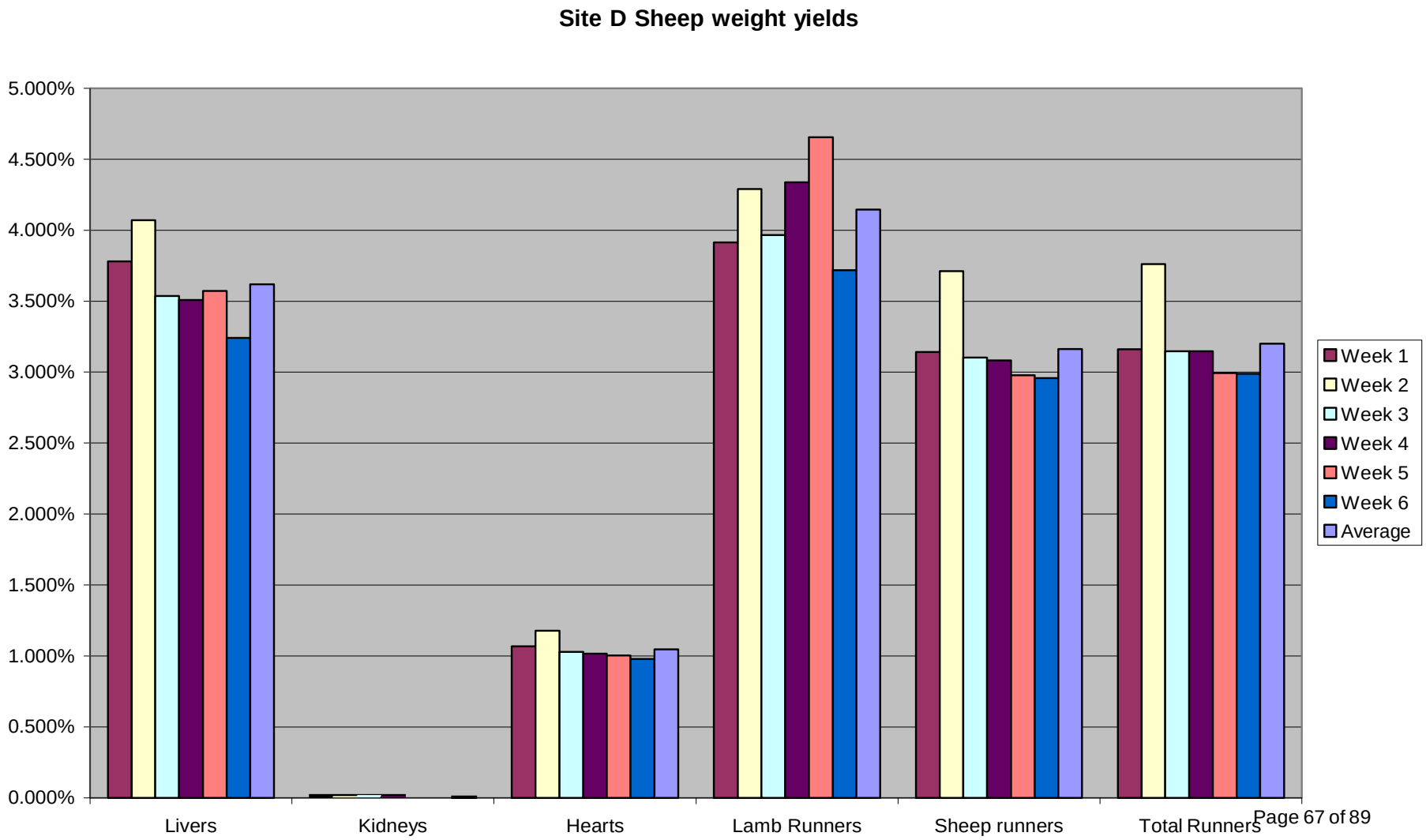
Table 22 – Site D - Sheep offal yields on piece basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by #	97%	92%	95%	94%	99%	96%	95%
% Lamb by #	3%	8%	5%	6%	1%	4%	5%
Average HSCW	22.18	18.86	22.40	22.43	23.34	23.52	22.12
Livers	101.790%	93.818%	95.014%	97.204%	92.777%	87.107%	94.618%
Kidneys	4.069%	3.562%	6.751%	3.797%	0.000%	0.000%	3.030%
Hearts	96.792%	90.202%	94.849%	95.394%	94.486%	96.659%	94.730%
Lamb Runners	5.508%	8.411%	9.366%	6.014%	1.409%	3.528%	5.706%
Sheep runners	86.400%	84.082%	80.997%	86.081%	90.456%	83.627%	85.274%
Total Runners	91.908%	92.493%	90.363%	92.096%	91.865%	87.155%	90.980%

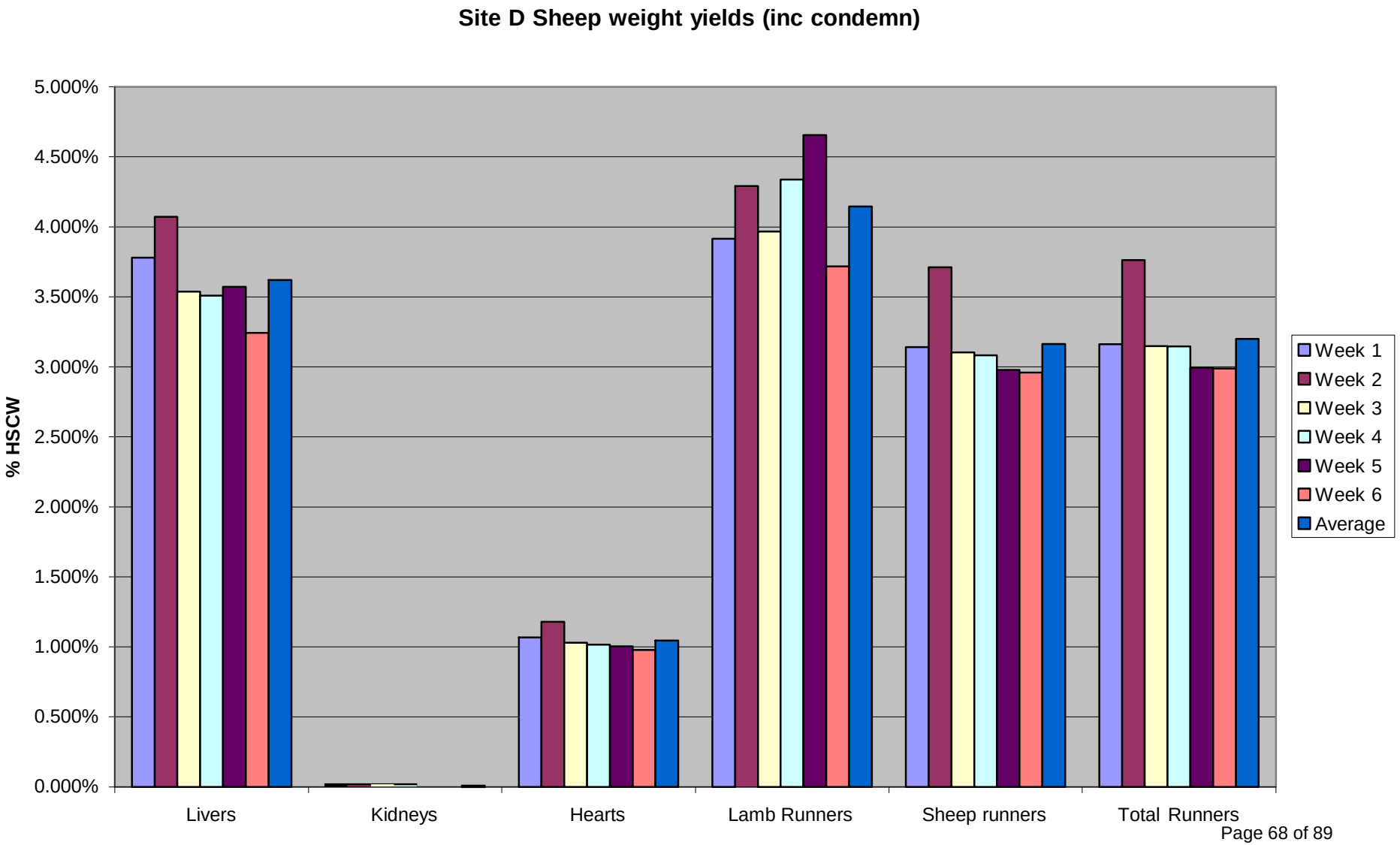
Table 23 – Site D - Sheep offal yields on piece basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by #	97%	92%	95%	94%	99%	96%	95%
% Lamb by #	3%	8%	5%	6%	1%	4%	5%
Average HSCW	22.18	18.86	22.40	22.43	23.34	23.52	22.12
Livers	101.834%	93.853%	95.057%	97.251%	92.822%	87.143%	94.660%
Kidneys	4.099%	3.562%	6.751%	3.797%	0.000%	0.000%	3.035%
Hearts	96.805%	90.246%	94.881%	95.433%	94.534%	96.707%	94.768%
Lamb Runners	5.508%	8.411%	9.366%	6.014%	1.409%	3.528%	5.706%
Sheep runners	86.400%	84.082%	80.997%	86.081%	90.456%	83.627%	85.274%
Total Runners	91.908%	92.493%	90.363%	92.096%	91.865%	87.155%	90.980%

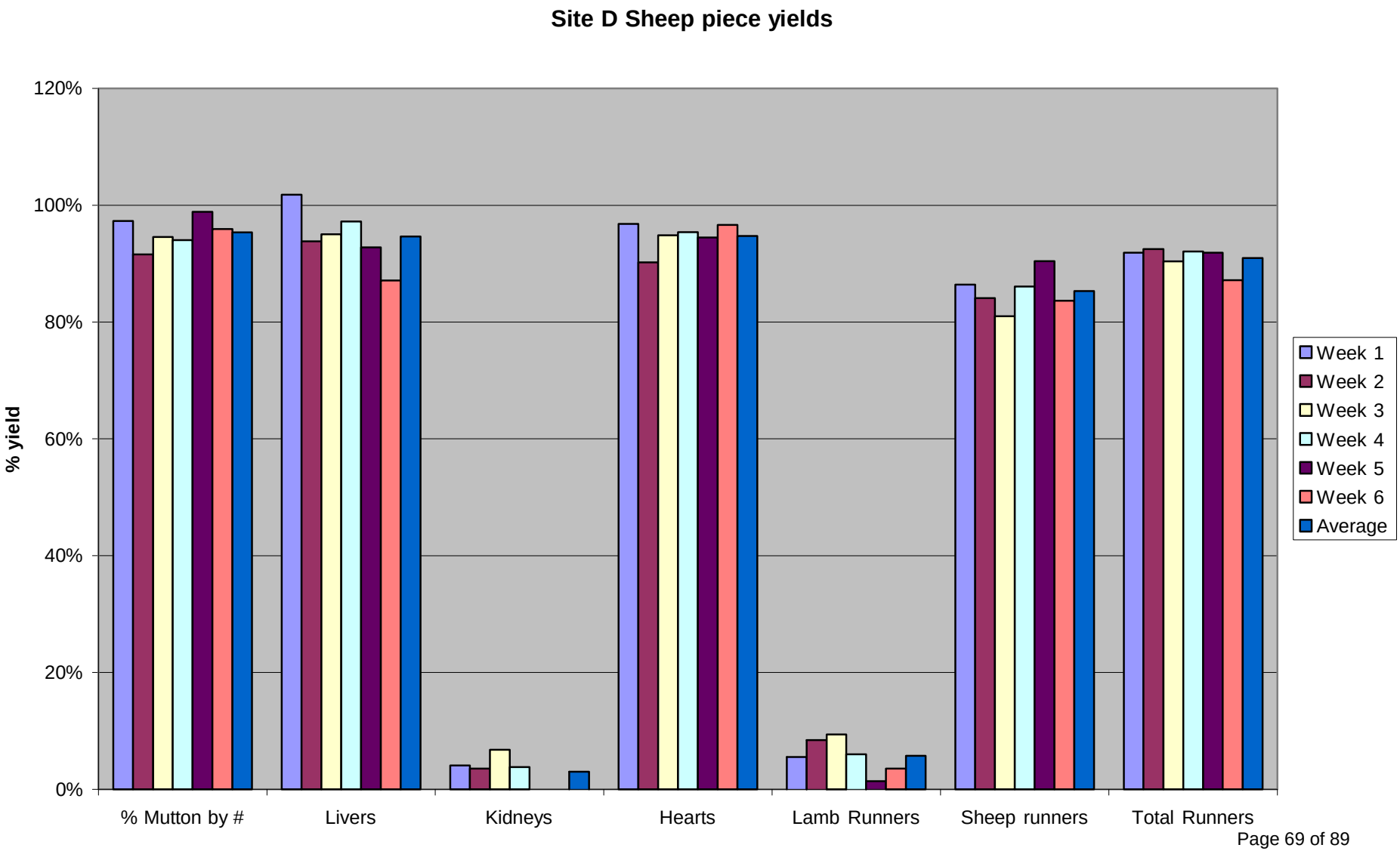
Graph 14. Site D - Sheep offal yield as % of HSCW (Condemnations not included in calculations)



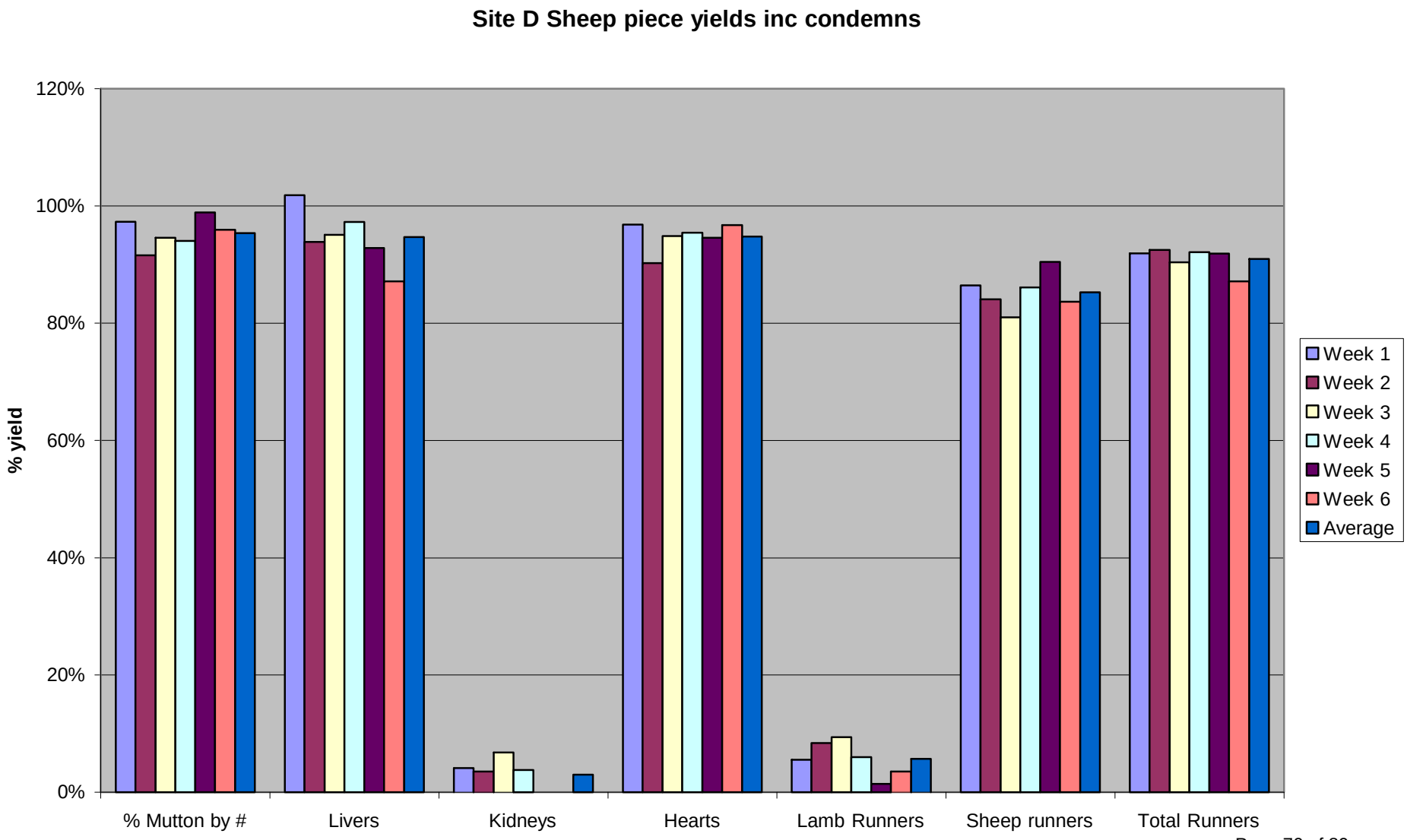
Graph 15. Site D - Sheep offal yield as % of HSCW (Condemnations included in calculations)



Graph 16. Site D - Sheep offal yield as % of available pieces (Condemnations not included in calculations)



Graph 17. Site D - Sheep offal yield as % of available pieces (Condemnations included in calculations)



Appendix J –Site A Beef 6 Week Validation.

Table 24 – Site A - Beef offal yields on HSCW basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by wgt	28%	28%	28%	26%	24%	36%	28%
% steers by wgt	58%	57%	63%	57%	76%	50%	60%
% grain fed by wgt	14%	14%	9%	17%	0%	14%	11%
Average HSCW	344.42	269.34	242.36	270.85	245.35	274.18	274.42
Cheek	0.231%	0.350%	0.358%	0.342%	0.239%	0.351%	0.312%
Headmeat	0.109%	0.146%	0.034%	0.031%	0.023%	0.037%	0.063%
Hearts	0.466%	0.681%	0.652%	0.572%	0.388%	0.599%	0.560%
Lips (Papillae)	0.217%	0.285%	0.258%	0.232%	0.158%	0.235%	0.231%
Livers	1.292%	2.209%	1.847%	1.718%	1.030%	1.699%	1.632%
Skirt membrane	0.044%	0.058%	0.047%	0.057%	0.035%	0.044%	0.048%
Thin skirt	0.263%	0.408%	0.344%	0.342%	0.212%	0.323%	0.315%
Thick skirt	0.208%	0.360%	0.260%	0.285%	0.173%	0.288%	0.262%
Tails	0.257%	0.397%	0.347%	0.345%	0.215%	0.324%	0.314%
Tendons	0.044%	0.071%	0.060%	0.048%	0.031%	0.041%	0.049%
TR Fillet	0.025%	0.046%	0.032%	0.034%	0.024%	0.035%	0.032%
Tongues	0.443%	0.592%	0.538%	0.541%	0.447%	0.531%	0.515%
Honeycomb	0.174%	0.267%	0.261%	0.213%	0.186%	0.231%	0.222%
Pillar tripe	0.112%	0.082%	0.136%	0.158%	0.124%	0.153%	0.128%
Tripe pieces	1.223%	1.825%	1.793%	1.512%	1.309%	1.646%	1.551%

Table 25 – Site A - Beef offal yields on HSCW basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by wgt	28%	28%	28%	26%	24%	36%	28%
% steers by wgt	58%	57%	63%	57%	76%	50%	60%
% grain fed by wgt	4906%	14%	2064%	4643%	0%	3966%	2599%
Average HSCW	344.42	269.34	242.36	270.85	245.35	274.18	274.42
Cheek	0.264%	0.429%	0.382%	0.361%	0.247%	0.365%	0.342%
Headmeat	0.117%	0.155%	0.046%	0.043%	0.041%	0.048%	0.075%
Hearts	0.526%	0.750%	0.689%	0.673%	0.571%	0.690%	0.650%
Lips (Papillae)	0.250%	0.364%	0.283%	0.252%	0.167%	0.248%	0.261%
Livers	1.594%	2.640%	2.281%	2.305%	1.855%	2.340%	2.169%
Skirt membrane	0.047%	0.062%	0.049%	0.062%	0.044%	0.048%	0.052%
Thin skirt	0.296%	0.446%	0.364%	0.403%	0.317%	0.373%	0.366%
Thick skirt	0.245%	0.397%	0.278%	0.340%	0.270%	0.334%	0.311%
Tails	0.321%	0.470%	0.410%	0.434%	0.377%	0.395%	0.401%
Tendons	0.051%	0.079%	0.075%	0.063%	0.058%	0.055%	0.064%
TR Fillet	0.026%	0.049%	0.035%	0.040%	0.035%	0.041%	0.038%
Tongues	0.462%	0.613%	0.559%	0.618%	0.574%	0.596%	0.570%
Honeycomb	0.207%	0.315%	0.277%	0.261%	0.270%	0.273%	0.267%
Pillar tripe	0.146%	0.134%	0.145%	0.188%	0.176%	0.179%	0.162%
Tripe pieces	1.397%	2.003%	1.870%	1.755%	1.736%	1.860%	1.770%

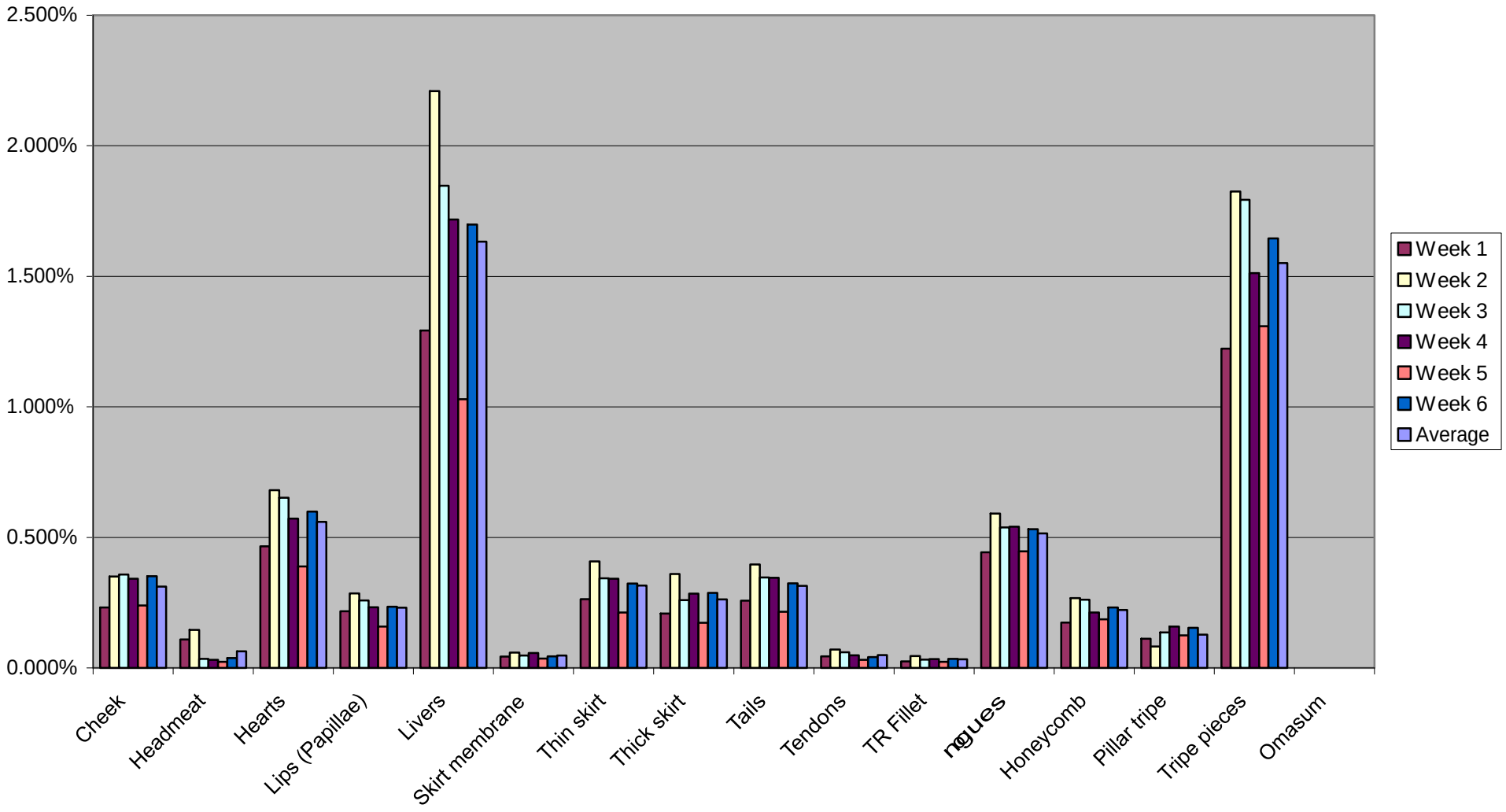
Table 26 – Site A - Beef offal yields on piece basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by #	40%	29%	25%	26%	21%	36%	29%
% steers by #	47%	57%	69%	61%	79%	53%	61%
% grain fed by #	13%	13%	5%	13%	0%	11%	9%
Average HSCW	344.42	269.34	242.36	270.85	245.35	274.18	274.42
Livers	77.656%	86.725%	78.947%	81.358%	45.239%	88.716%	76.440%
Thick skirt	88.565%	115.428%	80.123%	93.906%	49.411%	90.811%	86.374%
Tails	84.785%	86.776%	87.021%	87.837%	48.522%	82.053%	79.499%
Tongues	102.392%	94.823%	93.766%	108.871%	75.372%	103.170%	96.399%
Honeycomb	88.565%	86.725%	97.547%	91.746%	70.813%	102.311%	89.618%
Pillar tripe	69.665%	50.410%	71.589%	70.147%	61.812%	87.695%	68.553%

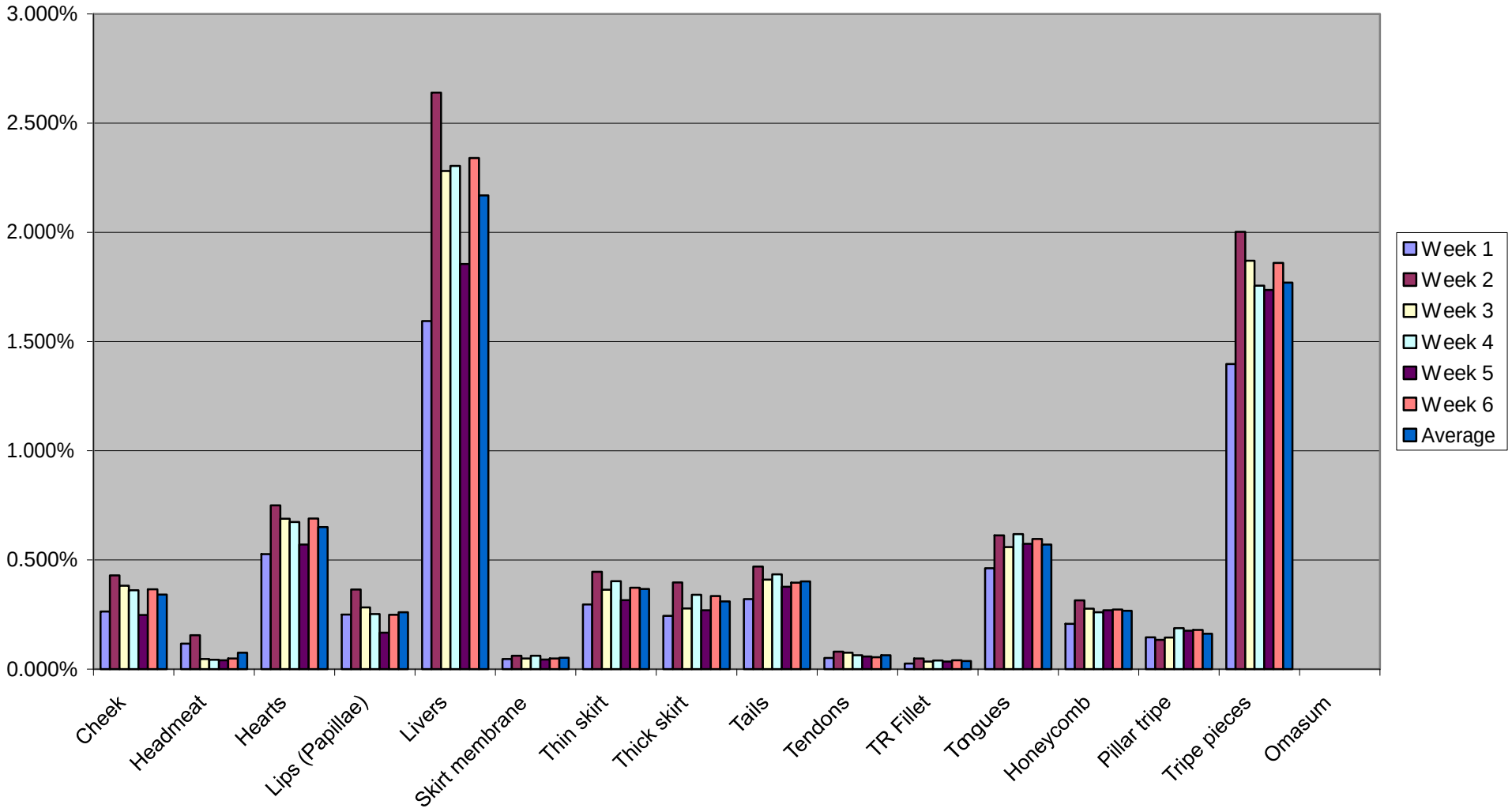
Table 27 – Site A - Beef offal yields on piece basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% cow/bull by #	40%	29%	25%	26%	21%	36%	29%
% steers by #	47%	57%	69%	61%	79%	53%	61%
% grain fed by #	13%	13%	5%	13%	0%	11%	9%
Average HSCW	344.42	269.34	242.36	270.85	245.35	274.18	274.42
Livers	95.263%	106.407%	96.781%	108.305%	79.583%	118.538%	100.813%
Thick skirt	103.397%	127.114%	85.437%	111.751%	77.844%	106.072%	101.936%
Tails	102.823%	103.229%	99.642%	107.740%	81.476%	98.227%	98.856%
Tongues	108.804%	100.513%	98.774%	129.802%	106.587%	121.064%	110.924%
Honeycomb	104.163%	104.152%	102.606%	109.540%	99.131%	118.162%	106.292%
Pillar tripe	95.789%	81.522%	76.648%	87.940%	90.129%	103.546%	89.263%

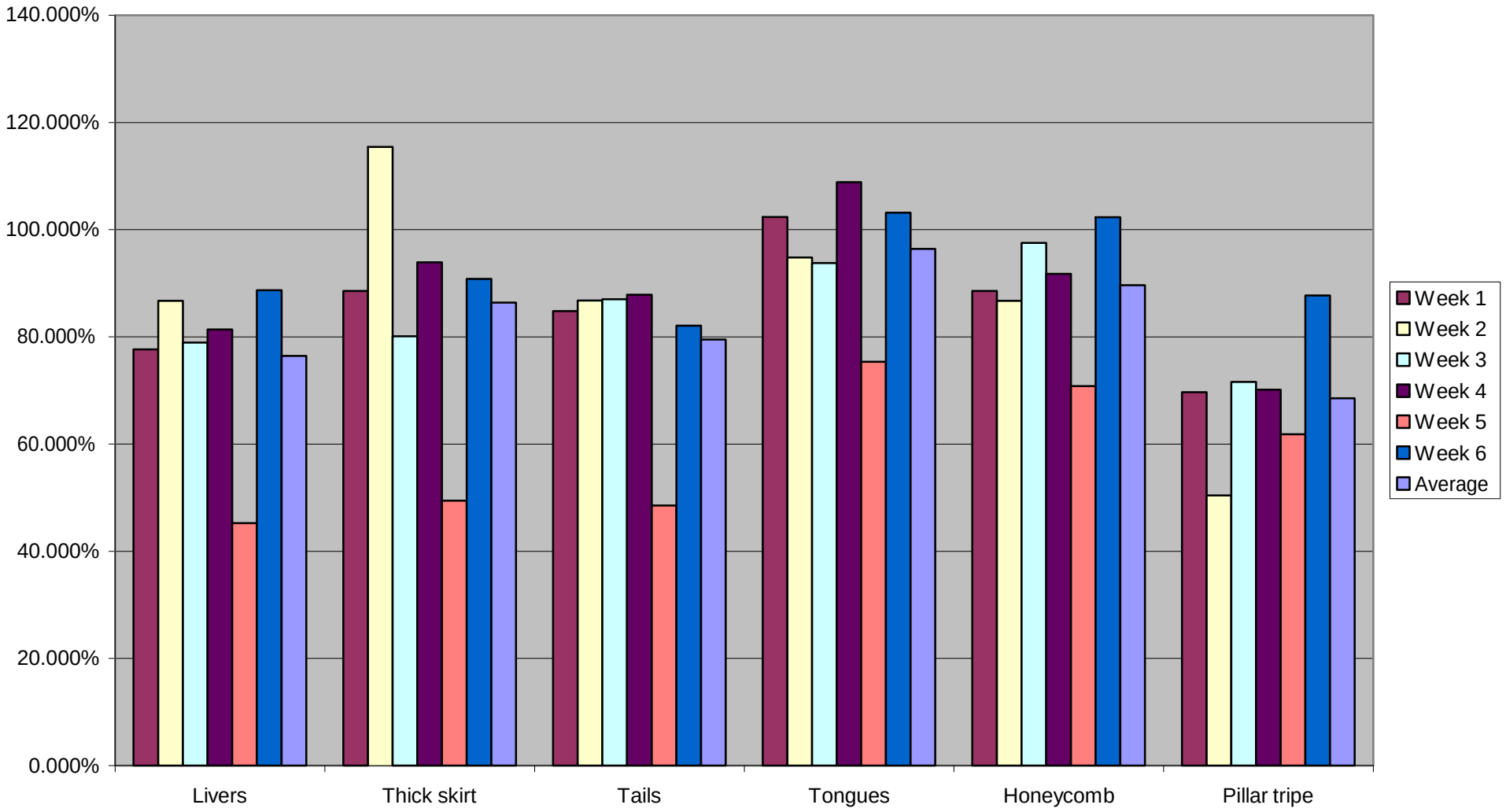
Graph 18. Site A - Beef offal yield as % of HSCW (Condemnations not included in calculations)



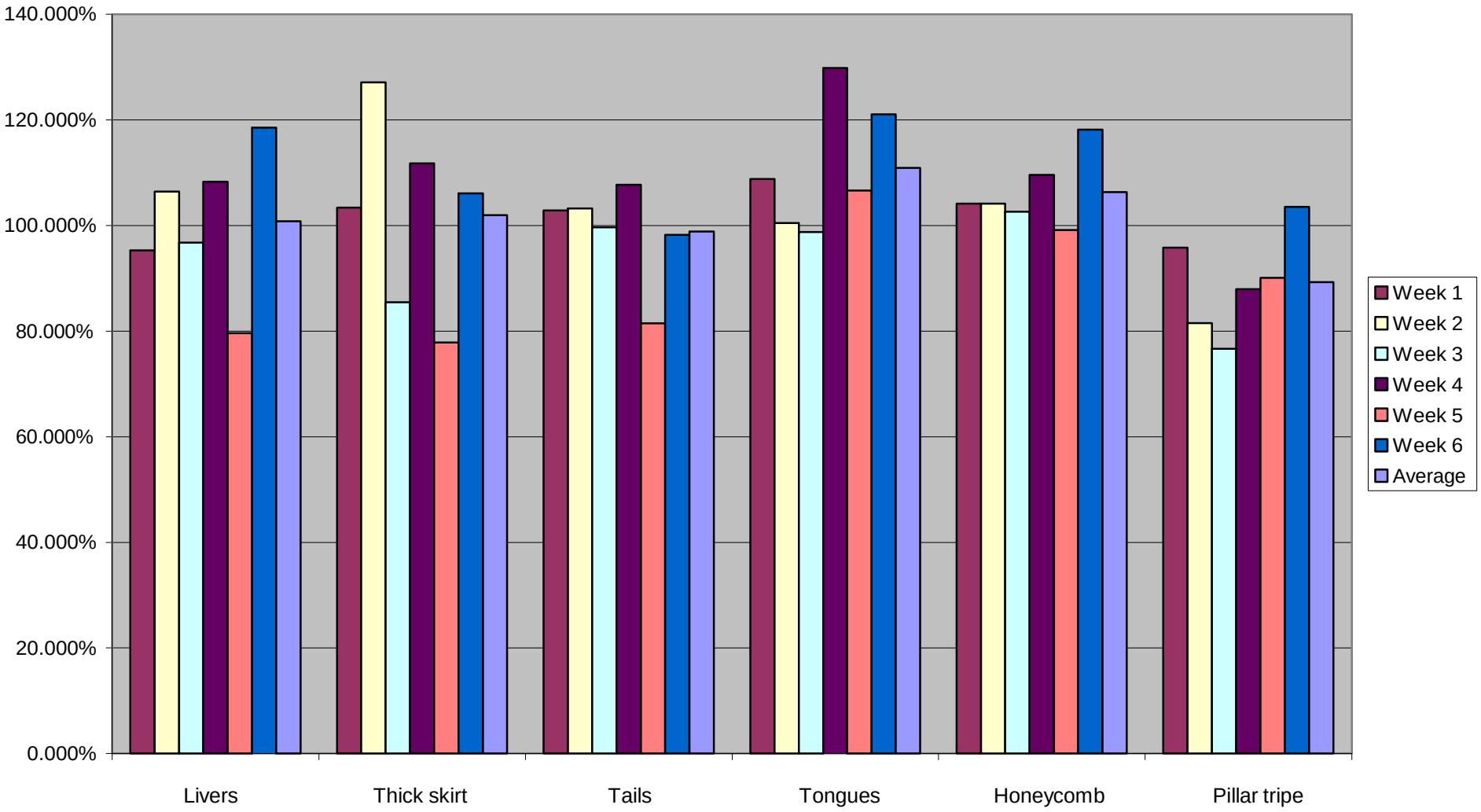
Graph 19. Site A - Beef offal yield as % of HSCW (Condemnations included in calculations)



Graph 20. Site A - Beef offal yield as % of available pieces (Condemnations not included in calculations)



Graph 21. Site A - Beef offal yield as % of available pieces (Condemnations included in calculations)



Appendix K –Site A Sheep 6 Week Validation.

Table 28 – Site A - Sheep offal yields on HSCW basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by wgt	44%	49%	42%	42%	43%	44%	44%
% Lamb by wgt	56%	51%	58%	58%	57%	56%	56%
Average HSCW	24.11	24.46	24.34	23.98	24.78	24.40	24.35
Livers	2.297%	2.418%	2.231%	1.675%	2.041%	2.146%	2.135%
Kidneys	0.284%	0.299%	0.285%	0.219%	0.300%	0.290%	0.279%
Hearts	0.716%	0.799%	0.287%	0.582%	0.675%	0.744%	0.634%
Lamb Runners			2.739%	2.809%	2.957%	2.821%	2.832%
Sheep runners			1.923%	2.174%	1.812%	2.075%	1.996%
Total Runners			2.237%	2.390%	2.323%	2.494%	2.361%

Table 29 – Site A - Sheep offal yields on HSCW basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by wgt	56%	49%	42%	42%	43%	44%	46%
% Lamb by wgt	44%	51%	58%	58%	57%	56%	54%
Average HSCW	24.11	24.46	24.34	23.98	24.78	24.40	24.35
Livers	2.595%	2.676%	2.550%	2.179%	2.390%	2.522%	2.485%
Kidneys	0.371%	0.300%	0.285%	0.219%	0.300%	0.290%	0.294%
Hearts	0.793%	0.874%	0.329%	0.698%	0.730%	0.857%	0.714%
Thin skirt	0.490%	0.493%	0.389%	0.311%	0.374%	0.415%	0.412%
Lamb Runners			2.745%	2.816%	2.964%	2.829%	2.839%
Sheep runners			1.979%	2.204%	1.851%	2.106%	2.035%
Total Runners			2.264%	2.406%	2.343%	2.512%	2.381%

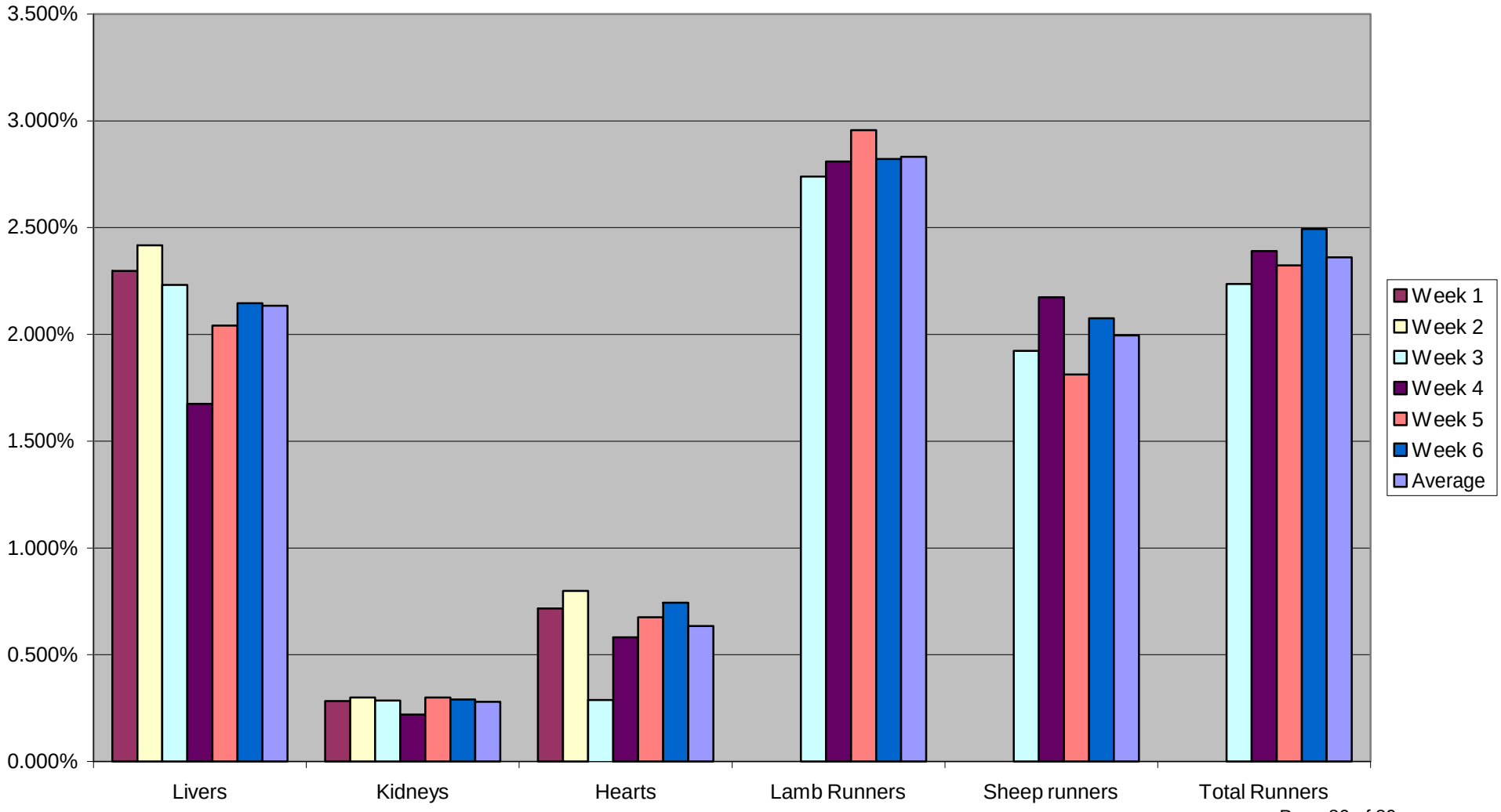
Table 30 – Site A - Sheep offal yields on piece basis (not including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by #	44%	42%	40%	40%	40%	42%	41%
% Lamb by #	56%	58%	60%	60%	60%	58%	59%
Average HSCW	24.11	24.46	24.34	23.98	24.78	24.40	24.35
Lamb Runners	89.885%	100.225%	98.428%	94.586%	96.930%	96.044%	96.016%
Sheep runners	68.294%	90.823%	83.092%	90.538%	80.256%	91.117%	84.020%
Total Runners	75.168%	96.240%	87.091%	87.718%	85.173%	93.961%	87.558%

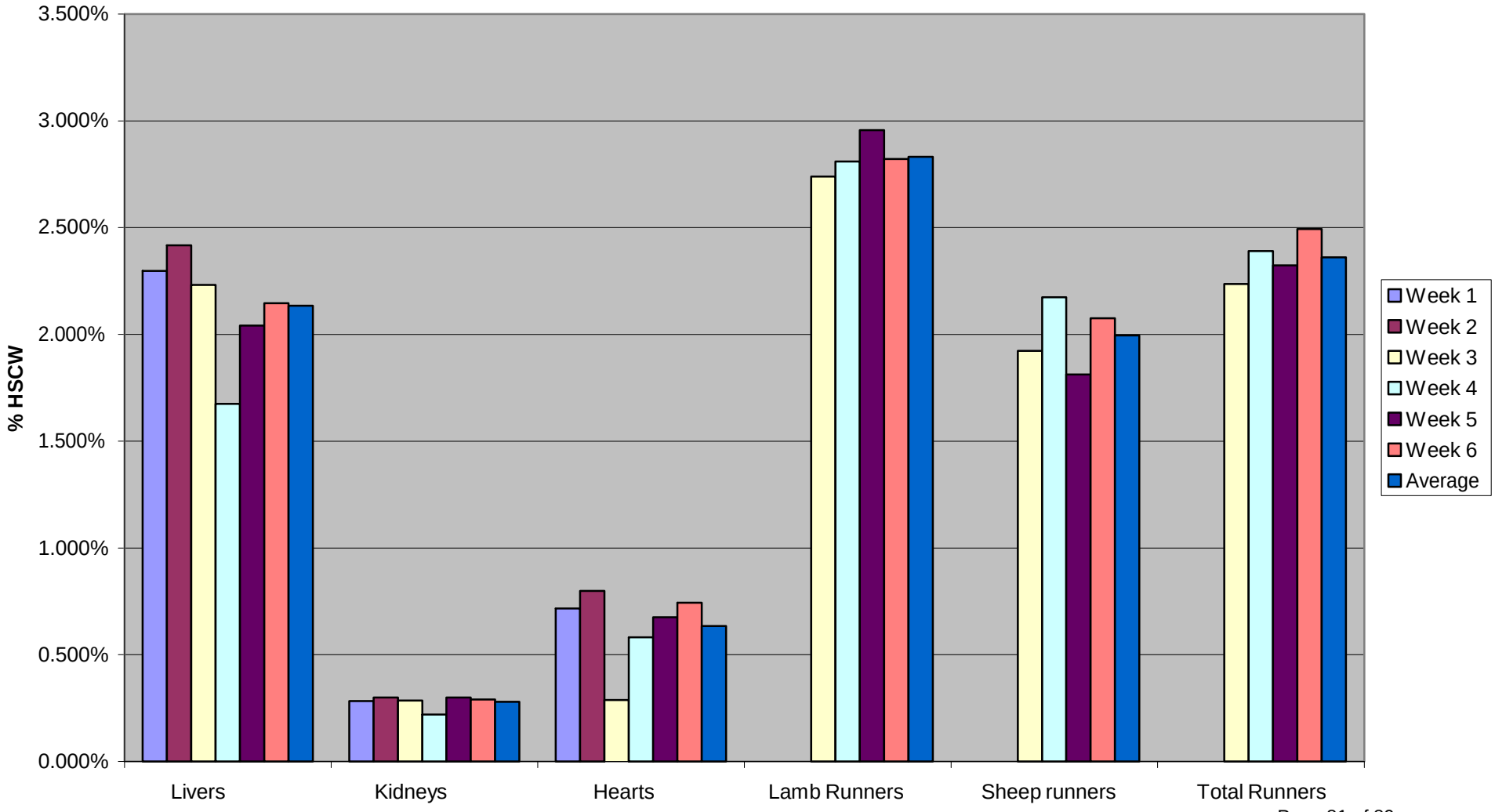
Table 31 – Site A - Sheep offal yields on piece basis (including condemns)

Offal	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Average
% Mutton by #	44%	42%	40%	40%	40%	42%	41%
% Lamb by #	56%	58%	60%	60%	60%	58%	59%
Average HSCW	24.11	24.46	24.34	23.98	24.78	24.40	24.35
Lamb Runners	91.481%	101.081%	99.138%	95.307%	97.792%	96.990%	96.965%
Sheep runners	70.850%	93.100%	88.278%	93.255%	83.891%	93.910%	87.214%
Total Runners	82.305%	97.699%	94.782%	94.490%	92.259%	95.688%	92.870%

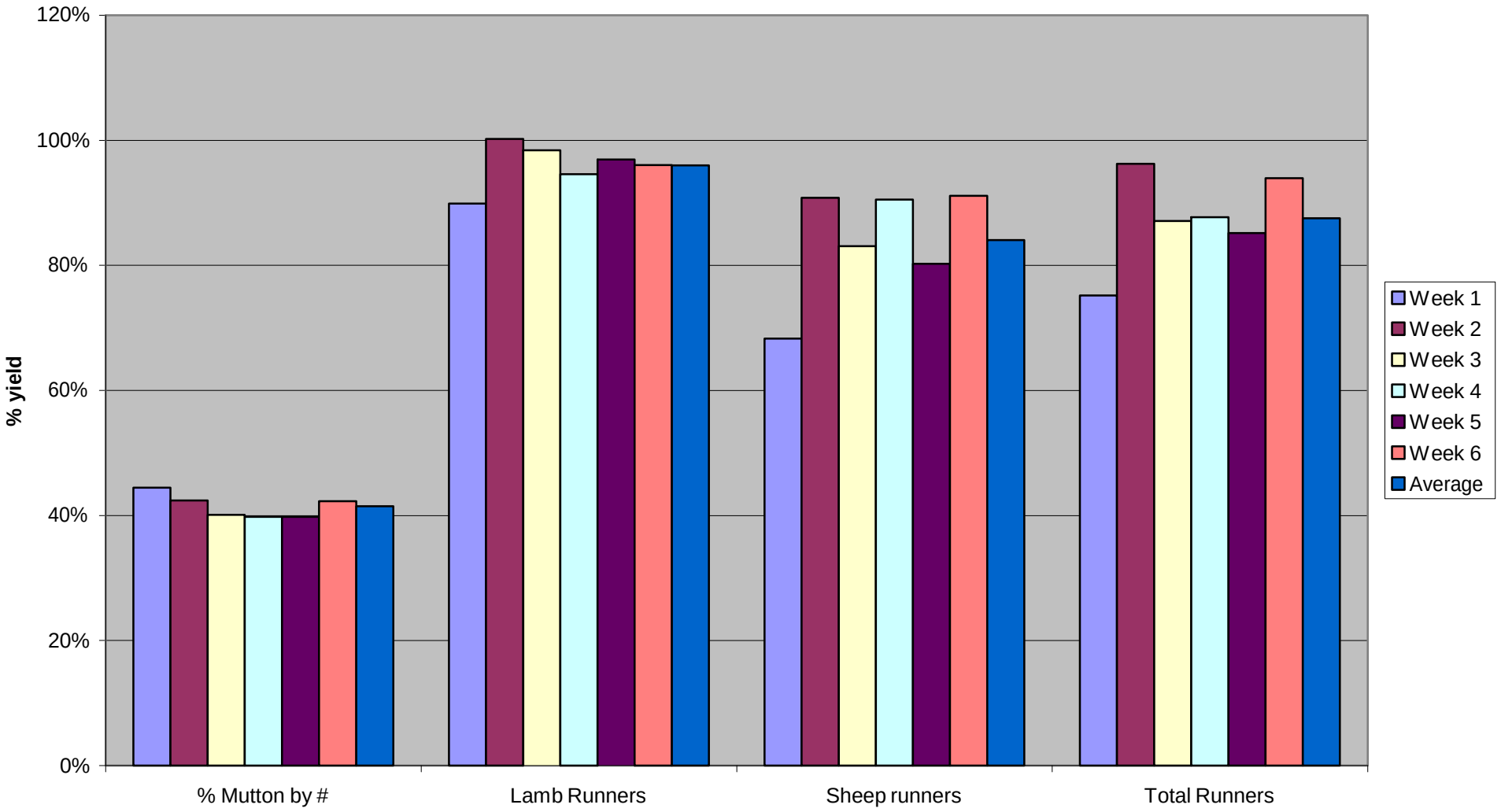
Graph 22. Site A - Sheep offal yield as % of HSCW (Condemnations not included in calculations)



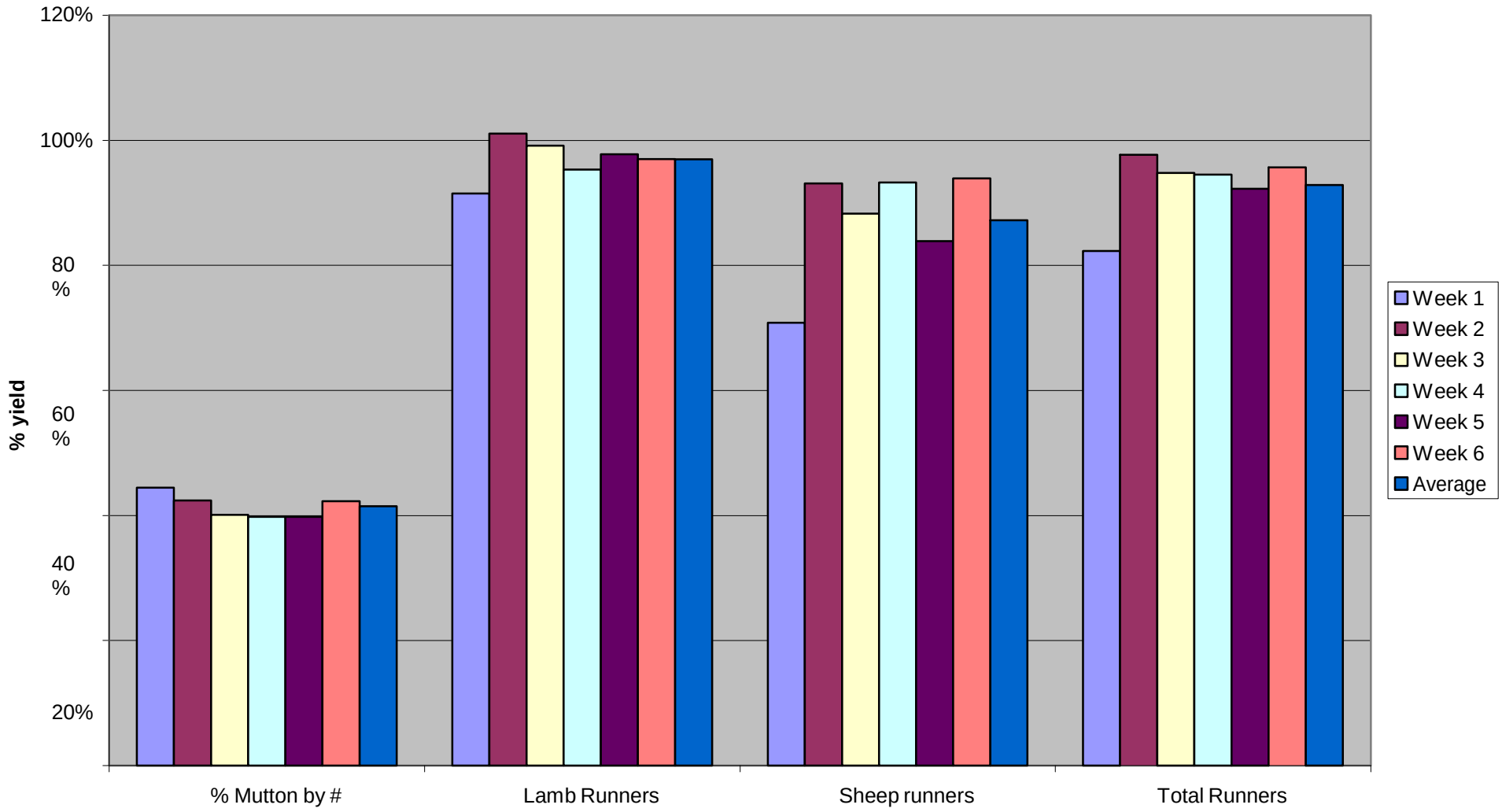
Graph 23. Site A - Sheep offal yield as % of HSCW (Condemnations included in calculations)



Graph 24. Site A - Sheep offal yield as % of available pieces (Condemnations not included in calculations)



Graph 25. Site A - Sheep offal yield as % of available pieces (Condemnations included in calculations)



0%

% Mutton by #	Lamb Runners	Sheep runners	Total Runners

Appendix L - Offal Weight Survey

Date of survey: 22nd August 2007

Note: Some offals especially those that are a result of trimming of other offals were not assessed as they exhibited extreme variation in size and weight

Note: Offals were collected during six periods of the working day

Period	**1**		**2**		**3**		**4**		**5**		**6**		**Totals**		
Sheep offal Ham no	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**Av No**	**Tot No cc**	**Tot wt per cc**	**Av wt/cc**
Hearts 7050	2.735	10	2.055	10	2.430	10	2.800	10	2.760	10	3.555	15	65	16.335	0.251
Livers 7030	3.295	5	2.670	5	3.525	5	3.425	5	3.840	5	4.465	5	30	21.220	0.707
Kidneys (2) 7040	0.910	12	0.835	12	0.900	12	0.840	12	0.825	12	1.040	12	36	5.35	0.149
Thick skirt 5110	1.510	10	1.090	10	1.545	10	1.700	10	1.525	10	2.060	20	70	9.43	0.135
Spleens	1.295	10	0.850	10	0.970	10	1.725	12	2.070	16	1.855	20	78	8.765	0.112
Tripe	4.445	10	2.00	5	2.125	5	4.00	10	7.080	10	11.725	20	55	31.375	0.570

Period			1		2		3		4		5		6	Totals	
Beef Offal Ham no	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**No wt**	**Tot wt**	**No**	**Tot wt**	**No**	**Tot wt**	**No**	**Tot No cc**	**Tot wt per cc**	**Av wt/cc**
Aorta 6499	1.610	10	1.405	10	1.235	10	1.490	10	1.245	10	2.380	20	70	9.365	0.134
Cheeks pap off (2) 6060	5.375	10	4.080	10	4.360	10	4.595	10	5.580	10	8.535	20	40	32.525	0.813
Hearts 6100	10.210	5	8.535	5	9.560	5	11.680	5	11.610	7	12.615	8	35	64.210	1.835
Kidneys (2) 6090	5.395	10	4.50	10	5.465	10	6.310	10	8.270	16	9.075	20	38	39.015	1.027
Lips (2) 6260	4.475	10	3.250	10	4.280	10	4.670	12	4.325	10	7.315	20	36	28.315	0.786
Livers 6080	20.745	3	11.540	2	19.055	3	18.240	2	10.410	2	16.735	3	15	96.725	6.448
Lungs (2) 6210	10.235	8	7.400	6	12.705	10	10.715	8	9.350	8	11.195	12	26	61.600	2.370
Thin skirt 2190	6.645	10	6.885	10	7.985	10	7.045	8	4.650	10	4.650	10	58	37.860	0.653
Thick skirt 2180	4.975	5	4.910	5	9.960	10	4.670	5	7.365	10	7.140	10	45	39.020	0.867
Tails 6070	5.815	5	4.830	5	5.230	5	7.850	5	5.620	5	5.720	5	30	35.065	1.169
Tendons (2) 6200	0.860	10	0.755	10	1.150	10	2.525	20	1.645	20	2.400	26	48	9.335	0.195
Tongue roots 6040	11.585	5	11.660	5	13.630	5	14.860	5	13.015	6	20.040	10	36	84.79	2.355
Tongue root fillets (2) 6045	0.620	10	0.815	10	1.820	20	1.220	15	1.215	15	1.785	20	45	7.475	0.166
Tongues SC 6025	5.860	5	5.870	5	5.985	5	8.770	5	11.635	8	14.215	11	39	52.355	1.342
Weasand meat 6280	1.220	10	1.145	10	1.240	10	1.495	10	1.770	14	2.020	16	70	8.890	0.127

Summary Data Offal - Average Weight Per Carcase

Sheep offal Ham no	Av wt/cc Kg	Sheep offal Ham no	Av wt/cc Kg	Sheep offal Ham no	Av wt/cc Kg
Hearts 7050	0.251	Livers 7030	0.707	Kidneys (2) 7040	0.149
Thick skirt 5110	0.135	Spleens	0.112	Tripe	0.570

Beef Offal Ham no	Av wt/cc Kg	Beef Offal Ham no	Av wt/cc Kg	Beef Offal Ham no	Av wt/cc Kg
Aorta 6499	0.134	Lungs (2) 6210	2.370	Tongue root fillets (2) 6045	0.166
Cheeks pap off (2) 6060	0.813	Thin skirt 2190	0.653	Tongues SC 6025	1.342
Hearts 6100	1.835	Thick skirt 2180	0.867	Weasand meat 6280	0.127
Kidneys (2) 6090	1.027	Tails 6070	1.169	Livers 6080	6.448
Lips (2) 6260	0.786	Tendons (2) 6200	0.195	Tongue roots 6040	2.355

Appendix M – Instructions for Excel Based Yield Tools

Tool 1 – Data Analysis Tool

Welcome to the Beef Offal Yield Benchmarking Tool

This tool is to allow processors to determine the weight yields of beef offal based on % HSCW and the recovery rates based on % of kill
This tool links automatically with the Beef Offal 6 Week Validation Tool - see this tool for instruction

To use this tool you will need to provide:

1. Your expected piece weights for the individual items of offal in the blue cells below.
2. Your daily production data in the yellow cells on the Data Input worksheet.

Yields are available on the basis of:

A. weight (% of HSCW) and pieces (% of kill)

B. Excluding and including an allowance for condemnations

In the Beef Offal 6 Week Validation Tool yields are presented in numerical tables and in graphical representation

All other spreadsheets (including hidden sheet) are protected so that they can not be accidentally modified. If the protection password is required please contact Chris Sentance at Food Safety Services (SA) Pty Ltd, phone 08 8370 7466 or email chrisfss@ozemail.com.au

Beef Offal	Estimated weight per item
Aorta	
Cheek	
Headmeat	
Hearts	
Kidneys	
Lips (Papillae)	
Livers	
Lungs	
Skirt membrane	
Skirt pieces	
Thin skirt	
Thick skirt	

Veal Offal	Estimated weight per item
Cheek	
Hearts	
Kidneys	
Lips (Papillae)	
Livers	
Lungs	
Thick skirt	
Tongues	
Tails	
Tripe Pieces	
Rectum	
Sweetbreads	

Sheep Offal	Estimated weight per item
Livers	
Kidneys	
Hearts	
Honeycomb	
Thin Skirt	
Lamb Runners	
Sheep runners	

Tails	
Tendons	
Tongue Roots	
TR Fillet	
Tongues	
Weasand meat	
Feet	
Reeds	
Rennets	
Honeycomb	
Pillar tripe	
Tripe pieces	
Small intestine	
Omasum	

L

Tool 2 – Beef & Sheep 6 week Validation Tool

Welcome to the Beef Offal 6 Week Yield Validation Tool

This tool works with the Offal Yield Analysis Tool to provide a 6 week analysis of offal yields in both numerical table form and graphical form

Please note. When this file is opened it will give the option for links to other workbooks. Please select UPDATE LINKS. If you have already opened the book please close and reopen selecting the UPDATE LINKS option.

To use this tool establish the following folder and file structure:

1. Create a master folder for your analysis. Use any name you wish.
2. Create sub-folders named "week x" (where x = 1 - 6 respectively).
3. Copy the file "Data analysis protected" into each sub-folder
4. Rename these files "Data analysis week x protected" (where x = 1-6 respectively)
5. Copy this file "Beef Offal 6 Week Validation Tool" into the master folder.
6. Supply data to the weekly "Data analysis week x protected" files.
7. Open this file "Beef Offal 6 Week Validation Tool". Ensure to use the UPDATE LINKS option when opening.
8. Performance is automatically transferred to this tool where it can be seen in tabular or graphical form in the following worksheets.

All spreadsheets in this workbook are protected so that they can not be accidentally modified.
If the protection password is required please contact Chris Sentance at Food Safety Services (SA) Pty Ltd, phone 08 8370 7466 or email chrisfss@ozemail.com.au